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Edwin I. Hatch Nuclear Plant Units 1 and 2
License Amendment Request for
Technical Specifications 3.3.8.1 and 3.8.1 Regarding Unit 1 Degraded Voltage Protection

Ladies and Gentlemen:

Pursuant to the provisions of Section 50.90 of Title 10 of the Code of Federal Regulations (10 CFR), Southern Nuclear Operating Company (SNC) hereby requests an amendment to the Technical Specifications (TS) for Edwin I. Hatch Nuclear Plant (HNP) Unit 1 Renewed Facility Operating License DPR-57 and Unit 2 Renewed Facility Operating License NPF-5 and includes the results of the no significant hazards determination. The proposed amendment would revise Unit 1 and Unit 2 TS 3.3.8.1, "Loss of Power (LOP) Instrumentation" to modify the instrument allowable values for the Unit 1 4.16 kV emergency bus degraded voltage instrumentation and delete the annunciation requirements for the Unit 1 4.16 kV emergency bus undervoltage instrumentation, including associated TS actions. This proposed amendment would also delete Unit 1 License Condition 2.C(11) and Unit 2 License Condition 2.C(3)(i). Additionally, the proposed amendment would revise surveillance requirement (SR) 3.8.1.8 in TS 3.8.1, "AC Sources – Operating," to increase the voltage limit in the emergency diesel generator (DG) full load rejection test for the Unit 1 DGs.

Revision of the requirements in TS 3.3.8.1 for LOP instrumentation functions is needed to be consistent with an electrical power system modification required to satisfy Unit 1 License Condition 2.C(11) and Unit 2 License Condition 2.C(3)(i). These license conditions require SNC to implement modifications that will eliminate use of manual actions as part of the HNP degraded voltage protection scheme, and specify the schedule by which the modifications must be implemented. The increased voltage limit for SR 3.8.1.8 is necessary due the higher operating voltage on the emergency buses, post-modification.

SNC requests approval of the proposed license amendments by December 31, 2019. The proposed changes would be implemented prior to startup from the Unit 1 spring 2020 refueling outage.

Enclosure 1 provides a description of the proposed change, the supporting technical and regulatory analysis, and the no significant hazards considerations analysis. Attachment 1 provides the marked-up facility operating license pages and TS pages. Attachment 2 provides the clean-typed facility operating license pages and TS pages. Attachment 3 contain the marked-up TS Bases pages showing the accompanying proposed changes for information only.

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Attachment 4 provides a summary of the HNP Unit 1 LOP instrumentation setpoint calculations that supports the proposed instrumentation allowable value changes.

In accordance with 10 CFR 50.91, SNC is notifying the State of Georgia of this license amendment request by transmitting a copy of this letter and enclosures to the designated State Official. This letter contains no NRC commitments. If you have any questions, please contact Jamie Coleman at 205.992.6611.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 30th day of April 2019.

Respectfully submitted,

C. A. Gayheart
Director, Regulatory Affairs
Southern Nuclear Operating Company

CAG/RMJ

Enclosure: 1. Basis for Proposed Changes

Attachments: 1. HNP Unit 1 and Unit 2 Facility Operating License Technical Specifications Marked-Up Pages
2. HNP Unit 1 and Unit 2 Facility Operating License and Technical Specifications Clean-Typed Pages
3. HNP Unit 1 and Unit 2 Technical Specifications Bases Marked-Up Pages (Information Only)
4. Summary of the HNP Unit 1 Loss of Power Instrumentation Setpoint Calculations

cc: Regional Administrator, Region II
NRR Project Manager – Hatch
Senior Resident Inspector – Hatch
Director, Environmental Protection Division – State of Georgia
RType: CHA02.004

Edwin I. Hatch Nuclear Plant Units 1 and 2
License Amendment Request for
Technical Specifications 3.3.8.1 and 3.8.1 Regarding Unit 1 Degraded Voltage Protection

Enclosure 1

Basis for Proposed Changes

1.0 Summary Description

This proposed amendment to the Edwin I. Hatch Nuclear Plant (HNP) Units 1 and 2 operating licenses would revise Unit 1 and Unit 2 Technical Specification (TS) 3.3.8.1, "Loss of Power (LOP) Instrumentation" to modify the instrument allowable values (AVs) for the Unit 1 4.16 kV emergency bus degraded voltage instrumentation and delete the annunciation requirements for the Unit 1 4.16 kV emergency bus undervoltage instrumentation, including associated TS actions. This proposed amendment would also delete Unit 1 License Condition 2.C(11) and Unit 2 License Condition 2.C(3)(i). Additionally, this proposed amendment would revise surveillance requirement (SR) 3.8.1.8 in technical specification (TS) 3.8.1, "AC Sources – Operating," to increase the voltage limit in the emergency diesel generator (DG) full load rejection test for the Unit 1 DGs.

2.0 Detailed Description

2.1 System Design and Operation

Offsite power is the preferred source of power for the 4.16 kV emergency buses which power the required components. The LOP protection instrumentation monitors voltage on the safety related 4.16 kV buses of each HNP unit. Each 4.16 kV emergency bus has independent LOP instrumentation and relay actuation logic for detecting degraded grid or loss of voltage conditions and initiating an LOP DG start signal. As described, in part, in HNP Unit 1 Final Safety Analysis Report (FSAR), Section 8.4.3 and Unit 2 FSAR, Section 8.3.1.1.3, automatic starting of the DGs is initiated by undervoltage on 4.16 kV emergency buses 1E, 1F, 1G, 2E, 2F, and 2G as a result of a complete loss-of-offsite power, a sustained degraded voltage condition, or a failure in any of the redundant instrument train's sensing voltage.

To enhance degraded voltage detection and mitigation to the HNP Class 1E electrical distribution system, SNC is in the process of modifying the electrical power scheme at HNP. The degraded voltage protection modification includes replacing the existing C and D station auxiliary transformers (SATs) on both units and adding an additional SAT E for each unit. This modified configuration includes realigning the 4.16 kV engineered safety feature (ESF) buses to increase the expected voltage range which allows the installation of automatic degraded voltage relays (DVRs). The installation of the degraded voltage protection modification is complete on Unit 2. The degraded voltage protection modification for Unit 1 is scheduled in the 2020 spring outage.

The current degraded voltage instrumentation protection scheme causes an automatic transfer from the primary source to the alternate or emergency source and disconnects certain electrical loads following a time delay. Figure 1, "Current Unit 1 Degraded Voltage Protection Scheme," shows the degraded voltage instrumentation logic for the 1E 4.16 kV emergency bus and associated DG 1A. The current degraded voltage instrumentation logic for each Unit 1 4.16 kV emergency bus is consistent with that shown in Figure 1. As shown in Figure 1, bus degraded voltage for each 4.16 kV emergency bus is monitored by two induction disk type undervoltage relays with inverse time delay and a logic output arranged in a two-out-of-two logic configuration for supported components except the DGs. The DG start logic is arranged in a one-out-of-two configuration.

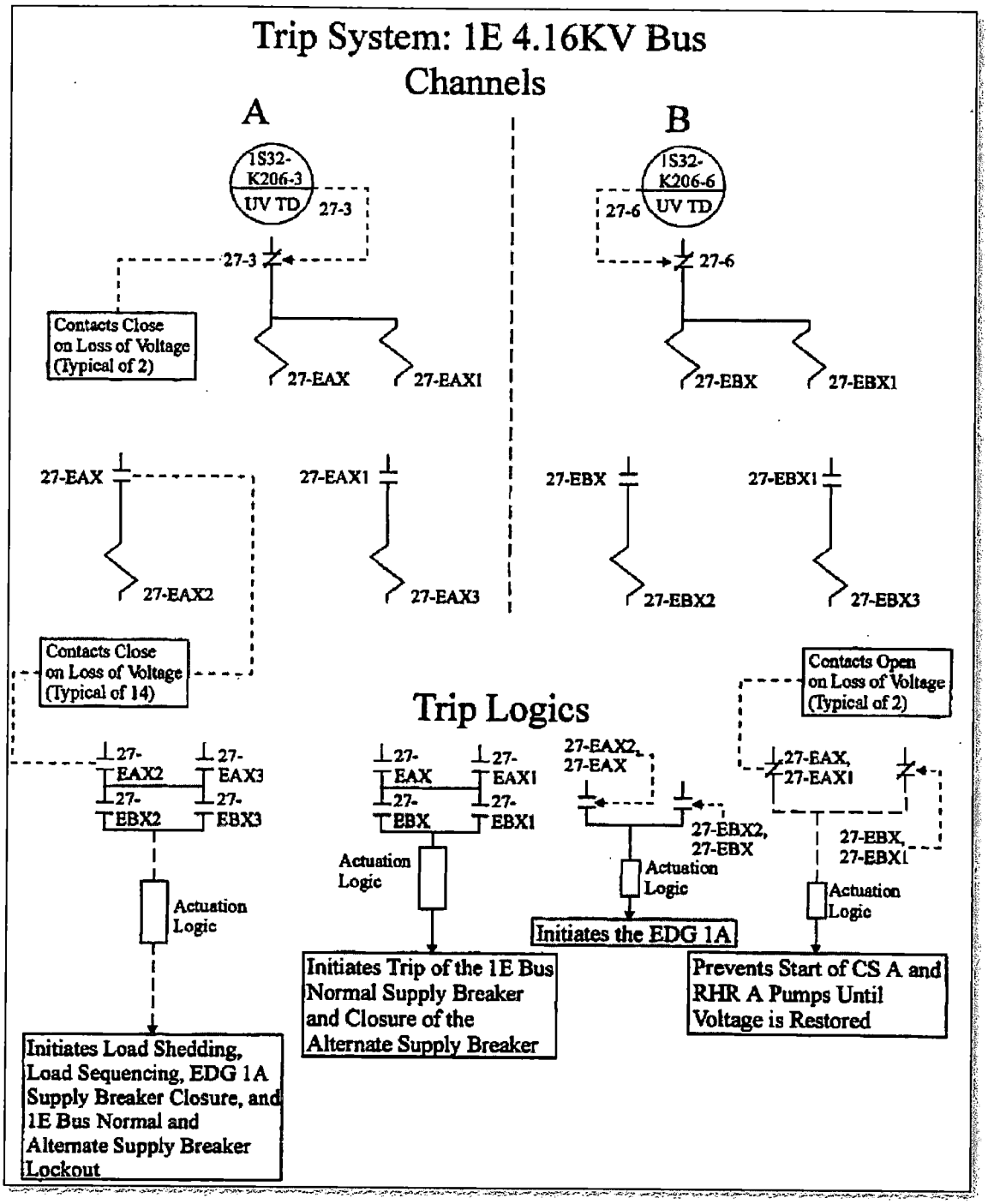


Figure 1 – Current Unit 1 Degraded Voltage Protection Scheme

The current low voltage instrumentation protection scheme is similar to the degraded voltage instrumentation scheme with separate loss of voltage relays with different voltage and time delay characteristics. The loss of voltage instrumentation protection scheme and associated setpoints are not altered as a result of the electrical power system modification. Each emergency bus also has a dedicated low voltage annunciator with signal provided from two relays and associated time delays. Figure 2, "Unit 1 4.16 kV Bus Low Voltage Alarm Scheme," shows the annunciation instrumentation logic for the Unit 1 4.16 kV emergency buses. The

logic for the Unit 1 annunciation functions is arranged in a two-out-of-two configuration as shown in Figure 2.

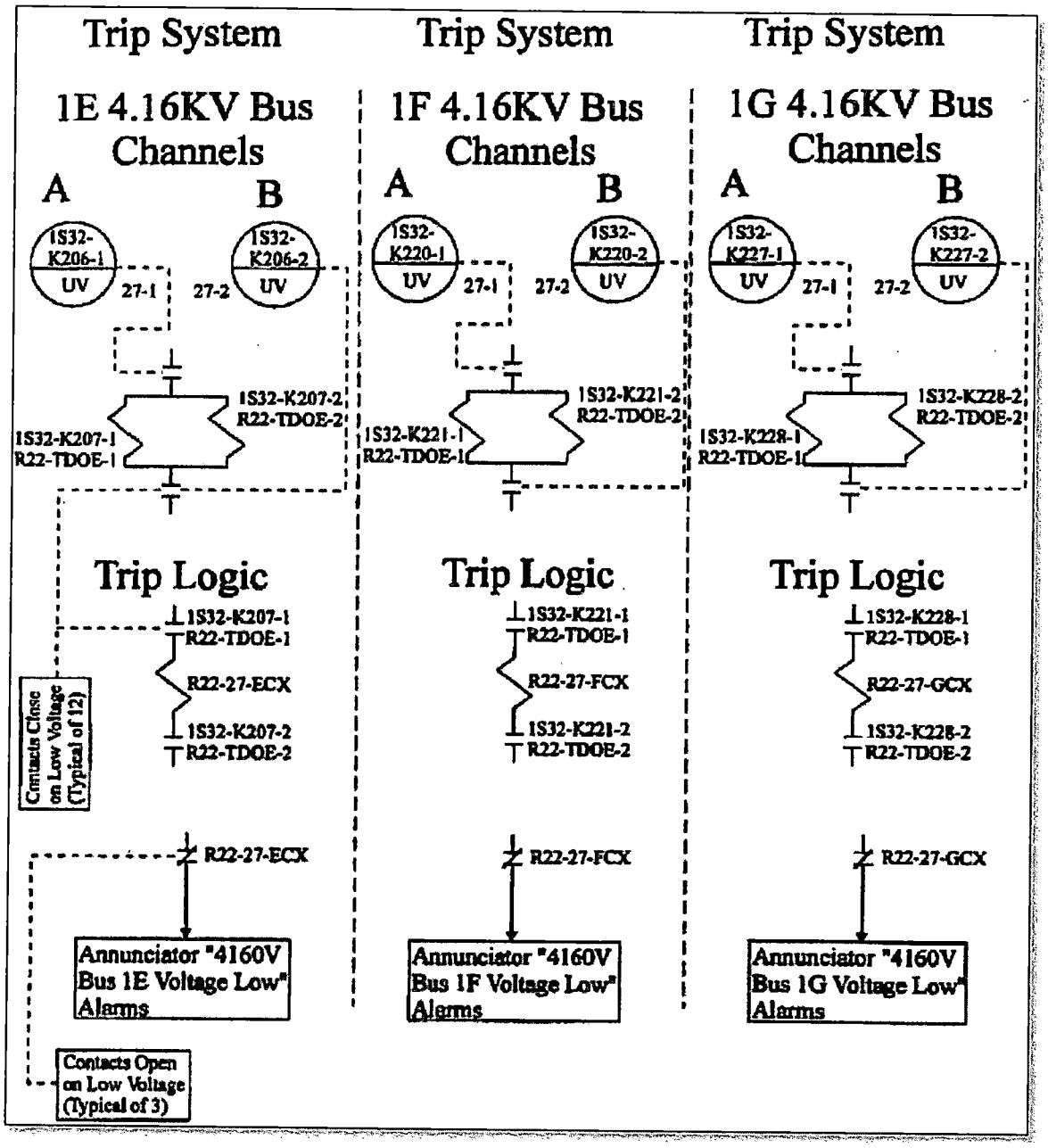


Figure 2 – Unit 1 4.16 kV Bus Low Voltage Alarm Scheme

The current DVRs are intended to protect plant equipment from a sustained degraded voltage condition when the 4.16 kV emergency buses are powered from the offsite grid. The existing margins available between the Unit 1 minimum expected bus voltage and the voltage level required by the safety-related equipment, coupled with the inverse time operating characteristics of the existing DVRs, do not allow for resolution of the issue addressed in NRC Regulatory Issue Summary (RIS) 2011-12, "Adequacy Of Station Electric Distribution System Voltages,"

(Reference 1) through DVR setpoint adjustment alone. Therefore, the existing HNP degraded voltage protection scheme for the Unit 1 emergency buses relies in part on manual actions to assure adequate voltage is supplied to safety-related equipment during design basis events.

