



Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37384-2000

September 30, 2004

TVA-SQN-TS-04-01

10 CFR 50.90

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

Gentlemen:

In the Matter of)	Docket Nos. 50-327
Tennessee Valley Authority)	50-328

SEQUOYAH NUCLEAR PLANT (SQN) - UNITS 1 AND 2 - TECHNICAL SPECIFICATION (TS) CHANGE NO. 04-01 - "NEW SPECIFICATION FOR LOSS OF POWER INSTRUMENTATION FOR EMERGENCY DIESEL GENERATOR AND AUXILIARY FEEDWATER ACTUATION"

Pursuant to 10 CFR 50.90, Tennessee Valley Authority (TVA) is submitting a request for a TS change (TS 04-01) to Licenses DPR-77 and DPR-79 for SQN Units 1 and 2. The proposed change will relocate the loss of power instrumentation for the emergency diesel generators (EDG) to a new limiting conditions for operation (LCO) section consistent with the requirements in the latest version of the standard TSs (NUREG-1431, Revision 3). This change will replace the setpoint and allowable values for the auxiliary feedwater loss of power start function by referring to the new proposed LCO. Included in this relocation is the addition of a maximum value for the 6.9-kilovolt shutdown board loss of voltage and degraded voltage sensors to protect against inadvertent actuation of the emergency diesel generators. This revision is consistent with NRC proposed and approved TSTF-365.

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TVA has determined that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosures to the Tennessee State Department of Public Health.

TVA does not have specific schedule needs for this proposed change and processing can be pursued as appropriate. TVA requests that the implementation of the revised TS be within 45 days of NRC approval.

There are no commitments contained in this submittal.

If you have any questions about this change, please contact me at (423) 843-7170 or Jim Smith at (423) 843-6672.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 30th day of September.

Sincerely,



P. L. Pace
Manager, Site Licensing
and Industry Affairs

Enclosures:

1. TVA Evaluation of the Proposed Changes
2. Proposed Technical Specifications Changes (mark-up)
3. Changes to Technical Specifications Bases Pages

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Enclosures

cc (Enclosures):

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

1.0 DESCRIPTION

This letter is a request to amend Operating License(s) DPR-77 and DPR-79 for SQN Units 1 and 2. The proposed change would relocate the requirements for the emergency diesel generator (EDG) start loss of power instrumentation and associated actions in the engineered safety features (ESF) tables to a new limiting conditions for operation (LCO) in the instrumentation section of the SQN technical specifications (TSs). In addition to the relocation, an upper allowable value has been added to the voltage sensors for loss of voltage and degraded voltage consistent with Technical Specification Task Force (TSTF) Item TSTF-365 along with a lower allowable value limit for the degraded voltage diesel generator start and load shed timer. The auxiliary feedwater (AFW) loss of power start setpoints and allowable values have been relocated to this new LCO.

This relocated function utilizes LCO requirements, actions, and surveillances that are consistent with current requirements or have been revised to be consistent with NUREG-1431 and NRC approved revisions. A new TS Bases section is provided for the new LCO. The proposed revision includes the necessary changes to the TS index for the relocated specifications. The proposed changes are consistent with the latest version of the standard technical specifications (TSs) (NUREG-1431, Revision 3) for SQN's loss of power function design.

2.0 PROPOSED CHANGE

The proposed change would remove Item 7 requirements for the loss of power functional unit in TS Tables 3.3-3, 3.3-4, and 4.3-2. A new LCO, TS Section 3.3.3.11 is generated along with TS Tables 3.3-14 and 4.3-10 to provide the loss of power requirements for the EDGs. The deletion of Item 7 of TS Table 3.3-3 removes the only item that utilized Action 34 and footnote ####, therefore; this action and footnote is deleted. The setpoint and allowable values for the AFW start functional unit in TS Table 3.3-4 have been deleted and replaced by a note that refers to the new TS Table 3.3-14 for the location of these values. The # footnote in TS Table 4.3-2 is removed along with the deletion of Item 7 as this was the only item that utilized this note. The TS index has been revised to reflect the new LCO.

The new TS 3.3.3.11 provides the same LCO requirements with two additions. The voltage sensors in TS Table 3.3-14 have been enhanced by adding the upper voltage limit for the allowable value. The new upper allowable value limit for the loss of voltage sensor is less than or equal to 5688 volts and for the degraded voltage sensor is less than or equal to 6522.5 volts. This is a completely new value for the loss of voltage function and replaces the current reset value for the degraded voltage function. This change for the degraded voltage allowable value limit is more conservative than the less than or equal to 6595.5 volt value currently required. The second addition is the inclusion of a lower allowable value limit for the degraded voltage start and load shed timer. There is no current value indicated and this revision will add a greater than or equal to 218.6 second lower allowable value limit. Proposed TS Table 3.3-14 combines the requirements found in current TS Tables 3.3-3 and 3.3-4. The new table only utilizes a required channels column in place of the minimum channels operable column. The new table does not include the total number of channels or the channels to trip columns currently found in TS Table 3.3-3. This change is consistent with the standard TSs recommendations for instrumentation functions that utilize a table representation. TVA is utilizing this table format to more clearly reflect the requirements for this instrumentation in lieu of the more general LCO provision in the standard TS for the loss of power diesel generator start function.

The applicability requirements are retained as currently required with only one exception. This is that the TS 3.0.4 exception for shutdown conditions has been removed based on TVA's request in TS Change 03-13. This request implements the latest standard TS recommendations for the application of TS 3.0.4 in accordance with TSTF-359, Revision 9 and NRC's associated consolidated line item improvement process. This change is more conservative by removing a permanent allowance that allows entry into applicable modes when features are not operable. TS Change 03-13 provides for mode changes only if a risk assessment was determined to be acceptable and the risk can be managed.

Proposed Actions a and b are the same as proposed for TS Table 3.3-3 in Action 34 by TS Change 02-01, Revision 1, previously submitted to NRC. TS Change 02-01, Revision 1 reduces the minimum channels operable requirement for timers that resulted in revised action wording to be consistent with this revision. The wording in Action b. has been rewritten in this proposed change to address the changes in the columns used in TS Table 3.3-14 described above. The resulting action requirements would be applied without change. Action c provides a clarification that each function in Table 3.3-14 can be entered separately. This provision is the same

as the current application of the existing TS requirements for this instrumentation. Action d. is a new provision that is included to improve the awareness that additional actions associated with the AFW instrumentation requirements could be impacted. If the inoperable instrumentation involves the loss of voltage functions this would also require the entry into Action 35 of TS Table 3.3-3. This provision helps ensure the evaluation of other potentially impacted functions but does not impact the application of actions for the loss of power function.

The surveillances for the proposed new LCO are consistent with the current surveillance requirements (SRs). The new SR 4.3.3.11.1 is the same as the current SR 4.3.2.1.1 with only the subject being modified to specifically indicate the loss of power diesel generator start instrumentation and the table reference being changed to reflect the new TS Table 4.3-10 that will apply. The current SR 4.3.2.1.2 is not applicable to the proposed LCO since there are no interlocks involved in the relocated functions. Therefore, no surveillance is proposed or is necessary to cover this provision. The new SR 4.3.3.11.2 is the same as the current SR 4.3.2.1.3 with only the elimination of the last portion of the last sentence that refers to the "Total Number of Channels" column. This portion of the surveillance is not applicable to the new LCO as the proposed TS Table 3.3-14 does not utilize a total number of channels column as previously discussed. This deletion will not affect surveillance implementation as the deleted portion only provided guidance for determining the number of channels. The requirements found in proposed TS Table 4.3-10 are identical to the current requirements for the loss of power DG start instrumentation.

In summary, the proposed change will relocate the requirements for the loss of power instrumentation to a new LCO that will retain the current requirements or provide more restrictive requirements in accordance with NRC-approved industry changes to the standard TSs. New upper allowable value limits for the voltage sensors and a new lower allowable value limit for a degraded voltage timer provide more conservative requirements to enhance the safety function provided by this instrumentation. Format changes incorporated with this revision will not alter the application of the requirements for this instrumentation. Safety functions for the loss of power DG and AFW start instrumentation are not adversely impacted by the proposed changes.

3.0 BACKGROUND

The automatic connection of the EDGs to the 6.9-kilo volt (kV) shutdown boards is initiated by either the loss-of-

voltage relays or the degraded voltage relays on the 6.9 kV bus. The AFW pump start is initiated by the loss-of-voltage relays only. A loss of voltage (< 80 percent) on the 6.9-kV shutdown board bus is detected by a two-out-of-three logic with a definite time delay, followed by trip of the normal and alternate feeder breaker, starts the EDG and AFW pumps and trips major 6900V and 480V shutdown board loads. When the EDG set has reached a speed of 850 rpm and design minimum voltage of 96.8 percent of nominal, it is automatically connected to the 6.9-kV shutdown board bus. The return of voltage to the 6.9-kV shutdown board initiates logic which connects the required loads. The standby (onsite) power system's automatic sequencing logic is designed to automatically connect the required loads in proper sequence should the logic receive an accident signal concurrent with a loss of all nuclear unit (through the unit station service transformers) and preferred power.

To protect the Class 1E buses from a sustained degraded undervoltage, each of the two 6.9-kV Class 1E buses per unit is provided with a set of three instantaneous solid-state undervoltage relays. These relays have a nominal setpoint of 6456V (93.5 percent of nominal). The relays are arranged in a two-out-of-three coincidence logic to initiate three simultaneous time delay sequences.

