CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9810270145 DOC.DATE: 98/10/21 NOTARIZED: YES DOCKET #
FACIL:50-275 Diablo Canyon Nuclear Power Plant, Unit 1, Pacific Ga 05000275
50-323 Diablo Canyon Nuclear Power Plant, Unit 2, Pacific Ga 05000323

AUTH.NAME AUTHOR AFFILIATION
WOMACK,L.F. Pacific Gas & Electric Co.
RECIP.NAME RECIPIENT AFFILIATION
Records Management Branch (Document Control Desk)

See Proposed Change To Tech Specs

SUBJECT: LAR 98-08 for licenses DPR-80 & DPR-82,revising TS 3/4.3.2 by revising voltage & time delay setpoints for first level undervoltage relays (FLUR) & second level under voltage relays (SLUR).

DISTRIBUTION CODE: A001D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 34 + 22
TITLE: OR Submittal: General Distribution

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD4-2 LA	1	1	PD4-2 PD	1	1
	BLOOM,S	1	1			
INTERNAL:	ACRS	1	1	~~FILE CENTER 01~~	1	1
	NRR/DE/ECGB/A	1	1	NRR/DE/EMCB	1	1
	NRR/DRCH/HICB	1	1	NRR/DSSA/SPLB	1	1
	NRR/DSSA/SRXB	1	1	NUDOCS-ABSTRACT	1	1
	OGC/HDS3	1	0			
EXTERNAL:	NOAC	1	1	NRC PDR	1	1

C A T E G O R Y 1 D O C U M E N T

NOTE TO ALL "RIDS" RECIPIENTS:
PLEASE HELP US TO REDUCE WASTE. TO HAVE YOUR NAME OR ORGANIZATION REMOVED FROM DISTRIBUTION LISTS OR REDUCE THE NUMBER OF COPIES RECEIVED BY YOU OR YOUR ORGANIZATION, CONTACT THE DOCUMENT CONTROL DESK (DCD) ON EXTENSION 415-2083

TOTAL NUMBER OF COPIES REQUIRED: LTTR 14 ENCL 13

Pacific Gas and Electric Company

Lawrence F. Womack
Vice President
Nuclear Technical Services

Diablo Canyon Power Plant
P.O. Box 56
Avila Beach, CA 93424

805.545.6000

October 21, 1998

PG&E Letter DCL-98-153

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

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
License Amendment Request 98-08
Revision of Technical Specification 3/4.3.2 to Change First and Second Level Undervoltage Relay Setpoints and Surveillance Frequencies

References:

1. PG&E License Amendment Request 97-09, DCL-97-106, dated June 2, 1997, "Technical Specification Conversion License Amendment Request"

2. PG&E License Amendment Request 97-10, DCL-97-135, dated July 30, 1997, "Engineered Safety Features Actuation System Instrumentation," to Add Refueling Water Storage Tank Level Instrumentation

Dear Commissioners and Staff:

Enclosed is an application for amendment to Facility Operating License Nos. DPR-80 and DPR-82. In this license amendment request (LAR), PG&E proposes to revise current Technical Specification (TS) 3/4.3.2, "Engineered Safety Features Actuation System Instrumentation," and Improved TS (ITS) 3.3.5, "Loss of Power Diesel Generator Start Instrumentation." PG&E proposes to revise the voltage and time delay setpoints for the first level undervoltage relays (FLUR) and the second level undervoltage relays (SLUR). These changes are associated with several modifications to improve offsite power service including the installation of new automatic load tap changing startup transformers and retapping of the 4 kV to 480 volt Class 1E load center transformers. PG&E also proposes to change the 18-month surveillance requirement test frequencies for the FLURs and SLURs to 24 months to support the conversion of Diablo Canyon Power Plant, Units 1 and 2, from 18-month to 24-month operating cycles.

A001

In this LAR, PG&E also revises ITS pages submitted in Reference 1, and TS pages submitted in Reference 2 as follows:

TS Pages	TS or ITS	Submitted by Reference:
3.3-49, 3.3-50, B 3.3-123, B 3.3-124, and B 3.3-125	ITS	1
3/4 3-20, 3/4 3-27, and 3/4 3-35	TS	2

A description of the proposed TS changes, and the bases for them, are provided in Attachment A. Changes to the TS and associated Bases are noted in the marked up copies of the current TS pages and proposed ITS pages provided in Attachments B and D. Proposed current TS pages are provided in Attachment C. The changes do not involve a significant hazards consideration, as defined in 10 CFR 50.92, or an unreviewed environmental question. Further, there is reasonable assurance that the proposed changes will not adversely affect the health and safety of the public.

Although the changes proposed in this LAR are not required to address an immediate safety concern, PG&E requests that the NRC review this LAR on a medium priority basis. PG&E requests that the TS changes become effective immediately upon issuance of the license amendment, to be implemented during the next available refueling outage for each Unit.

Sincerely,

Lawrence F. Womack

cc: Edgar Bailey, DHS
Steven D. Bloom
Ellis W. Merschoff
Gregory A. Pick
David L. Proulx
Diablo Distribution

Enclosures

JER/2057

Enclosure
PG&E Letter DCL-98-153

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of PACIFIC GAS AND ELECTRIC COMPANY	)	Docket No. 50-275 Facility Operating License No. DPR-80
Diablo Canyon Power Plant Units 1 and 2	)	Docket No. 50-323 Facility Operating License No. DPR-82

AFFIDAVIT

Lawrence F. Womack, of lawful age, first being duly sworn upon oath says that he is Vice President - Nuclear Technical Services of Pacific Gas and Electric Company; that he is familiar with the content thereof; that he has executed LAR 98-08, dated October 21, 1998, on behalf of said company with full power and authority to do so; and that the facts stated therein are true and correct to the best of his knowledge, information, and belief.

Lawrence F. Womack
Vice President
Nuclear Technical Services

Subscribed and sworn to before me this 19th day of Oct, 1998.
County of San Luis Obispo
State of California

Amy J. Calloway
Notary Public

AMY J. CALLOWAY
COMM. #1096602
NOTARY PUBLIC CALIFORNIA
SAN LUIS OBISPO COUNTY
My Comm. Expires April 28, 2000

REVISION OF TECHNICAL SPECIFICATION 3/4.3.2 TO CHANGE FIRST AND SECOND LEVEL UNDERVOLTAGE RELAY SETPOINTS AND SURVEILLANCE FREQUENCY

A. DESCRIPTION OF AMENDMENT REQUEST

This license amendment request (LAR) proposes to change Technical Specification (TS) 3/4.3.2, "Engineered Safety Features Actuation System Instrumentation," as follows:

1. TS 3.3.2, Table 3.3-3, "Engineered Safety Features Actuation System Instrumentation," Functional Unit 7.a.1), will be revised to incorporate a redesign of the first level undervoltage relays (FLURs) that replaces the single emergency diesel generator (EDG) start channel with two channels for loss of voltage protection and two channels for low voltage protection. Functional Units 7.a.3) and 7.a.4) will be added for timers to start the diesel (one for loss of voltage and one for low voltage per bus) and timers to shed load (one per bus). New Action Statement 36 for Functional Unit 7.a.1 will require an EDG to be declared inoperable if less than the total number of channels are operable. Existing Action Statement 16 will be applied to Functional Units 7.a.3) and 7.a.4).

2. TS 3.3.2, Table 3.3-4, "Engineered Safety Features Actuation System Instrumentation Trip Setpoints," Functional Unit 7, will be revised to reflect the redesign of the FLURs and new second level undervoltage relay (SLUR) voltage and time delay trip setpoints and allowable values. These are shown in the tables below.

3. TS 3.3.2, Table 4.3-2, "Engineered Safety Features Actuation System Instrumentation Surveillance Requirements," Functional Unit 7.a and 7.b, channel calibration and trip actuating device operational test surveillance frequencies will be revised from "R" (18 months) to "R24" (24 months).

