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SUBJECT: Forwards amend to licenses NPF-14 & NPF-22,respectively, consisting of proposed change numbers 154 & 109,revising TS Tables 3.3.3-1,3.3.3-2,3.3.3-3 & 4.3.3.1-1,to add an undervoltage protection scheme to DG E auxiliaries.

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DEC 0 8 1992

Director of Nuclear Reactor Regulation
Attention: Mr. C. L. Miller, Project Director
Project Directorate I-2
Division of Reactor Projects
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUSQUEHANNA STEAM ELECTRIC STATION
PROPOSED AMENDMENT NO. 154 TO NPF-14 AND
PROPOSED AMENDMENT NO. 109 TO NPF-22 :
ADDITION OF DEGRADED VOLTAGE PROTECTION
FOR DIESEL GENERATOR E AUXILIARIES
PLA-3885 FILES A17-2/R41-2

Docket Nos. 50-387
and 50-388

Dear Mr. Miller:

The purpose of this letter is to propose changes to the Susquehanna SES Unit 1 and Unit 2 Technical Specifications to add an undervoltage protection scheme to the Diesel Generator E auxiliaries.

DESCRIPTION OF CHANGE

This proposal results in the addition of an undervoltage scheme to the Diesel Generator E auxiliaries. The Technical Specifications involved are portions of Tables 3.3.3-1, 3.3.3-2, 3.3.3-3 and 4.3.3.1-1. The changes are illustrated on the attached marked-up pages.

SAFETY ANALYSIS

PROBLEM

During the preparation for our EDSFI, it was discovered that the undervoltage protection scheme on the Diesel Generator E MCC OB565 bus does not transfer the MCC from the offsite power source to the Diesel Generator E power source for single phasing of the offsite power source or sustained degraded bus voltage below 90 percent and above 30

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percent when the Diesel Generator E power source is available. This was documented in our Engineering Deficiency Tracking Program and was reported to the NRC as a 50.9 Report in PLA-3456 dated October 26, 1990.

BACKGROUND

The Diesel Generator E is a diesel generator which can be substituted for any of the Diesel Generators A, B, C or D without violating independency of the redundant Class 1E load groups. All of the auxiliaries required to support the operation of the Diesel Generator E are supplied from the Class 1E 480 V Motor Control Center (MCC) OB565. As indicated in Attachment No. 1, MCC OB565 is normally supplied offsite power from Startup Bus 20 through the 13.2kV-480V transformer OX556 and an automatic transfer switch OTAS556. An alternate offsite supply is from Startup Bus 10 through 13.2kV-480V transformer OX555 and switch OTAS556. The non-Class 1E Automatic Transfer Switch OATS556 transfers to the alternate offsite supply when the normal supply voltage is below 70 percent (336 VAC) for 3.0 seconds provided the alternate supply voltage is above 87.1 percent (418 VAC). If the transfer switch transfers to the alternate power supply, the switch automatically transfers back to the normal power supply if the normal supply voltage is above 87.1 percent for 5 minutes. All of the controls and voltage sensing for the automatic transfer switch are non-Class 1E.

In addition to the offsite power supplies from the automatic transfer switch OATS556, MCC OB565 can be supplied power from the Diesel Generator E 4.16kV-480V transformer OX565 provided the Diesel Generator E is operating. If the voltage on the MCC OB565 bus is sustained below 30 percent and the automatic transfer switch OATS556 operation has not corrected the bus voltage above 30 percent, the undervoltage protection scheme on bus OB565 initiates a bus transfer after 5 seconds from the offsite power source of the transfer switch OATS556 to the onsite power source of the transformer OX565 if the Diesel Generator 1E is operating. If the Diesel Generator E is not operating, no transfer occurs.

The Diesel Generator E has two modes of operation. When aligned for standby automatic operation the Diesel Generator E is substituted for one of the other diesel generators and performs the same functions as the substituted diesel generator. When not aligned, the Diesel Generator E is operated through the Test Facility Transformer OX207 in order to perform surveillance testing.

