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TXX-19064

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Ref 10 CFR 50.90
10 CFR 50.91(b)(1)

03/31/2020

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT
DOCKET NOS. 50-445 AND 50-446
LICENSE AMENDMENT REQUEST (LAR) 15-001
REVISION TO TECHNICAL SPECIFICATIONS (TS) 3.8.1, AC SOURCES -- OPERATING

Dear Sir or Madam:

Pursuant to 10CFR50.90, Vistra Operations Company LLC (Vistra OpCo) hereby requests an amendment to the Comanche Peak Nuclear Power Plant (CPNPP) Unit 1 Operating License (NPF-87) and CPNPP Unit 2 Operating License (NPF-89) by incorporating the attached change into the CPNPP Units 1 and 2 Technical Specifications. This change request applies to both units.

The proposed change will revise Technical Specification 3.8.1 entitled “AC SOURCES -- OPERATING.” The proposed change will revise the Emergency Diesel Generator surveillance requirement steady state frequency band. The current steady state frequency band of 58.8 Hz to 61.2 Hz will be changed to 59.9 Hz to 60.1 Hz in multiple Surveillance Requirements. This amendment request also removes historical information from TS 3.8.1, Required Action A.3 Completion Time and a Note from SR 3.8.1.13.

The enclosure provides a description and assessment of the proposed changes. Attachment 1 provides the existing TS pages, marked TS pages to show the proposed changes, and the retyped TS pages. TS Bases current, marked, and retype pages are included “for information only.” Attachments 2, 3, 4, and 5 are provided “for information only” are not intended to become part of the CPNPP licensing basis. Attachment 2 provides CPNPP figures for 6900VAC and 480VAC and Electrical Grid Connection. Attachment 3 provides requested TS 3.8.1 surveillance requirement information. Attachment 4 provides safety related pump and motor operated valve (MOV) response to voltage and frequency changes. Attachment 5 provides safety related MOV minimum required starting voltage.

Approval of the proposed amendment is requested within one year of the NRC acceptance date. Once approved, the amendment shall be implemented within 90 days.

In accordance with 10CFR50.91(b)(1), Vistra OpCo is providing the State of Texas with a copy of this proposed amendment.

This letter contains no new regulatory commitments.

If you have any questions regarding this submittal, please contact Garry W Struble at (254) 897-6628 or garry.struble@luminant.com.

I state under penalty of perjury that the foregoing is true and correct.

Executed on 03/31/2020.

Sincerely,

Thomas P. McCool

Enclosure: LICENSE AMENDMENT REQUEST (LAR) 15-001, REVISION TO TECHNICAL SPECIFICATIONS (TS) 3.8.1, AC SOURCES -- OPERATING

Attachments:
1. CPNPP TECHNICAL SPECIFICATION 3.8.1, AC SOURCES -- OPERATING TECHNICAL SPECIFICATION AND BASES PAGES
2. CPNPP FIGURES
3. CPNPP TECHNICAL SPECIFICATION 3.8.1, AC SOURCES -- OPERATING, SURVEILLANCE REQUIREMENT INFORMATION IN ACCORDANCE WITH THE SURVEILLANCE FREQUENCY CONTROL PROGRAM
4. CPNPP SAFETY RELATED PUMP AND MOTOR OPERATED VALVE RESPONSE
5. CPNPP DBD-EE-041, 480V AND 120V AC ELECTRICAL POWER SYSTEM, TABLE 5.3, MOV MINIMUM STARTING VOLTAGE REQUIRED

c –

Scott Morris, Region IV
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Resident Inspectors, Comanche Peak

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1.0 SUMMARY DESCRIPTION

Proposed License Amendment Request (LAR) 15-001 revises Technical Specifications (TS) 3.8.1, AC Sources -- Operating for Comanche Peak Nuclear Power Plant (CPNPP) Units 1 and 2.

Vistra Operation Company LLC (Vistra OpCo) is requesting this change to the Emergency Diesel Generator (EDG), Surveillance Requirement(s) (SR) descriptions (acceptance criteria). Revising these acceptance criteria is necessary for validation of steady state voltage and frequency requirements. These steady state requirements are necessary when the EDG is the sole power source for safety related loads. LAR 15-001 also includes two editorial changes to delete historical information.

There are no changes to the CPNPP Final Safety Analysis Report (FSAR) as a result of LAR 15-001 (References 6.1 and 6.2).

2.0 DETAILED DESCRIPTION

The design function of the EDGs is to provide power for safe shutdown of the plant when offsite power is not available. EDGs operate in the isochronous mode to perform their design function. Following restoration of offsite power, the EDGs are required to synchronize with the grid to restore offsite power to safety buses without interruption of power. EDG capability to provide adequate voltage and frequency for performance of safety related functions during isochronous mode is required to be validated by the surveillance testing program. As noted in section 2.3, the NRC has questioned the adequacy of EDG surveillance testing frequency tolerance of (60 $\pm$ 1.2) Hz for steady state operation, to adequately ensure power for performance of safety related Structures, Systems, and Components (SSC).

The preferred source of power for safe shutdown of the plant is offsite power. CPNPP has established voltage and frequency requirements for offsite sources to ensure adequate voltage and frequency for performance of SSCs.

Switchyard steady state voltage is maintained, between 135 and 144 kV, for the 138 kV switchyard and between 340 and 361 kV, for the 345 kV switchyard. Switchyard voltage requirements are documented in agreements with Electric Reliability Council of Texas (ERCOT) (grid operator) and Oncor (transmission and distribution provider). These requirements ensure a voltage of $\pm$ 10% of rated voltage at motor terminals for adequate performance of SSCs. To meet the requirement of $\pm$ 10% of rated voltage at motor terminals, EDG steady state voltage is defined as $\geq$ 6480 V and $\leq$ 7150 V. These voltage requirements are used to validate EDG capability to provide adequate voltage for performance of SSCs.

CPNPP Engineering Report ER-ME-109 (Reference 6.10) evaluates safety related pump degradation issues and concludes that a ± 0.1 Hz frequency variation has insignificant impact on 60 Hz motor and pump performance. Therefore, to ensure adequate performance of SSCs, offsite power steady state frequency limits were defined as ≥ 59.9 Hz and ≤ 60.1 Hz, and documented in an agreement with ERCOT. However, these frequency acceptance criteria were not incorporated into Technical Specification (TS) 3.8.1 surveillance testing because the testing acceptance criteria of 60 ± 1.2 Hz were based on Regulatory Guide (RG) 1.9 frequency limits and were considered adequate for steady state operation.

6900 V bus voltage and frequency, when tied to the grid, is controlled by the grid. Therefore, an EDG operating in parallel with the grid provides adequate voltage and frequency for performance of SSCs. The design function of an EDG, operating in isochronous mode, is to provide adequate voltage and frequency for performance of SSCs when offsite power is not available. Therefore, the TS 3.8.1 surveillance program is being revised to incorporate steady state frequency limits, ≥ 59.9 Hz and ≤ 60.1 Hz, in the SRs. This will align the surveillance acceptance criteria for DG frequency with the Offsite Power System steady state frequency and will ensure insignificant impact on 60 Hz motor and pump performance.

Current SR descriptions (acceptance criteria) do not align with EDG steady state frequency limits with desired EDG control system performance. CPNPP is administratively trending the steady state frequency in the surveillance testing program. If steady state frequency is outside the 60 ± 0.1 Hz band engineering is contacted for assistance. LAR 15-001 will make this administrative trending acceptance criterion.

Refer to Attachment 1 to TXX-19064 for the CPNPP Current, Markup, and Retyped Technical Specification, 3.8.1 AC Sources – Operating. Included as “For Information Only” are the CPNPP Current, Markup, and Retyped Technical Specification Bases, B 3.8.1 AC Sources – Operating.

2.1 System Design and Operation

The Emergency Diesel Generators provide emergency onsite power for safety-related equipment. There are two EDGs for each unit and they are train-related.

Unit 1	EDG 1-01	Train A	1EA1
	EDG 1-02	Train B	1EA2
Unit 2	EDG 2-01	Train A	2EA1
	EDG 2-02	Train B	2EA2

During normal power operation the 6900 V safeguards buses 1EA1, 1EA2, 2EA1, and 2EA2 are power from their preferred offsite power source.

The preferred offsite power source for Unit 1 is from the 345 KV switchyard through transformer XST2 or XST2A. The alternate offsite power source for Unit 1 is from the 138 KV switchyard through transformer XST1 or XST1A.

The preferred offsite power source for Unit 2 is from the 138 KV switchyard through transformer XST1 or XST1A. The alternate offsite power source for Unit 2 is from the 345 KV switchyard through transformer XST2 or XST2A.

For the CPNPP 6900 V safeguards buses the transfer from the preferred offsite source to the alternate offsite source is a Slow Transfer only. If the Slow Transfer fails, the associated EDG will start and provide power to the bus. In either case the loads will be sequenced onto the bus by the Blackout Sequencer. If the preferred offsite source is lost coincident with a Safety Injection, the Safety Injection Sequencer will load the bus.

Conditions required for a Slow Transfer include the following:

- Transfer switch for the alternate power supply breaker selected to the Control Room
- Alternate power supply breaker handswitch on the main control board in AUTO
- Preferred power supply breaker in connect and open
- Voltage available from the alternate source
- Undervoltage condition on the bus for at least 0.5 seconds
- 1.9 seconds have NOT elapsed
- EDG output breaker open
- No 86 lockouts on the bus

If the preferred and alternate offsite power sources are unavailable, then a dedicated EDG may be aligned to each safeguards 6900 V bus. The EDGs receive an automatic emergency start due to bus undervoltage (Blackout) and buses are loaded by a Blackout Sequencer. The EDGs also receive an automatic emergency start due to Safety Injection and buses are loaded by a Safety Injection Sequencer. A Safety Injection may be initiated manually, by low pressurizer pressure, low main steam line pressure, or containment building high pressure. The sequencers are designed to load the EDGs in a controlled manner to ensure that loading does not cause the EDG to trip.

EDG ratings are 7000 kW at 0.8 PF (Power Factor) and 60 Hz. EDGs maintain their voltage within $\pm$ 0.5% of 6900 V. EDGs are required to maintain their frequency within $\pm$ 0.6 Hz; however, test experience shows

that the EDGs will maintain frequency at ± 0.1 Hz. The EDGs are capable of operating in parallel with 6900 V buses, fed from the offsite power grid. 6900 V bus and electrical distribution system frequency, when tied to the grid, is same as grid frequency. 6900 V bus voltage when tied to the grid, is controlled by grid voltage and voltage drop across the Startup Transformers (SUT). The grid normally maintains its frequency at 60 ± 0.03 Hz and switchyards normally maintain their voltages ≥ 138 kV for 138 kV switchyard and ≥ 342 kV for 345 kV switchyard. These voltages correspond to 6900 V bus voltages of 6900/6840 V at no load.

Surveillance testing performed during plant operation may require EDG parallel operation with the grid. Station procedures provide administrative controls for EDG parallel operation with the grid without declaring the paralleled EDG inoperable. During such testing, only one of the redundant DGs shall be paralleled at any one time, leaving the other EDG available in standby. To synchronize with the grid, EDG frequency and voltage controls are used to bring EDG voltage and frequency to values necessary for synchronization. After synchronization the EDG voltage and frequency will be controlled by the grid during EDG parallel operation.

Refer to Attachment 2 to TXX-19064 for CPNPP simplified plant diagrams; Figure 1 - 6900VAC and 480VAC and Figure 2 - CPNPP Electrical Grid Connection Diagram.

2.2 Current Technical Specification 3.8.1 Requirements

2.2.1 TS 3.8.1 Surveillance Requirements with a specified Diesel Generator frequency band

The current acceptance criteria for the following SRs includes a diesel generator frequency band of "≥ 58.8 Hz and ≤ 61.2 Hz:"

- 3.8.1.2 (DG Monthly Slow Start)
- 3.8.1.7 (DG Semi-annual Fast Start)
- 3.8.1.11 (Emergency Bus Load Shed, DG Start, Sequence and Run on Loss of Offsite Power)
- 3.8.1.15 (DG Hot Restart)
- 3.8.1.19 (Emergency Bus Load Shed, DG Start, Sequence and Run on Safety Injection in Conjunction with Loss of Offsite Power)
- 3.8.1.20 (Simultaneous Start of Both DGs)

2.2.2 TS 3.8.1, CONDITION A, REQUIRED ACTION A.3, COMPLETION TIME

This REQUIRED ACTION A.3 incudes a current COMPLETION TIME of "72 hours OR 14 days for a one time outage on XST1 to complete a plant modification to be completed by March 31, 2017."

The proposed editorial change deletes “OR 14 days for a one time outage on XST1 to complete a plant modification to be completed by March 31, 2017.” from the COMPLETION TIME as it is historical and no longer needed.

2.2.3 TS Surveillance Requirement 3.8.1.13

The current NOTE in SR 3.8.1.13 is “For Unit 2, testing need only be performed for LOOP concurrent with SI until startup following 2RF05.” The proposed editorial change deletes the NOTE in SR 3.8.1.13 as it is historical and no longer needed.

Refer to Attachment 1 to TXX-19064 for the CPNPP Current, 3.8.1 AC Sources – Operating. Included as “For Information Only” are the CPNPP Current Technical Specification Bases, B 3.8.1 AC Sources – Operating.

2.3 Reason for Proposed Change

During a Component Design Bases Inspection performed in 2013, the inspectors identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, states, in part, “measures shall be established to assure that conditions adverse to quality are promptly identified and corrected.” Specifically, since May 2010, the licensee failed to correct a condition adverse to quality in a timely manner that involved updating design basis calculations for safety-related equipment to include the allowed technical specification frequency range of ± 2 percent for the emergency diesel generators.

The issue led to an industry sponsored evaluation that yielded no concrete actions to address the issue. CPNPP is submitting this LAR 15-001 to close this issue.

CPNPP is proposing a technical specification change to address EDG frequency acceptance criteria. CPNPP proposed acceptance criteria provides a better basis for determining if diesel generator controls are performing as designed.

A frequency of 60 $\pm$ 0.1 Hz has no significant impact on 60 Hz motor or pump performance, per ER-ME-109 Rev 1 (Ref. 16). EDG steady state frequency of $\geq$ 59.9 Hz and $\leq$ 60.1 Hz ensures adequate frequency at safety related loads for performance of their safety related function. The EDG control system maintains steady state frequency within 60 $\pm$ 0.1 Hz.

In accordance with North American Electric Reliability Corporation (NERC) Mandatory Reliability Standard NUC-001, Nuclear Plant Interface Requirement-1 (NPIR-1) the offsite power system is maintained at 60 $\pm$ 0.1 Hz and switchyard voltages are maintained 340 kV to 361 kV for the 345 kV switchyard and 135 kV to 144 kV for the 138 kV switchyard. After synchronizing with the grid the CPNPP electrical system frequency will be the same as grid frequency and safety bus voltage will remain between the required voltage limits of 6480 V and 7150 V. Switchyard controls in conjunction with plant administrative controls for EDG parallel operation

with the grid, ensure the EDG capability limits, to maintain voltage of ≥ 6480 V and frequency of ≥ 59.9 Hz can be verified for synchronizing to the offsite circuit, and the grid will maintain EDG frequency at 60 ± 0.1 Hz and voltage between 6480 V and 7150 V after synchronization.

These SURVEILLANCE REQUIREMENT changes will adequately address the original issue from 2010 and allow closure of all actions regarding the finding from 2013. The editorial changes will remove historical information no longer required from TS 3.8.1, AC -- Operating, CONDITION A, REQUIRED ACTION A.3 COMPLETION TIME and the NOTE from SR 3.8.1.13.

2.4 Description of Proposed Change

2.4.1 TS 3.8.1 Surveillance Requirements with a specified Diesel Generator frequency band

The current acceptance criteria for the following SRs includes a diesel generator frequency band of "≥ 58.8 Hz and ≤ 61.2 Hz:"

- 3.8.1.2 (DG Monthly Slow Start)
- 3.8.1.7 (DG Semi-annual Fast Start)
- 3.8.1.11 (Emergency Bus Load Shed, DG Start, Sequence and Run on Loss of Offsite Power)
- 3.8.1.15 (DG Hot Restart)
- 3.8.1.19 (Emergency Bus Load Shed, DG Start, Sequence and Run on Safety Injection in Conjunction with Loss of Offsite Power)
- 3.8.1.20 (Simultaneous Start of Both DGs)

LAR 15-001 proposes to change the diesel generator frequency band from "> 58.8 Hz and < 61.2 Hz" to "> 59.9 Hz and < 60.1 Hz" for the SRs listed above.

2.4.2 TS 3.8.1, CONDITION A, REQUIRED ACTION A.3, COMPLETION TIME

This REQUIRED ACTION A.3 incudes a current COMPLETION TIME of "72 hours OR 14 days for a one time outage on XST1 to complete a plant modification to be completed by March 31, 2017." The proposed editorial change deletes "OR 14 days for a one time outage on XST1 to complete a plant modification to be completed by March 31, 2017." from the COMPLETION TIME as it is historical and no longer needed.

2.4.3 TS Surveillance Requirement 3.8.1.13

The current NOTE in SR 3.8.1.13 is "For Unit 2, testing need only be performed for LOOP concurrent with SI until startup following 2RF05." The proposed editorial change deletes the NOTE in SR

3.8.1.13 as it is historical and no longer needed.

Refer to Attachment 1 to TXX-19064 for the CPNPP Markup, 3.8.1 AC Sources – Operating.

2.4.4 Changes to TS 3.8.1 Bases provided "For Information Only"

The change to the TS Bases includes several editorial changes that will assist the operators while in TS 3.8.1, AC Sources -- Operating. The background adds that an associated bus undervoltage will automatically start the associated EDG as well as a Safety Injection (SI) signal.

The change updates current administrative controls to implement when performing surveillance testing the EDG paralleled to the grid.

The surveillance requirement section updates the steady state frequency bands proposed for TS 3.8.1.

Refer to Attachment 1 to TXX-19064 which includes "For Information Only" are the CPNPP Markup Technical Specification Bases, B 3.8.1 AC Sources – Operating.

The retyped pages for the proposed change to Technical Specification, TS 3.8.1 are provided for review.

Refer to Attachment 1 to TXX-19064 for the CPNPP Retyped, 3.8.1 AC Sources – Operating. Included as "For Information Only" are the CPNPP Retyped Technical Specification Bases, B 3.8.1 AC Sources – Operating.

3.0 TECHNICAL EVALUATION

The proposed change provides surveillance requirements that are aligned with diesel generator voltage and frequency required to supply power to safety related SSCs. The EDG SRs test the time required to have the diesel generators "ready-to-load" to ensure compliance with the maximum time to load under accident conditions. The band for frequency of 60 Hz $\pm$ 0.1 Hz tests the ability of the DG controls to maintain steady state frequency when required. Years of empirical data show that the sole time when DG controls could not control frequency at 60 Hz $\pm$ 0.1 Hz the DG controls were inoperable and thus the DG was inoperable. The voltage band of $\geq$ 6480 volts and $\leq$ 7150 volts fulfills two requirements; first the band ensures components down to the 120-volt level provide adequate voltage for safety related SSCs and second the band ensures compliance with TS 3.8.9, Distribution Systems – Operating and TS 3.8.10, Distribution Systems – Shutdown.

The design basis event, Loss of Coolant Accident (LOCA) with a Loss of Offsite Power (LOOP) is the primary event where the diesel generators must perform in order to cool the core and provide for long term cooling. This design basis event assumes that at least one train of onsite emergency power (DG) and one train of Emergency Core Cooling System (ECCS) are available. The proposed

Technical Specification change does not adversely impact the ability to meet those two objectives. The proposed changes enhance the ability of CPNPP to discover, during diesel generator surveillance testing, possible degraded conditions.

CPNPP has included Attachment 4, Safety Related Pump and Motor Operated Valve (MOV) Response and Attachment 5, DBD-EE-041, 480V and 120V AC Electrical Power System, Table 5.3, MOV Minimum Starting Voltage Required. Attachment 4 uses simple mathematical principles to show the effect of a change in frequency on pump volumetric flowrate. It illustrates that the current frequency band of 2% and the proposed frequency band of 0.2% have minor effect on actual pump volumetric flowrates. Attachment 4 also illustrates the impact of varying voltage and frequency on motor operated valves. Again simple mathematical principles are used to show the effect on MOV motor torque. It illustrates that the current frequency band of 2% and the proposed frequency band of 0.2% have minor effect on actual MOV motor torque. These attachments are provided for illustration only they are not intended to become part of the CPNPP licensing basis.

See Attachment 4 to TXX-19064, for Safety Related Pump and Motor Operated Valve Response. See Attachment 5 to TXX-19064, for DBD-EE-041, 480V and 120V AC Electrical Power System, Table 5.3, MOV Minimum Starting Voltage Required. Attachments 4 and 5 are provided “For Information Only.”

