REWORDED: The condition under which testing of the OPERABLE EDG is required "if the EDG became inoperable due to any cause other than preplanned preventative maintenance or testing" has been replaced with "Determine that the OPERABLE EDG is not inoperable due to common mode failure within 24 hours."

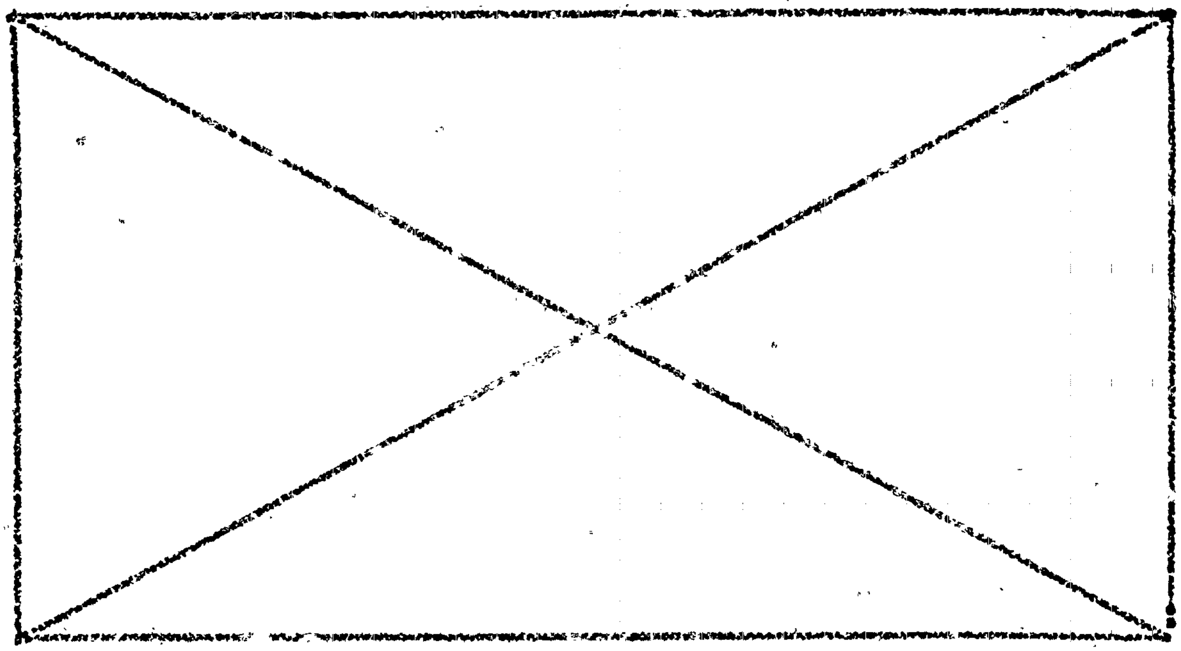
~~This ACTION currently requires that the OPERABLE EDG be started and loaded to demonstrate OPERABILITY in the event an EDG becomes inoperable due to any cause other than preplanned preventative maintenance or testing. The intent of this requirement is to perform additional testing only in those cases where a potential for a common mode failure exists. The current requirement would cause unnecessary testing of the OPERABLE EDG in the event of preplanned corrective maintenance.~~

Delete

~~Corrective maintenance is not necessarily considered work that is required to be performed to maintain EDG OPERABILITY (i.e., preplanned corrective maintenance could be delayed without declaring the EDG inoperable). Accordingly, the condition requiring corrective maintenance has not prevented the EDG from performing its intended safety function. The current requirement could delay minor corrective maintenance to preclude having to demonstrate the OPERABILITY of the remaining EDG. The ability to perform types of maintenance other than preventative without subsequent testing of the OPERABLE EDG does not affect the design or performance characteristics of the EDGs.~~