PROPOSED ACTION

The proposed action is to install a new undervoltage protection scheme on the Diesel Generator E MCC OB565 bus as follows:

1. Replace the 30 percent undervoltage relays (ITE Type 27D) on MCC OB565 bus with similar degraded voltage relays (ABB Type 27N) having new setpoints of 65 percent voltage and time delay of 5 seconds.

2. Add degraded voltage relays (ABB Type 27N) on MCC OB565 bus having relay setpoints of 92 percent voltage and time delay of 7 seconds.

3. Add an alarm circuit from the new 92 percent degraded voltage relays to the existing bus undervoltage alarm circuit for MCC OB565.

Attachment No. 2 is the undervoltage protection logic for MCC OB565 bus with the proposed action.

The raising of the setpoints of the 27-1 and 27-2 to 65 percent voltage assures that the relays detect the occurrence of single phasing in the offsite power source. The existing ITE 27D only have a pickup range of 30 to 50 VAC. In order to achieve the new voltage setpoint of 65 percent, the ITE 27D relays are replaced with the ABB Type 27N relays having a pickup range of 70 to 120 VAC. The Type 27N relay manufactured by ABB is from the same product line as the original Type 27D relays supplied by ITE. The Type 27N relay is provided with a harmonic filter to eliminate the possibility of voltage harmonics from affecting the setpoint of the relay.

The time delay of the 65 percent degraded voltage relays 27-1 and 27-2 is changed from 3 seconds to 5 seconds to coordinate with operation of the automatic transfer switch OATS556. With the automatic transfer switch having a 3 second time delay, the 5 second time delay of the relays permits the automatic transfer switch to sense either a single phase condition, a degraded voltage condition or a loss of power condition and transfer MCC OB565 to the alternate offsite power supply, if available. In the event that the automatic transfer switch OATS556 transfers to a offsite power supply with an unacceptable voltage level, the 27-1 and 27-2 relays initiate the automatic transfer of OB565 from the offsite power source to the OX565 transformer if the Diesel Generator E is operating. There is a phase angle difference of 30 degrees between the offsite power source (OATS556) and the Diesel Generator E power source (OX565). When the 27-1 and 27-2 relays were set at 30 percent bus voltage the automatic transfer was immediate since the residual bus voltage would be below the limit for out of phase re-energization. With the raising of the setpoint to 65 percent, the automatic transfer of OB565 must be delayed .5 seconds to

allow the residual bus voltage to decay below the limit. The existing 27X-1 relay output contact, which initiated closure of the OX565 source to the MCC OB565 bus (Breaker OB5651IN2) is rewired to energize a new Agastat ETR time delay relay 62-27X with a setpoint of .5 seconds. An output contact of the 62-27X relay initiates the closure of the OX565 source to the MCC OB565 bus.

The addition of the 27BI and 27B2 degraded voltage relays assures that the MCC OB565 bus is protected from degraded voltage conditions by transferring to the Diesel Generator E power source (OX565) if the Diesel Generator E is operating. The seven second time delay permits either the starting of single large motors or the sequential starting of motor loads without actuation of the degraded voltage relays 27BI and 27B2. The relays output contacts energize a new Agastat ETR time delay 62-27B with a setpoint of 3 seconds. The 3 second time delay after the 27Bl and 27B2 have operated is to make the configuration of the time delay of the degraded voltage protection of MCC OB565 consistent with the configuration of the time delay of the degraded voltage protection on the Class 1E 4.16 kV buses when reselected for a LOCA condition. The output contact of the 62-27B relay initiates the automatic bus transfer similar to the 27-1 and 27-2 undervoltage relays. Again, the transfer is delayed .5 seconds to allow the residual bus voltage to decay. The .5 seconds delay is adequate even if the bus voltage was at 92 percent since the running motor loads on MCC OB565 bus are small motors with limited back EMF capability.

The existing local alarm for a MCC OB565 bus undervoltage is an alarm window on the Diesel Generator E Building Services Panel OC577E which is lit by contacts from the 27-1 and 27-2 undervoltage relays. Contacts from the new degraded voltage relays 27Bl and 27B2 are added to this existing alarm circuit. The local alarm window becomes a common window for the 27-1, 27-2, 27BI and 27B2 relays. A separate alarm window on OC577E is not provided since each relay has a light on the relay which indicates the relay status. Response to the alarm window will result in the reset button on the relay target being depressed to reset the target. The existing local alarm window on OC577E is presently in the group alarm which indicates DIESEL GENERATOR E TROUBLE in the Main Control Room.