In the existing protection scheme, manual action is supported by the low voltage alarm. This alarm alerts plant operators of a degraded grid voltage condition so that they can coordinate with the transmission system operators on actions to restore grid voltage. At present, these manual actions are the means relied on to protect safety-related equipment from inadequate voltages in the range where automatic protection is not provided by the DVRs.

The modified LOP instrumentation design includes two loss of voltage relays per bus (i.e., 6 per Function per unit) and three solid state DVRs per bus (i.e., 9 per Function per unit) with each DVR relay sensing voltage from an electrically independent 4200V/120V potential transformer. Figure 3, "Unit 2 Degraded Voltage Protection Scheme," shows the modified degraded voltage instrumentation logic for the 2E 4.16 kV emergency bus and associated DG 2A. The modified degraded voltage instrumentation logic for each Unit 1 4.16 kV emergency bus will be consistent with the degraded voltage instrumentation logic for Unit 2 as shown in Figure 3 upon completion of the electrical power system modification. As shown in Figure 3, bus degraded voltage is monitored by the three DVRs with fixed time delay for each emergency bus and a logic output arranged in a two-out-of-three configuration for supported components except the DGs. The DG start logic is arranged in a one-out-of-three configuration. A two-out-of-three coincidence logic precludes spurious trips of the offsite power source due to the failure of one instrument channel, while a one-out-of-three DG start logic does not preclude a DG start in the event of a single instrument channel failure.

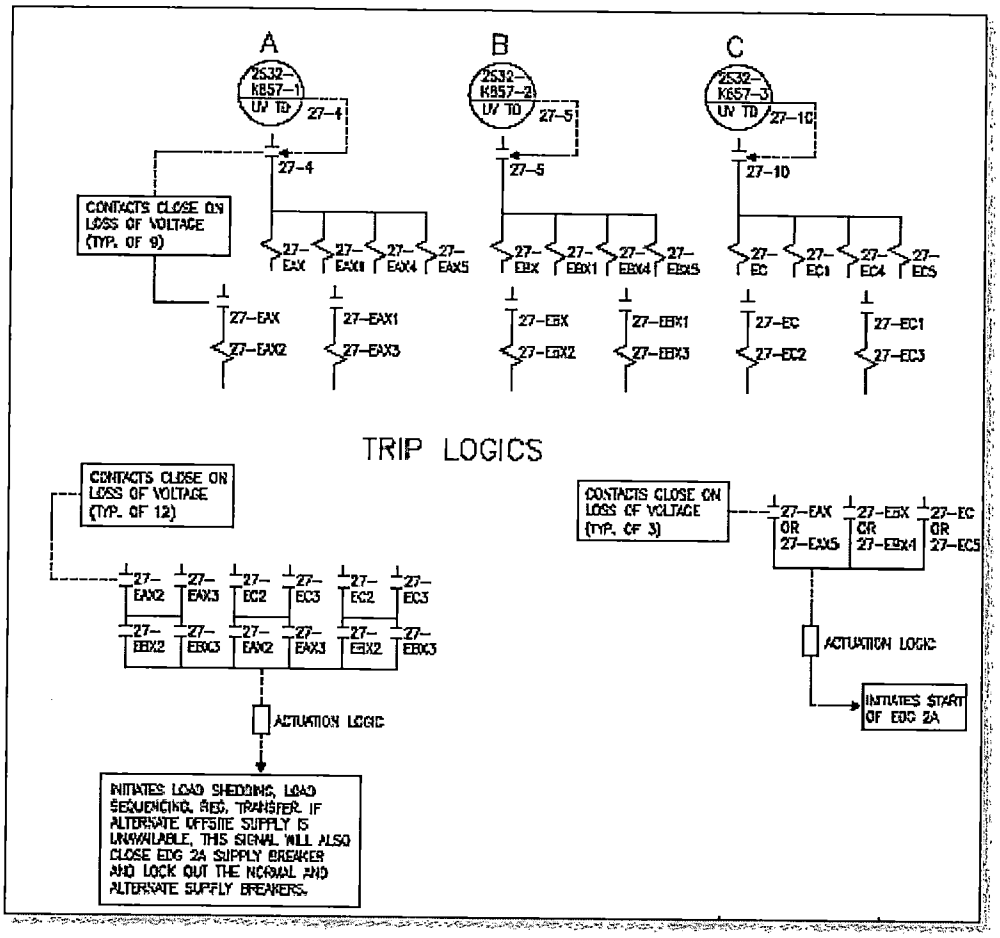


Figure 3 – Modified Degraded Voltage Protection Scheme

2.2 Current Operating License and Technical Specifications Requirements

HNP Unit 1 License Condition 2.C(11) states: "SNC shall implement the Degraded Voltage modifications to eliminate the manual actions in lieu of automatic degraded voltage protection to assure adequate voltage to safety-related equipment during design basis events by completion of the Unit 1 2020 Spring Outage, U1R29."

HNP Unit 2 License Condition 2.C(3)(i) states: "SNC shall implement the Degraded Voltage modifications to eliminate the manual actions in lieu of automatic degraded voltage protection to assure adequate voltage to safety-related equipment during design basis events for the Unit 2 4.16 kV emergency buses by completion of the Unit 2 2019 Spring Outage, U2R25 and for the required Unit 1 4.16 kV emergency buses by completion of the Unit 1 2020 Spring Outage, U1R29."

LCO 3.3.8.1 requires the instrumentation for each Function in Table 3.3.8.1-1 to be operable for each DG required by LCO 3.8.1, "AC Sources – Operating" and LCO 3.8.2, "AC Sources – Shutdown" when the associated DG is required to be operable. Table 3.3.8.1-1 provides

requirements for three LOP instrument functions:

- Function 1, 4.16 kV Emergency Bus Undervoltage (Loss of Voltage);
- Function 2, 4.16 kV Emergency Bus Undervoltage (Degraded Voltage); and
- Unit 1 Function 3, 4.16 kV Emergency Bus Undervoltage (Annunciation).

For each LOP instrument function, Table 3.3.8.1-1 lists applicable number of required channels, surveillance requirements, and AVs. When one or more channels of Function 1 or 2 are inoperable, TS Actions require restoring the channel to operable status within 1 hour or declare the associated DG inoperable. When one or more channels of Function 3 are inoperable, TS Actions require verifying voltage on the associated Unit 1 emergency bus is ≥ 3825 V once per hour or to declare the associated DG inoperable.

Currently, SR 3.8.1.8 requires a verification that each DG operating at a power factor ≤ 0.88 does not trip and voltage is maintained, as specified for each DG, during and following a load rejection of ≥ 2775 kW with a frequency in accordance with the surveillance frequency control program. TS SR 3.8.1.8 requires the maximum DG voltage during the performance of the DG full load rejection test to be less than 4800 V for DGs 1A and 1C.

2.3 Reason for Proposed Change

Revision of the requirements in TS 3.3.8.1 for LOP instrumentation is needed to reflect an electrical power system modification required to satisfy Unit 1 License Condition 2.C(11) and Unit 2 License Condition 2.C(3)(i). Unit 1 License Condition 2.C(11) and Unit 2 License Condition 2.C(3)(i) require implementation of degraded voltage modifications that will eliminate the use of manual actions as part of the HNP degraded voltage protection scheme. Revision of the voltage limit requirement in SR 3.8.1.8 for the Unit 1 DGs is required as a result of the higher operating voltage on the 1E and 1G 4.16 kV emergency buses.

The Unit 2 portion of the electrical power system modification, including the installation of the new degraded voltage instrumentation, was installed in the 2019 spring refueling outage. The final portion of the electrical power system modification will be installed for the Unit 1 4.16 kV emergency buses during the 2020 spring refueling outage. SNC has evaluated the modification against the criteria of 10 CFR 50.59(c) and determined the facility modification does not require a license amendment pursuant to 10 CFR 50.90. However, a change to TS 3.3.8.1 and TS 3.8.1 is required as part of the implementation of that plant modification for Unit 1.

2.4 Description of Proposed Change

The proposed amendment would delete Unit 1 License Condition 2.C(11) and Unit 2 License Condition 2.C(3)(i), and would revise Unit 1 and Unit 2 TS 3.3.8.1 and TS 3.8.1 as follows (deleted text in ~~strikeout~~ and added text in *italics*):

TS 3.3.8.1 Changes

- Condition A is revised to state "One or more required channels inoperable ~~for Functions 1 and 2~~."

- Condition B is deleted; Condition C is renumbered as Condition B.

- Surveillance Requirement Note 1 is revised to state "~~Refer to~~ *These SRs apply to each Function in* Table 3.3.8.1-1 ~~to determine which SRs apply for each LOP Function~~."

- Surveillance Requirement Note 2 is revised to state "When a 4.16 kV Emergency Bus Undervoltage channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains initiation capability ~~(for Functions 1 and 2) and annunciation capability (for Function 3)~~."

- SR 3.3.8.1.1 is removed; the remaining SRs are renumbered accordingly.

- The Unit 1 AVs associated with Table 3.3.8.1-1 Functions 2.a, "Bus Undervoltage" and 2.b, "Time Delay," are revised with new calculated values individually specifying the bus undervoltage AV for each required 4.16 kV emergency bus.

- Table 3.3.8.1-1 Function 3 is removed.

- Table 3.3.8.1-1 Surveillance Requirements column is removed.

TS 3.8.1 Change

- SR 3.8.1.8 is revised to state:

  Verify each DG operating at a power factor ≤ 0.88
  does not trip and *voltage is* ~~the following voltages are~~
  maintained ≤ *5200 V* during and following a load rejection of
  ≥ 2775 kW~~:~~
  ~~[a. For DGs 1A and 1C, ≤ 4800 V; and~~
  ~~b. For DGs 2A, 2C, and 1B, ≤ 5200 V]~~. (Unit 1)
  ~~[a. For DGs 2A, 2C, and 1B, ≤ 5200 V; and~~
  ~~b. For DGs 1A and 1C, ≤ 4800 V]~~. (Unit 2)

The proposed changes are shown in the marked-up and clean typed Unit 1 and Unit 2 facility operating license pages and TS pages provided in Attachments 1 and 2. In addition, Attachment 3 provides, for information only, mark-ups of anticipated corresponding changes to affected TS Bases pages.

3.0 Technical Evaluation

3.1 Discussion of Changes

Facility Operating License

The proposed deletion to Unit 1 License Condition 2.C(11) and Unit 2 License Condition 2.C(3)(i) is appropriate, since these conditions will be satisfied upon completion of the electrical power system modifications that will eliminate the use of manual actions as part of the HNP degraded voltage protection scheme, thereby making these license conditions unnecessary. Deleting these license conditions as part of this amendment is considered an administrative change based on satisfying the subject of these conditions.

TS 3.3.8.1

The proposed change to Condition A to delete the phrase "for Functions 1 and 2" is an attendant change based on the deletion of Table 3.3.8.1-1 Function 3. Since Table 3.3.8.1-1 will only include Functions 1 and 2, this phrase is no longer necessary as the Condition will apply to both remaining Functions. This proposed change is a presentation preference, and is considered administrative.

The proposed deletion of Condition B (and corresponding renumbering of Condition C) is an attendant change based on the deletion of Table 3.3.8.1-1 Function 3. Condition B is only applicable to Table 3.3.8.1-1 Function 3, and is therefore no longer necessary. This proposed change is a presentation preference, and is considered administrative.

The proposed revision to Surveillance Requirement Note 1 and Note 2, the proposed deletion of SR 3.3.8.1.1 (and the corresponding renumbering of the remaining SRs), and the deletion of the Table 3.3.8.1-1 Surveillance Requirements column are attendant changes based on the deletion of Table 3.3.8.1-1 Function 3. The remaining Functions 1 and 2 do not require performance of SR 3.3.8.1.1; therefore this SR is no longer needed for TS 3.3.8.1. The remaining SRs apply to remaining Functions 1 and 2. These proposed changes are presentation preferences, and are considered administrative.

Function 3, Unit 1 4.16 kV Emergency Bus Undervoltage (Annunciation) and associated requirements are removed because manually transferring electrical power sources during a degraded voltage condition is no longer required for Unit 1 4.16 kV emergency buses to assure adequate voltage is supplied to safety-related equipment during design basis events. The proposed deletion of the Unit 1 loss of voltage annunciation requirements is offset by the more restrictive degraded voltage instrumentation AVs, thereby providing an automatic emergency bus transfer to the alternate or emergency power supply in the event of a sustained degraded voltage condition.

The proposed change to revise the degraded voltage instrumentation requirements (i.e., TS Table 3.3.8.1-1, Function 2) for the Unit 1 buses does not involve a physical change to the LOP instrumentation, nor does it change the safety function of the LOP instrumentation or the equipment supported by the LOP instrumentation. The AVs for Function 2a, "Bus Undervoltage," and Function 2b, "Time Delay," include new calculated values individually specified for each required Unit 1 4.16 kV emergency bus and are more restrictive than the current requirements. These more restrictive requirements continue to ensure process variables, structures, systems, and components are maintained consistent with the safety analyses and licensing basis.

TS 3.8.1

The revised maximum voltage requirement for DGs 1A and 1C specified in SR 3.8.1.8 is necessary based on the increased post-modification operating voltage on the 1E and 1G 4.16 kV emergency buses.

3.2 Degraded Voltage Instrument Setpoints and Allowable Values

The new AVs specified for the DVRs in Table 3.3.8.1-1 Function 2 have been chosen to assure adequate voltage to safety-related equipment during design basis events, eliminating reliance

on manual actions from the degraded voltage protection scheme. Specifically, a loss of coolant accident (LOCA) signal concurrent with degraded bus voltage just below the DVR AV was assumed, such that sufficient voltage for proper operation of the safety-related loads is maintained until the DVRs actuate to separate the buses from the degraded offsite power source. The methodology used in determining the AV's follows the guidelines listed in Generic Letter 79-36, "Adequacy of Station Electric Distribution Systems Voltages," (Reference 2) as supplemented in RIS 2011-12 (Reference 1). The loss of voltage annunciators will continue to alert the operator of a degraded voltage condition, however, they do not initiate automatic separation of the 4.16 kV buses from offsite power upon a LOCA actuation signal. Automatic separation of the buses from offsite power upon a LOCA actuation is not needed because the proposed DVR actuation voltage AVs have been calculated to maintain adequate voltage on the Class 1E buses with LOCA loads assumed. The proposed degraded voltage time delay was optimized to ensure that the Class 1E buses are separated from the offsite power system prior to damaging the safety related loads during sustained degraded voltage conditions while avoiding an inadvertent separation of safety-related buses from the offsite power system. New, higher alarm setpoints have been calculated for each bus that do not overlap with the new DVR AVs; therefore, separating a Class 1E bus from the preferred offsite power source at the low voltage alarm setpoint is not warranted.