The revision to TS LCO 3.8.1.1 ACTION b eliminates testing of the remaining OPERABLE EDG when an EDG is declared inoperable, unless there is cause to believe any potential common mode failure exists for the remaining OPERABLE EDG. It is acceptable to base OPERABILITY of the remaining OPERABLE EDG on satisfactory completion of the 31 day SR. The 31 day SR assures that the EDGs are OPERABLE and are capable of performing their intended safety functions. The 31 day SR is sufficient to demonstrate EDG reliability. Therefore, the testing of the OPERABLE EDG, as required in the current TS LCO 3.8.1.1 ACTION b, is excessive unless there is cause to believe a potential common mode failure exists. Additionally, allowing station personnel 24 hours to determine that the cause of one EDG being inoperable does not affect the OPERABILITY of the remaining OPERABLE EDG will further reduce unnecessary testing of the OPERABLE EDGs. Deleting this testing requirement does not create the potential for operating with an inoperable EDG once a common mode failure has been dismissed. The basis for this testing was originally to verify the OPERABILITY of the EDGs. However, as stated in NUREG 1366, industry experience has shown that excessive testing of the EDGs in fact reduces reliability, and therefore, OPERABILITY. The EDG design and function remain as previously analyzed and the EDG response during accident conditions is not affected. The effect of this change will improve EDG performance by reducing the number of unnecessary starts and by requiring more appropriate testing when a potential common mode failure exists.

Delete



~~The change to require a common mode failure determination also eliminates the concern of corrective maintenance possibly creating any potential common mode failures. If during or following the performance of preplanned maintenance (preventative or corrective), it is discovered that the EDG is in fact inoperable and requires additional maintenance to restore it to OPERABLE status, plant personnel will either verify that the cause of the EDG being inoperable does not impact the OPERABILITY of the other EDG or perform SR 4.8.1.1.2.a to provide assurance of continued OPERABILITY of that EDG.~~

~~This change is also consistent with guidance provided in GL 93-05 Section 10.1 EDG SRs (i.e., when an EDG itself is inoperable, the other EDG should be tested only once and within 8 hours unless the absence of any potential common mode failure can be demonstrated); however, 24 hours as opposed to the recommended 8 hours is a more reasonable time period to determine the possibility of any potential common mode failure. The guidance provided in GL 91-18 (Paragraphs 5.5 and 6.1) supports this position, in that, in most cases, it is expected that the determination can be made immediately, while, in other cases, it is expected that the determination can be made within approximately 24 hours of discovery even though complete information may not be available. According to GL 84-15, 24 hours is reasonable to confirm that the OPERABLE EDG is not affected by the same problem as the inoperable EDG. The 24 hours to determine if a common mode failure exists takes into account the capacity and capability of the remaining AC sources, a reasonable time to investigate the EDG failure, and the low probability of a DBA occurring during this period.~~

Delete

ADDED: a 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.

DELETED: requirement to load the EDG as a step to demonstrate OPERABILITY of the remaining OPERABLE EDG. The current SR 4.8.1.1.2.a.4 requirement includes a fast start and a gradual loading of the EDG. Consistent with NUREG 1432, CE STS 3.8.1 ACTION B, only an EDG start is necessary to demonstrate OPERABILITY of the remaining OPERABLE EDG. It is acceptable to base the EDG's capability to load on satisfactory completion of the 31 day SR. The 31 day SR assures that EDGs are OPERABLE and are capable of performing their intended safety functions. The 31 day SR is sufficient to demonstrate EDG reliability. Therefore, the loading requirement in the current TS LCO 3.8.1.1 ACTION b is excessive. In addition, it is not desirable to subject the OPERABLE EDG to grid perturbations that may occur during the loading test.

REWORDED: * (footnote) to require performance of ACTION b.3 if this condition is entered.

These changes are consistent with NUREG 1432, CE STS 3.8.1 ACTION B.

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 ~~The intent of this ACTION is that all EDG inoperabilities must be investigated for common mode failures regardless of how long the EDG inoperability persists. This ACTION provides an allowance of 24 hours (1) for station personnel to determine that the cause of one EDG being inoperable does not affect the OPERABILITY of the remaining OPERABLE EDG in order to avoid unnecessary testing of the OPERABLE EDG, or (2) to complete the testing on the remaining EDG.~~ New Text

