50-528

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 6, 1997

Mr. James M. Levine
Executive Vice President, Nuclear
Arizona Public Service Company
Post Office Box 53999
Phoenix, Arizona 85072-3999

SUBJECT: ISSUANCE OF AMENDMENTS FOR THE PALO VERDE NUCLEAR GENERATING STATION UNIT NO. 1 (TAC NO. M91918), UNIT NO. 2 (TAC NO. M91919), AND UNIT NO. 3 (TAC NO. M91920)

Dear Mr. Levine:

The Commission has issued the enclosed Amendment No. 114 to Facility Operating License No. NPF-41, Amendment No. 107 to Facility Operating License No. NPF-51, and Amendment No. 86 to Facility Operating License No. NPF-74 for the Palo Verde Nuclear Generating Station, Unit Nos. 1, 2, and 3, respectively. The amendments consist of changes to the Technical Specifications in response to your application dated March 24, 1995, as supplemented by letters dated September 10, 1995, and March 22, 1996.

These amendments change the existing TS to (1) reflect the applicable portions of NUREG-1432, "Standard Technical Specifications Combustion Engineering Plants," (2) implement the recommendations of GL 93-05, "Line-Item Technical Specification Improvements to Reduce Surveillance Requirements for Testing During Power Operations," and (3) implement the recommendations of GL 94-01, "Removal of Accelerated Testing and Specific Reporting Requirements for Emergency Diesel Generators." The purpose of the proposed amendment is to increase emergency diesel generator (EDG) reliability by reducing stresses on EDGs caused by unnecessary testing. The associated Bases have also been updated.

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A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly Federal Register notice

Sincerely,
Original Signed By
Kristine M. Thomas, Project Manager
Project Directorate IV-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-528, STN 50-529
and STN 50-530

Enclosures:
1. Amendment No. 114 to NPF-41
2. Amendment No. 107 to NPF-51
3. Amendment No. 86 to NPF-74
4. Safety Evaluation

cc w/encls: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-528

PALO VERDE NUCLEAR GENERATING STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 114
License No. NPF-41

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Arizona Public Service Company (APS or the licensee) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority dated March 24, 1995, as supplemented by letters dated September 10, 1995, and March 22, 1996, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Facility Operating License No. NPF-41 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 114, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of the date of issuance to be implemented within 120 days of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Kristine M. Thomas

Kristine M. Thomas, Project Manager
Project Directorate IV-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: October 6, 1997

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 114 TO FACILITY OPERATING LICENSE NO. NPF-41

DOCKET NO. STN 50-528

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain marginal lines indicating the areas of change. The corresponding overleaf pages are also provided to maintain document completeness.

REMOVE	INSERT
3/4 8-1	3/4 8-1
3/4 8-2	3/4 8-2
3/4 8-3	3/4 8-3
3/4 8-4	3/4 8-4
3/4 8-4a	---
3/4 8-5	3/4 8-5
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3/4 8-7	3/4 8-7
3/4 8-8	3/4 8-8
3/4 8-8a	3/4 8-8a
B 3/4 8-1	B 3/4 8-1
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---	B 3/4 8-22

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 The following AC electrical power sources shall be OPERABLE:

a. Two physically independent circuits from the offsite transmission network to the switchyard and two physically independent circuits from the switchyard to the onsite Class 1E distribution system, and

b. Two separate and independent emergency diesel generators (EDG).

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With one offsite circuit of LCO 3.8.1.1.a inoperable,

1. Demonstrate the OPERABILITY of the remaining OPERABLE offsite circuits by performing SR 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; AND

2. Declare the required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable within 24 hours from the discovery of no offsite power to one train concurrent with the inoperability of the redundant required feature(s); AND

3. a. Restore the offsite circuit to OPERABLE status within 72 hours AND within 6 days from the discovery of failure to meet LCO 3.8.1.1; OR

b. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one EDG of LCO 3.8.1.1.b inoperable[1],

1. Demonstrate the OPERABILITY of the OPERABLE offsite circuits by performing SR 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; AND

2. Declare the required feature(s) supported by the inoperable EDG inoperable when its redundant required feature(s) is inoperable within 4 hours from the discovery of an inoperable EDG concurrent with the inoperability of the redundant required feature(s); AND

[1] TS LCO 3.8.1.1 ACTION b.3 shall be completed if this condition is entered.

LIMITING CONDITION FOR OPERATION (Continued)

3. Determine that the OPERABLE EDG is not inoperable due to common mode failure within 24 hours, OR demonstrate the OPERABILITY of the remaining OPERABLE EDG by performing SR 4.8.1.1.2.a.2 within 24 hours; AND

4. a. Restore the EDG to OPERABLE status within 72 hours AND within 6 days from the discovery of failure to meet LCO 3.8.1.1; OR

   b. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With one offsite circuit and one EDG inoperable[1], restore one of the inoperable AC sources to OPERABLE status within 12 hours; OR be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With two of the required offsite circuits inoperable[2],

   1. Declare the required feature(s) inoperable when its redundant required feature(s) is inoperable within 12 hours from the discovery of two offsite circuits inoperable concurrent with the inoperability of the redundant required feature(s); AND

   2. Restore one offsite circuit to OPERABLE status within 24 hours; OR be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With two of the required EDGs inoperable[3], restore one EDG to OPERABLE status within 2 hours; OR be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

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[1] Enter applicable conditions and requirements of TS LCO 3.8.1.1 ACTION a and ACTION b. In addition, with no AC power source to one train, enter applicable conditions and ACTIONs of TS LCO 3.8.3.1, "Onsite Power Distribution Systems - Operating."

[2] Enter applicable conditions and requirements of TS LCO 3.8.1.1 ACTION a.

[3] Enter applicable conditions and requirements of TS LCO 3.8.1.1 ACTION b.

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each required offsite circuit of LCO 3.8.1.1.a shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignment and indicated power availability.

b. Demonstrated OPERABLE at least once per 18 months[1] by manually transferring the onsite Class 1E power supply from the normal offsite circuit to the alternate offsite circuit.

4.8.1.1.2 Each emergency diesel generator (EDG) of LCO 3.8.1.1.b shall be demonstrated OPERABLE:

a. At least once per 31 days by:

1. Verifying the day tank has a minimum level of 2.75 feet (550 gallons of fuel).

2. Verifying the EDG starts and achieves voltage at 4160 ± 420 volts and frequency at 60 ± 1.2 Hz[2].

3. Verifying the EDG is synchronized to its appropriate bus and gradually loaded to 4950 - 5500 kW and operates for at least 60 minutes[3].

b. At least once per 31 days by verifying the fuel oil transfer system operates to automatically transfer fuel oil from the storage tank to the day tank.

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[1] This surveillance shall not be performed in MODE 1, 2, 3, or 4. Credit may be taken for unplanned events that satisfy this SR.

[2] Performance of 4.8.1.1.2.c satisfies this SR. A fuel limited EDG start may be used for the SR as recommended by the manufacturer. When the fuel limited start procedure is not used, the time, voltage, and frequency tolerances of 4.8.1.1.2.c must be met. All EDG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading as recommended by the manufacturer.

[3] EDG loading may be conducted in accordance with the manufacturer's recommendations, including gradual load. Momentary transients outside the load range do not invalidate this test. This SR shall be conducted on only one EDG at a time. This SR shall be preceded by and immediately follow, without shutting down, a successful performance of 4.8.1.1.2.a.2 or 4.8.1.1.2.c.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

c. At least once per 184 days by verifying the EDG starts from normal standby condition and achieves in ≤ 10 seconds at least 3740 volts and 58.8 Hz, and subsequently achieves steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz[1]. Following the EDG start, perform SR 4.8.1.1.2.a.3.

d. At least once per 18 months by:

1. Verifying the EDG capability to reject a single largest load ≥ 842 kW for EDG A (Train A Normal Water Chiller) and ≥ 904 kW for EDG B (Train B Auxiliary Feedwater pump) without tripping on overspeed, while maintaining voltage at 4160 ± 420 volts and frequency at 60 ± 1.2 Hz[3].

2. Verifying the EDG capability to reject a load of 4950 - 5500 kW without tripping on overspeed. The EDG voltage shall not exceed 6200 volts during and following the load rejection[2].

3. Verifying on a simulated loss of offsite power signal[3]:

a. Deenergization of the emergency buses;

b. Load shedding from emergency buses;

c. EDG auto-starts and:

1. energizes the emergency buses with permanently connected loads in ≤ 10 seconds,

2. energizes auto-connected shutdown loads through the load sequencer,

3. maintains steady state voltage at 4160 ± 420 volts, and frequency at 60 +1.2/-0.3 Hz[4], and

4. operates for ≥ 5 minutes while loaded with shutdown loads.

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[1] Performance of this SR may also serve to meet the requirements of SR 4.8.1.1.2.a.2. All EDG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading as recommended by the manufacturer.

[2] This Surveillance shall not be performed in MODE 1 or 2.

[3] This Surveillance shall not be performed in MODE 1, 2, 3, or 4.

[4] Momentary transients do not invalidate this test.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

4. Verifying that on an ESF actuation test signal (without a loss of power) the EDG auto-starts and:

   a. Achieves a steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz; and

   b. operates for ≥ 5 minutes on standby (running unloaded).[3]

5. Verifying on a simulated loss of offsite power signal in conjunction with an ESF actuation test signal:[3]

   a. Deenergization of the emergency buses;
   b. Load shedding from emergency buses;
   c. EDG auto-starts from normal standby condition and;

      1. energizes the emergency buses with permanently connected loads in ≤ 10 seconds,
      2. energizes auto-connected emergency (accident) loads through the load sequencer,
      3. maintains steady state voltage at 4160 ± 420 volts, and frequency at 60 +1.2/-0.3 Hz, and
      4. operates for ≥ 5 minutes while loaded with emergency loads.

6. Verifying that all automatic EDG trips are bypassed during emergency operation, except:[2]

   a. Engine overspeed,
   b. Generator differential,
   c. Engine low lube oil pressure, and
   d. Manual emergency stop trip.

7. Verifying each EDG operates for ≥ 24 hours:[2,4]

   a. For ≥ 22 hours of the test, the EDG shall be loaded to 4950-5500 kW[1], and

   b. For ≥ 2 continuous hours of the test, the EDG shall be loaded to 5775-6050 kW.[1]

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[1] Momentary transients outside the load range do not invalidate this test.
[2] This Surveillance shall not be performed in MODE 1 or 2.
[3] This Surveillance shall not be performed in MODE 1, 2, 3, or 4.
[4] The EDG may be prelubed, warmed up, and loaded in accordance with the manufacturer's recommendations.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

8. Within 5 minutes of shutting down the EDG after the EDG has operated at 4950 - 5500 kW for 2 hours or until operating temperatures have stabilized,[1,2] verifying that the EDG starts and achieves in ≤ 10 seconds at least 3740 volts and 58.8 Hz, and maintains steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz.

9. Verifying each EDG:[3]

   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. Return to standby operation (running unloaded).

10. Verifying, with the EDG operating in test mode and connected to its bus, a simulated SIAS overrides the test mode by:[3]

    a. Returning the EDG to standby operation (running unloaded); and

    b. the Class 1E bus remains energized with offsite power.

11. Verifying that the automatic load sequencers are OPERABLE with the interval between each load block within ± 1 second of its design interval.[3]

e. At least once per 10 years, verifying, when started simultaneously each EDG achieves in ≤ 10 seconds at least 3740 volts and 58.8 Hz, and maintains steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz.[2,4]

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[1] Momentary transients outside the load range do not invalidate this test.
[2] This Surveillance shall not be performed in MODE 1 or 2.
[3] This Surveillance shall not be performed in MODE 1, 2, 3, or 4.
[4] Credit may be taken for unplanned events or for testing after any modifications which could affect EDG interdependence that satisfy this SR.

ELECTRICAL POWER SYSTEMS

A.C. SOURCES

SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.1.2 The following AC electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. One emergency diesel generator (EDG)

APPLICABILITY: MODES 5 and 6

ACTION:

With less than the above minimum required AC electrical power sources OPERABLE,[1] immediately suspend all operations involving:

1. CORE ALTERATIONS,

2. Movement of irradiated fuel assemblies,

3. Positive reactivity additions, and

4. Crane operation with loads over the fuel storage pool.

Immediately initiate action to restore the required sources to OPERABLE status.

SURVEILLANCE REQUIREMENTS

4.8.1.2 For AC sources required to be OPERABLE, the SRs of TS LCO 3.8.1.1, AC Sources - Operating," except SR 4.8.1.1.1.b, SR 4.8.1.1.2.d.4, SR 4.8.1.1.2.d.10, and SR 4.8.1.1.2.e, are applicable.[2]

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[1] With no AC power source to one train as a result of one offsite circuit inoperable, enter applicable conditions and ACTIONs of TS LCO 3.8.3.2, "Onsite Power Distribution Systems - Shutdown."

[2] The following SRs are not required to be performed:
SR 4.8.1.1.2.a.3 and
SR 4.8.1.1.2.d.

ELECTRICAL POWER SYSTEMS

A.C. SOURCES

DIESEL FUEL OIL STORAGE SYSTEM - DIESEL FUEL OIL REQUIREMENTS

LIMITING CONDITION FOR OPERATION

3.8.1.3.1 Each diesel fuel oil storage system shall be within its limits.

APPLICABILITY: When the associated EDG is required to be OPERABLE.

ACTION:

a. With either EDG fuel oil storage system < 80% indicated fuel level but ≥ 71% indicated fuel level, restore the fuel oil level to within its limit within 48 hours or declare the associated EDG inoperable.[1]

b. With either EDG fuel oil storage system with stored fuel oil viscosity not within limits, restore fuel oil to within limits within 30 days or declare the associated EDG inoperable.[1]

c. With either EDG fuel oil storage system with stored fuel oil water and sediment not within limits, immediately declare the associated EDG inoperable.[1]

SURVEILLANCE REQUIREMENTS

4.8.1.3.1.1 At least once per 31 days, verify that the fuel level in the fuel storage tank is within its limits.

4.8.1.3.1.2 At least once per 92 days, verify that a sample of diesel fuel from the fuel storage tank obtained in accordance with ASTM-D4176-82 is within the acceptable limits specified in Table 1 of ASTM D975-81 when checked for viscosity, water, and sediment.

[1] A separate condition entry is allowed for each EDG.

ELECTRICAL POWER SYSTEMS

A.C. SOURCES

DIESEL FUEL OIL STORAGE SYSTEM - CATHODIC PROTECTION

LIMITING CONDITION FOR OPERATION

3.8.1.3.2 The Cathodic Protection System associated with the EDG diesel fuel oil storage tanks shall be OPERABLE.

APPLICABILITY: At all times.

ACTION:

a. With the cathodic protection system inoperable for more than 30 days, prepare and submit a Special Report to the Commission pursuant to TS 6.9.2 within the next 10 days outlining the cause of the malfunction and the plans for restoring the system to OPERABLE status.

b. The provisions of TS 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.8.1.3.2 Verify that the cathodic protection system is OPERABLE at the following time intervals:

1. Verify at least once per 61 days that the cathodic protection rectifiers are OPERABLE and have been inspected in accordance with Regulatory Guide 1.137.

2. Verify at least once per 12 months that the cathodic protection is OPERABLE and providing adequate protection against corrosion in accordance with Regulatory Guide 1.137.

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1.1 A.C. SOURCES

OPERATING

BASES

The OPERABILITY of the AC and DC power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety-related equipment required for (1) the safe shutdown of the unit and (2) the mitigation and control of accident conditions within the unit. As required by 10CFR50, Appendix A, GDC 17, 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 AC sources in one train must be separate and independent (to the extent possible) of the AC sources in the other train. For the EDGs, separation and independence are complete.

The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set of onsite AC and DC power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss-of-offsite power and single failure of the other onsite AC source.

Two physically independent circuits from the offsite transmission network to the switchyard and two physically independent circuits from the switchyard to the onsite Class 1E distribution system, and two separate and independent EDG 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 design basis accident (DBA).

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. Each EDG must be capable of supplying one train of the onsite Class 1E AC Power Distribution System (PDS). Each EDG must be capable of starting, accelerating to rated speed (i.e., frequency) and voltage, and connecting to its respective ESF bus on detection of bus undervoltage in $\leq$ 10 seconds. Each EDG 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.

The ACTION requirements specified for the level of degradation of the power sources provide restriction upon continued unit operation commensurate with the level of degradation.

ACTIONS:

a.1 To ensure a highly reliable power source remains with the one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. Since the ACTION only specifies "perform," a failure of SR 4.8.1.1.1.a acceptance

criteria does not result in an ACTION not being met. However, if a second offsite circuit fails SR 4.8.1.1.1.a, the second required circuit is inoperable, and TS 3.8.1.1 ACTION d, for two offsite circuits inoperable, is entered.

a.2 This ACTION, which only applies if the train (i.e., ESF bus) cannot be powered from an offsite source, is intended to provide assurance that an event coincident with a single failure of the associated EDG will not result in a complete loss of safety function of critical redundant required features. These features require Class 1E power from PBA-S03 or PBB-S04 ESF buses to be OPERABLE, and include: charging pumps (TS 3.1.2.4); radiation monitors Train A RU-29, Train B RU-30, Train A RU-31, and Train B RU-145 (TS 3.3.3.1 and ODCM 2.1); pressurizer heaters (TS 3.4.3.1); ECCS (TS 3.5.2); containment spray (TS 3.6.2.1); containment isolation valves NCA-UV-402, NCB-UV-403, WCA-UV-62, and WCB-UV-61 (TS 3.6.3); containment hydrogen monitors (TS 3.6.4.1); containment electric hydrogen recombiners (TS 3.6.4.2); auxiliary feedwater pumps (TS 3.7.1.2); essential cooling water loops (TS 3.7.3); essential spray pond loops (TS 3.7.4); ultimate heat sink (TS 3.7.5); essential chilled water loops (TS 3.7.6); control room essential filtration (TS 3.7.7); ESF pump room air exhaust cleanup (TS 3.7.8); shutdown cooling subsystems (TS 3.7.11 and 3.4.1.3); and fuel building ventilation (TS 3.9.12). Mode applicability is as specified in each appropriate TS section.

The 24 hour completion time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 24 hours also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." The completion time only begins on discovery that both:

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

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

If at any time during the existence of one offsite circuit inoperable, a redundant required feature subsequently becomes inoperable, the 24 hour time begins to be tracked.

Discovering no offsite power to one train of the onsite Class 1E PDS 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 24 hour clock. 24 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.

The remaining OPERABLE offsite circuit and EDGs are adequate to supply electrical power to Train A and Train B of the onsite Class 1E PDS. 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 RG 1.93, operation may continue with one offsite circuit inoperable 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. However, the remaining OPERABLE offsite circuit and EDGs are adequate to supply electrical power to the onsite Class 1E PDS.

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.

The 6 day completion time (6 days from the discovery of the failure to meet the LCO) for restoring the offsite circuit to OPERABLE status establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. For example, if one offsite circuit is inoperable while an EDG is inoperable, and that EDG is subsequently returned to OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the offsite circuit. At this time, an EDG could again become inoperable, the circuit restored to OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day completion time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is reasonable for situations in which both the offsite circuit and the EDG are inoperable concurrently. The AND connector between the 72 hour and 6 day completion times means that both completion times apply simultaneously, and the more restrictive completion time must be met.

The completion time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time ACTION a was entered.

b.1 To ensure a highly reliable power source remains with an inoperable EDG, it is necessary to verify the availability of the offsite circuits on a more frequent basis. Since the ACTION only specifies "perform," a

failure of SR 4.8.1.1.1.a acceptance criteria does not result in an ACTION not being met. However, if a offsite circuit fails to pass the SR, it is inoperable. Upon offsite circuit inoperability, additional conditions and ACTIONs must then be entered.

b.2 This ACTION is intended to provide assurance that a loss of offsite power, during the period that an EDG is inoperable, does not result in a complete loss of safety function of redundant required features. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable EDG. These features require Class 1E power from PBA-S03 or PBB-S04 ESF buses to be OPERABLE, and include: charging pumps (TS 3.1.2.4); radiation monitors Train A RU-29, Train B RU-30, Train A RU-31, and Train B RU-145 (TS 3.3.3.1 and ODCM 2.1); pressurizer heaters (TS 3.4.3.1); ECCS (TS 3.5.2); containment spray (TS 3.6.2.1); containment isolation valves NCA-UV-402, NCB-UV-403, WCA-UV-62, and WCB-UV-61 (TS 3.6.3); containment hydrogen monitors (TS 3.6.4.1); containment electric hydrogen recombiners (TS 3.6.4.2); auxiliary feedwater pumps (TS 3.7.1.2); essential cooling water loops (TS 3.7.3); essential spray pond loops (TS 3.7.4); ultimate heat sink (TS 3.7.5); essential chilled water loops (TS 3.7.6); control room essential filtration (TS 3.7.7); ESF pump room air exhaust cleanup (TS 3.7.8); shutdown cooling subsystems (TS 3.7.11 and 3.4.1.3); and fuel building ventilation (TS 3.9.12). Mode applicability is as specified in each appropriate TS section.

The 4 hour completion time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 4 hours also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." The completion time only begins on discovery that both:

a. An inoperable EDG exists; and

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

If at any time during the existence of one EDG inoperable, a required feature subsequently becomes inoperable, the 4 hour time begins to be tracked.

Discovering one required EDG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE EDG, results in starting the 4 hour clock 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.

The remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to onsite Class 1E PDS. 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 This ACTION provides an allowance to avoid unnecessary testing of OPERABLE EDGs. If it can be determined that the cause of the inoperable EDG does not exist on the OPERABLE EDG, SR 4.8.1.1.2.a does not have to be performed. If the cause of inoperability exists on the other EDG, the other EDG would be declared inoperable upon discovery and TS 3.8.1.1 ACTION e would be entered. Once the failure is repaired, the common mode failure no longer exists and this ACTION is satisfied. If the cause of the initial inoperable EDG cannot be confirmed not to exist on the remaining EDG, performance of SR 4.8.1.1.2.a within the initial 24 hour period suffices to provide assurance of continued OPERABILITY of that EDG.

In the event the inoperable EDG is restored to OPERABLE status prior to completing this ACTION, an evaluation will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in ACTION b.

According to GL 84-17, 24 hours is reasonable to confirm that the OPERABLE EDG is not affected by the same problem as the inoperable EDG.

b.4 According to RG 1.93, operation may continue with one EDG inoperable for a period that should not exceed 72 hours. The remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E PDS. 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.

The 6 day completion time (6 days from the discovery of the failure to meet the LCO) for restoring the EDG to OPERABLE status establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. For example, if one EDG is inoperable while an offsite circuit is inoperable, and that circuit is subsequently returned to OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the EDG. At this time, an offsite circuit could again become inoperable, the EDG restored to OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day completion time provides a limit on

the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is reasonable for situations in which both the offsite circuit and the EDG are inoperable concurrently. The AND connector between the 72 hour and 6 day completion times means that both completion times apply simultaneously, and the more restrictive completion time must be met.