- (1) A time delay of 9.5 seconds is short enough to allow safety-related equipment to be powered within the time required by the safety analysis. At the end of 9.5 seconds if a safety injection signal has been initiated, or is subsequently initiated, the logic will trip the normal and alternate feeder breaker, start the EDG, and trip major 6900V and 480V shutdown board loads.
- (2) A time delay of 30 seconds will ride through normal system voltage transients before annunciating the undervoltage in the main control room.
- (3) A time delay of five minutes is long enough to allow operator action but not allow damage to connected safety-related equipment. At the end of five minutes, the logic will trip the normal and alternate feeder breaker, start the EDG and trip major 6900V and 480V shutdown board loads if the voltage has not returned to normal.

The loss-of-voltage/degraded voltage relays remain in the circuit at all times, regardless of the power feed (normal, alternate, or emergency) to the 6.9-kV shutdown board. If the loss-of-voltage/degraded voltage relays' voltage setpoint is reached, the proper operation includes:

1. Annunciate the 6.9-kV shutdown board failure or undervoltage condition.
2. Initiate an EDG emergency start signal and enable essential raw cooling water valve alignment and a start signal to the AFW pumps for loss-of-voltage.
3. To shed loads to be within the EDG capacity when the EDG automatically connects to the board.*
4. Allow the EDG to reach/recover speed and voltage.*
5. Reconnect the loads in the proper sequence.*

*If the board is being supplied from the EDG, an installed interlock circuit will prevent actions 3, 4, and 5 if the EDG output voltage is greater than 70 percent of nominal. This will prevent unnecessary load shedding during expected voltage transients during diesel loading.

These features are described in the Updated Final Safety Analysis Report Section 8.3.1 for the EDG and Section 10.4.7.2.5 for the AFW pumps.

The proposed changes to relocate the requirements for the loss of power instrumentation will continue to maintain these design functions. The addition of the upper and lower allowable value limits provides a more conservative set of values to ensure the safety functions are properly maintained. The proposed upper limits are consistent with NRC recommended and approved changes to the standard TSs. TVA will benefit from the proposed changes by having a more concise LCO for this function and by gaining more consistency with the standard TSs.

4.0 TECHNICAL ANALYSIS

The new LCO 3.3.3.11, "Loss of Power Diesel Generator Start Instrumentation," is the result of requirements moved from the ESF instrumentation specification and TS Tables 3.3-3, 3.3-4, and 4.3-2. The LCO requirements have been incorporated consistent with NUREG-1431 and utilizes information for applicability, required channels, nominal trip setpoint, and allowable values (Avs). The required channel provisions (currently minimum channels operable) for the voltage sensors and timers are not changed. However, the current columns for total number of channels and channels to trip are not utilized. The omission of these columns does not impact the implementation of the requirements for this instrumentation when considered in conjunction with minor wording modifications to the action requirements. Those action requirements that are currently based on total number of channels can be revised to meet the exact same

requirements when related to the minimum channels operable or the equivalent title in the proposed change of required channels. The applicability requirements are retained as currently required with only one exception. This is that the TS 3.0.4 exception for shutdown conditions has been removed based on TVA's request in TS Change 03-13. This request implements the latest standard TS recommendations for the application of TS 3.0.4 in accordance with TSTF-359, Revision 9 and NRC's associated consolidated line item improvement process. This change is more conservative by removing the permanent allowance that allows entry into applicable modes when the loss of power function is not operable for the required EDG in Modes 5 or 6. TS Change 03-13 provides for mode changes only if a risk assessment determines there is an acceptable level of risk and the risk can be managed. This is a more limiting requirement for entry into Modes 5 and 6 when these functions are not available. TS 3.0.4 continues to apply in Modes 1 through 4 without change from the current requirements.

The Avs for the loss of power functions has been enhanced in accordance with NUREG-1431 and TSTF Item 365. NRC proposed and approved a change to the NUREG that would add upper limits to the loss of voltage and degraded voltage limits. TVA has incorporated this provision to provide better control of the voltage sensor settings and ensure the accident mitigation capabilities. This change provides better assurance that unintended actuation of the AFW and EDG start circuitry will not occur. These new limits were developed using TVA setpoint methodology discussed below. For the degraded voltage relay function, a 25 percent margin allowance was incorporated into the upper analytical limit (UAL) determination. For the loss of voltage relay function, an intermediate value between the maximum and minimum Av was used since sufficient margin did not exist between the relay setpoint and the UAL to allow incorporation of a 25 percent loop accuracy (LAN) margin within the calculation of the Av.

From TVA Calculation 27DAT, Revision 5, the degraded voltage relay dropout UAL was determined by using the following equation:

$$\text{UAL} = \text{Setpoint} + \text{LAN} + \text{Margin}$$

Where the setpoint is 6456 volts, the LAN composed of the transformer and relay is 55.77 volts and margin is defined as 25 percent of LAN for conservatism. Therefore;

$$\text{UAL} = 6456 + 55.77 + 13.94 \text{ volts}$$

$$\text{UAL} = 6526 \text{ volts (rounded up)}$$

The Av was determined by the TVA setpoint methodology using the following equation:

$$Av = UAL - (LAN - LANf)$$

Where LANf is defined as the relay normal measurable accuracy of 52.29 volts. The above equation represents a determination of the maximum allowable value since a margin of 25 percent LAN has already been incorporated within the determination of the above UAL value. Therefore;

$$Av = 6526 - (55.77 - 52.29) \text{ volts}$$

$$Av = 6522.5 \text{ volts}$$

Based on the above, the TS Av for the 6.9-kV shutdown board degraded voltage is 6522.5 volts.

From TVA Calculation 27DAT, Revision 5, the loss of voltage relay Av was determined by using the TVA methodology for the maximum and minimum allowable values. The intermediate value was chosen which is conservative compared to using maximum allowable value. The maximum and minimum Avs were determined utilizing the following TVA setpoint methodology equations:

For a decreasing setpoint maximum Av determination;

$$Av_{(max)} = UAL + (LAN - LANf)$$

For a decreasing setpoint minimum Av determination;

$$Av_{(min)} = \text{Setpoint} - LANf$$

The above equation for $Av_{(max)}$;

$$Av_{(max)} = UAL - (LAN - LANf_{\text{relay}})$$

$$Av_{(max)} = 5700 - (159.45 - 158.59)$$

$$Av_{(max)} = 5699.14 \text{ Volts}$$

$$Av_{(min)} = \text{Setpoint} + LANf_{\text{relay}}$$

$$Av_{(min)} = 5520 + 159.45$$

$$Av_{(min)} = 5678.59 \text{ Volts}$$

The intermediate Av value is determined as follows;

$$Av_{(int)} = \frac{Av_{(max)} + Av_{(min)}}{2}$$

$$Av_{(int)} = \frac{5699.14 + 5678.59}{2}$$

$$Av_{(int)} = 5688.9 \text{ Volts}$$

Based on the above, the 6.9-kV shutdown board loss of voltage Av will be defined as 5688 Volts (rounded down for conservatism).

In conjunction with this change, a lower time limit for the degraded voltage time delay has been added. Currently, only a maximum allowable value is utilized and this change will ensure that unintended actuations for degraded voltage will not occur when not necessary. This is not a change to the analysis and only adds the value that has been verified and used even though not previously included in the TSs. The time delay functions for the other timers currently have upper and lower limits and retain these limits in the proposed changes.

The action requirements are the same as proposed in TS Change 02-01, Revision 1 for inoperable voltage sensors and timers. The actions have been slightly reworded to accommodate the use of a required channels column in Table 3.3-14. Specifically, where the actions referred to "Total Number of Channels" they now refer to "Required Channels." In addition, since the timers only require one channel, Action b has requirements for more than one voltage sensor or one timer less than the "Required Channels" inoperable that was not necessary with the current table representation. This rewording does not alter the application of the action and provides identical requirements.

A provision is being added to allow separate entry into the actions for each function. This change is consistent with NUREG-1431 and does not impact the ability to initiate the start of the EDGs or AFW pumps when needed for accident mitigation. TVA currently applies these requirements in a manner consistent with this provision and the specific inclusion of this action only serves to clarify the allowance. This change does not alter current application of the TS requirements. An additional action is being added to this LCO that is not addressed in the current SQN specifications or NUREG-1431. This action is a reminder that some of these voltage sensors and timers provide a start function for the AFW pumps and requires the evaluation of applicable action in the ESF instrumentation specification. By adding this action to the LCO for EDG start instrumentation, any inoperability that could also affect the AFW system will also be considered as applicable. This is a conservative change that will help to ensure the entry into applicable TS requirements.

SRs for the loss of power diesel start instrumentation have not been altered from the current requirements for channel check, channel calibrations, and functional tests. These requirements differ slightly from the NUREG because of specific SQN plant design. In particular, there is no indication on the voltage sensors or timers to allow performance of a channel check; therefore, a channel check is not applicable in the current or proposed requirements. Channel calibration and functional tests are consistent with the NUREG requirements and utilize the same refueling and monthly frequencies, respectively. The current response time SRs are maintained consistent with the current licensing basis. This surveillance is more restrictive than the NUREG-1431 recommendations and provides assurance that the system will actuate within the necessary time limits to support the safety function. The proposed SRs do not alter the current requirements and the wording changes are administrative and only serve to accommodate the format of the new LCO.

Conclusion

The proposed loss of power instrumentation changes provide acceptable limits to ensure accident mitigation and safety functions are available and capable of performing their intended function. The proposed changes implement equivalent or more conservative requirements as compared to the current provisions. Requirements that retain current licensing basis requirements and are less restrictive than those in NUREG-1431 are acceptable based on the discussions provided. Overall, the proposed changes are acceptable and adequately maintain required safety functions.

