UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. for a Class 103 License to Acquire, Possess, and Use a Utilization Facility as Part of Unit No. 2 of the San Onofre Nuclear Generating Station	))))))	Docket No. 50-361 Amendment Application No. 156

SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. pursuant to 10 CFR 50.90, hereby submit Amendment Application No. 156.

This amendment application consists of Proposed Change Number (PCN)-454 to Facility Operating License No. NPF-10. PCN-454 revises the acceptance criteria for the Agastat time delay relays used in the Engineered Safety Features (ESF) load sequencer in Surveillance Requirement (SR) 3.8.1.18, "A.C. Sources - Operating" of Technical Specification (TS) 3.8.1, "A.C. Sources - Operating." The Bases of SR 3.8.1.18 will also be revised.

Subscribed on this 29th day of May, 1996

Respectfully submitted,

SOUTHERN CALIFORNIA EDISON COMPANY

By: [signature]
Dwight E. Nunn
Vice President

State of California
County of ~~Orange~~ San Diego
On 5/29/96 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 [signature]

MARIANE SANCHEZ
COMM. # 1033763
Notary Public — California
ORANGE COUNTY
My Comm. Expires OCT 14, 1998

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. for a Class 103 License to Acquire, Possess, and Use a Utilization Facility as Part of Unit No. 3 of the San Onofre Nuclear Generating Station	))))))	Docket No. 50-362 Amendment Application No. 140

SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. pursuant to 10 CFR 50.90, hereby submit Amendment Application No. 140.

This amendment application consists of Proposed Change Number (PCN)-454 to Facility Operating License No. NPF-15. PCN-454 revises the acceptance criteria for the Agastat time delay relays used in the Engineered Safety Features (ESF) load sequencer in Surveillance Requirement (SR) 3.8.1.18, "A.C. Sources - Operating" of Technical Specification (TS) 3.8.1, "A.C. Sources - Operating." The Bases of SR 3.8.1.18 will also be revised.

Subscribed on this 29th day of May, 1996.

Respectfully submitted,

SOUTHERN CALIFORNIA EDISON COMPANY

By: [signature]
Dwight E. Nunn
Vice President

State of California
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On 5/29/96 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 [signature]

MARIANE SANCHEZ
COMM. # 1033763
Notary Public -- California
ORANGE COUNTY
My Comm. Expires OCT 14, 1998

ENCLOSURE 1

DESCRIPTION AND SAFETY ANALYSIS
OF PROPOSED CHANGE NPF-10/15-454

DESCRIPTION AND SAFETY ANALYSIS
OF PROPOSED CHANGE NPF-10/15-454

This is a request to revise Unit 2 Amendment No. 127 and Unit 3 Amendment No. 116 approved Surveillance Requirement (SR) 3.8.1.18 of Technical Specification (TS) 3.8.1, "A.C. Sources- Operating," for San Onofre Units 2 and 3. The Bases of SR 3.8.1.18, "A.C. Sources- Operating," will also be revised.

Amendment Nos. 127 and 116 Approved Technical Specifications

Unit 2: See Attachment "A"
Unit 3: See Attachment "B"

Proposed Specifications

Unit 2: See Attachment "C"
Unit 3: See Attachment "D"

Supporting Analyses

Units 2 and 3: See Attachment "E"

1.0 DESCRIPTION OF CHANGES:

This amendment request is to revise the acceptance criteria for the Agastat time delay relays used in the Engineered Safety Features (ESF) load sequencer in Surveillance Requirement (SR) 3.8.1.18, "A.C. Sources - Operating" of Technical Specification (TS) 3.8.1, "A.C. Sources- Operating." Surveillance Requirement 3.8.1.18 requires that each automatic load sequence timer operates within ±10% of its design interval. The design interval is defined as the difference between the nominal start times (timer settings) of adjacent load groups. This amendment request is to revise the acceptance criteria for each timer from ±10% of its design interval to ±10% of its setting or ±2.5 seconds, whichever is greater, with the exception of the 5 second load group which is -0.5, +2.5 seconds.

The manufacturer's stated accuracy for the Agastat time delay relays used to sequence ESF loads is ±10% of setting at a constant temperature. The current TS requirement of ±10% of interval is more restrictive and has resulted in many recorded test failures, when actual system performance was acceptable. Edison has performed analyses that demonstrate that the wider tolerance is acceptable.