   The current and proposed FLUR and SLUR setpoint and allowable values for TS 3.3.2, Table 3.3-4, are as follows:

Setpoint Changes

Functional Unit	Current Trip Setpoints	Revised Trip Setpoints
7.a.1) First Level Diesel Start	≥ 0 volts with a ≤ 0.8 second time delay and ≥ 2583 volts with a ≤ 10 second time delay	Loss of Voltage: 1040 volts with a 0.69 second time delay Low Voltage: 3172 volts with a 1.89 second time delay
7.a.2) First Level Initiation of Load Shed	One relay ≥ 0 volts with a ≤ 4 second time delay and ≥ 2583 volts with a ≤ 25 second time delay with one relay ≥ 2870 volts, instantaneous	3172 volts with a 3.89 second time delay
7.b.1) Second Level Diesel Start	≥ 3785 volts with a ≤ 10 second time delay	3790 volts with a 9.89 second time delay
7.b.2) Second Level Initiation of Load Shed	≥ 3785 volts with a ≤ 20 second time delay	3790 volts with a 19.89 second time delay

Allowable Value Changes

Functional Unit	Current Allowable Values	Revised Allowable Values
7.a.1) First Level Diesel Start	≥ 0 volts with a ≤ 0.8 second time delay and >2583 volts with a < 10 second time delay	Loss of Voltage: ≥ 993 volts with ≤ 0.75 second time delay Low Voltage: ≥ 3126 volts with ≤ 1.95 second time delay

Functional Unit	Current Allowable Values	Revised Allowable Values
7.a.2) First Level Initiation of Load Shed	One relay ≥ 0 volts with a ≤ 4 second time delay and > 2583 volts with a ≤ 25 second time delay with one relay ≥ 2870 volts, instantaneous	3126 to 3218 volts with a 3.83 to 3.95 second time delay
7.b.1) Second Level Diesel Start	≥ 3785 volts with a ≤ 10 second time delay	≥ 3753 volts with ≤ 9.95 second time delay
7.b.2) Second Level Initiation of Load Shed	≥ 3785 volts with a ≤ 20 second time delay	3753 to 3815 volts with a 19.83 to 19.95 second time delay

The associated TS Bases will be appropriately revised.

The proposed changes are provided in the marked up copies of the TS pages in Attachment B (current TS) and Attachment D (improved TS). The proposed new TS pages are provided in Attachment C (current TS).

B. BACKGROUND

Electric Power Systems

General Design Criterion (GDC)-17, "Electric Power Systems," states that the onsite electric power supplies shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure. Electric power from the transmission network to the onsite electric distribution system shall be supplied by two physically independent circuits designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. At Diablo Canyon Power Plant (DCPP), the two sources of offsite power are the 500 kV system and the 230 kV system, with the 230 kV system being immediately available after an accident. The 230 kV system is supplied by two incoming

transmission lines, one from Morro Bay Substation, and the other from Mesa Substation.

DCPP TS 3.8.1.1a. requires two independent power supplies (one with delayed access - 500 kV) between the offsite transmission network and the onsite Class 1E distribution system.

Branch Technical Position Power Systems Branch-1 (BTP PSB-1), "Adequacy of Station Electric Distribution System Voltages," specifies requirements for a second level of undervoltage protection to protect Class 1E loads from sustained degraded voltage conditions that would not be detected by first level undervoltage protection relays. BTP PSB-1 was issued in July 1981 and postdates the original SLUR and FLUR designs which were completed and accepted in DCPP Safety Evaluation Report Supplement No. 9, dated June 1980. PG&E is not committed to BTP PSB-1, but has used it for guidance in developing this LAR.

BTP PSB-1 primarily provides guidance for design of the SLUR which is not being changed by this LAR. This LAR recommends only setpoint changes for the SLUR, and proposes both design changes and setpoint changes for the FLURs. There is no comparable BTP for the FLURs.

BTP PSB-1 is written for a plant which has Class 1E loads connected to the offsite power source at all times. This is different than the DCPP electrical distribution design, and as a result, some parts of BTP PSB-1 do not apply to the DCPP electrical distribution design. Otherwise, the TS changes proposed by this LAR meet the intent of BTP PSB-1.

The FLUR and SLUR setpoints and allowable values are proposed to be changed based on a redesigned 4.16 kV (4 kV) electrical distribution system and its associated protective relaying. The redesign of the 4 kV protective relaying scheme includes a new FLUR logic and the replacement of the current FLUR General Electric "inverse-time" undervoltage relays with ABB/Westinghouse Solid State undervoltage relays. There are two types of solid state relays used in the new FLUR scheme; one is the same as the existing SLURs and the other is the same as the existing residual undervoltage relays used in the existing bus transfer to startup scheme. The existing SLUR relay logic will be retained, but the electronic time delay relays will be replaced with solid state digital time delay relays.

4 kV Electrical System

DCPP engineered safety feature (ESF) loads are supplied by three 4 kV vital buses or from 480 V buses supplied by the vital 4 kV buses. Each of the three vital 4 kV buses, designated F, G, and H, can be powered from three sources: auxiliary power (from either the 500 kV system or the main generator), 230 kV, or from a dedicated emergency diesel generator (EDG). Figure 1 shows the 4 kV electrical system for DCPP Unit 1 (Unit 2 is similar). During normal operation, the main generator supplies auxiliary power to the 4 kV buses via Auxiliary Transformer 1-2 and power to the 500 kV switchyard through the main transformers. When the plant is shut down, power is normally backfed through the main transformers from the 500 kV switchyard with the main generator motor-operated disconnect (MOD) switch open. 230 kV startup power serves both as an alternate power source for the 4 kV buses, and as the source of power during plant startup and shutdown operations when the main generator is being paralleled to or disconnected from the grid and auxiliary power is not available.

Automatic 4 kV Bus Transfers

An automatic transfer is provided for each 4 kV bus (vital and nonvital) to the 230 kV startup supply upon loss of power from the main generator or the 500 kV system. If a 4 kV vital bus transfer to startup is not successful, the bus will automatically transfer to its respective EDG.

Initiating events for automatic transfer are:

1. Unit (generator) trip.
2. Trip (opening) of the auxiliary transformer feeder breaker.
3. Trip of 500 kV breakers to a Unit.
4. Safety injection signal.
5. FLUR actuation.
6. SLUR actuation.

On a transfer to the startup transformer feeder, none of the 4 kV vital loads are shed, so those loads previously running would start as soon as the startup feeder breaker closed. Automatic load sequencing timers start the remaining 4 kV vital loads.

FLURs and SLURs

If the transfer to the startup transformer is unsuccessful or if there is a loss of voltage from the startup transformer, undervoltage protection for each 4 kV vital bus is provided by FLURs and SLURs. Either set of relays will start the EDG for its respective bus in the event offsite power is unavailable or degraded.

The first level of undervoltage protection is provided by the FLURs. They detect the loss of bus voltage (< approximately 69 percent of normal bus voltage) and have sufficient time delay to allow the transfer of the 4 kV vital buses to the 230 kV startup transformers, provided startup power is available. Each bus has one EDG start and two load shed FLURs. To prevent spurious transfers, both load shed FLURs, one instantaneous and one time delayed, must activate for the transfer to the EDG to occur.

EDGs are automatically started on sustained bus undervoltage (approximately 0.8 seconds at 0 volts). A problem with the existing design, is that during a successful bus transfer, an occasional diesel start has been experienced when a vital bus is lightly loaded. If the transfer to the startup transformer is unsuccessful, the FLURs will shed the 4 kV vital bus motor loads. The EDG breaker will close after a time delay of approximately 2 seconds to allow the motor breakers to trip and bus voltage to decay. After the EDG breaker closes, the ESF loads will be started by automatic load sequencing timers.

A second level of undervoltage protection is provided by the SLURs to protect Class 1E loads from a sustained degradation of offsite power. The SLUR setting is based on providing a minimum of 90 percent motor voltage at the 4 kV and 460 volt vital motor terminals, and 90 percent voltage at the 120 volt vital loads.

The SLUR circuits incorporate two separate time delays, one for EDG starting and one for EDG loading. The first SLUR time delay prevents inadvertent starting of the diesels on transient undervoltages. The second SLUR time delay allows time for the EDGs to start and be ready to accept load. The EDGs are started after a maximum delay of 10 seconds. The 4 kV motors are shed after a maximum delay of 20 seconds in preparation for EDG loading. EDG breaker closing is delayed approximately 2 more seconds to allow the motor breakers to trip and bus voltage to decay. After the EDG breaker closes, the 4 kV vital bus loads are started by automatic load sequencing timers. Both SLURs must actuate to cause a transfer to the EDG.