The DVR actuation voltage and delay time settings are chosen to minimize nuisance tripping during normal operating conditions but still ensure that the voltage requirements of the safety-related loads are met without exceeding the maximum time delay assumed in the safety analyses. To address the effects of test equipment harmonics on offsetting relay operating points as described in NRC Information Notice 95-05, "Undervoltage Protection Relay Settings Out of Tolerance Due to Test Equipment Harmonics," the new DVRs include harmonic filters to preclude spurious actuations due to electrical bus harmonics (Reference 3).

A summary of the methodology used to determine the Unit 1 LOP instrument degraded voltage setpoints (i.e., analytical limits, AVs, and nominal trip setpoints (NTSPs)), including the method of calculating the minimum expected voltage (MEV) and minimum required voltage (MRV), is provided in Attachment 4, "Summary of the HNP Loss of Power Instrumentation Setpoint Methodology," of the Unit 2 degraded voltage instrumentation license amendment request (LAR) (Reference 4). This is the same methodology that was used to determine the corresponding Unit 2 LOP instrument degraded voltage setpoints. The methodology follows the guidelines listed in Generic Letter 79-36 (Reference 2), as supplemented in RIS 2011-12 (Reference 1).

The NRC staff confirmed the methods used to calculate Unit 2 LOP instrument degraded voltage setpoints meet the applicable regulatory guidance and branch technical positions. As indicated in the safety evaluation issuing the amendments associated with the Unit 2 degraded voltage instrumentation (Reference 5), the NRC determined that the Unit 2 degraded voltage instrumentation AVs, using the same methodology, provide reasonable assurance that automatic actuation of the degraded voltage relays will ensure proper equipment performance during postulated design basis events and concluded that the changes meet the requirements of general design criteria (GDCs) 13 and 17, 10 CFR 50.55(h)(2), and 10 CFR 50.36.

Attachment 4 of this LAR provides a summary of the setpoint calculations from which the AVs were derived and includes criteria and assumptions used for determining the required voltage, voltage setpoints, and the time delay settings. Calculations were performed to determine the acceptable voltage operating range at the 4.16 kV emergency buses during normal and LOCA conditions, including transients due to motor starting and bus transfer. As stated in the HNP

Unit 2 FSAR, Section 8.2, "Offsite Power System," the normal offsite system operating voltage range for Units 1 and 2 is 101.3% to 104.9% of 230 kV. The MEV was calculated as the 4.16 kV emergency bus voltage which would occur during worst-case steady-state loading with a minimum 230-kV switchyard voltage of 101.3%.

The MRV was determined as the greater of: a) the minimum acceptable steady-state voltage for normal operation and LOCA conditions of Class 1E loads, using maximum expected non-accident bus loading, b) the minimum pre-start voltage providing acceptable Class 1E motor starting (e.g. during LOCA group motor starting, using maximum expected accident loading, c) the minimum steady-state voltage providing acceptable Class 1E motor starting and operation for individual motors, using maximum expected accident loading, or d) the minimum voltage to the Class 1E motor control centers necessary for motor controller contactor pickup and equipment operation.

Electrical system voltage evaluations encompassed both Class 1E normal offsite power configurations and alternate offsite power configurations to determine worst case loading conditions. The evaluations included plant configurations with a single SAT out of service and the associated loads powered from the alternate SAT concurrent with safety related and non-safety related loads. Additional details on the methodology for determining the MRV are summarized in Attachment 4 of the Unit 2 degraded voltage instrumentation LAR (Reference 4).

The MRV value for each emergency bus was used in calculating the new DVR actuation voltage AVs proposed for Functions 2.a and 2.b of TS Table 3.3.8.1-1. The proposed Unit 1 LOP instrumentation AVs and NTSPs are less than the respective emergency bus MEVs but remain above their respective MRVs to ensure that the voltages at safety-related equipment powered downstream from each respective safety-related 4.16 kV emergency bus remain above their minimum level during steady-state and motor starting conditions. The proposed Unit 1 LOP instrumentation NTSPs will reset at their minimum reset value of 0.5% of settings, consistent with the calculation assumption.

3.3 Human Factors Impacts

Control room operators currently respond to an electrical degraded voltage condition using applicable alarm response procedures and take action in accordance with the applicable abnormal operations procedure. Operator actions include, but are not limited to, coordinating with the electrical grid system operator to maintain voltage above the minimum value per TS 3.3.8.1, Required Action B.1, minimize activities that may have an impact of large load changes at the plant, and, if necessary, start the associated DG and transfer the affected 4.16 kV emergency buses to their associated DG.

Following implementation of the electrical power system modification, the alarm response procedures and the abnormal operations procedure associated with degraded system voltage will be modified to independently specify actions for alarm and automatic actuation response. Operator response to a low voltage alarm will continue to include minimizing activities that may have an impact of large load changes at the plant, coordinating with the electrical grid system operator to restore the system voltage to within an acceptable range and, if necessary, start the associated DG and transfer the affected 4.16 kV emergency buses to their associated DG. Following an automatic degraded voltage actuation, the applicable alarm response procedure will direct the operator to verify auto DG start, auto bus transfer to the DG, and verification of power available to the bus and associated loads.

The proposed license amendment changes the HNP licensing basis such that the degraded voltage protection design will rely upon the automatic actuation of the DVRs without crediting the current administrative controls, once the modifications are completed on each of the 4.16 kV emergency buses in each unit. HNP emergency operating procedures are not affected by the proposed change; therefore, SNC has determined that an emergency operating procedure control room task analysis is not required.

No changes to controls or displays in the control room are required to support the proposed license amendment. The loss of voltage and degraded voltage automatic actuations are currently annunciated in the control room and not modified as a result of the degraded voltage instrumentation modification or the proposed license amendment.

As part of implementation of the electrical power system modification, the plant reference simulator will be updated to reflect the modified electrical power system as required by paragraph (c) of 10 CFR 55.46, including the revised degraded voltage protection scheme instrument logic configuration and revision of the LOP instrumentation degraded voltage and annunciation actuation and reset setpoints and applicable operator training programs assessed in accordance with the systems approach to training process as required by paragraph (b) of 10 CFR 50.120.

3.4 Voltage Limit Change for SR 3.8.1.8

The purpose of a full load rejection test as performed under SR 3.8.1.8 is to demonstrate that the DG is capable of rejecting a full load without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of a system fault or inadvertent breaker tripping. This SR ensures proper DG load response under the simulated test conditions. This test simulates the loss of the total connected load that the DG experiences following a full load rejection and verifies that the DG does not trip upon loss of the load. These acceptance criteria provide for DG damage protection. While the DG is not expected to experience this transient during the event, the SR requirements ensure that the DG is not degraded for future operation, including re-connection to the bus if the trip initiator can be corrected or isolated. The existing 4800 V limit for DGs 1A and 1C in SR 3.8.1.8 is based on the pre-modification ESF bus voltages. The ESF bus operating voltages will increase as a result of the electrical power system modification, which will increase the maximum DG voltage experienced during the performance of this SR. The increased limit will provide a more appropriate acceptance criteria for the performance of this SR, and will not result in damage to the DGs or the other components subjected to the transient voltages.

In addition, since at least one Unit 1 DG is required to support AC sources on Unit 2 while Unit 2 is operating, conforming changes are necessary in the Unit 2 technical specifications.

The voltage overshoot following a full load rejection is a transient condition typically lasting for only a few seconds, with the peak voltage lasting for a much shorter period. The DG control components quickly reduce excitation and return voltage to its normal control point. The swing DG full load rejection test shows that the maximum voltage was present for approximately five cycles. Components subjected to these transient voltages include the generator, the cables that connect the DG to the 4.16 kV ESF buses, the 4160 V switchgear, and the DG control components. SNC has analyzed the effect of an increased voltage limit on these components as described herein.

Generator

The HNP DGs are Fairbanks Morse DGs. DGs 1A and 1C have a 1000-hour rating of 2850 KW and a 168-hour rating of 3250 KW. These DGs are rated at 4160 V, three-phase, 60 Hz, and are capable of attaining rated frequency and voltage within 12 seconds after receipt of a start signal. Fairbanks Morse identified that alternator hi-potential (hi-pot) factory testing on the generators is conducted for one minute at twice the rated voltage plus 1000 volts; 9320 V. Based on the vendor input, the increased voltage limit of 5200 V will not adversely impact or damage the EDG since the factory test conditions encompass the voltage expected to be received during the full load rejection test. Thus, the generator can withstand significantly higher voltages than the proposed voltage limit during DG full load rejection testing.

As stated in Subsection 6.2.5 of Institute of Electrical and Electronic Engineers (IEEE) 387-1972 (Reference 6), the DG shall demonstrate the capability of rejecting the maximum rated load without exceeding speeds or voltages which will cause tripping, mechanical damage, or harmful overstresses. Additionally, Fairbanks Morse has evaluated the generator at the higher voltage and provided concurrence that the DG will not incur mechanical damage or harmful overstresses. NRC Regulatory Guide 1.9, Rev. 0 (formally Safety Guide 9) (Reference 7), states that when disconnection of the largest single load, the speed of the diesel generator set should not exceed 75% of the difference between nominal speed and the overspeed trip set point or 115% of nominal, whichever is lower. The Fairbanks Morse vendor manual states that the generator is protected with an overspeed setting of 112% to 115% of rated speed. The overspeed trip setting will sense an overspeed and shut down the engine. The vendor indicates that the overspeed of the alternator is rated for 125%. HNP DGs 2A, 1B, and 2C did not experience an overspeed trip during full load rejection surveillance testing performed during the spring 2019 refueling outage. Fairbanks Morse, the generator manufacturer, has verified that a transient overshoot voltage of 5200 volts, which may be experienced on an infrequent basis during testing at a frequency in accordance with the plant surveillance frequency control program, does not adversely impact the generator and the generator will not experience detrimental effects due to transient voltages up to 5200 V.

Cables

Power cables used in the 4.16 kV system at HNP from the breaker to the DG are 3/C 500 MCM triplex EPR insulated cables and rated for 15 kV. Thus, the voltage rating of the power cables exceed the proposed voltage limit during a DG full load rejection test. The DG control cable is rated at 600 V, which provides acceptable margin over the 269 V value which would result from a DG voltage of 9320 V. Therefore, the power and control cables will not experience detrimental effects due to transient voltages up to 5200 V.

Switchgear

The vendor manual for the Westinghouse DHP switchgear states that the switchgear is designed to withstand an impulse test of 60 kV and a factory production test of 19 kV, at 60 Hz, for one minute was performed. This is consistent with IEEE C37.20.2-1999, "IEEE Standard for Metal-Clad Switchgear." The switchgear is designed for elevated voltage and thus it is found that there would be no adverse effect on the ability of the switchgear to operate following a voltage transient of 5200 volts for a short duration.

Control Components

The HNP DG voltage regulators are MPR/Basler Electric automatic voltage regulators (AVRs). The exciter portion of the excitation system consists of power current transformers, saturable transformers, linear reactors, and the AVR power supply transformer. These transformers are connected to the output of the DG via their primary windings and are isolated from the exciter output. The voltage regulator portion of the excitation system includes the AVR, which obtains voltage sensing from potential transformers. These transformers are connected to the output of the generator via their primary windings. The Basler design employs a 12 kV dielectric withstand rating for the primary windings of these transformers. Therefore, a DG transient voltage of 5200 V is well within the ratings of the exciter and AVR.

Discussions with the vendor determined that the voltage transient that would result from a short term DG output voltage of 5200 V would not prevent the voltage regulator, including the sensing potential transformers, from fulfilling its safety function.

Other Safety Related Components

The potential impacts of higher operating ESF voltages on other safety-related components were evaluated as part of the modification package and plant design change during the electrical modification process and determined to be satisfactory prior to commencement of installation of the electrical power system modification.

The safety-related calculation concluded that safety-related equipment being evaluated for overvoltage was acceptable. The criteria and methodology for considering overvoltage has not changed.

This LAR addresses the transient voltage experienced by the DGs and related components upon a full load rejection test. The safety-related components associated with the ESF buses are not affected by the transient voltage on the DGs as a result of a full load rejection test.

The resulting transient voltage on the DGs is due to performing the full load rejection test while in parallel with offsite power. This is a simulated test of actual DG loading conditions during an accident with no offsite power. To simulate a full load rejection, the 4160-volt feeder breaker at the safety-related bus is opened. At the time after the breaker has opened, the 4160-volt bus does not experience the peak transient voltage that occurs at the generator.

Consistent with the current voltage limit of 4800 volts for DGs 1A and 1C, the revised limit of 5200 volts does not include voltage meter tolerance or accuracy consistent with the current requirement. The voltage meter accuracy is ±1.0% of the range.

Based on the information provided herein, SNC has determined that the proposed voltage limit during a full load rejection test would not adversely affect the generator, the cables that connect the DG safety buses, the 4160-volt switchgear, the DG control components, or the capability of the DG to perform its intended safety function. SNC's determination is based on (1) the maximum voltage (5200 volts) during a full load rejection test lasts for approximately five cycles; (2) generator, cables, and switchgear are tested (hi-pot) at much higher voltage with longer

duration; (3) the voltage regulator will continue to fulfill its safety function per the vendor; and (4) manufacturers' confirmation that the generator, exciter, AVR sensing potential transformers, interconnecting cables and devices, and the switchgear would not have any adverse effect on performance due to transient voltage of up to 5200 volts for a short duration.

4.0 Regulatory Evaluation

4.1 Applicable Regulatory Requirements/Criteria

The loss of power (LOP) instrumentation associated with the Class 1E electrical power distribution system and the onsite AC emergency electrical power system design satisfies the criteria of 10 CFR 50.36, paragraph (c)(2)(ii), Criterion 3. Automatic transfer of the Class 1E buses from their normal power source to the alternate or emergency power sources in the event of a degraded voltage condition while connected to offsite power and proper starting and loading of the DGs in the event of a loss of offsite power are considered primary success paths to mitigate design basis accidents. Upon LOP instrumentation sensing a sustained degraded voltage condition on a Class 1E bus, the normal power is automatically disconnected from the bus and the alternate or emergency power is automatically connected to assure adequate voltage to safety related equipment during design basis accidents.

The proposed amendment continues to maintain requirements associated with structures, systems, and components that are part of the primary success path and actuate to mitigate the related design basis accidents and transients, including the LOP instrumentation and onsite AC electrical power sources.

Following implementation of the electrical power system modification, which includes providing automatic degraded voltage protection in lieu of manual actions to assure adequate voltage to safety related equipment during design basis accidents, the modified LOP instrumentation design will continue to comply with the applicable requirements of 10 CFR 50.55a(h)(2), Protection and safety systems, and meet the requirements of the applicable Institute of Electrical and Electronics Engineers standards pursuant to 10 CFR 50.55a(2). The proposed amendment does not alter the design of the LOP instrumentation or any protection or safety system, rather, the proposed amendment incorporates attendant changes as a result of the electrical power system modification. Therefore, the protection and safety system design continues to meet the requirements of 10 CFR 50.55a.