For these reasons, Vistra OpCo concludes that the Surveillance Requirement changes proposed by this amendment do not alter any existing analysis. The proposed change does not adversely affect diesel generator; design function, evaluation methodology (surveillance testing), operation or testing procedures, design bases or safety analysis, and does not create a new test or experiment.

In summary, the proposed technical specification changes align acceptance criteria for TS 3.8.1 surveillance requirements with the steady state voltage and frequency required to support performance of safety related SSCs and provide a better indicator of EDG control system performance. The overall scope of the diesel generator surveillance requirements includes a series of sequential, overlapping, and total examination of the entire operation of the diesel generators. The frequencies at which each surveillance requirement is performed, is controlled within the Surveillance Frequency Control Program (SFCP).

The CPNPP EDG surveillance requirements are made up of 22 separate tests that are either performed alone or in a specific sequence.

Refer to Attachment 3 to TXX-19064, for Technical Specification 3.8.1, AC Sources – Operating Surveillance Requirement Information. The surveillance requirement intervals provided are taken from the CPNPP SFCP.

The two editorial changes remove historical information that no longer applies to

the CPNPP Technical Specifications. Their removal has no impact on the Technical Evaluation.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements

The regulatory basis for Technical Specifications 3.8.1, “AC Sources -- Operating” is to ensure that a Loss of Offsite Power or a Loss of Coolant Accident with a Loss of Offsite Power are sensed and operation of systems and components important to safety are initiated in order to protect against violating core design limits, challenging the reactor coolant system pressure boundary, and to mitigate the consequences of accidents.

Section 182a of the Atomic Energy Act requires applicants for nuclear power plant operating licenses to include technical specifications as part of the license. The Commission's regulatory requirements related to the content of the technical specifications are contained in Title 10, Code of Federal Regulations (10 CFR), Section 50.36, "Technical Specifications," of 10 CFR Part 50 "Domestic Licensing of Production and Utilization Facilities." The technical specification requirements in 10 CFR 50.36 include the following categories: (1) safety limits, limiting safety systems settings and control settings, (2) limiting conditions for operation, (3) surveillance requirements, (4) design features, and (5) administrative controls. The requirements for AC Sources -- Operating are included in the technical specifications in accordance with 10 CFR 50.36(c)(2), "Limiting Conditions for Operation."

This license amendment request is submitted pursuant to 10 CFR 50.90 as a change to the technical specifications is required. Vistra OpCo’s submittal meets the requirements of 10 CFR 50.90.

General Design Criterion (GDC) 17 "Electric power Systems," of Appendix A "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires, among other things, an onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be 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 proposed operational change continues to provide onsite electric power supplies, including the batteries, and the onsite electric

distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure. (Reference 6.3)

General Design Criterion (GDC) 18 "Inspection and Testing of Electric Power Systems," of Appendix A "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires, among other things, Electric power systems important to safety shall be designed to permit appropriate periodic inspection and testing of important areas and features, such as wiring, insulation, connections, and switchboards, to assess the continuity of the systems and the condition of their components. The systems shall be designed with a capability to test periodically (1) the operability and functional performance of the components of the systems, such as onsite power sources, relays, switches, and buses, and (2) the operability of the systems as a whole and, under conditions as close to design as practical, the full operation sequence that brings the systems into operation, including operation of applicable portions of the protection system, and the transfer of power among the nuclear power unit, the offsite power system, and the onsite power system. The proposed operational change continues to periodically test the specific operability and functionality of the Emergency Diesel Generators and loading sequencers. (Reference 6.4)

Regulatory Guide 1.9 [1971], Selection of Diesel Generator Set Capacity for Standby Power Supplies.

The rating of the diesel generators is based on the maximum continuous load demand. This rating exceeds the sum of the conservatively rated loads. Motor loads are based on nameplate rating, pump runout conditions, or flow pressure conditions. 6600-V motor efficiency is based on design data.

During preoperational testing, the maximum continuous load demand is verified by tests. Each diesel generator set is capable of starting and accelerating to rated speed and loading all Class 1E loads in the required sequence.

Sequencing of large loads at 5-sec intervals ensures that large motors have reached rated speed and that voltage and frequency have stabilized before the succeeding loads are applied. The voltage may dip below 75 percent of nominal voltage when the diesel generator breaker closes and energizes the two 2000/2666 KVA, 6.9 KV/480-V unit substation transformers supplied from each diesel generator. This dip is due to magnetizing inrush current which exists for two to three cycles. The diesel generators are designed to recover to 80 percent of nominal voltage within 10 cycles for this transient. The effect on the first load group would, therefore, be a maximum possible delay of 12 to 13 cycle after closure of the diesel generator breaker. However, the objective of first load group and subsequent load groups is not affected. During recovery

from transients caused by step load increases or resulting from the disconnection of the largest single load, the speed of the diesel generator set should not exceed the nominal speed plus 75 percent of the difference between nominal speed and the overspeed trip setpoint or 115 percent of nominal, whichever is lower. The voltage is restored to within 10 percent of nominal; and the frequency is restored to within two percent of nominal in less than 40 percent of each load sequence time interval. The diesel generator supplier has successfully performed these tests in their facility on one CPNPP diesel generator set.

The prototype qualification test program of

a. Start and load capability at full load, and

b. 300 valid start and load tests on the diesel generator (Reference 6.5)

Regulatory Guide 1.32 [1977], Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants.

The offsite power system includes the preferred design stated in NRC Regulatory Guide 1.32: namely, two immediate access circuits from the transmission network are available to the emergency (Class 1E) bus systems. (Reference 6.6)

Regulatory Guide 1.93 [1974], Availability of Electric Power Sources.

CPNPP power operation procedure is in compliance with NRC Regulatory Guide 1.93 as described in technical specifications. The power operation procedure is initiated and continued without restriction only when the limiting conditions for operation (TS) are met. If the TSs are not met, the power operation will be restricted in accordance with the technical specification. (Reference 6.7)

Regulatory Guide 1.108 [1977], Periodic Testing of Diesel Generator Units used as Onsite Electric Power Systems at Nuclear Power Plants.

The CPNPP design complies with the intent of Revision 1 (8/77) of this regulatory guide.

1. The requirements of position C. 1b.4 are satisfied as described below:

    a. Diesel generator (D-G) "Ready Stand by" status indication in the Control Room can be acknowledged by the combination of a green light for output breaker and the absence of a "D-G disable" and a "D-G trouble" annunciator indication.

    b. "D-G Lockout" status is indicated by means of a "D-G disable" annunciation in the Control Room. This status is also indicated by "DG PWR" indication on the safety system bypass and inoperable status indicating light box in the

Control Room due to any of the following:

1. DC power unavailable
2. Remote-Local-Maintenance switch not in remote on the generator control panel.

c. "D-G undertest" status light is not provided in the CPNPP design.

d. A means of communication is provided between the diesel generator room and the Control Room.

2. The requirements of Regulatory Positions are clarified as described below:

Regulatory Position C.2.a.(4)

The largest single load is taken to be the largest single end load and not combined distribution system loads (e.g., distribution system transformers or load centers). This load is 783 kW equal to the nameplate rating of the Component Cooling Water pump.

Regulatory Position C.2.d

If the number of failures in the last 100 valid tests is seven or more for an individual diesel generator unit, the reliability of that diesel generator requires special evaluation (i.e., the reliability of both diesel generators is not impacted).

3. The CPNPP periodic testing program meets the intent of the regulatory guide with the following exceptions:

a. Regulatory Position C.2.a.3

During preoperational testing, testing will be conducted at the full-load-carrying capability for an interval of not less than 24 hours, of which 22 hours will be at the continuous rating capability of the diesel generator and 2 hours at a load equivalent to the two hour rating of the diesel generator. At a frequency specified in accordance with Technical Specification 5.5.21, "Surveillance Frequency Control Program", testing will be conducted to demonstrate full-load-carrying capability for an interval of not less than 24 hours, of which 22 hours will be at a load which exceeds the maximum expected diesel generator load requirements and 2 hours at a load which is approximately 110% of this maximum expected load.

b. Regulatory Position C.2.a.5

Demonstrate functional capability at full load temperature conditions by rerunning the test phase outlined in Regulatory Position C.2.a.1 and by demonstrating proper operation for shutdown-loading-sequence to shutdown-load requirements

immediately following the performance of C.2.a.3, except during preoperational testing when the proper operation for the design-accident-loading-sequence to design-load requirements will be demonstrated.

c. Regulatory Position C.2.a.9

Demonstrate the reliability of the Emergency Diesel Generator by performing at least a total of 69 (but no less than 35 per Emergency Diesel Generator) consecutive valid start and load tests on the Emergency Diesel Generators from cold ambient conditions to at least 50 percent continuous rating for at least 1 hour with no failures. These tests need not be performed as part of the pre-operational test program, but may be performed at any time prior to the required operability of the Emergency Diesel Generator.

d. Regulatory Position C.2.c.2

Periodic testing of the diesel generator units during normal plant operation to demonstrate full-load-carrying capability will be conducted at a load which exceeds the maximum expected diesel generator load requirements. During this test, loading to the diesel generator is accomplished in accordance with vendor recommendations.

e. Regulatory Position C.2.d

Diesel generators testing frequency is in accordance with the requirements of the technical specifications.

4. The requirements of Regulatory Position c.3.b is satisfied as described below:

Other existing reporting requirements adequately ensure that the NRC learns of significant problems with diesel generator performance. Reporting requirements for EDG failures provided in this section will not be submitted.
(Reference 6.8)

<u>IEEE 387-1977, Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations.</u>

Testability and Maintenance

Circuit design provisions incorporate test capability to periodically monitor the operational capability of the safety-related Class 1E systems during power operation. Initially, all safety-related equipment is tested during the startup testing phase.

Diesel generator sets are tested after final assembly and preliminary startup. Site acceptance tests are given to each diesel generator set to demonstrate its required capabilities.

The following tests are administered to certify the adequacy of the units for the intended service:

a. Starting tests

b. Load acceptance tests

c. Rated load tests

d. Design load tests

e. Load rejection tests

f. Electrical tests

g. Subsystem tests

The objectives and requirements of the preceding tests are established in IEEE 387-1977 [32].

Periodic testing of the diesel generators will be performed as specified in the Technical Specifications to verify their continued capability and availability to perform their design function after commercial operation of the plant. Typical tests consist of availability and operational tests as outlined in IEEE 387-1977.

The CPNPP preventive maintenance program is established to prevent failures. Should failures occur, however, the program will function to identify root cause of any malfunctions and to perform the required repairs or component replacement. On completion of the repairs/maintenance, final equipment check is performed prior to starting of any tests to assure a good start. On satisfactory completion of the post-maintenance testing, control of equipment is transferred to the control room operator. These are accomplished by maintenance department procedure. (Reference 6.9)

4.2 Precedent

None cited.

4.3 No Significant Hazards Consideration Determination

Vistra OpCo has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, “Issuance of amendment,” as discussed below:

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

   Response: No

   The design basis event of a LOCA with a LOOP bounds all other

loss of offsite power events. This design basis event evaluation assumes at least one train of emergency onsite power (DG) and one train of ECCS equipment will be available. The single train of emergency on site power and single train of ECCS equipment are credited in design basis accidents and are, therefore, part of the primary success path for postulated accident mitigation as defined by 10 CFR 50.36(c)(2)(ii), Criterion 3. The proposed change in EDG frequency bands is bounded by the current frequency bands and therefore does affect any safety analysis. The proposed change to TS 3.8.1 surveillance requirements will not impact any previously evaluated design basis accidents. The two editorial changes remove historical information that is no longer required. Their removal will not impact any previously evaluated design basis accidents.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

   Response: No

   This technical specification change provides surveillance requirement acceptance criteria that aligns diesel generator steady state voltage and frequency required to support performance of safety related SSCs. These changes do not impact accident analysis. Since these changes only affect surveillance requirement acceptance criteria and do not affect the function of the emergency diesel generators, it will not be an initiator to a new or different kind of accident from any accident previously evaluated. And as previously stated, the proposed change in EDG frequency bands is bounded by the current frequency bands. The two editorial changes remove historical information that is no longer required. Their removal will not be an initiator to a new or different kind of accident from any accident previously evaluated. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Do the proposed changes involve a significant reduction in a margin of safety?

   Response: No

   This Technical Specification change involves surveillance

requirement acceptance criteria, which does not affect an assumed start signal for design basis events. The two editorial changes remove historical information that is no longer required. Their removal deletes a one time Completion Time that has expired and deletes a surveillance requirement Note that has not been used since CPNPP Unit 2, fifth refueling outage. These changes do not modify any values or limits involved in a safety related function or accident analysis.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above evaluations, Vistra OpCo concludes that the proposed amendment presents no 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.

4.4 Conclusions

The requirements of GDC 17 (Reference 6.3) and 18 (Reference 6.4) continue to be met since no changes are being proposed which would affect the design capability, function, operation, or method of testing the Emergency Diesel Generators. The changes are to some surveillance requirement acceptance criteria and the editorial removal of historical information that is no longer required for Technical Specification 3.8.1, AC Sources – Operating. Therefore, the applicable guidance of Regulatory Guides 1.9, 1.32, 1.93, and 1.108 continue to be met. AC Sources – Operating will continue to meet the requirements of IEEE 327-1977.

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

5.0 ENVIRONMENTAL CONSIDERATIONS

Vistra OpCo has determined that the proposed amendment would change requirements with respect to the installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amount of effluent that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility

criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.

6.0 REFERENCES

6.1 CPNPP FSAR Section 8.3.1, "AC Power Systems"

6.2 CPNPP FSAR Section 15.6.5, "Loss of Coolant Accident Resulting from a Spectrum of Postulated Piping Breaks within the Reactor Coolant Pressure Boundary"

6.3 General Design Criteria (GDC) of 10 CFR 50 Appendix A, GDC 17 "Electric Power Systems”

6.4 General Design Criteria (GDC) of 10 CFR 50 Appendix A, GDC 18 “Inspection and Testing of Electric Power Systems”

6.5 Regulatory Guide 1.9, Selection of Diesel Generator Set Capacity for Standby Power Supplies (3/10/71)

6.6 Regulatory Guide 1.32, Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants (Revision 2, 2/77)

6.7 Regulatory Guide 1.93, Availability of Electric Power Sources (12/74)

6.8 Regulatory Guide 1.108, Periodic Testing of Diesel Generator Units used as Onsite Electric Power Systems at Nuclear Power Plants (Revision 1, August 1977)

6.9 IEEE 387-1977, Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations.

6.10 ER-ME-109 Rev 1, Evaluation of Safety-Related Pump Degradation Issues

Attachment 1 to TXX-19064

CPNPP Technical Specification 3.8.1, AC Sources -- Operating Technical Specification and Bases Pages

1.	Current Technical Specification	Page 3.8-1 through 3.8-16
2.	Markup of Technical Specification	Page 3.8-1 through 3.8-16
3.	Retype of Technical Specification	Page 3.8-1 through 3.8-16
4.	Current Technical Specification Bases (For Information Only)	Pages B 3.8-1 through B 3.8-29
5.	Markup of Technical Specification Bases (For Information Only)	Pages B 3.8-1 through B 3.8-29
6.	Retype of Technical Specification Bases (For Information Only)	Pages B 3.8-1 through B 3.8-30

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources -- Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System;

b. Two diesel generators (DGs) capable of supplying the onsite Class 1E power distribution subsystem(s); and

c. Automatic load sequencers for Train A and Train B.

APPLICABILITY: MODES 1, 2, 3, and 4

----------NOTE----------
One DG may be synchronized with the offsite power source under administrative controls for the purpose of surveillance testing.

ACTIONS

----------NOTE----------
LCO 3.0.4.b is not applicable to DGs.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable.	A.1 Perform SR 3.8.1.1 for required OPERABLE offsite circuit.	1 hour AND Once per 8 hours thereafter
	AND	
	A.2 ----------NOTE---------- In MODES 1, 2 and 3, the TDAFW pump is considered a required redundant feature. ---------- Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
	AND	
	A.3 Restore required offsite circuit to OPERABLE status.	72 hours OR 14 days for a one-time outage on XST1 to complete a plant modification to be completed by March 31, 2017.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One DG inoperable.	B.1 Perform SR 3.8.1.1 for the required offsite circuit(s).	1 hour AND Once per 8 hours thereafter
	AND	
	B.2 ----------NOTE---------- In MODES 1, 2 and 3, the TDAFW pump is considered a required redundant feature. ---------- Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	AND	
	B.3.1 Determine OPERABLE DG(s) is not inoperable due to common cause failure. OR	24 hours
	B.3.2 ----------NOTE---------- The SR need not be performed if the DG is already operating and loaded. ---------- Perform SR 3.8.1.2 for OPERABLE DG(s).	24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	AND B.4 Restore DG to OPERABLE status.	72 hours
C. Two required offsite circuits inoperable.	C.1 ----------NOTE---------- In MODES 1, 2 and 3, the TDAFW pump is considered a required redundant feature. ---------- Declare required feature(s) inoperable when its redundant required feature(s) is inoperable.	12 hours from discovery of Condition C concurrent with inoperability of redundant required features
	AND C.2 Restore one required offsite circuit to OPERABLE status.	24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One required offsite circuit inoperable. AND One DG inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating," when Condition D is entered with no AC power source to any train. ---------- D.1 Restore required offsite circuit to OPERABLE status. OR D.2 Restore DG to OPERABLE status.	 12 hours 12 hours
E. Two DGs inoperable.	E.1 Restore one DG to OPERABLE status.	2 hours
F. One SI sequencer inoperable.	F.1 ----------NOTE---------- One required SI sequencer channel may be bypassed for up to 4 hours for surveillance testing provided the other channel is operable. ---------- Restore SI sequencer to OPERABLE status.	 24 hours
G. Required Action and associated Completion Time of Condition A, B, C, D, E, or F not met.	G.1 Be in MODE 3. AND G.2 Be in MODE 5.	6 hours 36 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. Three or more required AC sources inoperable.	H.1 Enter LCO 3.0.3.	Immediately
I. One Blackout Sequencer inoperable	I.1 Declare associated DG inoperable	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each required offsite circuit.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.2	----------NOTES---------- 1. Performance of SR 3.8.1.7 satisfies this SR. 2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading. 3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.7 must be met. ---------- Verify each DG starts from standby conditions and achieves steady state voltage $\geq$ 6480 V and $\leq$ 7150 V, and frequency $\geq$ 58.8 Hz and $\leq$ 61.2 Hz.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.3	----------NOTES---------- 1. DG loadings may include gradual loading as recommended by the manufacturer. 2. Momentary transients outside the load range do not invalidate this test. 3. This Surveillance shall be conducted on only one DG at a time. 4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.7. ---------- Verify each DG is synchronized and loaded and operates for ≥ 60 minutes at a load ≥ 6300 kW and ≤ 7000 kW.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.4	Verify each day tank contains ≥ 1440 gal of fuel oil.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.5	Check for and remove accumulated water from each day tank.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.6	Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank to the day tank.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.7	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts from standby condition and achieves: a. in ≤ 10 seconds, voltage ≥ 6480 V and frequency ≥ 58.8 Hz; and b. steady state, voltage ≥ 6480 V and ≤ 7150 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.8	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify automatic and manual transfer of AC power sources from the normal offsite circuit to each alternate required offsite circuit.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.9	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and: a. Following load rejection, the frequency is ≤ 66.75 Hz; and b. Within 3 seconds following load rejection, the voltage is ≥ 6480 V and ≤ 7150 V.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.10	Verify each DG does not trip and voltage is maintained ≤ 8280 V during and following a load rejection of ≥ 6300 kW and ≤ 7000 kW.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.11	----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ----------	
	Verify on an actual or simulated loss of offsite power signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤10 seconds, 2. energizes auto-connected shutdown loads through automatic load sequencer, 3. maintains steady state voltage ≥ 6480 V and ≤ 7150 V, 4. maintains steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and 5. supplies permanently connected and auto-connected shutdown loads for ≥ 5 minutes.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.12	----------NOTE---------- All DG starts may be preceded by prelube period. ---------- Verify on an actual or simulated Safety Injection (SI) actuation signal each DG auto-starts from standby condition and; a. in ≤ 10 seconds after auto-start and during tests, achieves voltage ≥ 6480 V and frequency ≥ 58.8 Hz; b. Achieves steady state voltage ≥ 6480 V and ≤ 7150 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz; c. Operates for ≥ 5 minutes.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.13	----------NOTE---------- For Unit 2, testing need only be performed for LOOP concurrent with SI until startup following 2RFO5. ---------- Verify each DG's automatic trips are bypassed on actual or simulated (i) loss of voltage signal on the emergency bus, and (ii) SI actuation signal, except: a. Engine overspeed; and b. Generator differential current.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.14	----------NOTE---------- Momentary transients outside the load and power factor ranges do not invalidate this test. ---------- Verify each DG operates for ≥ 24 hours: a. For ≥ 2 hours loaded ≥ 6900 kW and ≤ 7700 kW; and b. For the remaining hours of the test loaded ≥ 6300 kW and ≤ 7000 kW.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.15	----------NOTES---------- 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ 2 hours loaded ≥ 6300 kW and ≤ 7000 kW. Momentary transients outside of load range do not invalidate this test. 2. All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts and achieves: a. in ≤ 10 seconds, voltage ≥ 6480 V and frequency ≥ 58.8 Hz; and b. steady state, voltage ≥ 6480 V and ≤ 7150 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.16	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify each DG: a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power; b. Transfers loads to offsite power source; and c. Returns to ready-to-load operation.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.17	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify, with a DG operating in test mode and connected to its bus, an actual or simulated SI actuation signal overrides the test mode by: a. Returning DG to ready-to-load operation; and b. Automatically energizing the emergency load from offsite power.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.18	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify interval between each sequenced load block is within ± 10% of design interval for each automatic load sequencer.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.19	----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ----------	
	Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated SI actuation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected emergency loads through load sequencer, 3. achieves steady state voltage ≥ 6480 V and ≤ 7150 V, 4. achieves steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.20	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify when started simultaneously from standby condition, each DG achieves: a. in ≤ 10 seconds, voltage ≥ 6480 V and frequency ≥ 58.8 Hz, and b. steady state, voltage ≥ 6480 V, and ≤ 7150 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.21	Calibrate BO sequencers.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.22	----------NOTES---------- 1. Verification of setpoint is not required. 2. Actuation of final devices is not included. ---------- Perform TADOT for SI and BO sequencers.	In accordance with the Surveillance Frequency Control Program.