Degraded Offsite Power

In PG&E Letter DCL-96-158, Licensee Event Report 1-95-007-01, "230 kV System May Not Be Able to Meet Its Design Requirements for All Conditions Due to Personnel Error," dated August 6, 1996, PG&E reported that the DCPP 230 kV system should have been declared inoperable 47 times since 1990 due to degraded 230 kV system conditions. Specifically, when the 230 kV line from Morro Bay Substation was taken out of service, there would have been inadequate voltage at DCPP. This could have resulted in SLUR actuation during accident conditions and the double sequencing of ESF loads. If a loss of coolant accident (LOCA) occurred with this condition, the ESF loads would transfer to the 230 kV source, and then 30 seconds later the remaining balance of plant loads would also transfer to the 230 kV source. With the 230 kV system degraded, this sequence could cause the 230 kV voltage to drop low enough to actuate the 4 kV vital bus SLURs. Actuation of the SLURs would cause the ESF loads to stop and be restarted on the EDGs, i.e., double sequencing. PG&E failed to recognize that when the 230 kV line from Morro Bay substation was taken out of service, the 230 kV source of offsite power was inoperable and that the action statement for TS 3.8.1.1.a should have been entered which includes a requirement to restore the offsite circuit to operable status within 72 hours.

PG&E implemented short term procedural controls for line maintenance outages, operation of Morro Bay Power Plant (MBPP), and maintenance of grid voltage to assure operability of offsite power. Compensatory measures were established for single and dual line outages to maintain operable offsite power.

PG&E initiated long range actions to maintain operability of the 230 kV source. These actions included installation of automatic load tap changing (LTC) transformers and several other plant modifications and 230 kV grid modifications. The plant modifications are discussed below and the 230 kV grid modifications are discussed in LAR 98-01, "Implementation of 230 kV System Improvements" (Ref. PG&E letters DCL-98-008 dated January 14, 1998, and DCL-98-076 dated May 19, 1998). Along with these modifications, changes to the FLUR circuitry, FLUR setpoints, and SLUR setpoints are proposed in this LAR.

The new LTC transformers automatically adjust the transformer ratio to maintain a preset voltage on the load side when supply side voltage decreases due to increased load. The plant and grid modifications will assure operable offsite power for either 230 kV transmission line into DCPP for all reasonably anticipated grid configurations. Anticipated grid configurations include any single line outage and most dual line outages on a common right of way.

The present SLUR setpoints were established to assure that adequate voltage was available to all Class IE components. The limiting components are on the 480 volt AC (VAC) system. The modifications to the plant distribution system include retapping the 4 kV to 480 VAC Class IE transformers to boost the voltage by 2.5 percent. The new SLUR setpoints proposed in this LAR provide a minimum of 90 percent voltage to all AC components on the Class IE AC plant distribution system.

The present FLUR undervoltage relays and setpoints are prone to prematurely starting the EDGs on a Unit trip. To preclude the premature starting of the EDGs, a new design incorporating fixed setpoint undervoltage relays with accurate electronic timers is proposed for the FLUR EDG start and load shed functions.

All setpoints were determined using Instrument Society of America (ISA) Recommended Practice RP67.04, Part II, "Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation," setpoint methodology and have drift allowance for a 24-month fuel cycle (including a 25 percent surveillance extension).

C. JUSTIFICATION

The FLUR and SLUR setpoints proposed by this LAR have been developed to fully utilize the advantages of the modifications made to enhance the capability of the 230 kV system, and to preclude premature starts of the EDGs. The proposal to change the surveillance requirement test frequencies for the FLURs and SLURs from 18 months to 24 months supports implementation of extended cycles at DCPP. The primary benefits of extended cycles are fewer refuelings, improved outage scheduling, and reduced personnel dose and radwaste.

D. SAFETY EVALUATION

PG&E has performed an evaluation to determine long range actions necessary to ensure continued reliability and operability of the 230 kV system. To assist with this review, PG&E contracted with Duke Engineering and Services to perform an analysis of the DCPP electrical distribution system based on future anticipated minimum 230 kV grid voltages.

<u>Evaluation Assumptions</u>

As a result of the electrical system review, PG&E identified the following modifications and procedure changes that would improve the capability of the DCPP electrical distribution system to start and operate ESF loads over a lower

range of 230 kV switchyard voltages. The following modifications have been made to both Unit 1 and Unit 2. The modifications have been evaluated in accordance with the requirements of 10 CFR 50.59, and have been determined not to involve an unreviewed safety question.

1. Replace the fixed ratio startup transformers with LTC transformers.

2. Achieve a fast transfer of a circulating water pump (CWP) during a Unit trip without tripping the CWP.

3. Trip the No. 2 Heater Drain Pump on a Unit trip.

4. Block the automatic start of the third standby condensate/condensate booster pump set on a Unit trip. This feature is manually implemented by the control room operator as a procedurally controlled compensatory action during a degraded offsite power condition.

5. Change vital load center transformer tap settings to improve the voltage supplied to vital loads on a transfer to startup power. This will optimize the Unit auxiliary transformer tap settings to limit overvoltage on the 480 volt system during 500 kV backfeed operations.

In addition, a procedurally-controlled compensatory action to operate in a 12 kV half transfer mode condition has been established to support Class IE functions during a degraded off-site power system condition. A half transfer is the transfer of either 12 kV Bus D or 12 kV Bus E, but not both which results in two reactor coolant pumps (RCPs) and one CWP operating after a Unit trip or design basis accident instead of four RCPs and one CWP if both buses transfer. This compensatory action is implemented in the control room

These modifications and procedural changes will improve the voltage profile of the safety-related electrical distribution system, either by increasing the available voltage through use of automatic LTCs, or by removing, not starting, or not cycling selected large loads, thus reducing load on the system during accident conditions. To take full advantage of these enhancements, PG&E performed an analysis of the FLUR and SLUR relay and timer designs, logics, setpoints, and allowable values.

FLUR and SLUR Analyses

A computer model was developed to perform load flow, short circuit, and transient analyses for the electrical system configurations identified for evaluation. This

model was used to determine the analytical limit for the FLUR, FLUR timer, SLUR, and SLUR timer, and to determine if the relays would function as required for each configuration to ensure compliance with GDC 17 and the intent of BTP PSB-1.

The model development consisted of obtaining the electrical data for both Units and incorporating this information into a single model to perform steady state and transient analysis. The motor and nonmotor loading was determined by analyzing each load and determining its operating status for each event and loading category. The transformer, motor, switchgear, and motor control center data was obtained by a combination of walkdowns and a review of vendor data. For large motors, the model results were compared with plant and vendor data to validate the accuracy of the model. A preload of one Unit in an outage on the 230kV system was assumed since the plant can be in that configuration for a considerable length of time for maintenance on the 500 kV system. A worst case, degraded 230 kV system condition, with the MBPP to DCPP line out of service, was assumed for the analysis.

The electrical system configurations identified for evaluation were modeled and load flow, short circuit, and transient cases were run. The load flow results for each configuration included: (1) safety-related bus voltages, (2) voltage at each continuous duty load, (3) current and power flow in the electrical distribution system, and (4) the LTC transformer tap position. The short circuit results for each configuration included the maximum expected short circuit current at each safety-related bus and the rating of the bus and interrupting device. The transient results included, as a function of time: (1) bus voltage, (2) critical safety-related motor voltage, (3) current, (4) speed, (5) power, and (6) power flow in the electrical distribution system. This data provided the information required to determine the analytical limit for the FLUR, FLUR timer, SLUR, and SLUR timer, and to determine if the relays would function as required for the worst case configuration to ensure compliance with GDC 17 and the intent of BTP PSB-1.

Relay and Timer Acceptance Criteria

Acceptance criteria were determined for the FLUR, FLUR timers, SLUR, and SLUR timers, and are summarized as follows:

1. FLUR Criteria - Equipment shall be able to operate at the FLUR low voltage setpoint analytical limit for the maximum duration of the SLUR time delay without tripping protective relay devices. The FLUR loss of voltage setpoint shall be selected to detect a complete loss of voltage. It shall not drop out during: (1) sequential LOCA loading, or (2) Class 1E motor starting, or

(3) nonClass1E motor starting.

2. FLUR Timer Criteria - The FLUR timers shall have a time delay greater than the maximum fault clearing time. The minimum time delay shall be greater than the duration required for bus voltage to return to the maximum FLUR reset during: (1) sequential LOCA loading, or (2) Class 1E motor starting, (3) nonClass 1E motor starting, or (4) automatic bus transfer.

3. SLUR Drop Out Criteria - The minimum voltage analytical limit will:

    - Successfully operate all Class 1E motors (continuously) and nonmotor loads at maximum expected (LOCA or non-LOCA) load, without tripping overload protective devices.

    - Provide sufficient voltage to pick up and hold in Class 1E control circuit contactors and relays in control power transformer circuits.

    - Operate (open and/or close) all Class 1E motor-operated valves required to mitigate design basis events.

4. SLUR Reset Criteria - The SLUR shall reset whenever the steady state voltage is equal to or greater than the minimum design basis steady state voltage calculated for the following cases:

    - All plant loads are on the Unit auxiliary transformers, maximum non-1E and 1E plant loading, and minimum steady state 500 kV switchyard voltage of 520 kV.