The installation of a new undervoltage protection scheme on the Diesel Generator E MCC OB565 bus has no effect on the Diesel Generator E start time in response to a Loss of Offsite Power (LOOP), a Loss of Coolant Accident (LOCA) or a LOCA/LOOP condition. All of the components and their controls which initiate the Diesel Generator E start and control operation of the Diesel Generator are supplied from the Diesel Generator E 125 VDC Battery OD595 through Distribution Panel OD597. The loads supplied from the MCC OB565 bus are required for the continuous operation of the diesel generator.

DESIGN BASIS

The undervoltage protection scheme on the Diesel Generator E MCC OB565 bus provides two levels of voltage protection for the bus. The 92 percent degraded voltage relays 27BI and 27B2 are to detect sustained degraded voltage conditions which are below the minimum voltage required for equipment operation but above the 70 percent voltage setpoint for operation of the automatic transfer switch OATS556. The 10 second time delay of the 27Bl and 27B2 relays is to prevent spurious operation due to individual large motor starts or sequential motor starts. The 65 percent degraded voltage relays 27-1 and 27-2 are to detect single phase conditions, sustained degraded voltage conditions or loss of power conditions. The relay voltage setpoints of 65 percent and time delays of 5 seconds are to coordinate with the automatic transfer switch OATS556 voltage setpoint of 70 percent voltage and 3 second time delay. This allows the automatic transfer switch to correct the voltage conditions by transferring to the alternate offsite power source, if it is above 87.1 percent voltage. Attachment No. 3 indicates the coordination between the MCC OB565 bus undervoltage protection scheme and the OATS556 automatic transfer switch.

The undervoltage protection scheme on the Diesel Generator E MCC OB565 bus provides two different functions depending upon the operating conditions of the Diesel Generator E. If the Diesel Generator E is not operating, the undervoltage protection scheme ensures that the main control room is aware of a degraded voltage or loss of power condition has occurred on the MCC OB565 bus which was not corrected by the automatic transfer switch OATS556. The notification is through the group alarm which indicates DIESEL GENERATOR E TROUBLE. The loads affected are primarily those loads required to maintain the diesel generator operable in the standby condition. If the Diesel Generator E is operating, the undervoltage protection scheme ensures that the loads required to support the diesel generator operation are connected to an adequate power source. Should a degraded voltage or loss of power condition occur on the MCC OB565 bus while the Diesel Generator E was operating, the undervoltage protection scheme would transfer the MCC OB565 bus to an adequate power source (OX565) if the automatic transfer switch OATS556 did not correct the voltage conditions by transferring to a power source with an acceptable voltage level. Again, the main control room would receive the group alarm.

The alarm circuitry from the new undervoltage protection scheme on the MCC OB565 bus is to inform the operator that a degraded voltage or loss of power condition has occurred on the bus. The manual resetting of the relay targets will indicate the condition. A separate voltage alarm to indicate degraded voltage conditions on the MCC OB565 bus prior to the bus transfer from the offsite power source (OATS556) to the OX565 transformer is not provided. The loads on the OB565 bus are only required to support operation of the Diesel Generator E. If the Diesel Generator E is aligned for standby

automatic operation but not operating and a degraded voltage condition occurs, the voltage condition is detected on the 4.16 kV Class 1E buses and alarmed in the main control room. Under these conditions, the bus transfer scheme would not operate since the Diesel Generator E is not operating. If the Diesel Generator E is aligned and operating, the new undervoltage protection scheme automatically protects the MCC OB565 bus below 92 percent bus voltage. For bus voltage above 92 percent, a separate alarm is not warranted for these limited conditions since the main control room would only receive the group trouble alarm for the Diesel Generator E.

The proposed action does not change the safety function of any of the affected components. The addition of a new undervoltage protection scheme to the Diesel Generator E MCC OB565 bus is to ensure adequate voltage is available to all of the connected loads, including their control circuitry, so that they can perform their safety function. When the Diesel Generator E is not operating, the undervoltage protection scheme notifies the main control room that an unacceptable voltage condition occurred on the bus. When the Diesel Generator E is operating, the scheme automatically initiates a transfer scheme to correct the voltage condition.

