Palo Verde Nuclear
Generating Station

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10CFR50.90

102-04451-CDM/AKK/RKR
June 6, 2000

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-37
Washington, D.C. 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket No. STN 50-528/529/530
Proposed Amendment to Technical Specifications
3.8.1, AC Sources - Operating and 3.8.2, AC Sources - Shutdown

Arizona Public Service Company (APS) requests an amendment to Technical Specifications 3.8.1, AC Sources - Operating and 3.8.2, AC Sources - Shutdown, for each Palo Verde Nuclear Generating Station (PVNGS) Unit. The proposed amendment would change the steady-state diesel generator voltage and frequency specified in the surveillance requirements for Technical Specification 3.8.1. Technical Specification 3.8.2, AC Sources - Shutdown requires certain surveillance requirements from Technical Specification 3.8.1 to be performed that are necessary to ensure operability of the AC sources when shutdown. Therefore, the proposed changes also affect Technical Specification 3.8.2 surveillance requirements.

As part of a review of steady-state voltage and frequency requirements for safety-related equipment, PVNGS engineering determined that the current Technical Specification limits for steady-state diesel generator voltage and frequency are not conservative. The revised limits will ensure that the steady-state diesel generator voltage and frequency will meet the requirements for safety-related equipment. In the interim, PVNGS has administratively implemented more conservative diesel generator steady-state voltage and frequency limits to ensure that the steady-state voltage and frequency requirements for safety-related equipment are met. The revised Technical Specification Bases are also provided (see enclosure 2) as supporting information to facilitate the approval of the Technical Specification changes.

NRR-057

A001

This issue has been documented and evaluated in accordance with the PVNGS corrective action program. As part of the corrective action, PVNGS engineering performed an extensive review of the steady-state voltage and frequency requirements for equipment being powered by the diesel generators. This included safety-related equipment and equipment that is important to the safety analysis. PVNGS engineering reviewed the steady-state voltage and frequency requirements for motor operated valves, pumps, fans, and non-motorized equipment (e.g., instrumentation and heaters). The review identified steady-state voltage and frequency ranges that would ensure proper operation of this equipment. The review also determined, based on a review of plant operating experience since 1995, that the actual steady state diesel generator voltage and frequency met the new acceptance criteria.

Provided in the enclosure to this letter are the following sections which support the proposed Technical Specification amendments:

A. Need for the Amendment
B. Description of the Proposed Technical Specification Amendment
C. Purpose of the Technical Specification
D. Safety Analysis of the Proposed Technical Specification Amendment
E. No Significant Hazards Consideration Determination
F. Environmental Consideration
G. Revised Technical Specification Pages
H. Retyped Technical Specification Pages

In accordance with PVNGS Quality Assurance Program, the Plant Review Board and Offsite Safety Review Committee have reviewed and concurred with this proposed amendment. By copy of this letter this request is being forwarded to the Arizona Radiation Regulatory Agency (ARRA) pursuant to 10 CFR 50.91(b)(1).

APS requests 45 days to implement the approved Technical Specification amendment.

The proposed amendment modifies the limits for diesel generator steady-state voltage and frequency. Since the steady state voltage and frequency limits are being controlled administratively, APS requests that the following condition be added to the amendment issuance letter: "For surveillance requirements associated with the revised steady-state voltage and frequency limits in technical specifications 3.8.1 and 3.8.2, the first performance is due at the end of the first surveillance interval that began on the date the surveillance was last performed prior to the date of implementation of this amendment." This is consistent with the license condition issued with technical specification amendment 117 to the Palo Verde operating license.

No commitments are being made to the NRC by this letter.

Should you have any questions, please contact Scott A. Bauer at (623) 393-5978.