    - All plant loads are on the Unit auxiliary transformers, maximum non-1E and 1E plant loading, and minimum steady state main generator voltage of 97.5 percent of 25 kV.

5. SLUR Load Shed Timer Criteria - The minimum SLUR load shed time delay shall be:

    - Greater than the time it takes the voltage to recover above the SLUR reset voltage, when either the main generator or 500 kV system is at its minimum expected voltage, during the starting of an RCP, CWP, or condensate booster/condensate pump set on the D or E bus.

- Greater than the time it takes the voltage to recover, above the SLUR reset, during an automatic bus transfer with and without a safety injection.
- Greater than the maximum fault clearing time. The maximum fault clearing time shall be based on the backup protection tripping scheme.

6. SLUR Load Shed Timer Criteria - The maximum SLUR load shed time delay shall be:
   - Less than or equal to 20 seconds (reference TS Table 3.3-4).
   - Less than the maximum time safety-related equipment can operate without damage or protective device trips when the safety-related bus voltage is just above the FLUR low voltage drop out voltage.

7. SLUR EDG Start Timer Criteria - The maximum SLUR EDG start time delay shall be less than 10 seconds. This time delay is to avoid inadvertent starting of the diesel on transient undervoltage and ensures that the allowable times for system flow requirements are not exceeded for the worst case design basis accident.

New FLUR and SLUR voltage and time delay trip setpoints were developed to meet the above acceptance criteria.

Relay Setpoints

The existing DCPP FLUR design is comprised of three undervoltage relays. The loss of bus voltage relay is the first level diesel start relay. This relay initiates a transfer of the 4 kV bus from the auxiliary transformer to the startup transformer, starts the auxiliary salt water pump on the opposite train, starts the EDG and alarms in the control room. The first level diesel start relay is an inverse time relay and has the TS values listed below:

FLUR DIESEL START RELAYS EXISTING TS TRIP SETPOINTS AND ALLOWABLE VALUES	
VOLTAGE	TIME
≥ 0 volts	≤ 0.8 seconds
≥ 2583 volts	≤ 10.0 seconds

The other two FLUR relays are first level initiation of load shed relays, one instantaneous and one time delayed, combined in a two out of two logic. Both load shed FLURs must activate for the transfer to the EDG to occur, which prevents spurious transfers. These relays shed loads from the 4 kV bus and initiate a transfer to the EDG. The relay with an inverse time relay has the following TS values:

FLUR TIME DELAYED LOAD SHED RELAYS EXISTING TS TRIP SETPOINTS AND ALLOWABLE VALUES	
VOLTAGE	TIME
≥ 0 volts	≤ 4.0 seconds
≥ 2583 volts	≤ 25.0 seconds

The second FLUR load shed relay is an instantaneous relay with no time delay. The TS value for the relay is to drop out at not less than 2870 volts. Refer to Figure 2 for a time voltage plot for the existing FLUR relays. It shows the inverse time relation for the two FLURs with time delays.

Proposed FLUR Design

To meet the acceptance criteria discussed earlier, it will be necessary to modify the FLUR design. The proposed design incorporates fixed setpoint undervoltage relays with solid state digital timers. The relays and timers are capable of being set to specific voltages and time delays. The proposed design uses four instantaneous undervoltage relays combined with three timers to provide the first level undervoltage protection that is required to meet the acceptance criteria. Figure 3 shows the proposed FLUR logic and Figure 4 shows the time voltage plot of the proposed FLUR setpoints. The proposed TS setpoints for the FLUR voltage relays and the FLUR timers are listed below. (Relay device identification numbers shown below are for identification of relays on Figure 2. The "*" is used in place of letters F, G, and H, for each of the three 4 kV buses, which are identical.)

FLUR VOLTAGE RELAYS PROPOSED TS VALUES		
VOLTAGE RELAYS	TRIP SETPOINT	ALLOWABLE VALUE
Load Shed & Start EDG (27H*F1)	3172 volts	3126 to 3218 volts

Load Shed & Start EDG (27H*F2)	3172 volts	3126 to 3218 volts
Start EDG (27H*B1)	1040 volts	≥ 993 volts
Start EDG (27H*B2)	1040 volts	≥ 993 volts

FLUR TIMERS PROPOSED TS VALUES		
TIMER RELAYS	**TRIP SETPOINT[1]**	**ALLOWABLE VALUE**
Start EDG Function (62H*T1)	1.89 seconds	≤ 1.95 sec.
Load Shed Function(62H*T2)	3.89 seconds	3.83 to 3.95 sec.
Start EDG Function(62H*T3)	0.69 seconds	≤ 0.75 sec.

Figures 2, 3, and 4 document that the proposed design will start the EDG as fast as the existing design for a complete loss of power. For voltages greater than zero, the proposed design will operate as fast, or faster, over most of the voltage range, than the existing design. The proposed design meets all of the acceptance criteria discussed above and will ensure continued compliance with GDC-17 and the intent of BTP PSB-1.

SLUR Design

The existing SLUR relay logic will be retained, but the existing electro-mechanical time delay relays will be replaced with solid state digital time delay relays. The relay logic uses two instantaneous undervoltage relays with two discrete time delay relays for each 4 kV bus.

The existing TS limit for the SLURs are:

SLUR RELAYS EXISTING TS TRIP SETPOINTS AND ALLOWABLE VALUES		
RELAY	**Trip Setpoint**	**Allowable Value**
Diesel Start		
Voltage Relay	≥ 3785 volts	≥ 3785 volts
Time Delay Relay	≤ 10.0 seconds	≤ 10.0 seconds

[1] The time delays listed in the TS include a 0.05 second delay inherent to the actuation time of the undervoltage relays. Therefore, the timers will be set 0.05 seconds faster than the listed setpoints so that the undervoltage relay timer combination achieves the TS specified delays.

[illegible]

Initiation of Load Shed Voltage Relay Time Delay Relay	 ≥ 3785 volts ≤ 20.0 seconds	 ≥ 3785 volts ≤ 20.0 seconds

Based on analysis of future voltage profiles, minor revisions are proposed for the setpoints. Accordingly, PG&E proposes the following new SLUR setpoints:

SLUR RELAYS PROPOSED TS TRIP SETPOINTS AND ALLOWABLE VALUES		
RELAY	**Trip Setpoint[2]**	**Allowable Value**
Diesel Start Voltage Relay Time Delay Relay	 3790 volts. 9.89 seconds	 ≥ 3753 volts ≤ 9.95 sec.
Initiation of Load Shed Voltage Relay Time Delay Relay	 3790 volts. 19.89 seconds	 3753 to 3815 volts 19.83 to 19.95 sec.

The proposed setpoints will ensure that all motor loads operate at a minimum of 90 percent of rated voltage and that all nonmotor loads will have sufficient voltage to operate as required. The proposed setpoints are low enough to prevent spurious actuation at the minimum expected offsite grid voltages. These revised setpoints and allowable values were developed in accordance with ISA RP67.04, Part II methodology. They will meet the acceptance criteria discussed earlier, and will ensure compliance with GDC-17 and the intent of BTP PSB-1.

Revisions to TS 3.3.2, Table 3.3-3

The new FLUR design will require changes to TS 3.3.2, Table 3.3-3, Functional Unit 7, "Loss of Power (4.16.kV Emergency Bus Undervoltage)." Functional Unit 7.a.1) will be revised to replace the single EDG start channel with two channels for loss of voltage protection and two channels for low voltage protection. Functional Units 7.a.3) and 7.a.4) will be added for timers to start the diesel (one for loss of voltage, and one for low voltage per bus), and timers to shed load (one per bus).

[2] The time delays listed in the TS include a 0.05 second delay inherent to the actuation time of the undervoltage relays. Therefore, the timers will be set 0.05 seconds faster than the listed setpoints so that the undervoltage relay timer combination achieves the TS specified delays.

[illegible]

New Action Statement 36 for Functional Unit 7.a.1) will require an EDG to be declared inoperable if less than the total number of channels are operable. A minimum of one operable channel is required to start the diesel, but both channels are required to provide both the low voltage and the loss of voltage protection functions.

Existing Action Statement 16 will be applied to Functional Units 7.a.3) and 7.a.4). These functional units each contain a total of one channel per bus. Action Statement 16 is appropriate because it requires declaring the EDG inoperable if the number of operable channels is less than the total number of channels.