The completion time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time ACTION b was entered.

c According to RG 1.93, operation may continue with one offsite circuit and one EDG inoperable for a period that should not exceed 12 hours. 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.

d.1 This ACTION, which applies when two offsite circuits are inoperable due to voltage outside the acceptable operating band or if both trains of the onsite Class 1E PDS (i.e., ESF buses) cannot be powered from an offsite source, 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. The rationale for the reduction to 12 hours is that RG 1.93 allows a completion time of 24 hours for two required offsite circuits inoperable, based on 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 require Class 1E power from PBA-S03 or PBB-S04 ESF buses to be OPERABLE, and include: charging pumps (TS 3.1.2.4); radiation monitors RU-29, RU-30, RU-31, and RU-145 (TS 3.3.3.1 and ODCM 2.1); pressurizer heaters (TS 3.4.3.1); ECCS (TS 3.5.2); containment spray (TS 3.6.2.1); containment isolation valves NCA-UV-402, NCB-UV-403, WCA-UV-62, and WCB-UV-61 (TS 3.6.3); containment hydrogen monitors (TS 3.6.4.1); containment electric hydrogen recombiners (TS 3.6.4.2); auxiliary feedwater pumps (TS 3.7.1.2); essential cooling water loops (TS 3.7.3); essential spray pond loops (TS 3.7.4); ultimate heat sink (TS 3.7.5); essential chilled water loops (TS 3.7.6); control room essential filtration (TS 3.7.7); ESF pump room air exhaust cleanup (TS 3.7.8); shutdown cooling subsystems (TS 3.7.11 and 3.4.1.3); and fuel building ventilation (TS 3.9.12). Mode applicability is as specified in each appropriate TS section.

BASES

The 12 hour completion time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 12 hours also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." 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 two offsite circuits inoperable, and a required feature becomes inoperable, the 12 hour time begins to be tracked.

d.2 According to RG 1.93, operation may continue with two offsite circuits inoperable 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 EDGs 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.

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 worse 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 RG 1.93, 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 TS LCO 3.8.1.1 ACTION a.

e. With Train A and Train B EDGs 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 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). Any inadvertent generator trip could also result in a total loss of offsite AC power. Therefore, the time allowed for continued operation is severely restricted. The intent of this ACTION, with both EDGs inoperable, is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to RG 1.93, with both EDGs inoperable, operation may continue for a period that should not exceed 2 hours.

ACTION requirements 3.8.1.1.f and 3.8.1.1.g provide restrictions upon continued unit operation commensurate with degradation of switchyard voltage and restoration of OPERABILITY of the required A.C. sources. In an effort to minimize the risk to the health and safety to the public, ACTIONS 3.8.1.1.f and 3.8.1.1.g balance the risk of a forced shutdown against the risk of remaining at power with a switchyard voltage in the lower portion of the expected range. The risk during ACTIONS 3.8.1.1.f and 3.8.1.1.g due to a switchyard voltage in the lower portion of the expected range and an independent accident is less than the risk associated with a normal shutdown including a reactor trip.

Conformance to GDC-17 requires maintenance of switchyard voltages at or above those identified in ACTIONS 3.8.1.1.f and 3.8.1.1.g. At voltages below those identified, a unit trip resulting from an ESF signal, coincident with low switchyard voltages, will result in sequencing of ESF equipment on preferred offsite power. The Class 1E degraded voltage relays will detect a sustained degraded voltage due to the fast bus transfer of non-Class 1E loads from the auxiliary transformers to the startup transformers. The relays will actuate to strip the ESF equipment and resequence it on the emergency diesel generator. This "double sequencing" causes an interruption in equipment credited with specific response time in the UFSAR Chapter 6 and 15 safety analysis, and is unanalyzed. Maintenance of switchyard voltage at or above the specified value prevents this effect as does the configurations authorized by ACTIONS 3.8.1.1.f and 3.8.1.1.g. The required voltage is higher when three units are operating on two startup transformers, as

two secondary windings of the startup transformers must each supply ESF power to two units.

ACTIONS 3.8.1.1.f.1 and 3.8.1.1.g.1 are preferred over ACTIONS 3.8.1.1.f.2 and 3.8.1.1.g.2. ACTIONS 3.8.1.1.f.1 and 3.8.1.1.g.1 are designed to balance the probability of double sequencing (should no actions to mitigate be undertaken) due to switchyard voltage in the lower portion of the expected range coincident with an accident, which is unlikely, against the probability of natural circulation (should both trains of fast bus transfer be blocked) due to a unit trip coincident with switchyard voltage in the lower portion of the expected range, which is also unlikely but more probable. ACTIONS 3.8.1.1.f.1 and 3.8.1.1.g.1 provides offsite power to half of the non-class 1E loads for forced circulation to respond to a normal plant trip, as well as EDG power and the second offsite power circuit to the two trains of ESF equipment to respond to any accident. ACTIONS 3.8.1.1.f.2 and 3.8.1.1.g.2 are provided to allow operation of both trains of fast bus transfer blocked in the unlikely event of problems with the emergency diesel generators.

SURVEILLANCE REQUIREMENTS:

The surveillance requirements for demonstrating OPERABILITY of the emergency diesel generators (EDG) are based on the recommendations of Regulatory Guide (RG) 1.9, Revision 3, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," unless otherwise noted in the Updated FSAR Section 1.8.

All planned EDG starts may be preceded by an engine prelube period as recommended by the manufacturer in order to minimize wear and tear on the EDGs during testing. The EDG capabilities (starting and loading) are required to be met from a variety of initial conditions such as EDG in standby with the engine hot (SR 4.8.1.1.2.d.8), EDG in standby with the engine at normal standby conditions (SR 4.8.1.1.2.c and SR 4.8.1.1.2.d.5.c), and EDG operating in a parallel test mode (SR 4.8.1.1.2.d.10). Although it is expected that most EDG starts will be performed from normal standby conditions, EDG starts, except as specified in the SR, may be performed with the jacket water cooling and lube oil temperatures within the lower to upper limits of EDG OPERABILITY. Lube oil and jacket water cooling within manufacturer's recommended temperatures constitutes normal standby condition. Rapid cooling of the EDG down to normal standby conditions should be minimized.

The timed start ($\leq$ 10 seconds) is satisfied when the EDG achieves at least 3740 volts and 58.8 Hz. At these values, the EDG output breaker permissives are satisfied; and on detection of bus undervoltage or loss of power, the EDG breakers would close reenergizing its respective ESF bus. Following the timed start, it is expected that the rated speed (i.e., frequency) and voltage will stabilize and maintain steady state voltage at 4160 $\pm$ 420 volts and frequency at 60 +1.2/-0.3 Hz.

BASES

The required steady state frequency range for the EDG is 60 +1.2/-0.3 Hz to be consistent with the safety analysis to provide adequate safety injection flow. In accordance with the guidance provided in RG 1.9, 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).

Surveillance load testing uses the referenced equipment or equivalent loading.

4.8.1.1.1

a. This SR assures proper circuit continuity and indicated 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 7 day frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

b. This SR demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The 18 month frequency is based on engineering judgement, taking into consideration the unit conditions required to perform the SR, and is intended to be consistent with 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 is concluded to be acceptable from a reliability standpoint.

The reason for the footnote "This Surveillance shall not be performed in MODE 1, 2, 3, or 4" is that performing this SR would remove a required offsite circuit from service, perturb the electrical distribution system (EDS), and challenge safety systems.

4.8.1.1.2

a.1 The 31 day SR is adequate to assure that a sufficient supply of fuel oil is available, since low level alarms are provided in the control room. In addition, operators would be aware of any large uses of fuel oil during this period.

a.2 This SR helps 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.

In order to reduce stress and wear on diesel engines, the EDG may be tested using a fuel limited start as opposed to a fast start (≤ 10 seconds) during the 31 day SR. A fuel limited start is an EDG start in which the amount of fuel is temporarily restricted during the start to cause a more gradual acceleration to rated frequency and voltage than would occur during a start in Emergency Mode. The fast start is required to be performed during the 184 day SR. Reducing fast starts would avoid premature wear of the engine and lead to greater EDG reliability and availability. The change is consistent with the GL 84-15 recommendations for changes to the TS to reduce the number of fast starts and improve reliability. Performing the fast start test every 184 days will adequately demonstrate the EDG's present level of reliability and availability. However, if a fuel limited start is not used, the time, voltage, and frequency tolerances of 4.8.1.1.2.c must be met.

This change is also consistent with the guidance provided in RG 1.9 which states that for monthly SRs, the EDG can be brought to rated speed and voltage in a time that is recommended by the manufacturer to minimize stress and wear (slow started).

The 184 day SR 4.8.1.1.2.c requires a fast start (≤ 10 seconds), is more restrictive than SR 4.8.1.1.2.a.2, and may be performed in lieu of SR 4.8.1.1.2.a.2.

a.3 This SR verifies that the EDGs are capable of synchronizing with the offsite electrical system and accepting loads of 90 to 100 percent (4950 - 5500 kW) of the continuous rating of the EDG. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the EDG is connected to the offsite source. However, additional runtime in excess of 60 minutes may be performed as recommended by the manufacturer. This SR should be conducted on only one EDG at a time in order to avoid common mode failures that might result from offsite circuit or grid perturbations. A successful EDG start (SR 4.8.1.1.2.a.2 or SR 4.8.1.1.2.c) must precede this test to credit satisfactory performance.

Consistent with the guidance provided in RG 1.9 for monthly SRs, the EDG can be loaded at a rate that is recommended by the manufacturer to minimize stress and wear (gradual loading).

Consistent with the guidance provided in the RG 1.9 load-run test description, the 4950 - 5500 kW band will demonstrate 90 to 100 percent of the continuous rating of the EDG. The load band (4950 - 5500 kW) is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing may be performed within the guidance of the generator capability curve. Momentary transients because of changing bus loads do not invalidate this test.

b. This SR demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank, in order to support continuous operation of the EDG. This SR 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 control systems for automatic fuel transfer systems are OPERABLE.

An OPERABLE fuel oil transfer system is required to ensure that the 7 days of inventory of fuel in the fuel storage system is capable of being transferred to the fuel oil day tank for utilization by the EDGs.

The frequency is based upon the rate of full load fuel oil consumption, the level control system, and the fuel oil transfer pump capability, which transfer approximately hourly during full load operation.

c. The bases for 4.8.1.1.2.a.2 also apply to this SR. The 184 day frequency for 4.8.1.1.2.c imposes a reduction in fast start SRs consistent with GL 84-15. The 31 day and 184 day frequencies provide adequate assurance of EDG OPERABILITY, while minimizing degradation resulting from testing. RG 1.9 fast-start test description specifies that the EDG is to start from standby condition.

d. In general, unless otherwise specified, the SR frequency of 18 months is consistent with the recommendations of RG 1.9, and is intended to be consistent with expected fuel cycle lengths.

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 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; or that performing the SR would remove a required EDG from service. The reason for "This Surveillance shall not be performed in MODE 1, 2, 3, or 4" is that performing this SR would remove a required offsite circuit from service, perturb the EDS, and challenge safety systems.

d.1 The EDG 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 the diesel engine to overspeed, which, if excessive, might result in a trip of the engine. This SR demonstrates the EDG load response characteristics and capability to reject the single largest, 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 904 kW) are the bounding loads for the EDG A and EDG B to reject, respectively. These values are listed in Table 8.3-3, Load Bases for Class 1E Buses, in the Updated FSAR.

BASES

d.2 This SR demonstrates the EDG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The EDG full load rejection may occur because of a system fault or inadvertent breaker tripping. This SR ensures proper engine generator load response under the simulated test conditions.

Consistent with the guidance provided in the RG 1.9 full-load rejection test description, the 4950 - 5500 kW band will demonstrate the EDG's capability to reject a load equal to 90 to 100 percent of its continuous rating. Administrative limits have been placed upon the Class 1E 4160 V buses due to high voltage concerns. As a result, power factors deviating much from unity are currently not possible when the EDG runs parallel to the grid. To the extent practicable, VARs will be provided by the EDG during this SR.

d.3 This SR demonstrates the as-designed operation of the emergency standby power sources during a loss of the offsite source, and also demonstrates the capability of the EDG to automatically achieve the required voltage and frequency within the required time, as specified in RG 1.9, paragraph 2.2.4.

The requirement to verify the connection and power supply of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the EDG loading logic. In certain circumstances, many of these loads cannot actually be connected without undue hardship or potential for undesired operation. For example, ECCS injection valves are not desired to be stroked open, HPSI systems are not 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, testing that adequately shows the capability of the EDG 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.

d.4 This SR demonstrates that the EDG automatically starts and achieves the required voltage and frequency from the design basis actuation signal (LOCA signal) and operates for $\geq$ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability. The primary purpose of this SR is to test the circuitry of a safety injection actuation signal with offsite power available and to verify that the EDG receives a start signal.

d.5 In the event of a DBA coincident with a loss of offsite power, the EDGs are required to supply the necessary power to ESF systems so that fuel, RCS, and containment design limits are not exceeded.

This SR demonstrates the EDG operation, as discussed in the Bases for 4.8.1.1.2.d.3, 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 EDG 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.

d.6 This SR demonstrates that the EDG noncritical protective functions are bypassed during emergency operation, and that the critical protective functions trip the EDG to avert substantial damage to the EDG 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 EDG 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 EDG.

d.7 The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.9. The provisions for prelubricating and warmup, discussed in SR 4.8.1.1.2.a.2, and for gradual loading, discussed in SR 4.8.1.1.2.a.3, are applicable to this SR.

Per the guidance in RG 1.9, in order to demonstrate the full-load carrying capability for an interval of not less than 24 hours, the 2 hour interval is to be performed at a load equal to 105 to 110 percent of the continuous rating of the EDG (5775 - 6050 kW), and the 22 hour interval is to be performed at a load equal to 90 to 100 percent of its continuous rating (4950 - 5500 kw).

The reason for footnote 1 (Momentary transients outside the load range do not invalidate this test) is that this band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing under direct monitoring of the manufacturer or momentary variations due to changing bus loads shall not invalidate the test.

d.8 This SR demonstrates that the EDG can restart from a hot condition, such as subsequent to a shutdown from a normal SR, and achieve the required voltage and frequency in $\leq$ 10 seconds. The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.10.

Running for 2 hours or until operating temperatures have stabilized ensures that the test is performed with the EDG sufficiently hot. The load band is provided to avoid routine overloading of the EDG. Per the guidance in RG 1.9, this SR would demonstrate the hot restart functional capability at full-load temperature conditions, after the EDG has

operated for 2 hours (or until operating temperatures have stabilized) at full load (i.e., 4950 - 5500 kW).

d.9 The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.11. This SR ensures that the manual synchronization and automatic load transfer from the EDG to the offsite source can be made and that the EDG can be returned to standby status (running unloaded) when offsite power is restored.

d.10 Demonstration of the test mode override ensures that the EDG availability under accident conditions will not be compromised as the result of testing and the EDG will automatically reset to standby operation (running unloaded) if an ESF actuation signal is received during operation in the test mode. The provisions for automatic switchover are required by IEEE-308, paragraph 6.2.6(2). The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.13.

d.11 Each EDG is required to demonstrate proper operation for the DBA loading sequence to ensure that voltage and frequency are maintained within the required limits. The load sequence time interval tolerance ensures that sufficient time exists for the EDG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.4.

e. This SR demonstrates that the EDG starting independence has not been compromised; and that each engine can achieve proper speed within the specified time when the EDGs are started simultaneously. The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.3.2.4 and RG 1.137.

BASES

The OPERABILITY of the minimum specified AC power sources during shutdown and refueling ensures that (1) the unit can be maintained in the shutdown or refueling condition for extended time periods, (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status, and (3) adequate AC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

An OPERABLE offsite circuit ensures that all required loads are powered from offsite power. An OPERABLE EDG ensures a diverse power source is available to provide electrical power support assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and EDG ensures the availability of sufficient AC sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and reactor vessel draindown).

The OPERABLE offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses. It is acceptable for trains to be cross tied during shutdown conditions, allowing a single offsite power circuit to supply all required trains.

The OPERABLE EDG must be capable of supplying one train of the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.3.2.

The ACTION requirements specified for the level of degradation of the power sources provide restriction upon continued unit operation commensurate with the level of degradation.

ACTIONS:

Suspension of the specified activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability or the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the unit safety systems. The required ACTION to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory provided the required SDM is maintained.

Notwithstanding performance of the conservative required ACTIONs, the unit is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

BASES

The completion time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the unit safety systems may be without sufficient power.

When one offsite circuit is inoperable with no AC power to one ESF bus, the ACTIONs for TS LCO 3.8.3.2 must be immediately entered. The footnote allows the condition (no AC power source to one train as a result of one offsite circuit inoperable) to provide requirements for the loss of the offsite circuit, whether or not a train is deenergized. TS LCO 3.8.3.2 provides the appropriate restrictions for the situation involving a deenergized train.

SURVEILLANCE REQUIREMENTS:

SR 4.8.1.2 requires the SRs from TS LCO 3.8.1.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 4.8.1.1.1.b is not required to be met since only one offsite circuit is required to be OPERABLE. SR 4.8.1.1.2.d.4 and SR 4.8.1.1.2.d.10 are not required to be met because the ESF functions (i.e., AFAS and SIAS) are not required to be OPERABLE during shutdown. In addition, SR 4.8.1.1.2.d.10 is not required to be met because the required OPERABLE EDG is not required to undergo periods of being synchronized to the offsite circuit. SR 4.8.1.1.2.e is excepted because starting independence is not required with an EDG that is not required to be OPERABLE.

The reason for the footnote (The following SRs are not required to be performed) is to preclude requiring the OPERABLE EDG from being paralleled with the offsite power network or otherwise rendered inoperable. With limited AC sources available, a single event could compromise both the required circuit and the EDG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the EDG is required to be OPERABLE.

BASES

Each emergency diesel generator (EDG) is provided with a storage tank having a fuel oil capacity sufficient to operate that EDG for a period of 7 days, while the EDG is supplying maximum post loss of coolant accident load demand. The onsite fuel oil capacity is sufficient to operate the EDGs for longer than the time to replenish the onsite supply from outside sources.

A cross-connect capability exists for use when a failure has occurred in one of the EDG's fuel oil storage or transfer systems in order that the redundant system can be used to supply that EDG. However, cross-connecting the diesel fuel oil storage tanks during normal operations in Modes 1, 2, 3, or 4 would violate the independence and redundancy design criteria.

For proper operation of the standby EDGs, it is necessary to ensure the proper quality of the fuel oil. RG 1.137 addresses the recommended fuel oil practices. The fuel oil properties governed by these SRs are the water and sediment content, and the viscosity.

EDG day tank fuel requirements, as well as transfer capability from the storage tank to the day tank, are addressed in both LCO 3.8.1.1, "A.C. Sources - Operating," and LCO 3.8.1.2, "A.C. Sources - Shutdown."

A cathodic protection system is provided for the fuel oil storage tanks and piping located underground. The external corrosion protection as well as cathodic protection has been provided for the tanks to minimize external corrosion. The cathodic protection system consists of a number of rectifiers and deep bed anodes producing a direct current flow through the ground to the metallic objects buried in the soil which require corrosion protection.

If any other metallic structures (e.g., buildings, new or modified piping systems, conduit) are placed in the ground in the vicinity of the fuel oil storage system or if the original system is modified, the adequacy and frequency of inspections of the cathodic protection system shall be re-evaluated and adjusted in accordance with Regulatory Guide 1.137.

ACTIONS:

a. In this condition (i.e., $< 80\%$ indicated level but $\geq 71\%$ indicated level), the 7 day fuel oil supply (69,700 gallons of fuel) for an EDG is not available. However, the condition is restricted to fuel oil level reductions that maintain at least a 6 day supply (60,500 gallons of fuel). These circumstances may be caused by events such as full load operation required after an inadvertent start while at minimum required level; or feed and bleed operations, which may be necessitated by any number of oil quality degradations. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analysis required prior to addition of fuel oil to the tank. A period

of 48 hours is sufficient to complete the restoration of the required level prior to declaring the EDG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period. With the required ACTION and associated completion time not met, the associated EDG may be incapable of performing its intended function and must be immediately declared inoperable.

b. With the stored fuel oil viscosity not within the required limits, a period of 30 days is allowed for restoration. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if an EDG start and load was required during the 30 day frequency and the fuel oil viscosity was outside its limits, there is a high likelihood that the EDG would still be capable of performing its intended function. With the required ACTION and associated completion time not met, the associated EDG may be incapable of performing its intended function and must be immediately declared inoperable.

c. With the stored fuel oil water and sediment not within the required limits, the associated EDG may not be capable of performing its intended function and must be immediately declared inoperable.

SURVEILLANCE REQUIREMENTS:

SR 4.8.1.3.1.1 provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each EDG's operation for 7 days at full load. The 7 day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an outside source. The 31 day SR is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 4.8.1.3.1.2 ensures the availability of high quality fuel oil for the EDGs. The frequency of this test (92 days) takes into consideration the low humidity and infrequent rainfall at the site and is an exception to RG 1.137, and is consistent with UFSAR Section 1.8.

SR 4.8.1.3.2 ensures that the cathodic protection system is capable of minimizing external corrosion for the fuel oil storage tanks.

3/4.8.2 and 3/4.8.3 D.C. SOURCES and ONSITE POWER DISTRIBUTION SYSTEMS

BASES

The OPERABILITY of the AC and DC power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety-related equipment required for (1) the safe shutdown of the unit and (2) the mitigation and control of accident conditions within the unit. As required by 10CFR50, Appendix A, GDC 17, 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 OPERABILITY of the minimum specified AC and DC power sources and associated distribution systems during shutdown and refueling ensures that (1) the unit can be maintained in the shutdown or refueling condition for extended time periods, (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status, and (3) adequate AC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set of onsite AC and DC power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss-of-offsite power and single failure of the other onsite AC source.

The ACTION requirements specified for the level of degradation of the power sources provide restriction upon continued unit operation commensurate with the level of degradation.

The surveillance requirement for demonstrating the OPERABILITY of the Station batteries are based on the recommendations of RG 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plant," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage on float charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.

Table 4.8-2 specifies the normal limits for each designated pilot cell and each connected cell for electrolyte level, float voltage and specific gravity. The limits for the designated pilot cells float voltage and specific gravity, greater than 2.13 volts (Exide) 2.18 volts (AT&T) and 0.010 below the manufacturer's full charge specific gravity or a battery charger current that had stabilized at a low value, is characteristic of a charged cell with adequate capacity. The normal limits for each connected cell for float voltage and specific gravity, greater than 2.13 volts (Exide) 2.18 volts

BASES

(AT&T) and not more than 0.020 below the manufacturer's full charge specific gravity with an average specific gravity of all the connected cells not more than 0.010 below the manufacturer's full charge specific gravity, ensures the OPERABILITY and capability of the battery.