Sincerely,

CDM/AKK/RKR/kg

Enclosures

cc: E. W. Merschoff (all w/Enclosure)
M. B. Fields
J. H. Moorman
A. V. Godwin

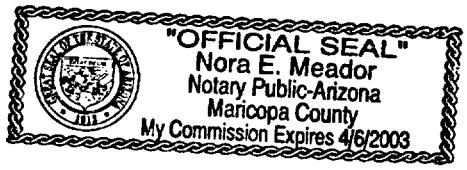
STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, David Mauldin, represent that I am Vice President Nuclear Engineering and Support, Arizona Public Service Company (APS), that the foregoing document has been signed by me on behalf of APS with full authority to do so, and that to the best of my knowledge and belief, the statements made therein are true and correct.

David Mauldin

Sworn To Before Me This 2nd Day Of June, 2000.

Nora E. Meador
Notary Public



April 6, 2003
Notary Commission Stamp

ENCLOSURE 1

Proposed Amendment to Technical Specifications 3.8.1, AC Sources - Operating and 3.8.2, AC Sources - Shutdown

Enclosure 1: Proposed Amendment to Technical Specifications 3.8.1, AC Sources - Operating and 3.8.2, AC Sources - Shutdown

A. DESCRIPTION OF AMENDMENT REQUEST

The proposed amendment revises Technical Specification 3.8.1 surveillance requirements SR 3.8.1.2, SR 3.8.1.7, SR 3.8.1.11, SR 3.8.1.12, SR 3.8.1.15, SR 3.8.1.19 and SR 3.8.1.20. The proposed amendment also revises Technical Specification 3.8.2 since Technical Specification 3.8.2 requires performance of certain surveillance requirements from Technical Specification 3.8.1, including SR 3.8.1.2, SR 3.8.1.7, SR 3.8.1.11, and SR 3.8.1.15. The revised Technical Specifications provide new limits for steady-state diesel generator voltage and frequency. Currently, technical specification surveillance requirements have steady-state diesel generator voltage limits of ≥3740 and ≤4580 volts and steady-state diesel generator frequency limits of ≥59.7 (≥58.8 for surveillance requirement 3.8.1.2) and ≤61.2 hertz. The proposed TS amendment changes the steady-state diesel generator voltage limits to ≥4000 and ≤4377.2 volts and the steady-state diesel generator frequency limits to ≥59.7 and ≤60.7 hertz. The proposed TS amendment also adds a note to each of the revised surveillance requirements. The note states that the steady-state voltage and frequency limits are analyzed values and have not been adjusted for instrument error.

The indicated steady state diesel generator voltage and frequency limits, using the panel mounted diesel generator instrumentation and adjusted for instrument error, are ≥4080 and ≤4300 volts, and ≥59.9 and ≤60.5 hertz, respectively.

B. PURPOSE OF THE TECHNICAL SPECIFICATION

TS 3.8.1, AC Sources - Operating, describes the requirements for both the offsite and the onsite AC sources required to be operable in Modes 1, 2, 3, and 4. TS 3.8.2, AC Sources – Shutdown, describes the requirements for both the offsite and the onsite AC sources required to be operable in Modes 5 and 6, and during movement of irradiated fuel assemblies. These requirements include the circuits from the offsite transmission network to the onsite Class 1E AC electrical power distribution system as well as the diesel generators. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to engineered safety features systems so that the fuel, reactor coolant system (RCS), and containment design limits are not exceeded. The operability of the AC electrical power system ensures that sufficient power will be available to supply the engineered safety features systems equipment required for the safe shutdown of the facility, and the mitigation and control of accident conditions within the facility. The diesel generator voltage and frequency requirements, both starting and steady-state, ensure that the onsite AC electrical power system will meet these requirements with an assumed loss of offsite power.

C. NEED FOR THE TECHNICAL SPECIFICATION AMENDMENT

This issue was initially discovered as part of the implementation of NRC Generic Letter 89-10, "Safety-Related Motor-Operated Valve (MOV) Testing and Surveillance." PVNGS engineering was developing design basis calculations for MOVs and discovered a discrepancy between the design basis MOV frequency and the allowable diesel generator frequency range. Subsequently, PVNGS engineering reviewed the steady-state voltage and frequency requirements for safety-related equipment and determined that the current Technical Specification limits for steady-state diesel generator voltage and frequency were not conservative. In general, the original mechanical systems' design calculations assumed a nominal voltage and frequency and did not consider any variation in voltage and frequency when evaluating system performance. Variations in frequency can affect system flows and variations in voltage can affect heater output and motor operation. The calculations showed that under certain emergency loading conditions, with diesel generator steady-state voltage and frequency near the allowed technical specification limits, certain safety-related equipment may not function as expected.