Allowable Values

The allowable values proposed by this LAR were determined using the Westinghouse definition of an allowable value from WCAP 11082, Rev. 5, "Westinghouse Setpoint Methodology for Protection Systems Diablo Canyon Units 1 & 2 24 Month Fuel Cycle Evaluation." The definition states:

> *Allowable Value*
>
> *A bistable trip setpoint (analog function) or CPU trip output (digital function) in Plant Technical Specifications, which allows for deviation, e.g., rack drift plus rack measuring and test equipment accuracy, from the nominal trip setpoint. A trip setpoint found non-conservative with respect to the allowable value requires some action for restoration by plant operating personnel.*

One of the electrical distribution design goals discussed in BTP PSB-1 is to prevent spurious separations of safety-related electrical loads from the offsite source of electrical power. To satisfy this design goal, PG&E has established double sided allowable values for the FLUR and SLUR load shed functions.

The FLUR load shed time delay function allowable value lower limit is based on the maximum expected time necessary for the vital 4 kV bus voltages to return to the maximum FLUR reset points during transients. The SLUR load shed time delay function allowable value lower limit is based on the maximum time needed for the vital 4 kV bus voltages to recover from a transient when offsite power is at its minimum. The FLUR load shed undervoltage relay allowable value upper limit is based on insuring that the FLUR relay will have reset before the minimum FLUR load shed time delay has elapsed when the bus is recoverable. The SLUR load

shed undervoltage function allowable value upper limit is based on ensuring that the SLUR relay will have reset before the minimum SLUR load shed time delay has elapsed when offsite power is available.

Surveillance Test Frequency Revision From 18 to 24 Months

PG&E proposes to extend the FLUR and SLUR channel calibration and trip actuating device operational test surveillances from 18 to 24 months. PG&E has evaluated the effects of an increased calibration interval on FLUR and SLUR setpoint uncertainty to confirm that drift will not result in setpoints that exceed the assumptions of the safety analysis. Undervoltage relay drift can affect the capability of the electrical distribution system to perform its safety function, and therefore was considered in determining safety system setpoints. PG&E has reviewed DCPP operating experience and vendor specifications for undervoltage relay performance to develop information on the increase in undervoltage relay errors that could occur with an increased calibration interval. This information, together with a program to monitor and assess the long term effects of undervoltage relay drift, provides the basis for increasing the refueling outage related FLUR and SLUR calibration intervals.

PG&E has reviewed past performance of FLUR and SLUR settings in accordance with enclosure 1 of Generic Letter (GL) 91-04. With few exceptions, all surveillance tests were performed successfully.

Based on evaluation of past relay performance data, PG&E: 1) determined statistically based drift values, and 2) confirmed that there is high confidence that the relays will be left within the calibration procedure's as-left setting tolerance. The combination of as-left setting tolerance and plant specific relay drift provides the basis for the allowance within which it is reasonable to expect the relay to continue to perform for extended cycles. Once expected performance characteristics are established, the relay as-found calibration data indicates whether or not the relay stayed within reasonable allowances over the interval since the last calibration.

Statistically based drift values were used as input to determine the channel statistical allowance, setpoint, and allowable value using the methodology described in PG&E letter DCL-96-213, dated December 9, 1996, LAR 96-10, "Revision of Technical Specifications to Support Extended Fuel Cycles to 24 Months," which was approved by License Amendments (LA) 122/120 dated February 17, 1998.

Drift Evaluation

Plant specific drift equals the difference between the as-found and the previous as-left calibration data and involves the actual relay drift and the error in the calibration measuring and test equipment. SLURs have been in use since 1985. However, their acceptance criteria were tightened in 1991. Based on a review of completed test procedures, including those executed at refueling outages as well as any mid-cycle tests that were conducted, PG&E compiled as-found and as-left SLUR relay calibration data for the entire time the relays were installed (through July 1998). The calibration and drift data from 1991 through July 1998 were statistically analyzed to establish relay performance characteristics. The drift data was evaluated for the existence of outliers and no statistical or mechanistic outliers were identified. The final drift data set contained 52 values. Descriptive statistics of the final drift data set were determined and the data set was tested to determine whether it could be characterized as a normal distribution.

The existing FLUR 27H*T2 relays are Westinghouse type SSV-T relays and will become part of the FLUR low voltage setpoint scheme. These relays have been installed since 1985. However, their acceptance criteria was not changed in 1991. PG&E performed a similar review and collection of data from completed tests. The calibration and drift data from 1985 through July 1998 was statistically analyzed to establish FLUR low voltage relay performance characteristics. The drift data was evaluated for the existence of outliers. Two sets of mechanistic outliers were identified. The final drop out and pick up drift data sets contained 57 and 56 values, respectively. Descriptive statistics of the final drift data set were determined and the data set was tested to determine whether it could be characterized as a normal distribution.

Determination of Drift Values

Separate statistical evaluations were performed for the relay's drop out and pick up setpoints. The SLUR and FLUR low voltage drop out data met the criteria for a normal distribution. The SLUR pick up data met the criteria for a normal distribution, but the FLUR low voltage pick up data did not (too peaked for a normal distribution). A modified set of FLUR low voltage pick up data was constructed by deleting one additional data point based on statistical outlier tests. The modified FLUR low voltage pick up drift data set met the criteria for a normal distribution. Mean values and standard deviations for the drift in the relay's drop out and pick up voltages were conservatively determined from the relay data. The final drift data set reflects a 95 percent or higher probability at a 95 percent (95/95) confidence level.

Finally, the SLUR and FLUR low voltage drift data was examined for indications of time dependence and adjustments were made, as appropriate, to yield instrumentation drift allowances applicable to a 24-month fuel cycle (i.e., a maximum surveillance interval of 30 calendar months). The correlation coefficients of drift versus calibration interval were insignificant. No adjustments were necessary to the relay drift for extending the calibration time interval. The details of the statistical analysis of the DCPP calibration data are contained in PG&E Calculation 357M-DC.

<u>Relays With Insufficient Data</u>

Statistically based 95/95 drift values were determined for the SLUR relays and for the FLUR low voltage relays. The FLUR loss of voltage relays will be ABB Type 47H, which have been recently installed at DCPP. The relays were installed in the non-TS bus transfer application in 1996 and 1997 and only one has been recalibrated since then. Therefore, statistically based plant specific performance data is not yet available. The vendor does not specify drift value for the pick up or drop out settings of these relays. The relays' solid state design was the basis for an engineering judgment that a ±3 percent span drift would be conservative for a 24-month fuel cycle surveillance extension. These relays have been identified for inclusion in the drift monitoring program established as part of LAR 96-10 as approved by LAs 122/120.

The solid state digital timers to be used to establish the TS required time delays are manufactured by Agastat Division of Thomas & Betts Company. The relay manufacturer does not specify a drift value for the performance of these relays. The product specification does specify an overall accuracy value of ±0.02 second. The current and proposed calibration procedure has an as-left setting tolerance of ±0.05 second for these time delay functions. A statistical analysis of the vendor acceptance test data for these relays, obtained prior to their use at DCPP, showed a variability of ±0.012 second at a 95/95 confidence level (The testing encompassed 27 relays and three consecutive timings). This value is well within the vendor's ±0.02 second specification. These relays have been installed in the containment fan cooling unit fan control circuitry and have been in service for approximately nine months. Relay performance data was obtained after three and six months. The data (with a single exception) indicates a 95/95 drift on the order of ≤ ±0.010 second. In order to be conservative, a drift value equal to the as-left setting tolerance of ±0.050 second was used in determining the timer's

uncertainty. These timers have been identified for inclusion in the drift monitoring program established in response to GL 91-04. Therefore, if their performance is as specified by the manufacturer, the drift value may be reduced at some future date and additional setpoint margin gained.

Comparison Of PG&E Evaluation To GL 91-04 Guidance

The NRC provided specific guidance on extension of instrumentation calibration surveillances in GL 91-04. Enclosure 2 of GL 91-04 provides seven issues and suggested actions related to justification of increased calibration intervals.

1. *Confirm that instrument drift as determined by as-found and as-left calibration data from surveillance and maintenance records has not, except on rare occasions, exceeded acceptable limits for a calibration interval.*

   The surveillance and maintenance history for SLUR relays was reviewed. The same type relay has been utilized in the SLUR application since 1985. Although drop out voltage and pick up voltage drift values for each SLUR relay were determined for all available data, only drift data since 1991 were included in the statistical drift analysis. The drift analysis covered relay operation through July 1998. All drift data was evaluated for the existence of outliers and no statistical or mechanistic outliers were identified. All analyzed drift values were encompassed by the 95/95 drift limits. The analysis of the as-left calibration error utilized all as-left relay settings for each SLUR relay installed in both DCPP Units. No as-left data was excluded from the analysis.

