



Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

MAY 14 2001

TVA-WBN-TS-00-11

10 CFR 50.90

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

Gentlemen:

In the Matter of ) Docket No. 50-390  
Tennessee Valley Authority )

**WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - TECHNICAL SPECIFICATION  
(TS) CHANGE NO. 00-11 - "INCREASE IN DEGRADED VOLTAGE TIME DELAY"**

In accordance with the provisions of 10 CFR 50.90, TVA is submitting a request for an amendment to WBN's license NPF-90 to change the Technical Specifications for Unit 1.

The proposed amendment would revise the WBN Unit 1 TS Section 3.3.5, "Loss of Power (LOP) Diesel Generator Start Instrumentation," to increase the time delay setting of the 6.9 kV Shutdown Board degraded voltage relays from a nominal 6 seconds to 10 seconds. This change will provide the plant with operating margin by allowing additional time for the Class 1E Auxiliary Power System to react to projected voltage transients on the offsite grid. This will aid in preventing unnecessary challenges to the WBN Class 1E power supply due to spurious relay actuations which result in automatic transfer from the WBN preferred offsite power supply to the emergency standby diesel generators.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the change is exempt from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). The WBN Plant Operations Review Committee and the WBN Nuclear Safety Review Board have reviewed this proposed change and have determined that operation of WBN Unit 1 in accordance with the proposed change will not endanger the health and safety of the public. 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.

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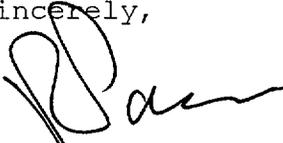
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Enclosure 1 to this letter provides the description and evaluation of the proposed change, including TVA's determination that the proposed change does not involve a significant hazards consideration, and is exempt from environmental review. Enclosure 2 contains copies of the appropriate Unit 1 TS pages marked-up to show the proposed change. Enclosure 3 forwards the revised TS pages which incorporate the proposed change.

TVA requests that approval be provided approximately 30 days prior to beginning the Unit 1 Cycle 4 refueling outage, and that the revised TS be made effective prior to Startup following the Cycle 4 refueling outage.

There are no regulatory commitments associated with this request. If you have any questions about this change, please contact me at (423) 365-1824.

Sincerely,



P. L. Pace, Manager  
Licensing and Industry Affairs

Enclosures  
cc: See page 3

Subscribed and sworn to before me  
on this 14<sup>th</sup> day of May, 2001.

 Greg M. Billingsley  
Notary Public  
My Commission Expires Oct. 9, 2002

U.S. Nuclear Regulatory Commission

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cc (Enclosures):

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## ENCLOSURE 1

### TENNESSEE VALLEY AUTHORITY WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - DOCKET NO. 390

#### PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-00-11 DESCRIPTION AND EVALUATION OF THE PROPOSED CHANGE

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#### I. DESCRIPTION OF THE PROPOSED CHANGE

The proposed license amendment would revise the Watts Bar Nuclear Plant (WBN) Unit 1 Technical Specifications (TS), Section 3.3.5, Loss of Power (LOP) Diesel Generator Start Instrumentation, to reflect a design change for the time delay setting of the 6.9 kV Shutdown Board degraded voltage relays from a nominal 6 seconds to 10 seconds. Specifically, the Trip Setpoint and Allowable Value for Table 3.3.5-1, Function 2(b), "6.9 kV Emergency Bus Undervoltage (Degraded Voltage) - Time Delay," would be revised as follows:

The current Trip Setpoint:  $\geq 5.84$  sec and  $\leq 6.16$  sec,  
would be revised to:  $\geq 9.73$  sec and  $\leq 10.27$  sec.

The current Allowable Value:  $\geq 5.7$  sec and  $\leq 6.3$  sec,  
would be revised to:  $\geq 9.42$  sec and  $\leq 10.49$  sec.

The Bases of TS 3.3.5 would also be revised to reflect the change from a nominal 6 seconds to 10 seconds. TVA's proposed changes are illustrated by the markup of the WBN TS and Bases, provided in Enclosure 2.