PVNGS engineering reviewed the system requirements for the affected safety related equipment and identified steady-state voltage and frequency ranges that would ensure proper operation of this equipment based on the mechanical system design requirements. The revised steady-state voltage and frequency limits will maintain operability of the engineered safety features systems equipment required for the safe shutdown of the facility and the mitigation and control of accident conditions when this equipment is powered from an emergency diesel generator.

D. SAFETY ANALYSIS OF THE PROPOSED AMENDMENT REQUEST

The initial conditions of design basis accident and transient analyses in the updated final safety analysis report (UFSAR), Chapter 6 and Chapter 15, assume engineered safety features 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 engineered safety features systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded.

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 or 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.

As part a review of the steady-state voltage and frequency requirements for safety-related equipment, PVNGS engineering determined that the current Technical Specification limits for steady-state diesel generator voltage and frequency were not conservative. In general, the original design mechanical systems' calculations assumed a nominal voltage and frequency and did not consider any variation in voltage and frequency when evaluating system performance. The limits associated with diesel generator steady-state voltage and frequency ensure that equipment loaded on the diesel generator will function as required. High voltage can affect motor operation. Low voltage can cause misoperation (low MOV torque and low heater output). High frequency can cause excessive hydraulic flow and differential pressure across valves. Low frequency can cause inadequate hydraulic flow. Simultaneous voltage and frequency deviations could also impact system pressure and hydraulic flow.

This issue has been documented and evaluated in accordance with the PVNGS corrective action program. As part of the corrective action, PVNGS engineering performed an extensive review of the steady-state voltage and frequency requirements for equipment being powered by the diesel generators. This included safety-related equipment and equipment that is important to the safety analysis. PVNGS engineering reviewed the system requirements (i.e., flow, head, pressure, etc.) to determine the acceptable steady-state voltage and frequency requirements for motor operated valves (MOVs), pumps, fans, and non-motorized equipment (e.g., instrumentation and heaters). The review identified steady-state voltage and frequency ranges that would ensure proper operation of this equipment based on the mechanical system design requirements.

The revised diesel generator steady-state voltage and frequency requirements are more restrictive than the current requirements. The revised steady-state voltage and frequency limits will maintain operability of the engineered safety features systems equipment required for the safe shutdown of the facility and the mitigation and control of accident conditions when powered by the emergency diesel generator.

E. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission has provided standards for determining whether a significant hazards consideration exists as stated in 10 CFR 50.92. A proposed amendment to an operating license for a facility involves no significant hazards consideration if operation of the facility in accordance with a proposed amendment would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated;

2. Create the possibility of a new or different kind of accident from any accident previously evaluated; or

3. Involve a significant reduction in a margin of safety.

A discussion of these standards as they relate to this amendment request follows:

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

No. The proposed change does not significantly increase the probability of an accident previously evaluated in the Updated Final Safety Analysis Report (UFSAR). The more restrictive steady-state voltage and frequency ranges ensure that the equipment being powered by the diesel generator will function as required to mitigate an accident as described in the UFSAR. The diesel generators are part of the systems required to mitigate an accident. Mitigation equipment is not a factor in accident initiation and, therefore, the probability of an accident previously evaluated will not be significantly increased.

The change to the steady state diesel generator voltage and frequency acceptance limits does not increase the probability of a diesel generator failure. Therefore, this change does not increase the probability of a station blackout event.