Operation with a battery cell's parameter outside the normal limit but within the allowable value specified in Table 4.8-2 is permitted for up to 7 days. During this 7-day period: (1) the allowable values for electrolyte level ensures no physical damage to the plates with an adequate electron transfer capability; (2) the allowable value for the average specific gravity of all the cells, not more than 0.020 below the manufacturer's recommended full charge specific gravity, ensures that the decrease in rating will be less than the safety margin provided in sizing; (3) the allowable value for an individual cell's specific gravity, ensures that an individual cell's specific gravity will not be more than 0.040 below the manufacturer's full charge specific gravity and that the overall capability of the battery will be maintained within an acceptable limit; and (4) the allowable value for an individual cell's float voltage, greater than 2.07 volts (Exide) 2.14 volts (AT&T), ensures the battery's capability to perform its design function.

BASES

REFERENCES:

1. 10 CFR 50, Appendix A, GDC 17
2. Updated FSAR, Chapter 1
3. Updated FSAR, Chapter 8
4. GL 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.
5. RG 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.
6. RG 1.93, "Availability of Electric Power Sources," Revision 0, December 1974.
7. RG 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," Revision 1, February 1978
8. RG 1.137, "Fuel Oil Systems for Standby Diesel Generators," Revision 1, October 1979.
9. ASME, Boiler and Pressure Vessel Code, Section XI
10. IEEE Standard 308-1974, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."
11. IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement"of Large Lead Storage Batteries for Generating Stations."

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-529

PALO VERDE NUCLEAR GENERATING STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 107
License No. NPF-51

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Arizona Public Service Company (APS or the licensee) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority dated March 24, 1995, as supplemented by letters dated September 10, 1995, and March 22, 1996, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Facility Operating License No. NPF-51 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 107, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of the date of issuance to be implemented within 120 days of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Kristine M. Thomas

Kristine M. Thomas, Project Manager
Project Directorate IV-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: October 6, 1997

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 107 TO FACILITY OPERATING LICENSE NO. NPF-51

DOCKET NO. STN 50-529

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change. The corresponding overleaf pages are also provided to maintain document completeness.

REMOVE	INSERT
3/4 8-1	3/4 8-1
3/4 8-2	3/4 8-2
3/4 8-3	3/4 8-3
3/4 8-4	3/4 8-4
3/4 8-4a	---
3/4 8-5	3/4 8-5
3/4 8-6	3/4 8-6
3/4 8-7	3/4 8-7
3/4 8-8	3/4 8-8
3/4 8-8a	3/4 8-8a
B 3/4 8-1	B 3/4 8-1
B 3/4 8-2	B 3/4 8-2
B 3/4 8-3	B 3/4 8-3
B 3/4 8-4	B 3/4 8-4
---	B 3/4 8-5
---	B 3/4 8-6
---	B 3/4 8-7
---	B 3/4 8-8
---	B 3/4 8-9
---	B 3/4 8-10
---	B 3/4 8-11
---	B 3/4 8-12
---	B 3/4 8-13
---	B 3/4 8-14
---	B 3/4 8-15
---	B 3/4 8-16
---	B 3/4 8-17
---	B 3/4 8-18
---	B 3/4 8-19
---	B 3/4 8-20
---	B 3/4 8-21
---	B 3/4 8-22

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 The following AC electrical power sources shall be OPERABLE:

a. Two physically independent circuits from the offsite transmission network to the switchyard and two physically independent circuits from the switchyard to the onsite Class 1E distribution system, and

b. Two separate and independent emergency diesel generators (EDG).

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With one offsite circuit of LCO 3.8.1.1.a inoperable,

1. Demonstrate the OPERABILITY of the remaining OPERABLE offsite circuits by performing SR 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; AND

2. Declare the required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable within 24 hours from the discovery of no offsite power to one train concurrent with the inoperability of the redundant required feature(s); AND

3. a. Restore the offsite circuit to OPERABLE status within 72 hours AND within 6 days from the discovery of failure to meet LCO 3.8.1.1; OR

b. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one EDG of LCO 3.8.1.1.b inoperable[1],

1. Demonstrate the OPERABILITY of the OPERABLE offsite circuits by performing SR 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; AND

2. Declare the required feature(s) supported by the inoperable EDG inoperable when its redundant required feature(s) is inoperable within 4 hours from the discovery of an inoperable EDG concurrent with the inoperability of the redundant required feature(s); AND

[1] TS LCO 3.8.1.1 ACTION b.3 shall be completed if this condition is entered.

LIMITING CONDITION FOR OPERATION (Continued)

3. Determine that the OPERABLE EDG is not inoperable due to common mode failure within 24 hours, OR demonstrate the OPERABILITY of the remaining OPERABLE EDG by performing SR 4.8.1.1.2.a.2 within 24 hours; AND

4. a. Restore the EDG to OPERABLE status within 72 hours AND within 6 days from the discovery of failure to meet LCO 3.8.1.1; OR

   b. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With one offsite circuit and one EDG inoperable[1], restore one of the inoperable AC sources to OPERABLE status within 12 hours; OR be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With two of the required offsite circuits inoperable[2],

   1. Declare the required feature(s) inoperable when its redundant required feature(s) is inoperable within 12 hours from the discovery of two offsite circuits inoperable concurrent with the inoperability of the redundant required feature(s); AND

   2. Restore one offsite circuit to OPERABLE status within 24 hours; OR be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With two of the required EDGs inoperable[3], restore one EDG to OPERABLE status within 2 hours; OR be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

---

[1] Enter applicable conditions and requirements of TS LCO 3.8.1.1 ACTION a and ACTION b. In addition, with no AC power source to one train, enter applicable conditions and ACTIONs of TS LCO 3.8.3.1, "Onsite Power Distribution Systems - Operating."

[2] Enter applicable conditions and requirements of TS LCO 3.8.1.1 ACTION a.

[3] Enter applicable conditions and requirements of TS LCO 3.8.1.1 ACTION b.

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each required offsite circuit of LCO 3.8.1.1.a shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignment and indicated power availability.

b. Demonstrated OPERABLE at least once per 18 months[1] by manually transferring the onsite Class 1E power supply from the normal offsite circuit to the alternate offsite circuit.

4.8.1.1.2 Each emergency diesel generator (EDG) of LCO 3.8.1.1.b shall be demonstrated OPERABLE:

a. At least once per 31 days by:

1. Verifying the day tank has a minimum level of 2.75 feet (550 gallons of fuel).

2. Verifying the EDG starts and achieves voltage at 4160 ± 420 volts and frequency at 60 ± 1.2 Hz[2].

3. Verifying the EDG is synchronized to its appropriate bus and gradually loaded to 4950 - 5500 kW and operates for at least 60 minutes[3].

b. At least once per 31 days by verifying the fuel oil transfer system operates to automatically transfer fuel oil from the storage tank to the day tank.

---

[1] This surveillance shall not be performed in MODE 1, 2, 3, or 4. Credit may be taken for unplanned events that satisfy this SR.

[2] Performance of 4.8.1.1.2.c satisfies this SR. A fuel limited EDG start may be used for the SR as recommended by the manufacturer. When the fuel limited start procedure is not used, the time, voltage, and frequency tolerances of 4.8.1.1.2.c must be met. All EDG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading as recommended by the manufacturer.

[3] EDG loading may be conducted in accordance with the manufacturer's recommendations, including gradual load. Momentary transients outside the load range do not invalidate this test. This SR shall be conducted on only one EDG at a time. This SR shall be preceded by and immediately follow, without shutting down, a successful performance of 4.8.1.1.2.a.2 or 4.8.1.1.2.c.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

c. At least once per 184 days by verifying the EDG starts from normal standby condition and achieves in ≤ 10 seconds at least 3740 volts and 58.8 Hz, and subsequently achieves steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz[1]. Following the EDG start, perform SR 4.8.1.1.2.a.3.

d. At least once per 18 months by:

1. Verifying the EDG capability to reject a single largest load ≥ 842 kW for EDG A (Train A Normal Water Chiller) and ≥ 904 kW for EDG B (Train B Auxiliary Feedwater pump) without tripping on overspeed, while maintaining voltage at 4160 ± 420 volts and frequency at 60 ± 1.2 Hz[3].

2. Verifying the EDG capability to reject a load of 4950 - 5500 kW without tripping on overspeed. The EDG voltage shall not exceed 6200 volts during and following the load rejection[2].

3. Verifying on a simulated loss of offsite power signal[3]:

a. Deenergization of the emergency buses;

b. Load shedding from emergency buses;

c. EDG auto-starts and:

1. energizes the emergency buses with permanently connected loads in ≤ 10 seconds,

2. energizes auto-connected shutdown loads through the load sequencer,

3. maintains steady state voltage at 4160 ± 420 volts, and frequency at 60 +1.2/-0.3 Hz[4], and

4. operates for ≥ 5 minutes while loaded with shutdown loads.

---

[1] Performance of this SR may also serve to meet the requirements of SR 4.8.1.1.2.a.2. All EDG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading as recommended by the manufacturer.

[2] This Surveillance shall not be performed in MODE 1 or 2.

[3] This Surveillance shall not be performed in MODE 1, 2, 3, or 4.

[4] Momentary transients do not invalidate this test.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

4. Verifying that on an ESF actuation test signal (without a loss of power) the EDG auto-starts and:

   a. Achieves a steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz; and

   b. operates for ≥ 5 minutes on standby (running unloaded).[3]

5. Verifying on a simulated loss of offsite power signal in conjunction with an ESF actuation test signal:[3]

   a. Deenergization of the emergency buses;
   b. Load shedding from emergency buses;
   c. EDG auto-starts from normal standby condition and;

      1. energizes the emergency buses with permanently connected loads in ≤ 10 seconds,
      2. energizes auto-connected emergency (accident) loads through the load sequencer,
      3. maintains steady state voltage at 4160 ± 420 volts, and frequency at 60 +1.2/-0.3 Hz, and
      4. operates for ≥ 5 minutes while loaded with emergency loads.

6. Verifying that all automatic EDG trips are bypassed during emergency operation, except:[2]

   a. Engine overspeed,
   b. Generator differential,
   c. Engine low lube oil pressure, and
   d. Manual emergency stop trip.

7. Verifying each EDG operates for ≥ 24 hours:[2,4]

   a. For ≥ 22 hours of the test, the EDG shall be loaded to 4950-5500 kW[1], and

   b. For ≥ 2 continuous hours of the test, the EDG shall be loaded to 5775-6050 kW.[1]

---

[1] Momentary transients outside the load range do not invalidate this test.
[2] This Surveillance shall not be performed in MODE 1 or 2.
[3] This Surveillance shall not be performed in MODE 1, 2, 3, or 4.
[4] The EDG may be prelubed, warmed up, and loaded in accordance with the manufacturer's recommendations.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

8. Within 5 minutes of shutting down the EDG after the EDG has operated at 4950 - 5500 kW for 2 hours or until operating temperatures have stabilized,[1,2] verifying that the EDG starts and achieves in ≤ 10 seconds at least 3740 volts and 58.8 Hz, and maintains steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz.

9. Verifying each EDG:[3]

   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. Return to standby operation (running unloaded).

10. Verifying, with the EDG operating in test mode and connected to its bus, a simulated SIAS overrides the test mode by:[3]

    a. Returning the EDG to standby operation (running unloaded); and

    b. the Class 1E bus remains energized with offsite power.

11. Verifying that the automatic load sequencers are OPERABLE with the interval between each load block within ± 1 second of its design interval.[3]

e. At least once per 10 years, verifying, when started simultaneously each EDG achieves in ≤ 10 seconds at least 3740 volts and 58.8 Hz, and maintains steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz.[2,4]

---

[1] Momentary transients outside the load range do not invalidate this test.
[2] This Surveillance shall not be performed in MODE 1 or 2.
[3] This Surveillance shall not be performed in MODE 1, 2, 3, or 4.
[4] Credit may be taken for unplanned events or for testing after any modifications which could affect EDG interdependence that satisfy this SR.

ELECTRICAL POWER SYSTEMS

A.C. SOURCES

SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.1.2 The following AC electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. One emergency diesel generator (EDG)

APPLICABILITY: MODES 5 and 6

ACTION:

With less than the above minimum required AC electrical power sources OPERABLE,[1] immediately suspend all operations involving:

1. CORE ALTERATIONS,

2. Movement of irradiated fuel assemblies,

3. Positive reactivity additions, and

4. Crane operation with loads over the fuel storage pool.

Immediately initiate action to restore the required sources to OPERABLE status.

SURVEILLANCE REQUIREMENTS

4.8.1.2 For AC sources required to be OPERABLE, the SRs of TS LCO 3.8.1.1, AC Sources - Operating," except SR 4.8.1.1.1.b, SR 4.8.1.1.2.d.4, SR 4.8.1.1.2.d.10, and SR 4.8.1.1.2.e, are applicable.[2]

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[1] With no AC power source to one train as a result of one offsite circuit inoperable, enter applicable conditions and ACTIONs of TS LCO 3.8.3.2, "Onsite Power Distribution Systems - Shutdown."

[2] The following SRs are not required to be performed:
SR 4.8.1.1.2.a.3 and
SR 4.8.1.1.2.d.

ELECTRICAL POWER SYSTEMS

A.C. SOURCES

DIESEL FUEL OIL STORAGE SYSTEM - DIESEL FUEL OIL REQUIREMENTS

LIMITING CONDITION FOR OPERATION

3.8.1.3.1 Each diesel fuel oil storage system shall be within its limits.

APPLICABILITY: When the associated EDG is required to be OPERABLE.

ACTION:

a. With either EDG fuel oil storage system < 80% indicated fuel level but ≥ 71% indicated fuel level, restore the fuel oil level to within its limit within 48 hours or declare the associated EDG inoperable.[1]

b. With either EDG fuel oil storage system with stored fuel oil viscosity not within limits, restore fuel oil to within limits within 30 days or declare the associated EDG inoperable.[1]

c. With either EDG fuel oil storage system with stored fuel oil water and sediment not within limits, immediately declare the associated EDG inoperable.[1]

SURVEILLANCE REQUIREMENTS

4.8.1.3.1.1 At least once per 31 days, verify that the fuel level in the fuel storage tank is within its limits.

4.8.1.3.1.2 At least once per 92 days, verify that a sample of diesel fuel from the fuel storage tank obtained in accordance with ASTM-D4176-82 is within the acceptable limits specified in Table 1 of ASTM D975-81 when checked for viscosity, water, and sediment.

[1] A separate condition entry is allowed for each EDG.

ELECTRICAL POWER SYSTEMS

A.C. SOURCES

DIESEL FUEL OIL STORAGE SYSTEM - CATHODIC PROTECTION

LIMITING CONDITION FOR OPERATION

3.8.1.3.2 The Cathodic Protection System associated with the EDG diesel fuel oil storage tanks shall be OPERABLE.

APPLICABILITY: At all times.

ACTION:

a. With the cathodic protection system inoperable for more than 30 days, prepare and submit a Special Report to the Commission pursuant to TS 6.9.2 within the next 10 days outlining the cause of the malfunction and the plans for restoring the system to OPERABLE status.

b. The provisions of TS 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.8.1.3.2 Verify that the cathodic protection system is OPERABLE at the following time intervals:

1. Verify at least once per 61 days that the cathodic protection rectifiers are OPERABLE and have been inspected in accordance with Regulatory Guide 1.137.

2. Verify at least once per 12 months that the cathodic protection is OPERABLE and providing adequate protection against corrosion in accordance with Regulatory Guide 1.137.

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1.1 A.C. SOURCES

OPERATING

BASES

The OPERABILITY of the AC and DC power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety-related equipment required for (1) the safe shutdown of the unit and (2) the mitigation and control of accident conditions within the unit. As required by 10CFR50, Appendix A, GDC 17, 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 AC sources in one train must be separate and independent (to the extent possible) of the AC sources in the other train. For the EDGs, separation and independence are complete.

The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set of onsite AC and DC power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss-of-offsite power and single failure of the other onsite AC source.

Two physically independent circuits from the offsite transmission network to the switchyard and two physically independent circuits from the switchyard to the onsite Class 1E distribution system, and two separate and independent EDG 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 design basis accident (DBA).

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. Each EDG must be capable of supplying one train of the onsite Class 1E AC Power Distribution System (PDS). Each EDG must be capable of starting, accelerating to rated speed (i.e., frequency) and voltage, and connecting to its respective ESF bus on detection of bus undervoltage in $\leq$ 10 seconds. Each EDG 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.

The ACTION requirements specified for the level of degradation of the power sources provide restriction upon continued unit operation commensurate with the level of degradation.

ACTIONS:

a.1 To ensure a highly reliable power source remains with the one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. Since the ACTION only specifies "perform," a failure of SR 4.8.1.1.1.a acceptance

criteria does not result in an ACTION not being met. However, if a second offsite circuit fails SR 4.8.1.1.1.a, the second required circuit is inoperable, and TS 3.8.1.1 ACTION d, for two offsite circuits inoperable, is entered.

a.2 This ACTION, which only applies if the train (i.e., ESF bus) cannot be powered from an offsite source, is intended to provide assurance that an event coincident with a single failure of the associated EDG will not result in a complete loss of safety function of critical redundant required features. These features require Class 1E power from PBA-S03 or PBB-S04 ESF buses to be OPERABLE, and include: charging pumps (TS 3.1.2.4); radiation monitors Train A RU-29, Train B RU-30, Train A RU-31, and Train B RU-145 (TS 3.3.3.1 and ODCM 2.1); pressurizer heaters (TS 3.4.3.1); ECCS (TS 3.5.2); containment spray (TS 3.6.2.1); containment isolation valves NCA-UV-402, NCB-UV-403, WCA-UV-62, and WCB-UV-61 (TS 3.6.3); containment hydrogen monitors (TS 3.6.4.1); containment electric hydrogen recombiners (TS 3.6.4.2); auxiliary feedwater pumps (TS 3.7.1.2); essential cooling water loops (TS 3.7.3); essential spray pond loops (TS 3.7.4); ultimate heat sink (TS 3.7.5); essential chilled water loops (TS 3.7.6); control room essential filtration (TS 3.7.7); ESF pump room air exhaust cleanup (TS 3.7.8); shutdown cooling subsystems (TS 3.7.11 and 3.4.1.3); and fuel building ventilation (TS 3.9.12). Mode applicability is as specified in each appropriate TS section.

The 24 hour completion time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 24 hours also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." The completion time only begins on discovery that both:

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

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

If at any time during the existence of one offsite circuit inoperable, a redundant required feature subsequently becomes inoperable, the 24 hour time begins to be tracked.

Discovering no offsite power to one train of the onsite Class 1E PDS 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 24 hour clock. 24 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.

The remaining OPERABLE offsite circuit and EDGs are adequate to supply electrical power to Train A and Train B of the onsite Class 1E PDS. 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 RG 1.93, operation may continue with one offsite circuit inoperable 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. However, the remaining OPERABLE offsite circuit and EDGs are adequate to supply electrical power to the onsite Class 1E PDS.

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.

The 6 day completion time (6 days from the discovery of the failure to meet the LCO) for restoring the offsite circuit to OPERABLE status establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. For example, if one offsite circuit is inoperable while an EDG is inoperable, and that EDG is subsequently returned to OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the offsite circuit. At this time, an EDG could again become inoperable, the circuit restored to OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day completion time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is reasonable for situations in which both the offsite circuit and the EDG are inoperable concurrently. The AND connector between the 72 hour and 6 day completion times means that both completion times apply simultaneously, and the more restrictive completion time must be met.

The completion time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time ACTION a was entered.

b.1 To ensure a highly reliable power source remains with an inoperable EDG, it is necessary to verify the availability of the offsite circuits on a more frequent basis. Since the ACTION only specifies "perform," a

failure of SR 4.8.1.1.1.a acceptance criteria does not result in an ACTION not being met. However, if a offsite circuit fails to pass the SR, it is inoperable. Upon offsite circuit inoperability, additional conditions and ACTIONs must then be entered.

b.2 This ACTION is intended to provide assurance that a loss of offsite power, during the period that an EDG is inoperable, does not result in a complete loss of safety function of redundant required features. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable EDG. These features require Class 1E power from PBA-S03 or PBB-S04 ESF buses to be OPERABLE, and include: charging pumps (TS 3.1.2.4); radiation monitors Train A RU-29, Train B RU-30, Train A RU-31, and Train B RU-145 (TS 3.3.3.1 and ODCM 2.1); pressurizer heaters (TS 3.4.3.1); ECCS (TS 3.5.2); containment spray (TS 3.6.2.1); containment isolation valves NCA-UV-402, NCB-UV-403, WCA-UV-62, and WCB-UV-61 (TS 3.6.3); containment hydrogen monitors (TS 3.6.4.1); containment electric hydrogen recombiners (TS 3.6.4.2); auxiliary feedwater pumps (TS 3.7.1.2); essential cooling water loops (TS 3.7.3); essential spray pond loops (TS 3.7.4); ultimate heat sink (TS 3.7.5); essential chilled water loops (TS 3.7.6); control room essential filtration (TS 3.7.7); ESF pump room air exhaust cleanup (TS 3.7.8); shutdown cooling subsystems (TS 3.7.11 and 3.4.1.3); and fuel building ventilation (TS 3.9.12). Mode applicability is as specified in each appropriate TS section.

The 4 hour completion time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 4 hours also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." The completion time only begins on discovery that both:

a. An inoperable EDG exists; and

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

If at any time during the existence of one EDG inoperable, a required feature subsequently becomes inoperable, the 4 hour time begins to be tracked.

Discovering one required EDG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE EDG, results in starting the 4 hour clock 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.

The remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to onsite Class 1E PDS. 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 This ACTION provides an allowance to avoid unnecessary testing of OPERABLE EDGs. If it can be determined that the cause of the inoperable EDG does not exist on the OPERABLE EDG, SR 4.8.1.1.2.a does not have to be performed. If the cause of inoperability exists on the other EDG, the other EDG would be declared inoperable upon discovery and TS 3.8.1.1 ACTION e would be entered. Once the failure is repaired, the common mode failure no longer exists and this ACTION is satisfied. If the cause of the initial inoperable EDG cannot be confirmed not to exist on the remaining EDG, performance of SR 4.8.1.1.2.a within the initial 24 hour period suffices to provide assurance of continued OPERABILITY of that EDG.

In the event the inoperable EDG is restored to OPERABLE status prior to completing this ACTION, an evaluation will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in ACTION b.

According to GL 84-17, 24 hours is reasonable to confirm that the OPERABLE EDG is not affected by the same problem as the inoperable EDG.

b.4 According to RG 1.93, operation may continue with one EDG inoperable for a period that should not exceed 72 hours. The remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E PDS. 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.

The 6 day completion time (6 days from the discovery of the failure to meet the LCO) for restoring the EDG to OPERABLE status establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. For example, if one EDG is inoperable while an offsite circuit is inoperable, and that circuit is subsequently returned to OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the EDG. At this time, an offsite circuit could again become inoperable, the EDG restored to OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day completion time provides a limit on

the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is reasonable for situations in which both the offsite circuit and the EDG are inoperable concurrently. The AND connector between the 72 hour and 6 day completion times means that both completion times apply simultaneously, and the more restrictive completion time must be met.