This amendment will also change the SR Bases to include a matrix of sequenced loads. This matrix (See tables - Attachments C and D) will identify the deviations from nominal timer settings which are acceptable for each load group. The change to the Bases will state that the calibration requirement for timer setting is ±0.5 seconds (±10% of a nominal 5 second interval), while the relaxed acceptance criteria, as specified in the matrix, will apply to as-found timer settings obtained during surveillance testing (See table, next page). Test results outside of the manufacturer's stated accuracy (± 10% of setting at a constant temperature) but within the as-found limits of the matrix are evaluated, but are not otherwise treated as surveillance test failures. In any case, as-left settings will be within the nominal setting tolerance of ± 0.5 seconds.

2.0 BACKGROUND:

2.1 Technical Specifications

SR 3.8.1.18 of TS 3.8.1, "A.C. Sources- Operating," requires verification that the automatic load sequence timer is operable with an interval between each load block within ±10% of its design interval.

The surveillance requirements ensure that the overall emergency diesel generator (DG) system functional capability is maintained within design basis requirements.

2.2 Electrical Power Systems - AC Sources

The Class 1E Electrical Power Distribution System AC sources consist of the offsite power sources (preferred or normal power sources and alternate(s)), and the onsite standby power sources (Train A and Train B DG's). The onsite Class 1E AC Distribution System is divided into redundant load groups (trains) so that the loss of any one group does not prevent the minimum safety functions from being performed. Each train has connections to two preferred (offsite) power sources and a single DG.

The onsite standby power source for each 4.16 kV ESF bus is a dedicated DG. DG's G002 and G003 are dedicated to ESF buses A04 and A06, respectively. In the event of loss of preferred power, the ESF electrical loads are manually connected to the DG's to enable safe reactor shutdown. Analysis of different Design Basis Accident (DBA) scenarios, including the Loss of Coolant Accident (LOCA), demonstrates that the DBA's will be successfully mitigated; that is, the automatic sequencing of the electrical loads to the DG's will occur soon enough to mitigate the DBA, while not overloading the DG's.

<u>Proposed DG Load Sequencing Timer Acceptance Criteria</u>

		Start Time (Sec)	Nominal Setting Tolerance (Sec)	As-Found Tolerance (Sec)	TS Response Time (Sec)
1.	LPSI Pumps P015, P016	5.00	±0.5	-0.5 +2.5	41.0
2.	Dome Air Circ Fans A071, A074, A072, A073	5.00	±0.5	-0.5 +2.5	None
3.	Control Room AC Units E418, E419	5.00	±0.5	-0.5 +2.5	None
4.	Containment Spray Pumps P012, P013	10.00	±0.5	±2.5	25.4
5.	Diesel Gen Radiator Fans E546, E550, E547, E549	10.00	±0.5	±2.5	None
6.	Component Cooling Pumps P024, P025, P026	15.00	±0.5	±2.5	31.0
7.	DG Bldg Emergency Fans A274, A275, A276, A277	15.00	±0.5	±2.5	None
8.	Salt Water Cooling Pumps P112, P307, P113, P114	20.00	±0.5	±2.5	None
9.	Aux Feed Water Pumps P141, P504	30.00	±0.5	±3.0	52.7
10.	Emergency Chillers E336, E335	35.00	±0.5	±3.5	None

A DG starts automatically on a safety injection actuation signal (SIAS) or on an ESF bus undervoltage signal. After the DG has started, it will automatically tie to its respective bus after the connection to offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage. The DG's will also start and come to rated voltage and frequency without tying to the ESF bus on a SIAS alone. On a SIAS with loss of voltage signal (LOVS), an undervoltage signal strips nonpermanent and nonessential loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to their respective ESF bus, by the load sequence relays. The sequencing logic controls the permissive and starting signals to breaker control circuits to prevent overloading the DG by automatic load application. The required loads are reconnected to the Class 1E bus in a predetermined sequence in order to prevent overloading the DG.

Within 107 seconds after the SIAS is received, all auto-connected loads needed to recover the unit or maintain it in a safe condition are returned to service. Additional loads may be manually connected by the operators as permitted by the Emergency Operating Instructions (EOI's).

Proper sequencing of loads, including tripping of nonpermanent and nonessential loads, is a required function for DG operability.