The consequences of an accident previously evaluated in the UFSAR will not be significantly increased. The more restrictive change to the diesel generator steady-state voltage and frequency acceptance limits ensures that the equipment powered by the diesel generators will perform as analyzed and mitigate the consequences of any accident described in the UFSAR. Therefore, the change in steady-state voltage and frequency acceptance limits is within the bounds of previous analysis in the UFSAR and does not involve a significant increase in the consequences of an accident previously evaluated.

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

No. The possibility of an accident of a new or different kind from any accident previously evaluated has not been created. The more restrictive change to the diesel generator steady-state voltage and frequency acceptance limits ensures that the equipment powered by the diesel generators will perform as analyzed. This equipment and the diesel generators mitigate the consequences of an accident. Mitigation equipment does not contribute to accident initiation. Making existing requirements more restrictive will not alter the plant configuration (no new or different type of equipment will be installed) or change the methods governing normal plant operation. These changes are consistent the assumptions made in the safety analysis. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

No. The change to the diesel generator steady-state voltage and frequency acceptance limits ensures that the equipment powered by the diesel generators will perform as analyzed. This equipment and the diesel generators mitigate the consequences of an accident. This change maintains the required function of the equipment powered by the diesel generators and ensures the required operation of the plant and any structures systems, or components is as intended by the safety analysis. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

F. ENVIRONMENTAL IMPACT CONSIDERATION DETERMINATION

APS has determined that the proposed amendment involves no change in the amount or type of effluent that may be released offsite, and that there is no increase in individual or cumulative occupational radiation exposure. As such, operation of PVNGS Units 1, 2, and 3, in accordance with the proposed amendment, does not involve an unreviewed environmental safety question.

F. REVISED TECHNICAL SPECIFICATION PAGES

Units 1, 2, and 3: Pages 3.8.1-6, 3.8.1-8, 3.8.1-10, 3.8.1-11, 3.8.1-14, 3.8.1-16, and 3.8.1-17

G. RETYPED TECHNICAL SPECIFICATION PAGES

Units 1, 2, and 3: Pages 3.8.1-6, 3.8.1-8, 3.8.1-10, 3.8.1-11, 3.8.1-14, 3.8.1-16, and 3.8.1-17

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.7 ----------NOTE---------- All DG starts may be preceded by an engine prelube period followed by a warmup period prior to loading. ---------- (1.)	
Verify each DG starts from standby condition and achieves a. In ≤ 10 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and b. Steady state voltage ≥ 3740 V and ≤ 4580 V, and frequency ≥ 59.7 Hz and ≤ 61.2 Hz. (4377.2) (60.7)	184 days (4000)
SR 3.8.1.8 ----------NOTE---------- This Surveillance shall not be performed in MODE 1 or 2. ----------	
Verify manual transfer of AC power sources from the normal offsite circuit to each alternate offsite circuit.	18 months

(continued)

2. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.11 ----------NOTE---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. 3. Momentary voltage and frequency transients induced by load changes do not invalidate this test. ---------- 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 and: 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected emergency loads through automatic load sequencer, 3. maintains steady state voltage ≥ 4000 V and ≤ 4377.2 V, 4. maintains steady state frequency ≥ 59.7 Hz and ≤ 60.7 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	18 months

(continued)

4. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.12 ----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ---------- Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal (without a loss of offsite power) each DG auto-starts and: a. In ≤ 10 seconds, achieves voltage ≥ 3740 V and frequency ≥ 58.8 Hz; b. Achieves steady state voltage ≥ 3740 and ≤ 4580 V and frequency ≥ 59.7 Hz and ≤ 61.2 Hz; c. Operates for ≥ 5 minutes on standby (running unloaded); d. Permanently connected loads remain energized from the offsite power system; and e. Emergency loads are energized (auto-connected through the automatic load sequencer) from the offsite power system.	18 months

(continued)

4000

4377.2

60.7

3. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.15 ----------NOTES---------- 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG, loaded ≥ 4950 kW and ≤ 5500 kW, has operated ≥ 2 hours or until temperatures have stabilized. 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 ≥ 3740 V and frequency ≥ 58.8 Hz; and b. Steady state voltage ≥ 3740 V and ≤ 4580 V, and frequency ≥ 59.7 Hz and ≤ 61.2 Hz.	18 months
SR 3.8.1.16 ----------NOTE---------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ---------- 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.	18 months

(continued)

4000

4377.2

60.7

3. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error.