The proposed change related to the DG voltage limit during a full load rejection test does not delete requirements associated with the DGs, and LCO 3.8.1 continues to maintain requirements associated with structures, systems, and components that are part of the primary success path and actuate to mitigate the related design basis accidents and transients. The proposed amendment does not alter the remedial actions or shutdown requirements required by 10 CFR 50.36(c)(2)(i).

The proposed amendment increases the voltage limit in the DG full load rejection surveillance test for the Unit 1 DGs. However, the technical analysis performed to support this proposed amendment has demonstrated that the DGs can withstand voltages above the proposed limit without a loss of protection. Therefore, the proposed change continues to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met as required by 10 CFR 50.36(c)(3).

The following principal design criterion is related to the Unit 1 LOP instrumentation design:

> Criterion 39: Following implementation of the electrical power system modification, which includes providing automatic degraded voltage protection in lieu of manual actions to assure adequate voltage to safety related equipment during design basis accidents, the LOP instrumentation design will comply with the applicable requirements of Unit 1 principal design criterion 39. The proposed amendment does not alter the design of any onsite or offsite electric power system, including the LOP instrumentation, rather, the proposed amendment incorporates concomitant changes as a result of the electrical power system modification. The modified HNP electrical power system design, including the LOP instrumentation design changes, continues to assure the safety function for the offsite and standby auxiliary sources continue to provide electrical power to attain prompt shutdown and continued maintenance of the plant in a safe condition. The capacity of the offsite and onsite power sources continue to be independently adequate to accomplish the required engineered safety feature functions, assuming a failure of a single active component in each power system.

In addition, the following 10 CFR Part 50, Appendix A GDCs are related to the Unit 1 and Unit 2 LOP instrumentation design:

> GDC 17: Electrical power systems. Following implementation of the electrical power system modification, which includes providing automatic degraded voltage protection in lieu of manual actions to assure adequate voltage to safety related equipment during design basis accidents, the LOP instrumentation design will comply with the applicable requirements of GDC-17. The proposed amendment does not alter the design of any onsite or offsite electric power system, including the LOP instrumentation, rather, the proposed amendment incorporates concomitant changes as a result of the electrical power system modification. The modified HNP electrical power system design, including the LOP instrumentation design changes, continues to assure the safety function for the offsite and onsite electrical power systems continue to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents. The onsite electric power supplies and the onsite electric distribution system will continue to have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.
>
> The proposed amendment does not alter the design of the offsite circuits and these circuits will continue to be available in sufficient time following a loss of all onsite alternating current power supplies and the other offsite electric power circuits, to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. The design of these circuits ensure at least one circuit is available within a few seconds following a loss-of-coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained.
>
> GDC 18: Inspection and testing of electric power systems. The proposed amendment does not alter the design of any onsite or offsite electric power system, including the LOP instrumentation, rather, the proposed amendment incorporates concomitant changes as a result of the electrical power system modification. Therefore, proposed amendment does not impact the HNP electrical power system design capability to test

periodically; (1) the operability and functional performance of the components, including the loss of voltage and degraded voltage relays; and (2) the operability of the offsite and onsite electrical power systems as a whole and the full operation sequence that brings the systems into operation.

The proposed change does not alter the design or operation of any instrumentation provided to monitor variables and systems over their anticipated ranges for normal operation, anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. Therefore, Unit 1 instrumentation continues to comply with HNP Unit 1 principal design criterion 15 and GDC 13 of 10 CFR 50, Appendix A, as previously licensed and approved by the NRC.

NRC Branch Technical Position (BTP) 8-6 (Reference 8) of NUREG 0800, Position B.1 contains criteria for undervoltage protection for sustained degraded voltage conditions, referred to as a "second level of undervoltage protection" additional to loss of offsite power, which is the first level. Position B.1.b specifies two time delays for this second level of undervoltage protection. The first time delay is for a degraded voltage alarm in the control room (a function which the emergency bus undervoltage relays will continue to provide), but Position B.1.b.i also specifies immediate separation from offsite power in the event of the subsequent occurrence of a safety injection actuation signal (i.e., LOCA signal). The second time delay, per Position B.1.b.ii, is for automatic separation from offsite power after a duration, limited such that Class 1E loads will not be damaged.

Actuation of the alarm relays does not initiate separation of the bus from offsite power upon a LOCA actuation signal as specified in BTP 8-6, Position B.1.b.i, but this automatic function is not needed at HNP because the proposed DVR actuation voltage AVs have been calculated to maintain adequate voltage on the Class 1E buses with LOCA loads assumed. New, higher alarm setpoints have been calculated for each bus that do not overlap with the new DVR AVs; therefore, separating a Class 1E bus from the preferred offsite power source at the alarm setpoint voltage as discussed in BTP 8-6, Position B.1.b.i is not warranted.

The new DVR actuation voltage AV limits for each required Unit 1 4.16 kV emergency bus, as proposed individually in Table 3.3.8.1-1 Function 2, are increased from the existing AV range specified in Table 3.3.8.1-1 so as to provide for fully automatic degraded voltage protection on each bus, eliminating the need for manual actions that are used in the existing HNP degraded voltage protection scheme.

4.2 No Significant Hazards Consideration Analysis

Pursuant to 10 CFR 50.90, Southern Nuclear Operating Company (SNC) hereby requests an amendment to Edwin I. Hatch Nuclear Plant (HNP) Unit 1 Renewed Facility Operating License DPR-57 and Unit 2 Renewed Facility Operating License NPF-5. The proposed amendment revises Technical Specification (TS) 3.3.8.1, "Loss of Power (LOP) Instrumentation" to modify the instrument Allowable Values (AVs) for the Unit 1 4.16 kV emergency bus degraded voltage instrumentation and delete the annunciation requirements for the Unit 1 4.16 kV emergency bus undervoltage instrumentation, including associated TS actions. This proposed change is needed to reflect an electrical power system modification required to satisfy Unit 1 License Condition 2.C(11) and Unit 2 License Condition 2.C(3)(i). The proposed amendment would also delete the Unit 1 and Unit 2 license conditions, since they are no longer necessary. The

electrical power system modification, which SNC has evaluated independently, will eliminate use of manual actions as part of the HNP degraded voltage protection scheme. Additionally, this proposed amendment would revise surveillance requirements (SR) 3.8.1.8 in technical specification (TS) 3.8.1, "AC Sources – Operating," to increase the voltage limit in the emergency diesel generator (DG) full load rejection test for the Unit 1 DGs.

SNC has evaluated whether a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

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

   Response: No

   The proposed change incorporates concomitant changes to the LOP instrumentation requirements to reflect an electrical power system modification by deleting the unnecessary loss of voltage annunciation requirements and increasing the AVs for the degraded voltage protection instrumentation.

   The proposed license change does not involve a physical change to the LOP instrumentation, nor does it change the safety function of the LOP instrumentation or the equipment supported by the LOP instrumentation. Automatic starting of the DGs is assumed in the mitigation of a design basis event upon a loss of offsite power. This includes transferring the normal offsite power source to an alternate or emergency power source in the event of a sustained degraded voltage condition. The LOP instrumentation continues to provide this capability and is not altered by the proposed license change. The proposed change does not adversely affect accident initiators or precursors including a loss of offsite power or station blackout. The revised LOP degraded instrumentation setpoints ensure that the Class 1E electrical distribution system is separated from the offsite power system prior to damaging the safety related loads during sustained degraded voltage conditions while avoiding an inadvertent separation of safety-related buses from the offsite power system. Additionally, the degraded voltage instrumentation time delay will isolate the Class 1E electrical distribution system from offsite power before the diesel generators are ready to assume the emergency loads, which is the limiting time basis for mitigating system responses to design basis accidents.

   In addition, the proposed change includes an increase of the voltage limit in the DG full load rejection surveillance test for the Unit 1 DGs. The DGs' safety function is solely mitigative and is not needed unless there is a loss of offsite power. The DGs do not affect any accident initiators or precursors of any accident previously evaluated. The proposed increase in the TS SR voltage limit does not affect the DGs' interaction with any system whose failure or malfunction can initiate an accident. Therefore, the probability of occurrence of an accident previously evaluated is not significantly increased. The DG safety function is to provide power to safety related components needed to mitigate the consequences of an accident following a loss of offsite power. The purpose of the TS SR voltage limit is to assure DG damage protection following a full load rejection. The technical analysis performed to support this proposed amendment has demonstrated that the DGs can withstand voltages above the proposed limit without a loss of protection. The proposed higher limit will continue to provide

assurance that the DGs are protected, and the safety function of the DGs will be unaffected by the proposed change. Therefore, the consequences of an accident previously evaluated will not be significantly increased.

As a result, the proposed change does not significantly alter assumptions relative to the mitigation of an accident or transient event and the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

   Response: No

   With respect to a new or different kind of accident, the proposed change does not alter the design or performance of the LOP instrumentation or electrical power system; nor are there any changes in the method by which safety related plant structures, systems, and components (SSCs) perform their specified safety functions as a result of the proposed license amendment. The proposed change deletes the loss of voltage annunciation requirements and increases the AVs for the degraded voltage protection instrumentation as a result of an electrical power system modification, which SNC has evaluated independently of this proposed license amendment. The proposed license amendment will not affect the normal method of plant operation or revise any operating parameters. Additionally, there is no detrimental impact on the manner in which plant equipment operates or responds to an actuation signal as a result of the proposed license change. No new accident scenarios, transient precursor, failure mechanisms, or limiting single failures will be introduced as a result of this proposed change and the failure modes and effects analyses of SSCs important to safety are not altered as a result of this proposed change.

   The process of operating and testing the LOP instrumentation uses current procedures, methods, and processes already established and currently in use and is not being altered by the proposed license amendment. Therefore, the proposed change does not constitute a new type of test.

   With respect to a new or different kind of accident for the increase of the voltage limit in the DG full load rejection surveillance test for the Unit 1 DGs, there are no new DG failure modes created and the DGs are not an initiator of any new or different kind of accident. The proposed increase in the TS SR voltage limit does not affect the interaction of the DGs with any system whose failure or malfunction can initiate an accident. The proposed amendment will not affect the normal method of plant operation or revise any operating parameters. No new accident scenarios, transient precursor, failure mechanisms, or limiting single failures will be introduced as a result of this proposed change and the failure modes and effects analyses of the DGs are not altered as a result of this proposed change.

   Accordingly, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

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

   Response: No

   Margin of safety is provided by the performance capability of plant equipment in preventing or mitigating challenges to fission product barriers under postulated operational transient and accident conditions. The proposed license change deletes the loss of voltage annunciation requirements and increases the AVs for the degraded voltage protection instrumentation as a result of an electrical power system modification, which SNC has evaluated independently of this proposed license amendment. The proposed deletion of the loss of voltage annunciation requirements is offset by the more restrictive degraded voltage instrumentation AVs thereby providing an automatic emergency bus transfer to the alternate or emergency power supply in the event of a sustained degraded voltage condition.

   The increase in the TS SR voltage limit will not affect the ability of the DGs to perform their safety function. The technical analysis performed to support this amendment demonstrates that this ability will be unaffected and an increase in the TS SR voltage limit will not affect this ability.

   Therefore, the margin associated with a design basis or safety limit parameter are not adversely impacted by the proposed amendment and, thus the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, SNC concludes that the proposed change does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

4.3 Precedent

The corresponding changes to the Unit 2 electrical bus loss of power instrumentation setpoints were submitted on March 9, 2018, and approved on January 28, 2019 (References 4 and 5).

The corresponding change to the 2A, 1B, and 2C DG full load rejection surveillance test voltage limit was submitted on February 19, 2019, supplemented on February 20, 2019, and approved on February 22, 2019 (References 9, 10, and 11).

4.4 Conclusion

In conclusion, based on the considerations discussed herein: (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.

5.0 Environmental Consideration

SNC has determined that the proposed amendment does not change a surveillance requirement. SNC has evaluated the proposed amendment to change the HNP Technical Specifications and determined that 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 effluents that may be released offsite, or (iii) a significant increase in the

individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment 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 or environmental impact statement is not required for the proposed amendment.

6.0 References

1. NRC Regulatory Issue Summary (RIS) 2011-12, "Adequacy of Station Electric Distribution System Voltages," Revision 1, dated December 29, 2011 (NRC ADAMS Accession No. ML113050583).

2. NRC Generic Letter 79-36, "Adequacy of Station Electric Distribution Systems Voltages," dated August 8, 1979.

3. NRC Information Notice 95-05, "Undervoltage Protection Relay Settings Out of Tolerance Due to Test Equipment Harmonics," dated January 20, 1995 (NRC ADAMS Accession No. ML031060397)

4. Letter from J. J. Hutto (SNC) to the Document Control Desk (NRC), "Edwin I. Hatch Nuclear Plant Units 1 and 2 License Amendment Request for Technical Specification 3.3.8.1 Regarding Degraded Voltage Protection," dated March 9, 2018 (NRC ADAMS Accession No. ML18071A363).

5. Letter from S. Williams for J. R. Hall (NRC) to C. A. Gayheart (SNC), "Edwin I. Hatch Nuclear Plant, Unit Nos. 1 and 2 - Issuance of Amendments to Revise Technical Specification 3.3.8.1, "Loss of Power (LOP) Instrumentation" (EPID L-2018-LLA-0069)," dated January 28, 2019 (NRC ADAMS Accession No. ML19010A009).

6. Institute of Electrical and Electronic Engineers Standard IEEE 387-1972, "IEEE Trial-Use Standard: Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations," dated March 20, 1972.

7. NRC Safety Guide 9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," dated August 10, 1971 (NRC ADAMS Accession No. ML12305A251).

8. NRC Branch Technical Position 8-6, "Adequacy of Station Electric Distribution System Voltages," Revision 3, dated March 2007 (NRC ADAMS Accession No. ML070710478).

9. Letter from C. A. Gayheart (SNC) to the Document Control Desk (NRC), "Edwin I. Hatch Nuclear Plant – Units 1 and 2 Emergency License Amendment Request for Technical Specification 3.8.1 Regarding Voltage Limit Increase for Emergency Diesel Generator Load Rejection Surveillance Test," dated February 19, 2019 (NRC ADAMS Accession No. ML19050A010).

10. Letter from C. A. Gayheart (SNC) to the Document Control Desk (NRC), "Edwin I. Hatch Nuclear Plant – Units 1 and 2 Emergency License Amendment Request for Technical Specification 3.8.1 Regarding Voltage Limit Increase for Emergency Diesel Generator Load Rejection Surveillance Test SNC Response to NRC Request for Additional Information," dated February 20, 2019 (NRC ADAMS Accession No. ML19051A145)

11. Letter from J. R. Hall (NRC) to C. A. Gayheart (SNC), "Edwin I. Hatch Nuclear Plant, Unit Nos. 1 and 2 - Issuance of Amendments to Revise Technical Specification 3.8.1, "AC Sources - Operating" (EPID L-2019-LLA-0026) (Emergency Circumstances)," dated February 22, 2019 (NRC ADAMS Accession No. ML19053A093).