The purpose of the sequencing logic and timers is to ensure that the DG is loaded in the proper intervals, so that adequate voltage and frequency are maintained. The San Onofre Technical Specifications, which are based on the Combustion Engineering Standard Technical Specifications, conservatively require ± 10% of sequence interval as the allowable timer tolerance.

2.3 <u>Channel Functional Testing</u>

The AC sources and associated automatic load sequence timers are required to be operable in Modes 1,2,3 and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of anticipated operational occurrences (AOO's) or abnormal transients; and

b. Adequate core cooling is provided and containment operability and other vital functions are maintained in the event of a postulated design basis accident (DBA).

As required by Regulatory Guide 1.108, paragraph 2.a.(2), each DG is required to demonstrate proper operation for the DG loading sequence to ensure that voltage and frequency are maintained within the required limits. Under accident conditions, prior to connecting the DG's to their respective buses, all loads are shed except the HPSI pumps, if connected, load center feeders and those motor control centers that power Class 1E loads (referred to as "permanently connected" loads). At or near rated voltage and frequency, the DG's are then connected to their respective buses.

Loads are then sequentially connected to the bus by the load sequence relays. The sequencing logic controls the permissive and starting signals to load breakers to prevent overloading of the DG's during load application. The load sequence start time tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment response times are not violated.

2.4 Affected Technical Specifications

SR 3.8.1.18, "AC Sources - Operating," requires that the automatic load sequence timer is operable with an interval between each load block within ± 10% of its design interval. This amendment request is to revise the acceptance criteria for each timer from ±10% of its design interval to ±10% of its setting or ±2.5 seconds, whichever is greater, with the exception of the 5 second load group which is -0.5, +2.5 seconds.

The corresponding SR Bases will also be changed to include a matrix of sequenced loads. This matrix will identify the deviations from nominal start times which are acceptable for each load group. The change to the Bases will state that the calibration requirement for timer setting is ±0.5 seconds (±10% of a nominal 5 second interval), while the relaxed acceptance criteria, as specified in the matrix, will apply to as-found timer settings obtained during surveillance testing. Test results outside of the manufacturer's stated accuracy (± 10% of setting at a constant temperature) but within the as-found limits of the matrix are evaluated, but are not otherwise treated as surveillance test failures. In any case, as-left settings will be within the nominal setting tolerance of ± 0.5 seconds.

3.0 DISCUSSION:

The timing requirement of SR 3.8.1.18 is important for two reasons: 1) to prevent DG overload due to loads starting too close together in time, and 2) to support the assumed starting time of equipment in the various safety analyses. Analyses have been performed using the proposed expanded timing tolerance that demonstrate that acceptable safety system performance will be maintained. Descriptions of these analyses are presented below.

Electrical Analyses

Electrical system performance has been analyzed by performing dynamic voltage analyses assuming a timer tolerance of ± 2.5 seconds for all load groups. A tolerance of ± 2.5 seconds creates the possibility of overlap of adjacent load groups (i.e., one load group starts 2.5 seconds late and the following load group starts 2.5 seconds early, resulting in two load groups starting at the same time). Figure 1 illustrates this. All possible combinations of adjacent load groups overlapping have been evaluated and shown to be acceptable with respect to electrical system and DG performance. These analyses are documented in Reference 1 and are included as part of Attachment E.

ELECTRICAL ANALYSIS

(WORST CASE STARTING SEQUENCES WITH OVERLAPPING LOAD GROUPS)