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources -- Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System;

b. Two diesel generators (DGs) capable of supplying the onsite Class 1E power distribution subsystem(s); and

c. Automatic load sequencers for Train A and Train B.

APPLICABILITY: MODES 1, 2, 3, and 4

----------NOTE----------
One DG may be synchronized with the offsite power source under administrative controls for the purpose of surveillance testing.

ACTIONS

----------NOTE----------
LCO 3.0.4.b is not applicable to DGs.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable.	A.1 Perform SR 3.8.1.1 for required OPERABLE offsite circuit.	1 hour AND Once per 8 hours thereafter
	AND	
	A.2 ----------NOTE---------- In MODES 1, 2 and 3, the TDAFW pump is considered a required redundant feature. --- Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
	AND	
	A.3 Restore required offsite circuit to OPERABLE status.	72 hours ~~OR~~ ~~14 days for a one-time outage on XST1 to complete a plant modification to be completed by March 31, 2017.~~

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One DG inoperable.	B.1 Perform SR 3.8.1.1 for the required offsite circuit(s).	1 hour AND Once per 8 hours thereafter
	AND	
	B.2 ----------NOTE---------- In MODES 1, 2 and 3, the TDAFW pump is considered a required redundant feature. ---------- Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	AND	
	B.3.1 Determine OPERABLE DG(s) is not inoperable due to common cause failure. OR	24 hours
	B.3.2 ----------NOTE---------- The SR need not be performed if the DG is already operating and loaded. ---------- Perform SR 3.8.1.2 for OPERABLE DG(s).	24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	AND B.4 Restore DG to OPERABLE status.	72 hours
C. Two required offsite circuits inoperable.	C.1 ----------NOTE---------- In MODES 1, 2 and 3, the TDAFW pump is considered a required redundant feature. ---------- Declare required feature(s) inoperable when its redundant required feature(s) is inoperable.	12 hours from discovery of Condition C concurrent with inoperability of redundant required features
	AND C.2 Restore one required offsite circuit to OPERABLE status.	24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One required offsite circuit inoperable. AND One DG inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating," when Condition D is entered with no AC power source to any train. ---------- D.1 Restore required offsite circuit to OPERABLE status. OR D.2 Restore DG to OPERABLE status.	 12 hours 12 hours
E. Two DGs inoperable.	E.1 Restore one DG to OPERABLE status.	2 hours
F. One SI sequencer inoperable.	F.1 ----------NOTE---------- One required SI sequencer channel may be bypassed for up to 4 hours for surveillance testing provided the other channel is operable. ---------- Restore SI sequencer to OPERABLE status.	 24 hours
G. Required Action and associated Completion Time of Condition A, B, C, D, E, or F not met.	G.1 Be in MODE 3. AND G.2 Be in MODE 5.	6 hours 36 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. Three or more required AC sources inoperable.	H.1 Enter LCO 3.0.3.	Immediately
I. One Blackout Sequencer inoperable	I.1 Declare associated DG inoperable	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each required offsite circuit.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.2	----------NOTES---------- 1. Performance of SR 3.8.1.7 satisfies this SR. 2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading. 3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.7 must be met. ---------- Verify each DG starts from standby conditions and achieves steady state voltage ≥ 6480 V and ≤ 7150 V, and frequency ≥ ~~58.8~~ 59.9 Hz and ≤ ~~61.2~~ 60.1 Hz.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.3	----------NOTES---------- 1. DG loadings may include gradual loading as recommended by the manufacturer. 2. Momentary transients outside the load range do not invalidate this test. 3. This Surveillance shall be conducted on only one DG at a time. 4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.7. ---------- Verify each DG is synchronized and loaded and operates for ≥ 60 minutes at a load ≥ 6300 kW and ≤ 7000 kW.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.4	Verify each day tank contains ≥ 1440 gal of fuel oil.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.5	Check for and remove accumulated water from each day tank.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.6	Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank to the day tank.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.7	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts from standby condition and achieves: a. in ≤ 10 seconds, voltage ≥ 6480 V and frequency ≥ 58.8 Hz; and b. steady state, voltage ≥ 6480 V and ≤ 7150 V, and frequency ≥ ~~58.8~~ 59.9 Hz and ≤ ~~61.2~~ 60.1 Hz.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.8	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify automatic and manual transfer of AC power sources from the normal offsite circuit to each alternate required offsite circuit.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.9	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and: a. Following load rejection, the frequency is ≤ 66.75 Hz; and b. Within 3 seconds following load rejection, the voltage is ≥ 6480 V and ≤ 7150 V.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.10	Verify each DG does not trip and voltage is maintained ≤ 8280 V during and following a load rejection of ≥ 6300 kW and ≤ 7000 kW.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.11	----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify on an actual or simulated loss of offsite power signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤10 seconds, 2. energizes auto-connected shutdown loads through automatic load sequencer, 3. maintains steady state voltage ≥ 6480 V and ≤ 7150 V, 4. maintains steady state frequency ≥ ~~58.8~~ 59.9 Hz and ≤ ~~61.2~~ 60.1 Hz, and 5. supplies permanently connected and auto-connected shutdown loads for ≥ 5 minutes.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.12	----------NOTE---------- All DG starts may be preceded by prelube period. ---------- Verify on an actual or simulated Safety Injection (SI) actuation signal each DG auto-starts from standby condition and; a. in ≤ 10 seconds after auto-start and during tests, achieves voltage ≥ 6480 V and frequency ≥ 58.8 Hz; b. Achieves steady state voltage ≥ 6480 V and ≤ 7150 V and frequency ≥ ~~58.8~~ 59.9 Hz and ≤ ~~61.2~~ 60.1 Hz; c. Operates for ≥ 5 minutes.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.13	~~----------NOTE----------~~ ~~For Unit 2, testing need only be performed for LOOP concurrent with SI until startup following 2RFO5.~~ ~~----------~~ Verify each DG's automatic trips are bypassed on actual or simulated (i) loss of voltage signal on the emergency bus, and (ii) SI actuation signal, except: a. Engine overspeed; and b. Generator differential current.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.14	----------NOTE---------- Momentary transients outside the load and power factor ranges do not invalidate this test. ---------- Verify each DG operates for ≥ 24 hours: a. For ≥ 2 hours loaded ≥ 6900 kW and ≤ 7700 kW; and b. For the remaining hours of the test loaded ≥ 6300 kW and ≤ 7000 kW.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.15	----------NOTES---------- 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ 2 hours loaded ≥ 6300 kW and ≤ 7000 kW. Momentary transients outside of load range do not invalidate this test. 2. All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts and achieves: a. in ≤ 10 seconds, voltage ≥ 6480 V and frequency ≥ 58.8 Hz; and b. steady state, voltage ≥ 6480 V and ≤ 7150 V and frequency ≥ ~~58.8~~ 59.9 Hz and ≤ ~~61.2~~ 60.1 Hz.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.16	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify each DG: a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power; b. Transfers loads to offsite power source; and c. Returns to ready-to-load operation.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.17	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify, with a DG operating in test mode and connected to its bus, an actual or simulated SI actuation signal overrides the test mode by: a. Returning DG to ready-to-load operation; and b. Automatically energizing the emergency load from offsite power.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.18	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify interval between each sequenced load block is within ± 10% of design interval for each automatic load sequencer.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.19	----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ----------	
	Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated SI actuation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected emergency loads through load sequencer, 3. achieves steady state voltage ≥ 6480 V and ≤ 7150 V, 4. achieves steady state frequency ≥ ~~58.8~~ 59.9 Hz and ≤ ~~61.2~~ 60.1 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.20	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify when started simultaneously from standby condition, each DG achieves: a. in ≤ 10 seconds, voltage ≥ 6480 V and frequency ≥ 58.8 Hz, and b. steady state, voltage ≥ 6480 V, and ≤ 7150 V and frequency ≥ ~~58.8~~ 59.9 Hz and ≤ ~~61.2~~ 60.1 Hz.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.21	Calibrate BO sequencers.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.22	----------NOTES---------- 1. Verification of setpoint is not required. 2. Actuation of final devices is not included. ---------- Perform TADOT for SI and BO sequencers.	In accordance with the Surveillance Frequency Control Program.

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources -- Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System;

b. Two diesel generators (DGs) capable of supplying the onsite Class 1E power distribution subsystem(s); and

c. Automatic load sequencers for Train A and Train B.

APPLICABILITY: MODES 1, 2, 3, and 4

----------NOTE----------
One DG may be synchronized with the offsite power source under administrative controls for the purpose of surveillance testing.

ACTIONS

----------NOTE----------
LCO 3.0.4.b is not applicable to DGs.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable.	A.1 Perform SR 3.8.1.1 for required OPERABLE offsite circuit.	1 hour AND Once per 8 hours thereafter
	AND	
	A.2 ----------NOTE---------- In MODES 1, 2 and 3, the TDAFW pump is considered a required redundant feature. ---------- Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
	AND	
	A.3 Restore required offsite circuit to OPERABLE status.	72 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One DG inoperable.	B.1 Perform SR 3.8.1.1 for the required offsite circuit(s).	1 hour AND Once per 8 hours thereafter
	AND	
	B.2 ----------NOTE---------- In MODES 1, 2 and 3, the TDAFW pump is considered a required redundant feature. ---------- Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	AND	
	B.3.1 Determine OPERABLE DG(s) is not inoperable due to common cause failure. OR	24 hours
	B.3.2 ----------NOTE---------- The SR need not be performed if the DG is already operating and loaded. ---------- Perform SR 3.8.1.2 for OPERABLE DG(s).	24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	AND B.4 Restore DG to OPERABLE status.	72 hours
C. Two required offsite circuits inoperable.	C.1 ----------NOTE---------- In MODES 1, 2 and 3, the TDAFW pump is considered a required redundant feature. ---------- Declare required feature(s) inoperable when its redundant required feature(s) is inoperable. AND C.2 Restore one required offsite circuit to OPERABLE status.	12 hours from discovery of Condition C concurrent with inoperability of redundant required features 24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One required offsite circuit inoperable. AND One DG inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating," when Condition D is entered with no AC power source to any train. ---------- D.1 Restore required offsite circuit to OPERABLE status. OR D.2 Restore DG to OPERABLE status.	 12 hours 12 hours
E. Two DGs inoperable.	E.1 Restore one DG to OPERABLE status.	2 hours
F. One SI sequencer inoperable.	F.1 ----------NOTE---------- One required SI sequencer channel may be bypassed for up to 4 hours for surveillance testing provided the other channel is operable. ---------- Restore SI sequencer to OPERABLE status.	 24 hours
G. Required Action and associated Completion Time of Condition A, B, C, D, E, or F not met.	G.1 Be in MODE 3. AND G.2 Be in MODE 5.	6 hours 36 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. Three or more required AC sources inoperable.	H.1 Enter LCO 3.0.3.	Immediately
I. One Blackout Sequencer inoperable	I.1 Declare associated DG inoperable	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each required offsite circuit.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.2	----------NOTES---------- 1. Performance of SR 3.8.1.7 satisfies this SR. 2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading. 3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.7 must be met. ---------- Verify each DG starts from standby conditions and achieves steady state voltage $\geq$ 6480 V and $\leq$ 7150 V, and frequency $\geq$ 59.9 Hz and $\leq$ 60.1 Hz.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.3	----------NOTES---------- 1. DG loadings may include gradual loading as recommended by the manufacturer. 2. Momentary transients outside the load range do not invalidate this test. 3. This Surveillance shall be conducted on only one DG at a time. 4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.7. ----------	
	Verify each DG is synchronized and loaded and operates for ≥ 60 minutes at a load ≥ 6300 kW and ≤ 7000 kW.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.4	Verify each day tank contains ≥ 1440 gal of fuel oil.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.5	Check for and remove accumulated water from each day tank.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.6	Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank to the day tank.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.7	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts from standby condition and achieves: a. in ≤ 10 seconds, voltage ≥ 6480 V and frequency ≥ 58.8 Hz; and b. steady state, voltage ≥ 6480 V and ≤ 7150 V, and frequency ≥ 59.9 Hz and ≤ 60.1 Hz.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.8	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify automatic and manual transfer of AC power sources from the normal offsite circuit to each alternate required offsite circuit.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.9	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and: a. Following load rejection, the frequency is ≤ 66.75 Hz; and b. Within 3 seconds following load rejection, the voltage is ≥ 6480 V and ≤ 7150 V.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.10	Verify each DG does not trip and voltage is maintained ≤ 8280 V during and following a load rejection of ≥ 6300 kW and ≤ 7000 kW.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.11	----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ----------	
	Verify on an actual or simulated loss of offsite power signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤10 seconds, 2. energizes auto-connected shutdown loads through automatic load sequencer, 3. maintains steady state voltage ≥ 6480 V and ≤ 7150 V, 4. maintains steady state frequency ≥ 59.9 Hz and ≤ 60.1 Hz, and 5. supplies permanently connected and auto-connected shutdown loads for ≥ 5 minutes.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.12	----------NOTE---------- All DG starts may be preceded by prelube period. ---------- Verify on an actual or simulated Safety Injection (SI) actuation signal each DG auto-starts from standby condition and; a. in ≤ 10 seconds after auto-start and during tests, achieves voltage ≥ 6480 V and frequency ≥ 58.8 Hz; b. Achieves steady state voltage ≥ 6480 V and ≤ 7150 V and frequency ≥ 59.9 Hz and ≤ 60.1 Hz; c. Operates for ≥ 5 minutes.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.13	Verify each DG's automatic trips are bypassed on actual or simulated (i) loss of voltage signal on the emergency bus, and (ii) SI actuation signal, except: a. Engine overspeed; and b. Generator differential current.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.14	----------NOTE---------- Momentary transients outside the load and power factor ranges do not invalidate this test. ---------- Verify each DG operates for ≥ 24 hours: a. For ≥ 2 hours loaded ≥ 6900 kW and ≤ 7700 kW; and b. For the remaining hours of the test loaded ≥ 6300 kW and ≤ 7000 kW.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.15	----------NOTES---------- 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ 2 hours loaded ≥ 6300 kW and ≤ 7000 kW. Momentary transients outside of load range do not invalidate this test. 2. All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts and achieves: a. in ≤ 10 seconds, voltage ≥ 6480 V and frequency ≥ 58.8 Hz; and b. steady state, voltage ≥ 6480 V and ≤ 7150 V and frequency ≥ 59.9 Hz and ≤ 60.1 Hz.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.16	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify each DG: a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power; b. Transfers loads to offsite power source; and c. Returns to ready-to-load operation.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.17	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify, with a DG operating in test mode and connected to its bus, an actual or simulated SI actuation signal overrides the test mode by: a. Returning DG to ready-to-load operation; and b. Automatically energizing the emergency load from offsite power.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.18	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, this Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify interval between each sequenced load block is within ± 10% of design interval for each automatic load sequencer.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.19	----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ----------	
	Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated SI actuation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected emergency loads through load sequencer, 3. achieves steady state voltage ≥ 6480 V and ≤ 7150 V, 4. achieves steady state frequency ≥ 59.9 Hz and ≤ 60.1 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.20	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify when started simultaneously from standby condition, each DG achieves: a. in ≤ 10 seconds, voltage ≥ 6480 V and frequency ≥ 58.8 Hz, and b. steady state, voltage ≥ 6480 V, and ≤ 7150 V and frequency ≥ 59.9 Hz and ≤ 60.1 Hz.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.21	Calibrate BO sequencers.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.1.22	----------NOTES---------- 1. Verification of setpoint is not required. 2. Actuation of final devices is not included. ---------- Perform TADOT for SI and BO sequencers.	In accordance with the Surveillance Frequency Control Program.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources - Operating

BASES

BACKGROUND

The unit Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power source, and alternate), and the onsite standby emergency power sources (Train A and Train B diesel generators (DGs)). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The onsite Class 1E AC Distribution System is divided into redundant load groups (trains) so that the loss of any one group does not prevent the minimum safety functions from being performed. Each train has connections to two offsite power sources and a dedicated DG.

Offsite power is supplied to the plant switchyards from the transmission network by seven 345 KV and two 138 KV transmission lines. From the switchyards, two electrically and physically separated circuits provide AC power, through step down startup transformers, to the 6.9 kV ESF buses. A detailed description of the offsite power network and the circuits to the Class 1E ESF buses is found in the FSAR, Chapter 8 (Ref. 2).

An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network buses at plant switchyards to the onsite Class 1E ESF buses.

Certain required unit loads are started and/or returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite Class 1E Distribution System. Within 2 minutes after the initiating signal is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service when the bus is energized or by the load sequencer.

The onsite standby power source for each 6.9 kV ESF bus is a dedicated DG. DGs 1EG1, 1EG2, 2EG1 and 2EG2 are dedicated to ESF buses 1EA1, 1EA2, 2EA1 and 2EA2 respectively. The DG starts automatically on a safety injection (SI) signal.

If the Diesel Generator voltage exceeds the minimum or maximum voltage limits for steady state operation, except for allowed transients (less than 3

(continued)

BASES

BACKGROUND (continued)

seconds), the Digital Voltage Regulator will be isolated automatically and excitation will be controlled by the “magnetics.” “Magnetics” will maintain the DG output voltage within the required TS limits. However, the passive voltage control provided by the “magnetics” will not allow adjustment of DG voltage, and the capability to synchronize the Diesel Generator with offsite power, to restore the offsite power to the safety bus, will not exist. The Digital Voltage Regulator can be repaired during DG operation, e.g., while the DG carries the safety bus loads, to restore the DG operability.

On an ESF bus undervoltage signal, the DG start signal is delayed 1 second to allow alternate source breaker closure. If the alternate source is not available the ESF bus undervoltage signal automatically starts the DG, (refer to LCO 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation"). As a result of degraded voltage the preferred source is tripped after a time delay to assure that the bus loads exposure to degraded voltage, in the absence of a Safety Injection Actuation Signal (SIAS) is limited to 60 seconds. In the event of a SIAS, after the confirmation of degraded condition that it is not due to a motor start, the preferred source breaker is tripped instantly. Subsequently, if the alternate source does not alleviate the degraded condition, the alternate source is tripped after a time delay of 1.9 seconds. After the offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage and the DG has started, it will automatically tie to its respective bus, independent of or coincident with an SI signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SI signal alone. Following the trip of offsite power, an undervoltage signal strips nonpermanent loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the available alternate power source. If the alternate source is not available, then the ESF electrical loads are connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA).

Certain required unit loads are started and/or returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Within 2 minutes after the initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service when the bus is energized or by the load sequencer.

(continued)

BASES

BACKGROUND (continued)

Ratings for Train A and Train B DGs satisfy the requirements of Regulatory Guide 1.9; Ref. (3) and IEEE 387 (Ref. 13). The continuous service rating of each DG is 7000 kW with 10% overload permissible for up to 2 hours in any 24 hour period. The ESF loads that are powered from the 6.9 kV ESF buses are listed in Reference 2. The maximum calculated load is less than 6300 kW. This maximum continuous service load is reflected in selected surveillances.

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the FSAR, Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the unit. This results in maintaining at least one train of the onsite AC sources or one of the offsite AC sources OPERABLE during Accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power; and

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10CFR50.36(c)(2)(ii).