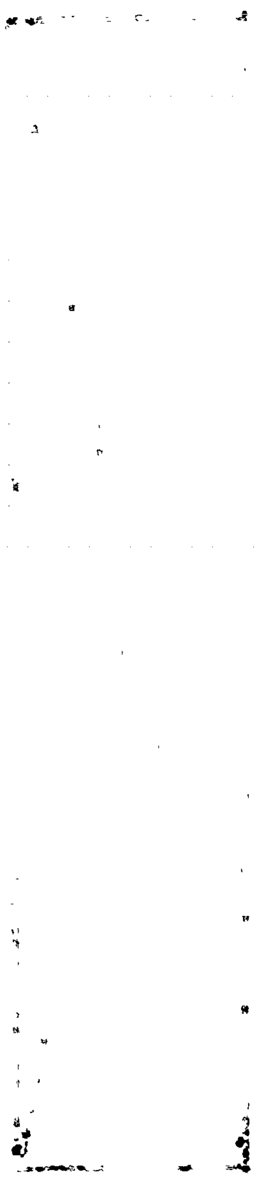
If it can be determined that the cause of the inoperable EDG does not exist on the OPERABLE EDG, SR 4.8.1.1.2.a does not have to be performed. If the cause of inoperability exists on the other EDG, the other EDG would be declared inoperable upon discovery and TS 3.8.1.1 ACTION e would be entered. Once 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.

~~If during or following the performance of preplanned maintenance (preventative or corrective), it is discovered that the EDG is in fact inoperable and requires additional maintenance to restore it to OPERABLE status, plant personnel will either verify that the cause of the EDG being inoperable does not impact the OPERABILITY of the other EDG or perform SR 4.8.1.1.2.a to provide assurance of continued OPERABILITY of that EDG.~~

~~Corrective maintenance is not necessarily considered work that is required to be performed to maintain an EDG OPERABLE (i.e., preplanned corrective maintenance could be delayed without declaring the EDG inoperable). Accordingly, the condition requiring corrective maintenance has not prevented the EDG from performing its intended safety function.~~ New text

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



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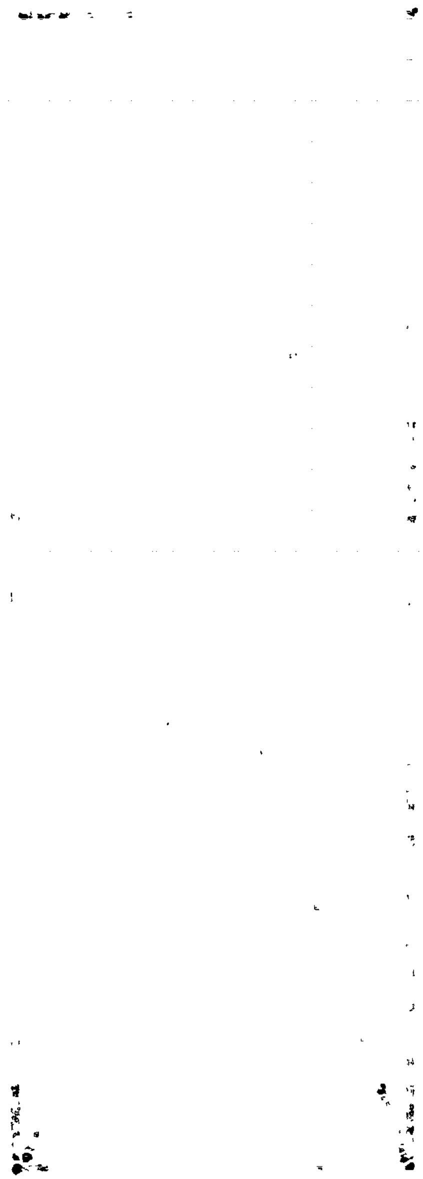


[illegible]

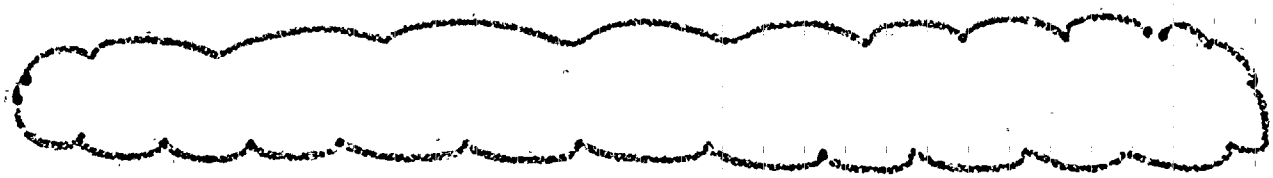
Replacement text for BASES 3.8.1.1 ACTION b.3 (Page 11)