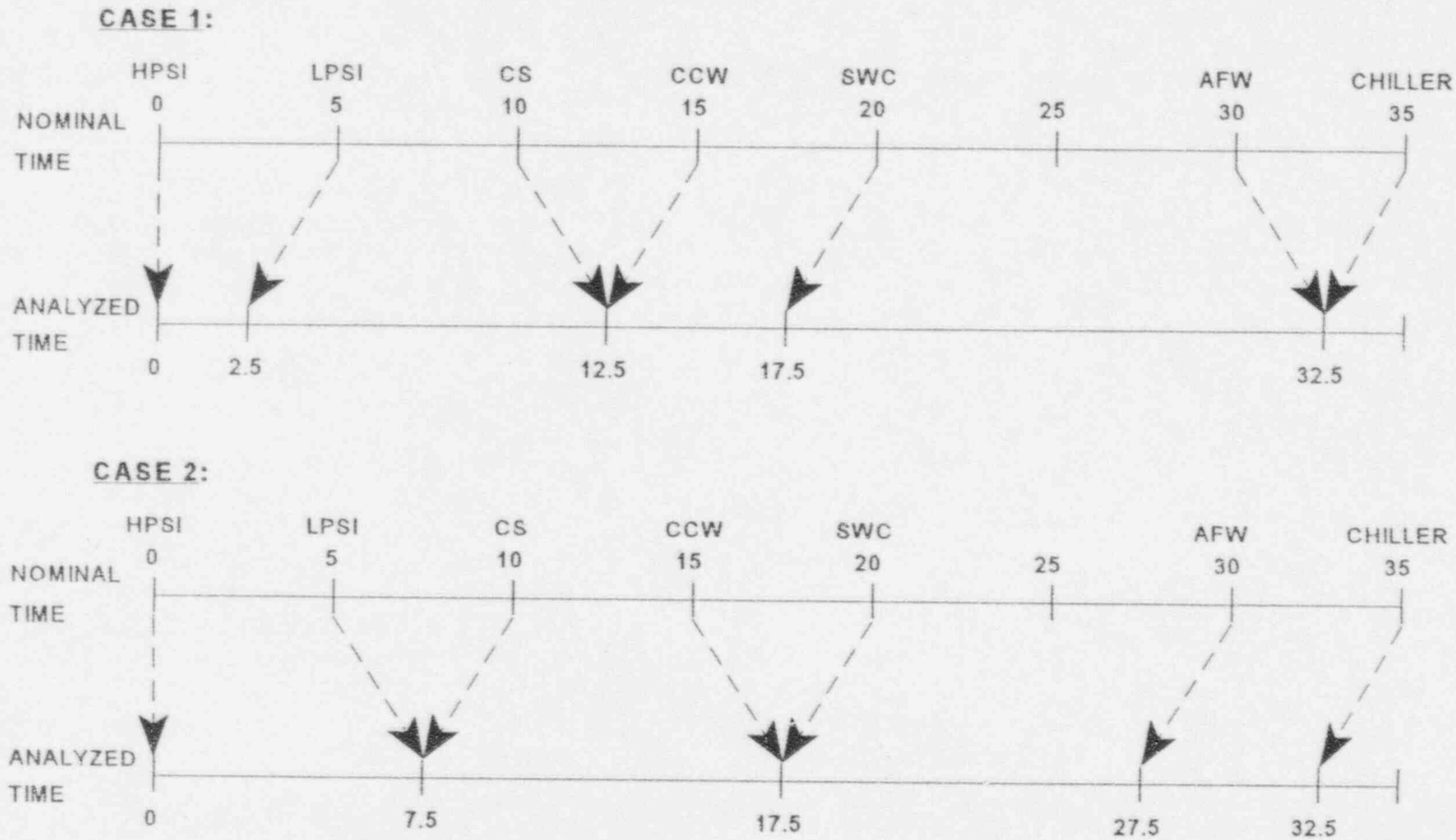


FIGURE 1

Although a tolerance of ±2.5 seconds for the 5 second load group is acceptable with respect to the loading capability of the DGs, the as-found tolerance for this load group will be -0.5, +2.5 seconds. This ensures that the voltage transient due to starting this load group when powered from the offsite source will not interfere with the Loss of Voltage/Degraded Grid Voltage with SIAS (LOVS/DGVSS) circuitry. The LOVS/DGVSS circuit senses the 4 kV bus voltage just prior to time T = 4.5 seconds and transfers the bus to the DG if the voltage is below the degraded voltage setpoint. If the 5 second load group were to start prior to T = 4.5 seconds, the resulting voltage dip could appear to be a degraded voltage condition, and cause an undesirable actuation of the DVGSS relay scheme. To avoid this potential interference, the as-found tolerance for early starting of the 5 second load group will be restricted to -0.5 seconds. The acceptable as-found tolerance is therefore -0.5, +2.5 seconds.

In the case of the 30 second load group which includes only the auxiliary feedwater (AFW) pump, the electrical analysis was performed assuming a timer tolerance of ± 2.5 seconds for this and adjacent load groups, which is the worst combination of starting conditions as it includes overlapping starting of the AFW pump and emergency chillers. This is a more severe load condition for the DG's than the ± 3.0 seconds requested in this PCN for this load group.