#### II. REASON FOR THE PROPOSED CHANGE

WBN design modification (DCN D-50565-A) would change the setpoint of the degraded voltage relay timers from a nominal 6 seconds to 10 seconds to relax the offsite power criteria. The primary purpose of this change is to provide the plant additional operating margin by allowing additional time for the automatic load tap changers (LTCs) on the Common Station Service Transformers C and D (0-XFMR-200-C/CSST and 0-XFMR-200-D/CSST) to compensate for postulated degraded voltage conditions on the WBN 161 kV Off-Site Power Grid.

Recent analysis of the offsite grid indicates that due to future grid loading projections (within about two years), voltage fluctuations on the grid could unnecessarily challenge the WBN Class 1E power supply and associated equipment if the current time delay settings are maintained. The longer time delay setpoint would relax the present offsite power criteria by allowing a more severe worst case degraded voltage condition on the 161 kV Grid to be accommodated by the CSST C and D LTCs. This extended time delay would eliminate an unnecessary electrical transient associated with the automatic transfer from the WBN preferred offsite power supply to the emergency standby diesel generators (DGs) when a degraded voltage condition of less than 10 seconds is experienced. Consequently, challenges to equipment associated with the actuation of breakers, shedding of loads, starting of the DGs, etc., would also be reduced or eliminated.

### III. SAFETY ANALYSIS

The WBN AC electrical power sources are designed to ensure the availability of necessary power to engineered safety features (ESF) systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. The onsite Class 1E AC Distribution System supplies electrical power to four power trains with each train powered by an independent Class 1E 6.9 kV Shutdown Board. Each 6.9 kV Shutdown Board has two separate and independent offsite sources of power as well as a dedicated onsite DG source. 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 DG start if a loss of voltage or degraded voltage condition occurs on the 161 kV Offsite Power Grid. There are four LOP start signals, one for each 6.9 kV Shutdown Board. 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 in which a loss of offsite power is assumed.

Offsite power is supplied to the Watts Bar 161 kV transformer yard by two dedicated lines from the Watts Bar Hydro Plant switchyard. From the 161 kV transformer yard, two electrically and physically separated circuits provide AC power, through CSSTs C and D to the 6.9 kV Shutdown Boards. In order for the offsite power system to meet the requirements identified in GDC-17, the Class 1E Auxiliary Power System must be able to supply all required safety-related loads (including motor starting) for a worst case design basis event without transferring to the diesel generators. A detailed description of the offsite and onsite power systems is provided in WBN UFSAR Sections 8.2 and 8.3 and in the Bases of the WBN Technical Specifications.

The four Class 1E 6.9 kV Shutdown Boards are each provided with one set of degraded voltage relays (27DAT, 27DBT, & 27DCT) to protect 1E loads. The degraded voltage relays have a voltage setpoint of 96% of 6900V (nominal, decreasing) and are arranged in a two-out-of-three coincidence logic to initiate a nominal time delay (via time delay relays DS-1 and DS-2). The purpose of this time delay is to allow for voltage transients on the 161 kV Off-Site Grid. This arrangement provides time for the LTCs on CSSTs C and D to recover the degraded voltage condition at the 6.9 kV Shutdown Boards back to an acceptable level resetting the degraded voltage relays. The CSST LTCs maintain the nominal steady state 6.9 kV Shutdown Board voltage between 7010 and 7132 volts for variation in board loading and grid voltage. The present time delay value is six seconds (nominal). If a degraded voltage condition still exists at the end of 6 seconds, an alarm will be annunciated in the Control Room, a trip of the respective 6.9 kV Shutdown Board supply breaker will occur, loads will be shed, and a diesel generator start will be initiated.

The subject modification would change the setpoint of the degraded voltage timers from a nominal 6 seconds to 10 seconds to relax the offsite power criteria. The current site criteria assumes that the 161 kV offsite grid source shall not have a change in voltage of more than 6 kV (pre-event to post-event) and shall not drop below 153 kV during mitigation of a design basis event. The revised criteria assumes the minimum normal

operating voltage is 164 kV, and a subsequent change in grid voltage at event initiation that results in a minimum post-event grid voltage of 153 kV. The LTCs will continue to maintain the steady state 6.9 kV Shutdown Board voltage between 7010 and 7132 volts. TVA's analysis of this event was included as part of an overall re-analysis performed for the WBN auxiliary power system (6.9 kV and 480V), the results of which were documented in plant calculations. Increasing the degraded voltage time delay setpoint was determined to not adversely impact the 6.9 kV Shutdown Boards or the protection scheme for the Class 1E loads fed from these boards.