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 be performed in MODE 1, 2, 3, or 4. ---------- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation 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 emergency loads through load sequencer. 3. achieves steady state voltage ≥ (3740) V and ≤ (4580) V. 4. achieves steady state frequency ≥ 59.7 Hz and ≤ (61.2) Hz. and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	18 months

4000 → 4377.2

60.7

(continued)

3. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.20 ----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1 or 2. ---------- Verify, when started simultaneously, each DG achieves a. In ≤ 10 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and b. Steady state voltage ≥ 3740 V and ≤ 4580 V, and frequency ≥ 59.7 Hz and ≤ 60.7 Hz.	10 years

4000

4377.2

60.7

3. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.7	----------NOTE---------- 1. All DG starts may be preceded by an engine prelube period followed by a warmup period prior to loading. 2. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error. ---------- Verify each DG starts from standby condition and achieves a. In ≤ 10 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and b. Steady state voltage ≥ 4000 V and ≤ 4377.2 V, and frequency ≥ 59.7 Hz and ≤ 60.7 Hz.	184 days
SR 3.8.1.8	----------NOTE---------- This Surveillance shall not be performed in MODE 1 or 2. ---------- Verify manual transfer of AC power sources from the normal offsite circuit to each alternate offsite circuit.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.11	----------NOTE---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. 3. Momentary voltage and frequency transients induced by load changes do not invalidate this test. 4. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error. ---------- 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 and: 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected emergency loads through automatic load sequencer, 3. maintains steady state voltage ≥ 4000 V and ≤ 4377.2 V, 4. maintains steady state frequency ≥ 59.7 Hz and ≤ 60.7 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.12	----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. 3. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error. ---------- Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal (without a loss of offsite power) each DG auto-starts and: a. In ≤ 10 seconds, achieves voltage ≥ 3740 V and frequency ≥ 58.8 Hz; b. Achieves steady state voltage ≥ 4000 and ≤ 4377.2 V and frequency ≥ 59.7 Hz and ≤ 60.7 Hz; c. Operates for ≥ 5 minutes on standby (running unloaded); d. Permanently connected loads remain energized from the offsite power system; and e. Emergency loads are energized (auto-connected through the automatic load sequencer) from the offsite power system.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.15	----------NOTES---------- 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG, loaded ≥ 4950 kW and ≤ 5500 kW, has operated ≥ 2 hours or until temperatures have stabilized. Momentary transients outside of load range do not invalidate this test. 2. All DG starts may be preceded by an engine prelube period. 3. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error. ---------- Verify each DG starts and achieves a. In ≤ 10 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and b. Steady state voltage ≥ 4000 V and ≤ 4377.2 V, and frequency ≥ 59.7 Hz and ≤ 60.7 Hz.	18 months
SR 3.8.1.16	----------NOTE---------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ---------- 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.	18 months

(continued)

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 be performed in MODE 1, 2, 3, or 4. 3. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error. ---------- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation 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 emergency loads through load sequencer, 3. achieves steady state voltage ≥ 4000 V and ≤ 4377.2 V, 4. achieves steady state frequency ≥ 59.7 Hz and ≤ 60.7 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.20	----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1 or 2. 3. The steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument error. ---------- Verify, when started simultaneously, each DG achieves a. In ≤ 10 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and b. Steady state voltage ≥ 4000 V and ≤ 4377.2 V, and frequency ≥ 59.7 Hz and ≤ 60.7 Hz.	10 years

ENCLOSURE 2

REVISED TECHNICAL SPECIFICATION BASES

BASES

ACTIONS (continued)

I.1

Condition I 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.

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 OPERABILITY of the DGs are based on the recommendations of Regulatory Guide 1.9 (Ref. 3), unless otherwise noted in the Updated FSAR Section 1.8.