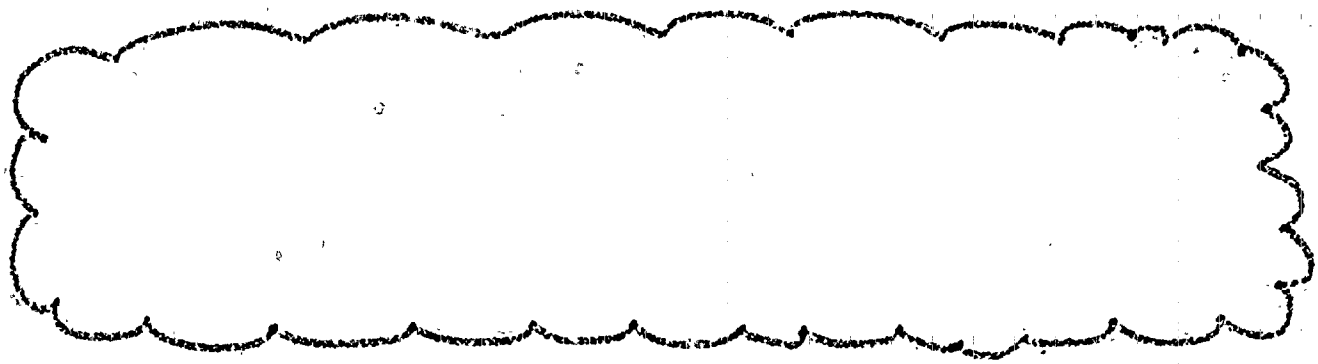
b.3 **This ACTION provides an allowance to avoid unnecessary testing of OPERABLE EDGs.**

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.





BASES FOR TS 4.8.1.1 SR

SURVEILLANCE REQUIREMENTS:

The surveillance requirements for demonstrating the OPERABILITY of the emergency diesel generators (EDG) are based on the recommendations of Regulatory Guide (RG) 1.9 "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971 and July 1993; and RG 1.108 "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977 except as noted in Updated FSAR Section 1.8.

All 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, EDG in standby with the engine at normal standby conditions, and EDG operating in a parallel test mode. 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. 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.

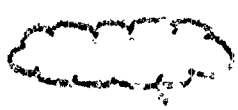
The required steady state frequency range for the EDG is 60 +1.2/-0.3 Hz to be consistent with the safety analysis to provide adequate safety injection flow. In accordance with the guidance provided in RG 1.9, where steady state conditions do not exist (i.e., transients), the frequency range should be restored to within $\pm$ 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 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



ADD NEW TEXT

[2] Performance of 4.8.1.1.2.c satisfies this SR;
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 loading.
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.

DESCRIPTION OF CHANGES TO TS 4.8.1.1 SR

THIS SECTION IS CONSISTENT WITH NUREG 1432 STS SR 3.8.1.2, 3.8.1.3, and 3.8.1.4 (exception taken to EDG start from standby condition)

a. DELETED: "In accordance with the frequency specified in Table 4.8-1 on a STAGGERED TEST BASIS". The table has been deleted. This test is performed at least once per 31 days. The deletion of the table is consistent with the guidance provided in GL 94-01 and with the changes proposed for BWRs and NUREG 1432, CE STS SR 3.8.1.2 and SR 3.8.1.3. Additional justification for deleting "on a STAGGERED TEST BASIS" is provided below.

a.1. RELOCATED: the fuel volume requirements (gallons and footage) for the day tank from the LCO to this SR. This change is consistent with NUREG 1432, CE STS SR 3.8.1.4.

[a.2. RELOCATED: the OLD TS SR 4.8.1.1.2.a.2 (verify the fuel level in the fuel storage tank) to TS 3/4.8.1.3 DIESEL FUEL OIL STORAGE SYSTEM.]

[a.3. RELOCATED: the SR for the fuel oil transfer system to SR 4.8.1.1.2.b]

[a.4. SEPARATED: the single SR into two separate SRs: 4.8.1.1.2.a.2 and 4.8.1.1.2.a.3.]

a.2. DELETED: the requirement for the EDG to start and accelerate in $\leq$ 10 seconds. This change would allow a reduction in the number of fast starts ($\leq$ 10 seconds) currently required by SR 4.8.1.1.2; allow the EDGs to be tested using "slow starts" during the monthly surveillance; and would require conducting fast starts during the 184 day surveillance. Slow starts decrease the stress and wear on the EDG and therefore, would avoid premature wear of the engine and lead to greater EDG reliability and availability. This change is consistent with the guidance contained in GL 84-15 which contains 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 EDGs' level of reliability and availability. These

ADA
NEW TEXT

Additional text for SR 4.8.1.1.2.a.2 FOOTNOTE (Page 5)

[2] Performance of 4.8.1.1.2.c satisfies this SR;

A slow EDG start involving gradual acceleration to synchronous speed may be used for the SR as recommended by the manufacturer. When the slow 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.

frequencies provide adequate assurance of EDG OPERABILITY, while minimizing degradation resulting from testing. ADD NEW TEXT

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).