The analysis was performed using the Electrical Transient Analyzer Program (ETAP) Power Station Release 3.0.1N. The software includes the capability to analyze the electrical auxiliary power system for loading, short-circuit currents, running voltages, and starting voltages. The calculations demonstrate the ability of the Class 1E Auxiliary Power System to transmit sufficient energy to start and operate all required loads for a worst case design basis event without transferring to the diesel generators. Increasing the delay time from 6 to 10 seconds will not change the voltage recovery profile. The lower boundary dropout and the upper reset setpoint of the degraded voltage relays remains unchanged. Analyses has shown that operating equipment, such as motors, would not be damaged and would accelerate back to rated speed, thus ensuring their continued availability to perform their intended safety function.

Specifically, the analysis demonstrates that required safety related equipment in operation at the time a degraded voltage condition occurred would continue to operate throughout the 10 second delay. If the degraded voltage condition cleared during this time period, the voltage would return to nominal levels and be available for equipment required to perform safety functions. Calculations demonstrate the following:

- The automatic LTCs remain capable of regulating the 6.9 kV Shutdown Board voltage within the present LTC voltage relay setpoints. The LTCs will restore 6.9 kV Shutdown Board voltage for a safety injection signal (SI) with a simultaneous worst case grid drop before the degraded voltage relays actuate to transfer power supply to the DGs.
- ESF motors required to mitigate an accident will have sufficient voltage available at the terminals to ensure proper starting and operation, when supplied by offsite power. This includes achieving rated speed within five seconds after an SI initiation signal which simultaneously starts all ESF motors. Figure 1 below illustrates the composite response of the full load amperage for key ESF pump motors (auxiliary feedwater, residual heat removal, containment spray, safety injection, and centrifugal charging) plotted with a typical worst case 6.9 kV Shutdown Board voltage recovery profile based on plant calculations.
- Maximum loading on transformers, distribution system cables, and 6900V and 480V boards is bounded by current analyses and remains below component ratings.

If the degraded condition still existed at the end of the 10 second time period, transfer to the DGs would occur and board voltage would recover to an acceptable level. In either case, acceptable voltage levels would be available for equipment to respond in a timely manner if called upon to perform a safety function.

TVA's evaluation of similar industry changes did not identify a precedent. Although several facilities have implemented changes in the degraded voltage operating range, changes made solely to the time delay setting were not identified.