LCO

Two qualified circuits between the offsite transmission network buses at the plant switchyards and the onsite Class 1E Electrical Power System and separate and independent DGs for each train ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the unit. In addition, one automatic load sequencer per train must be OPERABLE.

(continued)

BASES

LCO (continued)

Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses.

Offsite circuit #1 is fed from the 138 kV switchyard and offsite circuit # 2 is fed from the 345 kV switchyard. Circuit #1 is the preferred source for Unit 2 and alternate source for Unit 1. Circuit # 2 is the preferred source for Unit 1 and alternate source for Unit 2. Each offsite circuit can supply 6.9 kV Train A and Train B ESF busses for both Unit 1 and Unit 2.

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on receipt of bus undervoltage signal. This will be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot and DG in standby with the engine at ambient conditions. Additional DG capabilities must be demonstrated to meet required Surveillance, e.g., capability of the DG to revert to ready-to-load status on an SI signal while operating in parallel test mode.

The Diesel Generator, when operating on magnetics only, is considered not operable because the passive voltage control provided by the “magnetics” will not allow adjustment of DG voltage, and the capability to synchronize the Diesel Generator with offsite power, to restore the offsite power to the safety bus, will not exist.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

The offsite AC sources must be separate and independent (to the extent possible). For the onsite DGs, separation and independence are complete.

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus, with transfer capability to the other circuit OPERABLE, and not violate separation criteria. A circuit that is not connected to an ESF bus, is required to have an operable transfer mechanism to that bus to support operability of that circuit.

Each circuit of offsite source can feed both trains. Preferred source breakers are normally closed and alternate source breakers are normally open. Each bus has automatic capability to transfer to the alternate source on loss of preferred source.

(continued)

BASES

LCO (continued)

LCO 3.8.1 is modified by a Note stating that one DG may be synchronized with the offsite power source under administrative controls for the purpose of surveillance testing. During such testing, only one of the redundant DGs shall be paralleled at any one time, leaving the other DG available in standby service.

Administrative controls for performing surveillance testing with the DG connected to an offsite circuit ensure or require that:

a. Weather conditions are conductive for performing the SR.

b. The offsite power supply and switchyard conditions are conductive for performing the SR, which includes ensuring that switchyard access is restricted and that no potential impactive activity within the switchyard is performed.

c. No equipment or systems assumed to be available for supporting the performance of the SR are removed from service.

d. Associated risks shall be managed in accordance with the TS 5.5.18, “Configuration Risk Management Program.”

e. All 6.9 kV safeguards buses (both units) are fed from their respective preferred offsite source.

f. 6.9 kV bus voltage for the unit requiring the DG test is $\geq$ 6750 V.

g. Terminate the test if the Reactor trips.

h. Terminate the test if system frequency, bus voltage, or DG load indicate a potential for a degrading grid. Specifically:

   1. Terminate the test if the DG steady state load $\geq$ 7000 kW or a greater limit established for the test.

   2. Terminate the test if the DG requires frequent or continuous adjustment to decrease its load in order to maintain the specified load for the DG test.

   3. Terminate the test if DG kVAR exceed 5000 kVAR.

   4. Terminate the test if bus steady state voltage decreases $\geq$ 200 V from the voltage at the start of the test.

(continued)

BASES

LCO (continued)

5. Terminate the test if bus steady state frequency is $\leq$ 59 Hz.

The Note is consistent with the NRC position provided in Information Notice 84-29, which “prohibits the use of DGs for purposes other than supplying standby power, when needed, and permits interconnection of the onsite and offsite sources only for short periods of time for the purpose of DG load retesting.” Thus, the DG under test need not be considered inoperable strictly due to being paralleled with offsite power during performance of the required testing.

APPLICABILITY

The AC sources and sequencers are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients; and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA. The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources - Shutdown."

ACTIONS

A Note prohibits the application of LCO 3.0.4.b to an inoperable DG. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable DG and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

A.1

To ensure a highly reliable power source remains with one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

(continued)

BASES

ACTIONS (continued)

A.2

Required Action A.2, which only applies if the train cannot be powered from an offsite source, is intended to provide assurance that an event coincident with a single failure of the associated DG will not result in a complete loss of safety function of critical redundant required features. These features are powered from the redundant AC electrical power train. This includes the motor driven auxiliary feedwater pumps and the TDAFW pump which must be available for mitigation of a Feedwater line break. Single train systems, other than the steam driven (turbine driven) auxiliary feedwater pump, are not included.

The Completion Time for Required Action A.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time “clock.” In this required Action, the Completion Time only begins on discovery that both:

a. The train has no offsite power supplying it loads; and

b. A required feature on the other train is inoperable.

If at any time during the existence of Condition A (one offsite circuit inoperable) with a train with no offsite power available, and a redundant required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering no offsite power to one train of the onsite Class 1E Electrical Power Distribution System coincident with one or more inoperable required support or supported features, or both, that are associated with the other train that has offsite power, results in starting the Completion Times for the Required Action.

Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to Train A and Train B of the onsite Class 1E Distribution System. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS (continued)

A.3

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition A for a period that should not exceed 72 hours. With one offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety systems. In this Condition, however, the remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System.

The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

An OR statement for a temporary Completion Time is added to the Completion Time above (72 hours). The one-time, 14-day Completion Time is applicable to XST1 only and expires on March 31, 2017. The 14-day Completion Time applies as part of the plant modification to facilitate connection of either XST1 or XST1A startup transformers to the 1E buses. If during the conduct of the prescribed maintenance outage, should any combination of the remaining OPERABLE AC Sources be determined inoperable, current TS requirements would apply.

B.1

To ensure a highly reliable power source remains with an inoperable DG, it is necessary to verify the availability of the offsite circuits on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met. However, if a circuit fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a DG is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related trains. This includes the motor driven auxiliary feedwater pumps and the TDAFW pump which must be available for mitigation of a Feedwater line break. Single train systems, other than the turbine driven auxiliary feedwater pump, are not included. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable DG.

(continued)

BASES

ACTIONS

B.2 (continued)

The Completion Time for Required Action B.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. An inoperable DG exists; and

b. A required feature on the other train (Train A or Train B) is inoperable.

If at any time during the existence of this Condition (one DG inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering one DG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DG, results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

In this Condition, the remaining OPERABLE DG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

B.3.1 and B.3.2

Required Actions B 3.1 and B 3.2 are only applicable to the affected Unit. Any actions that may apply to an unaffected Unit, or the DGs for the unaffected Unit, would be determined by the Corrective Action Program and the 24 hour COMPLETION TIME for TS 3.8.1, Required Actions B 3.1 and B 3.2 does not apply with respect to the unaffected Unit or its DGs.

Required Action B.3.1 provides an allowance to avoid unnecessary testing of the OPERABLE DG. If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be

(continued)

BASES

ACTIONS

B.3.1 and B.3.2 (continued)

performed. If the cause of inoperability exists on the other DG, the other DG would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered. Once the failure is repaired, the common cause failure no longer exists, and Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining DG, performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the applicable plant procedures will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

According to Generic Letter 84-15 (Ref. 7), 24 hours is reasonable to confirm that the OPERABLE DG is not affected by the same problem as the inoperable DG.

During performance of surveillance activities as a requirement for ACTION statements, the air-roll test shall not be performed.

B.4

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition B for a period that should not exceed 72 hours.

In Condition B, the remaining OPERABLE DG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

C.1 and C.2

Required Action C.1, which applies when two offsite circuits are inoperable, is intended to provide assurance that an event with a coincident single failure will not result in a complete loss of redundant required safety functions. The Completion Time for this failure of redundant required features is reduced to 12 hours from that allowed for one train without offsite power (Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete

(continued)

BASES

ACTIONS

C.1 and C.2 (continued)

safety trains are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are powered from redundant AC safety trains. This includes the motor driven auxiliary feedwater pumps and the TDAFW pump which must be available for mitigation of a Feedwater line break. Single train systems, other than the turbine driven auxiliary feedwater pump, are not included.

The Completion Time for Required Action C.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. All required offsite circuits are inoperable; and

b. A required feature is inoperable.

If at any time during the existence of Condition C (two offsite circuits inoperable) a required feature becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition C for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more DGs inoperable.

However, two factors tend to decrease the severity of this level of degradation:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure; and

b. The time required to detect and restore an unavailable offsite power source is generally much less than that required to detect and restore an unavailable onsite AC source.

(continued)

BASES

ACTIONS

C.1 and C.2 (continued)

With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

According to Reference 6, with the available offsite AC sources, two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with Condition A.

D.1 and D.2

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable. Therefore, the Required Actions of Condition D are modified by a Note to indicate that when Condition D is entered with no AC source to any train, (for CPSES this requires both offsite sources and DG inoperable) the Conditions and Required Actions for LCO 3.8.9, "Distribution Systems - Operating," must be immediately entered. This allows Condition D to provide requirements for the loss of one offsite circuit and one DG, without regard to whether a train is inoperable. LCO 3.8.9 provides the appropriate restrictions for a inoperable train.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition D for a period that should not exceed 12 hours.

In Condition D, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition C (loss of both required offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS (continued)

E.1

With Train A and Train B DGs inoperable, there are no remaining standby AC sources. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. Since the offsite electrical power system is the only source of AC power for this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability, which could result in a total loss of AC power). Since any inadvertent generator trip could also result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to Reference 6, with both DGs inoperable, operation may continue for a period that should not exceed 2 hours.

F.1

The SI sequencer(s) is an essential support system to both the offsite circuit

and the DG associated with a given ESF bus. Furthermore, the sequencer is on the primary success path for most major AC electrically powered safety systems powered from the associated ESF bus. Therefore, loss of an ESF bus sequencer affects every major ESF system in the train. The 24 hour Completion Time provides a period of time to correct the problem commensurate with the importance of maintaining sequencer OPERABILITY. This time period also ensures that the probability of an accident (requiring sequencer OPERABILITY) occurring during periods when the sequencer is inoperable is minimal.

This Required Action is modified by a note. The note allows one sequencer channel to be bypassed for surveillance testing provided the other channel is operable. The 4 hours allows sufficient time to perform the required testing. Based on the low probability of an event requiring the sequencer in combination with a failure to the operable sequencer channel during the 4 hours, this period of inoperability for testing is acceptable.

G.1 and G.2

If the inoperable AC electric power sources cannot be restored to OPERABLE status within the required Completion Time, the unit must be

(continued)

BASES

ACTIONS

G.1 and G.2 (continued)

brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

H.1

Condition H corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

I.1

A Blackout sequencer is an essential support system to the DG associated with a given ESF bus. The sequencer is required to provide the system response to a loss of or degraded ESF bus voltage signal. Therefore, the loss of the Blackout sequencer causes the associated DG to become inoperable immediately.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref. 8). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SR for demonstrating the OPERABILITY of the DGs are consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), and Regulatory Guide 1.137 (Ref. 10).

Where the SR discussed herein specify voltage and frequency tolerances, the following is applicable.

The minimum steady state output voltage of 6480 V allows for voltage drops to motors and other equipment down to the 120 V level to ensure that the loads will not experience voltage less than the minimum rated voltage. The maximum steady state output voltage of 7150 V ensures that, under lightly loaded conditions, motors and other equipment down to the 120 V level will not experience voltages more than the maximum rated voltage. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ± 2% of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that appropriate independence of offsite circuits is maintained. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.2 and SR 3.8.1.7

These SR help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and to maintain the unit in a safe shutdown condition.

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SR are modified by a Note (Note 2 for SR 3.8.1.2) to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period. In addition, for SR 3.8.1.2, following prelube, a warmup period is allowed prior to loading.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.2 and SR 3.8.1.7 (continued)

For the purposes of SR 3.8.1.2 and SR 3.8.1.7 testing, the DGs are started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. For SR 3.8.1.2 and SR 3.8.1.7 testing, the diesel should be started from ambient conditions which means the diesel engine is cold or at a temperature consistent with manufacturer's recommendations.

The DG shall start using one of the following signals: 1) Manual, 2) Simulated or actual safeguards bus undervoltage, 3) Safety Injection simulated or actual signal in conjunction with a simulated or actual loss of offsite power signal, or 4) a Safety Injection simulated or actual signal by itself.

For SR 3.8.1.2, in order to reduce stress and wear on diesel engines, the manufacturer recommends a modified start in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of Note 3.

SR 3.8.1.7 requires that the DG starts from standby conditions, accelerates to 441 RPM, and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the FSAR, Chapter 15 (Ref. 5).

The 10 second start requirement is not applicable to SR 3.8.1.2 (see Note 3) when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.7 applies.

Since SR 3.8.1.7 requires a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This is the intent of Note 1 of SR 3.8.1.2.

In addition to the SR requirements, the time for the DG to reach steady state operation, unless the modified DG start is employed, is periodically monitored and the trend evaluated to identify degradation of governor and voltage regulator performance.

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

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.3

This Surveillance verifies that the DGs are capable of synchronizing with the offsite electrical system and accepting loads greater than or equal to the equivalent of the maximum expected accident loads. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the DG is connected to the offsite source.

Although no power factor requirements are established by this SR, the DG is normally operated at a power factor between 0.8 lagging and 1.0. The 0.8 value is the design rating of the machine, while the 1.0 is an operational limitation to ensure circulating currents are minimized. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

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

This SR is modified by four Notes. Note 1 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 2 states that momentary transients, because of changing bus loads, do not invalidate this test. Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations. Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

SR 3.8.1.4

This SR provides verification that the level of fuel oil in the day tank is at or above the required level. The level is expressed as an equivalent volume in gallons, and is selected to ensure adequate fuel oil for a minimum of 1 hour of DG operation at full load plus 10% (571 gallons) plus 869 gallons which is credited in TS 3.8.3 in meeting the 7 day fuel oil storage requirement.

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

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day tanks eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during the performance of this Surveillance.

SR 3.8.1.6

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

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

SR 3.8.1.7

See SR 3.8.1.2.

SR 3.8.1.8

Transfer of each 6.9 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.8 (continued)

This SR is modified by a Note. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment.

SR 3.8.1.9

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. The single largest motor load on the bus at any given time is the Component Cooling Water pump load which has a name plate rating of 783 KW. This Surveillance may be accomplished by:

a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus; or

b. Tripping its associated single largest post-accident load with the DG solely supplying the bus.

As required by IEEE-308 (Ref. 12), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower.

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.9 (continued)

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The 3 seconds specified is equal to 60% of a typical 5 second load sequence interval associated with sequencing of the largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.9.a corresponds to the maximum frequency excursion, while SR 3.8.1.9.b is a steady state voltage value to which the system must recover following load rejection. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by a Note. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABIITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment.

SR 3.8.1.10

This Surveillance demonstrates the DG capability to reject 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 Surveillance ensures proper engine generator 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 an event and continues to be available, this response ensures that the DG is not degraded for future application,

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.10 (continued)

including reconnection to the bus if the trip initiator can be corrected or isolated.

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

SR 3.8.1.11

As required by Regulatory Guide 1.9 (Ref.3), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all safety functions encountered from the loss of offsite power, including shedding of the nonessential loads, energization of the emergency buses in ≤ 10 seconds after auto-start signal, and energization of the respective loads from the DG. It further demonstrates the capability of the DG to automatically maintain the required steady state voltage and frequency.

The DG autostart time of 10 seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability is achieved.

The requirement to verify the connection and power supply of permanent and autoconnected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, or high pressure injection systems are not capable of being operated at full flow, or residual heat removal (RHR) systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG systems to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean

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SURVEILLANCE REQUIREMENTS

SR 3.8.1.11 (continued)

that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.12

This Surveillance demonstrates that the DG automatically starts, achieves and maintains the required voltage and frequency within the specified time (10 seconds) from the safety injection signal and operates for $\geq$ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability.

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

This SR is modified by a Note. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start.

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.13

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a DG emergency start which occurs from either a loss of voltage or an SI actuation test signal. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

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

SR 3.8.1.14

Regulatory Guide 1.9 (Ref.3), requires demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours, ≥ 2 hours of which is at a load equivalent to approximately 110% of the continuous duty rating and the remainder of the time at a load equivalent to 90% to 100% of the continuous duty rating of the DG. For the purposes of the 2 hour run, the minimum load is approximately 110% of the 6300 kW maximum design load in lieu of the 7000 kW continuous rating. The DG start for this Surveillance can be performed either from ambient or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

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

This Surveillance is modified by a Note 1 which states that momentary transients due to changing bus loads do not invalidate this test.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The 10 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

The generator voltage shall be between 6480 V and 7150 V and frequency shall be 60± 1.2 Hz within 10 seconds after the start signal; the steady state generator voltage and frequency shall be maintained within these limits during this test.

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

SR 3.8.1.16

As required by Regulatory Guide 1.9 (Ref. 3) this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and the DG can be returned to ready to load status when offsite power is restored. It also ensures that the autostart logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready to load status when the DG is at rated speed and voltage, the output breaker is open and can receive an autoclose signal on bus undervoltage, and the load sequence timers are reset.

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

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.1.16 (continued)

reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment.

SR 3.8.1.17

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to ready to load operation if a LOCA actuation signal is received during operation in the test mode. Ready to load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are consistent with IEEE-308 (Ref. 13).

The intent of the requirement to automatically energize the emergency loads with offsite power is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable.

This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns)

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.17 (continued)

provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.18

Under accident and loss of offsite power conditions loads are sequentially connected to the bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The 10% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

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

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced.

This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.1.18 (continued)

to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.19

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the DG operation, as discussed in the Bases for SR 3.8.1.11, during a loss of offsite power actuation test signal in conjunction with an SI actuation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start. The reason for Note 2 is that the performance of the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.1.19 (continued)

against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.20

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed (441 rpm) within the specified time when the DGs are started simultaneously.

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

This SR is modified by a Note. The reason for the Note is to minimize wear on the DG during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start.

SR 3.8.1.21 and SR 3.8.1.22

These SRs ensure the proper functioning of the safety injection and blackout sequencers.

SR 3.8.1.21 applies to the blackout sequencer input undervoltage relays. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.22 applies to the Solid State Safeguards Sequencers (both the Safety Injection Sequencer and the Blackout Sequencer) and is the performance of a TADOT. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by two Notes. The first Note excludes verification of setpoints from the TADOT. The trip setpoints are verified by as part of the ESF Instrumentation. The second Note excludes actuation of final devices. Operation of the sequencer during power operations could disrupt normal operation and induce a plant transient.

(continued)

BASES (continued)

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.

2. FSAR, Chapter 8.

3. Regulatory Guide 1.9 Rev 3, July 1993.

4. FSAR, Chapter 6.

5. FSAR, Chapter 15.

6. Regulatory Guide 1.93, Rev. 0, December 1974.

7. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.

8. 10 CFR 50, Appendix A, GDC 18.

9. Regulatory Guide 1.108, Rev. 1, August 1977.

10. Regulatory Guide 1.137, January 1978.

11. ASME Code for Operation and Maintenance of Nuclear Power Plants.

12. IEEE Standard 308-1974.

13. IEEE Standard 387-1977

14. Generic Letter 94-01, “Removal of Accelerated Testing and Special Reporting Requirements for Emergency Diesel Generators,” May 31, 1994.

15. ANSI C84.1

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources - Operating

BASES

BACKGROUND

The unit Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power source, and alternate), and the onsite standby emergency power sources (Train A and Train B diesel generators (DGs)). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The onsite Class 1E AC Distribution System is divided into redundant load groups (trains) so that the loss of any one group does not prevent the minimum safety functions from being performed. Each train has connections to two offsite power sources and a dedicated DG.

Offsite power is supplied to the plant switchyards from the transmission network by seven 345 KV and two 138 KV transmission lines. From the switchyards, two electrically and physically separated circuits provide AC power, through step down startup transformers, to the 6.9 kV ESF buses. A detailed description of the offsite power network and the circuits to the Class 1E ESF buses is found in the FSAR, Chapter 8 (Ref. 2).

An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network buses at plant switchyards to the onsite Class 1E ESF buses.

Certain required unit loads are started and/or returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite Class 1E Distribution System. Within 2 minutes after the initiating signal is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service when the bus is energized ~~or~~ by the load sequencer.

The onsite standby power source for each 6.9 kV ESF bus is a dedicated DG. DGs 1EG1, 1EG2, 2EG1 and 2EG2 are dedicated to ESF buses 1EA1, 1EA2, 2EA1 and 2EA2 respectively. The DG starts automatically on a safety injection (SI) signal. or associated bus undervoltage.

If the Diesel Generator voltage exceeds the minimum or maximum voltage limits for steady state operation, except for allowed transients (less than 3

(continued)

BASES

BACKGROUND (continued)

seconds), the Digital Voltage Regulator will be isolated automatically and excitation will be controlled by the “magnetics.” “Magnetics” will maintain the DG output voltage within the required TS limits. However, the passive voltage control provided by the “magnetics” will not allow adjustment of DG voltage, and the capability to synchronize the Diesel Generator with offsite power, to restore the offsite power to the safety bus, will not exist. The Digital Voltage Regulator can be repaired during DG operation, e.g., while the DG carries the safety bus loads, to restore the DG operability.