Edwin I. Hatch Nuclear Plant Units 1 and 2
License Amendment Request for
Technical Specifications 3.3.8.1 and 3.8.1 Regarding Unit 1 Degraded Voltage Protection

Attachment 1

HNP Unit 1 and Unit 2 Facility Operating License and
Technical Specifications Marked-Up Pages

c. The first performance of the periodic measurement of CRE pressure, Specification 5.5.14.d, shall be within 24 months, plus the 6 months allowed by SR 3.0.2, from the date of the most recent successful pressure measurement test.

Deleted.

(11) ~~Degraded Voltage Protection~~

~~SNC shall implement the Degraded Voltage modifications to eliminate the manual actions in lieu of automatic degraded voltage protection to assure adequate voltage to safety-related equipment during design basis events by completion of the Unit 1 2020 Spring Outage, U1R29.~~

D. Southern Nuclear shall not market or broker power or energy from Edwin I. Hatch Nuclear Plant, Unit 1.

3. This renewed license is effective as of the date of issuance and shall expire at midnight, August 6, 2034.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Samuel J. Collins, Director
Office of Nuclear Reactor Regulation

Attachments:
Appendix A – Technical Specifications
Appendix B – Environmental Protection Plan

Date of Issuance: January 15, 2002

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Function in Table 3.3.8.1-1 shall be OPERABLE for each diesel generator (DG) required by LCO 3.8.1, "AC Sources - Operating," and LCO 3.8.2, "AC Sources - Shutdown."

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required channels inoperable ~~for Functions 1 and 2~~.	A.1 Restore channel to OPERABLE status.	1 hour
~~B. One or more channels inoperable for Function 3.~~	~~B.1 Verify voltage on associated Unit 1 4.16 kV bus is ≥ 3825 V.~~	~~Once per hour~~
~~C.~~ Required Action and associated Completion Time not met. (B)	~~C.~~1 Declare associated DG inoperable. (B)	Immediately

These SRs apply to each Function in

SURVEILLANCE REQUIREMENTS

NOTES

1. ~~Refer to~~ Table 3.3.8.1-1 ~~to determine which SRs apply for each LOP Function~~.

2. When a 4.16 kV Emergency Bus Undervoltage channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains initiation capability ~~(for Functions 1 and 2) and annunciation capability (for Function 3)~~.

SURVEILLANCE		FREQUENCY
~~SR 3.3.8.1.1~~	~~Perform CHANNEL CHECK.~~	~~In accordance with the Surveillance Frequency Control Program~~
SR 3.3.8.1.~~2~~ (1)	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.8.1.~~3~~ (2)	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.8.1.~~4~~ (3)	Perform LOGIC SYSTEM FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.8.1-1 (page 1 of 1)
Loss of Power Instrumentation

FUNCTION	REQUIRED CHANNELS PER BUS	~~SURVEILLANCE REQUIREMENTS~~	ALLOWABLE VALUE
1. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage)			
a. Bus Undervoltage	2	~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	≥ 2800 V
b. Time Delay	2	~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	≤ 6.5 seconds
2. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage)			
a. Bus Undervoltage	2	~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	3990 3861 3885
1) Bus 1E			≥ ~~3280~~ V
2) Bus 1F			≥ ~~3280~~ V
3) Bus 1G			≥ ~~3280~~ V
4) Bus 2E			≥ 3952 V
5) Bus 2G			≥ 3892 V
b. Time Delay	2	~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	11.3
1) Unit 1 Buses			≤ ~~21.5~~ seconds
2) Unit 2 Buses			≤ 9.8 seconds
~~3. Unit 1 4.16 kV Emergency Bus Undervoltage (Annunciation)~~			
~~a. Bus Undervoltage~~	~~2~~	~~SR 3.3.8.1.1~~ ~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	~~≥ 3825 V~~
~~b. Time Delay~~	~~2~~	~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	~~≤ 65 seconds~~

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.8 ----------NOTES---------- 1. This Surveillance shall not normally be performed in MODE 1 or 2, except for the swing DG. However, this surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. For the swing DG, this Surveillance shall not be performed in MODE 1 or 2 using the Unit 1 controls. Credit may be taken for unplanned events that satisfy this SR. 2. If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to the limit as practicable. 3. For the swing DG, a single test at the specified Frequency will satisfy this Surveillance for both units. ---------- voltage is ≤ 5200 V Verify each DG operating at a power factor ≤ 0.88 does not trip and ~~the following voltages are~~ maintained during and following a load rejection of ≥ 2775 kW: ~~a. For DGs 1A and 1C, ≤ 4800 V; and~~ ~~b. For DGs 2A, 2C, and 1B, ≤ 5200 V.~~	In accordance with the Surveillance Frequency Control Program

(continued)

(h) TSTF-448 Control Room Habitability

Upon implementation of the Amendments adopting TSTF-448, Revision 3, the determination of control room envelope (CRE) unfiltered air inleakage as required by SR 3.7.4.4, in accordance with TS 5.5.14.c.(i), the assessment of CRE habitability as required by Specification 5.5.14.c.(ii), and the measurement of CRE pressure as required by Specification 5.5.14.d, shall be considered met. following implementation:

i) The first performance of SR 3.7.4.4, in accordance with Specification 5.5.14.c.(i), shall be within the next 18 months.

ii) The first performance of the periodic assessment of CRE habitability, Specification 5.5.14.c.(ii), shall be within 3 years, plus the 9-month allowance of SR 3.0.2, of the next successful tracer gas test.

iii) The first performance of the periodic measurement of CRE pressure, Specification 5.5.14.d, shall be within 24 months, plus the 6 months allowed by SR 3.0.2, from the date of the most recent successful pressure measurement test.

Deleted.

(i) ~~Degraded Voltage Protection~~

~~SNC shall implement the Degraded Voltage modifications to eliminate the manual actions in lieu of automatic degraded voltage protection to assure adequate voltage to safety-related equipment during design basis events for the Unit 2 4.16 kV emergency bus by completion of the Unit 2 2019 Spring Outage, U2R25 and for the required Unit 1 4.16 kV emergency buses by completion of the Unit 1 2020 Spring Outage, U1R29.~~

D. This renewed license is subject to the following antitrust conditions:

(1) As used herein:

(a) "Entity" means any financially responsible person, private or public corporation, municipality, county, cooperative, association, joint stock association or business trust, owning, operating or proposing to own or operate equipment or facilities within the state of Georgia (other than Chatham, Effingham, Fannin, Towns and Union Counties) for

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Function in Table 3.3.8.1-1 shall be OPERABLE for each diesel generator (DG) required by LCO 3.8.1, "AC Sources - Operating," and LCO 3.8.2, "AC Sources - Shutdown."

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required channels inoperable ~~for Functions 1 and 2~~.	A.1 Restore channel to OPERABLE status.	1 hour
~~B. One or more channels inoperable for Function 3.~~	~~B.1 Verify voltage on associated Unit 1 4.16 kV bus is ≥ 3825 V.~~	~~Once per hour~~
~~C~~. Required Action and associated Completion Time not met. (B)	~~C~~.1 Declare associated DG inoperable. (B)	Immediately

These SRs apply to each Function in

SURVEILLANCE REQUIREMENTS

----------NOTES----------

1. ~~Refer to~~ Table 3.3.8.1-1 ~~to determine which SRs apply for each LOP Function~~.

2. When a 4.16 kV Emergency Bus Undervoltage channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains initiation capability ~~(for Functions 1 and 2) and annunciation capability (for Function 3)~~.

SURVEILLANCE		FREQUENCY
~~SR 3.3.8.1.1~~	~~Perform CHANNEL CHECK.~~	~~In accordance with the Surveillance Frequency Control Program~~
SR 3.3.8.1.~~2~~ (1)	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.8.1.~~3~~ (2)	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.8.1.~~4~~ (3)	Perform LOGIC SYSTEM FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.8.1-1 (page 1 of 1)
Loss of Power Instrumentation

FUNCTION	REQUIRED CHANNELS PER BUS	~~SURVEILLANCE REQUIREMENTS~~	ALLOWABLE VALUE
1. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage)			
a. Bus Undervoltage	2	~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	≥ 2800 V
b. Time Delay	2	~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	≤ 6.5 seconds
2. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage)			
a. Bus Undervoltage	2	~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	
1) Bus 2E			≥ 3952 V
2) Bus 2F			≥ 3892 V
3) Bus 2G			≥ 3892 V
4) Bus 1E			≥ ~~3280~~ V
5) Bus 1G			≥ ~~3280~~ V 3990 3885
b. Time Delay	2	~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	
1) Unit 2 Buses			≤ 9.8 seconds
2) Unit 1 Buses			≤ ~~21.5~~ seconds 11.3
~~3. Unit 1 4.16 kV Emergency Bus Undervoltage (Annunciation)~~			
~~a. Bus Undervoltage~~	~~2~~	~~SR 3.3.8.1.1~~ ~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	~~≥ 3825 V~~
~~b. Time Delay~~	~~2~~	~~SR 3.3.8.1.2~~ ~~SR 3.3.8.1.3~~ ~~SR 3.3.8.1.4~~	~~≤ 65 seconds~~

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.8 ----------NOTES---------- 1. This Surveillance shall not normally be performed in MODE 1 or 2, except for the swing DG. However, this surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. For the swing DG, this Surveillance shall not be performed in MODE 1 or 2 using the Unit 2 controls. Credit may be taken for unplanned events that satisfy this SR. 2. If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to the limit as practicable. 3. For the swing DG, a single test at the specified Frequency will satisfy this Surveillance for both units. ---------- Verify each DG operating at a power factor ≤ 0.88 does not trip and ~~the following voltages are~~ maintained during and following a load rejection of ≥ 2775 kW~~:~~ ~~a. For DGs 2A, 2C, and 1B, ≤ 5200 V; and~~ ~~b. For DGs 1A and 1C, ≤ 4800 V.~~	In accordance with the Surveillance Frequency Control Program

voltage is

≤ 5200 V

(continued)

Edwin I. Hatch Nuclear Plant Units 1 and 2
License Amendment Request for
Technical Specifications 3.3.8.1 and 3.8.1 Regarding Unit 1 Degraded Voltage Protection

Attachment 2

HNP Unit 1 and Unit 2 Facility Operating License and
Technical Specifications Clean Typed Pages

c. The first performance of the periodic measurement of CRE pressure, Specification 5.5.14.d, shall be within 24 months, plus the 6 months allowed by SR 3.0.2, from the date of the most recent successful pressure measurement test.

(11) Deleted.

D. Southern Nuclear shall not market or broker power or energy from Edwin I. Hatch Nuclear Plant, Unit 1.

3. This renewed license is effective as of the date of issuance and shall expire at midnight, August 6, 2034.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Samuel J. Collins, Director
Office of Nuclear Reactor Regulation

Attachments:
Appendix A – Technical Specifications
Appendix B – Environmental Protection Plan

Date of Issuance: January 15, 2002

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Function in Table 3.3.8.1-1 shall be OPERABLE for each diesel generator (DG) required by LCO 3.8.1, "AC Sources - Operating," and LCO 3.8.2, "AC Sources - Shutdown."

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required channels inoperable.	A.1 Restore channel to OPERABLE status.	1 hour
B. Required Action and associated Completion Time not met.	B.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTES----------

1. These SRs apply to each Function in Table 3.3.8.1-1.

2. When a 4.16 kV Emergency Bus Undervoltage channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains initiation capability.

SURVEILLANCE		FREQUENCY
SR 3.3.8.1.1	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.8.1.2	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.8.1.3	Perform LOGIC SYSTEM FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.8.1-1 (page 1 of 1)
Loss of Power Instrumentation

FUNCTION	REQUIRED CHANNELS PER BUS	ALLOWABLE VALUE
1. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage)		
a. Bus Undervoltage	2	≥ 2800 V
b. Time Delay	2	≤ 6.5 seconds
2. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage)		
a. Bus Undervoltage	2	
1) Bus 1E		≥ 3990 V
2) Bus 1F		≥ 3861 V
3) Bus 1G		≥ 3885 V
4) Bus 2E		≥ 3952 V
5) Bus 2G		≥ 3892 V
b. Time Delay	2	
1) Unit 1 Buses		≤ 11.3 seconds
2) Unit 2 Buses		≤ 9.8 seconds

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.8	----------NOTES---------- 1. This Surveillance shall not normally be performed in MODE 1 or 2, except for the swing DG. However, this surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. For the swing DG, this Surveillance shall not be performed in MODE 1 or 2 using the Unit 1 controls. Credit may be taken for unplanned events that satisfy this SR. 2. If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to the limit as practicable. 3. For the swing DG, a single test at the specified Frequency will satisfy this Surveillance for both units. ---------- Verify each DG operating at a power factor ≤ 0.88 does not trip and voltage is maintained ≤ 5200 V during and following a load rejection of ≥ 2775 kW.	In accordance with the Surveillance Frequency Control Program

(continued)

(h) TSTF-448 Control Room Habitability

Upon implementation of the Amendments adopting TSTF-448, Revision 3, the determination of control room envelope (CRE) unfiltered air inleakage as required by SR 3.7.4.4, in accordance with TS 5.5.14.c.(i), the assessment of CRE habitability as required by Specification 5.5.14.c.(ii), and the measurement of CRE pressure as required by Specification 5.5.14.d, shall be considered met. following implementation:

i) The first performance of SR 3.7.4.4, in accordance with Specification 5.5.14.c.(i), shall be within the next 18 months.

ii) The first performance of the periodic assessment of CRE habitability, Specification 5.5.14.c.(ii), shall be within 3 years, plus the 9-month allowance of SR 3.0.2, of the next successful tracer gas test.

iii) The first performance of the periodic measurement of CRE pressure, Specification 5.5.14.d, shall be within 24 months, plus the 6 months allowed by SR 3.0.2, from the date of the most recent successful pressure measurement test.

(i) Deleted.

D. This renewed license is subject to the following antitrust conditions:

(1) As used herein:

(a) "Entity" means any financially responsible person, private or public corporation, municipality, county, cooperative, association, joint stock association or business trust, owning, operating or proposing to own or operate equipment or facilities within the state of Georgia (other than Chatham, Effingham, Fannin, Towns and Union Counties) for

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Function in Table 3.3.8.1-1 shall be OPERABLE for each diesel generator (DG) required by LCO 3.8.1, "AC Sources - Operating," and LCO 3.8.2, "AC Sources - Shutdown."

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required channels inoperable.	A.1 Restore channel to OPERABLE status.	1 hour
B. Required Action and associated Completion Time not met.	B.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTES----------

1. These SRs apply to each Function in Table 3.3.8.1-1.

2. When a 4.16 kV Emergency Bus Undervoltage channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains initiation capability.