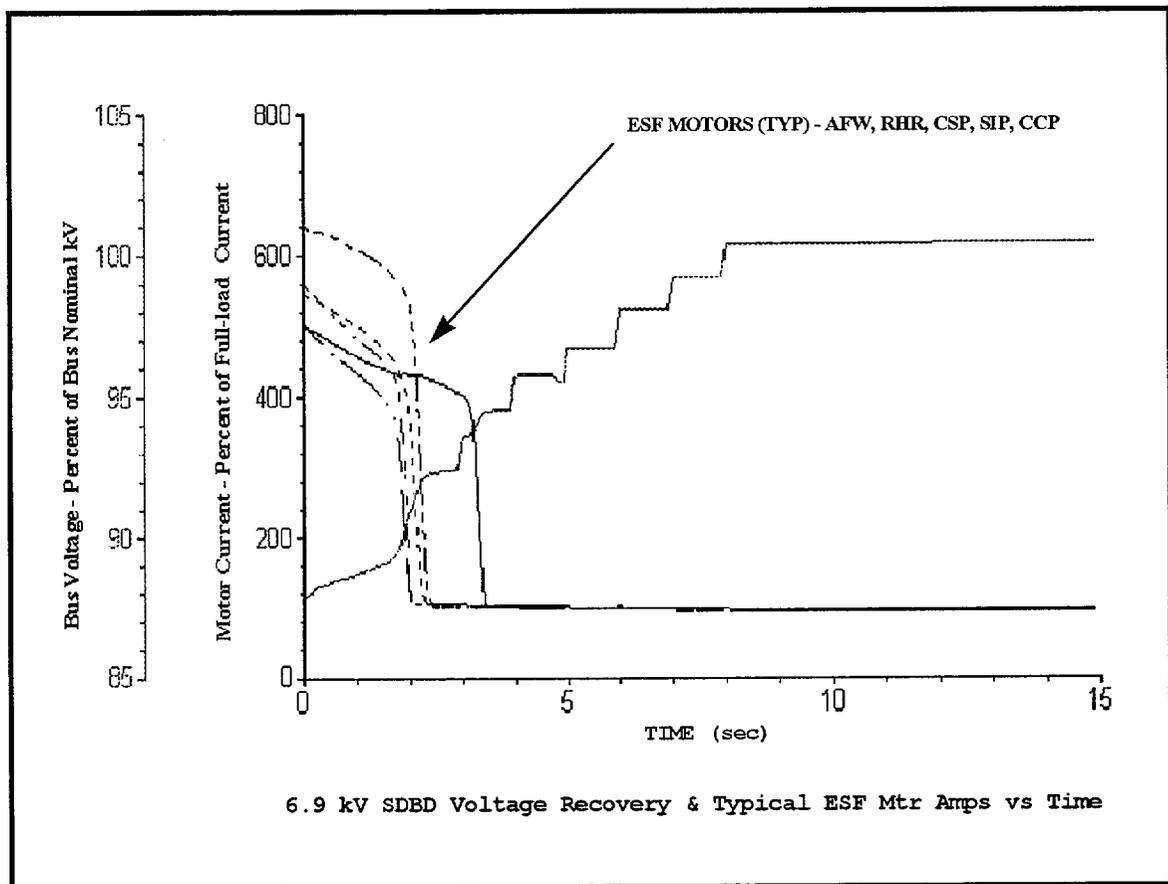


FIGURE 1

#### IV. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

TVA is submitting a request for an amendment to the WBN Unit 1 Technical Specifications (TS), Loss of Power (LOP) Diesel Generator Start Instrumentation, to reflect a design change for the time delay setting of the 6.9 kV degraded voltage relays from a nominal 6 seconds to 10 seconds. This change will provide the plant increased operating margin by allowing additional time for the automatic load tap changers on the Common Station Service Transformers (CSST) C and D to compensate for future projected voltage transients on the WBN 161 kV Off-site power grid.

TVA has concluded that operation of Watts Bar Nuclear Plant (WBN) Unit 1 in accordance with the proposed change to the TS does not involve a significant hazards consideration. TVA's conclusion is based on its evaluation, in accordance with 10 CFR 50.91(a)(1), of the three standards set forth in 10 CFR 50.92(c).

A. The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The degraded voltage protection relays and associated time delay relays provided for each of the four 6.9 kV Shutdown Boards act to mitigate the consequences of previously analyzed accidents by detecting a sustained undervoltage condition, isolating the safety buses from offsite power, and starting the associated diesel generators. This safety function and logic of the degraded voltage relay circuits remains unchanged. The revised time delay setpoint will allow automatic load tap changers on CSSTs C and D additional time to react to voltage transients on the offsite grid. This will aid in preventing unnecessary relay actuation and isolation from offsite power sources, which in turn will reduce the probability of a loss of offsite power to the unit due to voltage transients on the offsite grid. The additional four second time delay does not introduce any new constraints that would prevent safety equipment from performing its designed function. The only impact to equipment previously evaluated is an increase in the exposure to a degraded voltage condition (for the loads fed from the 6.9 kV Shutdown Boards) for a duration of an additional four seconds. However, the required safety-related equipment would continue to operate throughout the 10 second delay. The proposed change will not contribute to any radiological dose during an accident. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

- B. The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

The 6.9 kV Shutdown Power System will continue to function as specified in the design basis. The Class 1E loads supplied by the 6.9 kV Shutdown Boards will continue to be available to perform their intended safety function during the degraded voltage condition. The affected 6.9 kV Shutdown Boards will satisfactorily recover the voltage either by: 1) stabilization of the offsite power grid if the degraded voltage condition is resolved within 10 seconds, or 2) transfer to emergency power if condition is present at the end of 10 seconds. There are no changes in the credible failure modes of the 6.9 kV Shutdown Boards (including the degraded voltage relays and timers) from those identified and evaluated previously in the FSAR. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

- C. The proposed amendment does not involve a significant reduction in a margin of safety.