The completion time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time ACTION b was entered.

c According to RG 1.93, operation may continue with one offsite circuit and one EDG inoperable for a period that should not exceed 12 hours. 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.

d.1 This ACTION, which applies when two offsite circuits are inoperable due to voltage outside the acceptable operating band or if both trains of the onsite Class 1E PDS (i.e., ESF buses) cannot be powered from an offsite source, 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. The rationale for the reduction to 12 hours is that RG 1.93 allows a completion time of 24 hours for two required offsite circuits inoperable, based on 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 require Class 1E power from PBA-S03 or PBB-S04 ESF buses to be OPERABLE, and include: charging pumps (TS 3.1.2.4); radiation monitors RU-29, RU-30, RU-31, and RU-145 (TS 3.3.3.1 and ODCM 2.1); pressurizer heaters (TS 3.4.3.1); ECCS (TS 3.5.2); containment spray (TS 3.6.2.1); containment isolation valves NCA-UV-402, NCB-UV-403, WCA-UV-62, and WCB-UV-61 (TS 3.6.3); containment hydrogen monitors (TS 3.6.4.1); containment electric hydrogen recombiners (TS 3.6.4.2); auxiliary feedwater pumps (TS 3.7.1.2); essential cooling water loops (TS 3.7.3); essential spray pond loops (TS 3.7.4); ultimate heat sink (TS 3.7.5); essential chilled water loops (TS 3.7.6); control room essential filtration (TS 3.7.7); ESF pump room air exhaust cleanup (TS 3.7.8); shutdown cooling subsystems (TS 3.7.11 and 3.4.1.3); and fuel building ventilation (TS 3.9.12). Mode applicability is as specified in each appropriate TS section.

BASES

The 12 hour completion time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 12 hours also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." 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 two offsite circuits inoperable, and a required feature becomes inoperable, the 12 hour time begins to be tracked.

d.2 According to RG 1.93, operation may continue with two offsite circuits inoperable 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 EDGs 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.

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 worse 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 RG 1.93, 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 TS LCO 3.8.1.1 ACTION a.

e. With Train A and Train B EDGs 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 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). Any inadvertent generator trip could also result in a total loss of offsite AC power. Therefore, the time allowed for continued operation is severely restricted. The intent of this ACTION, with both EDGs inoperable, is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to RG 1.93, with both EDGs inoperable, operation may continue for a period that should not exceed 2 hours.

ACTION requirements 3.8.1.1.f and 3.8.1.1.g provide restrictions upon continued unit operation commensurate with degradation of switchyard voltage and restoration of OPERABILITY of the required A.C. sources. In an effort to minimize the risk to the health and safety to the public, ACTIONS 3.8.1.1.f and 3.8.1.1.g balance the risk of a forced shutdown against the risk of remaining at power with a switchyard voltage in the lower portion of the expected range. The risk during ACTIONS 3.8.1.1.f and 3.8.1.1.g due to a switchyard voltage in the lower portion of the expected range and an independent accident is less than the risk associated with a normal shutdown including a reactor trip.

Conformance to GDC-17 requires maintenance of switchyard voltages at or above those identified in ACTIONS 3.8.1.1.f and 3.8.1.1.g. At voltages below those identified, a unit trip resulting from an ESF signal, coincident with low switchyard voltages, will result in sequencing of ESF equipment on preferred offsite power. The Class 1E degraded voltage relays will detect a sustained degraded voltage due to the fast bus transfer of non-Class 1E loads from the auxiliary transformers to the startup transformers. The relays will actuate to strip the ESF equipment and resequence it on the emergency diesel generator. This "double sequencing" causes an interruption in equipment credited with specific response time in the UFSAR Chapter 6 and 15 safety analysis, and is unanalyzed. Maintenance of switchyard voltage at or above the specified value prevents this effect as does the configurations authorized by ACTIONS 3.8.1.1.f and 3.8.1.1.g. The required voltage is higher when three units are operating on two startup transformers, as

two secondary windings of the startup transformers must each supply ESF power to two units.

ACTIONS 3.8.1.1.f.1 and 3.8.1.1.g.1 are preferred over ACTIONS 3.8.1.1.f.2 and 3.8.1.1.g.2. ACTIONS 3.8.1.1.f.1 and 3.8.1.1.g.1 are designed to balance the probability of double sequencing (should no actions to mitigate be undertaken) due to switchyard voltage in the lower portion of the expected range coincident with an accident, which is unlikely, against the probability of natural circulation (should both trains of fast bus transfer be blocked) due to a unit trip coincident with switchyard voltage in the lower portion of the expected range, which is also unlikely but more probable. ACTIONS 3.8.1.1.f.1 and 3.8.1.1.g.1 provides offsite power to half of the non-class 1E loads for forced circulation to respond to a normal plant trip, as well as EDG power and the second offsite power circuit to the two trains of ESF equipment to respond to any accident. ACTIONS 3.8.1.1.f.2 and 3.8.1.1.g.2 are provided to allow operation of both trains of fast bus transfer blocked in the unlikely event of problems with the emergency diesel generators.

SURVEILLANCE REQUIREMENTS:

The surveillance requirements for demonstrating OPERABILITY of the emergency diesel generators (EDG) are based on the recommendations of Regulatory Guide (RG) 1.9, Revision 3, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," unless otherwise noted in the Updated FSAR Section 1.8.

All planned EDG starts may be preceded by an engine prelube period as recommended by the manufacturer in order to minimize wear and tear on the EDGs during testing. The EDG capabilities (starting and loading) are required to be met from a variety of initial conditions such as EDG in standby with the engine hot (SR 4.8.1.1.2.d.8), EDG in standby with the engine at normal standby conditions (SR 4.8.1.1.2.c and SR 4.8.1.1.2.d.5.c), and EDG operating in a parallel test mode (SR 4.8.1.1.2.d.10). Although it is expected that most EDG starts will be performed from normal standby conditions, EDG starts, except as specified in the SR, may be performed with the jacket water cooling and lube oil temperatures within the lower to upper limits of EDG OPERABILITY. Lube oil and jacket water cooling within manufacturer's recommended temperatures constitutes normal standby condition. Rapid cooling of the EDG down to normal standby conditions should be minimized.

The timed start ($\leq$ 10 seconds) is satisfied when the EDG achieves at least 3740 volts and 58.8 Hz. At these values, the EDG output breaker permissives are satisfied; and on detection of bus undervoltage or loss of power, the EDG breakers would close reenergizing its respective ESF bus. Following the timed start, it is expected that the rated speed (i.e., frequency) and voltage will stabilize and maintain steady state voltage at 4160 $\pm$ 420 volts and frequency at 60 +1.2/-0.3 Hz.

BASES

The required steady state frequency range for the EDG is 60 +1.2/-0.3 Hz to be consistent with the safety analysis to provide adequate safety injection flow. In accordance with the guidance provided in RG 1.9, 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).

Surveillance load testing uses the referenced equipment or equivalent loading.

4.8.1.1.1

a. This SR assures proper circuit continuity and indicated 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 7 day frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

b. This SR demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The 18 month frequency is based on engineering judgement, taking into consideration the unit conditions required to perform the SR, and is intended to be consistent with 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 is concluded to be acceptable from a reliability standpoint.

The reason for the footnote "This Surveillance shall not be performed in MODE 1, 2, 3, or 4" is that performing this SR would remove a required offsite circuit from service, perturb the electrical distribution system (EDS), and challenge safety systems.

4.8.1.1.2

a.1 The 31 day SR is adequate to assure that a sufficient supply of fuel oil is available, since low level alarms are provided in the control room. In addition, operators would be aware of any large uses of fuel oil during this period.

a.2 This SR helps 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.

BASES

In order to reduce stress and wear on diesel engines, the EDG may be tested using a fuel limited start as opposed to a fast start (≤ 10 seconds) during the 31 day SR. A fuel limited start is an EDG start in which the amount of fuel is temporarily restricted during the start to cause a more gradual acceleration to rated frequency and voltage than would occur during a start in Emergency Mode. The fast start is required to be performed during the 184 day SR. Reducing fast starts would avoid premature wear of the engine and lead to greater EDG reliability and availability. The change is consistent with the GL 84-15 recommendations for changes to the TS to reduce the number of fast starts and improve reliability. Performing the fast start test every 184 days will adequately demonstrate the EDG's present level of reliability and availability. However, if a fuel limited start is not used, the time, voltage, and frequency tolerances of 4.8.1.1.2.c must be met.

This change is also consistent with the guidance provided in RG 1.9 which states that for monthly SRs, the EDG can be brought to rated speed and voltage in a time that is recommended by the manufacturer to minimize stress and wear (slow started).

The 184 day SR 4.8.1.1.2.c requires a fast start (≤ 10 seconds), is more restrictive than SR 4.8.1.1.2.a.2, and may be performed in lieu of SR 4.8.1.1.2.a.2.

a.3 This SR verifies that the EDGs are capable of synchronizing with the offsite electrical system and accepting loads of 90 to 100 percent (4950 - 5500 kW) of the continuous rating of the EDG. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the EDG is connected to the offsite source. However, additional runtime in excess of 60 minutes may be performed as recommended by the manufacturer. This SR should be conducted on only one EDG at a time in order to avoid common mode failures that might result from offsite circuit or grid perturbations. A successful EDG start (SR 4.8.1.1.2.a.2 or SR 4.8.1.1.2.c) must precede this test to credit satisfactory performance.

Consistent with the guidance provided in RG 1.9 for monthly SRs, the EDG can be loaded at a rate that is recommended by the manufacturer to minimize stress and wear (gradual loading).

Consistent with the guidance provided in the RG 1.9 load-run test description, the 4950 - 5500 kW band will demonstrate 90 to 100 percent of the continuous rating of the EDG. The load band (4950 - 5500 kW) is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing may be performed within the guidance of the generator capability curve. Momentary transients because of changing bus loads do not invalidate this test.

BASES

b. This SR demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank, in order to support continuous operation of the EDG. This SR 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 control systems for automatic fuel transfer systems are OPERABLE.

An OPERABLE fuel oil transfer system is required to ensure that the 7 days of inventory of fuel in the fuel storage system is capable of being transferred to the fuel oil day tank for utilization by the EDGs.

The frequency is based upon the rate of full load fuel oil consumption, the level control system, and the fuel oil transfer pump capability, which transfer approximately hourly during full load operation.

c. The bases for 4.8.1.1.2.a.2 also apply to this SR. The 184 day frequency for 4.8.1.1.2.c imposes a reduction in fast start SRs consistent with GL 84-15. The 31 day and 184 day frequencies provide adequate assurance of EDG OPERABILITY, while minimizing degradation resulting from testing. RG 1.9 fast-start test description specifies that the EDG is to start from standby condition.

d. In general, unless otherwise specified, the SR frequency of 18 months is consistent with the recommendations of RG 1.9, and is intended to be consistent with expected fuel cycle lengths.

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 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; or that performing the SR would remove a required EDG from service. The reason for "This Surveillance shall not be performed in MODE 1, 2, 3, or 4" is that performing this SR would remove a required offsite circuit from service, perturb the EDS, and challenge safety systems.

d.1 The EDG 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 the diesel engine to overspeed, which, if excessive, might result in a trip of the engine. This SR demonstrates the EDG load response characteristics and capability to reject the single largest, 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 904 kW) are the bounding loads for the EDG A and EDG B to reject, respectively. These values are listed in Table 8.3-3, Load Bases for Class 1E Buses, in the Updated FSAR.

BASES

d.2 This SR demonstrates the EDG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The EDG full load rejection may occur because of a system fault or inadvertent breaker tripping. This SR ensures proper engine generator load response under the simulated test conditions.

Consistent with the guidance provided in the RG 1.9 full-load rejection test description, the 4950 - 5500 kW band will demonstrate the EDG's capability to reject a load equal to 90 to 100 percent of its continuous rating. Administrative limits have been placed upon the Class 1E 4160 V buses due to high voltage concerns. As a result, power factors deviating much from unity are currently not possible when the EDG runs parallel to the grid. To the extent practicable, VARs will be provided by the EDG during this SR.

d.3 This SR demonstrates the as-designed operation of the emergency standby power sources during a loss of the offsite source, and also demonstrates the capability of the EDG to automatically achieve the required voltage and frequency within the required time, as specified in RG 1.9, paragraph 2.2.4.

The requirement to verify the connection and power supply of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the EDG loading logic. In certain circumstances, many of these loads cannot actually be connected without undue hardship or potential for undesired operation. For example, ECCS injection valves are not desired to be stroked open, HPSI systems are not 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, testing that adequately shows the capability of the EDG 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.

d.4 This SR demonstrates that the EDG automatically starts and achieves the required voltage and frequency from the design basis actuation signal (LOCA signal) and operates for ≥ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability. The primary purpose of this SR is to test the circuitry of a safety injection actuation signal with offsite power available and to verify that the EDG receives a start signal.

d.5 In the event of a DBA coincident with a loss of offsite power, the EDGs are required to supply the necessary power to ESF systems so that fuel, RCS, and containment design limits are not exceeded.

This SR demonstrates the EDG operation, as discussed in the Bases for 4.8.1.1.2.d.3, 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 EDG 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.

d.6 This SR demonstrates that the EDG noncritical protective functions are bypassed during emergency operation, and that the critical protective functions trip the EDG to avert substantial damage to the EDG 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 EDG 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 EDG.

d.7 The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.9. The provisions for prelubricating and warmup, discussed in SR 4.8.1.1.2.a.2, and for gradual loading, discussed in SR 4.8.1.1.2.a.3, are applicable to this SR.

Per the guidance in RG 1.9, in order to demonstrate the full-load carrying capability for an interval of not less than 24 hours, the 2 hour interval is to be performed at a load equal to 105 to 110 percent of the continuous rating of the EDG (5775 - 6050 kW), and the 22 hour interval is to be performed at a load equal to 90 to 100 percent of its continuous rating (4950 - 5500 kw).

The reason for footnote 1 (Momentary transients outside the load range do not invalidate this test) is that this band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing under direct monitoring of the manufacturer or momentary variations due to changing bus loads shall not invalidate the test.

d.8 This SR demonstrates that the EDG can restart from a hot condition, such as subsequent to a shutdown from a normal SR, and achieve the required voltage and frequency in $\leq$ 10 seconds. The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.10.

Running for 2 hours or until operating temperatures have stabilized ensures that the test is performed with the EDG sufficiently hot. The load band is provided to avoid routine overloading of the EDG. Per the guidance in RG 1.9, this SR would demonstrate the hot restart functional capability at full-load temperature conditions, after the EDG has

operated for 2 hours (or until operating temperatures have stabilized) at full load (i.e., 4950 - 5500 kW).

d.9 The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.11. This SR ensures that the manual synchronization and automatic load transfer from the EDG to the offsite source can be made and that the EDG can be returned to standby status (running unloaded) when offsite power is restored.

d.10 Demonstration of the test mode override ensures that the EDG availability under accident conditions will not be compromised as the result of testing and the EDG will automatically reset to standby operation (running unloaded) if an ESF actuation signal is received during operation in the test mode. The provisions for automatic switchover are required by IEEE-308, paragraph 6.2.6(2). The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.13.

d.11 Each EDG is required to demonstrate proper operation for the DBA loading sequence to ensure that voltage and frequency are maintained within the required limits. The load sequence time interval tolerance ensures that sufficient time exists for the EDG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.4.

e. This SR demonstrates that the EDG starting independence has not been compromised; and that each engine can achieve proper speed within the specified time when the EDGs are started simultaneously. The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.3.2.4 and RG 1.137.

3/4.8.1.2 A.C. SOURCES

SHUTDOWN

BASES

The OPERABILITY of the minimum specified AC power sources during shutdown and refueling ensures that (1) the unit can be maintained in the shutdown or refueling condition for extended time periods, (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status, and (3) adequate AC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

An OPERABLE offsite circuit ensures that all required loads are powered from offsite power. An OPERABLE EDG ensures a diverse power source is available to provide electrical power support assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and EDG ensures the availability of sufficient AC sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and reactor vessel draindown).

The OPERABLE offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses. It is acceptable for trains to be cross tied during shutdown conditions, allowing a single offsite power circuit to supply all required trains.

The OPERABLE EDG must be capable of supplying one train of the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.3.2.

The ACTION requirements specified for the level of degradation of the power sources provide restriction upon continued unit operation commensurate with the level of degradation.

ACTIONS:

Suspension of the specified activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability or the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the unit safety systems. The required ACTION to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory provided the required SDM is maintained.

Notwithstanding performance of the conservative required ACTIONs, the unit is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

BASES

The completion time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the unit safety systems may be without sufficient power.

When one offsite circuit is inoperable with no AC power to one ESF bus, the ACTIONs for TS LCO 3.8.3.2 must be immediately entered. The footnote allows the condition (no AC power source to one train as a result of one offsite circuit inoperable) to provide requirements for the loss of the offsite circuit, whether or not a train is deenergized. TS LCO 3.8.3.2 provides the appropriate restrictions for the situation involving a deenergized train.

SURVEILLANCE REQUIREMENTS:

SR 4.8.1.2 requires the SRs from TS LCO 3.8.1.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 4.8.1.1.1.b is not required to be met since only one offsite circuit is required to be OPERABLE. SR 4.8.1.1.2.d.4 and SR 4.8.1.1.2.d.10 are not required to be met because the ESF functions (i.e., AFAS and SIAS) are not required to be OPERABLE during shutdown. In addition, SR 4.8.1.1.2.d.10 is not required to be met because the required OPERABLE EDG is not required to undergo periods of being synchronized to the offsite circuit. SR 4.8.1.1.2.e is excepted because starting independence is not required with an EDG that is not required to be OPERABLE.

The reason for the footnote (The following SRs are not required to be performed) is to preclude requiring the OPERABLE EDG from being paralleled with the offsite power network or otherwise rendered inoperable. With limited AC sources available, a single event could compromise both the required circuit and the EDG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the EDG is required to be OPERABLE.

ELECTRICAL POWER SYSTEMS

3/4.8.1.3 A.C. SOURCES

DIESEL FUEL OIL STORAGE SYSTEM

BASES

Each emergency diesel generator (EDG) is provided with a storage tank having a fuel oil capacity sufficient to operate that EDG for a period of 7 days, while the EDG is supplying maximum post loss of coolant accident load demand. The onsite fuel oil capacity is sufficient to operate the EDGs for longer than the time to replenish the onsite supply from outside sources.

A cross-connect capability exists for use when a failure has occurred in one of the EDG's fuel oil storage or transfer systems in order that the redundant system can be used to supply that EDG. However, cross-connecting the diesel fuel oil storage tanks during normal operations in Modes 1, 2, 3, or 4 would violate the independence and redundancy design criteria.

For proper operation of the standby EDGs, it is necessary to ensure the proper quality of the fuel oil. RG 1.137 addresses the recommended fuel oil practices. The fuel oil properties governed by these SRs are the water and sediment content, and the viscosity.

EDG day tank fuel requirements, as well as transfer capability from the storage tank to the day tank, are addressed in both LCO 3.8.1.1, "A.C. Sources - Operating," and LCO 3.8.1.2, "A.C. Sources - Shutdown."

A cathodic protection system is provided for the fuel oil storage tanks and piping located underground. The external corrosion protection as well as cathodic protection has been provided for the tanks to minimize external corrosion. The cathodic protection system consists of a number of rectifiers and deep bed anodes producing a direct current flow through the ground to the metallic objects buried in the soil which require corrosion protection.

If any other metallic structures (e.g., buildings, new or modified piping systems, conduit) are placed in the ground in the vicinity of the fuel oil storage system or if the original system is modified, the adequacy and frequency of inspections of the cathodic protection system shall be re-evaluated and adjusted in accordance with Regulatory Guide 1.137.

ACTIONS:

a. In this condition (i.e., $< 80\%$ indicated level but $\geq 71\%$ indicated level), the 7 day fuel oil supply (69,700 gallons of fuel) for an EDG is not available. However, the condition is restricted to fuel oil level reductions that maintain at least a 6 day supply (60,500 gallons of fuel). These circumstances may be caused by events such as full load operation required after an inadvertent start while at minimum required level; or feed and bleed operations, which may be necessitated by any number of oil quality degradations. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analysis required prior to addition of fuel oil to the tank. A period

of 48 hours is sufficient to complete the restoration of the required level prior to declaring the EDG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period. With the required ACTION and associated completion time not met, the associated EDG may be incapable of performing its intended function and must be immediately declared inoperable.

b. With the stored fuel oil viscosity not within the required limits, a period of 30 days is allowed for restoration. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if an EDG start and load was required during the 30 day frequency and the fuel oil viscosity was outside its limits, there is a high likelihood that the EDG would still be capable of performing its intended function. With the required ACTION and associated completion time not met, the associated EDG may be incapable of performing its intended function and must be immediately declared inoperable.

c. With the stored fuel oil water and sediment not within the required limits, the associated EDG may not be capable of performing its intended function and must be immediately declared inoperable.

SURVEILLANCE REQUIREMENTS:

SR 4.8.1.3.1.1 provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each EDG's operation for 7 days at full load. The 7 day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an outside source. The 31 day SR is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 4.8.1.3.1.2 ensures the availability of high quality fuel oil for the EDGs. The frequency of this test (92 days) takes into consideration the low humidity and infrequent rainfall at the site and is an exception to RG 1.137, and is consistent with UFSAR Section 1.8.

SR 4.8.1.3.2 ensures that the cathodic protection system is capable of minimizing external corrosion for the fuel oil storage tanks.

3/4.8.2 and 3/4.8.3 D.C. SOURCES and ONSITE POWER DISTRIBUTION SYSTEMS

BASES

The OPERABILITY of the AC and DC power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety-related equipment required for (1) the safe shutdown of the unit and (2) the mitigation and control of accident conditions within the unit. As required by 10CFR50, Appendix A, GDC 17, 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 OPERABILITY of the minimum specified AC and DC power sources and associated distribution systems during shutdown and refueling ensures that (1) the unit can be maintained in the shutdown or refueling condition for extended time periods, (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status, and (3) adequate AC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set of onsite AC and DC power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss-of-offsite power and single failure of the other onsite AC source.

The ACTION requirements specified for the level of degradation of the power sources provide restriction upon continued unit operation commensurate with the level of degradation.

The surveillance requirement for demonstrating the OPERABILITY of the Station batteries are based on the recommendations of RG 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plant," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage on float charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.

Table 4.8-2 specifies the normal limits for each designated pilot cell and each connected cell for electrolyte level, float voltage and specific gravity. The limits for the designated pilot cells float voltage and specific gravity, greater than 2.13 volts (Exide) 2.18 volts (AT&T) and 0.010 below the manufacturer's full charge specific gravity or a battery charger current that had stabilized at a low value, is characteristic of a charged cell with adequate capacity. The normal limits for each connected cell for float voltage and specific gravity, greater than 2.13 volts (Exide) 2.18 volts

BASES

(AT&T) and not more than 0.020 below the manufacturer's full charge specific gravity with an average specific gravity of all the connected cells not more than 0.010 below the manufacturer's full charge specific gravity, ensures the OPERABILITY and capability of the battery.