5.0 REGULATORY SAFETY ANALYSIS

This letter is a request to amend Operating Licenses DPR-77 and DPR-79 for Sequoyah Nuclear Plant (SQN) Units 1 and 2. The proposed change would relocate the requirements for the emergency diesel generator (EDG) start loss of power instrumentation and associated actions in the engineered safety features (ESF) tables to a new limiting conditions for operation (LCO) in the instrumentation section of the SQN technical specifications (TSs). In addition to the relocation, an upper allowable value has been added to the voltage sensors for loss of voltage and degraded voltage consistent with Technical Specification Task Force (TSTF) Item TSTF-365 along with a lower allowable value limit for the degraded voltage diesel generator start and load shed timer. The auxiliary feedwater (AFW) loss of power start setpoints and allowable values have been relocated to this new LCO.

This relocated function utilizes revised LCO requirements, actions, and surveillances that are consistent with current requirements or have been revised to be consistent with Standard Technical Specification - Westinghouse Plants (NUREG-1431) and U.S. Nuclear Regulatory Commission (NRC) approved revisions. A new TS Bases section is provided for the new LCO. The proposed revision includes the necessary changes to the TS index for the relocated specifications. The proposed changes are consistent with the latest version of the standard technical specifications (TSS) (NUREG-1431, Revision 3) for SQN's loss of power function design.

5.1 No Significant Hazards Consideration

TVA has evaluated whether or not a significant hazards consideration is involved with the proposed amendments by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below:

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

Response: No.

The relocation and enhancement of the loss of power functions to a new LCO does not alter the intended functions of this feature or physically alter these systems. Changes to Avs have been evaluated in accordance with TVA setpoint methodology and have been verified to acceptably protect the associated safety limits. Format changes provide a clearer representation of the requirements and provide more consistency with the standard TSS in NUREG-1431. The EDG and AFW start functions provided by this instrumentation are utilized for the mitigation of accident conditions and are not considered to be a potential source for accident generation. Additionally, these start functions are enhanced by the addition of an upper allowable value limit such that the accident mitigation functions are not challenged unnecessarily. This further assures the ability to mitigate accidents and maintain acceptable offsite dose limits. These changes continue to support or improve the required safety functions; therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

Response: No.

The proposed changes for the loss of power instrumentation will not alter plant processes, components, or operating practices. The function to start the EDGs and AFW pumps on a loss of voltage or degraded voltage to the shutdown boards will not be altered by the proposed change. Additionally, the EDGs and AFW system is not considered to be a source for the generation of postulated accidents. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

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

Response: No.

The proposed changes do not alter any plant settings or functions that are utilized to mitigate accident conditions. The enhanced allowable values for the voltage sensors help to prevent unnecessary actuation of mitigation systems to ensure their ability to respond to actual accident conditions. The parameters that ensure the required margin of safety will be maintained with the proposed changes or improved. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, TVA concludes that the proposed amendment(s) present no significant hazards consideration under the standards set forth in 10 CFR 50.92(c); accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

Section 182a of the Atomic Energy Act requires applicants for nuclear power plant operating licenses to include TSs as part of the license. The Commission's regulatory requirements related to the content of the TSs are contained in Title 10, Code of Federal Regulations (10 CFR), Section 50.36. The TS requirements in 10 CFR 50.36 include the following categories: (1) safety limits, limiting safety systems settings and control settings; (2) limiting conditions for operation (LCO); (3) surveillance requirements; (4) design features; and (5) administrative controls. The requirements for the loss of power EDG and AFW

start functions are included in the TSs in accordance with 10 CFR 50.36(c) (2), "Limiting Conditions for Operation."

As stated in 10 CFR 50.59(c) (1) (i), a licensee is required to submit a license amendment pursuant to 10 CFR 50.90 if a change to the TSs is required. Furthermore, the requirements of 10 CFR 50.59 necessitate that the U.S. Nuclear Regulatory Commission (NRC) approve the TS changes before the TS changes are implemented. TVA's submittal meets the requirements of 10 CFR 50.59(c) (1) (i) and 10 CFR 50.90.

Standard Technical Specification - Westinghouse Plants (NUREG-1431) Revision 3 provides the recommendations for TS requirements associated with the Westinghouse Electric Company designed plants. These recommendations are modified by NRC-approved technical specification task force (TSTF) changes that will be incorporated in the next revision of NUREG-1431. The NUREG-1431 recommendations for loss of power EDG and AFW start functions, NUREG-1431, Revision 3, Specification 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation," includes equivalent provisions for this function in consideration of the specific design of the SQN units. In particular, the requirements are the same except for placing a channel in trip, which is not provided for in the SQN design, and the channel check which cannot be achieved with the SQN instrumentation. In addition, NRC-approved changes to the NUREG in TSTF-365 have been incorporated to add upper allowable value limits to the voltage sensor functions. Therefore, the proposed changes meet the recommendations of NUREG-1431, Revision 3 that incorporated TSTF-365, within the system capabilities of the SQN design.

10 CFR 50, Appendix A, General Design Criteria (GDC) 17, "Electric Power Systems" and GDC 18 "Inspection and Testing of Electrical Power Systems" apply to the EDG loss of power start function. GDC 17 provides criteria for onsite and offsite electrical power systems. This includes requirements to ensure the availability of sufficient power to maintain fuel design limits. GDC 18 provides requirements to verify these functions are able to perform required safety functions. The loss of power start function is used to transfer safety-related shutdown power from the offsite power system to the onsite system in the event inadequate voltage conditions occur. The proposed changes do not alter this function as they retain the current requirements and add a more conservative upper limit for the voltage sensors. Since all functions are retain within current requirements or

enhanced, the requirements of GDC 17 and 18 will continue to be satisfied.

Regulatory Guide (RG) 1.108, "Periodic Testing of Diesel Generators Used as Onsite Power Systems at Nuclear Power Plants" provides recommendations for testing EDG systems to ensure that safety functions can be achieved. These recommendations include surveillance testing that verifies automatic start and loading of the EDG in the event of a loss of power at the shutdown board. The proposed changes to the loss of power EDG start function do not alter surveillance requirements or alter the instrumentation and setpoints for actuation of this feature. The addition of an upper allowable value limit minimizes unnecessary starts of the EDG when not required and would serve to ensure the reliability of the EDGs. Since the testing aspects of the EDG systems are not affected by this change, compliance with the recommendations of RG 1.108 is not impacted.

GDC 34, "Residual Heat Removal," GDC 44, "Cooling Water," and GDC 46, "Testing of Cooling Water System" provide requirements for the AFW system operation and testing. GDC 34 and GDC 44 describe the attributes for decay heat removal and cooling water systems that provide this function and are to be available with or without offsite power. The loss of power instrumentation supports the transfer of power from the offsite power system to the onsite system to satisfy this requirement. GDC 46 provides the requirements for testing cooling water systems to ensure essential features, such as the loss of power start function, can be verified to be available. These requirements ensure that the cooling requirements to maintain the fuel design limits can be achieved in response to postulated accidents. The proposed changes to the loss of power function will not alter the equipment, testing, or operation of this feature. The additional allowable value limits will enhance the reliability of the loss of power function by ensuring that start functions will only be challenged for valid conditions. Therefore, the proposed changes will continue to satisfy the requirements of GDC 34, 44, and 46.

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

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 50.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. NUREG-1431, Revision 3, dated June 2004, "Standard Technical Specifications - Westinghouse Plants."
2. 10 CFR Part 50, Appendix A, General Design Criterion 17, "Electric Power Systems."
3. 10 CFR Part 50, Appendix A, General Design Criterion 18, "Inspection and Testing of Electrical Power Systems."
4. Regulatory Guide 1.108, "Periodic Testing of Diesel Generators Used as Onsite Power Systems at Nuclear Power Plants."
5. 10 CFR Part 50, Appendix A, General Design Criterion 34, "Residual Heat Removal."
6. 10 CFR Part 50, Appendix A, General Design Criterion 44, "Cooling Water."
7. 10 CFR Part 50, Appendix A, General Design Criterion 46, "Testing of Cooling Water System."

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
SEQUOYAH PLANT (SQN)
UNITS 1 and 2

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS 04-01
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3/4	3-27b	3/4	3-27b
3/4	3-37	3/4	3-37
3/4	3-37a	3/4	3-38
3/4	3-38	3/4	3-39

II. MARKED PAGES

See attached.

INSERT 1 (Unit 1)

LOSS OF POWER DIESEL GENERATOR START
INSTRUMENTATION3/4 3-76

INSERT 2 (Unit 2)

LOSS OF POWER DIESEL GENERATOR START
INSTRUMENTATION3/4 3-74

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Add Insert 1

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
↓ 7. <i>This Functional Unit has been deleted.</i>					
7. LOSS OF POWER					
a. 6.9 kv Shutdown Board					
Loss of Voltage					
1. Voltage Sensors	3/shutdown-board	2/shutdown-board	3/shutdown-board	1, 2, 3, 4, 5^{####}, 6^{####}	34
2. Diesel Generator Start and Load Shed Timer	2/shutdown-board	1/shutdown-board	2/shutdown-board	1, 2, 3, 4, 5^{####}, 6^{####}	34
b. 6.9 kv Shutdown Board					
Degraded Voltage					
1. Voltage Sensors	3/shutdown-board	2/shutdown-board	3/shutdown-board	1, 2, 3, 4, 5^{####}, 6^{####}	34
2. Diesel Generator Start and Load Shed Timer	2/shutdown-board	1/shutdown-board	2/shutdown-board	1, 2, 3, 4, 5^{####}, 6^{####}	34
3. SI/Degraded Voltage Logic Enable Timer	2/shutdown-board	1/shutdown-board	2/shutdown-board	1, 2, 3, 4	34
8. ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INTERLOCKS					
a. Pressurizer Pressure-P-11/Not P-11	3	2	2	1, 2, 3	22a
b. Deleted					
c. Steam Generator Level P-14	3/loop	2/loop any loop	3/loop	1, 2	22c

TABLE 3.3-3 (Continued)

TABLE NOTATION

Trip function may be bypassed in this MODE below P-11 (Pressurizer Pressure Block of Safety Injection) setpoint.