DELETED: the requirement for an EDG start using one of the following signals on a STAGGERED TEST BASIS: manual, simulated LOP, simulated LOP and ESFAS test signal, or ESFAS test signal. This change is consistent with changes proposed for BWRs and NUREG 1432, CE STS SR 3.8.1.2 and SR 3.8.1.3.

Per CEN 355, "Restructured STS," studies have shown that staggered testing (such as alternating the method of EDG starts) has little impact on component and system reliability. Additionally, such testing schedules increase operational problems and increase the likelihood of human error. The details pertaining to the EDG starting methods are covered by plant procedures. As defined in TS 1.33 and CE STS 1.1 Definitions, STAGGERED TEST BASIS consists of testing of one EDG at a time, not specifying alternate methods of performing EDG starts.

a.3. SEPARATED: this SR (load only) from the start and load SR (OLD 4.8.1.1.2.a.4).

REWORDED: the footnote.

REVISED: the kW band to be consistent with the guidance provided in RG 1.9. RG 1.9 load-run test description states to demonstrate 90 to 100 percent of the continuous rating of the EDG (4950 to 5500 kW).

These changes are consistent with NUREG 1432, CE STS SR 3.8.1.3, RG 1.9, and GL 93-05 Section 10.1 EDG SRs (i.e., EDGs should be loaded in accordance with the manufacturer's recommendations for all test purposes other than the refueling outage LOOP tests).

[a.5. DELETED: A separate SR is not required by definition of EDG OPERABILITY as demonstrated by SR 4.8.1.1.2.a. This change is consistent with CE STS in that the SR is not specifically included in NUREG 1432 CE STS.]

NOTE: Exception to EDG start from standby condition:

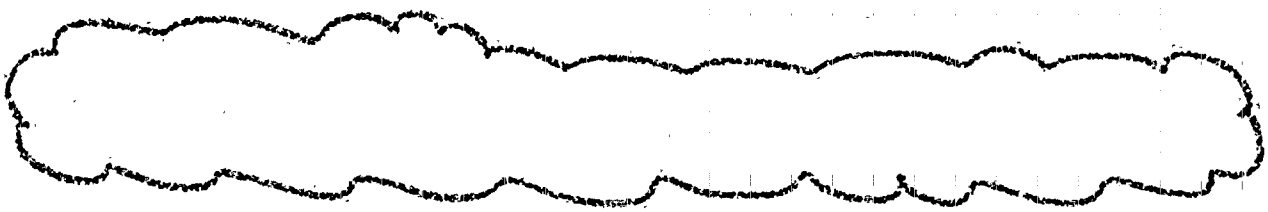
Because it is important to EDG reliability to minimize the number of unnecessary runs, it is expected that most EDG starts will be performed from normal standby conditions. However, all EDG starts, except the 184 day EDG start (new SR 4.8.1.1.2.c), may be performed with the jacket water cooling and lube oil temperatures within the lower to upper limits of EDG OPERABILITY. The requirement to cool the EDG down to standby conditions in between EDG runs should be minimized. The time required to cool the EDG down may impact the time in the LCO, possibly exceeding the LCO and

NO NEW TEXT

Additional text for SR 4.8.1.1.2.a.2 DESCRIPTION OF CHANGES (Page 6)

[These] frequencies provide adequate assurance of EDG OPERABILITY, while minimizing degradation resulting from testing.

However, if a slow start is not used in order to reduce stress on the EDG, the time, voltage, and frequency tolerances of 4.8.1.1.2.c must be met.



unnecessarily subjecting the unit to a shutdown, challenging safety systems. Rapid cooling (e.g., excessive ventilation) of the EDG in order to achieve standby condition could have an adverse affect on EDG reliability and should be minimized. Performing the EDG start test from standby condition every 184 days will adequately demonstrate the EDGs' present level of reliability and availability, and provide adequate assurance of EDG OPERABILITY, while minimizing potential degradation resulting from testing.