Operation with a battery cell's parameter outside the normal limit but within the allowable value specified in Table 4.8-2 is permitted for up to 7 days. During this 7-day period: (1) the allowable values for electrolyte level ensures no physical damage to the plates with an adequate electron transfer capability; (2) the allowable value for the average specific gravity of all the cells, not more than 0.020 below the manufacturer's recommended full charge specific gravity, ensures that the decrease in rating will be less than the safety margin provided in sizing; (3) the allowable value for an individual cell's specific gravity, ensures that an individual cell's specific gravity will not be more than 0.040 below the manufacturer's full charge specific gravity and that the overall capability of the battery will be maintained within an acceptable limit; and (4) the allowable value for an individual cell's float voltage, greater than 2.07 volts (Exide) 2.14 volts (AT&T), ensures the battery's capability to perform its design function.

BASES

REFERENCES:

1. 10 CFR 50, Appendix A, GDC 17
2. Updated FSAR, Chapter 1
3. Updated FSAR, Chapter 8
4. GL 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.
5. RG 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.
6. RG 1.93, "Availability of Electric Power Sources," Revision 0, December 1974.
7. RG 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," Revision 1, February 1978
8. RG 1.137, "Fuel Oil Systems for Standby Diesel Generators," Revision 1, October 1979.
9. ASME, Boiler and Pressure Vessel Code, Section XI
10. IEEE Standard 308-1974, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."
11. IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement"of Large Lead Storage Batteries for Generating Stations."

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-530

PALO VERDE NUCLEAR GENERATING STATION, UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 86
License No. NPF-74

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Arizona Public Service Company (APS or the licensee) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority dated March 24, 1995, as supplemented by letters dated September 10, 1995, and March 22, 1996, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Facility Operating License No. NPF-74 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 86, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of the date of issuance to be implemented within 120 days of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Kristine M. Thomas

Kristine M. Thomas, Project Manager
Project Directorate IV-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: October 6, 1997

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 86 TO FACILITY OPERATING LICENSE NO. NPF-74

DOCKET NO. STN 50-530

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change. The corresponding overleaf pages are also provided to maintain document completeness.

REMOVE	INSERT
3/4 8-1	3/4 8-1
3/4 8-2	3/4 8-2
3/4 8-3	3/4 8-3
3/4 8-4	3/4 8-4
3/4 8-4a	---
3/4 8-5	3/4 8-5
3/4 8-6	3/4 8-6
3/4 8-7	3/4 8-7
3/4 8-8	3/4 8-8
3/4 8-8a	3/4 8-8a
B 3/4 8-1	B 3/4 8-1
B 3/4 8-2	B 3/4 8-2
B 3/4 8-3	B 3/4 8-3
B 3/4 8-4	B 3/4 8-4
---	B 3/4 8-5
---	B 3/4 8-6
---	B 3/4 8-7
---	B 3/4 8-8
---	B 3/4 8-9
---	B 3/4 8-10
---	B 3/4 8-11
---	B 3/4 8-12
---	B 3/4 8-13
---	B 3/4 8-14
---	B 3/4 8-15
---	B 3/4 8-16
---	B 3/4 8-17
---	B 3/4 8-18
---	B 3/4 8-19
---	B 3/4 8-20
---	B 3/4 8-21
---	B 3/4 8-22

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 The following AC electrical power sources shall be OPERABLE:

a. Two physically independent circuits from the offsite transmission network to the switchyard and two physically independent circuits from the switchyard to the onsite Class 1E distribution system, and

b. Two separate and independent emergency diesel generators (EDG).

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With one offsite circuit of LCO 3.8.1.1.a inoperable,

1. Demonstrate the OPERABILITY of the remaining OPERABLE offsite circuits by performing SR 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; AND

2. Declare the required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable within 24 hours from the discovery of no offsite power to one train concurrent with the inoperability of the redundant required feature(s); AND

3. a. Restore the offsite circuit to OPERABLE status within 72 hours AND within 6 days from the discovery of failure to meet LCO 3.8.1.1; OR

b. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one EDG of LCO 3.8.1.1.b inoperable[1],

1. Demonstrate the OPERABILITY of the OPERABLE offsite circuits by performing SR 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; AND

2. Declare the required feature(s) supported by the inoperable EDG inoperable when its redundant required feature(s) is inoperable within 4 hours from the discovery of an inoperable EDG concurrent with the inoperability of the redundant required feature(s); AND

[1] TS LCO 3.8.1.1 ACTION b.3 shall be completed if this condition is entered.

LIMITING CONDITION FOR OPERATION (Continued)

3. Determine that the OPERABLE EDG is not inoperable due to common mode failure within 24 hours, OR demonstrate the OPERABILITY of the remaining OPERABLE EDG by performing SR 4.8.1.1.2.a.2 within 24 hours; AND

4. a. Restore the EDG to OPERABLE status within 72 hours AND within 6 days from the discovery of failure to meet LCO 3.8.1.1; OR

   b. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With one offsite circuit and one EDG inoperable[1], restore one of the inoperable AC sources to OPERABLE status within 12 hours; OR be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With two of the required offsite circuits inoperable[2],

   1. Declare the required feature(s) inoperable when its redundant required feature(s) is inoperable within 12 hours from the discovery of two offsite circuits inoperable concurrent with the inoperability of the redundant required feature(s); AND

   2. Restore one offsite circuit to OPERABLE status within 24 hours; OR be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With two of the required EDGs inoperable[3], restore one EDG to OPERABLE status within 2 hours; OR be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

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[1] Enter applicable conditions and requirements of TS LCO 3.8.1.1 ACTION a and ACTION b. In addition, with no AC power source to one train, enter applicable conditions and ACTIONs of TS LCO 3.8.3.1, "Onsite Power Distribution Systems - Operating."

[2] Enter applicable conditions and requirements of TS LCO 3.8.1.1 ACTION a.

[3] Enter applicable conditions and requirements of TS LCO 3.8.1.1 ACTION b.

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each required offsite circuit of LCO 3.8.1.1.a shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignment and indicated power availability.

b. Demonstrated OPERABLE at least once per 18 months[1] by manually transferring the onsite Class 1E power supply from the normal offsite circuit to the alternate offsite circuit.

4.8.1.1.2 Each emergency diesel generator (EDG) of LCO 3.8.1.1.b shall be demonstrated OPERABLE:

a. At least once per 31 days by:

1. Verifying the day tank has a minimum level of 2.75 feet (550 gallons of fuel).

2. Verifying the EDG starts and achieves voltage at 4160 ± 420 volts and frequency at 60 ± 1.2 Hz[2].

3. Verifying the EDG is synchronized to its appropriate bus and gradually loaded to 4950 - 5500 kW and operates for at least 60 minutes[3].

b. At least once per 31 days by verifying the fuel oil transfer system operates to automatically transfer fuel oil from the storage tank to the day tank.

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[1] This surveillance shall not be performed in MODE 1, 2, 3, or 4. Credit may be taken for unplanned events that satisfy this SR.

[2] Performance of 4.8.1.1.2.c satisfies this SR. A fuel limited EDG start may be used for the SR as recommended by the manufacturer. When the fuel limited start procedure is not used, the time, voltage, and frequency tolerances of 4.8.1.1.2.c must be met. All EDG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading as recommended by the manufacturer.

[3] EDG loading may be conducted in accordance with the manufacturer's recommendations, including gradual load. Momentary transients outside the load range do not invalidate this test. This SR shall be conducted on only one EDG at a time. This SR shall be preceded by and immediately follow, without shutting down, a successful performance of 4.8.1.1.2.a.2 or 4.8.1.1.2.c.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

c. At least once per 184 days by verifying the EDG starts from normal standby condition and achieves in ≤ 10 seconds at least 3740 volts and 58.8 Hz, and subsequently achieves steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz[1]. Following the EDG start, perform SR 4.8.1.1.2.a.3.

d. At least once per 18 months by:

1. Verifying the EDG capability to reject a single largest load ≥ 842 kW for EDG A (Train A Normal Water Chiller) and ≥ 904 kW for EDG B (Train B Auxiliary Feedwater pump) without tripping on overspeed, while maintaining voltage at 4160 ± 420 volts and frequency at 60 ± 1.2 Hz[3].

2. Verifying the EDG capability to reject a load of 4950 - 5500 kW without tripping on overspeed. The EDG voltage shall not exceed 6200 volts during and following the load rejection[2].

3. Verifying on a simulated loss of offsite power signal[3]:

a. Deenergization of the emergency buses;

b. Load shedding from emergency buses;

c. EDG auto-starts and:

1. energizes the emergency buses with permanently connected loads in ≤ 10 seconds,

2. energizes auto-connected shutdown loads through the load sequencer,

3. maintains steady state voltage at 4160 ± 420 volts, and frequency at 60 +1.2/-0.3 Hz[4], and

4. operates for ≥ 5 minutes while loaded with shutdown loads.

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[1] Performance of this SR may also serve to meet the requirements of SR 4.8.1.1.2.a.2. All EDG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading as recommended by the manufacturer.

[2] This Surveillance shall not be performed in MODE 1 or 2.

[3] This Surveillance shall not be performed in MODE 1, 2, 3, or 4.

[4] Momentary transients do not invalidate this test.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

4. Verifying that on an ESF actuation test signal (without a loss of power) the EDG auto-starts and:

   a. Achieves a steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz; and

   b. operates for ≥ 5 minutes on standby (running unloaded).[3]

5. Verifying on a simulated loss of offsite power signal in conjunction with an ESF actuation test signal:[3]

   a. Deenergization of the emergency buses;
   b. Load shedding from emergency buses;
   c. EDG auto-starts from normal standby condition and;

      1. energizes the emergency buses with permanently connected loads in ≤ 10 seconds,
      2. energizes auto-connected emergency (accident) loads through the load sequencer,
      3. maintains steady state voltage at 4160 ± 420 volts, and frequency at 60 +1.2/-0.3 Hz, and
      4. operates for ≥ 5 minutes while loaded with emergency loads.

6. Verifying that all automatic EDG trips are bypassed during emergency operation, except:[2]

   a. Engine overspeed,
   b. Generator differential,
   c. Engine low lube oil pressure, and
   d. Manual emergency stop trip.

7. Verifying each EDG operates for ≥ 24 hours:[2,4]

   a. For ≥ 22 hours of the test, the EDG shall be loaded to 4950-5500 kW[1], and

   b. For ≥ 2 continuous hours of the test, the EDG shall be loaded to 5775-6050 kW.[1]

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[1] Momentary transients outside the load range do not invalidate this test.
[2] This Surveillance shall not be performed in MODE 1 or 2.
[3] This Surveillance shall not be performed in MODE 1, 2, 3, or 4.
[4] The EDG may be prelubed, warmed up, and loaded in accordance with the manufacturer's recommendations.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 (Continued)

8. Within 5 minutes of shutting down the EDG after the EDG has operated at 4950 - 5500 kW for 2 hours or until operating temperatures have stabilized,[1,2] verifying that the EDG starts and achieves in ≤ 10 seconds at least 3740 volts and 58.8 Hz, and maintains steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz.

9. Verifying each EDG:[3]

   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. Return to standby operation (running unloaded).

10. Verifying, with the EDG operating in test mode and connected to its bus, a simulated SIAS overrides the test mode by:[3]

    a. Returning the EDG to standby operation (running unloaded); and

    b. the Class 1E bus remains energized with offsite power.

11. Verifying that the automatic load sequencers are OPERABLE with the interval between each load block within ± 1 second of its design interval.[3]

e. At least once per 10 years, verifying, when started simultaneously each EDG achieves in ≤ 10 seconds at least 3740 volts and 58.8 Hz, and maintains steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz.[2,4]

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[1] Momentary transients outside the load range do not invalidate this test.
[2] This Surveillance shall not be performed in MODE 1 or 2.
[3] This Surveillance shall not be performed in MODE 1, 2, 3, or 4.
[4] Credit may be taken for unplanned events or for testing after any modifications which could affect EDG interdependence that satisfy this SR.

ELECTRICAL POWER SYSTEMS

A.C. SOURCES

SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.1.2 The following AC electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. One emergency diesel generator (EDG)

APPLICABILITY: MODES 5 and 6

ACTION:

With less than the above minimum required AC electrical power sources OPERABLE,[1] immediately suspend all operations involving:

1. CORE ALTERATIONS,

2. Movement of irradiated fuel assemblies,

3. Positive reactivity additions, and

4. Crane operation with loads over the fuel storage pool.

Immediately initiate action to restore the required sources to OPERABLE status.

SURVEILLANCE REQUIREMENTS

4.8.1.2 For AC sources required to be OPERABLE, the SRs of TS LCO 3.8.1.1, AC Sources - Operating," except SR 4.8.1.1.1.b, SR 4.8.1.1.2.d.4, SR 4.8.1.1.2.d.10, and SR 4.8.1.1.2.e, are applicable.[2]

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[1] With no AC power source to one train as a result of one offsite circuit inoperable, enter applicable conditions and ACTIONs of TS LCO 3.8.3.2, "Onsite Power Distribution Systems - Shutdown."

[2] The following SRs are not required to be performed:
SR 4.8.1.1.2.a.3 and
SR 4.8.1.1.2.d.

ELECTRICAL POWER SYSTEMS

A.C. SOURCES

DIESEL FUEL OIL STORAGE SYSTEM - DIESEL FUEL OIL REQUIREMENTS

LIMITING CONDITION FOR OPERATION

3.8.1.3.1 Each diesel fuel oil storage system shall be within its limits.

APPLICABILITY: When the associated EDG is required to be OPERABLE.

ACTION:

a. With either EDG fuel oil storage system < 80% indicated fuel level but ≥ 71% indicated fuel level, restore the fuel oil level to within its limit within 48 hours or declare the associated EDG inoperable.[1]

b. With either EDG fuel oil storage system with stored fuel oil viscosity not within limits, restore fuel oil to within limits within 30 days or declare the associated EDG inoperable.[1]

c. With either EDG fuel oil storage system with stored fuel oil water and sediment not within limits, immediately declare the associated EDG inoperable.[1]

SURVEILLANCE REQUIREMENTS

4.8.1.3.1.1 At least once per 31 days, verify that the fuel level in the fuel storage tank is within its limits.

4.8.1.3.1.2 At least once per 92 days, verify that a sample of diesel fuel from the fuel storage tank obtained in accordance with ASTM-D4176-82 is within the acceptable limits specified in Table 1 of ASTM D975-81 when checked for viscosity, water, and sediment.

[1] A separate condition entry is allowed for each EDG.

ELECTRICAL POWER SYSTEMS

A.C. SOURCES

DIESEL FUEL OIL STORAGE SYSTEM - CATHODIC PROTECTION

LIMITING CONDITION FOR OPERATION

3.8.1.3.2 The Cathodic Protection System associated with the EDG diesel fuel oil storage tanks shall be OPERABLE.

APPLICABILITY: At all times.

ACTION:

a. With the cathodic protection system inoperable for more than 30 days, prepare and submit a Special Report to the Commission pursuant to TS 6.9.2 within the next 10 days outlining the cause of the malfunction and the plans for restoring the system to OPERABLE status.

b. The provisions of TS 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.8.1.3.2 Verify that the cathodic protection system is OPERABLE at the following time intervals:

1. Verify at least once per 61 days that the cathodic protection rectifiers are OPERABLE and have been inspected in accordance with Regulatory Guide 1.137.

2. Verify at least once per 12 months that the cathodic protection is OPERABLE and providing adequate protection against corrosion in accordance with Regulatory Guide 1.137.

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1.1 A.C. SOURCES

OPERATING

BASES

The OPERABILITY of the AC and DC power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety-related equipment required for (1) the safe shutdown of the unit and (2) the mitigation and control of accident conditions within the unit. As required by 10CFR50, Appendix A, GDC 17, 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 AC sources in one train must be separate and independent (to the extent possible) of the AC sources in the other train. For the EDGs, separation and independence are complete.

The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set of onsite AC and DC power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss-of-offsite power and single failure of the other onsite AC source.

Two physically independent circuits from the offsite transmission network to the switchyard and two physically independent circuits from the switchyard to the onsite Class 1E distribution system, and two separate and independent EDG 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 design basis accident (DBA).

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. Each EDG must be capable of supplying one train of the onsite Class 1E AC Power Distribution System (PDS). Each EDG must be capable of starting, accelerating to rated speed (i.e., frequency) and voltage, and connecting to its respective ESF bus on detection of bus undervoltage in $\leq$ 10 seconds. Each EDG 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.

The ACTION requirements specified for the level of degradation of the power sources provide restriction upon continued unit operation commensurate with the level of degradation.

ACTIONS:

a.1 To ensure a highly reliable power source remains with the one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. Since the ACTION only specifies "perform," a failure of SR 4.8.1.1.1.a acceptance

criteria does not result in an ACTION not being met. However, if a second offsite circuit fails SR 4.8.1.1.1.a, the second required circuit is inoperable, and TS 3.8.1.1 ACTION d, for two offsite circuits inoperable, is entered.

a.2 This ACTION, which only applies if the train (i.e., ESF bus) cannot be powered from an offsite source, is intended to provide assurance that an event coincident with a single failure of the associated EDG will not result in a complete loss of safety function of critical redundant required features. These features require Class 1E power from PBA-S03 or PBB-S04 ESF buses to be OPERABLE, and include: charging pumps (TS 3.1.2.4); radiation monitors Train A RU-29, Train B RU-30, Train A RU-31, and Train B RU-145 (TS 3.3.3.1 and ODCM 2.1); pressurizer heaters (TS 3.4.3.1); ECCS (TS 3.5.2); containment spray (TS 3.6.2.1); containment isolation valves NCA-UV-402, NCB-UV-403, WCA-UV-62, and WCB-UV-61 (TS 3.6.3); containment hydrogen monitors (TS 3.6.4.1); containment electric hydrogen recombiners (TS 3.6.4.2); auxiliary feedwater pumps (TS 3.7.1.2); essential cooling water loops (TS 3.7.3); essential spray pond loops (TS 3.7.4); ultimate heat sink (TS 3.7.5); essential chilled water loops (TS 3.7.6); control room essential filtration (TS 3.7.7); ESF pump room air exhaust cleanup (TS 3.7.8); shutdown cooling subsystems (TS 3.7.11 and 3.4.1.3); and fuel building ventilation (TS 3.9.12). Mode applicability is as specified in each appropriate TS section.

The 24 hour completion time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 24 hours also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." The completion time only begins on discovery that both:

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

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

If at any time during the existence of one offsite circuit inoperable, a redundant required feature subsequently becomes inoperable, the 24 hour time begins to be tracked.

Discovering no offsite power to one train of the onsite Class 1E PDS 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 24 hour clock. 24 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.

BASES

The remaining OPERABLE offsite circuit and EDGs are adequate to supply electrical power to Train A and Train B of the onsite Class 1E PDS. 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 RG 1.93, operation may continue with one offsite circuit inoperable 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. However, the remaining OPERABLE offsite circuit and EDGs are adequate to supply electrical power to the onsite Class 1E PDS.

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.

The 6 day completion time (6 days from the discovery of the failure to meet the LCO) for restoring the offsite circuit to OPERABLE status establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. For example, if one offsite circuit is inoperable while an EDG is inoperable, and that EDG is subsequently returned to OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the offsite circuit. At this time, an EDG could again become inoperable, the circuit restored to OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day completion time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is reasonable for situations in which both the offsite circuit and the EDG are inoperable concurrently. The AND connector between the 72 hour and 6 day completion times means that both completion times apply simultaneously, and the more restrictive completion time must be met.

The completion time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time ACTION a was entered.

b.1 To ensure a highly reliable power source remains with an inoperable EDG, it is necessary to verify the availability of the offsite circuits on a more frequent basis. Since the ACTION only specifies "perform," a

failure of SR 4.8.1.1.1.a acceptance criteria does not result in an ACTION not being met. However, if a offsite circuit fails to pass the SR, it is inoperable. Upon offsite circuit inoperability, additional conditions and ACTIONs must then be entered.

b.2 This ACTION is intended to provide assurance that a loss of offsite power, during the period that an EDG is inoperable, does not result in a complete loss of safety function of redundant required features. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable EDG. These features require Class 1E power from PBA-S03 or PBB-S04 ESF buses to be OPERABLE, and include: charging pumps (TS 3.1.2.4); radiation monitors Train A RU-29, Train B RU-30, Train A RU-31, and Train B RU-145 (TS 3.3.3.1 and ODCM 2.1); pressurizer heaters (TS 3.4.3.1); ECCS (TS 3.5.2); containment spray (TS 3.6.2.1); containment isolation valves NCA-UV-402, NCB-UV-403, WCA-UV-62, and WCB-UV-61 (TS 3.6.3); containment hydrogen monitors (TS 3.6.4.1); containment electric hydrogen recombiners (TS 3.6.4.2); auxiliary feedwater pumps (TS 3.7.1.2); essential cooling water loops (TS 3.7.3); essential spray pond loops (TS 3.7.4); ultimate heat sink (TS 3.7.5); essential chilled water loops (TS 3.7.6); control room essential filtration (TS 3.7.7); ESF pump room air exhaust cleanup (TS 3.7.8); shutdown cooling subsystems (TS 3.7.11 and 3.4.1.3); and fuel building ventilation (TS 3.9.12). Mode applicability is as specified in each appropriate TS section.

The 4 hour completion time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 4 hours also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." The completion time only begins on discovery that both:

a. An inoperable EDG exists; and

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

If at any time during the existence of one EDG inoperable, a required feature subsequently becomes inoperable, the 4 hour time begins to be tracked.

Discovering one required EDG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE EDG, results in starting the 4 hour clock 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.

BASES

The remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to onsite Class 1E PDS. 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 This ACTION provides an allowance to avoid unnecessary testing of OPERABLE EDGs. If it can be determined that the cause of the inoperable EDG does not exist on the OPERABLE EDG, SR 4.8.1.1.2.a does not have to be performed. If the cause of inoperability exists on the other EDG, the other EDG would be declared inoperable upon discovery and TS 3.8.1.1 ACTION e would be entered. Once the failure is repaired, the common mode failure no longer exists and this ACTION is satisfied. If the cause of the initial inoperable EDG cannot be confirmed not to exist on the remaining EDG, performance of SR 4.8.1.1.2.a within the initial 24 hour period suffices to provide assurance of continued OPERABILITY of that EDG.

In the event the inoperable EDG is restored to OPERABLE status prior to completing this ACTION, an evaluation will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in ACTION b.

According to GL 84-17, 24 hours is reasonable to confirm that the OPERABLE EDG is not affected by the same problem as the inoperable EDG.

b.4 According to RG 1.93, operation may continue with one EDG inoperable for a period that should not exceed 72 hours. The remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E PDS. 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.