Trip function automatically blocked above P-11 and may be blocked below P11 when Safety Injection on Steam Line Pressure-Low is not blocked.

~~When Associated Diesel Generator is required to be OPERABLE by LCO 3.8.1.2, "AC Sources Shutdown." The Provisions of Specification 3.0.4 are not applicable.~~

* The provisions of Specification 3.0.4 are not applicable.

ACTION STATEMENTS

- ACTION 15 - With the number of OPERABLE Channels one less than the Total Number of Channels, be in at least HOT STANDBY within 12 hours and in COLD SHUTDOWN within the following 30 hours; however, one channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.3.2.1.1 provided the other channel is OPERABLE.
- ACTION 16 - Deleted.
- ACTION 17 - With the number of OPERABLE Channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:
- a. The inoperable channel is placed in the tripped condition within 6 hours.
 - b. The Minimum Channels OPERABLE requirements is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.2.1.1.
- ACTION 18 - With the number of OPERABLE Channels one less than the Total Number of Channels, operation may proceed provided the inoperable channel is placed in the bypassed condition within 6 hours and the Minimum Channels OPERABLE requirement is met; one additional channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.3.2.1.1.
- ACTION 19 - With less than the Minimum Channels OPERABLE, operation may continue provided the containment purge supply and exhaust valves are maintained closed.
- ACTION 20 - With the number of OPERABLE Channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

This table affected by previously submitted TS Change 02-01, Revision 1

TABLE 3.3-3 (Continued)

- ACTION 21 - With less than the Minimum Number of Channels OPERABLE, declare the associated auxiliary feedwater pump inoperable, and comply with the ACTION requirements of Specification 3.7.1.2.
- ACTION 22 - With less than the Minimum Number of Channels OPERABLE, declare the interlock inoperable and verify that all affected channels of the functions listed below are OPERABLE or apply the appropriate ACTION statement(s) for those functions. Functions to be evaluated are:
- a. Safety Injection
Pressurizer Pressure
Steam Line Pressure
Negative Steam Line Pressure Rate
 - b. Deleted
 - c. Turbine Trip
Steam Generator Level High-High
Feedwater Isolation
Steam Generator Level High-High
- ACTION 23 - With the number of OPERABLE channels one less than the Total Number of Channels, be in at least HOT STANDBY within 6 hours and in at least HOT SHUTDOWN within the following 6 hours; however, one channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.2.1.1.
- ACTION 24 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within 6 hours and in at least HOT SHUTDOWN within the following 6 hours.
- ACTION 25 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or declare the associated valve inoperable and take the ACTION required by Specification 3.7.1.5.

- ↓ Deleted**
- ACTION 34 - a. ~~With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 6 hours or enter applicable Limiting Condition(s) For Operation and Action(s) for the associated diesel generator set made inoperable by the channel.~~
- b. ~~With the number of OPERABLE channels less than the Total Number of Channels by more than one, restore all but one channel to OPERABLE status within 1 hour or enter applicable Limiting Condition(s) For Operation and Action(s) for the associated diesel generator set made inoperable by the channels.~~

This table affected by previously submitted TS Change 02-01, Revision 1

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

<u>FUNCTIONAL UNIT</u>	<u>TRIP SETPOINT</u>	<u>ALLOWABLE VALUES</u>
ii. RCS Loop ΔT Equivalent to Power > 50% RTP		
Coincident with Steam Generator Water Level-- Low-Low (Adverse) and	≥ 15.0% of narrow range instrument span	≥ 14.4% of narrow range instrument span
Containment Pressure (EAM) or	≤ 0.5 psig	≤ 0.6 psig
Steam Generator Water Level-- Low-Low (EAM)	≥ 10.7% of narrow range instrument span	≥ 10.1% of narrow range instrument span
d. S.I.	See 1 above (all SI Setpoints)	
e. Loss of Power Start	↓ Refer to Function 1 of Table 3.3-14 for setpoints and allowable values.	
1. Voltage Sensors		
2. Load Shed Timer		
f. Trip of Main Feedwater Pumps	N.A.	N.A.
g. Auxiliary Feedwater Suction Pressure-Low	≥ 3.21 psig (motor driven pump) ≥ 13.9 psig (turbine driven pump)	≥ 2.44 psig (motor driven pump) ≥ 12 psig (turbine driven pump)
h. Auxiliary Feedwater Suction Transfer Time Delays	4 seconds (motor driven pump) 5.5 seconds (turbine driven pump)	4 seconds ±0.4 (motor driven pump) seconds 5.5 seconds ±0.55 seconds (turbine driven pump)

This table affected by previously submitted TS Change 02-01

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

<u>FUNCTIONAL UNIT</u>	<u>TRIP SETPOINT</u>	<u>ALLOWABLE VALUES</u>
7. This Functional Unit has been deleted. 7. LOSS OF POWER a. 6.0 kv Shutdown Board Undervoltage Loss of Voltage 1. Voltage Sensors	≥ 5520 volts	≥ 5331 volts
2. Diesel Generator Start and Load Shed Timer	1.25 seconds	1.25 ± 0.25 seconds
b. 6.0 kv Shutdown Board Degraded Voltage 1. Voltage Sensors	6456 volts	≥ 6403.5 volts (dropout) ≤ 6595.5 volts (reset)
2. Diesel Generator Start and Load Shed Timer	≤ 300 seconds	≤ 370 seconds
3. S/Degraded Voltage Logic Enable Timer	0.5 seconds	0.5 ± 2.0 seconds
8. ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INTERLOCKS		
a. Pressurizer Pressure		
1. Not P-11, Automatic Unblock of Safety Injection on Increasing Pressure	≤ 1970 psig	≤ 1975.2 psig
2. P-11, Enable Manual Block of Safety Injection on Decreasing Pressure	≥ 1962 psig	≥ 1956.8 psig

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION
SURVEILLANCE REQUIREMENTS

<u>FUNCTIONAL UNIT</u>	<u>CHANNEL CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES FOR WHICH SURVEILLANCE REQUIRED</u>
c. Main Steam Generator Water Level--Low-Low				
1. Steam Generator Water Level--Low-Low (Adverse)	S	R	Q	1, 2, 3
2. Steam Generator Water Level--Low-Low (EAM)	S	R	Q	1, 2, 3
3. RCS Loop ΔT	S	R	Q	1, 2, 3
4. Containment Pressure (EAM)	S	R	Q	1, 2, 3
d. S.I.	See 1 above (all SI surveillance requirements)			
e. Loss of Power Start				
1. Voltage Sensors	N.A.	R	M	1, 2, 3
2. Load Shed Timer	N.A.	R	N.A.	1, 2, 3
f. Trip of Main Feedwater Pumps	N.A.	N.A.	R	1, 2
g. Auxiliary Feedwater Suction Pressure-Low	N.A.	R	N.A.	1, 2, 3
h. Auxiliary Feedwater Suction Transfer Time Delays	N.A.	R	N.A.	1, 2, 3
↓ 7. <i>This Functional Unit has been deleted.</i>				
7. LOSS OF POWER-				
a. 6.9 kv Shutdown Board-				
— Loss of Voltage-				
1. Voltage Sensors	N.A.	R	M	1, 2, 3, 4, 5#, 6#
2. Diesel Generator Start and Load Shed Timer	N.A.	R	N.A.	1, 2, 3, 4, 5#, 6#

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION
SURVEILLANCE REQUIREMENTS

<u>FUNCTIONAL UNIT</u>	<u>CHANNEL CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES FOR WHICH SURVEILLANCE REQUIRED</u>
b. 6.9 kv Shutdown Board - Degraded Voltage				
1. Voltage Sensors	N.A.	R	M	1, 2, 3, 4, 5[#], 6[#]
2. Diesel Generators Start and Load Shed Timer	N.A.	R	N.A.	1, 2, 3, 4, 5[#], 6[#]
3. S/Degraded Voltage Logic - Enable Timer	N.A.	R	N.A.	1, 2, 3, 4
8. ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INTERLOCKS				
a. Pressurizer Pressure, P-11/Not P-11	N.A.	R(2)	N.A.	1, 2, 3
b. Deleted				
c. Steam Generator Level, P-14	N.A.	R(2)	N.A.	1, 2
9. AUTOMATIC SWITCHOVER TO CONTAINMENT SUMP				
a. RSWT Level - Low COINCIDENT WITH Containment Sump Level - High AND Safety Injection	S	R	Q	1, 2, 3, 4
	S	R	Q	1, 2, 3, 4
	(See 1 above for all Safety Injection Surveillance Requirements)			
b. Automatic Actuation Logic	N.A.	N.A.	M(1)	1, 2, 3, 4

TABLE 4 .3-2 (Continued)

TABLE NOTATION

~~When associated diesel generator is required to be OPERABLE by LCO 3.8.1.2, "AC Sources Shutdown."~~

- (1) Each train or logic channel shall be tested at least every 62 days on a STAGGERED TEST BASIS.
- (2) The total interlock function shall be demonstrated OPERABLE during CHANNEL CALIBRATION testing of each channel affected by interlock operation.

New Page

INSTRUMENTATION

LOSS OF POWER (LOP) DIESEL GENERATOR (DG) START INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.11 The LOP DG start instrumentation for each function in Table 3.3-14 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4,
When associated DG is required to be OPERABLE by LCO 3.8.1.2, "AC Sources - Shutdown."