SURVEILLANCE		FREQUENCY
SR 3.3.8.1.1	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.8.1.2	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.8.1.3	Perform LOGIC SYSTEM FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.8.1-1 (page 1 of 1)
Loss of Power Instrumentation

FUNCTION	REQUIRED CHANNELS PER BUS	ALLOWABLE VALUE
1. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage)		
a. Bus Undervoltage	2	≥ 2800 V
b. Time Delay	2	≤ 6.5 seconds
2. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage)		
a. Bus Undervoltage	2	
1) Bus 2E		≥ 3952 V
2) Bus 2F		≥ 3892 V
3) Bus 2G		≥ 3892 V
4) Bus 1E		≥ 3990 V
5) Bus 1G		≥ 3885 V
b. Time Delay	2	
1) Unit 2 Buses		≤ 9.8 seconds
2) Unit 1 Buses		≤ 11.3 seconds

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.8	----------NOTES---------- 1. This Surveillance shall not normally be performed in MODE 1 or 2, except for the swing DG. However, this surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. For the swing DG, this Surveillance shall not be performed in MODE 1 or 2 using the Unit 2 controls. Credit may be taken for unplanned events that satisfy this SR. 2. If grid conditions do not permit, the power factor limit is not required to be met. Under this condition, the power factor shall be maintained as close to the limit as practicable. 3. For the swing DG, a single test at the specified Frequency will satisfy this Surveillance for both units. ---------- Verify each DG operating at a power factor ≤ 0.88 does not trip and voltage is maintained ≤ 5200 V during and following a load rejection of ≥ 2775 kW.	In accordance with the Surveillance Frequency Control Program

(continued)

Edwin I. Hatch Nuclear Plant Units 1 and 2
License Amendment Request for
Technical Specifications 3.3.8.1 and 3.8.1 Regarding Unit 1 Degraded Voltage Protection

Attachment 3

HNP Unit 1 and Unit 2 Technical Specifications Bases Marked-Up Pages
(Information Only)

B 3.3 INSTRUMENTATION

B 3.3.8.1 Loss of Power (LOP) Instrumentation

BASES

BACKGROUND

Successful operation of the required safety functions of the Emergency Core Cooling Systems (ECCS) is dependent upon the availability of adequate power sources for energizing the various components such as pump motors, motor operated valves, and the associated control components. The LOP instrumentation monitors the 4.16 kV emergency buses. Offsite power is the preferred source of power for the 4.16 kV emergency buses. If the monitors determine that insufficient power is available, the buses are disconnected from the offsite power sources and connected to the onsite diesel generator (DG) power sources.

Each 4.16 kV emergency bus has its own independent LOP instrumentation and associated trip logic. The voltage for each bus is monitored at two levels: 4.16 kV Emergency Bus Undervoltage Loss of Voltage and Degraded Voltage. The Loss of Voltage Function causes various bus transfers and disconnects and is monitored by two undervoltage relays for each emergency bus, whose outputs are arranged in a two-out-of-two logic configuration for affected components except the DGs. The DG start logic configuration is one-out-of-two (Ref. 1). The Degraded Voltage Function causes the same bus transfers and disconnects. ~~The Unit 1 Degraded Voltage Function is monitored by two inverse time undervoltage relays for each emergency bus whose outputs are arranged in a two out of two logic configuration for supported components except the DGs. The start logic for the Unit 1 DGs, including the swing DG (DG 1B) is arranged in a one out of two configuration (Ref. 1).~~ The ~~Unit 2~~ Degraded Voltage Function is monitored by three solid state undervoltage relays with fixed time delay for each emergency bus whose outputs are arranged in a two-out-of-three logic configuration for supported components except the DGs. The start logic ~~for the Unit 2 DGs and the swing DG (DG 1B)~~ is arranged in a one-out-of-three configuration (Ref. 1). The channels include electronic equipment (e.g., trip units) that compares measured input signals with pre-established setpoints. When the setpoint is exceeded, the channel output relay actuates, which then outputs a LOP trip signal to the trip logic.

DG

Each 4.16 kV emergency bus has its own independent LOP alarm instrumentation to provide an anticipatory alarm and the initiation of corrective measures to restore emergency bus voltages. The alarms are set higher than the LOP trip relays. ~~The Unit 1 LOP alarm instrumentation is required as part of the LCO.~~ The ~~Unit 2~~ LOP alarm

(continued)

BASES

BACKGROUND (continued)

instrumentation is not required as part of the LCO because the LOP degraded voltage protection scheme automatically protects safety related loads in the event of a sustained degraded electrical grid voltage condition.

~~Each Unit 1 4.16 kV emergency bus has a dedicated low voltage annunciator fed by two relays and their associated time delays. The logic for the annunciation function is arranged in a two out of two configuration.~~

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The LOP instrumentation is required for Engineered Safety Features to function in any accident with a loss of offsite power. The required channels of LOP instrumentation ensure that the ECCS and other assumed systems powered from the DGs, provide plant protection in the event of any of the References 2, 3, and 4 analyzed accidents in which a loss of offsite power is assumed. The initiation of the DGs on loss of offsite power, and subsequent initiation of the ECCS, ensure that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

Accident analyses credit the loading of the DG based on the concurrent loss of offsite power during a loss of coolant accident. The diesel starting and loading times have been included in the delay time associated with each safety system component requiring DG supplied power following a loss of offsite power.

~~The Unit 1 LOP alarm instrumentation provides annunciation to alert operators of a degraded electrical grid voltage condition thereby ensuring initiation of manual actions to protect safety related equipment powered from Unit 1 4.16 kV emergency buses during a sustained degraded electrical grid voltage condition.~~ The ~~Unit 2~~ LOP degraded voltage instrumentation provides automatic protection of safety related equipment ~~powered from Unit 2 4.16 kV emergency buses~~ during a sustained degraded electrical grid voltage condition.

The LOP instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

The OPERABILITY of the LOP instrumentation is dependent upon the OPERABILITY of the individual instrumentation channel Functions specified in Table 3.3.8.1-1. Each Function must have a required number of OPERABLE channels per 4.16 kV emergency bus, with their setpoints within the specified Allowable Values. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value. The setpoint is calibrated consistent with applicable procedures (nominal trip setpoint).

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The Allowable Values are specified for each Function in the Table. Nominal trip setpoints are specified in the setpoint calculations. The nominal setpoints are selected to ensure that the setpoints do not exceed the Allowable Value between CHANNEL CALIBRATIONS. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within the Allowable Value, is acceptable. Trip setpoints are those predetermined values of output and time delay at which an action should take place. The setpoints are compared to the actual process parameter (e.g., degraded voltage), and when the measured output value of the process parameter exceeds the setpoint and time delay, the associated device (e.g., trip relay) changes state.

The Allowable Values ~~for the Unit 2 4.16 kV degraded voltage instrumentation~~ are derived from the analytic limits, corrected for calibration, process, and some of the instrument errors. The trip setpoints are then determined accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for. ~~The Allowable Values for the Unit 1 4.16 kV degraded voltage instrumentation were determined in accordance with the NRC staff positions contained in an NRC letter dated June 2, 1977, except that manual actions are credited for restoring bus voltages or initiating a plant shutdown. The undervoltage degraded voltage setpoint represents a point on the inverse time characteristic curve for the relay. The Unit 1 anticipatory alarm setpoints are approximately midway between the calculated minimum expected voltage and the calculated minimum required voltage, based on maximum expected operating; i.e., non-LOCA, conditions.~~

The Specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

1. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage)

Loss of voltage on a 4.16 kV emergency bus indicates that offsite power may be completely lost to the respective emergency bus and is unable to supply sufficient power for proper operation of the applicable equipment. Therefore, the power supply to the bus is transferred from offsite power to DG power when the voltage on the bus drops below the Loss of Voltage Function Allowable Values (loss of voltage with a short time delay). This ensures that adequate power will be available to the required equipment.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

1. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage) (continued)

The Bus Undervoltage Allowable Values are low enough to prevent inadvertent power supply transfer, but high enough to ensure that power is available to the required equipment. The Time Delay Allowable Values are long enough to provide time for the offsite power supply to recover to normal voltages, but short enough to ensure that power is available to the required equipment.

Two channels of 4.16 kV Emergency Bus Undervoltage (Loss of Voltage) Function per associated emergency bus are only required to be OPERABLE when the associated DG is required to be OPERABLE to ensure that no single instrument failure can preclude the DG function. (Refer to LCOs 3.8.1, "AC Sources - Operating," and 3.8.2, "AC Sources - Shutdown," for Applicability Bases for the DGs.)

2. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage)

A reduced voltage condition on a 4.16 kV emergency bus indicates that, while offsite power may not be completely lost to the respective emergency bus, available power may be insufficient for starting large ECCS motors without risking damage to the motors that could disable the ECCS Function. Therefore, power supply to the bus is transferred from offsite power to onsite DG power when the voltage on the bus drops below the Degraded Voltage Function Allowable Values (degraded voltage with a time delay). This ensures that adequate power will be available to the required equipment.

The Bus Undervoltage Allowable Values are low enough to prevent inadvertent power supply transfer, but high enough to ensure that sufficient power is available to the large ECCS motors. ~~The Unit 1 Time Delay Allowable Values are long enough for the offsite power supply to usually recover.~~

~~This minimizes the potential that short duration disturbances will adversely impact the availability of the offsite power supply. For Unit 1 power supplies, manual actions are credited to restore bus voltages or to initiate a plant shutdown.~~ The ~~Unit 2~~ Time Delay Allowable Values are long enough to provide time for the offsite power supply to recover to normal voltages, but short enough to ensure that sufficient power is available to the required equipment.

Two channels of 4.16 kV Emergency Bus Undervoltage (Degraded Voltage) Function per associated bus are only required to be OPERABLE when the associated DG is required to be OPERABLE to ensure that no single instrument failure can preclude the DG function. Refer to LCO 3.8.1 and LCO 3.8.2 for Applicability Bases for the DGs.

~~(continued)~~

BASES

~~APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)~~

~~3. Unit 1 4.16 kV Emergency Bus Undervoltage (Annunciation)~~

~~A reduced voltage condition on a Unit 1 4.16 kV emergency bus indicates that, while offsite power is adequate for normal operating conditions, available power may be marginal for some equipment required for LOCA conditions. Therefore, the anticipatory alarms actuate when the 4.16 kV bus voltages approach the minimum required voltage for normal; i.e., non LOCA conditions. This ensures that manual actions will be initiated to restore the bus voltages or to initiate a plant shutdown.~~

~~Two channels of Unit 1 4.16 kV Emergency Bus Undervoltage (Annunciation) Function per associated bus are only required to be OPERABLE when the associated DG is required to be OPERABLE to ensure that adequate annunciation channels are available to alert the operator of a degraded voltage condition on the Unit 1 4.16 kV emergency buses.~~

ACTIONS

A Note has been provided to modify the ACTIONS related to LOP instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable LOP instrumentation channels provide appropriate compensatory measures for separate inoperable channels. As such, a Note has been provided that allows separate Condition entry for each inoperable LOP instrumentation channel.

A.1

With one or more required channels ~~of Function 1 or 2~~ inoperable, the Function does not maintain initiation capability for the associated emergency bus. Therefore, only 1 hour is allowed to restore the inoperable channel to OPERABLE status. The Required Action does not allow placing a channel in trip since this action will result in a DG initiation.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 1 hour Completion Time is acceptable because it minimizes risk while allowing time for restoration or tripping of channels.

(continued)

BASES

ACTIONS
(continued)

~~B.1~~

~~With one or more Function 3 channels per bus inoperable, annunciation capability may not be available to alert the operator of a degraded voltage condition on the Unit 1 4.16 kV emergency buses.~~

~~Since the intended function is to alert personnel to a lowering voltage condition and the voltage reading is available for each bus on the control room front panels, the Required Action is verification of the voltage to be above the annunciator setpoint (nominal) hourly.~~

B → ~~C.1~~

If any Required Action and associated Completion Time are not met, the associated Function does not maintain initiation capability for the associated emergency bus. Therefore, the associated DG(s) is declared inoperable immediately. This requires entry into applicable Conditions and Required Actions of LCO 3.8.1 and LCO 3.8.2, which provide appropriate actions for the inoperable DG(s).

SURVEILLANCE
REQUIREMENTS

As noted at the beginning of the SRs, the SRs ~~for~~ each LOP instrumentation Function ~~are located in the SRs column of~~ Table 3.3.8.1-1. The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains initiation capability ~~(for Functions 1 and 2) and annunciation capability (for Function 3)~~. Functions 1 and 2 maintain initiation capability provided that, for 2 of the 3 emergency buses, the following can be initiated by the Function: DG start, disconnect from the offsite power source, DG output breaker closure, load shed, and activation of the ECCS pump power permissive. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken.

are applicable to

in

~~SR 3.3.8.1.1~~

~~Performance of the CHANNEL CHECK ensures that a gross failure of instrumentation or a failure of annunciation has not occurred. A CHANNEL CHECK is defined for Function 3 to be a comparison of the annunciator status to the bus voltage and an annunciator test confirming the annunciator is capable of lighting and sounding.~~

(continued)

BASES

SURVEILLANCE REQUIREMENTS

~~SR 3.3.8.1.1 (continued)~~

~~A CHANNEL CHECK will detect gross channel failure or annunciator failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.~~

~~If a channel is outside the match criteria, it may be an indication that the instrument has drifted outside its limit.~~

~~The Surveillance Frequency is controlled under the Surveillance Frequency Control Program. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with channels required by the LCO.~~

1

SR 3.3.8.1.~~2~~

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

2

SR 3.3.8.1.~~3~~

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations, consistent with the plant specific setpoint methodology.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

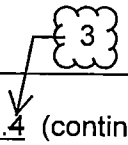
3

SR 3.3.8.1.~~4~~

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required actuation logic for a specific channel.

(continued)

BASES



SURVEILLANCE REQUIREMENTS

SR 3.3.8.1.4 (continued)

The system functional testing performed in LCO 3.8.1 and LCO 3.8.2 overlaps this Surveillance to provide complete testing of the assumed safety functions.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. FSAR, Section 8.4.
2. FSAR, Section 4.8.
3. FSAR, Section 6.5.
4. Unit 2 FSAR, Chapter 15.

B 3.3 INSTRUMENTATION

B 3.3.8.1 Loss of Power (LOP) Instrumentation

BASES

BACKGROUND

Successful operation of the required safety functions of the Emergency Core Cooling Systems (ECCS) is dependent upon the availability of adequate power sources for energizing the various components such as pump motors, motor operated valves, and the associated control components. The LOP instrumentation monitors the 4.16 kV emergency buses. Offsite power is the preferred source of power for the 4.16 kV emergency buses. If the monitors determine that insufficient power is available, the buses are disconnected from the offsite power sources and connected to the onsite diesel generator (DG) power sources.