The 6 day completion time (6 days from the discovery of the failure to meet the LCO) for restoring the EDG to OPERABLE status establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. For example, if one EDG is inoperable while an offsite circuit is inoperable, and that circuit is subsequently returned to OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the EDG. At this time, an offsite circuit could again become inoperable, the EDG restored to OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day completion time provides a limit on

the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is reasonable for situations in which both the offsite circuit and the EDG are inoperable concurrently. The AND connector between the 72 hour and 6 day completion times means that both completion times apply simultaneously, and the more restrictive completion time must be met.

The completion time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time ACTION b was entered.

c According to RG 1.93, operation may continue with one offsite circuit and one EDG inoperable for a period that should not exceed 12 hours. 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.

d.1 This ACTION, which applies when two offsite circuits are inoperable due to voltage outside the acceptable operating band or if both trains of the onsite Class 1E PDS (i.e., ESF buses) cannot be powered from an offsite source, 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. The rationale for the reduction to 12 hours is that RG 1.93 allows a completion time of 24 hours for two required offsite circuits inoperable, based on 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 require Class 1E power from PBA-S03 or PBB-S04 ESF buses to be OPERABLE, and include: charging pumps (TS 3.1.2.4); radiation monitors RU-29, RU-30, RU-31, and RU-145 (TS 3.3.3.1 and ODCM 2.1); pressurizer heaters (TS 3.4.3.1); ECCS (TS 3.5.2); containment spray (TS 3.6.2.1); containment isolation valves NCA-UV-402, NCB-UV-403, WCA-UV-62, and WCB-UV-61 (TS 3.6.3); containment hydrogen monitors (TS 3.6.4.1); containment electric hydrogen recombiners (TS 3.6.4.2); auxiliary feedwater pumps (TS 3.7.1.2); essential cooling water loops (TS 3.7.3); essential spray pond loops (TS 3.7.4); ultimate heat sink (TS 3.7.5); essential chilled water loops (TS 3.7.6); control room essential filtration (TS 3.7.7); ESF pump room air exhaust cleanup (TS 3.7.8); shutdown cooling subsystems (TS 3.7.11 and 3.4.1.3); and fuel building ventilation (TS 3.9.12). Mode applicability is as specified in each appropriate TS section.

BASES

The 12 hour completion time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 12 hours also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." 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 two offsite circuits inoperable, and a required feature becomes inoperable, the 12 hour time begins to be tracked.

d.2 According to RG 1.93, operation may continue with two offsite circuits inoperable 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 EDGs 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.

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 worse 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 RG 1.93, 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 TS LCO 3.8.1.1 ACTION a.

e. With Train A and Train B EDGs 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 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). Any inadvertent generator trip could also result in a total loss of offsite AC power. Therefore, the time allowed for continued operation is severely restricted. The intent of this ACTION, with both EDGs inoperable, is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to RG 1.93, with both EDGs inoperable, operation may continue for a period that should not exceed 2 hours.

ACTION requirements 3.8.1.1.f and 3.8.1.1.g provide restrictions upon continued unit operation commensurate with degradation of switchyard voltage and restoration of OPERABILITY of the required A.C. sources. In an effort to minimize the risk to the health and safety to the public, ACTIONS 3.8.1.1.f and 3.8.1.1.g balance the risk of a forced shutdown against the risk of remaining at power with a switchyard voltage in the lower portion of the expected range. The risk during ACTIONS 3.8.1.1.f and 3.8.1.1.g due to a switchyard voltage in the lower portion of the expected range and an independent accident is less than the risk associated with a normal shutdown including a reactor trip.

Conformance to GDC-17 requires maintenance of switchyard voltages at or above those identified in ACTIONS 3.8.1.1.f and 3.8.1.1.g. At voltages below those identified, a unit trip resulting from an ESF signal, coincident with low switchyard voltages, will result in sequencing of ESF equipment on preferred offsite power. The Class 1E degraded voltage relays will detect a sustained degraded voltage due to the fast bus transfer of non-Class 1E loads from the auxiliary transformers to the startup transformers. The relays will actuate to strip the ESF equipment and resequence it on the emergency diesel generator. This "double sequencing" causes an interruption in equipment credited with specific response time in the UFSAR Chapter 6 and 15 safety analysis, and is unanalyzed. Maintenance of switchyard voltage at or above the specified value prevents this effect as does the configurations authorized by ACTIONS 3.8.1.1.f and 3.8.1.1.g. The required voltage is higher when three units are operating on two startup transformers, as

two secondary windings of the startup transformers must each supply ESF power to two units.

ACTIONS 3.8.1.1.f.1 and 3.8.1.1.g.1 are preferred over ACTIONS 3.8.1.1.f.2 and 3.8.1.1.g.2. ACTIONS 3.8.1.1.f.1 and 3.8.1.1.g.1 are designed to balance the probability of double sequencing (should no actions to mitigate be undertaken) due to switchyard voltage in the lower portion of the expected range coincident with an accident, which is unlikely, against the probability of natural circulation (should both trains of fast bus transfer be blocked) due to a unit trip coincident with switchyard voltage in the lower portion of the expected range, which is also unlikely but more probable. ACTIONS 3.8.1.1.f.1 and 3.8.1.1.g.1 provides offsite power to half of the non-class 1E loads for forced circulation to respond to a normal plant trip, as well as EDG power and the second offsite power circuit to the two trains of ESF equipment to respond to any accident. ACTIONS 3.8.1.1.f.2 and 3.8.1.1.g.2 are provided to allow operation of both trains of fast bus transfer blocked in the unlikely event of problems with the emergency diesel generators.

SURVEILLANCE REQUIREMENTS:

The surveillance requirements for demonstrating OPERABILITY of the emergency diesel generators (EDG) are based on the recommendations of Regulatory Guide (RG) 1.9, Revision 3, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," unless otherwise noted in the Updated FSAR Section 1.8.

All planned EDG starts may be preceded by an engine prelube period as recommended by the manufacturer in order to minimize wear and tear on the EDGs during testing. The EDG capabilities (starting and loading) are required to be met from a variety of initial conditions such as EDG in standby with the engine hot (SR 4.8.1.1.2.d.8), EDG in standby with the engine at normal standby conditions (SR 4.8.1.1.2.c and SR 4.8.1.1.2.d.5.c), and EDG operating in a parallel test mode (SR 4.8.1.1.2.d.10). Although it is expected that most EDG starts will be performed from normal standby conditions, EDG starts, except as specified in the SR, may be performed with the jacket water cooling and lube oil temperatures within the lower to upper limits of EDG OPERABILITY. Lube oil and jacket water cooling within manufacturer's recommended temperatures constitutes normal standby condition. Rapid cooling of the EDG down to normal standby conditions should be minimized.

The timed start ($\leq$ 10 seconds) is satisfied when the EDG achieves at least 3740 volts and 58.8 Hz. At these values, the EDG output breaker permissives are satisfied; and on detection of bus undervoltage or loss of power, the EDG breakers would close reenergizing its respective ESF bus. Following the timed start, it is expected that the rated speed (i.e., frequency) and voltage will stabilize and maintain steady state voltage at 4160 $\pm$ 420 volts and frequency at 60 +1.2/-0.3 Hz.

BASES

The required steady state frequency range for the EDG is 60 +1.2/-0.3 Hz to be consistent with the safety analysis to provide adequate safety injection flow. In accordance with the guidance provided in RG 1.9, 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).

Surveillance load testing uses the referenced equipment or equivalent loading.

4.8.1.1.1

a. This SR assures proper circuit continuity and indicated 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 7 day frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

b. This SR demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The 18 month frequency is based on engineering judgement, taking into consideration the unit conditions required to perform the SR, and is intended to be consistent with 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 is concluded to be acceptable from a reliability standpoint.

   The reason for the footnote "This Surveillance shall not be performed in MODE 1, 2, 3, or 4" is that performing this SR would remove a required offsite circuit from service, perturb the electrical distribution system (EDS), and challenge safety systems.

4.8.1.1.2

a.1 The 31 day SR is adequate to assure that a sufficient supply of fuel oil is available, since low level alarms are provided in the control room. In addition, operators would be aware of any large uses of fuel oil during this period.

a.2 This SR helps 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.

BASES

In order to reduce stress and wear on diesel engines, the EDG may be tested using a fuel limited start as opposed to a fast start (≤ 10 seconds) during the 31 day SR. A fuel limited start is an EDG start in which the amount of fuel is temporarily restricted during the start to cause a more gradual acceleration to rated frequency and voltage than would occur during a start in Emergency Mode. The fast start is required to be performed during the 184 day SR. Reducing fast starts would avoid premature wear of the engine and lead to greater EDG reliability and availability. The change is consistent with the GL 84-15 recommendations for changes to the TS to reduce the number of fast starts and improve reliability. Performing the fast start test every 184 days will adequately demonstrate the EDG's present level of reliability and availability. However, if a fuel limited start is not used, the time, voltage, and frequency tolerances of 4.8.1.1.2.c must be met.

This change is also consistent with the guidance provided in RG 1.9 which states that for monthly SRs, the EDG can be brought to rated speed and voltage in a time that is recommended by the manufacturer to minimize stress and wear (slow started).

The 184 day SR 4.8.1.1.2.c requires a fast start (≤ 10 seconds), is more restrictive than SR 4.8.1.1.2.a.2, and may be performed in lieu of SR 4.8.1.1.2.a.2.

a.3 This SR verifies that the EDGs are capable of synchronizing with the offsite electrical system and accepting loads of 90 to 100 percent (4950 - 5500 kW) of the continuous rating of the EDG. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the EDG is connected to the offsite source. However, additional runtime in excess of 60 minutes may be performed as recommended by the manufacturer. This SR should be conducted on only one EDG at a time in order to avoid common mode failures that might result from offsite circuit or grid perturbations. A successful EDG start (SR 4.8.1.1.2.a.2 or SR 4.8.1.1.2.c) must precede this test to credit satisfactory performance.

Consistent with the guidance provided in RG 1.9 for monthly SRs, the EDG can be loaded at a rate that is recommended by the manufacturer to minimize stress and wear (gradual loading).

Consistent with the guidance provided in the RG 1.9 load-run test description, the 4950 - 5500 kW band will demonstrate 90 to 100 percent of the continuous rating of the EDG. The load band (4950 - 5500 kW) is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing may be performed within the guidance of the generator capability curve. Momentary transients because of changing bus loads do not invalidate this test.

b. This SR demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank, in order to support continuous operation of the EDG. This SR 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 control systems for automatic fuel transfer systems are OPERABLE.

An OPERABLE fuel oil transfer system is required to ensure that the 7 days of inventory of fuel in the fuel storage system is capable of being transferred to the fuel oil day tank for utilization by the EDGs.

The frequency is based upon the rate of full load fuel oil consumption, the level control system, and the fuel oil transfer pump capability, which transfer approximately hourly during full load operation.

c. The bases for 4.8.1.1.2.a.2 also apply to this SR. The 184 day frequency for 4.8.1.1.2.c imposes a reduction in fast start SRs consistent with GL 84-15. The 31 day and 184 day frequencies provide adequate assurance of EDG OPERABILITY, while minimizing degradation resulting from testing. RG 1.9 fast-start test description specifies that the EDG is to start from standby condition.

d. In general, unless otherwise specified, the SR frequency of 18 months is consistent with the recommendations of RG 1.9, and is intended to be consistent with expected fuel cycle lengths.

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 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; or that performing the SR would remove a required EDG from service. The reason for "This Surveillance shall not be performed in MODE 1, 2, 3, or 4" is that performing this SR would remove a required offsite circuit from service, perturb the EDS, and challenge safety systems.

d.1 The EDG 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 the diesel engine to overspeed, which, if excessive, might result in a trip of the engine. This SR demonstrates the EDG load response characteristics and capability to reject the single largest, 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 904 kW) are the bounding loads for the EDG A and EDG B to reject, respectively. These values are listed in Table 8.3-3, Load Bases for Class 1E Buses, in the Updated FSAR.

d.2 This SR demonstrates the EDG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The EDG full load rejection may occur because of a system fault or inadvertent breaker tripping. This SR ensures proper engine generator load response under the simulated test conditions.

Consistent with the guidance provided in the RG 1.9 full-load rejection test description, the 4950 - 5500 kW band will demonstrate the EDG's capability to reject a load equal to 90 to 100 percent of its continuous rating. Administrative limits have been placed upon the Class 1E 4160 V buses due to high voltage concerns. As a result, power factors deviating much from unity are currently not possible when the EDG runs parallel to the grid. To the extent practicable, VARs will be provided by the EDG during this SR.

d.3 This SR demonstrates the as-designed operation of the emergency standby power sources during a loss of the offsite source, and also demonstrates the capability of the EDG to automatically achieve the required voltage and frequency within the required time, as specified in RG 1.9, paragraph 2.2.4.

The requirement to verify the connection and power supply of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the EDG loading logic. In certain circumstances, many of these loads cannot actually be connected without undue hardship or potential for undesired operation. For example, ECCS injection valves are not desired to be stroked open, HPSI systems are not 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, testing that adequately shows the capability of the EDG 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.

d.4 This SR demonstrates that the EDG automatically starts and achieves the required voltage and frequency from the design basis actuation signal (LOCA signal) and operates for $\geq$ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability. The primary purpose of this SR is to test the circuitry of a safety injection actuation signal with offsite power available and to verify that the EDG receives a start signal.

d.5 In the event of a DBA coincident with a loss of offsite power, the EDGs are required to supply the necessary power to ESF systems so that fuel, RCS, and containment design limits are not exceeded.

This SR demonstrates the EDG operation, as discussed in the Bases for 4.8.1.1.2.d.3, 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 EDG 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.

d.6 This SR demonstrates that the EDG noncritical protective functions are bypassed during emergency operation, and that the critical protective functions trip the EDG to avert substantial damage to the EDG 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 EDG 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 EDG.

d.7 The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.9. The provisions for prelubricating and warmup, discussed in SR 4.8.1.1.2.a.2, and for gradual loading, discussed in SR 4.8.1.1.2.a.3, are applicable to this SR.

Per the guidance in RG 1.9, in order to demonstrate the full-load carrying capability for an interval of not less than 24 hours, the 2 hour interval is to be performed at a load equal to 105 to 110 percent of the continuous rating of the EDG (5775 - 6050 kW), and the 22 hour interval is to be performed at a load equal to 90 to 100 percent of its continuous rating (4950 - 5500 kw).

The reason for footnote 1 (Momentary transients outside the load range do not invalidate this test) is that this band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing under direct monitoring of the manufacturer or momentary variations due to changing bus loads shall not invalidate the test.

d.8 This SR demonstrates that the EDG can restart from a hot condition, such as subsequent to a shutdown from a normal SR, and achieve the required voltage and frequency in $\leq$ 10 seconds. The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.10.

Running for 2 hours or until operating temperatures have stabilized ensures that the test is performed with the EDG sufficiently hot. The load band is provided to avoid routine overloading of the EDG. Per the guidance in RG 1.9, this SR would demonstrate the hot restart functional capability at full-load temperature conditions, after the EDG has

operated for 2 hours (or until operating temperatures have stabilized) at full load (i.e., 4950 - 5500 kW).

d.9 The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.11. This SR ensures that the manual synchronization and automatic load transfer from the EDG to the offsite source can be made and that the EDG can be returned to standby status (running unloaded) when offsite power is restored.

d.10 Demonstration of the test mode override ensures that the EDG availability under accident conditions will not be compromised as the result of testing and the EDG will automatically reset to standby operation (running unloaded) if an ESF actuation signal is received during operation in the test mode. The provisions for automatic switchover are required by IEEE-308, paragraph 6.2.6(2). The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.13.

d.11 Each EDG is required to demonstrate proper operation for the DBA loading sequence to ensure that voltage and frequency are maintained within the required limits. The load sequence time interval tolerance ensures that sufficient time exists for the EDG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.2.4.

e. This SR demonstrates that the EDG starting independence has not been compromised; and that each engine can achieve proper speed within the specified time when the EDGs are started simultaneously. The requirements and frequency of this SR are consistent with the recommendations of RG 1.9, paragraph 2.3.2.4 and RG 1.137.

3/4.8.1.2 A.C. SOURCES

SHUTDOWN

BASES

The OPERABILITY of the minimum specified AC power sources during shutdown and refueling ensures that (1) the unit can be maintained in the shutdown or refueling condition for extended time periods, (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status, and (3) adequate AC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

An OPERABLE offsite circuit ensures that all required loads are powered from offsite power. An OPERABLE EDG ensures a diverse power source is available to provide electrical power support assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and EDG ensures the availability of sufficient AC sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and reactor vessel draindown).

The OPERABLE offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses. It is acceptable for trains to be cross tied during shutdown conditions, allowing a single offsite power circuit to supply all required trains.

The OPERABLE EDG must be capable of supplying one train of the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.3.2.

The ACTION requirements specified for the level of degradation of the power sources provide restriction upon continued unit operation commensurate with the level of degradation.

ACTIONS:

Suspension of the specified activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability or the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the unit safety systems. The required ACTION to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory provided the required SDM is maintained.

Notwithstanding performance of the conservative required ACTIONs, the unit is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

BASES

The completion time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the unit safety systems may be without sufficient power.

When one offsite circuit is inoperable with no AC power to one ESF bus, the ACTIONs for TS LCO 3.8.3.2 must be immediately entered. The footnote allows the condition (no AC power source to one train as a result of one offsite circuit inoperable) to provide requirements for the loss of the offsite circuit, whether or not a train is deenergized. TS LCO 3.8.3.2 provides the appropriate restrictions for the situation involving a deenergized train.

SURVEILLANCE REQUIREMENTS:

SR 4.8.1.2 requires the SRs from TS LCO 3.8.1.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 4.8.1.1.1.b is not required to be met since only one offsite circuit is required to be OPERABLE. SR 4.8.1.1.2.d.4 and SR 4.8.1.1.2.d.10 are not required to be met because the ESF functions (i.e., AFAS and SIAS) are not required to be OPERABLE during shutdown. In addition, SR 4.8.1.1.2.d.10 is not required to be met because the required OPERABLE EDG is not required to undergo periods of being synchronized to the offsite circuit. SR 4.8.1.1.2.e is excepted because starting independence is not required with an EDG that is not required to be OPERABLE.

The reason for the footnote (The following SRs are not required to be performed) is to preclude requiring the OPERABLE EDG from being paralleled with the offsite power network or otherwise rendered inoperable. With limited AC sources available, a single event could compromise both the required circuit and the EDG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the EDG is required to be OPERABLE.

3/4.8.1.3 A.C. SOURCES

DIESEL FUEL OIL STORAGE SYSTEM

BASES

Each emergency diesel generator (EDG) is provided with a storage tank having a fuel oil capacity sufficient to operate that EDG for a period of 7 days, while the EDG is supplying maximum post loss of coolant accident load demand. The onsite fuel oil capacity is sufficient to operate the EDGs for longer than the time to replenish the onsite supply from outside sources.

A cross-connect capability exists for use when a failure has occurred in one of the EDG's fuel oil storage or transfer systems in order that the redundant system can be used to supply that EDG. However, cross-connecting the diesel fuel oil storage tanks during normal operations in Modes 1, 2, 3, or 4 would violate the independence and redundancy design criteria.

For proper operation of the standby EDGs, it is necessary to ensure the proper quality of the fuel oil. RG 1.137 addresses the recommended fuel oil practices. The fuel oil properties governed by these SRs are the water and sediment content, and the viscosity.

EDG day tank fuel requirements, as well as transfer capability from the storage tank to the day tank, are addressed in both LCO 3.8.1.1, "A.C. Sources - Operating," and LCO 3.8.1.2, "A.C. Sources - Shutdown."

A cathodic protection system is provided for the fuel oil storage tanks and piping located underground. The external corrosion protection as well as cathodic protection has been provided for the tanks to minimize external corrosion. The cathodic protection system consists of a number of rectifiers and deep bed anodes producing a direct current flow through the ground to the metallic objects buried in the soil which require corrosion protection.

If any other metallic structures (e.g., buildings, new or modified piping systems, conduit) are placed in the ground in the vicinity of the fuel oil storage system or if the original system is modified, the adequacy and frequency of inspections of the cathodic protection system shall be re-evaluated and adjusted in accordance with Regulatory Guide 1.137.

ACTIONS:

a. In this condition (i.e., $< 80\%$ indicated level but $\geq 71\%$ indicated level), the 7 day fuel oil supply (69,700 gallons of fuel) for an EDG is not available. However, the condition is restricted to fuel oil level reductions that maintain at least a 6 day supply (60,500 gallons of fuel). These circumstances may be caused by events such as full load operation required after an inadvertent start while at minimum required level; or feed and bleed operations, which may be necessitated by any number of oil quality degradations. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analysis required prior to addition of fuel oil to the tank. A period

of 48 hours is sufficient to complete the restoration of the required level prior to declaring the EDG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period. With the required ACTION and associated completion time not met, the associated EDG may be incapable of performing its intended function and must be immediately declared inoperable.

b. With the stored fuel oil viscosity not within the required limits, a period of 30 days is allowed for restoration. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if an EDG start and load was required during the 30 day frequency and the fuel oil viscosity was outside its limits, there is a high likelihood that the EDG would still be capable of performing its intended function. With the required ACTION and associated completion time not met, the associated EDG may be incapable of performing its intended function and must be immediately declared inoperable.

c. With the stored fuel oil water and sediment not within the required limits, the associated EDG may not be capable of performing its intended function and must be immediately declared inoperable.

SURVEILLANCE REQUIREMENTS:

SR 4.8.1.3.1.1 provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each EDG's operation for 7 days at full load. The 7 day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an outside source. The 31 day SR is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 4.8.1.3.1.2 ensures the availability of high quality fuel oil for the EDGs. The frequency of this test (92 days) takes into consideration the low humidity and infrequent rainfall at the site and is an exception to RG 1.137, and is consistent with UFSAR Section 1.8.

SR 4.8.1.3.2 ensures that the cathodic protection system is capable of minimizing external corrosion for the fuel oil storage tanks.

3/4.8.2 and 3/4.8.3 D.C. SOURCES and ONSITE POWER DISTRIBUTION SYSTEMS

BASES

The OPERABILITY of the AC and DC power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety-related equipment required for (1) the safe shutdown of the unit and (2) the mitigation and control of accident conditions within the unit. As required by 10CFR50, Appendix A, GDC 17, 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 OPERABILITY of the minimum specified AC and DC power sources and associated distribution systems during shutdown and refueling ensures that (1) the unit can be maintained in the shutdown or refueling condition for extended time periods, (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status, and (3) adequate AC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set of onsite AC and DC power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss-of-offsite power and single failure of the other onsite AC source.

The ACTION requirements specified for the level of degradation of the power sources provide restriction upon continued unit operation commensurate with the level of degradation.

The surveillance requirement for demonstrating the OPERABILITY of the Station batteries are based on the recommendations of RG 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plant," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage on float charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.