ACTION:

- a. With the number of OPERABLE channels one less than the Required Channels for voltage sensors, restore the inoperable channel to OPERABLE status within 6 hours or enter applicable Limiting Condition(s) For Operation and Action(s) for the associated DG set made inoperable by the channel.
- b. With the number of OPERABLE channels less than the Required Channels by more than one for voltage sensors or with the number of OPERABLE channels one less than the Required Channels for timers, restore all but one channel of voltage sensors and at least one timer for each function to OPERABLE status within 1 hour or enter applicable Limiting Condition(s) For Operation and Action(s) for the associated DG set made inoperable by the channels.
- c. Separate entry is allowed for each function.
- d. Enter applicable Actions of LCO 3.3.2, "Engineered Safety Feature Actuation System Instrumentation," for Auxiliary Feedwater Loss of Power Start Instrumentation made inoperable by LOP DG Start Instrumentation.

SURVEILLANCE REQUIREMENTS

4.3.3.11.1 Each LOP DG Start Instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION, and CHANNEL FUNCTIONAL TEST operations for the MODES and at the frequencies shown in Table 4.3-10.

4.3.3.11.2 The ENGINEERED SAFETY FEATURES RESPONSE TIME of each LOP DG Start Instrumentation function shall be verified to be within the limit at least once per 18 months. Each verification shall include at least one train such that both trains are verified at least once per 36 months and one channel per function such that all channels are verified at least once every N times 18 months where N is the total number of redundant channels.

New Page

TABLE 3.3-14

LOSS OF POWER DIESEL GENERATOR START INSTRUMENTATION

<u>FUNCTIONAL UNIT</u>	<u>APPLICABLE MODES OR CONDITIONS</u>	<u>REQUIRED CHANNELS</u>	<u>NOMINAL TRIP SETPOINT</u>	<u>ALLOWABLE VALUES</u>
1. 6.9 kv Shutdown Board - Loss of Voltage				
a. Voltage Sensors	1, 2, 3, 4, #	3/Shutdown Board	5520	≥ 5331 volts and ≤ 5688 volts
b. Diesel Generator Start and Load Shed Timer	1, 2, 3, 4, #	2/Shutdown Board	1.25 seconds	1.25 ± 0.25 seconds
2. 6.9 kv Shutdown Board - Degraded Voltage				
a. Voltage Sensors	1, 2, 3, 4, #	3/Shutdown Board	6456 volts	≥ 6403.5 volts and ≤ 6522.5 volts
b. Diesel Generator Start and Load Shed Timer	1, 2, 3, 4, #	2/Shutdown Board	300 seconds	≥ 218.6 seconds and ≤ 370 seconds
c. SI/Degraded Voltage Logic Enable Timer	1, 2, 3, 4	2/Shutdown Board	9.5 seconds	9.5 ± 2.0 seconds

*These items affected by
proposed TS Change 02-01,
Revision 1*

When associated DG is required to be OPERABLE by LCO 3.8.1.2, "AC Sources - Shutdown."

New Page

TABLE 4.3-10

LOSS OF POWER DIESEL GENERATOR START INSTRUMENTATION
SURVEILLANCE REQUIREMENTS

<u>FUNCTIONAL UNIT</u>	<u>CHANNEL CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES FOR WHICH SURVEILLANCE REQUIRED</u>
1. 6.9 kv Shutdown Board - Loss of Voltage				
a. Voltage Sensors	N.A.	R	M	1, 2, 3, 4, #
b. Diesel Generator Start and Load Shed Timer	N.A.	R	N.A.	1, 2, 3, 4, #
2. 6.9 kv Shutdown Board - Degraded Voltage				
a. Voltage Sensors	N.A.	R	M	1, 2, 3, 4, #
b. Diesel Generators Start and Load Shed Timer	N.A.	R	N.A.	1, 2, 3, 4, #
c. SI/Degraded Voltage Logic Enable Timer	N.A.	R	N.A.	1, 2, 3, 4

When associated DG is required to be OPERABLE by LCO 3.8.1.2, "AC Sources - Shutdown."

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Add Insert 2

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION

<u>FUNCTIONAL UNIT</u>	<u>TOTAL NO. OF CHANNELS</u>	<u>CHANNELS TO TRIP</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABLE MODES</u>	<u>ACTION</u>
↓ 7. <i>This Specification has been deleted.</i>					
7. LOSS OF POWER					
a. 6.9 kv Shutdown Board Loss of Voltage					
1. Voltage Sensors	3/shutdown-board	2/shutdown-board	3/shutdown-board	1, 2, 3, 4, 5^{####}, 6^{####}	34
2. Diesel Generator Start and Load Shed Timer	2/shutdown-board	1/shutdown-board	2/shutdown-board	1, 2, 3, 4, 5^{####}, 6^{####}	34
b. 6.9 kv Shutdown Board Degraded Voltage					
1. Voltage Sensors	3/shutdown-board	2/shutdown-board	3/shutdown-board	1, 2, 3, 4, 5^{####}, 6^{####}	34
2. Diesel Generator Start and Load Shed Timer	2/shutdown-board	1/shutdown-board	2/shutdown-board	1, 2, 3, 4, 5^{####}, 6^{####}	34
3. S/Degraded Voltage Logic Enable Timer	2/shutdown-board	1/shutdown-board	2/shutdown-board	1, 2, 3, 4	34

TABLE 3.3-3 (Continued)

TABLE NOTATION

Trip function may be bypassed in this MODE below P-11 (Pressurizer Pressure Block of Safety Injection) setpoint.

Trip function automatically blocked above P-11 and may be blocked below P-11 when Safety Injection on Steam Line Pressure-Low is not blocked.

~~### When Associated Diesel Generator is required to be OPERABLE by LCO 3.8.1.2, "AC Sources Shutdown." The Provisions of Specification 3.0.4 are not applicable.~~

* The provisions of Specification 3.0.4 are not applicable.

ACTION STATEMENTS

ACTION 15 - With the number of OPERABLE Channels one less than the Total Number of Channels, be in HOT STANDBY within 12 hours and in COLD SHUTDOWN within the following 30 hours; however, one channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.3.2.1.1 provided the other channel is OPERABLE.

ACTION 16 - Deleted.

ACTION 17 - With the number of OPERABLE Channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

- a. The inoperable channel is placed in the tripped condition within 6 hours.
- b. The Minimum Channels OPERABLE requirements is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.2.1.1.

ACTION 18 - With the number of OPERABLE Channels one less than the Total Number of Channels, operation may proceed provided the inoperable channel is placed in the bypassed condition within 6 hours and the Minimum Channels OPERABLE requirement is met; one additional channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.3.2.1.1.

ACTION 19 - With less than the Minimum Channels OPERABLE, operation may continue provided the containment purge supply and exhaust valves are maintained closed.

ACTION 20 - With the number of OPERABLE Channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

TABLE 3.3-3 (Continued)

- ACTION 21 - With less than the Minimum Number of Channels OPERABLE, declare the associated auxiliary feedwater pump inoperable, and comply with the ACTION requirements of Specification 3.7.1.2.
- ACTION 22- With less than the Minimum Number of Channels OPERABLE, declare the interlock inoperable and verify that all affected channels of the functions listed below are OPERABLE or apply the appropriate ACTION statement(s) for those functions. Functions to be evaluated are:
- a. Safety Injection
Pressurizer Pressure
Steam Line Pressure
Negative Steam Line Pressure Rate
 - b. Deleted
 - c. Turbine Trip
Steam Generator Level High-High
Feedwater Isolation
Steam Generator Level High-High
- ACTION 23 - With the number of OPERABLE channels one less than the Total Number of Channels, be in at least HOT STANDBY within 6 hours and in at least HOT SHUTDOWN within the following 6 hours; however, one channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.2.1.1.
- ACTION 24 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within 6 hours and in at least HOT SHUTDOWN within the following 6 hours.
- ACTION 25- With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or declare the associated valve inoperable and take the ACTION required by Specification 3.7.1.5.
- ↓ Deleted
- ACTION 34 - ~~a. With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 6 hours or enter applicable Limiting Condition(s) For Operation and Action(s) for the associated diesel generator set made inoperable by the channel.~~
- ~~b. With the number of OPERABLE channels less than the Total Number of Channels by more than one, restore all but one channel to OPERABLE status within 1 hour or enter applicable Limiting Condition(s) For Operation and Action(s) for the associated diesel generator set made inoperable by the channels.~~

This table affected by previously submitted TS Change 02-01, Revision 1

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

<u>FUNCTIONAL UNIT</u>	<u>TRIP SETPOINT</u>	<u>ALLOWABLE VALUES</u>
ii. RCS Loop ΔT Equivalent to Power > 50% RTP		
Coincident with Steam Generator Water Level--Low-Low (Adverse) and Containment Pressure (EAM)	≥ 15.0% of narrow range instrument span	≥14.4% of narrow range instrument span
or Steam Generator Water Level--Low-Low (EAM)	≤ 0.5 psig	≤0.6 psig
	≥ 10.7% of narrow range instrument span	≥10.1% of narrow range instrument span
d. S.I.	See 1 above (all SI Setpoints)	
e. Loss of Power Start	<p style="text-align: center;">↓ <i>Refer to Function 1 of Table</i> ≥ 5520 volts and allowable values.</p>	
1. Voltage Sensors	≥ 5520 volts	≥ 5334 volts
2. Load Shed Timer	1.25 seconds	1.25 ± 0.25 seconds
f. Trip of Main Feedwater Pumps	N.A.	N.A.
g. Auxiliary Feedwater Suction Pressure-Low	≥ 3.21 psig (motor driven pump) ≥ 13.9 psig (turbine driven pump)	≥ 2.44 psig (motor driven pump) ≥ 12 psig (turbine driven pump)
h. Auxiliary Feedwater Suction Transfer Time Delays	4 seconds (motor driven pump) 5.5 seconds (turbine driven pump)	4 seconds ±0.4 (motor driven pump) seconds 5.5 seconds ±0.55 seconds (turbine driven pump)