Each 4.16 kV emergency bus has its own independent LOP instrumentation and associated trip logic. The voltage for each bus is monitored at two levels: 4.16 kV Emergency Bus Undervoltage Loss of Voltage and Degraded Voltage. The Loss of Voltage Function causes various bus transfers and disconnects and is monitored by two undervoltage relays for each emergency bus, whose outputs are arranged in a two-out-of-two logic configuration for affected components except the DGs. The DG start logic configuration is one-out-of-two (Ref. 1). The Degraded Voltage Function causes the same bus transfers and disconnects. ~~The Unit 1 Degraded Voltage Function is monitored by two inverse time undervoltage relays for each emergency bus whose outputs are arranged in a two out of two logic configuration for supported components except the DGs. The start logic for the Unit 1 DGs, including the swing DG (DG 1B) is arranged in a one out of two configuration (Ref. 1).~~ The ~~Unit 2~~ Degraded Voltage Function is monitored by three solid state undervoltage relays with fixed time delay for each emergency bus whose outputs are arranged in a two-out-of-three logic configuration for supported components except the DGs. The start logic ~~for the Unit 2 DGs and the swing DG (DG 1B)~~ is arranged in a one-out-of-three configuration (Ref. 1). The channels include electronic equipment (e.g., trip units) that compares measured input signals with pre-established setpoints. When the setpoint is exceeded, the channel output relay actuates, which then outputs a LOP trip signal to the trip logic.

DG

Each 4.16 kV emergency bus has its own independent LOP alarm instrumentation to provide an anticipatory alarm and the initiation of corrective measures to restore emergency bus voltages. The alarms are set higher than the LOP trip relays. ~~The Unit 1 LOP alarm instrumentation is required as part of the LCO.~~ The ~~Unit 2~~ LOP alarm

(continued)

BASES

BACKGROUND (continued)

instrumentation is not required as part of the LCO because the LOP degraded voltage protection scheme automatically protects safety related loads in the event of a sustained degraded electrical grid voltage condition.

~~Each Unit 1 4.16 kV emergency bus has a dedicated low voltage annunciator fed by two relays and their associated time delays. The logic for the annunciation function is arranged in a two-out-of-two configuration.~~

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The LOP instrumentation is required for Engineered Safety Features to function in any accident with a loss of offsite power. The required channels of LOP instrumentation ensure that the ECCS and other assumed systems powered from the DGs, provide plant protection in the event of any of the Reference 2, 3, and 4 analyzed accidents in which a loss of offsite power is assumed. The initiation of the DGs on loss of offsite power, and subsequent initiation of the ECCS, ensure that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

Accident analyses credit the loading of the DG based on the concurrent loss of offsite power during a loss of coolant accident. The diesel starting and loading times have been included in the delay time associated with each safety system component requiring DG supplied power following a loss of offsite power.

The ~~Unit 2~~ LOP degraded voltage instrumentation provides automatic protection of safety related equipment ~~powered from Unit 2 4.16 kV emergency buses~~ during a sustained degraded electrical grid voltage condition. ~~The Unit 1 LOP alarm instrumentation provides annunciation to alert operators of a degraded electrical grid voltage condition thereby ensuring initiation of manual actions to protect safety related equipment powered from Unit 1 4.16 kV emergency buses during a sustained degraded electrical grid voltage condition.~~

The LOP instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

The OPERABILITY of the LOP instrumentation is dependent upon the OPERABILITY of the individual instrumentation channel Functions specified in Table 3.3.8.1-1. Each Function must have a required number of OPERABLE channels per 4.16 kV emergency bus, with their setpoints within the specified Allowable Values. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value. The setpoint is calibrated consistent with applicable procedures (nominal trip setpoint).

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The Allowable Values are specified for each Function in the Table. Nominal trip setpoints are specified in the setpoint calculations. The nominal setpoints are selected to ensure that the setpoints do not exceed the Allowable Value between CHANNEL CALIBRATIONS. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within the Allowable Value, is acceptable. Trip setpoints are those predetermined values of output and time delay at which an action should take place. The setpoints are compared to the actual process parameter (e.g., degraded voltage), and when the measured output value of the process parameter exceeds the setpoint and time delay, the associated device (e.g., trip relay) changes state.

The Allowable Values ~~for the Unit 2 4.16 kV degraded voltage instrumentation~~ are derived from the analytic limits, corrected for calibration, process, and some of the instrument errors. The trip setpoints are then determined accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for. ~~The Allowable Values for the Unit 1 4.16 kV degraded voltage instrumentation were determined in accordance with the NRC staff positions contained in an NRC letter dated June 2, 1977, except that manual actions are credited for restoring bus voltages or initiating a plant shutdown. The undervoltage degraded voltage setpoint represents a point on the inverse time characteristic curve for the relay. The Unit 1 anticipatory alarm setpoints are approximately midway between the calculated minimum expected voltage and the calculated minimum required voltage, based on maximum expected operating; i.e., non-LOCA, conditions.~~

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

1. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage)

Loss of voltage on a 4.16 kV emergency bus indicates that offsite power may be completely lost to the respective emergency bus and is unable to supply sufficient power for proper operation of the applicable equipment. Therefore, the power supply to the bus is transferred from offsite power to DG power when the voltage on the bus drops below the Loss of Voltage Function Allowable Values (loss of voltage with a short time delay). This ensures that adequate power will be available to the required equipment.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

1. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage) (continued)

The Bus Undervoltage Allowable Values are low enough to prevent inadvertent power supply transfer, but high enough to ensure that power is available to the required equipment. The Time Delay Allowable Values are long enough to provide time for the offsite power supply to recover to normal voltages, but short enough to ensure that power is available to the required equipment.

Two channels of 4.16 kV Emergency Bus Undervoltage (Loss of Voltage) Function per associated emergency bus are only required to be OPERABLE when the associated DG is required to be OPERABLE to ensure that no single instrument failure can preclude the DG function. Refer to LCO 3.8.1, "AC Sources - Operating," and 3.8.2, "AC Sources - Shutdown," for Applicability Bases for the DGs.

2. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage)

A reduced voltage condition on a 4.16 kV emergency bus indicates that, while offsite power may not be completely lost to the respective emergency bus, available power may be insufficient for starting large ECCS motors without risking damage to the motors that could disable the ECCS function. Therefore, power supply to the bus is transferred from offsite power to onsite DG power when the voltage on the bus drops below the Degraded Voltage Function Allowable Values (degraded voltage with a time delay). This ensures that adequate power will be available to the required equipment.

The Bus Undervoltage Allowable Values are low enough to prevent inadvertent power supply transfer, but high enough to ensure that sufficient power is available to the large ECCS motors. The ~~Unit 2~~ Time Delay Allowable Values are long enough to provide time for the offsite power supply to recover to normal voltages, but short enough to ensure that sufficient power is available to the required equipment. ~~The Unit 1 Time Delay Allowable Values are long enough for the offsite power supply to usually recover.~~

~~This minimizes the potential that short duration disturbances will adversely impact the availability of the offsite power supply. For Unit 1 power supplies to Unit 2 required loads, manual actions are credited to restore bus voltages or to initiate a plant shutdown.~~

Two channels of 4.16 kV Emergency Bus Undervoltage (Degraded Voltage) Function per associated bus are only required to be OPERABLE when the associated DG is required to be OPERABLE to ensure that no single instrument failure can preclude the DG function. Refer to LCO 3.8.1 and LCO 3.8.2 for Applicability Bases for the DGs.

~~(continued)~~

BASES

~~APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)~~

~~3. Unit 1 4.16 kV Emergency Bus Undervoltage (Annunciation)~~

~~A reduced voltage condition on a Unit 1 4.16 kV emergency bus indicates that, while offsite power is adequate for normal operating conditions, available power may be marginal for some equipment required for LOCA conditions. Therefore, the anticipatory alarms actuate when the 4.16 kV bus voltages approach the minimum required voltage for normal, i.e., non-LOCA conditions. This ensures that manual actions will be initiated to restore the bus voltages or to initiate a plant shutdown.~~

~~Two channels of Unit 1 4.16 kV Emergency Bus Undervoltage (Annunciation) Function per associated required emergency bus are only required to be OPERABLE when the associated DG is required to be OPERABLE to ensure that adequate annunciation channels are available to alert the operator of a degraded voltage condition on the required Unit 1 4.16 kV emergency buses.~~

ACTIONS

A Note has been provided to modify the ACTIONS related to LOP instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable LOP instrumentation channels provide appropriate compensatory measures for separate inoperable channels. As such, a Note has been provided that allows separate Condition entry for each inoperable LOP instrumentation channel.

A.1

With one or more required channels ~~of Function 1 or 2~~ inoperable, the Function does not maintain initiation capability for the associated emergency bus. Therefore, only 1 hour is allowed to restore the inoperable channel to OPERABLE status. The Required Action does not allow placing a channel in trip since this action will result in a DG initiation.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 1 hour Completion Time is acceptable because it minimizes risk while allowing time for restoration or tripping of channels.

(continued)

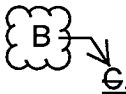
BASES

ACTIONS (continued)

~~B.1~~

~~With one or more Function 3 channels per required bus inoperable, annunciation capability may not be available to alert the operator of a degraded voltage condition on the required Unit 1 4.16 kV emergency buses.~~

~~Since the intended function is to alert personnel to a lowering voltage condition and the voltage reading is available for each bus on the control room front panels, the Required Action is verification of the voltage to be above the annunciator setpoint (nominal) hourly.~~



~~C.1~~

If any Required Action and associated Completion Time are not met, the associated Function does not maintain initiation capability for the associated emergency bus. Therefore, the associated DG(s) is declared inoperable immediately. This requires entry into applicable Conditions and Required Actions of LCO 3.8.1 and LCO 3.8.2, which provide appropriate actions for the inoperable DG(s).

SURVEILLANCE REQUIREMENTS

As noted at the beginning of the SRs, the SRs ~~for~~ each LOP instrumentation Function ~~are located in the SRs column of~~ Table 3.3.8.1-1. The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains initiation capability ~~(for Functions 1 and 2) and annunciation capability (for Function 3)~~. Functions 1 and 2 maintain initiation capability provided that, for 2 of the 3 emergency buses, the following can be initiated by the Function: DG start, disconnect from the offsite power source, DG output breaker closure, load shed, and activation of the ECCS pump power permissive. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken.

~~SR 3.3.8.1.1~~

~~Performance of the CHANNEL CHECK ensures that a gross failure of instrumentation or a failure of annunciation has not occurred. A CHANNEL CHECK is defined for Function 3 to be a comparison of the annunciator status to the bus voltage and an annunciator test confirming the annunciator is capable of lighting and sounding. A CHANNEL CHECK will detect gross channel failure or an annunciator failure; thus, it is key to verifying the instrumentation continues to~~

(continued)

BASES

SURVEILLANCE REQUIREMENTS

~~SR 3.3.8.1.1 (continued)~~

~~operate properly between each CHANNEL CALIBRATION.~~

~~If a channel is outside the match criteria, it may be an indication that the instrument has drifted outside its limit.~~

~~The Surveillance Frequency is controlled under the Surveillance Frequency Control Program. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with channels required by the LCO.~~

1

SR 3.3.8.1.~~2~~

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

2

SR 3.3.8.1.~~3~~

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations, consistent with the plant specific setpoint methodology.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

3

SR 3.3.8.1.~~4~~

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required actuation logic for a specific channel.

(continued)

BASES

3

SURVEILLANCE REQUIREMENTS

SR 3.3.8.1.4 (continued)

The system functional testing performed in LCO 3.8.1 and LCO 3.8.2 overlaps this Surveillance to provide complete testing of the assumed safety functions.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. FSAR, Section 8.3.1.
2. FSAR, Section 5.2.
3. FSAR, Section 6.3.
4. FSAR, Chapter 15.

Edwin I. Hatch Nuclear Plant Units 1 and 2
License Amendment Request for
Technical Specifications 3.3.8.1 and 3.8.1 Regarding Unit 1 Degraded Voltage Protection

Attachment 4

Summary of the HNP Unit 1 Loss of Power Instrumentation Setpoint Calculations

1.0 INTRODUCTION

The purpose of this document is to provide a summary of the Hatch Nuclear Plant (HNP) Unit 1 setpoint calculations used to determine the limiting trip setpoint (LTSP), nominal trip setpoints (NTSPs), allowable values (AVs), and as-left tolerance (ALT) for the loss of power (LOP) instrumentation in support of the HNP degraded voltage instrumentation modification that eliminates manual action in lieu of automatic degraded voltage protection and change to the Unit 1 degraded voltage instrumentation requirements in Technical Specification (TS) 3.3.8.1, "Loss of Power (LOP) Instrumentation." The modified degraded voltage protection scheme is part of an electrical power system modification that replaces the existing startup auxiliary transformers (SATs) and adds an additional SAT for each unit. The modification also reconfigures the electrical circuit paths between the SATs and the Class 1E electrical distribution system such that no more than two 4.16 kV emergency buses can be supplied by a single SAT. This new configuration will improve the electrical loading margin associated with each transformer and eliminate the reliance on one SAT supplying electrical power to three 4.16 kV emergency buses during normal or accident conditions when the other SAT is unavailable; thereby expanding the voltage operating range by which the degraded voltage relays (DVRs) can be set.

The Unit 2 modifications were implemented during the spring 2019 refueling outage. This Unit 1 degraded voltage instrumentation setpoint summary report supports implementation of the Unit 1 portion of the electrical power system modification. The Unit 1 degraded voltage instrumentation setpoint calculations utilized the same methodology used to calculate the Unit 2 degraded voltage instrumentation setpoints. This methodology is summarized in Attachment 4 of the Unit 2 degraded voltage instrumentation license amendment request (LAR) (Reference 1), which was the basis for NRC approval of the revised Unit 2 degraded voltage instrumentation AVs and NTSPs. Changes to the Unit 2 degraded voltage instrumentation in TS 3.3.8.1 were issued in license amendments 293 and 238 for HNP Units 1 and 2, respectively (Reference 2).

The modified 4.16 kV emergency bus degraded voltage protection scheme consists of three initiation channels for each bus. Each channel consists of a DVR with fixed time delay. The logic output is arranged in a two-out-of-three logic configuration for supported components except the diesel generators (DGs). The DG start logic is arranged in a one-out-of-three configuration.

2.0 SUMMARY OF UNIT 1 LOP DEGRADED VOLTAGE INSTRUMENT CALCULATIONS

The methodology used in determining the 4.16 kV emergency bus degraded voltage and time delay AV's uses the guidance in the SNC Setpoint Control Program procedures to the extent practicable and is consistent with the guidelines listed in NRC Generic Letter 79-36, "Adequacy of Station Electric Distribution Systems Voltages," (Reference 3) as supplemented in NRC Regulatory Issue Summary 2011-12, "Adequacy of Station Electric Distribution System Voltages," (Reference 4).

2.1 Minimum Expected Voltage and Minimum Required Voltage Determination

The safety-related 4.16 kV emergency bus voltage is maintained such that the resulting voltage at the safety-related loads powered downstream from each respective 4.16 kV bus is between the minimum and maximum allowable device voltage during undervoltage grid conditions.

The modified electrical power system improves the operating voltage at the 4.16 kV emergency buses due to the additional transformer loading margin afforded by the modified power configuration to the Class 1E electrical distribution system. Based on a minimum 230-kV switchyard voltage of 101.3% for both Unit 1 and Unit 2 specified in the HNP Unit 2 FSAR, Section 8.2, "Offsite Power System," the minimum expected voltage (MEV) of the safety-related 4.16 kV emergency buses is determined assuming the worst-case steady-state loading condition. In addition, the minimum required voltage (MRV) is determined to ensure the safety-related equipment can successfully actuate during design basis events.