The DG capabilities (starting and loading) are required to be met from a variety of initial conditions such as DG in standby condition with the engine hot (SR 3.8.1.15) and DG in standby condition with the engine at normal keep-warm conditions (SR 3.8.1.2, SR 3.8.1.7 and SR 3.8.1.19). Although it is expected that most DG starts will be performed from normal keep-warm conditions, DG starts should be performed with the jacket water cooling and lube oil temperatures within the lower to upper limits of DG OPERABILITY, except as noted above. Rapid cooling of the DG down to normal keep-warm conditions should be minimized.

0.7

The required steady state frequency range for the DG is 60 +[2]/-0.3 Hz to be consistent with the safety analysis to provide adequate safety injection flow. In accordance with the guidance provided in Regulatory Guide 1.9 (Ref. 3), where steady state conditions do not exist (i.e., transients), the frequency range should be restored to within ± 2% of the 60 Hz nominal frequency (58.8 Hz to 61.2 Hz).

INSERT 1

Specific MODE restraints have been footnoted where applicable to each 18 month SR. The reason for "This Surveillance shall not be performed in MODE 1 or 2" is that

(continued)

Insert Page
Technical Specification Bases 3.8.1

Insert 1

and the voltage range should be restored to within ± 10% of the 4160 volts nominal voltage (3740 volts to 4580 volts). The timed start is satisfied when the DG achieves at least 3740 volts and 58.8 Hz. At these values, the DG output breaker permissives are satisfied, and on detection of bus undervoltage or loss of power, the DG breakers would close, reenergizing its respective ESF bus.

Steady state voltage and frequency limits have not been adjusted for instrument error. Error values for specific instruments are established by plant staff to derive the indicated values for the steady state voltage and frequency limits.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.2 and SR 3.8.1.7 (continued)

lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. This is the intent of Note 3, which is only applicable when such modified start procedures are recommended by the manufacturer.

INSERT 1 →

SR 3.8.1.7 requires that, at a 184 day Frequency, the DG starts from standby conditions with the engine at normal keep-warm conditions and achieves required voltage and frequency within 10 seconds, and subsequently achieves steady state required voltage and frequency ranges. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the FSAR, Chapter 15 (Ref. 5).

A minimum voltage and frequency is specified rather than an upper and a lower limit because a diesel engine acceleration at full fuel (such as during a fast start) is likely to "overshoot" the upper limit initially and then go through several oscillations prior to a voltage and frequency within the stated upper and lower bounds. The time to reach "steady state" could exceed 10 seconds, and be cause to fail the SR. However, on an actual emergency start, the EDG would reach minimum voltage and frequency in ≤ 10 seconds at which time it would be loaded. Application of the load will dampen the oscillations. Therefore, only specifying the minimum voltage and frequency (at which the EDG can accept load) demonstrates the necessary capability of the EDG to satisfy safety requirements without including a potential for failing the Surveillance.

(at which the DG can accept load)

While reaching minimum voltage and frequency in ≤ 10 seconds is an immediate test of OPERABILITY, the ability of the governor and voltage regulator to achieve steady state operation, and the time to do so are important indicators of continued OPERABILITY. Therefore, the time to achieve steady state voltage and frequency will be monitored as a function of continued OPERABILITY.

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, 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.

(continued)

Insert Page
Technical Specification Bases 3.8.1

Insert 1

SR 3.8.1.7 Note 2 states that the steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument accuracy. The analyzed values for the steady-state diesel generator voltage limits are ≥4000 and ≤4377.2 volts and the analyzed values for the steady-state diesel generator frequency limits are ≥59.7 and ≤60.7 hertz. The indicated steady state diesel generator voltage and frequency limits, using the panel mounted diesel generator instrumentation and adjusted for instrument error, are ≥4080 and ≤4300 volts (Ref. 12), and ≥59.9 and ≤60.5 hertz (Ref. 13), respectively. If digital Maintenance and Testing Equipment (M&TE) is used instead of the panel mounted diesel generator instrumentation, the instrument error may be reduced, increasing the range for the indicated steady state voltage and frequency limits.