This table affected by previously submitted TS Change 02-01, Revision 1

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

<u>FUNCTIONAL UNIT</u>	<u>TRIP SETPOINT</u>	<u>ALLOWABLE VALUES</u>
 ↓ 7. This Specification has been deleted. 7. LOSS OF POWER 		
 a. 6.9 kv Shutdown Board Undervoltage Loss of Voltage 		
1. Voltage Sensors	≥ 5520 volts	≥ 5331 volts
2. Diesel Generator Start and Load Shed Timer	4.25 seconds	4.25 ± 0.25 seconds
 b. 6.9 kv Shutdown Board Degraded Voltage 		
1. Voltage Sensors	6456 volts	 ≥ 6403.5 volts (dropout) ≤ 6595.5 volts (reset)
2. Diesel Generator Start and Load Shed Timer	≤ 300 seconds	≤ 370 seconds
3. S/Degraded Voltage Logic Enable Timer	9.5 seconds	9.5 ± 2.0 seconds

8. ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INTERLOCKS

a. Pressurizer Pressure

1. Not P-11, Automatic Unblock of Safety Injection on Increasing Pressure	≤ 1970 psig	≤ 1975.2 psig
2. P-11, Enable Manual Block of Safety Injection on Decreasing Pressure	≥ 1962 psig	≥ 1956.8 psig

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION
SURVEILLANCE REQUIREMENTS

<u>FUNCTIONAL UNIT</u>	<u>CHANNEL CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES FOR WHICH SURVEILLANCE IS REQUIRED</u>
c. Main Steam Generator Water Level--Low-Low				
1. Steam Generator Water Level--Low-Low (Adverse)	S	R	Q	1, 2, 3
2. Steam Generator Water Level--Low-Low (EAM)	S	R	Q	1, 2, 3
3. RCS Loop ΔT	S	R	Q	1, 2, 3
4. Containment Pressure (EAM)	S	R	Q	1, 2, 3
d. S.I.	See 1 above (all SI surveillance requirements)			
e. Loss of Power Start				
1. Voltage Sensors	N.A.	R	M	1, 2, 3
2. Load Shed Timer	N.A.	R	N.A.	1, 2, 3
f. Trip of Main Feedwater Pumps	N.A.	N.A.	R	1, 2
g. Auxiliary Feedwater Suction Pressure-Low	N.A.	R	N.A.	1, 2, 3
h. Auxiliary Feedwater Suction Transfer Time Delays	N.A.	R	N.A.	1, 2, 3
<p>↓ 7. <i>This Specification has been deleted.</i></p> <p>7. LOSS OF POWER</p> <p>a. 6.9 kv Shutdown Board—Loss of Voltage</p> <p>1. Voltage Sensors N.A. R M 1, 2, 3, 4, 5[#], 6[#]</p> <p>2. Diesel Generator Start and Load Shed Timer N.A. R N.A. 1, 2, 3, 4, 5[#], 6[#]</p>				

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION
SURVEILLANCE REQUIREMENTS

<u>FUNCTIONAL UNIT</u>	<u>CHANNEL CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES FOR WHICH SURVEILLANCE IS REQUIRED</u>
b. 6.0 kv Shutdown Board Degraded Voltage				
1. Voltage Sensors	N.A.	R	M	1, 2, 3, 4, 5#, 6#
2. Diesel Generators Start and Load Shed Timer	N.A.	R	N.A.	1, 2, 3, 4, 5#, 6#
3. S/Degraded Voltage Logic Enable Timer	N.A.	R	N.A.	1, 2, 3, 4
8. ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INTERLOCKS				
a. Pressurizer Pressure, P-11/Not P-11	N.A.	R(2)	N.A.	1, 2, 3
b. Deleted				
c. Steam Generator Level, P-14	N.A.	R(2)	N.A.	1, 2
9. AUTOMATIC SWITCHOVER TO CONTAINMENT SUMP				
a. RSWT Level - Low COINCIDENT WITH Containment Sump Level - High AND Safety Injection	S	R	Q	1, 2, 3, 4
	S	R	Q	1, 2, 3, 4
	(See 1 above for all Safety Injection Surveillance Requirements)			
b. Automatic Actuation Logic	N.A.	N.A.	M(1)	1, 2, 3, 4

TABLE 4.3-2 (Continued)
TABLE NOTATION

~~"When associated diesel generator is required to be OPERABLE by LCO 3.8.1.2, "AC Sources—
Shutdown."~~

- (1) Each train or logic channel shall be tested at least every 62 days on a STAGGERED TEST BASIS.
- (2) The total interlock function shall be demonstrated OPERABLE during CHANNEL CALIBRATION testing of each channel affected by interlock operation.

New Page

INSTRUMENTATION

LOSS OF POWER (LOP) DIESEL GENERATOR (DG) START INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.11 The LOP DG start instrumentation for each function in Table 3.3-14 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4,
When associated DG is required to be OPERABLE by LCO 3.8.1.2, "AC Sources - Shutdown."

ACTION:

- a. With the number of OPERABLE channels one less than the Required Channels for voltage sensors, restore the inoperable channel to OPERABLE status within 6 hours or enter applicable Limiting Condition(s) For Operation and Action(s) for the associated DG set made inoperable by the channel.
- b. With the number of OPERABLE channels less than the Required Channels by more than one for voltage sensors or with the number of OPERABLE channels one less than the Required Channels for timers, restore all but one channel of voltage sensors and at least one timer for each function to OPERABLE status within 1 hour or enter applicable Limiting Condition(s) For Operation and Action(s) for the associated DG set made inoperable by the channels.
- c. Separate entry is allowed for each function.
- d. Enter applicable Actions of LCO 3.3.2, "Engineered Safety Feature Actuation System Instrumentation," for Auxiliary Feedwater Loss of Power Start Instrumentation made inoperable by LOP DG Start Instrumentation.

SURVEILLANCE REQUIREMENTS

4.3.3.11.1 Each LOP DG Start Instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION, and CHANNEL FUNCTIONAL TEST operations for the MODES and at the frequencies shown in Table 4.3-10.

4.3.3.11.2 The ENGINEERED SAFETY FEATURES RESPONSE TIME of each LOP DG Start Instrumentation function shall be verified to be within the limit at least once per 18 months. Each verification shall include at least one train such that both trains are verified at least once per 36 months and one channel per function such that all channels are verified at least once every N times 18 months where N is the total number of redundant channels.

New Page

TABLE 3.3-14

LOSS OF POWER DIESEL GENERATOR START INSTRUMENTATION

<u>FUNCTIONAL UNIT</u>	<u>APPLICABLE MODES OR CONDITIONS</u>	<u>REQUIRED CHANNELS</u>	<u>NOMINAL TRIP SETPOINT</u>	<u>ALLOWABLE VALUES</u>
1. 6.9 kv Shutdown Board - Loss of Voltage				
a. Voltage Sensors	1, 2, 3, 4, #	3/Shutdown Board	5520	≥ 5331 volts and ≤ 5688 volts
b. Diesel Generator Start and Load Shed Timer	1, 2, 3, 4, #	2/Shutdown Board	1.25 seconds	1.25 ± 0.25 seconds
2. 6.9 kv Shutdown Board - Degraded Voltage				
a. Voltage Sensors	1, 2, 3, 4, #	3/Shutdown Board	6456 volts	≥ 6403.5 volts and ≤ 6522.5 volts
b. Diesel Generator Start and Load Shed Timer	1, 2, 3, 4, #	2/Shutdown Board	300 seconds	≥ 218.6 seconds and ≤ 370 seconds
c. SI/Degraded Voltage Logic Enable Timer	1, 2, 3, 4	2/Shutdown Board	9.5 seconds	9.5 ± 2.0 seconds

These items affected by proposed TS Change 02-01

When associated DG is required to be OPERABLE by LCO 3.8.1.2, "AC Sources - Shutdown."

New Page

TABLE 4.3-10

LOSS OF POWER DIESEL GENERATOR START INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>FUNCTIONAL UNIT</u>	<u>CHANNEL CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES FOR WHICH SURVEILLANCE REQUIRED</u>
1. 6.9 kv Shutdown Board - Loss of Voltage				
a. Voltage Sensors	N.A.	R	M	1, 2, 3, 4, #
b. Diesel Generator Start and Load Shed Timer	N.A.	R	N.A.	1, 2, 3, 4, #
2. 6.9 kv Shutdown Board - Degraded Voltage				
a. Voltage Sensors	N.A.	R	M	1, 2, 3, 4, #
b. Diesel Generators Start and Load Shed Timer	N.A.	R	N.A.	1, 2, 3, 4, #
c. S/Degraded Voltage Logic Enable Timer	N.A.	R	N.A.	1, 2, 3, 4

When associated DG is required to be OPERABLE by LCO 3.8.1.2, "AC Sources - Shutdown."

ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY
SEQUOYAH PLANT (SQN)
UNITS 1 and 2

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS 04-01
BASES PAGES

I. AFFECTED PAGE LIST

Unit 1
Pages are New

Unit 2
Pages are New

II. MARKED PAGES

See attached.