A summary of the methodology used to determine the MEV and MRV for the 4.16 kV emergency buses is provided in Section 3.1 of Attachment 4 to the Unit 2 degraded voltage instrumentation LAR (Reference 1). The methodology used to determine the MEV and MRV for the Unit 1 4.16 kV emergency buses is the same methodology that was used to determine the associated MEV and MRV for the Unit 2 4.16 kV emergency buses.

Each safety-related 4.16kV emergency bus was evaluated separately with regards to the equipment powered by that bus and downstream distribution buses. With respect to the MEV evaluations, the limiting ETAP configurations for 4.16 kV emergency buses are as follows:

- Bus 1E - LOCA with SAT 1E unavailable and bus 1B, 1E, and 1G loads powered from SAT 1D simultaneously.
- Bus 1F - LOCA with SAT 1C unavailable and bus 1D, 1E, and 1F loads powered from SAT 1E simultaneously.
- Bus 1G - LOCA with SAT 1E unavailable and bus 1B, 1E, and 1G loads powered from SAT 1D simultaneously.

With respect to the MRV evaluations, the limiting ETAP configurations for 4.16 kV emergency buses are as follows:

- Bus 1E – Steady state with SAT 1E unavailable and bus 1B, 1E, and 1G loads powered from SAT 1D simultaneously.
- Bus 1F – Individual motor starting with SAT 1C unavailable and bus 1D, 1E, and 1F loads powered from SAT 1E simultaneously.
- Bus 1G – Steady state with SAT 1E unavailable and bus 1B, 1E, and 1G loads powered from SAT 1D simultaneously.

The resulting MEV and MRV for each Unit 1 4.16 kV emergency bus and the limiting loads at the MRV are shown in Table 2.1-1 assuming the worst case loading conditions.

Table 2.1-1 – MRV for Unit 1 4160 V Safety Related Buses

	MEV		MRV		
4160 V Emergency Bus	**(% 4160V)**	**(VAC)**	**(% 4160V)**	**(VAC)**	**Limiting Load**
1E	99.65	4145.4	92.66	3854.7	1R43-S001A – DG 1A Control Panel
1F	99.83	4152.9	90.20	3752.3	1B31-F031B - Outlet ISO Gate Valve
1G	99.67	4146.2	90.35	3758. 6	1P41-D103B PSW Strainer

2.2 4.16 kV Emergency Bus Degraded Voltage - Bus Undervoltage Function

Calculation Acceptance Criteria

The undervoltage trip function shall be set as low as possible while maintaining a margin of at least 0.2% setting (in addition to the required AV margin) between the lower analytical limit and TS Table 3.3.8.1-1, Function 2.a Allowable Value.

The goal for determining the NTSP (trip) and NTSP (reset) for the undervoltage trip function is to set these values as low as possible while allowing a margin of at least 0.2% setting (in addition to the AV margin) between the lower analytical limit and lower AV.

Calculation Assumptions

The calculation assumptions are equivalent to those used in Unit 2 degraded voltage instrumentation setpoint calculations, which are the basis for the current Unit 2 LOP instrumentation degraded voltage AVs, and are as follows:

- DVRs have been operating for at least 10 minutes (warmup).
- Conservatively convert the bias term associated with the calibration equipment to % setting based on 120 VAC and applying it as a non bias term yields an instrument calibration accuracy of ±0.584% setting
- Drift analysis was performed on the as-found/as-left data gathered from past calibrations of the DVR alarm relays located in the same operating environment as the relays being addressed by this calculation. The result of this analysis was extended to 22.5 months in accordance with guidelines provided in industry standard ISA-RP67.04.02 (Reference 5).
- No calibration accuracy associated with the potential transformers (PTs) monitoring the bus voltage.
- Process measurement accuracy (PMA) and primary element accuracy (PEA) are not applicable to this application.
- Test source used in calibrating the relays has less than 0.3% harmonic distortion.

- Room temperature effect of 0.75% setting is used, which bounds the temperature range that the relays will be exposed to.
- Leave-alone tolerance (LAT) for the undervoltage trip and reset is assumed to be equal to the reference accuracy for the undervoltage function.
- Maximum voltage drop on the cables between the PT secondary and the DVR is determined to be negligible based on the nominal voltage of 120V.
- Minimum control voltage is calculated to be available for the closing coils of the 4.16KV buses 1E, 1F, 1G, 2E, 2F and 2G breakers. Maximum control voltage is the maximum acceptable voltage specified for the close and trip function of the circuit breakers.
- Radiation and seismic effects are assumed to be negligible (zero).
- Vendor does not specify either humidity or pressure environmental requirements. Therefore, variations in humidity or pressure are assumed to have no effect on the relay's performance.
- Accuracy of the PTs monitoring the bus voltage is included.
- Calibration methodology and maintenance and test equipment (M&TE) used to calibrate the subject DVRs will be the same as those currently used to calibrate the degraded grid alarm relays.
- Calibration interval for the DVRs do not exceed 22.5 months (18 months + 25%).
- Undervoltage function of the relays will be set to reset at their minimum reset value of 0.5% of setting.

Methodology

A summary of the methodology used to determine the AVs for the Degraded Voltage – Bus Undervoltage LOP instrument function is provided in Section 3.2 of Attachment 4 to the Unit 2 degraded voltage instrumentation LAR (Reference 1). The methodology used to determine the AVs for the Unit 1 Degraded Voltage – Bus Undervoltage LOP instrument function is the same methodology that was used to determine the associated Unit 2 AVs.

Allowable Values for Degraded Voltage – Bus Undervoltage

Using the methodology summarized in Section 3.2 of Attachment 4 to the Unit 2 degraded voltage instrumentation LAR (Reference 1) and the assumptions provided herein, the following shows the results of the Unit 1 4.16 kV bus degraded voltage instrument calculations. Table 2.2-1 shows the LAT for the PT primary and secondary voltages, which were derived from the instrument reference accuracy and rounded up. The LATs apply to each Unit 1 4.16 kV emergency bus.

Table 2.2-1, Bus Undervoltage Tolerances

Calculation	Voltage	LAT
Primary Voltage	4160	±7.0 VAC , ±0.1%
Secondary Voltage	120	±0.2 VAC , ±0.1%

The calculated lower analytical limit, trip and reset AVs and NTSPs, and upper operating limit for the 4.16 kV safety related degraded voltage instrumentation loops associated with Unit 1 4.16 kV emergency buses are shown in Table 2.2-2:

Table 2.2-2 –Allowable Values and Nominal Setpoints (Bus Undervoltage Function)

Bus Degraded Voltage – Undervoltage Trip	1E Primary Voltage	1E Secondary Voltage	1F Primary Voltage	1F Secondary Voltage	1G Primary Voltage	1G Secondary Voltage
Upper Operating Limit (VAC)	4093.4	116.9	3962.4	113.2	3988.1	113.9
Upper Operating Limit (% setting)	98.40		95.25		95.87	
AV Reset (VAC)	4049.5	115.7	3920.0	112.0	3944.5	112.7
NTSP Reset (VAC)	4042.5	115.5	3913.0	111.8	3937.5	112.5
NTSP Trip (VAC)	4021.5	114.9	3892.0	111.2	3916.5	111.9
AV Trip (VAC)	**3990**	114.0	**3861**	110.3	**3885**	111.0
Lower Analytical Limit (VAC)	3937.9	112.6	3808.1	108.9	3833.5	109.6
Lower Analytical Limit (% setting)	94.66		91.54		92.15	

As shown in Tables 2.1-1 and 2.2-2, the calculated MEV and MRV bound the upper and lower analytical limits. Therefore, the degraded voltage instrument upper AV (reset) is below the MEV and the lower AV (trip) is above the MRV.

2.3 4.16 kV Emergency Bus Degraded Voltage - Time Delay Function

Calculation Acceptance Criteria

- With the 4160 V bus pre-start voltage at or below the MRV, LOCA motor starting transient time must be less than the DVR time delay setting, with tolerances, to mitigate spurious trips.
- DVR time delay setting, with tolerances, must be less than the DG start time of 12 seconds to prevent an extended degraded grid condition.
- DVR time delay setting, with tolerances, must be less than the minimum overcurrent relay trip time to prevent safety-related equipment from tripping during a degraded voltage condition.

Calculation Assumptions

The calculation assumptions are equivalent to those used in Unit 2 degraded voltage instrumentation setpoint calculations, which are the basis for the current Unit 2 LOP instrumentation degraded voltage AVs, and are as follows

- DVR calibration limits are determined to be ±0.5 seconds from the HNP surveillance test procedure for the degraded voltage alarm relays.
- LOCA group motor safe stall times are greater than the DG start time and therefore not considered as a limiting criteria.
- Loading on control power fuses from indicating lights is negligible.
- Motor starters are assumed to draw inrush current continuously until the DVR trips or the control power fuse blows. This is conservative because actual inrush current would be reduced by a degraded voltage condition.
- For calculating overcurrent relay trip times, motor locked-rotor current (LRA) is assumed with the motor voltage at the upstream 4160 V bus MRV (approximately 90% percent of rated voltage). In fact, the voltage at which the motor will continuously draw LRA is the minimum motor starting voltage requirement. This voltage is no greater than 75% of the motor rated voltage. As the LRA is proportional to the motor terminal voltage, using the MRV instead of the lower motor requirement is conservative and will yield faster calculated overcurrent relay trip times.

Methodology

A summary of the methodology used to determine the AVs for the Degraded Bus Voltage – Time Delay LOP instrument function is provided in Section 3.3 of Attachment 4 to the Unit 2 degraded voltage instrumentation LAR (Reference 1). The methodology used to determine the AVs for the Unit 1 Degraded Bus Voltage – Time Delay LOP instrument function is the same methodology that was used to determine the corresponding Unit 2 values.

Overcurrent relays (OCRs) at the 4160 V LOCA group motors (i.e., low pressure coolant injection (LPCI) pump and core spray pump motors) were analyzed to verify degraded voltage effects on these motors during starting will not cause an OCR trip prior to a DVR trip. To account for degraded voltage, the locked rotor amperes (LRA) associated with each LOCA group motor was adjusted by multiplying the LRA times a percentage of 4160 V at or less than the motor's respective electrical bus MRV. Each starting motor is conservatively assumed to stall continuously at this current until the time at which the OCR would trip. Table 2.3-1 shows the overcurrent trip time of the Unit 1 LOCA group motors based on the adjusted LRA.

Table 2.3-1 – Unit 1 LOCA Group Motors Overcurrent Trip Times

Motor Name	4.16 kV Bus	Motor HP	LRA (amperes)	≤ MRV (% 4160 V)	Adjusted LRA (amperes)	OCR Trip Time (secs.)
LPCI Pump 1A	1E	1000	840	91.30	767	11.80
Core Spray Pump 1A		1250	1040		950	11.45

Motor Name	4.16 kV Bus	Motor HP	LRA (amperes)	≤ MRV (% 4160 V)	Adjusted LRA (amperes)	OCR Trip Time (secs.)
LCPI Pump 1C	1F	1000	840	90.19	758	11.80
LPCI Pump 1D		1000	840		758	11.80
LPCI Pump 1B	1G	1060	840	90.71	762	11.80
Core Spray Pump 1B		1250	1040		943	11.45

Thermal overloads for LOCA group motor operated valves (MOVs) were not analyzed because the thermal overloads are permanently bypassed to avoid a protective device trip. It has been determined that MOVs motors less than 10 HP, including five LOCA group MOVs, will not be damaged before 17 seconds. Other safety-related equipment is assumed to have a full load ride-through capability of at least 75% of nameplate voltage with duration of at least 30 seconds. Below 75%, the loss of voltage relay is set to protect the safety-related equipment. Control power fuses for starting MOVs were also evaluated to ensure that they will not melt before the DVR trips.

Allowable Values for Degraded Voltage – Time Delay

From the LOCA group motor transient plots, the motors were capable of starting and reaching full speed within 2.00 seconds. Therefore, a DVR time delay of 2.00 seconds is determined to be minimum time to avoid unnecessary automatic transfer of the loads to the DGs. The calculated analytical limits, AVs, NTSP, and LAT for the 4.16 kV safety related degraded voltage relay time delay associated with Unit 1 4.16 kV emergency buses are shown in Table 2.3-2.

Table 2.3-2 –Allowable Values and Nominal Setpoints (Time Delay Function)

Bus Degraded Voltage – Time Delay	1E	1F	1G
Upper Analytical Limit (sec)	11.45	11.45	11.45
Upper AV (sec)	**11.36**	**11.36**	**11.36**
NTSP (sec)	9.00	9.00	9.00
Lower AV (sec)	2.02	2.02	2.02
Lower Analytical Limit (sec)	2.00	2.00	2.00
LAT (sec)	± 0.5	± 0.5	± 0.5

3.0 TECHNICAL SPECIFICATION APPLICATION OF INSTRUMENT SETPOINTS

The AVs for the Unit 1 4.16 kV Degraded Voltage Bus Undervoltage and Time Delay Functions in TS Table 3.3.8.1-1 (Functions 2.a and 2.b) were selected from the DVR trip AVs specified in

Table 2.2-2 and the upper time delay AV specified in Table 2.3-2. These AVs ensure that the voltage requirements of the safety-related loads are met during a design basis accident without exceeding the maximum time delay assumed in the safety analyses. The 4.16 kV Degraded Voltage Bus Undervoltage and Time Delay Functions are demonstrated operable by applying the following guidance during instrument channel calibrations:

If the instrument setting is found within the LAT, the results are recorded in the surveillance procedure and no further action is required for the instrument surveillance. If the instrument setting is found outside the LAT but conservative with respect to the TS AV, the channel is operable and the instrument setting must be calibrated to the NTSP (within the LAT). If the instrument setting is found non-conservative to the TS AV, the channel is inoperable until the instrument setting is calibrated to the NTSP (within the LAT) and any evaluations necessary to return the channel to service are completed. The instrument setting may be more conservative than the LTSP provided the as-found tolerance (i.e., minimum NTSP margin) and LAT are applied to the actual instrument setting (i.e., actual NSTP) used to confirm channel performance.

4.0 REFERENCES

1. Letter from J. J. Hutto (SNC) to the Document Control Desk (NRC), "Edwin I. Hatch Nuclear Plant Units 1 and 2 License Amendment Request for Technical Specification 3.3.8.1 Regarding Degraded Voltage Protection," dated March 9, 2018 (NRC ADAMS Accession No. ML18071A363).

2. Letter from S. Williams for J. R. Hall (NRC) to C. A. Gayheart (SNC), "Edwin I. Hatch Nuclear Plant, Unit Nos. 1 and 2 - Issuance of Amendments to Revise Technical Specification 3.3.8.1, "Loss of Power (LOP) Instrumentation" (EPID L-2018-LLA-0069)," dated January 28, 2019 (NRC ADAMS Accession No. ML19010A009).

3. NRC Generic Letter 79-36, "Adequacy of Station Electric Distribution Systems Voltages," dated August 8, 1979.

4. NRC Regulatory Issue Summary (RIS) 2011-12, "Adequacy of Station Electric Distribution System Voltages," Revision 1, dated December 29, 2011 (NRC ADAMS Accession No. ML113050583).

5. ISA-RP67.04.02, "Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation," 2000.