Table 4.8-2 specifies the normal limits for each designated pilot cell and each connected cell for electrolyte level, float voltage and specific gravity. The limits for the designated pilot cells float voltage and specific gravity, greater than 2.13 volts (Exide) 2.18 volts (AT&T) and 0.010 below the manufacturer's full charge specific gravity or a battery charger current that had stabilized at a low value, is characteristic of a charged cell with adequate capacity. The normal limits for each connected cell for float voltage and specific gravity, greater than 2.13 volts (Exide) 2.18 volts

BASES

(AT&T) and not more than 0.020 below the manufacturer's full charge specific gravity with an average specific gravity of all the connected cells not more than 0.010 below the manufacturer's full charge specific gravity, ensures the OPERABILITY and capability of the battery.

Operation with a battery cell's parameter outside the normal limit but within the allowable value specified in Table 4.8-2 is permitted for up to 7 days. During this 7-day period: (1) the allowable values for electrolyte level ensures no physical damage to the plates with an adequate electron transfer capability; (2) the allowable value for the average specific gravity of all the cells, not more than 0.020 below the manufacturer's recommended full charge specific gravity, ensures that the decrease in rating will be less than the safety margin provided in sizing; (3) the allowable value for an individual cell's specific gravity, ensures that an individual cell's specific gravity will not be more than 0.040 below the manufacturer's full charge specific gravity and that the overall capability of the battery will be maintained within an acceptable limit; and (4) the allowable value for an individual cell's float voltage, greater than 2.07 volts (Exide) 2.14 volts (AT&T), ensures the battery's capability to perform its design function.

REFERENCES:

1. 10 CFR 50, Appendix A, GDC 17
2. Updated FSAR, Chapter 1
3. Updated FSAR, Chapter 8
4. GL 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.
5. RG 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.
6. RG 1.93, "Availability of Electric Power Sources," Revision 0, December 1974.
7. RG 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," Revision 1, February 1978
8. RG 1.137, "Fuel Oil Systems for Standby Diesel Generators," Revision 1, October 1979.
9. ASME, Boiler and Pressure Vessel Code, Section XI
10. IEEE Standard 308-1974, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."
11. IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement"of Large Lead Storage Batteries for Generating Stations."

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 114 TO FACILITY OPERATING LICENSE NO. NPF-41, AMENDMENT NO. 107 TO FACILITY OPERATING LICENSE NO. NPF-51, AND AMENDMENT NO. 86 TO FACILITY OPERATING LICENSE NO. NPF-74

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

PALO VERDE NUCLEAR GENERATING STATION, UNIT NOS. 1, 2, AND 3

DOCKET NOS. STN 50-528, STN 50-529, AND STN 50-530

1.0 INTRODUCTION

By application dated March 24, 1995, and supplemented by letters dated September 10, 1995, and March 22, 1996, the Arizona Public Service Company (APS or the licensee) requested changes to the Technical Specifications (TS) (Appendix A to Facility Operating License Nos. NPF-41, NPF-51, and NPF-74, respectively) for the Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3. APS submitted this request on behalf of itself, the Salt River Project Agricultural Improvement and Power District, Southern California Edison Company, El Paso Electric Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority. The proposed changes would change the current technical specification (CTS) to (1) implement the applicable portions of NUREG-1432, "Standard Technical Specifications, Combustion Engineering Plants;" (2) implement the recommendations of Generic Letter (GL) 93-05, "Line-Item Technical Specification Improvements to Reduce Surveillance Requirements for Testing During Power Operations;" and (3) implement the recommendations of GL 94-01, "Removal of Accelerated Testing and Specific Reporting Requirements for Emergency Diesel Generators." The purpose of the proposed amendment is to increase the reliability of the Emergency Diesel Generators (EDGs) by reducing unnecessary testing. The associated Bases have been updated.

2.0 BACKGROUND

Concerns regarding EDG reliability have resulted in a number of staff actions to increase reliability. To this end, the staff focused significant attention on reducing the number of tests conducted on EDGs and also minimizing the impact on EDGs of tests that are still required. GL 93-05 (in part) and GL 94-01 provided licensees the opportunity to eliminate requirements for EDG testing under specific conditions. With the development of NUREG-1432, licensees were again afforded the opportunity to further reduce EDG testing

requirements, as well as to modify test requirements to reduce the impact of testing. The amendment proposed by the licensee incorporates the provisions of all three of the above mentioned documents. The following evaluation documents the staff's response to the licensee's proposal.

3.0 EVALUATION

LCO 3.8.1.1

The licensee is deleting the term "As a minimum" from the introductory portion of this limiting condition for operation (LCO). Because the term serves no demonstrable purpose and has no safety significance, the staff finds this change administrative. The deletion is therefore, acceptable.

Part b The licensee is adding the term "emergency" before "diesel generators" here and throughout the proposed electrical TS. Because the staff considers this an administrative change for purposes of consistency and of no safety significance, the staff finds this change acceptable.

Part b.1 The licensee is moving the requirement for the minimum volume of fuel oil in the day tank to proposed SR 4.8.1.1.2.a.1. This change moves the portion of the LCO that specifies the criteria for operability to the associated surveillance requirement (SR). The criteria remains unchanged. This change provides consistency with the format of NUREG-1432. The staff finds this change acceptable. This existing LCO includes a requirement for a "separate" day tank. The "separate" part of the LCO is deleted in the proposed change. The Palo Verde design is such that each EDG is separate with no interconnection between day tanks. As a result, the "separate" language is unnecessary. The staff finds deletion of this terminology an administrative change; therefore, it is acceptable.

Part b.2 The licensee is moving the requirement for a minimum volume of fuel oil in the fuel storage tank to proposed LCO 3.8.1.3.1.a. This is a reformatting change only to achieve consistency with NUREG-1432. In addition to reformatting, the wording of the requirement is changed to require the fuel oil storage volume to be "within limits," and an Action is provided to cover the Condition of the limits not being met. The limit included in the LCO is $\geq$ 80 percent of indicated fuel level (7-day supply), and the LCO is not satisfied at any volume less than 80 percent. However, instead of declaring the associated EDG inoperable immediately on going below 80 percent of indicated level as required by the CTS, the revised TS allow plant operation to continue for up to 48 hours provided the fuel oil storage is $\geq$ 71 percent of indicated level (6 day supply). These changes represent a relaxation from CTS requirements. This is consistent with the guidance described in NUREG-1432. However, the condition is restricted to fuel oil level reductions that maintain at least a 6 day supply. These circumstances may be caused by events such as fuel load operation required after an inadvertent start while at minimum required level; or feed and bleed operations, which may be necessitated by increasing particulate levels or any number of other oil quality degradations. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to

addition of fuel oil to the tank. A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the EDG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period. The staff concludes, therefore, that this change is acceptable.

Part b.3 The licensee is deleting this part of the LCO. The rationale for this deletion is that the fuel oil transfer pump OPERABILITY is an integral part of EDG OPERABILITY, and proposed SR 4.8.1.1.2.b will provide assurance of transfer pump OPERABILITY. Therefore, a separate LCO fuel oil transfer pump requirement is unnecessary. The staff agrees with this rationale and finds replacing Part b.3 of LCO 3.8.1.1 with SR 4.8.1.1.2.b acceptable because they accomplish the same purpose. This change is consistent with the format of NUREG-1432.

Action a This action addresses the condition in which one of the two offsite circuits is inoperable and is retained as Action a in the proposed TS with the following exceptions. The current requirement to test the EDGs with one offsite circuit inoperable is deleted. This deletion is consistent with the recommendations of GL 93-05, and with the findings presented in NUREG-1366, "Improvements to Technical Specifications Surveillance Requirements" with respect to reducing excessive EDG testing. The staff has concluded that the inoperability of an offsite circuit is not cause to question the reliability of EDGs that has been established based on a 31 day surveillance interval, and that testing of EDGs under such conditions is not necessary. The proposed deletion is consistent with the staff conclusions. It is therefore acceptable. The term "at least" is deleted from this action because it serves no purpose and is therefore unnecessary. In addition to the above, Action a is modified by editorial changes that include replacing "AC sources" with "OPERABLE offsite circuits," and adding "LCO" before "3.8.1.1.a." These are administrative changes that clarify the action, but do not alter the requirements. Therefore, the staff finds these changes acceptable.

In addition to these changes, Action a is further modified to include two new requirements. The licensee is adding a requirement to declare required features (safety systems and/or components) inoperable that are without offsite power as a consequence of one offsite power circuit being inoperable when the redundant required features are determined to be inoperable. The completion time for this requirement is established at 24 hours from the discovery of no offsite power to one train coincident with the inoperability of the redundant features. The second new requirement adds a maximum period of 6 days in which the LCO cannot be met as a consequence of alternating inoperability of offsite circuits and EDGs. Both new requirements represent added restrictions on plant operation to ensure that inoperability of AC sources will not have unacceptable consequences. These additions are enhancements to plant safety and are consistent with NUREG-1432. Therefore, the staff finds these changes acceptable.

Action b This action addresses the condition in which one of two EDGs is inoperable and is retained as Action b in the proposed TS with the following changes. The current requirement to test the other EDG within 24 hours has been modified to allow elimination of this test if it can be demonstrated by other means that there is no potential for a common mode failure. This change is consistent with the recommendations of GL 93-05 and with the findings presented in NUREG-1366 with respect to reducing excessive testing. This change is, therefore, acceptable. In addition, Action b is modified by editorial changes that include replacing "AC sources" with "OPERABLE offsite circuits" and adding "LCO" before "3.8.1.1.b." These are administrative changes that clarify the action but do not alter the requirements. These changes are also consistent with NUREG-1432. Therefore, the staff finds them acceptable. Action b also includes two new restrictions which are similar to the restrictions discussed for Action a, above, and are acceptable for the same reasons. The difference in the restrictions for Action b is that the 24 hour allowance is reduced to 4 hours with an inoperable EDG.

The licensee is retaining the current footnote to Action b, with editorial changes, as footnote 1 to proposed Action b. These changes do not alter the current requirements. This change is purely administrative, and it is therefore, acceptable.

Action c This action addresses the coincident inoperability of one offsite circuit and one EDG. The licensee is reformatting Action c and retaining it as Action c in the proposed TS. This reformatting does not change current requirements and is consistent with NUREG-1432. This is purely an administrative change and is, therefore, acceptable.

The footnote to proposed Action c also includes a requirement to enter the applicable actions of LCO 3.8.3.1 if one train is without AC power. Stating this requirement in the proposed footnote does not change any current requirements. It does, however, clarify the LCO. This is purely an administrative change and is, therefore, acceptable.

Action d This action addresses the inoperability of two offsite circuits. The licensee is retaining Action d with extensive modification, and is adding a new requirement in Action d of the proposed TS. This modification involves deletion of the requirement to test the EDGs, deletion of language referring to Action a, and deletion of clarifying language regarding EDG testing. The staff finds deletion of the requirement to test the EDGs consistent with GL 93-05 and NUREG-1366 as discussed previously and is, therefore, acceptable. The staff also finds that deletion of the qualifying language regarding EDG testing acceptable because EDG testing while in this action will no longer be required.

The language referring to Action a is replaced with a footnote reference. The footnote, in turn, requires coincident entry into Action a. Proposed Action d will also include a requirement to restore one offsite circuit to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours, and a footnote reference. The net result is no change to current requirements regarding offsite power.

This reformatting is an administrative change which the staff finds acceptable. Action d includes two new requirements which are similar to the restrictions discussed for Action a, above, and are acceptable for the same reasons. The difference in the restrictions for Action d is that the 24 hour allowance is reduced to 12 hours with two offsite circuits inoperable.

Action e This action addresses the condition in which two EDGs are inoperable. The licensee is reformatting Action e, and retaining it as Action e in the proposed TS. Reformatting involves deleting the current language regarding SR 4.8.1.1.1.a and the language regarding Action b. In both cases, the deleted language is replaced with a reference to a footnote. The footnote requires concurrent entry into Action b when Action e is entered. Action b includes the requirement to verify OPERABILITY of the offsite circuits. This requirement is the same as the deleted requirement regarding SR 4.8.1.1.1.a. Action b also identifies the requirements that will be in effect if one of the inoperable EDGs is restored to OPERABILITY. This is the same requirement as the deleted language regarding Action b. This reformatting does not change current requirements and is consistent with NUREG-1432. This is a purely administrative change and is, therefore, acceptable.

SR 4.8.1.1.1

The licensee is retaining this surveillance requirement with editorial changes, as proposed SR 4.8.1.1.1. The proposed changes do not alter the SR requirements but do clarify the material. These changes are purely administrative and are consistent with NUREG-1432. They are, therefore, acceptable.

SR 4.8.1.1.2.a

The licensee is retaining this SR with substantial editorial, formatting, and technical changes, as proposed SR 4.8.1.1.2. Technical changes include (1) deletion of the requirement to test the EDG as specified in Table 4.8.1 (accelerated testing) and substituting "At least once per 31 days," (2) deleting the requirement for EDGs to start and accelerate to specified voltage and frequency within 10 seconds, (3) changing the test load range from "5200-5400 kW" to "4950 to 5500 kW," and (4) deleting the specified methods for starting the EDGs. The staff finds change (1) acceptable because in accordance with GL 94-01, accelerated testing of EDGs can be eliminated with implementation of the maintenance rule under 10 CFR 50.65. This change is in accordance with GL 94-01, and is therefore, acceptable.

Reducing fast starts to once every 184 days, with slow or modified EDG starts at 31-day intervals, will provide adequate assurance of the capability of the EDG to respond to any design-basis event (DBE). At PVNGS, a "fuel-limited" start procedure will be followed for monthly EDG surveillances. Implementation of the "fuel-limited" procedure will prevent the EDG fuel system from reaching full rack travel when the EDG is started. This provides comparable reduction of testing stress as the "modified" EDG start. A footnote requires the constraints of SR 4.8.1.1.2.c to be followed if a fuel-limited start procedure for the EDGs is not followed. The above changes

reflect typical manufacturer's recommendations and are consistent with NUREG-1432. They are, therefore, acceptable.

The changes to SR 4.8.1.1.2 also modify the load range for EDG testing to 4950-5500 kW, or 90-100 percent of the EDG continuous rating. The staff finds that EDG testing in the 90-100 percent range, with no anomalies, provides adequate assurance of the EDG's capability to carry a full load while ensuring that the EDGs will not be routinely overloaded and while providing testing flexibility. This is consistent with Regulatory Guide 1.9 and GL 93-05. Therefore, the staff finds this change acceptable.

The staff finds change (4) acceptable because the requirement to vary the method of EDG starts does not produce any measurable increase in component or system reliability and it increases operational problems and the potential for human error. In addition, the licensee more thoroughly tests all start methodologies currently required by this SR at each refueling.

Reformatting changes are also made. These changes do not change current requirements and are consistent with NUREG-1432. These changes are purely administrative and are, therefore, acceptable.

Editorial changes include changing the way acceptance criteria are stated, deleting the language regarding manually synchronizing the generator to the bus, and other minor word changes. These changes do not change any requirements but do clarify the SR and delete language that is inappropriate for inclusion in SRs. These changes have no impact on safety. Therefore, the staff finds these editorial changes acceptable.

The licensee is deleting SR 4.8.1.1.2.a.5. The staff finds this change acceptable because this requirement (to be in standby) is an inherent part of OPERABILITY, which does not need to be restated. This is consistent with NUREG-1432.

The staff notes that both the CTS and the proposed TS are silent regarding what condition the EDGs must be in when they are started to satisfy the requirements of this SR. The licensee plans to conduct this SR from normal standby conditions with the following exception. In the event an EDG becomes inoperable, and performance of this SR is required to reestablish EDG OPERABILITY, the licensee plans to have the flexibility to conduct the SR with the EDG temperature anywhere between the upper and lower limits in lieu of conducting a forced cooldown of the EDG. The staff finds the licensee's plans acceptable since the benefits of conducting this SR from normal standby conditions when reestablishing EDG OPERABILITY do not offset the potential consequences of rapidly cooling down the EDG.

SR 4.8.1.1.2.b

The licensee is moving this SR to LCO 3.8.1.3. The staff finds this to be a format change that is consistent with NUREG-1432, and is, therefore, acceptable.

The licensee proposes to add a new SR 4.8.1.1.2.b. This SR will be added to reflect the deletion of the LCO 3.8.1.1.b.3 requirement for a fuel oil transfer pump and addresses fuel oil transfer system OPERABILITY. The SR requires that the capability of the fuel oil transfer system to automatically replenish the day tank be demonstrated every 31 days. The staff finds this requirement consistent with NUREG-1432 and, therefore, acceptable.

SR 4.8.1.1.2.c

This SR addresses the fast start of the EDGs every 184 days, and the licensee is retaining it, with technical, format, and editorial changes as proposed SR 4.8.1.1.2.c. The technical changes delete the requirement that EDG voltage and frequency be within an upper band within 10 seconds and the requirement to load the EDG to 5200-5400 kW in less than or equal to 60 seconds. The SR will now require that a minimum voltage and frequency be reached within 10 seconds and that the EDG subsequently achieve steady-state voltage and frequency within the upper band. This requirement is acceptable for two reasons. First, the primary concern from a safety perspective is that the EDGs reach a voltage and frequency that will support loading within 10 seconds. Steady-state operation, although important, is a secondary concern, and the time to reach steady-state operation need not be an acceptance criteria.

Second, during the fast start, EDGs go to full fuel for maximum acceleration. This overfueling results in a EDG speed overshoot, with attendant voltage overshoot, followed by speed and voltage decreases. These "oscillations" can be outside both the frequency and voltage tolerance bands and can continue for several seconds. As a result, the SR can be failed because the time and/or tolerance acceptance criteria are not met, but there is nothing wrong with the EDG. Modifying this SR as proposed will eliminate this problem. The staff finds deletion of the requirement to load the EDG to near full load in less than or equal to 60 seconds acceptable because rapid loading is detrimental to EDGs without providing any added assurance of EDG OPERABILITY. Therefore, for the reasons stated above, the staff finds these technical changes acceptable. These changes, including the associated editorial and format changes, are also consistent with NUREG-1432 and GL 93-05 and are, therefore, acceptable.

SR 4.8.1.1.2.d

SR 4.8.1.1.2.d currently reads as follows: "At least once per 18 months during shutdown by..." The licensee proposes to delete the term "during shutdown" and add footnotes to the subparts of the SR that limit the modes in which the SRs may be performed. These footnotes state that the SR shall not be performed in Modes 1 and 2, Modes 1 to 3, or Modes 1 to 4 depending on the SR. The staff reviewed the mode-limiting footnotes for all of the subparts of SR 4.8.1.1.2.d and finds them acceptable because they appropriately restrict testing that should not be performed during plant operation.

In NUREG-1432, the equivalent SRs to the subparts of SR 4.8.1.1.2.d include the constraint that the SRs must be conducted with the EDG in standby condition. "Standby condition" is identified in the Bases of NUREG-1432 as the condition in which the EDG is at the temperature maintained by the jacket

water and/or lube oil keepwarm systems. The licensee proposed to delete this requirement. The SRs are primarily for the purpose of demonstrating system performance, not the capability of the EDG to start from standby conditions. The EDG starting capability is demonstrated on a monthly basis. The staff agrees with this position and finds that deletion of the constraint to conduct these SRs from standby conditions acceptable, with one exception. This exception is associated with proposed SR 4.8.1.1.2.d.5 and is discussed in the part of this evaluation covering that SR (current SR 4.8.1.1.2.d.7).

SR 4.8.1.1.2.d.1

This SR requires that EDGs be inspected once every 18 months in accordance with vendor recommendations. The licensee proposes to delete this SR from the ITS because this requirement does not directly demonstrate EDG operability and, consequently, does not meet the criteria for retention in the TS. The licensee proposes to relocate this SR from the TS to a licensee-controlled document (Maintenance Plan). The vendor recommendations, as well as inspection results and actions, will be part of the maintenance activities pursuant to 10 CFR 50.65. The staff concludes that this change is acceptable because the inspections are not necessary to demonstrate EDG OPERABILITY, and compliance with 10 CFR 50.65 will ensure sufficient inspections for preventive maintenance of the EDGs.

SR 4.8.1.1.2.d.2

This SR involves demonstrating the capability of the EDGs to reject their associated single largest load without tripping on overspeed and while maintaining voltage and frequency within limits. The licensee is retaining this SR with minor changes as proposed SR 4.8.1.1.2.d.1. The changes include changing 903 kW to 904 kW, adding "for EDGB" after 904 kW, adding "for EDGA" after 842 kW, and adding "without tripping on overspeed" to the SR acceptance requirements. The result of these changes is that PVNGS specific design/values are represented in the SR, and the SR is made more clear without changing any requirements. Based on the above, the staff finds this acceptable.

In NUREG-1432, this SR includes a requirement to conduct this single largest load reject at a power factor as close to accident load power factor as possible. At PVNGS, this test will be conducted using actual plant loads powered from the EDG with the safety bus disconnected from offsite power. Under these conditions, the power factor will be determined by the actual loads, i.e., it cannot be manually controlled to a specific value. Since the testing methodology (as described in the Bases) will determine power factor, there is no need to state a power factor requirement in the SR. The staff finds this change acceptable.

The licensee is modifying proposed SR 4.8.1.1.2.d.2 by adding a footnote that states that the SR shall not be performed in Modes 1 to 4. The staff finds that additional restriction on plant operation, which achieves conformance with the SR in NUREG-1432, to be acceptable.

SR 4.8.1.1.2.d.3

This SR covers the requirement to demonstrate the capability of the EDG to reject a full load without tripping on overspeed or exceeding specified voltage limits. The licensee is retaining this SR with minor changes, as proposed SR 4.8.1.1.2.d.2. The changes include adding "on overspeed" following "without tripping" and modifying the value of the load to be rejected to include a range of 4950-5500 kW. The additional language clarifies the SR without changing the requirements, and the load range for this test is consistent with Regulatory Guide (RG) 1.9, Revision 3, "Selection, Design, and Qualification of Diesel-Generator Units Used as Standby (Onsite) Electric Power Systems at Nuclear Power Plants," and is therefore, acceptable.

In NUREG-1432, this SR includes a requirement to conduct this full-load rejection test at a power factor as close to the accident load power factor as practicable. The licensee has not adopted the NUREG requirement for the following reasons. The licensee is primarily concerned with over voltage. In order to obtain the rated power factor while paralleled to the grid, the EDG would have to be overexcited. Depending on the grid conditions, this overexcitation would raise EDG output voltage which could cause the downstream bus to exceed the upper voltage limit for ESF equipment. To avoid this potential problem, the licensee will not include a power factor requirement in the TS. The licensee has, however, included a statement in the Bases that states that the test will be conducted at a power factor as close to the accident load power factor as practicable that can be achieved without creating an overvoltage on the associated ESF buses. Based on the above, the staff concludes that the licensee's proposal regarding power factor for this SR is acceptable.

SR 4.8.1.1.2.d.4

The licensee is moving this SR within the TS and will become proposed SR 4.8.1.1.2.d.11. There are no changes to the current requirements. This is purely an administrative change and is, therefore, acceptable.