The ability of Class 1E loads fed from the 6.9 kV Shutdown Boards to perform their safety function is not compromised by this change. The lower boundary dropout and the upper reset setpoint of the degraded voltage relays remains unchanged. Increasing the delay time from 6 to 10 seconds will not change the voltage recovery profile. Analyses has shown that all motors will have adequate voltage to accelerate to their rated speed within their required times and therefore, there is no impact on operating equipment. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

V. ENVIRONMENTAL IMPACT CONSIDERATION

The proposed change does not involve a significant hazards consideration, a significant change in the types of or significant increase in the amounts of any effluents that may be released offsite, or a significant increase in individual or cumulative occupational radiation exposure. Therefore, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY  
WATTS BAR NUCLEAR PLANT (WBN)  
UNIT 1

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-00-11  
MARKED PAGES

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I. AFFECTED PAGE LIST

3.3-51  
B 3.3-147

II. MARKED PAGES

Attached

Table 3.3.5-1 (page 1 of 1)  
LOP DG Start Instrumentation

FUNCTION	REQUIRED CHANNELS PER BUS	SURVEILLANCE REQUIREMENTS	TRIP SETPOINT	ALLOWABLE VALUE
1. 6.9 kV Emergency Bus Undervoltage (Loss of Voltage)				
a. Bus Undervoltage	3	SR 3.3.5.1 SR 3.3.5.2	$\geq 5994 \text{ V}$ and $\leq 6006 \text{ V}$	$\geq 5967.6 \text{ V}$
b. Time Delay	2	SR 3.3.5.3	$\geq 0.73 \text{ sec}$ and $\leq 0.77 \text{ sec}$	$\geq 0.58 \text{ sec}$ and $\leq 0.94 \text{ sec}$
2. 6.9 kV Emergency Bus Undervoltage (Degraded Voltage)				
a. Bus Undervoltage	3	SR 3.3.5.1 SR 3.3.5.2	$\geq 6593.4 \text{ V}$ and $\leq 6606.6 \text{ V}$	$\geq 6570 \text{ V}$
b. Time Delay	2	SR 3.3.5.3	<del><math>\geq 5.84 \text{ sec}</math> and <math>\leq 6.16 \text{ sec}</math></del>	<del><math>\geq 5.7 \text{ sec}</math> and <math>\leq 6.3 \text{ sec}</math></del>
3. Diesel Generator Start	2	SR 3.3.5.1 SR 3.3.5.2	$\geq 4733.4 \text{ V}$ and $\leq 4926.6 \text{ V}$ with an internal time delay of $\geq 0.46 \text{ sec}$ and $\leq 0.54 \text{ sec}$	$\geq 2295.6 \text{ V}$ with an internal time delay of 0.56 sec at zero volts.
4. Load Shed	4	SR 3.3.5.1 SR 3.3.5.2	$\geq 4733.4 \text{ V}$ and $\leq 4926.6 \text{ V}$ with an internal time delay of $\geq 2.79 \text{ sec}$ and $\leq 3.21 \text{ sec}$	$\geq 2295.6 \text{ V}$ with an internal time delay of $\leq 3.3 \text{ sec}$ at zero volts.

$\geq 9.73 \text{ sec}$  and  $\leq 10.27 \text{ sec}$

$\geq 9.42 \text{ sec}$  and  $\leq 10.49 \text{ sec}$

B 3.3 INSTRUMENTATION

B 3.3.5 Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation

BASES

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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 supply breaker trip signal if the voltage is below 96% for 6 seconds (nominal). Additionally, three undervoltage 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 supply breaker trip signal if the voltage is below 87% for 0.75 seconds (nominal).

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Once the supply breakers have been opened, either one of two induction disk type relays, which have a voltage setpoint of 70% of 6.9 kV (nominal, decreasing) and an internal time delay of 0.5 seconds (nominal) at zero volts, will start the diesel generators. Four additional induction disk type relays, in a logic configuration of one-of-two taken twice which have a voltage setpoint of 70% of 6.9 kV (nominal, decreasing) and an internal time delay of 3 seconds (nominal), at zero volts, will initiate load shedding of the 6.9 kV Shutdown Board loads and selected loads on the 480 V shutdown boards and close the 480 V shutdown boards' current limiting reactor bypass breaker. The LOP start actuation is described in FSAR Section 8.3, "Onsite (Standby) Power System" (Ref. 1).