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SURVEILLANCE REQUIREMENTS

SR 3.8.1.9 (continued)

the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load, or equivalent load, without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. Train A Normal Water Chiller (at 842 kW) and Train B AFW pump (at 936 kW) are the bounding loads for the DG A and DG B to reject, respectively. These values are listed in Table 8.3-3, Load Bases for Class 1E Buses, in the Updated FSAR (Ref. 2). 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 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.

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 and SR 3.8.1.9.c are ~~steady state~~ voltage and frequency values ~~to which~~ the system must recover following load rejection. The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.9 (Ref. 3).

meet, within three seconds,

the

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.11 (continued)

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 to the extent possible ensuring power is available to the component.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by ~~three~~ four Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. 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. Note 3 states that momentary voltage and frequency transients induced by load changes do not invalidate this test.

INSERT 1

SR 3.8.1.12

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time (10 seconds) from the design basis accident signal (LOCA) signal, and subsequently achieves steady state required voltage and frequency ranges, and operates for ≥ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability. SR 3.8.1.12.d and SR 3.8.1.12.e ensure that permanently connected loads and auto-connected emergency loads (auto-connected through the automatic load sequencer) are energized from the offsite electrical power system on an ESF signal without loss of offsite power.

The requirement to verify the connection of permanent and auto-connected emergency loads is intended to satisfactorily show the relationship of these loads to the offsite circuit 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, ECCS injection valves are not desired to be stroked open, high pressure injection systems are not

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Technical Specification Bases 3.8.1

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Note 4 states that the steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument accuracy. The analyzed values for the steady-state diesel generator voltage limits are ≥4000 and ≤4377.2 volts and the analyzed values for the steady-state diesel generator frequency limits are ≥59.7 and ≤60.7 hertz. The indicated steady state diesel generator voltage and frequency limits, using the panel mounted diesel generator instrumentation and adjusted for instrument error, are ≥4080 and ≤4300 volts (Ref. 12), and ≥59.9 and ≤60.5 hertz (Ref. 13), respectively. If digital Maintenance and Testing Equipment (M&TE) is used instead of the panel mounted diesel generator instrumentation, the instrument error may be reduced, increasing the range for the indicated steady state voltage and frequency limits.

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SURVEILLANCE REQUIREMENTS

SR 3.8.1.12 (continued)

capable of being operated at full flow, or SDC 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 offsite circuit 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 to the extent possible ensuring power is available to the component.

The Frequency of 18 months takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by three Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. The reason for Note 2 is that performing this SR would remove a required offsite circuit from service, perturb the EDS, and challenge safety systems.

INSERT 1

SR 3.8.1.13

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal concurrent with an ESF actuation test signal, and critical protective functions (engine overspeed, generator differential current, engine low lube oil pressure, and manual emergency stop trip), trip the DG to avert substantial damage to the DG unit. 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.

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Technical Specification Bases 3.8.1

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Note 3 states that the steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument accuracy. The analyzed values for the steady-state diesel generator voltage limits are ≥4000 and ≤4377.2 volts and the analyzed values for the steady-state diesel generator frequency limits are ≥59.7 and ≤60.7 hertz. The indicated steady state diesel generator voltage and frequency limits, using the panel mounted diesel generator instrumentation and adjusted for instrument error, are ≥4080 and ≤4300 volts (Ref. 12), and ≥59.9 and ≤60.5 hertz (Ref. 13), respectively. If digital Maintenance and Testing Equipment (M&TE) is used instead of the panel mounted diesel generator instrumentation, the instrument error may be reduced, increasing the range for the indicated steady state voltage and frequency limits.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.14 (continued)

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.9, takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by four Notes. Note 1 states that momentary variations due to changing bus loads do not invalidate the test. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. 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 (Note 3 and Note 4).