B 3/4.3 INSTRUMENTATION

B 3/4.3.3.11 Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation

BASES

BACKGROUND

The DGs provide a source of emergency power when offsite power is either unavailable or is insufficiently stable to allow safe unit operation. Undervoltage protection will generate an LOP start if a loss-of-voltage or degraded voltage condition occurs in the switchyard. There are four LOP start signals, one for each 6.9 kV Shutdown Board.

Three degraded voltage relays (one per phase) are provided on each 6.9 kV Shutdown Board for detecting a sustained undervoltage condition. The relays are combined in a two-out-of-three logic configuration to generate a shutdown board load shed actuation and start the DGs if the voltage is below 93.5% for 300 seconds (nominal). If a safety injection signal is present at the time of the degraded voltage condition or if a safety injection actuation occurs during a degraded voltage condition, the load shed actuation will occur within 9.5 seconds (nominal).

Additionally, three loss-of-voltage relays (one per phase) are provided on each 6.9 kV Shutdown Board for the purpose of detecting a loss-of-voltage condition. These relays are combined in a two-out-of-three logic to generate a shutdown board load shed actuation and start the DGs if the voltage is below 80% for 1.25 seconds (nominal). The LOP start actuation is described in FSAR Section 8.3, "Onsite Power System" (Reference 1).

Allowable Values and LOP DG Start Instrumentation Setpoints

The trip setpoints used in the relays and timers are based on the analytical limits presented in TVA calculations, References 3, 4, and 5. The selection of these trip setpoints is such that adequate protection is provided when all sensor and time delays are taken into account.

The Nominal Trip Setpoint is the expected value to be achieved during calibrations. The Nominal Trip Setpoint considers all factors which may affect channel performance by statistically combining rack drift, rack measurement and test equipment effects, rack calibration accuracy, rack comparator setting accuracy, rack temperature effects, sensor measurements and test equipment effects, sensor calibration accuracy, primary element accuracy, and process measurement accuracy. The Allowable Value has been established by considering the measurable values assumed for rack effects only. The Allowable Value serves as an operability limit for the purpose of the CHANNEL FUNCTIONAL TESTS.

BASES

BACKGROUND (continued)

Setpoints adjusted consistent with the requirements of the Allowable Value ensure that the consequences of accidents will be acceptable, providing the unit is operated from within the LCOs at the onset of the accident and that the equipment functions as designed.

Allowable Values and/or Nominal Trip Setpoints are specified for each function in Table 3.3-14. Nominal Trip Setpoints are also specified in the unit specific setpoint calculations. The trip setpoints are selected to ensure that the setpoint measured by the surveillance procedure does not exceed the Allowable Value if the relay is performing as required. If the measured setpoint does not exceed the Allowable Value, the relay is considered OPERABLE. Operation with a trip setpoint less conservative than the Nominal Trip Setpoint, but within the Allowable Value, is acceptable provided that operation and testing is consistent with the assumptions of the unit specific setpoint calculation (Reference 3).

APPLICABLE SAFETY ANALYSES

The LOP DG start instrumentation is required for the Engineered Safety Features (ESF) Systems to function in any accident with a loss of offsite power. Its design basis is that of the ESF Actuation System (ESFAS).

Accident analyses credit the loading of the DG based on the loss of offsite power during a loss of coolant accident (LOCA). The actual DG start has historically been associated with the ESFAS actuation. The DG loading has been included in the delay time associated with each safety system component requiring DG supplied power following a loss of offsite power. The analyses assume a non-mechanistic DG loading, which does not explicitly account for each individual component of loss of power detection and subsequent actions.

The channels of LOP DG start instrumentation, in conjunction with the ESF systems powered from the DGs, provide unit protection in the event of any of the analyzed accidents discussed in Reference 2, in which a loss of offsite power is assumed.

The delay times assumed in the safety analysis for the ESF equipment include the 10 second DG start delay, and the appropriate sequencing delay, if applicable. The response times for ESFAS actuated equipment in LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," include the appropriate DG loading and sequencing delay.

The LOP DG start instrumentation channels satisfy Criterion 3 of the NRC Policy Statement.

BASES

LCO The LCO for LOP DG Start Instrumentation requires that the loss-of-voltage, degraded voltage, load shed, and DG Start functions shall be OPERABLE in MODES 1, 2, 3, and 4 when the LOP DG Start Instrumentation supports safety systems associated with the ESFAS. In MODES 5 and 6, the functions must be OPERABLE whenever the associated DG is required to be OPERABLE to ensure that the automatic start of the DG is available when needed. A channel is OPERABLE with an actual trip setpoint value outside its calibration tolerance band provided the trip setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established calibration tolerance band of the Nominal Trip Setpoint. A trip setpoint may be set more conservative than the Nominal Trip Setpoint as necessary in response to plant conditions. Loss of the LOP DG Start Instrumentation function could result in the delay of safety systems initiation when required. This could lead to unacceptable consequences during accidents. During the loss of offsite power the DG powers the motor driven auxiliary feedwater pumps. Failure of these pumps to start would leave only one turbine driven pump, as well as an increased potential for a loss of decay heat removal through the secondary system.

APPLICABILITY The LOP DG Start Instrumentation Functions are required in MODES 1, 2, 3, and 4 because ESF Functions are designed to provide protection in these MODES. Actuation in MODE 5 or 6 is required whenever the required DG must be OPERABLE so that it can perform its function on an LOP or a degraded voltage condition on the 6.9 kV Shutdown Board.

ACTIONS In the event a channel's trip setpoint is found nonconservative with respect to the Allowable Value, or the channel is found inoperable, then the function that channel provides must be declared inoperable and the LCO condition entered for the particular protection function affected.

Action a.

Action a. applies to the LOP DG start function with one channel of voltage sensors per board inoperable.

If one channel of voltage sensors is inoperable, Action a. requires the channel to be restored to OPERABLE status within 6 hours. The specified completion time is reasonable considering the function remains fully OPERABLE on every board and the low probability of an event occurring during these intervals.

When the inoperable channel can not be returned to OPERABLE status within 6 hours, the requirements specified in LCO 3.8.1.1, "AC Sources Operating," or LCO 3.8.1.2, "AC Sources Shutdown," for the DG made inoperable by failure of the LOP DG start instrumentation are required to be entered immediately. The actions of those LCOs provide for adequate compensatory actions to assure unit safety.

BASES

ACTIONS (continued)

Action b.

Action b. applies when more than one channel of voltage sensors or the required timer(s) on a single board is inoperable.

Action b. requires restoring all but one channel of voltage sensors and at least one timer for each required function to OPERABLE status. The 1 hour completion time should allow ample time to repair most failures and takes into account the low probability of an event requiring an LOP start occurring during this interval.

When the inoperable channel can not be returned to OPERABLE status within 1 hour, the requirements specified in LCO 3.8.1.1, "AC Sources Operating," or LCO 3.8.1.2, "AC Sources Shutdown," for the DG made inoperable by failure of the LOP DG start instrumentation are required to be entered immediately. The actions of those LCOs provide for adequate compensatory actions to assure unit safety.

Action c.

Because the required channels are specified on a per shutdown board basis, the condition may be entered separately for each board as appropriate.

Action c. has been added to clarify the application of completion time rules. The conditions of this Specification may be entered independently for each function listed in the LCO. The completion time(s) of the inoperable channel(s) of a function will be tracked separately for each function starting from the time the condition was entered for that function.

Action d.

Action d. has been added to direct entry into the applicable actions of LCO 3.3.2, "Engineered Safety Feature Actuation System Instrumentation," for inoperable Auxiliary Feedwater Loss of Power start instrumentation. The loss-of-voltage relays required by this LCO also initiate load shed and the sequencing functions that initiate the start of the motor driven auxiliary feedwater pumps for a loss of power condition and generate a start signal for the turbine driven auxiliary feedwater pump as required in LCO 3.3.2.

SURVEILLANCE
REQUIREMENTS4.3.3.11.1

A CHANNEL CHECK is not applicable to the voltage sensors or timers. There are no indicators associated with these instruments to allow the performance of this verification.

A CHANNEL FUNCTIONAL TEST of the voltage sensors is performed every 31 days. This test checks operation of the loss-of-voltage and degraded voltage sensors that provide actuation signals. The frequency is based on the known

BASES
SURVEILLANCE REQUIREMENTS (continued)

reliability of the relays and timers and the redundancy available, and has been shown to be acceptable through operating experience.

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the loss-of-voltage and degraded voltage functions, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy.

The setpoints, as well as the response to a loss-of-voltage and a degraded voltage test, shall include a single point verification that the trip occurs within the required time delay, as shown in Reference 1.

The frequency of 18 months is based on operating experience and consistency with the typical industry refueling cycle and is justified by the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

4.3.3.11.2

SR 4.3.3.11.2 is the performance of an ENGINEERED SAFETY FEATURES RESPONSE TIME test that shall include a single point verification that the trip occurs within the required time delay, as shown in Reference 1. The verification of response time at the specified frequencies provides assurance that the ESF actuation function associated with each channel is completed within the time limit assumed in the safety analyses.

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Each channel's response must be verified every 18 months with each individual channel being tested every n times 18 months where n is the number of channels.

REFERENCES

1. Sequoyah FSAR, Section 8.3, "Onsite Power System."
 2. Sequoyah FSAR, Section 15.0, "Accident Analysis."
 3. TVA Calculation 27 DAT, "Demonstrated Accuracy Calculation 27 DAT"
 4. TVA Calculation DS1-2, "Demonstrated Accuracy Calculation DS1-2"
 5. TVA Calculation SQN-EEB-MS-TI06-0008, "Degraded Voltage Analysis"
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B 3/4.3 INSTRUMENTATION

B 3/4.3.3.14 Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation

BASES

BACKGROUND

The DGs provide a source of emergency power when offsite power is either unavailable or is insufficiently stable to allow safe unit operation. Undervoltage protection will generate an LOP start if a loss-of-voltage or degraded voltage condition occurs in the switchyard. There are four LOP start signals, one for each 6.9 kV Shutdown Board.