Trip Setpoints and Allowable Values

The Trip Setpoints used in the relays and timers are based on the analytical limits presented in TVA calculations, References 3, 5, and 6. The selection of these Trip Setpoints is such that adequate protection is provided when all sensor and time delays are taken into account.

(continued)

ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY  
WATTS BAR NUCLEAR PLANT (WBN)  
UNIT 1

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-00-11  
REVISED PAGES

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I. AFFECTED PAGE LIST

3.3-51  
B 3.3-147

II. REVISED PAGES

ATTACHED

Table 3.3.5-1 (page 1 of 1)  
LOP DG Start Instrumentation

FUNCTION	REQUIRED CHANNELS PER BUS	SURVEILLANCE REQUIREMENTS	TRIP SETPOINT	ALLOWABLE VALUE
1. 6.9 kV Emergency Bus Undervoltage (Loss of Voltage)				
a. Bus Undervoltage	3	SR 3.3.5.1 SR 3.3.5.2	$\geq 5994 \text{ V}$ and $\leq 6006 \text{ V}$	$\geq 5967.6 \text{ V}$
b. Time Delay	2	SR 3.3.5.3	$\geq 0.73 \text{ sec}$ and $\leq 0.77 \text{ sec}$	$\geq 0.58 \text{ sec}$ and $\leq 0.94 \text{ sec}$
2. 6.9 kV Emergency Bus Undervoltage (Degraded Voltage)				
a. Bus Undervoltage	3	SR 3.3.5.1 SR 3.3.5.2	$\geq 6593.4 \text{ V}$ and $\leq 6606.6 \text{ V}$	$\geq 6570 \text{ V}$
b. Time Delay	2	SR 3.3.5.3	$\geq 9.73 \text{ sec}$ and $\leq 10.27 \text{ sec}$	$\geq 9.42 \text{ sec}$ and $\leq 10.49 \text{ sec}$
3. Diesel Generator Start	2	SR 3.3.5.1 SR 3.3.5.2	$\geq 4733.4 \text{ V}$ and $\leq 4926.6 \text{ V}$ with an internal time delay of $\geq 0.46 \text{ sec}$ and $\leq 0.54 \text{ sec}$	$\geq 2295.6 \text{ V}$ with an internal time delay of 0.56 sec at zero volts.
4. Load Shed	4	SR 3.3.5.1 SR 3.3.5.2	$\geq 4733.4 \text{ V}$ and $\leq 4926.6 \text{ V}$ with an internal time delay of $\geq 2.79 \text{ sec}$ and $\leq 3.21 \text{ sec}$	$\geq 2295.6 \text{ V}$ with an internal time delay of $\leq 3.3 \text{ sec}$ at zero volts.

B 3.3 INSTRUMENTATION

B 3.3.5 Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation

BASES

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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 supply breaker trip signal if the voltage is below 96% for 10 seconds (nominal). Additionally, three undervoltage 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 supply breaker trip signal if the voltage is below 87% for 0.75 seconds (nominal).

Once the supply breakers have been opened, either one of two induction disk type relays, which have a voltage setpoint of 70% of 6.9 kV (nominal, decreasing) and an internal time delay of 0.5 seconds (nominal) at zero volts, will start the diesel generators. Four additional induction disk type relays, in a logic configuration of one-of-two taken twice which have a voltage setpoint of 70% of 6.9 kV (nominal, decreasing) and an internal time delay of 3 seconds (nominal), at zero volts, will initiate load shedding of the 6.9 kV Shutdown Board loads and selected loads on the 480 V shutdown boards and close the 480 V shutdown boards' current limiting reactor bypass breaker. The LOP start actuation is described in FSAR Section 8.3, "Onsite (Standby) Power System" (Ref. 1).

Trip Setpoints and Allowable Values

The Trip Setpoints used in the relays and timers are based on the analytical limits presented in TVA calculations, References 3, 5, and 6. The selection of these Trip Setpoints is such that adequate protection is provided when all sensor and time delays are taken into account.

(continued)