   The surveillance and maintenance history for 27H*T2 relays, which will be used in the FLUR low voltage scheme, was reviewed. The same type relay has been utilized since 1985. Ten sets of drop out voltage and pick up voltage drift values for each relay were determined and included in the statistical drift analysis. The drift analysis covered relay operation through July 1998. The drift data was evaluated for the existence of statistical or mechanistic outliers and two sets of drift data (a drop out drift value and the corresponding pickup drift value) were removed for mechanistic reasons. One pickup drift value was excluded as a statistical outlier. The final drop out and pick up drift data sets contained ≥ 95% of the original data. All analyzed drift values were encompassed by the 95/95 drift limits. With one exception, the analysis of the as-left calibration error utilized all eleven as-left relay settings for each 27H*T2 relay installed in both DCPP Units. Only the 1-27HFT2 relay as-left data from April 9, 1985, (initial calibration) was excluded from the analysis.

The relay type which will be used in the FLUR loss of voltage scheme, has been installed at DCPP in another application, but the scheduled time interval between calibrations has been reached for only one relay. Therefore, there is insufficient postinstallation calibration data to evaluate. However, based on the relay's solid state design, as well as the performance of other solid state relays at DCPP, it is expected that these relays will not exceed acceptable limits for a 24-month calibration interval.

2. *Confirm that the values of drift for each instrument type (make, model, and range) and application have been determined with a high probability and a high degree of confidence. Provide a summary of the methodology and assumptions used to determine the rate of instrument drift with time based upon historical plant calibration data.*

Based on a review of completed test procedures PG&E compiled as-left/as-found SLUR and FLUR low voltage relay calibration test data for the entire time the relays were installed (1985 through July 1998). The calibration and drift data from 1991 through July 1998 were statistically analyzed to establish SLUR relay performance characteristics. The calibration and drift data from 1985 through 1998 were statistically analyzed to establish FLUR low voltage relay performance characteristics. PG&E worked with Duke Engineering and Services to evaluate the DCPP plant specific SLUR and FLUR setpoint data in accordance with the PG&E methodology. The results were relay drop out and pick up setpoint drift for a 24-month fuel cycle (30 month maximum calibration interval) with at least a 95/95 confidence level. Linear regression analysis techniques were used to test for any correlation between the observed relay setpoint drift and the length of the time interval between calibrations. The regression analysis results showed that there was statistically insignificant correlation with time. Consequently, it was assumed that drift behavior determined statistically from the 18-month calibration data are applicable, without modification, to drift behavior for 30 months between calibrations. The statistically based drift values were applied to the SLUR and FLUR low voltage setpoints and allowable value determinations.

The FLUR loss of voltage relays are different than the FLUR low voltage and SLUR relays. Their manufacturer does not specify a value for drop out or pick up setting drift and these relays have not been installed at DCPP sufficiently long enough to be able to determine a plant specific, statistically based, drift. The relay design utilizes solid state components and its drift is expected to be similar to that experienced by the FLUR low voltage and SLUR relays. For

conservatism, a default drift value equal to three percent span was selected. When converted into units of VAC, the FLUR loss of voltage drop out setpoint drift equals 1.26 VAC which is comparable to the statistically derived FLUR low voltage drop out setpoint drift of ±1.21 VAC.

3. *Confirm that the magnitude of instrument drift has been determined with a high probability and a high degree of confidence for a bounding calibration interval of 30 months for each instrument type (make, model number; and range) and application that performs a safety function. Provide a list of the channels by TS section that identifies these instrument applications.*

   The PG&E methodology used for this evaluation includes the consideration of high probability and high confidence levels (95/95) required for the instrument drift associated with the possible 30-month calibration interval. This LAR affects TS 3.3.2, Table 4.3-2, Functional Unit 7.a and 7.b channel calibration and trip actuating device operational test surveillance frequencies.

4. *Confirm that a comparison of the projected instrument drift errors has been made with the values of drift used in the setpoint analysis. If this results in revised setpoints to accommodate larger drift errors, provide proposed TS changes to update trip setpoints. If the drift errors result in a revised safety analysis to support existing setpoints, provide a summary of the updated analysis conclusions to confirm that safety limits and safety analysis assumptions are not exceeded.*

   PG&E verified that the projected values of FLUR and SLUR setpoint drift for the increased calibration interval are consistent with the values of drift errors used in determining safety system setpoints which is documented in the setpoint evaluation section of this LAR.

5. *Confirm that the projected instrument errors caused by drift are acceptable for control of plant parameters to effect a safe shutdown with the associated instrumentation.*

   The TS changes proposed in this LAR do not involve changes to any plant parameters associated with instrumentation used to effect a safe shutdown.

6. *Confirm that all conditions and assumptions of the setpoint and safety analyses have been checked and are appropriately reflected in the acceptance criteria of plant surveillance procedures for channel checks, channel functional tests, and channel calibrations.*

   PG&E used DCPP plant procedures and tests as input to the calculations which established the new FLUR and SLUR setpoints and allowable values. Following receipt of an LA, and as part of the implementation of the FLUR and SLUR design change, the existing DCPP plant procedures will be revised to incorporate these setpoint and allowable value changes as well as any as-left setting tolerance changes and measuring and test equipment changes assumed in the PG&E calculations.

7. *Provide a Summary description of the program for monitoring and assessing the effects of increased calibration surveillance intervals on instrument drift and its effect on safety.*

   As discussed in LAR 96-10, PG&E will continue to monitor instrument calibration results and review the effect on FLUR/SLUR relay drift that may accompany the increase in calibration intervals. This formal program will monitor the data from each sensor calibration to ensure that the drift determined by the difference between the as-found value and the previous as-left data is within the drift value found in the current setpoint calculations. If relay drift values are found outside the drift values used to establish the setpoints and allowable values, an evaluation will be performed and appropriate actions will be taken. Drift values may also be recalculated and lowered if supported by plant data. The monitoring program will assure that assumptions related to the effects of the increased calibration surveillance intervals are met, such that there is no significant change to a margin of safety.

PG&E has reviewed the evaluation of the FLUR and SLUR setpoint surveillance intervals in accordance with the methodology discussed above, and believes that the evaluation confirms the acceptability of extending the setpoints surveillance intervals. No assumptions in the plant licensing basis are invalidated on the basis of performing any surveillance at the proposed bounding interval.

<u>CONCLUSION</u>

PG&E has developed modifications, procedural controls, a new FLUR design, and new FLUR and SLUR setpoints to improve the capability of the DCPP electrical distribution system to start and operate ESF equipment over a wide range of switchyard voltages. The FLUR and SLUR setpoints proposed by this LAR have

been developed to fully utilize the advantages of the modifications and to preclude premature starts of the EDGs. The FLUR and SLUR setpoint changes have been evaluated and comply with GDC-17 and the intent of BTP PSB-1. The change in surveillance test frequency from 18 to 24 months meets the requirements of GL 91-04.

E. NO SIGNIFICANT HAZARDS EVALUATION

PG&E has evaluated the no significant hazards considerations (NSHC) involved with the proposed amendment, focusing on the three standards set forth in 10 CFR 50.92(c) as set forth below:

> *"The commission may make a final determination, pursuant to the procedures in paragraph 50.91, that a proposed amendment to an operating license for a facility licensed under paragraph 50.21(b) or paragraph 50.22 or for a testing facility involves no significant hazards considerations, if operation of the facility in accordance with the 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 evaluation is provided for the NSHCs.

1. *Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?*

   The proposed technical specification (TS) amendment does not change the fundamental function of the first level undervoltage relay (FLUR) or second level undervoltage relay (SLUR) protection as described in the Final Safety Analysis Report (FSAR) Update, Chapter 8. The FLURs and SLURs perform the same functions in the proposed design as they do in the existing design.

   The proposed change will provide sufficient voltage to operate all safety-related motors, contactors, relays, and motor-operated valves. This assures

that safety-related equipment will operate as designed and that the probability or consequences of an accident previously evaluated will not be increased.

The proposed change will not affect how the electrical distribution system will respond to a loss of offsite power (LOOP) or a degraded grid condition. It has no impact on how the electrical distribution system or other safety-related systems respond to other FSAR accidents. The proposed change has been designed to remain inactive for a normal Unit trip and bus transfer. For a LOOP, the proposed change will start the emergency diesel generator (EDG), load shed and transfer to the EDG in the same time as the existing design. For voltages greater than zero and less than the setpoint of the FLUR (low voltage at 4 kV bus), the proposed change will either operate the same as, or faster (which is the case for most of the voltage range) than the present system.