On an ESF bus undervoltage signal, the DG start signal is delayed 1 second to allow alternate source breaker closure. If the alternate source is not available the ESF bus undervoltage signal automatically starts the DG, (refer to LCO 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation"). As a result of degraded voltage the preferred source is tripped after a time delay to assure that the bus loads exposure to degraded voltage, in the absence of a Safety Injection Actuation Signal (SIAS) is limited to 60 seconds. In the event of a SIAS, after the confirmation of degraded condition that it is not due to a motor start, the preferred source breaker is tripped instantly. Subsequently, if the alternate source does not alleviate the degraded condition, the alternate source is tripped after a time delay of 1.9 seconds. After the offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage and the DG has started, it will automatically tie to its respective bus, independent of or coincident with an SI signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SI signal alone. Following the trip of offsite power, an undervoltage signal strips nonpermanent loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the available alternate power source. If the alternate source is not available, then the ESF electrical loads are connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA).

Certain required unit loads are started and/or returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Within 2 minutes after the initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service when the bus is energized or by the load sequencer.

(continued)

BASES

BACKGROUND (continued)

Ratings for Train A and Train B DGs satisfy the requirements of Regulatory Guide 1.9; Ref. (3) and IEEE 387 (Ref. 13). The continuous service rating of each DG is 7000 kW with 10% overload permissible for up to 2 hours in any 24 hour period. The ESF loads that are powered from the 6.9 kV ESF buses are listed in Reference 2. The maximum calculated load is less than 6300 kW. This maximum continuous service load is reflected in selected surveillances.

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the FSAR, Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the unit. This results in maintaining at least one train of the onsite AC sources or one of the offsite AC sources OPERABLE during Accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power; and

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10CFR50.36(c)(2)(ii).

LCO

Two qualified circuits between the offsite transmission network buses at the plant switchyards and the onsite Class 1E Electrical Power System and separate and independent DGs for each train ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the unit. In addition, one automatic load sequencer per train must be OPERABLE.

(continued)

BASES

LCO (continued)

Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses.

Offsite circuit #1 is fed from the 138 kV switchyard and offsite circuit # 2 is fed from the 345 kV switchyard. Circuit #1 is the preferred source for Unit 2 and alternate source for Unit 1. Circuit # 2 is the preferred source for Unit 1 and alternate source for Unit 2. Each offsite circuit can supply 6.9 kV Train A and Train B ESF busses for both Unit 1 and Unit 2.

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on receipt of bus undervoltage signal. This will be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot and DG in standby with the engine at ambient conditions. Additional DG capabilities must be demonstrated to meet required Surveillance, e.g., capability of the DG to revert to ready-to-load status on an SI signal while operating in parallel test mode.

The Diesel Generator, when operating on magnetics only, is considered not operable because the passive voltage control provided by the “magnetics” will not allow adjustment of DG voltage, and the capability to synchronize the Diesel Generator with offsite power, to restore the offsite power to the safety bus, will not exist.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

The offsite AC sources must be separate and independent (to the extent possible). For the onsite DGs, separation and independence are complete.

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to ~~more than~~ one ESF bus, with transfer capability to the other circuit OPERABLE, ~~and~~ not violate separation criteria. A circuit that is not connected to an ESF bus, is required to have an operable transfer mechanism to that bus to support operability of that circuit.

Each circuit of offsite source can feed both trains. Preferred source breakers are normally closed and alternate source breakers are normally open. Each bus has automatic capability to transfer to the alternate source on loss of preferred source.

(continued)

BASES

LCO (continued)

LCO 3.8.1 is modified by a Note stating that one DG may be synchronized with the offsite power source under administrative controls for the purpose of surveillance testing. During such testing, only one of the redundant DGs shall be paralleled at any one time, leaving the other DG available in standby service.

Administrative controls for performing surveillance testing with the DG paralleled ~~connected~~ to an offsite circuit ensure or require that:

a. Weather conditions are conductive for performing the SR.

b. The offsite power supply and switchyard conditions are conductive for performing the SR, which includes ensuring that switchyard access is restricted and that no potential impactive activity within the switchyard is performed.

c. No equipment or systems assumed to be available for supporting the performance of the SR are removed from service.

INSERT A →

d. Associated risks shall be managed in accordance with the TS 5.5.18, “Configuration Risk Management Program.”

e. All 6.9 kV safeguards buses (both units) are fed from their respective preferred offsite source.

f. 6.9 kV bus voltage for the unit requiring the DG test is ≥ 6750 V.

g. Terminate the test if the Reactor trips.

h. Terminate the test if system frequency, bus voltage, or DG load indicate a potential for a degrading grid. Specifically:

1. Terminate the test if the DG steady state load ≥ 7000 kW or a greater limit established for the test.

2. Terminate the test if the DG requires frequent or continuous adjustment to decrease its load in order to maintain the specified load for the DG test.

3. Terminate the test if DG kVAR exceed 5000 kVAR.

4. Terminate the test if bus steady state voltage decreases ≥ 200 V from the voltage at the start of the test.

(continued)

BASES

LCO (continued)

~~5. Terminate the test if bus steady state frequency is < 59 Hz.~~

The Note is consistent with the NRC position provided in Information Notice 84-29, which "prohibits the use of DGs for purposes other than supplying standby power, when needed, and permits interconnection of the onsite and offsite sources only for short periods of time for the purpose of DG load retesting." Thus, the DG under test need not be considered inoperable strictly due to being paralleled with offsite power during performance of the required testing.

APPLICABILITY

The AC sources and sequencers are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients; and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA. The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources - Shutdown."

ACTIONS

A Note prohibits the application of LCO 3.0.4.b to an inoperable DG. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable DG and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

A.1

To ensure a highly reliable power source remains with one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

(continued)

BASES

ACTIONS (continued)

A.2

Required Action A.2, which only applies if the train cannot be powered from an offsite source, is intended to provide assurance that an event coincident with a single failure of the associated DG will not result in a complete loss of safety function of critical redundant required features. These features are powered from the redundant AC electrical power train. This includes the motor driven auxiliary feedwater pumps and the TDAFW pump which must be available for mitigation of a Feedwater line break. Single train systems, other than the steam driven (turbine driven) auxiliary feedwater pump, are not included.

The Completion Time for Required Action A.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time “clock.” In this required Action, the Completion Time only begins on discovery that both:

a. The train has no offsite power supplying it loads; and

b. A required feature on the other train is inoperable.

If at any time during the existence of Condition A (one offsite circuit inoperable) with a train with no offsite power available, and a redundant required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering no offsite power to one train of the onsite Class 1E Electrical Power Distribution System coincident with one or more inoperable required support or supported features, or both, that are associated with the other train that has offsite power, results in starting the Completion Times for the Required Action.

Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to Train A and Train B of the onsite Class 1E Distribution System. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS (continued)

A.3

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition A for a period that should not exceed 72 hours. With one offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety systems. In this Condition, however, the remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System.

The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

An OR statement for a temporary Completion Time is added to the Completion Time above (72 hours). The one-time, 14-day Completion Time is applicable to XST1 only and expires on March 31, 2017. The 14-day Completion Time applies as part of the plant modification to facilitate connection of either XST1 or XST1A startup transformers to the 1E buses. If during the conduct of the prescribed maintenance outage, should any combination of the remaining OPERABLE AC Sources be determined inoperable, current TS requirements would apply.

B.1

To ensure a highly reliable power source remains with an inoperable DG, it is necessary to verify the availability of the offsite circuits on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met. However, if a circuit fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a DG is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related trains. This includes the motor driven auxiliary feedwater pumps and the TDAFW pump which must be available for mitigation of a Feedwater line break. Single train systems, other than the turbine driven auxiliary feedwater pump, are not included. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable DG.

(continued)

BASES

ACTIONS

B.2 (continued)

The Completion Time for Required Action B.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. An inoperable DG exists; and

b. A required feature on the other train (Train A or Train B) is inoperable.

If at any time during the existence of this Condition (one DG inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering one DG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DG, results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

In this Condition, the remaining OPERABLE DG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

B.3.1 and B.3.2

Required Actions B 3.1 and B 3.2 are only applicable to the affected Unit. Any actions that may apply to an unaffected Unit, or the DGs for the unaffected Unit, would be determined by the Corrective Action Program and the 24 hour COMPLETION TIME for TS 3.8.1, Required Actions B 3.1 and B 3.2 does not apply with respect to the unaffected Unit or its DGs.

Required Action B.3.1 provides an allowance to avoid unnecessary testing of the OPERABLE DG. If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be

(continued)

BASES

ACTIONS

B.3.1 and B.3.2 (continued)

performed. If the cause of inoperability exists on the other DG, the other DG would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered. Once the failure is repaired, the common cause failure no longer exists, and Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining DG, performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the applicable plant procedures will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

According to Generic Letter 84-15 (Ref. 7), 24 hours is reasonable to confirm that the OPERABLE DG is not affected by the same problem as the inoperable DG.

During performance of surveillance activities as a requirement for ACTION statements, the air-roll test shall not be performed.

B.4

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition B for a period that should not exceed 72 hours.

In Condition B, the remaining OPERABLE DG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

C.1 and C.2

Required Action C.1, which applies when two offsite circuits are inoperable, is intended to provide assurance that an event with a coincident single failure will not result in a complete loss of redundant required safety functions. The Completion Time for this failure of redundant required features is reduced to 12 hours from that allowed for one train without offsite power (Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete

(continued)

BASES

ACTIONS

C.1 and C.2 (continued)

safety trains are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are powered from redundant AC safety trains. This includes the motor driven auxiliary feedwater pumps and the TDAFW pump which must be available for mitigation of a Feedwater line break. Single train systems, other than the turbine driven auxiliary feedwater pump, are not included.

The Completion Time for Required Action C.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. All required offsite circuits are inoperable; and

b. A required feature is inoperable.

If at any time during the existence of Condition C (two offsite circuits inoperable) a required feature becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition C for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more DGs inoperable.

However, two factors tend to decrease the severity of this level of degradation:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure; and

b. The time required to detect and restore an unavailable offsite power source is generally much less than that required to detect and restore an unavailable onsite AC source.

(continued)

BASES

ACTIONS

C.1 and C.2 (continued)

With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

According to Reference 6, with the available offsite AC sources, two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with Condition A.

D.1 and D.2

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable. Therefore, the Required Actions of Condition D are modified by a Note to indicate that when_ Condition D is entered with no AC source to any train, (for CPSES this requires both offsite sources and DG inoperable) the Conditions and Required Actions for LCO 3.8.9, "Distribution Systems - Operating," must be immediately entered. This allows Condition D to provide requirements for the loss of one offsite circuit and one DG, without regard to whether a train is inoperable. LCO 3.8.9 provides the appropriate restrictions for a inoperable train.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition D for a period that should not exceed 12 hours.

In Condition D, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition C (loss of both required offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS (continued)

E.1

With Train A and Train B DGs inoperable, there are no remaining standby AC sources. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. Since the offsite electrical power system is the only source of AC power for this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability, which could result in a total loss of AC power). Since any inadvertent generator trip could also result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to Reference 6, with both DGs inoperable, operation may continue for a period that should not exceed 2 hours.

F.1

The SI sequencer(s) is an essential support system to both the offsite circuit and the DG associated with a given ESF bus. Furthermore, the sequencer is on the primary success path for most major AC electrically powered safety systems powered from the associated ESF bus. Therefore, loss of an ESF bus sequencer affects every major ESF system in the train. The 24 hour Completion Time provides a period of time to correct the problem commensurate with the importance of maintaining sequencer OPERABILITY. This time period also ensures that the probability of an accident (requiring sequencer OPERABILITY) occurring during periods when the sequencer is inoperable is minimal.

This Required Action is modified by a note. The note allows one sequencer channel to be bypassed for surveillance testing provided the other channel is operable. The 4 hours allows sufficient time to perform the required testing. Based on the low probability of an event requiring the sequencer in combination with a failure to the operable sequencer channel during the 4 hours, this period of inoperability for testing is acceptable.

G.1 and G.2

If the inoperable AC electric power sources cannot be restored to OPERABLE status within the required Completion Time, the unit must be

(continued)

BASES

ACTIONS

G.1 and G.2 (continued)

brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

H.1

Condition H corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

I.1

A Blackout sequencer is an essential support system to the DG associated with a given ESF bus. The sequencer is required to provide the system response to a loss of or degraded ESF bus voltage signal. Therefore, the loss of the Blackout sequencer causes the associated DG to become inoperable immediately.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref. 8). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SR for demonstrating the OPERABILITY of the DGs are consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), and Regulatory Guide 1.137 (Ref. 10).

Where the SR discussed herein specify voltage and frequency tolerances, the following is applicable.

These voltages ensure Distribution System OPERABILITY per LCO 3.8.9 AND LCO 3.8.10.

The minimum steady state output voltage of 6480 V allows for voltage drops to motors and other equipment down to the 120 V level to ensure that the loads will not experience voltage less than the minimum rated voltage. The maximum steady state output voltage of 7150 V ensures that, under lightly loaded conditions, motors and other equipment down to the 120 V level will not experience voltages more than the maximum rated voltage. The 59.9 specified minimum and maximum frequencies of the DG are ~~58.8~~ Hz and 0.1 Hz 60.1 ~~61.2~~ Hz, respectively. These values are equal to ± ~~2%~~ of the 60 Hz nominal frequency and are ~~derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3)~~. based on DG control system capabilities.

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that appropriate independence of offsite circuits is maintained. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.2 and SR 3.8.1.7

These SR help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and to maintain the unit in a safe shutdown condition.

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SR are modified by a Note (Note 2 for SR 3.8.1.2) to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period. In addition, for SR 3.8.1.2, following prelube, a warmup period is allowed prior to loading.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.2 and SR 3.8.1.7 (continued)

For the purposes of SR 3.8.1.2 and SR 3.8.1.7 testing, the DGs are started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. For SR 3.8.1.2 and SR 3.8.1.7 testing, the diesel should be started from ambient conditions which means the diesel engine is cold or at a temperature consistent with manufacturer's recommendations.

The DG shall start using one of the following signals: 1) Manual, 2) Simulated or actual safeguards bus undervoltage, 3) Safety Injection simulated or actual signal in conjunction with a simulated or actual loss of offsite power signal, or 4) a Safety Injection simulated or actual signal by itself.

For SR 3.8.1.2, in order to reduce stress and wear on diesel engines, the manufacturer recommends a modified start in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of Note 3.

SR 3.8.1.7 requires that the DG starts from standby conditions, accelerates to 441 RPM, and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the FSAR, Chapter 15 (Ref. 5).

The 10 second start requirement is not applicable to SR 3.8.1.2 (see Note 3) when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.7 applies.

Since SR 3.8.1.7 requires a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This is the intent of Note 1 of SR 3.8.1.2.

In addition to the SR requirements, the time for the DG to reach steady state operation, unless the modified DG start is employed, is periodically monitored and the trend evaluated to identify degradation of governor and voltage regulator performance.

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

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.3

This Surveillance verifies that the DGs are capable of synchronizing with the offsite electrical system and accepting loads greater than or equal to the equivalent of the maximum expected accident loads. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the DG is connected to the offsite source.

Although no power factor requirements are established by this SR, the DG is normally operated at a power factor between 0.8 lagging and 1.0. The 0.8 value is the design rating of the machine, while the 1.0 is an operational limitation to ensure circulating currents are minimized. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

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

This SR is modified by four Notes. Note 1 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 2 states that momentary transients, because of changing bus loads, do not invalidate this test. Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations. Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

SR 3.8.1.4

This SR provides verification that the level of fuel oil in the day tank is at or above the required level. The level is expressed as an equivalent volume in gallons, and is selected to ensure adequate fuel oil for a minimum of 1 hour of DG operation at full load plus 10% (571 gallons) plus 869 gallons which is credited in TS 3.8.3 in meeting the 7 day fuel oil storage requirement.

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

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day tanks eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during the performance of this Surveillance.

SR 3.8.1.6

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

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

SR 3.8.1.7

See SR 3.8.1.2.

SR 3.8.1.8

Transfer of each 6.9 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.8 (continued)

This SR is modified by a Note. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment.

SR 3.8.1.9

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. The single largest motor load on the bus at any given time is the Component Cooling Water pump load which has a name plate rating of 783 KW. This Surveillance may be accomplished by:

a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus; or

b. Tripping its associated single largest post-accident load with the DG solely supplying the bus.

As required by IEEE-308 (Ref. 12), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower.

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.9 (continued)

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The 3 seconds specified is equal to 60% of a typical 5 second load sequence interval associated with sequencing of the largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.9.a corresponds to the maximum frequency excursion, while SR 3.8.1.9.b is a steady state voltage value to which the system must recover following load rejection. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by a Note. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABIITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment.

SR 3.8.1.10

This Surveillance demonstrates the DG capability to reject 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 Surveillance ensures proper engine generator 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 an event and continues to be available, this response ensures that the DG is not degraded for future application,

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.10 (continued)

including reconnection to the bus if the trip initiator can be corrected or isolated.

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

SR 3.8.1.11

As required by Regulatory Guide 1.9 (Ref.3), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all safety functions encountered from the loss of offsite power, including shedding of the nonessential loads, energization of the emergency buses in ≤ 10 seconds after auto-start signal, and energization of the respective loads from the DG. It further demonstrates the capability of the DG to automatically maintain the required steady state voltage and frequency.

The DG autostart time of 10 seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability is achieved.

The requirement to verify the connection and power supply of permanent and autoconnected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, or high pressure injection systems are not capable of being operated at full flow, or residual heat removal (RHR) systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG systems to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean

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SURVEILLANCE REQUIREMENTS

SR 3.8.1.11 (continued)

that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.12

This Surveillance demonstrates that the DG automatically starts, achieves and maintains the required voltage and frequency within the specified time (10 seconds) from the safety injection signal and operates for $\geq$ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability.

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

This SR is modified by a Note. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start.

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.13

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a DG emergency start which occurs from either a loss of voltage or an SI actuation test signal. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

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

SR 3.8.1.14

Regulatory Guide 1.9 (Ref.3), requires demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours, ≥ 2 hours of which is at a load equivalent to approximately 110% of the continuous duty rating and the remainder of the time at a load equivalent to 90% to 100% of the continuous duty rating of the DG. For the purposes of the 2 hour run, the minimum load is approximately 110% of the 6300 kW maximum design load in lieu of the 7000 kW continuous rating. The DG start for this Surveillance can be performed either from ambient or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

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

This Surveillance is modified by a Note 1 which states that momentary transients due to changing bus loads do not invalidate this test.

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The 10 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

The generator voltage shall be ≥ 6480 V and frequency ≥ 58.8 Hz ~~between 6480 V and 7150 V and frequency shall be 60± 1.2 Hz~~ within 10 seconds after the start signal. The steady state voltage of ≥ 6480 V and ≤ 7150 V and frequency ≥ 59.9 Hz and ≤ 60.1 Hz shall be maintained during this test.

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

SR 3.8.1.16

As required by Regulatory Guide 1.9 (Ref. 3) this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and the DG can be returned to ready to load status when offsite power is restored. It also ensures that the autostart logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready to load status when the DG is at rated speed and voltage, the output breaker is open and can receive an autoclose signal on bus undervoltage, and the load sequence timers are reset.

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

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of

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SURVEILLANCE REQUIREMENTS

SR 3.8.1.16 (continued)

reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment.

SR 3.8.1.17

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to ready to load operation if a LOCA actuation signal is received during operation in the test mode. Ready to load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are consistent with IEEE-308 (Ref. 13).

The intent of the requirement to automatically energize the emergency loads with offsite power is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable.

This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns)

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SURVEILLANCE REQUIREMENTS

SR 3.8.1.17 (continued)

provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.18

Under accident and loss of offsite power conditions loads are sequentially connected to the bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The 10% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

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

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced.

This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.1.18 (continued)

to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.19

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the DG operation, as discussed in the Bases for SR 3.8.1.11, during a loss of offsite power actuation test signal in conjunction with an SI actuation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start. The reason for Note 2 is that the performance of the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.19 (continued)

against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.20

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed (441 rpm) within the specified time when the DGs are started simultaneously.

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

This SR is modified by a Note. The reason for the Note is to minimize wear on the DG during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start.

SR 3.8.1.21 and SR 3.8.1.22

These SRs ensure the proper functioning of the safety injection and blackout sequencers.

SR 3.8.1.21 applies to the blackout sequencer input undervoltage relays. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.22 applies to the Solid State Safeguards Sequencers (both the Safety Injection Sequencer and the Blackout Sequencer) and is the performance of a TADOT. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by two Notes. The first Note excludes verification of setpoints from the TADOT. The trip setpoints are verified by as part of the ESF Instrumentation. The second Note excludes actuation of final devices. Operation of the sequencer during power operations could disrupt normal operation and induce a plant transient.