The 35 second load group includes only the Emergency Chiller units. The electrical analysis performed for this group assumed a timer tolerance of ± 2.5 seconds for this and adjacent load groups, which is the worst combination of starting conditions as it includes overlapping starting of the AFW pump and emergency chillers. This is a more severe load condition for the DG's than the ± 3.5 seconds requested in this PCN for this load group.

<u>System Impact Analysis</u>
Process system performance has been analyzed for each system which could potentially be impacted by the wider timer tolerances assumed in the electrical analyses described above. Flow requirements, potential flow diversions, and the availability of supporting system components and equipment were evaluated. The performance of all systems potentially affected by the wider timer tolerance were shown to be acceptable. This analysis is documented in References 2 and 3 and are included as part of Attachment E.

<u>Safety System Analyses</u>
Applicable safety analyses were reviewed to determine the acceptability of the proposed change in timer tolerance. The response times for each system were evaluated. It was determined that the existing overall system response times can be maintained by reallocating existing margin for individual components, where needed, to accommodate the increased timer tolerance without increasing the overall system response time.

For example, the existing analysis for the Containment Spray system, the most limiting system, demonstrates that an overall system response time of ≤ 26.9 seconds is acceptable. This

analysis allocates 1.0 second for timer tolerance, 4.0 seconds for pump acceleration, and includes additional unallocated margin of 0.9 seconds. These intervals can be reallocated as follows with no overall increase to the system response time: 2.5 seconds for timer tolerance, 1.9 seconds for pump acceleration, and 1.5 seconds of unallocated margin. Figure 2 provides this comparison between the Technical Specification required response time for the pump and calculational basis (both existing and proposed) which justifies the changes.

Other systems credited in the safety analyses were evaluated in a similar manner. In all cases it was determined that the increase in timer tolerance can be accommodated without increasing the overall response time for any system. In analyses where the allocated time for pump acceleration was reduced to accommodate the increased timer tolerance, the actual acceleration times were reviewed to ensure that the actual times were consistent with the electrical analyses and were less than the assumed times. These analyses are documented in References 2, 4, 5, and 6 and are included as part of Attachment E.

4.0 SAFETY ANALYSIS

The proposed change described above shall be deemed to involve a significant hazards consideration if there is any positive finding in any one of the following areas.