NO SIGNIFICANT HAZARDS CONSIDERATIONS

1. **The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.**

   Chapters 6 and 15 of the FSAR, the Design Assessment Report and the current Reload Analysis were reviewed to determine if the proposed action has an effect on the spectrum of postulated initiating events for which transients or anticipated operational occurrences and accident conditions were analyzed.

   The addition of a new undervoltage protection scheme to the Diesel Generator E MCC OB565 bus does not affect any of the postulated initiating events identified in Chapter 6 and 15 of the FSAR, the Design Assessment Report, or the current Reload Analysis. Thus, the proposed action does not increase the probability of occurrence of an accident.

   The consequences of an accident is not changed by the proposed action. The addition of a new undervoltage protection scheme to the Diesel Generator E MCC OB565 bus assures that the Diesel Generator E auxiliaries can maintain the diesel generator in an operable status when aligned for standby automatic operation. The scheme also assures that the auxiliaries can support the Diesel Generator E operation when the diesel generator is a power source for those systems required to mitigate the consequences of an accident.

Thus, the addition of a new undervoltage protection scheme to the Diesel Generator E MCC OB565 bus does not increase the probability of occurrence or the consequences of an accident as previously evaluated in the FSAR.

II. **The proposed changed does not create the possibility of a new or different kind of accident from any previously evaluated.**

Chapters 6 and 15 of the FSAR, the Design Assessment Report and the current Reload Analysis were reviewed to determine if the proposed action had the potential of creating a postulated initiating event which was not within the spectrum of events for which transients or anticipated operational occurrences and accident conditions were analyzed. The review did not identify a postulated initiating event which would create the possibility for an accident of a different type.

III. **The proposed change does not involve a significant reduction in a margin of safety.**

The operability of the undervoltage protection scheme on the MCC OB565 bus is presently not governed explicitly by either Susquehanna SES Unit 1 Technical Specifications or Susquehanna SES Unit 2 Technical Specifications. The operability of the Class 1E 4.16 kV bus undervoltage protection scheme is governed by Technical Specification Section 3/4.3.3, entitled Emergency Core Cooling Actuation Instrumentation, with Tables 3.3.3-1, 3.3.3-2 and 3.3.3-3 establishing the required number of operable channels, the setpoints and response times. Since MCC OB565 is required to support operation of the Diesel Generator E when either aligned for standby automatic operation or not aligned but operating on the test facility, the bases which govern operability of the Class 1E 4.16 kV bus undervoltage protection is also applicable to the MCC OB565 bus undervoltage protection. The bases for operability of the Class 1E 4.16 kV bus undervoltage protection is to ensure that the Emergency Core Cooling System Actuation Instrumentation can provide the initiating actions to mitigate the consequences of accidents that are beyond the ability of the operator to control. Tables 3.3.3-1, 3.3.3-2 and 3.3.3-3 form the bases to ensure the effectiveness of the instrumentation used to initiate the actions. The proposed action adds to Section 3/4.3.3 the required number of operable channels and the conditions for operability (Table 3.3.3-1), the setpoints (Table 3.3.3-2) and the response times (Table 3.3.3.-3) of the new undervoltage protection scheme on the MCC OB565 bus.

Thus, based upon a review of the Technical Specifications and the FSAR, the addition of a new undervoltage protection scheme for the Diesel Generator E MCC OB565 bus, establishes the margin of safety for the scheme which is consistent with margin of safety for the Class 1E 4.16 kV bus undervoltage protection as defined in the basis of the Technical Specifications.

We request that these changes be approved by March 15, 1993 since the undervoltage scheme is presently scheduled to be installed during our Diesel Generator E outage in April, 1993. We request that these changes be effective upon completion of the installation of the undervoltage scheme.

Any questions on this submittal should be directed to Mr. C.T. Coddington at (215) 774-7915.

Very truly yours,

H. W. Keiser

Attachments

cc: NRC Document Control Desk (original)
NRC Region I
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