(continued)

BASES (continued)

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.

2. FSAR, Chapter 8.

3. Regulatory Guide 1.9 Rev 3, July 1993.

4. FSAR, Chapter 6.

5. FSAR, Chapter 15.

6. Regulatory Guide 1.93, Rev. 0, December 1974.

7. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.

8. 10 CFR 50, Appendix A, GDC 18.

9. Regulatory Guide 1.108, Rev. 1, August 1977.

10. Regulatory Guide 1.137, January 1978.

11. ASME Code for Operation and Maintenance of Nuclear Power Plants.

12. IEEE Standard 308-1974.

13. IEEE Standard 387-1977

14. Generic Letter 94-01, “Removal of Accelerated Testing and Special Reporting Requirements for Emergency Diesel Generators,” May 31, 1994.

15. ANSI C84.1

INSERT A

Prior to EDG start:
1. Ensure no Severe Thunderstorm or Tornado Warning is in effect.
2. Verify local grid stability by contacting the Grid Controller.
3. Ensure no switchyard activities will be performed that could impact the test.
4. Verify all required systems, subsystems, trains, components and devices that depend on the opposite train EDG are OPERABLE.
5. Verify the affected Unit Turbine Driven AFW pump is OPERABLE.
6. Verify offsite power sources are OPERABLE and SRs for opposite train EDG are current.
7. Ensure all safeguards 6900 V buses (both Units) are powered from their preferred offsite source.
8. Ensure affected Unit safeguards 6900 V bus voltages are $\geq$ 6750 volts.

Once the EDG is paralleled with an offsite power source, TERMINATE the test if any of the following occur:
1. Affected Unit Reactor trips.
2. The EDG being tested exceeds the limit established for the test. Momentary transients do not invalidate the test.
3. The EDG being tested requires frequent or continuous adjustment to maintain load below that specified for the test.
4. The EDG being tested exceeds 5000 KVAR.
5. Associated bus steady state voltage lowers $\geq$ 200 V.
6. Associated bus steady state frequency is $\leq$ 59 Hz.

If test termination is required;
1. Open the EDG output breaker.
2. Slowly adjust EDG voltage to 6900 V.
3. Slowly adjust EDG frequency to 60.0 Hz.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources - Operating

BASES

BACKGROUND

The unit Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power source, and alternate), and the onsite standby emergency power sources (Train A and Train B diesel generators (DGs)). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The onsite Class 1E AC Distribution System is divided into redundant load groups (trains) so that the loss of any one group does not prevent the minimum safety functions from being performed. Each train has connections to two offsite power sources and a dedicated DG.

Offsite power is supplied to the plant switchyards from the transmission network by seven 345 KV and two 138 KV transmission lines. From the switchyards, two electrically and physically separated circuits provide AC power, through step down startup transformers, to the 6.9 kV ESF buses. A detailed description of the offsite power network and the circuits to the Class 1E ESF buses is found in the FSAR, Chapter 8 (Ref. 2).

An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network buses at plant switchyards to the onsite Class 1E ESF buses.

Certain required unit loads are started and/or returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite Class 1E Distribution System. Within 2 minutes after the initiating signal is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service when the bus is energized by the load sequencer.

The onsite standby power source for each 6.9 kV ESF bus is a dedicated DG. DGs 1EG1, 1EG2, 2EG1 and 2EG2 are dedicated to ESF buses 1EA1, 1EA2, 2EA1 and 2EA2 respectively. The DG starts automatically on a safety injection (SI) signal or associated bus undervoltage.

If the Diesel Generator voltage exceeds the minimum or maximum voltage limits for steady state operation, except for allowed transients (less than 3

(continued)

BASES

BACKGROUND (continued)

seconds), the Digital Voltage Regulator will be isolated automatically and excitation will be controlled by the “magnetics.” “Magnetics” will maintain the DG output voltage within the required TS limits. However, the passive voltage control provided by the “magnetics” will not allow adjustment of DG voltage, and the capability to synchronize the Diesel Generator with offsite power, to restore the offsite power to the safety bus, will not exist. The Digital Voltage Regulator can be repaired during DG operation, e.g., while the DG carries the safety bus loads, to restore the DG operability.

On an ESF bus undervoltage signal, the DG start signal is delayed 1 second to allow alternate source breaker closure. If the alternate source is not available the ESF bus undervoltage signal automatically starts the DG, (refer to LCO 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation"). As a result of degraded voltage the preferred source is tripped after a time delay to assure that the bus loads exposure to degraded voltage, in the absence of a Safety Injection Actuation Signal (SIAS) is limited to 60 seconds. In the event of a SIAS, after the confirmation of degraded condition that it is not due to a motor start, the preferred source breaker is tripped instantly. Subsequently, if the alternate source does not alleviate the degraded condition, the alternate source is tripped after a time delay of 1.9 seconds. After the offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage and the DG has started, it will automatically tie to its respective bus, independent of or coincident with an SI signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SI signal alone. Following the trip of offsite power, an undervoltage signal strips nonpermanent loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the available alternate power source. If the alternate source is not available, then the ESF electrical loads are connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA).

Certain required unit loads are started and/or returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Within 2 minutes after the initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service when the bus is energized or by the load sequencer.

(continued)

BASES

BACKGROUND (continued)

Ratings for Train A and Train B DGs satisfy the requirements of Regulatory Guide 1.9; Ref. (3) and IEEE 387 (Ref. 13). The continuous service rating of each DG is 7000 kW with 10% overload permissible for up to 2 hours in any 24 hour period. The ESF loads that are powered from the 6.9 kV ESF buses are listed in Reference 2. The maximum calculated load is less than 6300 kW. This maximum continuous service load is reflected in selected surveillances.

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the FSAR, Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the unit. This results in maintaining at least one train of the onsite AC sources or one of the offsite AC sources OPERABLE during Accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power; and

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10CFR50.36(c)(2)(ii).

LCO

Two qualified circuits between the offsite transmission network buses at the plant switchyards and the onsite Class 1E Electrical Power System and separate and independent DGs for each train ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the unit. In addition, one automatic load sequencer per train must be OPERABLE.

(continued)

BASES

LCO (continued)

Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses.

Offsite circuit #1 is fed from the 138 kV switchyard and offsite circuit # 2 is fed from the 345 kV switchyard. Circuit #1 is the preferred source for Unit 2 and alternate source for Unit 1. Circuit # 2 is the preferred source for Unit 1 and alternate source for Unit 2. Each offsite circuit can supply 6.9 kV Train A and Train B ESF busses for both Unit 1 and Unit 2.

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on receipt of bus undervoltage signal. This will be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot and DG in standby with the engine at ambient conditions. Additional DG capabilities must be demonstrated to meet required Surveillance, e.g., capability of the DG to revert to ready-to-load status on an SI signal while operating in parallel test mode.

The Diesel Generator, when operating on magnetics only, is considered not operable because the passive voltage control provided by the “magnetics” will not allow adjustment of DG voltage, and the capability to synchronize the Diesel Generator with offsite power, to restore the offsite power to the safety bus, will not exist.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

The offsite AC sources must be separate and independent (to the extent possible). For the onsite DGs, separation and independence are complete.

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus, with transfer capability to the other OPERABLE circuit, and not violate separation criteria. A circuit that is not connected to an ESF bus, is required to have an operable transfer mechanism to that bus to support operability of that circuit.

Each circuit of offsite source can feed both trains. Preferred source breakers are normally closed and alternate source breakers are normally open. Each bus has automatic capability to transfer to the alternate source on loss of preferred source.

(continued)

BASES

LCO (continued)

LCO 3.8.1 is modified by a Note stating that one DG may be synchronized with the offsite power source under administrative controls for the purpose of surveillance testing. During such testing, only one of the redundant DGs shall be paralleled at any one time, leaving the other DG available in standby service.

Administrative controls for performing surveillance testing with the DG paralleled to an offsite circuit ensure or require that:

Prior to EDG start:

1. Ensure no Severe Thunderstorm or Tornado Warning is in effect.

2. Verify local grid stability by contacting the Grid Controller.

3. Ensure no switchyard activities will be performed that could impact the test.

4. Verify all required systems, subsystems, trains, components and devices that depend on the opposite train EDG are OPERABLE.

5. Verify the affected Unit Turbine Driven AFW pump is OPERABLE.

6. Verify offsite power sources are OPERABLE and SRs for opposite train EDG are current.

7. Ensure all safeguards 6900 V buses (both Units) are powered from their preferred offsite source.

8. Ensure affected Unit safeguards 6900 V bus voltages are $\geq$ 6750 volts.

Once the EDG is paralleled with an offsite power source, TERMINATE the test if any of the following occur:

1. Affected Unit Reactor trips.

2. The EDG being tested exceeds the limit established for the test. Momentary transients do not invalidate the test.

3. The EDG being tested requires frequent or continuous adjustment to maintain load below that specified for the test.

(continued)

BASES

LCO (continued)

4. The EDG being tested exceeds 5000 KVAR.

5. Associated bus steady state voltage lowers ≥ 200 V.

6. Associated bus steady state frequency is ≤ 59 Hz.

If test termination is required:

1. Open the EDG output breaker.

2. Slowly adjust EDG voltage to 6900 V.

3. Slowly adjust EDG frequency to 60.0 Hz.

The Note is consistent with the NRC position provided in Information Notice 84-29, which "prohibits the use of DGs for purposes other than supplying standby power, when needed, and permits interconnection of the onsite and offsite sources only for short periods of time for the purpose of DG load retesting." Thus, the DG under test need not be considered inoperable strictly due to being paralleled with offsite power during performance of the required testing.

APPLICABILITY

The AC sources and sequencers are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients; and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA. The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources - Shutdown."

ACTIONS

A Note prohibits the application of LCO 3.0.4.b to an inoperable DG. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable DG and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

(continued)

BASES

ACTIONS (continued)

A.1

To ensure a highly reliable power source remains with one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

A.2

Required Action A.2, which only applies if the train cannot be powered from an offsite source, is intended to provide assurance that an event coincident with a single failure of the associated DG will not result in a complete loss of safety function of critical redundant required features. These features are powered from the redundant AC electrical power train. This includes the motor driven auxiliary feedwater pumps and the TDAFW pump which must be available for mitigation of a Feedwater line break. Single train systems, other than the steam driven (turbine driven) auxiliary feedwater pump, are not included.

The Completion Time for Required Action A.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time “clock.” In this required Action, the Completion Time only begins on discovery that both:

a. The train has no offsite power supplying it loads; and

b. A required feature on the other train is inoperable.

If at any time during the existence of Condition A (one offsite circuit inoperable) with a train with no offsite power available, and a redundant required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering no offsite power to one train of the onsite Class 1E Electrical Power Distribution System coincident with one or more inoperable required support or supported features, or both, that are associated with the other train that has offsite power, results in starting the Completion Times for the Required Action.

(continued)

BASES

ACTIONS

A.2 (continued)

Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to Train A and Train B of the onsite Class 1E Distribution System. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

A.3

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition A for a period that should not exceed 72 hours. With one offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety systems. In this Condition, however, the remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System.

The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

An OR statement for a temporary Completion Time is added to the Completion Time above (72 hours). The one-time, 14-day Completion Time is applicable to XST1 only and expires on March 31, 2017. The 14-day Completion Time applies as part of the plant modification to facilitate connection of either XST1 or XST1A startup transformers to the 1E buses. If during the conduct of the prescribed maintenance outage, should any combination of the remaining OPERABLE AC Sources be determined inoperable, current TS requirements would apply.

B.1

To ensure a highly reliable power source remains with an inoperable DG, it is necessary to verify the availability of the offsite circuits on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met. However, if a circuit fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

(continued)

BASES

ACTIONS (continued)

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a DG is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related trains. This includes the motor driven auxiliary feedwater pumps and the TDAFW pump which must be available for mitigation of a Feedwater line break. Single train systems, other than the turbine driven auxiliary feedwater pump, are not included. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable DG.

The Completion Time for Required Action B.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. An inoperable DG exists; and

b. A required feature on the other train (Train A or Train B) is inoperable.

If at any time during the existence of this Condition (one DG inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering one DG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DG, results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

In this Condition, the remaining OPERABLE DG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS (continued)

B.3.1 and B.3.2

Required Actions B 3.1 and B 3.2 are only applicable to the affected Unit. Any actions that may apply to an unaffected Unit, or the DGs for the unaffected Unit, would be determined by the Corrective Action Program and the 24 hour COMPLETION TIME for TS 3.8.1, Required Actions B 3.1 and B 3.2 does not apply with respect to the unaffected Unit or its DGs.

Required Action B.3.1 provides an allowance to avoid unnecessary testing of the OPERABLE DG. If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on the other DG, the other DG would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered. Once the failure is repaired, the common cause failure no longer exists, and Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining DG, performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the applicable plant procedures will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

According to Generic Letter 84-15 (Ref. 7), 24 hours is reasonable to confirm that the OPERABLE DG is not affected by the same problem as the inoperable DG.

During performance of surveillance activities as a requirement for ACTION statements, the air-roll test shall not be performed.

B.4

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition B for a period that should not exceed 72 hours.

In Condition B, the remaining OPERABLE DG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS (continued)

C.1 and C.2

Required Action C.1, which applies when two offsite circuits are inoperable, is intended to provide assurance that an event with a coincident single failure will not result in a complete loss of redundant required safety functions. The Completion Time for this failure of redundant required features is reduced to 12 hours from that allowed for one train without offsite power (Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete safety trains are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are powered from redundant AC safety trains. This includes the motor driven auxiliary feedwater pumps and the TDAFW pump which must be available for mitigation of a Feedwater line break. Single train systems, other than the turbine driven auxiliary feedwater pump, are not included.

The Completion Time for Required Action C.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. All required offsite circuits are inoperable; and

b. A required feature is inoperable.

If at any time during the existence of Condition C (two offsite circuits inoperable) a required feature becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition C for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more DGs inoperable.

(continued)

BASES

ACTIONS

C.1 and C.2 (continued)

However, two factors tend to decrease the severity of this level of degradation:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure; and

b. The time required to detect and restore an unavailable offsite power source is generally much less than that required to detect and restore an unavailable onsite AC source.

With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

According to Reference 6, with the available offsite AC sources, two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with Condition A.

D.1 and D.2

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable. Therefore, the Required Actions of Condition D are modified by a Note to indicate that when Condition D is entered with no AC source to any train, (for CPSES this requires both offsite sources and DG inoperable) the Conditions and Required Actions for LCO 3.8.9, "Distribution Systems - Operating," must be immediately entered. This allows Condition D to provide requirements for the loss of one offsite circuit and one DG, without regard to whether a train is inoperable. LCO 3.8.9 provides the appropriate restrictions for a inoperable train.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition D for a period that should not exceed 12 hours.

(continued)

BASES

ACTIONS

D.1 and D.2 (continued)

In Condition D, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition C (loss of both required offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

E.1

With Train A and Train B DGs inoperable, there are no remaining standby AC sources. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. Since the offsite electrical power system is the only source of AC power for this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability, which could result in a total loss of AC power). Since any inadvertent generator trip could also result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to Reference 6, with both DGs inoperable, operation may continue for a period that should not exceed 2 hours.

F.1

The SI sequencer(s) is an essential support system to both the offsite circuit and the DG associated with a given ESF bus. Furthermore, the sequencer is on the primary success path for most major AC electrically powered safety systems powered from the associated ESF bus. Therefore, loss of an ESF bus sequencer affects every major ESF system in the train. The 24 hour Completion Time provides a period of time to correct the problem commensurate with the importance of maintaining sequencer OPERABILITY. This time period also ensures that the probability of an accident (requiring sequencer OPERABILITY) occurring during periods when the sequencer is inoperable is minimal.

(continued)

BASES

ACTIONS

F.1 (continued)

This Required Action is modified by a note. The note allows one sequencer channel to be bypassed for surveillance testing provided the other channel is operable. The 4 hours allows sufficient time to perform the required testing. Based on the low probability of an event requiring the sequencer in combination with a failure to the operable sequencer channel during the 4 hours, this period of inoperability for testing is acceptable.

G.1 and G.2

If the inoperable AC electric power sources cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

H.1

Condition H corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

I.1

A Blackout sequencer is an essential support system to the DG associated with a given ESF bus. The sequencer is required to provide the system response to a loss of or degraded ESF bus voltage signal. Therefore, the loss of the Blackout sequencer causes the associated DG to become inoperable immediately.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref. 8). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SR for demonstrating the OPERABILITY of the DGs are consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), and Regulatory Guide 1.137 (Ref. 10).

Where the SR discussed herein specify voltage and frequency tolerances, the following is applicable.

The minimum steady state output voltage of 6480 V allows for voltage drops to motors and other equipment down to the 120 V level to ensure that the loads will not experience voltage less than the minimum rated voltage. The maximum steady state output voltage of 7150 V ensures that, under lightly loaded conditions, motors and other equipment down to the 120 V level will not experience voltages more than the maximum rated voltage. These voltages ensure Distribution System OPERABILITY per LCO 3.8.9 AND LCO 3.8.10. The specified minimum and maximum frequencies of the DG are 59.9 Hz and 60.1 Hz, respectively. These values are equal to ± 0.1 Hz of the 60 Hz nominal frequency and are based on DG control system capabilities.

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that appropriate independence of offsite circuits is maintained. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.2 and SR 3.8.1.7

These SR help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and to maintain the unit in a safe shutdown condition.

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SR are modified by a Note (Note 2 for SR 3.8.1.2) to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period. In addition, for SR 3.8.1.2, following prelube, a warmup period is allowed prior to loading.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.2 and SR 3.8.1.7 (continued)

For the purposes of SR 3.8.1.2 and SR 3.8.1.7 testing, the DGs are started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. For SR 3.8.1.2 and SR 3.8.1.7 testing, the diesel should be started from ambient conditions which means the diesel engine is cold or at a temperature consistent with manufacturer's recommendations.

The DG shall start using one of the following signals: 1) Manual, 2) Simulated or actual safeguards bus undervoltage, 3) Safety Injection simulated or actual signal in conjunction with a simulated or actual loss of offsite power signal, or 4) a Safety Injection simulated or actual signal by itself.

For SR 3.8.1.2, in order to reduce stress and wear on diesel engines, the manufacturer recommends a modified start in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of Note 3.

SR 3.8.1.7 requires that the DG starts from standby conditions, accelerates to 441 RPM, and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the FSAR, Chapter 15 (Ref. 5).

The 10 second start requirement is not applicable to SR 3.8.1.2 (see Note 3) when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.7 applies.

Since SR 3.8.1.7 requires a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This is the intent of Note 1 of SR 3.8.1.2.

In addition to the SR requirements, the time for the DG to reach steady state operation, unless the modified DG start is employed, is periodically monitored and the trend evaluated to identify degradation of governor and voltage regulator performance.

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

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.3

This Surveillance verifies that the DGs are capable of synchronizing with the offsite electrical system and accepting loads greater than or equal to the equivalent of the maximum expected accident loads. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the DG is connected to the offsite source.

Although no power factor requirements are established by this SR, the DG is normally operated at a power factor between 0.8 lagging and 1.0. The 0.8 value is the design rating of the machine, while the 1.0 is an operational limitation to ensure circulating currents are minimized. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

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

This SR is modified by four Notes. Note 1 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 2 states that momentary transients, because of changing bus loads, do not invalidate this test. Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations. Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

SR 3.8.1.4

This SR provides verification that the level of fuel oil in the day tank is at or above the required level. The level is expressed as an equivalent volume in gallons, and is selected to ensure adequate fuel oil for a minimum of 1 hour of DG operation at full load plus 10% (571 gallons) plus 869 gallons which is credited in TS 3.8.3 in meeting the 7 day fuel oil storage requirement.

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

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day tanks eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during the performance of this Surveillance.

SR 3.8.1.6

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

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

SR 3.8.1.7

See SR 3.8.1.2.

SR 3.8.1.8

Transfer of each 6.9 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.8 (continued)

This SR is modified by a Note. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment.

SR 3.8.1.9

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. The single largest motor load on the bus at any given time is the Component Cooling Water pump load which has a name plate rating of 783 KW. This Surveillance may be accomplished by:

a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus; or

b. Tripping its associated single largest post-accident load with the DG solely supplying the bus.

As required by IEEE-308 (Ref. 12), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.9 (continued)

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The 3 seconds specified is equal to 60% of a typical 5 second load sequence interval associated with sequencing of the largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.9.a corresponds to the maximum frequency excursion, while SR 3.8.1.9.b is a steady state voltage value to which the system must recover following load rejection. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by a Note. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABIITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment.