As a result of the proposed change, the probability of a failure of a FLUR will be decreased since the diesel start design will be revised from a one out of one logic to two schemes each with a one out of two logic. No change will be made in the SLUR logic. The SLUR relay setpoint will be changed, and the timers will be replaced with a different model and revised setpoints. The FLUR and SLUR setpoints have been calculated using an analysis methodology identical to that used to establish the other reactor trip system and engineering safety features actuation systems setpoints. This method provides assurance that the relays will operate before their analytical limit is exceeded. This method also provides a higher probability and confidence than the method used for the existing setpoints.

The proposed increase in surveillance interval for the FLURs and SLURs from 18 months to 24 months does not change the manner in which the plant is operated or the way in which surveillance tests are performed. Evaluation of the specified components indicates they will continue to perform satisfactorily with a longer surveillance interval. There is no known mechanism that would significantly degrade the performance of this equipment during normal plant operation over the proposed maximum surveillance interval.

Therefore, the proposed TS changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?*

   Analyses performed for the proposed changes defined stringent acceptance criteria to ensure that the relay setpoints provide protection for all possible types of accidents and equipment failures. This included ensuring the design was capable of mitigating types of accidents and equipment failures not previously evaluated in the FSAR. The criteria were developed to ensure that the possibility of an accident of a different type than previously evaluated in the FSAR would not be increased. A review was performed of all possible accidents that could impact the voltage on the safety-related bus. A review was also performed to ensure the design would mitigate all accidents and not increase the probability of any accident. These reviews concluded that the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

   The surveillance history of the SLURs indicates that the specified components will continue to effectively perform their design function for 24-month operating cycles. Additionally, the increased surveillance interval does not result in any physical modifications, affect safety function performance, or alter the intent or method by which surveillance tests are performed.

   Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. *Does the change involve a significant reduction in a margin of safety?*

   The proposed design and setpoint changes do not change the fundamental function of the FLUR or SLUR protection as described in the FSAR or in the TS Bases.

   There is no safety analysis impact associated with increasing the surveillance interval from 18 months to 24 months for the FLUR and SLUR devices. This change will have no effect on any safety limit, protection system setpoint, or limiting condition of operation.

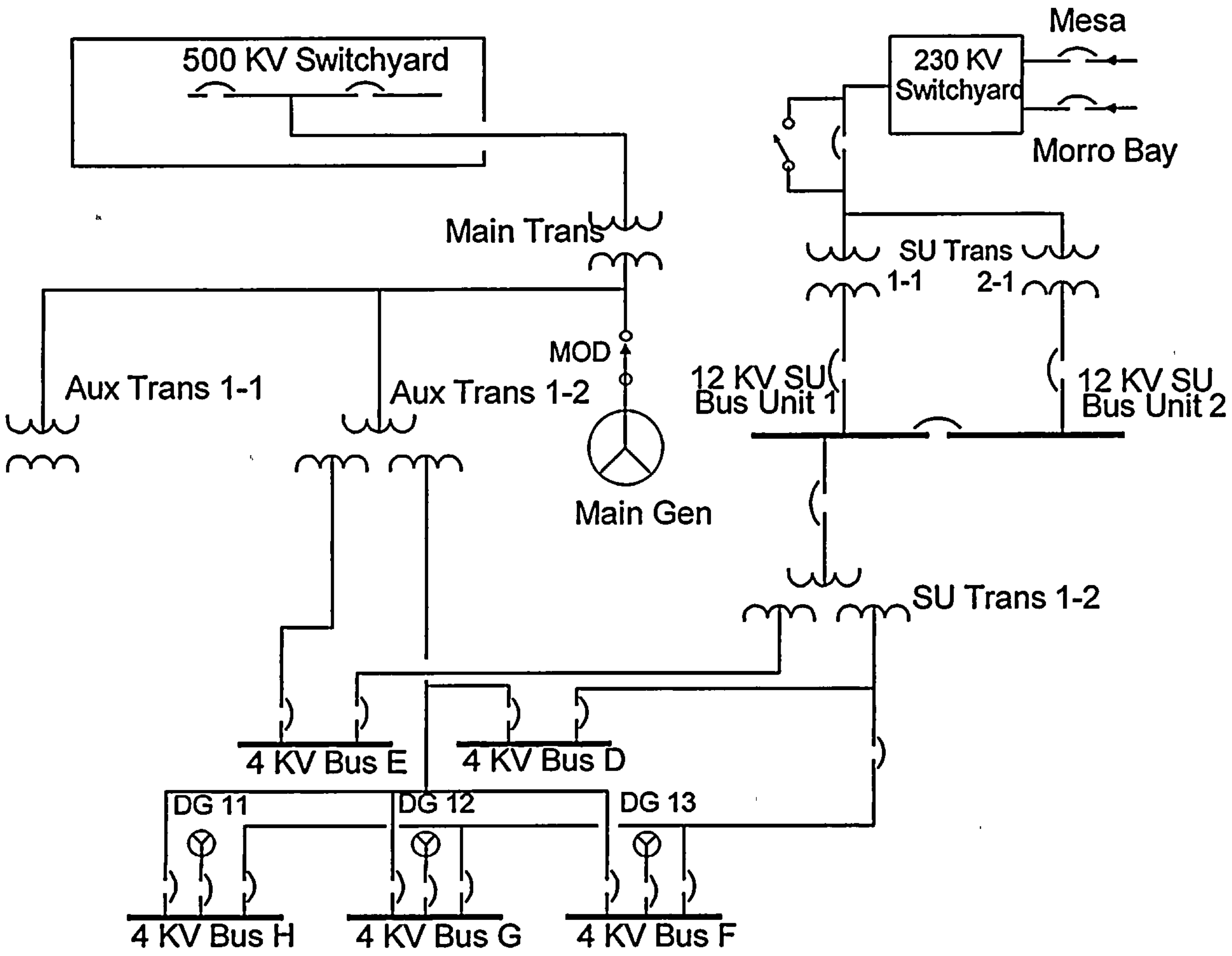
   Therefore, the proposed changes do not involve a reduction in a margin of safety.

F. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Based on the above safety evaluation, PG&E concludes that the changes proposed by this LAR satisfy the NSHC standards of 10 CFR 50.92(c), and accordingly a no significant hazards finding is justified.

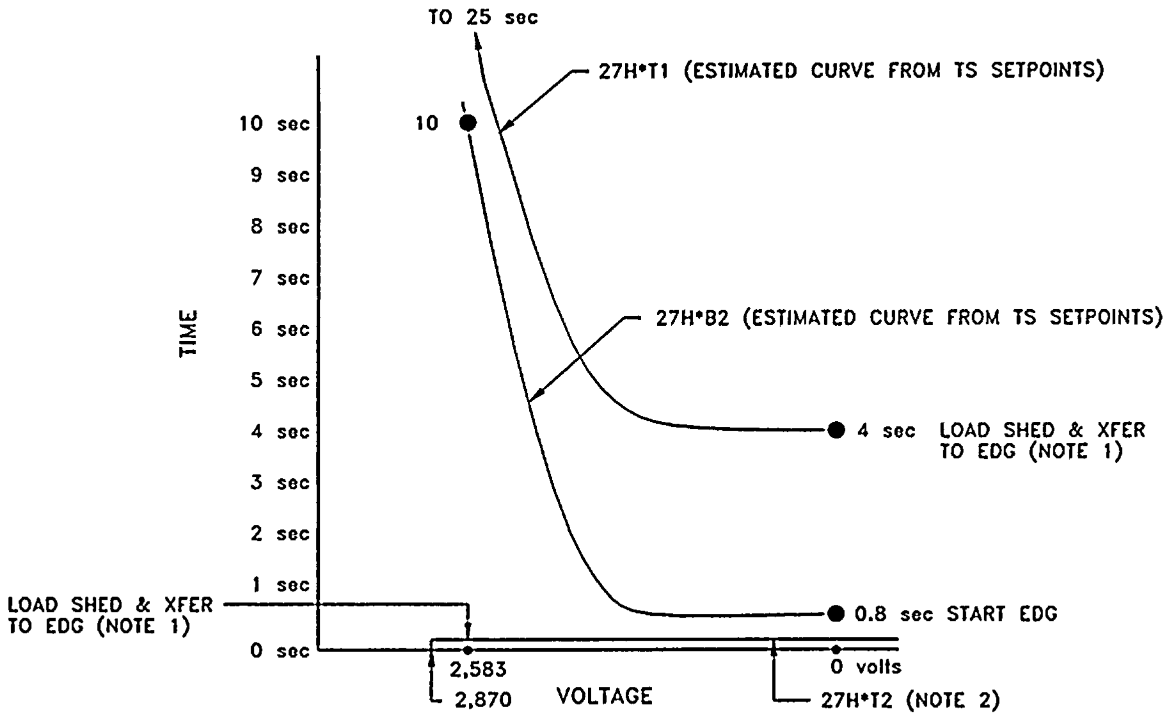
G. ENVIRONMENTAL EVALUATION

PG&E has evaluated the proposed changes and determined the changes do not involve: (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.