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, and subsequently achieves steady state required voltage and frequency ranges. The 10 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.10.

three

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. Per the guidance in Regulatory Guide 1.9, this SR would demonstrate the hot restart functional capability at full-load temperature conditions, after the DG has operated for 2 hours (or until operating temperatures have stabilized) at full load. Momentary transients due to changing bus loads do not invalidate the 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.

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Note 3 states that the steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument accuracy. The analyzed values for the steady-state diesel generator voltage limits are ≥4000 and ≤4377.2 volts and the analyzed values for the steady-state diesel generator frequency limits are ≥59.7 and ≤60.7 hertz. The indicated steady state diesel generator voltage and frequency limits, using the panel mounted diesel generator instrumentation and adjusted for instrument error, are ≥4080 and ≤4300 volts (Ref. 12), and ≥59.9 and ≤60.5 hertz (Ref. 13), respectively. If digital Maintenance and Testing Equipment (M&TE) is used instead of the panel mounted diesel generator instrumentation, the instrument error may be reduced, increasing the range for the indicated steady state voltage and frequency limits.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 ESF 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 Frequency of 18 months takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of 18 months.

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, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations for DGs. 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.

three

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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 within the specified time when the DGs are started simultaneously.

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), paragraph 2.3.2.4 and Regulatory Guide 1.137 (Ref. 9).

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Technical Specification Bases 3.8.1

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Note 3 states that the steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument accuracy. The analyzed values for the steady-state diesel generator voltage limits are ≥4000 and ≤4377.2 volts and the analyzed values for the steady-state diesel generator frequency limits are ≥59.7 and ≤60.7 hertz. The indicated steady state diesel generator voltage and frequency limits, using the panel mounted diesel generator instrumentation and adjusted for instrument error, are ≥4080 and ≤4300 volts (Ref. 12), and ≥59.9 and ≤60.5 hertz (Ref. 13), respectively. If digital Maintenance and Testing Equipment (M&TE) is used instead of the panel mounted diesel generator instrumentation, the instrument error may be reduced, increasing the range for the indicated steady state voltage and frequency limits.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.20 (continued)

three

This SR is modified by (two) Notes. The reason for Note 1 is to minimize wear on the DG during testing. The reason for Note 2 is that during operation with the reactor critical, performance of this SR could cause perturbations to the EDS that could challenge continued steady state operation and, as a result, unit safety systems.

INSERT 1

REFERENCES:

1. 10 CFR 50, Appendix A, GDC 17

2. Updated FSAR, Chapter 8

3. Regulatory Guide 1.9, Revision 3, "Selection, Design, Qualification and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," July 1993.

4. Updated FSAR, Chapter 6

5. Updated FSAR, Chapter 15

6. Regulatory Guide 1.93, "Availability of Electric Power Sources," Revision 0, December 1974.

7. GL 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 1.137, "Fuel Oil Systems for Standby Diesel Generators," Revision 1, October 1979.

10. ANSI C84.1-1982

11. IEEE Standard 308-1974, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

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Insert 1

Note 3 states that the steady state voltage and frequency limits are analyzed values and have not been adjusted for instrument accuracy. The analyzed values for the steady-state diesel generator voltage limits are ≥4000 and ≤4377.2 volts and the analyzed values for the steady-state diesel generator frequency limits are ≥59.7 and ≤60.7 hertz. The indicated steady state diesel generator voltage and frequency limits, using the panel mounted diesel generator instrumentation and adjusted for instrument error, are ≥4080 and ≤4300 volts (Ref. 12), and ≥59.9 and ≤60.5 hertz (Ref. 13), respectively. If digital Maintenance and Testing Equipment (M&TE) is used instead of the panel mounted diesel generator instrumentation, the instrument error may be reduced, increasing the range for the indicated steady state voltage and frequency limits.

Insert 2

12. Calculation 13-EC-PE-123, "Diesel Generator voltage meter loop E-PEN-EI-G01/G02 uncertainty calculation."

13. Calculation 13-EC-PE-124, "Diesel Generator frequency meter loop E-PEN-SI-G01/G02 uncertainty calculation."