SR 3.8.1.10

This Surveillance demonstrates the DG capability to reject 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 Surveillance ensures proper engine generator 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 an event and continues to be available, this response ensures that the DG is not degraded for future application,

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.1.10 (continued)

including reconnection to the bus if the trip initiator can be corrected or isolated.

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

SR 3.8.1.11

As required by Regulatory Guide 1.9 (Ref.3), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all safety functions encountered from the loss of offsite power, including shedding of the nonessential loads, energization of the emergency buses in ≤ 10 seconds after auto-start signal, and energization of the respective loads from the DG. It further demonstrates the capability of the DG to automatically maintain the required steady state voltage and frequency.

The DG autostart time of 10 seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability is achieved.

The requirement to verify the connection and power supply of permanent and autoconnected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, or high pressure injection systems are not capable of being operated at full flow, or residual heat removal (RHR) systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG systems to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean

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SURVEILLANCE REQUIREMENTS

SR 3.8.1.11 (continued)

that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.12

This Surveillance demonstrates that the DG automatically starts, achieves and maintains the required voltage and frequency within the specified time (10 seconds) from the safety injection signal and operates for $\geq$ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability.

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

This SR is modified by a Note. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.13

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a DG emergency start which occurs from either a loss of voltage or an SI actuation test signal. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

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

SR 3.8.1.14

Regulatory Guide 1.9 (Ref.3), requires demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours, ≥ 2 hours of which is at a load equivalent to approximately 110% of the continuous duty rating and the remainder of the time at a load equivalent to 90% to 100% of the continuous duty rating of the DG. For the purposes of the 2 hour run, the minimum load is approximately 110% of the 6300 kW maximum design load in lieu of the 7000 kW continuous rating. The DG start for this Surveillance can be performed either from ambient or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

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

This Surveillance is modified by a Note 1 which states that momentary transients due to changing bus loads do not invalidate this test.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The 10 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

The generator voltage shall be ≥ 6480 V and frequency ≥ 58.8 Hz within 10 seconds after the start signal. The steady state voltage of ≥ 6480 V and ≤ 7150 V and frequency ≥ 59.9 Hz and ≤ 60.1 Hz shall be maintained during this test.

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

SR 3.8.1.16

As required by Regulatory Guide 1.9 (Ref. 3) this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and the DG can be returned to ready to load status when offsite power is restored. It also ensures that the autostart logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready to load status when the DG is at rated speed and voltage, the output breaker is open and can receive an autoclose signal on bus undervoltage, and the load sequence timers are reset.

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

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of

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SURVEILLANCE REQUIREMENTS

SR 3.8.1.16 (continued)

reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment.

SR 3.8.1.17

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to ready to load operation if a LOCA actuation signal is received during operation in the test mode. Ready to load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are consistent with IEEE-308 (Ref. 13).

The intent of the requirement to automatically energize the emergency loads with offsite power is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable.

This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns)

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.1.17 (continued)

provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.18

Under accident and loss of offsite power conditions loads are sequentially connected to the bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The 10% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

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

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced.

This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.1.18 (continued)

to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.19

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the DG operation, as discussed in the Bases for SR 3.8.1.11, during a loss of offsite power actuation test signal in conjunction with an SI actuation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start. The reason for Note 2 is that the performance of the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g. post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured

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SURVEILLANCE REQUIREMENTS

SR 3.8.1.19 (continued)

against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment.

SR 3.8.1.20

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed (441 rpm) within the specified time when the DGs are started simultaneously.

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

This SR is modified by a Note. The reason for the Note is to minimize wear on the DG during testing. For the purpose of this testing, the DGs must be started from standby conditions. Standby conditions for a DG mean that the diesel is shutdown but is ready for either a manual or automatic start signal and is ready to pickup the required safety related loads. To minimize degradation resulting from testing, Diesel Generators may have the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations prior to DG start.

SR 3.8.1.21 and SR 3.8.1.22

These SRs ensure the proper functioning of the safety injection and blackout sequencers.

SR 3.8.1.21 applies to the blackout sequencer input undervoltage relays. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.22 applies to the Solid State Safeguards Sequencers (both the Safety Injection Sequencer and the Blackout Sequencer) and is the performance of a TADOT. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by two Notes. The first Note excludes verification of setpoints from the TADOT. The trip setpoints are verified by as part of the ESF Instrumentation. The second Note excludes actuation of final devices. Operation of the sequencer during power operations could disrupt normal operation and induce a plant transient.

(continued)

BASES (continued)

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.

2. FSAR, Chapter 8.

3. Regulatory Guide 1.9 Rev 3, July 1993.

4. FSAR, Chapter 6.

5. FSAR, Chapter 15.

6. Regulatory Guide 1.93, Rev. 0, December 1974.

7. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.

8. 10 CFR 50, Appendix A, GDC 18.

9. Regulatory Guide 1.108, Rev. 1, August 1977.

10. Regulatory Guide 1.137, January 1978.

11. ASME Code for Operation and Maintenance of Nuclear Power Plants.

12. IEEE Standard 308-1974.

13. IEEE Standard 387-1977

14. Generic Letter 94-01, “Removal of Accelerated Testing and Special Reporting Requirements for Emergency Diesel Generators,” May 31, 1994.

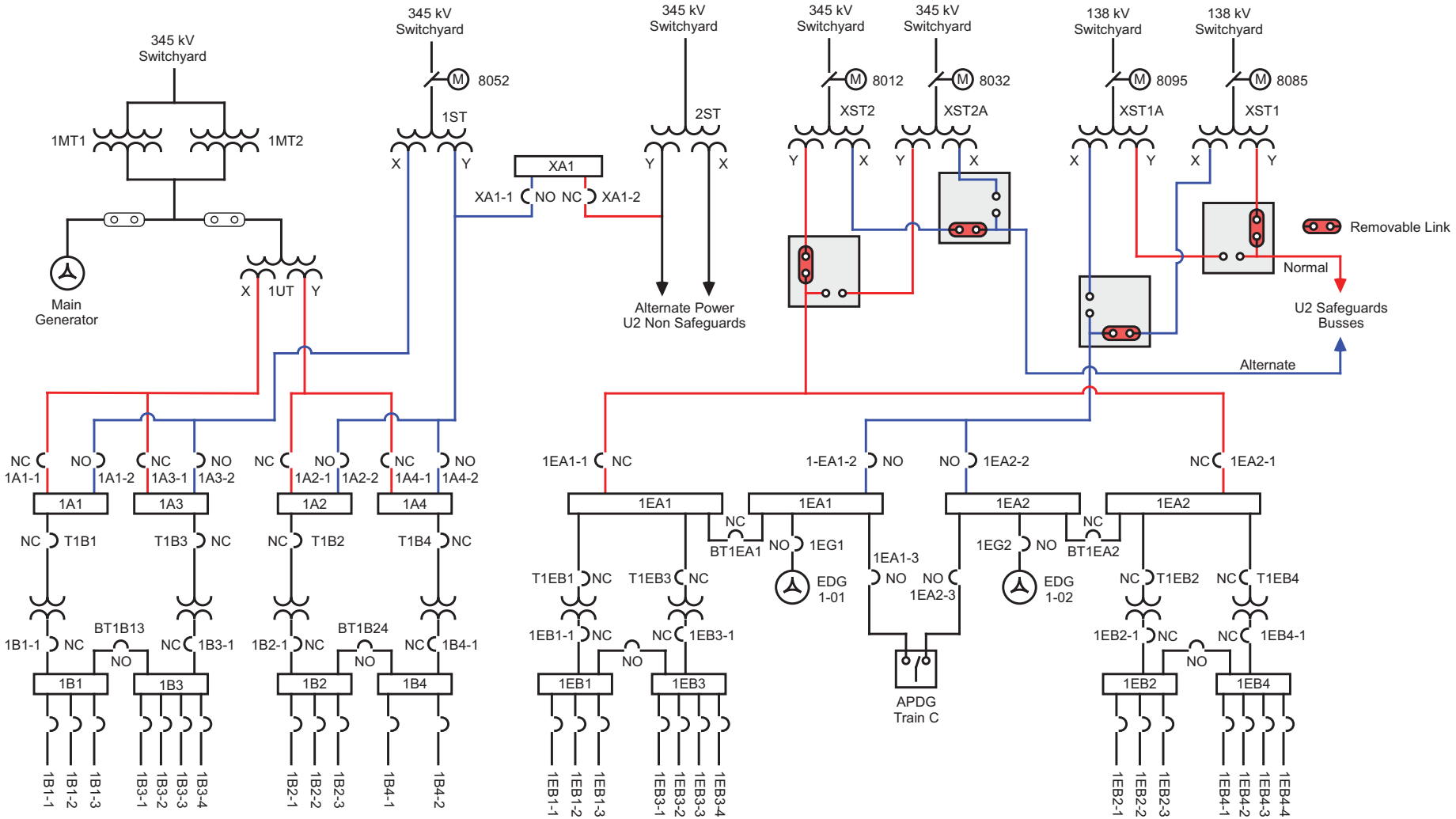
15. ANSI C84.1

Attachment 2 to TXX-19064

CPNPP FIGURES
For Information Only

Figure 1. 6900 VAC & 480 VAC (Unit 1 Only - Both units are similar)

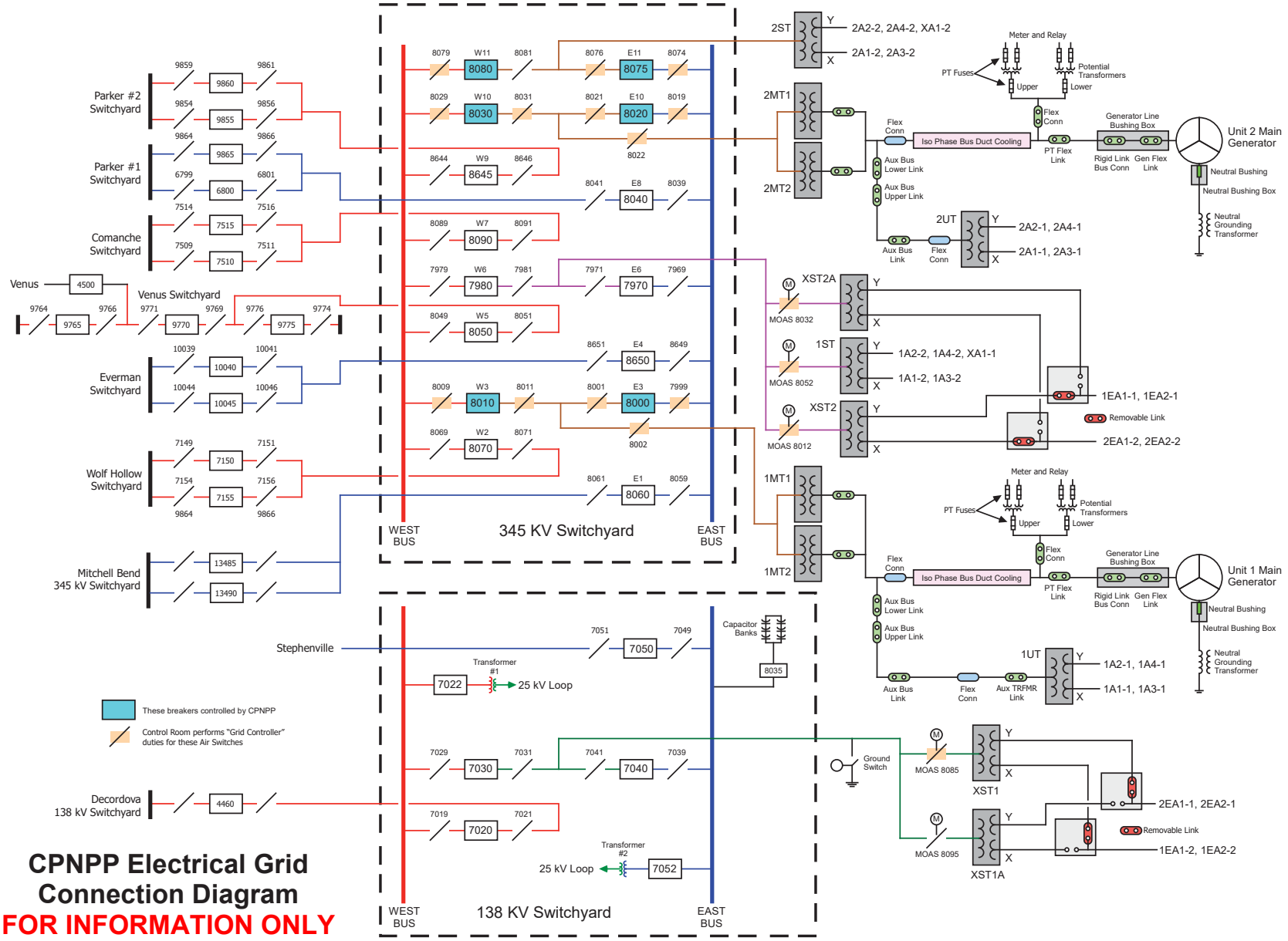
Figure 2. CPNPP Electric Grid Connection Diagram



6900VAC and 480VAC

FOR INFORATION ONLY

Figure 1



CPNPP Electrical Grid Connection Diagram

FOR INFORMATION ONLY

Figure 2

Attachment 3 to TXX-19064

CPNPP Technical Specification 3.8.1, AC Sources – Operating, Surveillance Requirement Information in accordance with the Surveillance Frequency Control Program "For Information Only"

Comanche Peak Nuclear Power Plant
Technical Specification 3.8.1, AC Sources -- Operating
Surveillance Requirement Information in accordance with the SFCP and Site Procedures

SR	SR Frequency	SR Title	Procedure	Procedure Title
3.8.1.1	7 days	Offsite & Onsite Circuit Continuity	OPT-215	Class 1E Electrical Systems Operability
3.8.1.2	31 Days	DG Monthly Slow Start	OPT-214A/B	Diesel Generator Operability Test
3.8.1.3	31 Days	DG Monthly 60 Minute Load Test	OPT-214A/B	Diesel Generator Operability Test
3.8.1.4	31 Days	DG Fuel Oil Day Tank Level	OPT-214A/B	Diesel Generator Operability Test
3.8.1.5	31 Days	DG Fuel Oil Day Tank Water Removal	OPT-214A/B	Diesel Generator Operability Test
3.8.1.6	92 Days	DG Fuel Oil Transfer Test	OPT-515A/B	Diesel Generator Fuel Oil Transfer System
3.8.1.7	184 Days	DG Semi-annual Fast Start	OPT-214A/B	Diesel Generator Operability Test
3.8.1.8	18 Months	Offsite Power Source Transfer	MSE-S1-0602A/B MSE-S2-0602A/B	Train A/B UV Relay/RTT & Bus Transfer Tests
3.8.1.9	18 Months (STB)	Single Largest Load Rejection	OPT-430A/B OPT-435A/B	Train A/B Integrated Test Sequence
3.8.1.10	18 Months (STB)	Full Load Rejection	OPT-430A/B OPT-435A/B	Train A/B Integrated Test Sequence

Comanche Peak Nuclear Power Plant
Technical Specification 3.8.1, AC Sources -- Operating
Surveillance Requirement Information in accordance with the SFCP and Site Procedures

SR	SR Frequency	SR Title	Procedure	Procedure Title
3.8.1.11	18 Months (STB)	Emergency Bus Load Shed, DG Start, Sequence and Run on Loss of Offsite Power	OPT-430A/B OPT-435A/B	Train A/B Integrated Test Sequence
3.8.1.12	18 Months	DG Safety Injection Auto Start	OPT-465A/B OPT-467A/B OPT-489A/B OPT-491A/B	Train A/B Safeguards Slave Relay K603, K609 Actuation Test
3.8.1.13	18 Months (STB)	DG Non-Emergency Trip Signals Bypassed on Safety Injection	OPT-430A/B OPT-435A/B	Train A/B Integrated Test Sequence
3.8.1.14	18 Months (STB)	DG 24/2 Hour Run	OPT-214A/B	Diesel Generator Operability Test
3.8.15	18 Months (STB)	DG Hot Restart	OPT-430A/B OPT-435A/B	Train A/B Integrated Test Sequence
3.8.1.16	18 Months (STB)	DG Synchronization and Load Transfer	OPT-430A/B OPT-435A/B	Train A/B Integrated Test Sequence
3.8.1.17	18 Months (STB)	DG Safety Injection Override Test	OPT-430A/B OPT-435A/B MSE-S1-0602A/B MSE-S2-0602A/B	Train A/B Integrated Test Sequence Train A/B UV Relay/RTT & Bus Transfer Tests
3.8.1.18	18 Months	Automatic Load Sequencing	INC-7917A/B INC-7918A/B	Channel Calibration Solid State Sequencer Train A/B

Comanche Peak Nuclear Power Plant
Technical Specification 3.8.1, AC Sources -- Operating
Surveillance Requirement Information in accordance with the SFCP and Site Procedures

SR	SR Frequency	SR Title	Procedure	Procedure Title
3.8.1.19	18 Months (STB)	Emergency Bus Load Shed, DG Start, Sequence and Run on Safety Injection in Conjunction with Loss of Offsite Power	OPT-430A/B OPT-435A/B	Train A/B Integrated Test Sequence
3.8.1.19b	18 Months (STB)	Load Shedding on SI with Loss of Offsite Power	OPT-430A/B OPT-435A/B	Train A/B Integrated Test Sequence
3.8.1.20	10 Years	Simultaneous Start of Both DGs	OPT-236A OPT-236B	Simultaneous Start of Unit 1(2) Train A and B Diesel Generators
3.8.1.21	18 Months	Blackout Sequencer Under Voltage Relay Test	INC-7917A/B INC-7918A/B MSE-S1-0673A/B MSE-S2-0673A/B	Channel Calibration Solid State Sequencer Train A/B Train A/B Sequencer Under Voltage Relay Surveillance
3.8.1.22	31 Days (STB)	Safety Injection and Blackout Sequencer Trip Actuating Device Operational Test	OPT-414A/B	SI/Blackout Sequencers

STB - Staggered Test Basis

Attachment 4 to TXX-19064

CPNPP
Safety Related Pump and Motor Operated Valve Response
“For Information Only”

For Information Only

CPNPP Safety Related Pump and Motor Operated Valve Response

Safety Related Pumps

Safety Related Pump Flows as a Function of Frequency					
Pump	Flow @ 58.8 Hz	Flow @ 59.9 Hz	Flow @ 60 Hz	Flow @ 60.1 Hz	Flow @ 61.2 Hz
Auxiliary Feedwater	426 gpm	434 gpm	435 gpm	436 gpm	444 gpm
Containment Spray	3259 gpm	3320 gpm	3325 gpm	3331 gpm	3392 gpm
Residual Heat Removal	3864 gpm	3936 gpm	3943 gpm	3950 gpm	4022 gpm
Safety Injection	593 gpm	604 gpm	605 gpm	606 gpm	617 gpm
Centrifugal Charging	421 gpm	429 gpm	430 gpm	431 gpm	439 gpm
Station Service Water	15532 gpm	15823 gpm	15849 gpm	15875 gpm	16166 gpm
Component Cooling Water	16293 gpm	16597 gpm	16625 gpm	16653 gpm	16958 gpm
Safety Chilled Water Recirc	279 gpm	285 gpm	285 gpm	286 gpm	291 gpm

The following relationship has been used to populate the above Table;

V = volumetric flowrate in gpm

n = pump speed in rpm

f = frequency in hertz

$V2 = V1 (n_2 / n_1)$, with frequency directly proportional to speed this relationship is used $V2 = V1 (f_2 / f_1)$

The above numbers are for illustration only. In actual plant operation with power sources operating as designed the frequency of the off-site power source is 60 Hz $\pm$ 0.03 Hz and the frequency of the Emergency Diesel Generators (EDG) is 60 Hz $\pm$ 0.1 Hz. To have frequency affect flow as illustrated in the table above there would have to be a malfunction of the off-site or EDG control system.

The table shows that flows at the frequencies given, provide adequate flow for Loss of Coolant Accident (LOCA) mitigation.

All nominal flows (@ 60 Hz) are selected within the acceptance criteria band used during surveillance testing for the listed pumps. The current Technical Specification minimum and maximum values for frequency would result in a 2% change in flow from each pump's nominal flow. The proposed Technical Specification minimum and maximum frequency values

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would result in a 0.2% change in flow from each pump's nominal flow. A 0.2% change in pump flow is indistinguishable from nominal pump flow.

The current Technical Specification 6900-volt acceptance criteria minimum of 6480 volts and maximum of 7150 volts do not adversely impact pump performance.