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

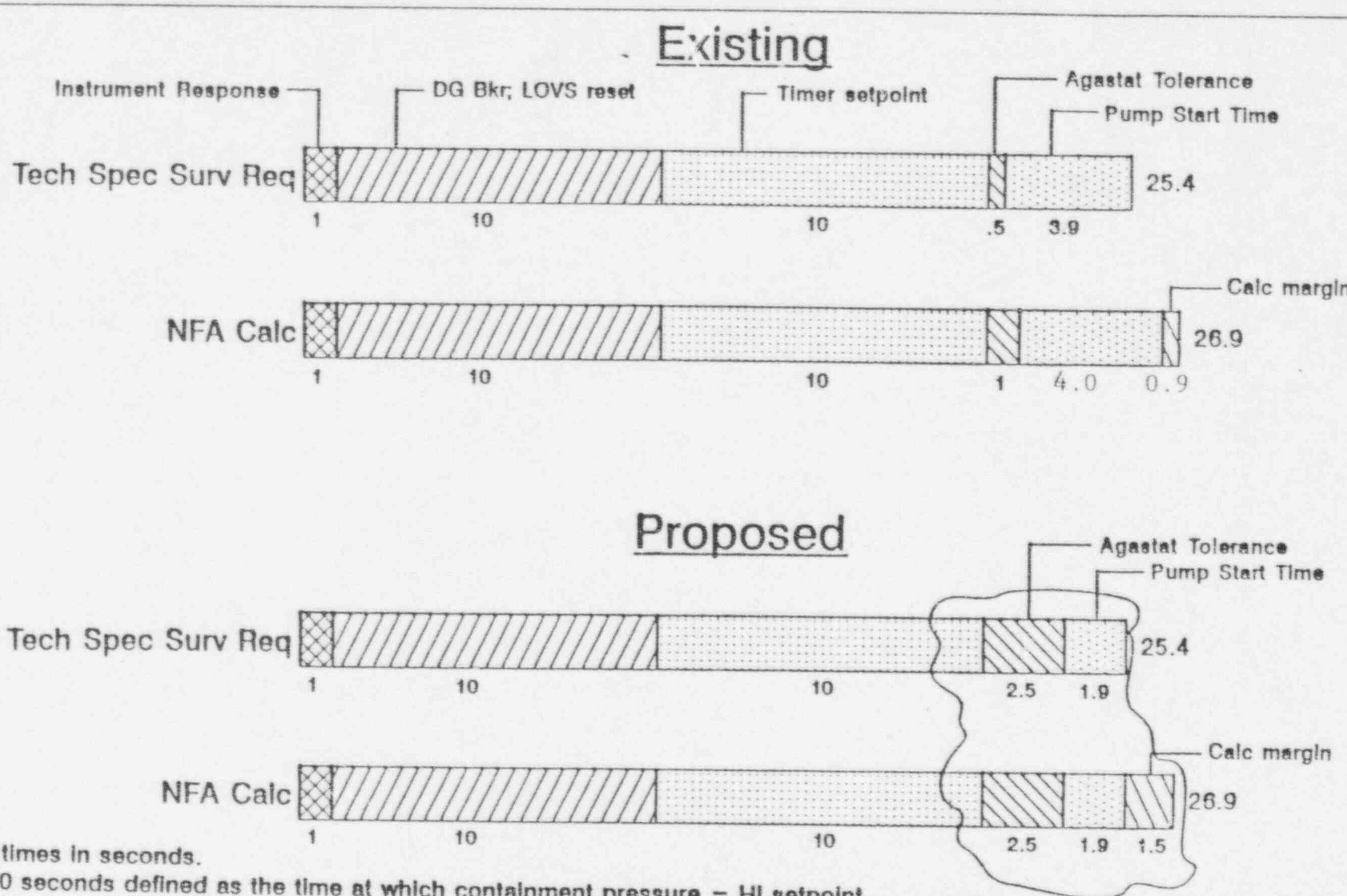
   Response: No

   The proposed change would expand the current surveillance acceptance criteria to more accurately reflect the characteristics of the installed plant equipment. The diesel generators (DG's) have sufficient capacity to maintain adequate voltage and frequency during load sequencing with the expanded tolerance. The overall Engineered Safety Features (ESF) response times in the Technical Specifications and safety analyses are maintained even though the timer tolerance is increased, therefore, the consequences of any accident previously evaluated are not increased. The DG load sequence timers are not of themselves a credible initiator of any accident, so the probability of an accident has not been increased. The timers will function acceptably to support the equipment needed for accident mitigation, so the consequences of an accident are not increased. Therefore, the probability or consequences of any accident previously evaluated is not increased.

Containment Spray Pump Response Time

Tech Spec Table 3.3-5

(TS Response Time Requirement is 25.4 seconds)



All times in seconds.

T=0 seconds defined as the time at which containment pressure = HI setpoint.

Agastat tolerance can be increased to ± 2.5 sec. Overall response time is unchanged.

FIGURE 2

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

   Response: No

   This amendment request does not involve any change to plant equipment or operation. In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the DG's in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA). Increasing the timer tolerance will not create the possibility of a new or different kind of accident from any previously evaluated.

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

   Response: No

   This amendment does not change the manner in which safety limits, limiting safety settings, or limiting conditions for operations are determined. The actual response times have not been altered by this amendment, therefore, operations will not be affected. Accordingly, this amendment will not involve a significant reduction in the margin of safety.

5.0 SAFETY AND SIGNIFICANT HAZARD DETERMINATION:

Based on the above Safety Analysis, it is concluded that: (1) the proposed change does not constitute a significant hazards consideration as defined by 10 CFR 50.92; and (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change. Moreover, because this action does not involve a significant hazards consideration, it will also not result in a condition which significantly alters the impact of the station on the environment as described in the NRC Final Environmental Statement.

6.0 REFERENCES

1. E4C-082 Rev 1, CCN N-3 System Dynamic Voltages During DBAs

2. Letter from S.D. Root to A.J. Thiel dated March 24, 1995,"Review of ESF Integrated Load Sequence Testing Design Response Time Requirements - Units 2 Cycle 8 San Onofre Nuclear Generating Station, Units 2&3"

3. System Impact Analysis [for NCR 93070031] by Kirk Wells, dated January 31, 1995.

4. N-4080-026 Suppl A Rev 0: LOCA Containment P/T

5. N-4080-027 Suppl A&B Rev 0: MSLB Containment P/T

6. N-4080-003 Rev 5: Containment Spray and Emergency Cooling Unit Actuation Times, CCN1