Three degraded voltage relays (one per phase) are provided on each 6.9 kV Shutdown Board for detecting a sustained undervoltage condition. The relays are combined in a two-out-of-three logic configuration to generate a shutdown board load shed actuation and start the DGs if the voltage is below 93.5% for 300 seconds (nominal). If a safety injection signal is present at the time of the degraded voltage condition or if a safety injection actuation occurs during a degraded voltage condition, the load shed actuation will occur within 9.5 seconds (nominal).

Additionally, three loss-of-voltage relays (one per phase) are provided on each 6.9 kV Shutdown Board for the purpose of detecting a loss-of-voltage condition. These relays are combined in a two-out-of-three logic to generate a shutdown board load shed actuation and start the DGs if the voltage is below 80% for 1.25 seconds (nominal). The LOP start actuation is described in FSAR Section 8.3, "Onsite Power System" (Reference 1).

Allowable Values and LOP DG Start Instrumentation Setpoints

The trip setpoints used in the relays and timers are based on the analytical limits presented in TVA calculations, References 3, 4, and 5. The selection of these trip setpoints is such that adequate protection is provided when all sensor and time delays are taken into account.

The Nominal Trip Setpoint is the expected value to be achieved during calibrations. The Nominal Trip Setpoint considers all factors which may affect channel performance by statistically combining rack drift, rack measurement and test equipment effects, rack calibration accuracy, rack comparator setting accuracy, rack temperature effects, sensor measurements and test equipment effects, sensor calibration accuracy, primary element accuracy, and process measurement accuracy. The Allowable Value has been established by considering the measurable values assumed for rack effects only. The Allowable Value serves as an operability limit for the purpose of the CHANNEL FUNCTIONAL TESTS.

BASES

BACKGROUND (continued)

Setpoints adjusted consistent with the requirements of the Allowable Value ensure that the consequences of accidents will be acceptable, providing the unit is operated from within the LCOs at the onset of the accident and that the equipment functions as designed.

Allowable Values and/or Nominal Trip Setpoints are specified for each function in Table 3.3-14. Nominal Trip Setpoints are also specified in the unit specific setpoint calculations. The trip setpoints are selected to ensure that the setpoint measured by the surveillance procedure does not exceed the Allowable Value if the relay is performing as required. If the measured setpoint does not exceed the Allowable Value, the relay is considered OPERABLE. Operation with a trip setpoint less conservative than the Nominal Trip Setpoint, but within the Allowable Value, is acceptable provided that operation and testing is consistent with the assumptions of the unit specific setpoint calculation (Reference 3).

APPLICABLE SAFETY ANALYSES

The LOP DG start instrumentation is required for the Engineered Safety Features (ESF) Systems to function in any accident with a loss of offsite power. Its design basis is that of the ESF Actuation System (ESFAS).

Accident analyses credit the loading of the DG based on the loss of offsite power during a loss of coolant accident (LOCA). The actual DG start has historically been associated with the ESFAS actuation. The DG loading has been included in the delay time associated with each safety system component requiring DG supplied power following a loss of offsite power. The analyses assume a non-mechanistic DG loading, which does not explicitly account for each individual component of loss of power detection and subsequent actions.

The channels of LOP DG start instrumentation, in conjunction with the ESF systems powered from the DGs, provide unit protection in the event of any of the analyzed accidents discussed in Reference 2, in which a loss of offsite power is assumed.

The delay times assumed in the safety analysis for the ESF equipment include the 10 second DG start delay, and the appropriate sequencing delay, if applicable. The response times for ESFAS actuated equipment in LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," include the appropriate DG loading and sequencing delay.

The LOP DG start instrumentation channels satisfy Criterion 3 of the NRC Policy Statement.

BASES

LCO

The LCO for LOP DG Start Instrumentation requires that the loss-of-voltage, degraded voltage, load shed, and DG Start functions shall be OPERABLE in MODES 1, 2, 3, and 4 when the LOP DG Start Instrumentation supports safety systems associated with the ESFAS. In MODES 5 and 6, the functions must be OPERABLE whenever the associated DG is required to be OPERABLE to ensure that the automatic start of the DG is available when needed. A channel is OPERABLE with an actual trip setpoint value outside its calibration tolerance band provided the trip setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established calibration tolerance band of the Nominal Trip Setpoint. A trip setpoint may be set more conservative than the Nominal Trip Setpoint as necessary in response to plant conditions. Loss of the LOP DG Start Instrumentation function could result in the delay of safety systems initiation when required. This could lead to unacceptable consequences during accidents. During the loss of offsite power the DG powers the motor driven auxiliary feedwater pumps. Failure of these pumps to start would leave only one turbine driven pump, as well as an increased potential for a loss of decay heat removal through the secondary system.

APPLICABILITY

The LOP DG Start Instrumentation Functions are required in MODES 1, 2, 3, and 4 because ESF Functions are designed to provide protection in these MODES. Actuation in MODE 5 or 6 is required whenever the required DG must be OPERABLE so that it can perform its function on an LOP or a degraded voltage condition on the 6.9 kV Shutdown Board.

ACTIONS

In the event a channel's trip setpoint is found nonconservative with respect to the Allowable Value, or the channel is found inoperable, then the function that channel provides must be declared inoperable and the LCO condition entered for the particular protection function affected.

Action a.

Action a. applies to the LOP DG start function with one channel of voltage sensors per board inoperable.

If one channel of voltage sensors is inoperable, Action a. requires the channel to be restored to OPERABLE status within 6 hours. The specified completion time is reasonable considering the function remains fully OPERABLE on every board and the low probability of an event occurring during these intervals.

When the inoperable channel can not be returned to OPERABLE status within 6 hours, the requirements specified in LCO 3.8.1.1, "AC Sources Operating," or LCO 3.8.1.2, "AC Sources Shutdown," for the DG made inoperable by failure of the LOP DG start instrumentation are required to be entered immediately. The actions of those LCOs provide for adequate compensatory actions to assure unit safety.

BASES

ACTIONS (continued)

Action b.

Action b. applies when more than one channel of voltage sensors or the required timer(s) on a single board is inoperable.

Action b. requires restoring all but one channel of voltage sensors and at least one timer for each required function to OPERABLE status. The 1 hour completion time should allow ample time to repair most failures and takes into account the low probability of an event requiring an LOP start occurring during this interval.

When the inoperable channel can not be returned to OPERABLE status within 1 hour, the requirements specified in LCO 3.8.1.1, "AC Sources Operating," or LCO 3.8.1.2, "AC Sources Shutdown," for the DG made inoperable by failure of the LOP DG start instrumentation are required to be entered immediately. The actions of those LCOs provide for adequate compensatory actions to assure unit safety.

Action c.

Because the required channels are specified on a per shutdown board basis, the condition may be entered separately for each board as appropriate.

Action c. has been added to clarify the application of completion time rules. The conditions of this Specification may be entered independently for each function listed in the LCO. The completion time(s) of the inoperable channel(s) of a function will be tracked separately for each function starting from the time the condition was entered for that function.

Action d.

Action d. has been added to direct entry into the applicable actions of LCO 3.3.2, "Engineered Safety Feature Actuation System Instrumentation," for inoperable Auxiliary Feedwater Loss of Power start instrumentation. The loss-of-voltage relays required by this LCO also initiate load shed and the sequencing functions that initiate the start of the motor driven auxiliary feedwater pumps for a loss of power condition and generate a start signal for the turbine driven auxiliary feedwater pump as required in LCO 3.3.2.

**SURVEILLANCE
REQUIREMENTS**

4.3.3.11.1

A CHANNEL CHECK is not applicable to the voltage sensors or timers. There are no indicators associated with these instruments to allow the performance of this verification.

A CHANNEL FUNCTIONAL TEST of the voltage sensors is performed every 31 days. This test checks operation of the loss-of-voltage and degraded voltage sensors that provide actuation signals. The frequency is based on the known

BASES

SURVEILLANCE REQUIREMENTS (continued)

reliability of the relays and timers and the redundancy available, and has been shown to be acceptable through operating experience.

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the loss-of-voltage and degraded voltage functions, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy.

The setpoints, as well as the response to a loss-of-voltage and a degraded voltage test, shall include a single point verification that the trip occurs within the required time delay, as shown in Reference 1.

The frequency of 18 months is based on operating experience and consistency with the typical industry refueling cycle and is justified by the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

4.3.3.11.2

SR 4.3.3.11.2 is the performance of an ENGINEERED SAFETY FEATURES RESPONSE TIME test that shall include a single point verification that the trip occurs within the required time delay, as shown in Reference 1. The verification of response time at the specified frequencies provides assurance that the ESF actuation function associated with each channel is completed within the time limit assumed in the safety analyses.

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Each channel's response must be verified every 18 months with each individual channel being tested every n times 18 months where n is the number of channels.

REFERENCES

1. Sequoyah FSAR, Section 8.3, "Onsite Power System."
 2. Sequoyah FSAR, Section 15.0, "Accident Analysis."
 3. TVA Calculation 27 DAT, "Demonstrated Accuracy Calculation 27 DAT"
 4. TVA Calculation DS1-2, "Demonstrated Accuracy Calculation DS1-2"
 5. TVA Calculation SQN-EEB-MS-TI06-0008, "Degraded Voltage Analysis"
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