Legend:
DG - diesel generator
MOD - motor operated disconnect switch
SU - startup
4 kV vital buses - F, G, and H
Non-vital buses - D and E

Figure 1 - DCPP 4 kV Electrical System (Unit 1)



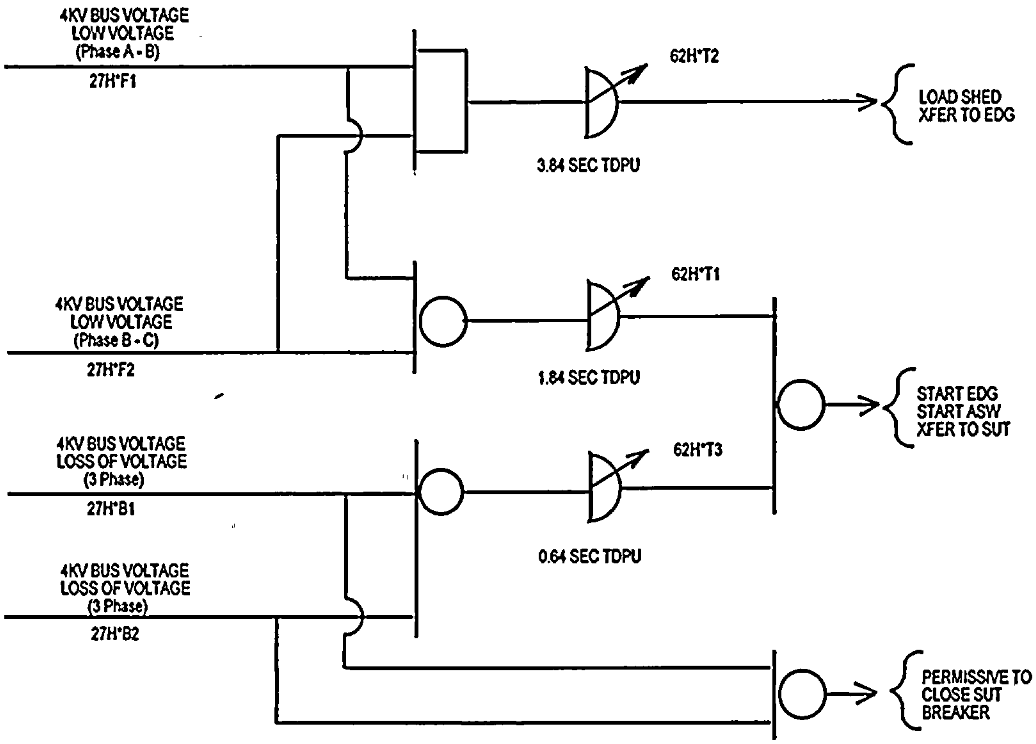
NOTES:

1. RELAYS 27H*T1 AND 27H*T2 BOTH MUST DROP OUT TO LOAD SHED AND TRANSFER TO EDG.
2. NO INTENTIONAL TIME FOR RELAY 27H*T2.

EXISTING FLUR TECHNICAL SPECIFICATION REQUIREMENTS

	RELAY	VOLTAGE	TIME
INITIATION OF LOAD SHED	27H*T1	0 VOLTS	4 SEC
	27H*T1	2,583 VOLTS	25 SEC
	27H*T2	2,870 VOLTS	INSTANTANEOUS
DIESEL START	27H*B2	0 VOLTS	0.8 SEC
	27H*B2	2,583 VOLTS	10 SEC

Figure 2 - Existing FLUR Setpoints



NOTES:

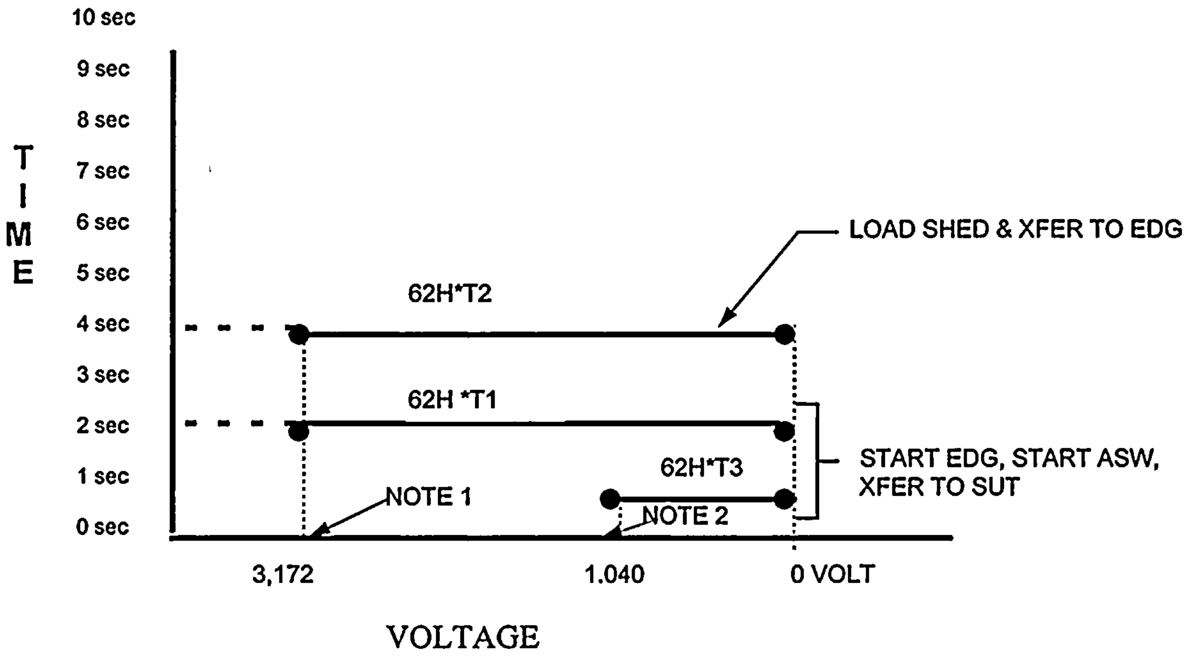
1. RELAYS 27H*F1 AND 27H*F2 ARE INSTANTANEOUS RELAYS. THE PROPOSED RELAY DROP OUT SETPOINT IS 3,172 VOLTS

2. RELAYS 27H*B1 AND 27H*B2 ARE INSTANTANEOUS RELAYS. THE PROPOSED RELAY DROP OUT SETPOINT IS 1,040 VOLTS

3. THE PROPOSED DESIGN USES RELAYS 27H*B1 AND 27H* B2 TO PROVIDE THE LOSS OF VOLTAGE FUNCTION. EXISTING RELAY 27H*B1 FUNCTIONS AS A PERMISSIVE TO CLOSE THE SUT BREAKER ON AUTOMATIC BUS TRANSFER WHEN THE BUS RESIDUAL VOLTAGE IS ABOUT 25% OF 4KV. PROPOSED DESIGN USES ITS SPARE CONTACT TO PROVIDE THE ADDITIONAL LOSS OF VOLTAGE FUNCTION.

4. WHEN THE FLUR UNDERVOLTAGE RELAY INHERENT DELAY OF 0.05 SEC. IS INCLUDED, THE TECHNICAL SPECIFICATION TRIP SETPOINT FOR THE TIME DELAY FUNCTION ARE OBTAINED.

Figure 3 - Proposed FLUR Logic



NOTES:

1. PROPOSED SETPOINTS FOR RELAYS 27H*F1 AND 27H*F2 ARE 3,172 VOLTS WITH TIME DELAY OF 1.89 SECONDS FOR D/G START FUNCTION AND 3.89 SECONDS FOR D/G LOAD SHED FUNCTION.

2. PROPOSED SETPOINTS FOR RELAYS 27H*B1 AND 27H*B2 ARE 1,040 VOLTS WITH TIME DELAY OF 0.69 SECOND FOR D/G START FUNCTION.

Figure 4 Proposed FLUR Setpoints

[illegible]