Safety Related Motor Operated Valves (MOV)

Motor Operated Valve (MOV) Motor V/Hz as a Function of Voltage and Frequency					
Voltage	V/Hz @ 58.8 Hz	V/Hz @ 59.9 Hz	V/Hz @ 60.0 Hz	V/Hz @ 60.1 Hz	V/Hz @ 61.2 Hz
368 (1)	6.26	6.14	6.13	6.12	6.01
410 (2)	6.97	6.84	6.83	6.82	6.70
455 (3)	7.74	7.60	7.58	7.57	7.43
460 (4)	7.82	7.68	7.67	7.65	7.52
480 (5)	8.16	8.01	8.00	7.99	7.84
508 (6)	8.64	8.48	8.47	8.45	8.30

The current Technical Specification 480-volt acceptance criteria minimum of 455 volts and maximum of 508 volts do not adversely impact MOV performance. Attachment 5 lists the minimum required starting voltage for Class 1E MOVs. As shown in Attachment 5 the highest minimum voltage required is 410 volts which is well below the Technical Specification minimum of 455 volts.

(1) Lowest Minimum Starting Voltage Safety-Related MOVs

(2) Highest Minimum Starting Voltage Safety-Related MOVs

(3) Minimum Technical Specification Voltage

(4) Motor Operated Valve Nameplate Voltage

(5) Nominal 480V Bus Voltage

(6) Maximum Technical Specification Voltage

For Information Only

Motor Operated Valve (MOV) Motor Torque as a Function of Volts per Hertz (V/Hz)					
Voltage	V/Hz@ 58.8 Hz	V/Hz@ 59.9 Hz	V/Hz@ 60.0 Hz	V/Hz@ 60.1 Hz	V/Hz@ 61.2 Hz
368 (1)	15.78 FT-LB	15.47 FT-LB	15.45 FT-LB	15.42 FT-LB	15.14 FT-LB
410 (2)	15.77 FT-LB	15.47 FT-LB	15.45 FT-LB	15.42 FT-LB	15.15 FT-LB
455 (3)	15.80 FT-LB	15.49 FT-LB	15.45 FT-LB	15.43 FT-LB	15.14 FT-LB
460 (4)	15.75 FT-LB	15.47 FT-LB	15.45 FT-LB	15.41 FT-LB	15.14 FT-LB
480 (5)	15.76 FT-LB	15.47 FT-LB	15.45 FT-LB	15.42 FT-LB	15.14 FT-LB
508 (6)	15.76 FT-LB	15.47 FT-LB	15.45 FT-LB	15.41 FT-LB	15.14 FT-LB

(1) Lowest Minimum Starting Voltage Safety-Related MOVs

(2) Highest Minimum Starting Voltage Safety-Related MOVs

(3) Minimum Technical Specification Voltage

(4) Motor Operated Valve Nameplate Voltage

(5) Nominal 480V Bus Voltage

(6) Maximum Technical Specification Voltage

Since;

MΦ = Magnetic Flux is proportional to Volts/Hertz

Ƭ = Torque is proportional to MΦ

The following example illustrates that as long as Technical Specification Maximum and Minimum voltages and frequencies are maintained there is little change to motor torque;

Torque = 10 HP x 5252 / 3400 rpm ($V/Hz_1/V/Hz_2$)

V/Hz_1 = Volts per Hertz at 60.0 Hz

V/Hz_2 = Volts per Hertz at current or proposed Technical Specification values

This Data is for Illustration Only

Attachment 5 to TXX-19064

CPNPP
DBD-EE-041, 480V and 120V AC Electrical Power System,
Table 5.3, MOV Minimum Starting Voltage Required
“For Information Only”

5.3.2 Safeguard 480V and 120V AC System

A. The maximum available short circuit currents at the 480V AC unit substations, at the MCC buses, and at the 120V AC and 208/120V AC panelboards are addressed in calculations # EE-SC-U1-1E & 16345-EE(B)-019 for unit 1 and EE-SC-U2-1E & 2-EE-013 for Unit 2.

B. The 480V AC Safeguard System is designed to furnish a nominal voltage of 480V at its unit substation buses. The 6.9 kV / 480 V voltage spread and the variation of bus voltages is addressed in calculation # EE-VP-U1-1E for Unit 1 and calculation # EE-VP-U2-1E for Unit 2.

C. Class 1E MOV voltage requirement is given in Table - 5.3 below based on the requirement as analyzed in Calc. # ME-CA-0000-1093.

TABLE - 5.3

MOV TAG #	MOV Minimum Starting Voltage Required	Valve Actuation Signal	REF. DWG ICD #
1-8000A	410	MANUAL	M1-2251-07
1-8000B	410	MANUAL	M1-2251-07

MOV TAG #	MOV Minimum Starting Voltage Required	Valve Actuation Signal	REF. DWG ICD #
1-8100	388	PH. A ISOL	M1-2253-09
1-8104	390	MANUAL	M1-2255-18A
1-8105	389	"S" SIGNAL	M1-2255-18
1-8106	390	"S" SIGNAL	M1-2255-18
1-8110	390	"S" SIGNAL	M1-2255-19
1-8111	391	"S" SIGNAL	M1-2255-19
1-8112	389	PH. A ISOL	M1-2253-09
1-8351A	410	MANUAL	M1-2253-16
1-8351B	410	MANUAL	M1-2253-16
1-8351C	410	MANUAL	M1-2253-16
1-8351D	410	MANUAL	M1-2253-16
1-8511A	386	"S" SIGNAL	M1-2255-21
1-8511B	390	"S" SIGNAL	M1-2255-21
1-8512A	410	MANUAL w/VLV INTRLK	M1-2255-22
1-8512B	410	MANUAL w/VLV INTRLK	M1-2255-22
1-8701A	410	MANUAL	M1-2260-05
1-8701B	399	MANUAL	M1-2260-05
1-8702A	390	MANUAL	M1-2260-05
1-8702B	383	MANUAL	M1-2260-05
1-8716A	410	MANUAL	M1-2260-05A
1-8716B	410	MANUAL	M1-2260-05A
1-8801A	385	"S" SIGNAL	M1-2261-05
1-8801B	385	"S" SIGNAL	M1-2261-05
1-8802A	410	MANUAL	M1-2263-05
1-8802B	410	MANUAL	M1-2263-05
1-8804A	410	MANUAL w/VLV INTRLK	M1-2261-06
1-8804B	410	MANUAL w/VLV INTRLK	M1-2261-06
1-8806	410	MANUAL	M1-2263-05
1-8807A	410	MANUAL	M1-2261-07
1-8807B	410	MANUAL	M1-2261-07
1-8809A	410	MANUAL	M1-2263-06
1-8809B	410	MANUAL	M1-2263-06
1-8811A	410	"S" SIGNAL w/RWST INTRLK	M1-2263-06
1-8811B	410	"S" SIGNAL w/RWST INTRLK	M1-2263-06
1-8812A	410	MANUAL	M1-2263-06
1-8812B	410	MANUAL	M1-2263-06
1-8813	410	MANUAL	M1-2263-07

MOV TAG #	MOV Minimum Starting Voltage Required	Valve Actuation Signal	REF. DWG ICD #
1-8814A	410	MANUAL	M1-2263-07
1-8814B	410	MANUAL	M1-2263-07
1-8821A	410	MANUAL	M1-2263-08
1-8821B	410	MANUAL	M1-2263-08
1-8835	410	MANUAL	M1-2263-09
1-8840	410	MANUAL	M1-2263-09
1-8923A	410	MANUAL	M1-2263-12
1-8923B	410	MANUAL	M1-2263-12
1-8924	410	MANUAL	M1-2261-11
1-FCV-0610	395	"S" SIGNAL	M1-2260-03
1-FCV-0611	397	"S" SIGNAL	M1-2260-03
1-FV-4772-1	391	"P" SIGNAL	M1-2232-03
1-FV-4772-2	391	"P" SIGNAL	M1-2232-03
1-FV-4773-1	391	"P" SIGNAL	M1-2232-03
1-FV-4773-2	391	"P" SIGNAL	M1-2232-03
1-HV-2480	410	MANUAL	M1-2206-08
1-HV-2481	410	MANUAL	M1-2206-08
1-HV-2482	410	MANUAL	M1-2206-08
1-HV-2484	390	"S" SIGNAL (AFW PUMP START)	M1-2206-09
1-HV-2485	389	"S" SIGNAL (AFW PUMP START)	M1-2206-09
1-HV-2491A	410	MANUAL	M1-2206-10
1-HV-2491B	410	MANUAL	M1-2206-10
1-HV-2492A	410	MANUAL	M1-2206-10
1-HV-2492B	410	MANUAL	M1-2206-10
1-HV-2493A	410	MANUAL	M1-2206-10
1-HV-2493B	410	MANUAL	M1-2206-10
1-HV-2494A	410	MANUAL	M1-2206-10
1-HV-2494B	410	MANUAL	M1-2206-10
1-HV-4075B	387	PH. A ISOL	M1-2225-01B
1-HV-4075C	389	PH. A ISOL	M1-2225-01B
1-HV-4286	391	"S" SIGNAL @ T= 25	M1-2233-05
1-HV-4287	392	"S" SIGNAL @ T= 25	M1-2233-05
1-HV-4393	392	EDG START	M1-2234-02A
1-HV-4394	410	EDG START	M1-2234-02A
1-HV-4395	410	MANUAL	M1-2234-02
1-HV-4396	410	MANUAL	M1-2234-02
1-HV-4512	385	PH. B ISOL	M1-2229-02

MOV TAG #	MOV Minimum Starting Voltage Required	Valve Actuation Signal	REF. DWG ICD #
1-HV-4513	387	PH. B ISOL	M1-2229-02
1-HV-4514	385	PH. B ISOL	M1-2229-04B
1-HV-4515	388	PH. B ISOL	M1-2229-02
1-HV-4524	385	PH. B ISOL	M1-2229-04B
1-HV-4525	387	PH. B ISOL	M1-2229-02
1-HV-4526	384	PH. B ISOL	M1-2229-04B
1-HV-4527	387	PH. B ISOL	M1-2229-02
1-HV-4572	390	"S" SIGNAL	M1-2229-06
1-HV-4573	391	"S" SIGNAL	M1-2229-06A
1-HV-4574	390	"P" SIGNAL	M1-2229-06
1-HV-4575	391	"P" SIGNAL	M1-2229-06A
1-HV-4696	388	"P" SIGNAL	M1-2231-02A
1-HV-4699	389	"P" SIGNAL	M1-2231-03
1-HV-4700	392	"P" SIGNAL	M1-2231-03
1-HV-4701	392	"P" SIGNAL	M1-2231-03
1-HV-4708	386	"P" SIGNAL	M1-2231-05
1-HV-4709	375	"P" SIGNAL	M1-2231-05A
1-HV-4758	410	MANUAL	M1-2232-02
1-HV-4759	410	MANUAL	M1-2232-02
1-HV-4776	386	"P" SIGNAL	M1-2232-04
1-HV-4777	386	"P" SIGNAL	M1-2232-04
1-HV-4782	410	MANUAL	M1-2232-05
1-HV-4783	398	MANUAL	M1-2232-05
1-HV-5540	395	"S" SIGNAL (CVI)	M1-2301-05
1-HV-5541	394	"S" SIGNAL (CVI)	M1-2301-05
1-HV-5542	390	"S" SIGNAL (CVI)	M1-2301-05
1-HV-5543	393	"S" SIGNAL (CVI)	M1-2301-05
1-HV-5562	393	"S" SIGNAL (CVI)	M1-2301-09
1-HV-5563	393	"S" SIGNAL (CVI)	M1-2301-09
1-HV-6082	392	PH. A ISOL	M1-2307-05
1-HV-6083	393	PH. A ISOL	M1-2307-05
1-HV-6084	385	PH. A ISOL	M1-2307-06
1-HV-8402A	368	NA	M1-2255-18
1-LCV-0112B	383	"S" SIGNAL	M1-2255-07
1-LCV-0112C	388	"S" SIGNAL	M1-2255-07
1-LCV-0112D	384	"S" SIGNAL	M1-2255-08
1-LCV-0112E	387	"S" SIGNAL	M1-2255-08

MOV TAG #	MOV Minimum Starting Voltage Required	Valve Actuation Signal	REF. DWG ICD #
1-LV-4754	390	"P" SIGNAL	M1-2232-01
1-LV-4755	389	"P" SIGNAL	M1-2232-01
2-8000A	410	MANUAL	M2-2251-07
2-8000B	410	MANUAL	M2-2251-07
2-8100	375	PH. A ISOL	M1-2253-09
2-8104	379	MANUAL	M1-2255-18A
2-8105	376	"S" SIGNAL	M1-2255-18
2-8106	382	"S" SIGNAL	M1-2255-18
2-8110	369	"S" SIGNAL	M1-2255-19
2-8111	372	"S" SIGNAL	M1-2255-19
2-8112	377	PH. A ISOL	M1-2253-09
2-8351A	410	MANUAL	M1-2253-16
2-8351B	410	MANUAL	M1-2253-16
2-8351C	410	MANUAL	M1-2253-16
2-8351D	410	MANUAL	M1-2253-16
2-8511A	368	"S" SIGNAL	M1-2255-21
2-8511B	379	"S" SIGNAL	M1-2255-21
2-8512A	410	MANUAL w/VLV INTRLK	M1-2255-22
2-8512B	410	MANUAL w/VLV INTRLK	M1-2255-22
2-8701A	410	MANUAL	M1-2260-05
2-8701B	399	MANUAL	M1-2260-05
2-8702A	393	MANUAL	M1-2260-05
2-8702B	373	MANUAL	M1-2260-05
2-8716A	410	MANUAL	M1-2260-05A
2-8716B	410	MANUAL	M1-2260-05A
2-8801A	381	"S" SIGNAL	M1-2261-05
2-8801B	378	"S" SIGNAL	M1-2261-05
2-8802A	410	MANUAL	M1-2263-05
2-8802B	410	MANUAL	M1-2263-05
2-8804A	410	MANUAL w/VLV INTRLK	M1-2261-06
2-8804B	410	MANUAL w/VLV INTRLK	M1-2261-06
2-8806	410	MANUAL	M1-2263-05
2-8807A	410	MANUAL	M1-2261-07
2-8807B	410	MANUAL	M1-2261-07
2-8809A	410	MANUAL	M1-2263-06
2-8809B	410	MANUAL	M1-2263-06
2-8811A	410	"S" SIGNAL w/RWST INTRLK	M1-2263-06

MOV TAG #	MOV Minimum Starting Voltage Required	Valve Actuation Signal	REF. DWG ICD #
2-8811B	393	"S" SIGNAL w/RWST INTRLK	M1-2263-06
2-8812A	408	MANUAL	M1-2263-06
2-8812B	409	MANUAL	M1-2263-06
2-8813	410	MANUAL	M1-2263-07
2-8814A	410	MANUAL	M1-2263-07
2-8814B	410	MANUAL	M1-2263-07
2-8821A	410	MANUAL	M1-2263-08
2-8821B	408	MANUAL	M1-2263-08
2-8835	410	MANUAL	M1-2263-09
2-8840	410	MANUAL	M1-2263-09
2-8923A	410	MANUAL	M1-2263-12
2-8923B	410	MANUAL	M1-2263-12
2-8924	410	MANUAL	M1-2261-11
2-FCV-0610	386	"S" SIGNAL	M1-2260-03
2-FCV-0611	385	"S" SIGNAL	M1-2260-03
2-FV-4772-1	378	"P" SIGNAL	M2-2232-03
2-FV-4772-2	378	"P" SIGNAL	M2-2232-03
2-FV-4773-1	378	"P" SIGNAL	M2-2232-03
2-FV-4773-2	378	"P" SIGNAL	M2-2232-03
2-HV-2480	410	MANUAL	M2-2206-08
2-HV-2481	410	MANUAL	M2-2206-08
2-HV-2482	410	MANUAL	M2-2206-08
2-HV-2484	383	"S" SIGNAL (AFW PUMP START)	M2-2206-09
2-HV-2485	385	"S" SIGNAL (AFW PUMP START)	M2-2206-09
2-HV-2491A	410	MANUAL	M2-2206-10
2-HV-2491B	410	MANUAL	M2-2206-10
2-HV-2492A	410	MANUAL	M2-2206-10
2-HV-2492B	410	MANUAL	M2-2206-10
2-HV-2493A	410	MANUAL	M2-2206-10
2-HV-2493B	410	MANUAL	M2-2206-10
2-HV-2494A	410	MANUAL	M2-2206-10
2-HV-2494B	410	MANUAL	M2-2206-10
2-HV-4075B	373	PH. A ISOL	M2-2225-01B
2-HV-4075C	376	PH. A ISOL	M2-2225-01B
2-HV-4286	380	"S" SIGNAL @ T= 25	M2-2233-05
2-HV-4287	383	"S" SIGNAL @ T= 25	M2-2233-05
2-HV-4393	385	EDG START	M2-2234-02A

MOV TAG #	MOV Minimum Starting Voltage Required	Valve Actuation Signal	REF. DWG ICD #
2-HV-4394	387	EDG START	M2-2234-02A
2-HV-4395	410	MANUAL	M2-2234-02
2-HV-4396	410	MANUAL	M2-2234-02
2-HV-4512	378	PH. B ISOL	M2-2229-02
2-HV-4513	382	PH. B ISOL	M2-2229-02
2-HV-4514	377	PH. B ISOL	M2-2229-04B
2-HV-4515	383	PH. B ISOL	M2-2229-02
2-HV-4524	378	PH. B ISOL	M2-2229-04B
2-HV-4525	383	PH. B ISOL	M2-2229-02
2-HV-4526	377	PH. B ISOL	M2-2229-04B
2-HV-4527	383	PH. B ISOL	M2-2229-02
2-HV-4572	383	"S" SIGNAL	M2-2229-06
2-HV-4573	386	"S" SIGNAL	M2-2229-06
2-HV-4574	383	"P" SIGNAL	M2-2229-06
2-HV-4575	387	"P" SIGNAL	M2-2229-06
2-HV-4696	379	"P" SIGNAL	M2-2231-02A
2-HV-4699	380	"P" SIGNAL	M2-2231-03
2-HV-4700	381	"P" SIGNAL	M2-2231-03
2-HV-4701	383	"P" SIGNAL	M2-2231-03
2-HV-4708	380	"P" SIGNAL	M2-2231-05
2-HV-4709	373	"P" SIGNAL	M2-2231-05A
2-HV-4758	410	MANUAL	M2-2232-02
2-HV-4759	410	MANUAL	M2-2232-02
2-HV-4776	383	"P" SIGNAL	M2-2232-04
2-HV-4777	381	"P" SIGNAL	M2-2232-04
2-HV-4782	410	MANUAL	M2-2232-05
2-HV-4783	393	MANUAL	M2-2232-05
2-HV-5540	384	"S" SIGNAL (CVI)	M2-3201-03
2-HV-5541	386	"S" SIGNAL (CVI)	M2-2301-03
2-HV-5542	384	"S" SIGNAL (CVI)	M2-2301-03
2-HV-5543	386	"S" SIGNAL (CVI)	M2-2301-03
2-HV-5562	383	"S" SIGNAL (CVI)	M2-2301-07
2-HV-5563	383	"S" SIGNAL (CVI)	M2-2301-07
2-HV-6082	380	PH. A ISOL	M2-2307-05
2-HV-6083	385	PH. A ISOL	M2-2307-05
2-HV-6084	378	PH. A ISOL	M2-2307-06
2-HV-8402A	368	NA	M2-2255-18

MOV TAG #	MOV Minimum Starting Voltage Required	Valve Actuation Signal	REF. DWG ICD #
2-LCV-0112B	368	"S" SIGNAL	M2-2255-07
2-LCV-0112C	373	"S" SIGNAL	M2-2255-07
2-LCV-0112D	379	"S" SIGNAL	M2-2255-08
2-LCV-0112E	384	"S" SIGNAL	M2-2255-08
2-LV-4754	381	"P" SIGNAL	M2-2232-01
2-LV-4755	377	"P" SIGNAL	M2-2232-01
X-PV-3583	90	"S" SIGNAL	M1-2229-07
X-PV-3584	90	"S" SIGNAL	M1-2229-07
X-PV-3585	90	"S" SIGNAL	M1-2229-07
X-PV-3586	90	"S" SIGNAL	M1-2229-07

NOTES:

1- Minimum required voltages are from Calculation ME-CA-0000-1093

2- The table lists voltage and actuation requirements for active MOVs. The minimum opening or closing voltage for all non - active MOVs is 368V except for MOVs # 2-8808A/B &C which requires 395V, 395V & 385V respectively (Ref. Calculation ME-CA-0000-1093)

3- All automatically actuated active MOVs, except 1 / 2-8811A/B, and manually actuated active MOVs 1-8104 and 2-8104 shall be evaluated for acceptability of required voltage concurrent with the start of four (4) CT Pump motors

4- All non - active valves, all manually actuated active valves, except for 1/2-8104, and automatically actuated active MOVs # 1 / 2-8811A/B shall be evaluated for acceptability of required voltage when the MCC bus is at steady state condition.

5- All MOVs listed in the table actuate automatically upon receipt of actuation signal except for MOVs identified with“Manual”action.