SR 4.8.1.1.2.d.5

SR 4.8.1.1.2.d.5 demonstrates the capability of the on-site AC power systems to respond to a LOOP. The licensee has reformatted the SR and retains this SR with minor editorial changes, as proposed SR 4.8.1.1.2.d.3. Because the reformatting and editorial changes do not alter the requirements, the staff finds this change acceptable. The licensee is modifying the SR by a note that states that the SR shall not be performed in Modes 1, 2, 3, or 4. The staff finds this added restriction acceptable. Reformatting of this SR and modifying the SR with a note are consistent with NUREG-1432.

The licensee is proposing to delete a footnote from current SR 4.8.1.1.2.d.5 that imposes requirements regarding prelube, warmup, and slow loading. Engine prelube will be retained as a permissive with the word "shall" replaced with

"may." Retaining prelube as a permissive is acceptable because prelubing is a recommended practice, but is not necessary for performing this SR. The requirements for warmup and slow loading are deleted. This deletion is acceptable because warmup and slow loading are inappropriate for this test. This SR is a timed test of EDG response to a LOOP that would be involved if the footnote requirements for warmup and loading were followed.

SR 4.8.1.1.2.d.6

SR 4.8.1.1.2.d.6 demonstrates that the EDGs will start on an ESF signal with offsite power available and continue to run unloaded (running standby). The licensee is reformatting and retaining SR 4.8.1.1.2.d.6, with minor changes, as proposed SR 4.8.1.1.2.d.4. The changes include adding "(running unloaded)" following "standby" and adding voltage and frequency acceptance criteria. Because the reformatting and changes clarify the SR but do not alter any requirements, the staff finds the changes acceptable.

The licensee is modifying a footnote to SR 4.8.1.1.2.d.6 which imposes requirements regarding prelube, warmup, and slow loading. Engine prelube will be retained as a permissive with the word "shall" replaced with "may." Retaining prelube as a permissive is acceptable because prelubing is a recommended practice, but is not necessary for performing this SR. The requirements for warmup and slow loading are deleted. This is acceptable because warmup and slow loading are inappropriate for this test. This SE is a timed test of EDG response to a LOCA signal which would be invalid if the footnote requirements for warmup and loading were followed. The licensee is also adding a note which precludes performing this SR in Modes 1 through 4. The Mode restriction is acceptable because it prevents perturbations to the onsite AC power systems during Modes 1 through 4, and is consistent with NUREG-1432.

SR 4.8.1.1.2.d.7

SR 4.8.1.1.2.d.7 demonstrates the capability of the on-site AC power systems to respond to a loss-of-coolant accident (LOCA) coincident with a LOOP. The licensee is reformatting and retaining SR 4.8.1.1.2.d.7 as proposed SR 4.8.1.1.2.d.5. Reformatting includes separating Part a and Part b into three parts with four subparts but does not alter any requirements. The staff finds the proposed change acceptable. Reformatting also includes separating Part c into a separate SR as discussed below.

The licensee is separating Part c from SR 4.8.1.1.2.d.7, and retaining it as proposed SR 4.8.1.1.2.d.6. In addition to becoming a separate SR, Part c is being reformatted and reworded. However, these changes do not alter the requirements. This is an administrative change and is, therefore, acceptable.

The licensee is modifying the footnote to SR 4.8.1.1.2.d.7, which imposes requirements regarding prelube, warmup, and loading. Engine prelube will be retained as a permissive in a footnote to proposed SR 4.8.1.1.2.d.5 and SR 4.8.1.1.2.d.6 with "shall" replaced with "may." Retaining prelube as a permissive is acceptable because prelubing is a recommended practice but is

not necessary for performance of this SR. The requirement for warmup and loading are deleted. This deletion is acceptable because warmup and slow loading are inappropriate for parts a and b of this SR (proposed SR 4.8.1.1.2.d.5). This SR is a timed test of EDG response to a LOCA/LOOP that would be invalid if the footnote requirements for warmup and loading were followed. Deletion of these warmup and loading requirements from part c of this SR (proposed SR 4.8.1.1.2.d.6) is acceptable because the warmup and loading requirements are not necessary for performance of part c of the SR. The licensee will add a footnote to SR 4.8.1.1.d.5 and SR 4.8.1.1.2.d.6 which precludes performing the SR in Modes 1 through 4 and Modes 1 and 2, respectively. These Mode restrictions are acceptable because they prevent perturbation to the onsite AC system during the restricted Modes. Proposed SR 4.8.1.1.2.d.6 will also include Part b of existing SR 4.8.1.1.2.d.12. This issue is discussed further in the part of this evaluation that deals with SR 4.8.1.1.2.d.12. In addition to the above, the licensee will adopt the NUREG-1432 constraints requiring that this SR be conducted with the EDG in normal standby condition at the beginning of the test. The above changes, including reformatting, moving SRs within TS, and addition/deletion of footnotes, are consistent with NUREG-1432.

SR 4.8.1.1.2.d.8

SR 4.8.1.1.2.d.8 has two parts. The first part involves a 24-hour EDG endurance run at full load, and the second part demonstrates the capability of the EDG to restart from a hot condition. The licensee is proposing to separate this SR into two individual SRs as discussed below.

The licensee is reformatting and retaining that portion of SR 4.8.1.1.2.d.8 associated with the 24-hour EDG run, with minor changes, as proposed SR 4.8.1.1.2.d.7. Because reformatting does not alter any of the requirements, the staff finds the changes acceptable. The minor changes involve adding load ranges to the 2-hour and 22-hour portions of the SR of 5775-6050 kW and 4950-5500 kW, respectively. These load ranges are consistent with the recommendations of RG 1.9, Revision 3, and are, therefore, acceptable.

The licensee will retain the portion of SR 4.8.1.1.2.d.8 that deals with the EDG hot restart as proposed SR 4.8.1.1.2.d.8. At present, this SR must be performed within 5 minutes of shutdown following the 24-hour run. As proposed, the SR may be conducted at any time following an EDG run of sufficient duration at 4950-5500 kW so that operating temperatures have stabilized. Although it is desirable to conduct this SR immediately following the 24-hour run, the staff recognizes that the same assurance of EDG hot restart capability can be obtained following a run of sufficient duration to produce the requisite temperatures. This change is consistent with RG 1.9, Revision 3, and is therefore, acceptable.

The current TS also requires demonstration of a hot restart by performing SR 4.8.1.1.2.d.7.b (LOOP test). The licensee proposes to delete this requirement and replace it with the requirement that the EDG starts and achieves rated speed and voltage within 10 seconds. The staff has reviewed the present PVNGS requirement and concludes that there is no benefit to be derived from

requiring a LOOP test as part of the EDG hot restart because the purpose of this SR is to demonstrate that the EDG has the capability to restart from operating temperatures regardless of the type of start signal. This change is consistent with RG 1.9, Revision 3, and is, therefore, acceptable.

SR 4.8.1.1.2.d.8 is currently modified by three footnotes. The licensee has retained the first footnote in part, and will allow an engine to be prelubed before conduct of the SR. The second footnote allows momentary excursions outside the load ranges specified in the SR without invalidating the test. The licensee will also retain this footnote, and both footnotes will be applicable to the two proposed SRs. The staff finds that retention of these CTS Notes acceptable because the change is purely administrative.

The licensee is incorporating the third footnote, which allows an exception to repeating the 24-hour run if the hot restart test fails, into proposed SR 4.8.1.1.2.d.8. The staff finds this change acceptable because it is purely administrative.

The licensee is adding an additional footnote, which will also be applicable to both proposed SRs. This footnote will preclude both SRs from being performed in Modes 1 and 2. This is a more restrictive change that enhances plant safety and is, therefore, acceptable.

The above changes, including reformatting, modification of the 24 hour load run surveillance, deletion of the LOOP test as part of the hot restart, and inclusion of footnotes, are consistent with NUREG-1432.

The proposed SR is intended to reflect SR 3.8.1.14 in NUREG-1432. However, the licensee will not adopt two parts of the SR as stated in NUREG-1432. First, the licensee proposed to delete the requirement that the SR be performed at a predetermined power factor. The licensee has not adopted NUREG-1432 for the following reasons. The licensee is primarily concerned with high voltage. In order to obtain the rated power factor while paralleled to the grid, the EDG would have to be overexcited. Depending on the grid conditions, this overexcitation would raise EDG output voltage which could cause the downstream bus to exceed the upper voltage limit in ESF equipment. To avoid this, a power factor requirement will not be included in the TS. Based on the above, the staff concludes that the licensee's proposal regarding power factor for this SR is acceptable. The second exception to SR 3.8.1.14 will allow the two hour portion of the test at 5775-6050 kW to be performed at any time during the 24-hours as opposed to the NUREG-1432 requirement to do it at the beginning of the test. The staff finds this exception acceptable as described below. For this test, the EDG may be started using a fuel-limited start, warmed up, and slow loaded to the required test values. The original idea behind the overload test was to demonstrate the dynamic response of a "cold" EDG to LOCA loading. However, the staff recognizes that rapid loading of a "cold" EDG can be detrimental to EDG reliability and no longer requires such loading. Therefore, this overload test no longer has any relationship to a specific time during the test. The staff finds the licensee's proposal to conduct it at any time during the 24-hour run is in accordance with RG 1.9, Revision 3, and is, therefore, acceptable.

SR 4.8.1.1.2.d.9

The purpose of SR 4.8.1.1.2.d.9 is to verify that the safety loads that the EDGs would have to carry following a design-basis accident coincident with a LOOP do not exceed the EDG continuous rating of 5500 kW. SR 4.8.1.1.2.d.9 only requires a calculation of the total safety loads. There are no requirements to operate the EDGs and safety loads to demonstrate that the loads do not exceed 5500 kW. The SR is not necessary to demonstrate EDG OPERABILITY, is inappropriate for inclusion in TS, and can be deleted. The licensee has stated that the requirements of this SR are covered by calculation 13-EC-MA-221 which is addressed in the UFSAR. On the basis of this information, the staff finds maintaining the load calculation in the UFSAR, which is governed by the provisions of 10 CFR 50.59, is acceptable.

SR 4.8.1.1.2.d.10

SR 4.8.1.1.2.d.10 addresses the capability of the EDG system to synchronize with the grid while carrying the ESF bus loads and to shift the ESF loads back to the offsite source. The licensee proposes to retain this SR with minor changes as SR 4.8.1.1.2.d.9 in the proposed TS. The minor changes include editorial changes that do not reduce present requirements and a complete rewording of Part c of the SR. Part c currently requires that the EDG "proceed through its shutdown sequence" after the ESF loads have been transferred back to offsite power. However, the intent of this SR as described in NUREG-1432 (SR 3.8.1.16) is that the EDG remain running in the standby mode and ready to accept a load. Part c of the current SR has been revised to reflect NUREG-1432. Also, this change does not reduce current requirements. Based on the above, the staff finds the proposed changes acceptable. Additionally, the licensee has added a footnote to preclude this SR from being performed in Modes 1, 2, 3, or 4. This is a more restrictive change that enhances plant safety and is, therefore, acceptable.

SR 4.8.1.1.2.d.11

SR 4.8.1.1.2.d.11 demonstrates the capability of the EDG system to automatically return to running standby from the test mode upon receipt of a safety injection actuation signal. The licensee is retaining this SR with minor editorial changes, as proposed SR 4.8.1.1.2.d.10. The minor editorial changes do not alter current requirements, and the staff finds the proposed SR acceptable. Additionally, the licensee has added a footnote to preclude this SR from being performed in Modes 1, 2, 3, or 4. This is a more restrictive change that enhances plant safety and is, therefore, acceptable.

SR 4.8.1.1.2.d.12

SR 4.8.1.1.2.d.12 demonstrates that lockout features associated with the EDG emergency stop and engagement of the EDG turning gear prevents starting of the EDG when required. The licensee has proposed to delete the "turning gear engaged" portion of this SR and to incorporate the "emergency stop" portion of the SR into proposed SR 4.8.1.1.2.d.6. Although this requirement may have a function relative to personnel safety, it is unnecessary for demonstrating the

safety function. Therefore, the staff finds the proposed deletion acceptable. With regard to incorporating the second part of this SR into SR 4.8.1.1.2.d.6, the staff agrees with the licensee that this is a more appropriate location for this requirement. The staff finds the move of a requirement within the TS acceptable.

SR 4.8.1.1.2.e

SR 4.8.1.1.2.e demonstrates the simultaneous starting capability of both EDGs for each unit. The licensee is retaining SR 4.8.1.1.2.e with modifications as proposed SR 4.8.1.1.2.e. The licensee will move that portion of the SR dealing with modifications that could affect diesel generator independence to a footnote, will delete the restriction to conduct the test during shutdown, and will add a footnote stating that the SR shall not be performed in Modes 1 or 2. With regard to the first modification, the staff concludes that moving part of the SR to a footnote is a format change only. Because there is no change in requirements, the staff finds this change acceptable. Substituting a Mode 1 or 2 restriction for "during shutdown" is a less restrictive action. However, the staff finds this change acceptable because this SR does not involve paralleling with the grid. Absent any connection to the grid, there is no potential for perturbations on the ESF busses, and the SR can safely be conducted in Mode 3 or in lower modes. The above changes are consistent with NUREG-1432.

In addition to these changes, the licensee is changing the acceptance criteria for this SR to reflect the acceptance criteria in proposed SR 4.8.1.1.2.c. Acceptance of these criteria is included in the staff's discussion for proposed SR 4.8.1.1.2.c which is also applicable here.

SR 4.8.1.1.3 and Table 4.8-1

The licensee proposes to delete the requirements in SR 4.8.1.1.3 and Table 4.8-1. SR 4.8.1.1.3 provides specific reporting requirements for EDG testing failures, while Table 4.8-1 provides increased frequencies over the nominal 31-day EDG testing based on the number of EDG failures over time.

EDG testing results and maintenance activities will be controlled by and documented in accordance with 10 CFR 50.65, RG 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and NUMARC 93-01, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." Section 50.65, which became effective in July 1996, provides a means to modify maintenance practices based on testing failures and appropriate root-cause analysis, to ensure optimum reliability of safety related equipment. The inspection and maintenance records will be available for NRC inspection. The staff concludes that, in accordance with Generic Letter 94-01, "Removal of Accelerated Testing and Special Reporting Requirements for Emergency Diesel Generators," these requirements can be deleted because adequate controls are provided by 10 CFR 50.65, and sufficient reporting requirements are provided in 10 CFR 21, 10 CFR 50.72 and 10 CFR 50.73.

LCO 3.8.1.2

The licensee is retaining Parts a and b of LCO 3.8.1.2 with minor editorial changes, as proposed LCO 3.8.1.2. The editorial changes include deleting "as a minimum" and changing "diesel generator" to "emergency diesel generator (EDG)." The staff finds these administrative changes acceptable, because these changes do not alter any TS requirements.

In addition to the above changes, the licensee proposes to move Parts b.1 and b.2 to the proposed new LCO 3.8.1.2.1, and to delete Part b.3. These changes are identical to those proposed for LCO 3.8.1.1. The acceptability of these changes is the same as that for the LCO 3.8.1.1 changes.

LCO 3.8.1.2 Action

The licensee is retaining the action of this LCO, with minor changes, as the action for proposed LCO 3.8.1.2. The changes include reformatting, deleting part of the Action, and adding a footnote. The deleted language is in the second sentence of the action beginning with "In addition..." through "as soon as possible." Deletion of the first part of the second sentence results in a more restrictive requirement because the action to "immediately initiate action to restore" is now applicable whenever the LCO is not met, not just under specific conditions relating to the vessel water level. The last four words of the action are redundant and add nothing to the action. The licensee is adding a further restriction in the form of a footnote, which requires entry into the applicable conditions and into actions of LCO 3.8.3.2 if one train is without AC power. The staff finds these purely administrative changes acceptable.

The licensee has opted to not adopt the first part of the Required Actions of LCO 3.8.2 in NUREG-1432, which allows declaring redundant required features inoperable. By declaring the affected features inoperable and taking the actions associated with the inoperable features, it is possible that shutdown activities could continue. By not adopting the first part of the required actions, the licensee has eliminated this potentially less restrictive option. The staff finds this acceptable because it results in a more restrictive action than if the option had been adopted.

SR 4.8.1.2

The licensee is deleting the current SR and is proposing a new SR 4.8.1.2. The change from existing requirements is to delete the requirement to perform SR 4.8.1.1.1, SR 4.8.1.1.2, and SR 4.8.1.1.3 for the OPERABLE AC sources and replace the requirements with a selective list of SRs that are not applicable, that are applicable but are not required to be performed, and that are unconditionally applicable. The following discussion addresses the SRs in the first two categories.

SR 4.8.1.1.1.b, SR 4.8.1.1.2.d.4, SR 4.8.1.1.2.d.10 and SR 4.8.1.1.2e are not applicable, that is, they are not necessary for ensuring the OPERABILITY of AC sources in Modes 5 and 6. SR 4.8.1.1.1.b involves transferring offsite power

feed from the preferred source to the alternate source. Because only one offsite source is required in Modes 5 and 6, this SR cannot be performed and is therefore not applicable. SR 4.8.1.1.2.d.4 requires testing of the EDG capability to respond to an ESF signal, while SR 4.8.1.1.2.d.10 requires demonstration that an EDG operating in the test mode will revert to running in standby in the event of an ESF actuation signal. However, since the design-basis LOCA and the attendant ESF actuation signal is not postulated in MODES 5 and 6, this EDG design capability is not required, and the SRs are therefore not applicable. SR 4.8.1.1.2.e requires demonstration of the simultaneous starting capability of both EDGs. However, in Modes 5 and 6, only one EDG must be OPERABLE and this SR cannot be performed. Therefore, it also is not applicable. Since the capabilities demonstrated by the above SRs are not required in Modes 5 and 6, the requirement to perform the SRs can be deleted.

The proposed SR has a footnote that states that the following SRs, while applicable, are not required to be performed on the OPERABLE EDG. The SRs include SR 4.8.1.1.2.a.3 and SR 4.8.1.1.2.d (except as noted above). All of these SRs require loading of the EDG to the grid in order to be performed. With only one EDG and one offsite circuit OPERABLE, paralleling the EDG with the offsite circuit creates the potential for a complete loss of AC power. To avoid this possibility, these SRs are not required to be performed on the OPERABLE EDG. However, it is expected that the OPERABLE EDG will be capable of meeting these SR requirements. The staff has concluded that avoidance of perturbations to the limited AC sources available in Modes 5 and 6 is more important than demonstrating EDG load carrying capability. Therefore, the above changes, which are consistent with NUREG-1432, are acceptable.

LCO 3.8.1.3.1

The licensee is proposing to move the requirements of this LCO to another LCO within the TS and to change the title of this LCO to "Diesel Fuel Oil Storage System - Diesel Fuel Oil Requirements." In addition to the title change, there will be new actions and revised SRs. The purpose of this change is to develop a TS for fuel oil requirements consistent with LCO 3.8.3 of NUREG-1432.

The proposed LCO will require that the diesel fuel oil storage system be within limits. This portion of the LCO is addressed in detail in the discussion of changes to LCO 3.8.1.1, Part 2.b, above. The LCO will be applicable when the associated EDG is required to be OPERABLE. This applicability is consistent with NUREG-1432 relative to fuel oil. The purpose of the NUREG organization was to provide more flexibility when systems and/or components that support EDG OPERABILITY are themselves inoperable or not within limits. Fuel oil is one such system. If the volume of stored fuel oil is less than the TS requirement for seven days of operation, but still available, the EDG is not rendered immediately inoperable. Therefore, some time can be allowed to restore the fuel oil storage system to required limits before possibly subjecting the plant to a shutdown transient. Because the proposed LCO is consistent with this purpose, the staff finds this change acceptable.

Also, since fuel oil is only required when the EDG is required to be OPERABLE, the staff finds the applicability acceptable. This is consistent with NUREG-1432.

The licensee is proposing three new Actions. The first action, Action a, addresses the condition in which the volume of fuel oil indicated in the storage tank is less than 80 percent indicated (a 7 day supply), but equal to or greater than 71 percent or more is indicated. For this condition, 48 hours is allowed to restore the fuel level to 80 percent or more. This change is consistent with NUREG-1432 as discussed for changes to LCO 3.8.1.1, Part b.2, above, and is, therefore, acceptable.

The second action, Action b, is adopted from the current SR 4.8.1.1.2.b and addresses viscosity of the stored fuel oil. This action provides explicit requirements to be followed in the event the viscosity of the stored fuel oil is not within limits. This action reflects the current SR 4.8.1.1.2.b (proposed SR 4.8.1.3.1.2) and allows 30 days to restore the fuel oil viscosity to within limits. Action b is a relaxation of current requirements. The staff has concluded that allowing 30 days to restore fuel oil viscosity to within limits is acceptable because viscosity is a parameter that does not vary greatly in storage. Therefore, a change in viscosity over a 30 day period would not render the fuel oil unfit for use. This change is consistent with NUREG-1432.

The third action, Action c, is also adapted from current SR 4.8.1.1.2.b and addresses water and sediment in the stored fuel. This action requires EDGs to be declared inoperable immediately if water and sediment in the associated fuel oil are not within limits. This action is an explicit statement of what is currently required if the water and sediment portion of SR 4.8.1.1.2.b is not met. There are no changes to existing requirements. Because proposed Action c clarifies existing requirements, the staff finds it acceptable.

A footnote is included in the proposed LCO that states that separate condition entry is allowed for each EDG. This means that the LCO could not be met for both EDGs without invoking LCO 3.0.3. The staff finds this process acceptable because the EDGs and associated fuel oil systems are independent, and non compliance conditions in one system (e.g., less the 80 percent indicated) does not affect the other EDG. On the basis of the above information, the staff finds the footnote to the proposed LCO acceptable. This change is consistent with NUREG-1432.

SR 4.8.1.1.2.a.2

The licensee is retaining this current SR as proposed SR 4.8.1.3.1.1, with the addition of "is within its limits" at the end of the SR. There are no changes to existing TS requirements, and this proposed SR is consistent with the proposed LCO which the staff has found acceptable. Therefore, the staff finds the proposed SR acceptable.

SR 4.8.1.1.2.b

The licensee is retaining this existing SR as proposed SR 4.8.1.3.1.2. With only very minor editorial changes, the proposed SR is the same as the current SR, and only involves reformatting within the TS. The staff finds the SR acceptable. This is a retention of current requirements with only editorial changes and is, therefore, acceptable.

LCO 3.8.1.3.2

The licensee is retaining this existing LCO in its entirety, including actions and SR, as proposed LCO 3.8.1.3.2. The licensee changed the title and made some very minor editorial changes. Because none of the existing requirements are changed, the changes are purely administrative and are therefore acceptable. This LCO addresses a design feature that is unique to PVNGS and is not addressed by NUREG-1432.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arizona State official was notified of the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such findings (60 FR 29870). Accordingly, the amendments meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement of environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

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