BASES FOR TS 4.8.1.1 SR

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 slow start as opposed to a fast start (≤ 10 seconds) during the 31 day SR. 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 guidance 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 EDGs' present level of reliability and availability. ADD NEW TEXT

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. 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.

ADD NEW TEXT

Additional text for SR 4.8.1.1.2.a.2 BASES (Page 7)

In order to reduce stress and wear on diesel engines, the EDG may be tested using a slow start as opposed to a fast start (≤ 10 seconds) during the 31 day SR. 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 guidance 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 EDGs' present level of reliability and availability.

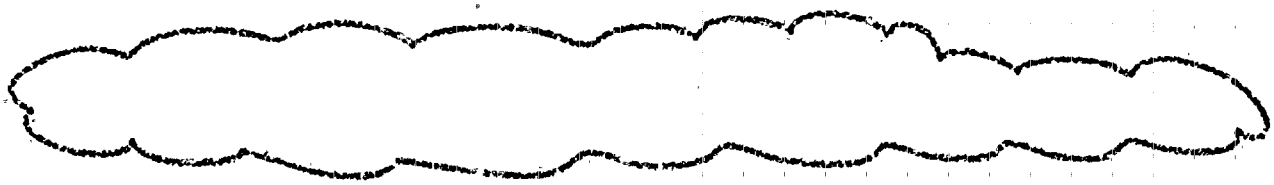
However, if a slow start is not used, the time, voltage, and frequency tolerances of 4.8.1.1.2.c must be met.

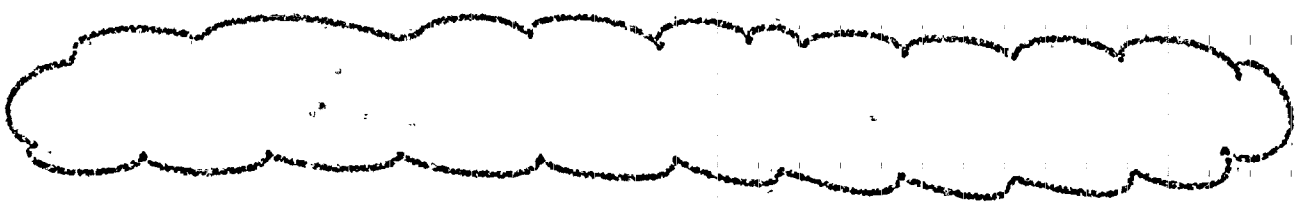
Additional text for SR 4.8.1.1.2.a.3 BASES (Page 7)

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.





grid conditions, this overexcitation would raise EDG output terminal voltage which could cause the downstream bus to exceed the upper voltage limit for ESF equipment, resulting in potential damage to downstream ESF loads.

BASES FOR TS 4.8.1.1 SR

d. In general, unless otherwise specified, the SR frequency of 18 months is consistent with the recommendations of RG 1.108 and 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.

~~This test is performed in emergency mode (not paralleled to the grid) and power factor is not a test condition~~.

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.

~~This test is performed in test mode (paralleled to the grid) and power factor is not a test condition~~.

OLD TS 4.8.1.1 SR

7&8. Verifying the diesel generator operates* for at least 24 hours. During the first 22 hours of this test, the diesel generator shall be loaded to an indicated ~~5200-5400~~ kW** and during the remaining 2 hours of this test, the diesel generator shall be loaded to ~~an indicated 5800-6000~~ kW**. Within 5 minutes after completing this 24-hour test, perform Surveillance Requirement 4.8.1.1.2.d.7.b).*** 5775-6050 4950-5500

Record

footnoted and in Bases

*This test shall be conducted in accordance with the manufacturer's recommendations regarding engine prelube and warmup procedures, and as applicable regarding loading recommendations.

footnoted

**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.

4.8.1.1.2.d.8

***If Specification 4.8.1.1.2.d.7.b) is not satisfactorily completed, it is not necessary to repeat the preceding 24-hour test. Instead, the diesel generator may be operated at ~~5200-5400~~ 4950-5500 kW** for ½ hours or until operating temperature has stabilized.

NEW TS 4.8.1.1 SR

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].

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.

[1] Momentary transients outside the load range do not invalidate this test.
[2] This Surveillance shall not be performed in MODE 1 or 2.

4 Retain above (*) footnote

Additional text for SR 4.8.1.1.2.d.7 (Page 21)

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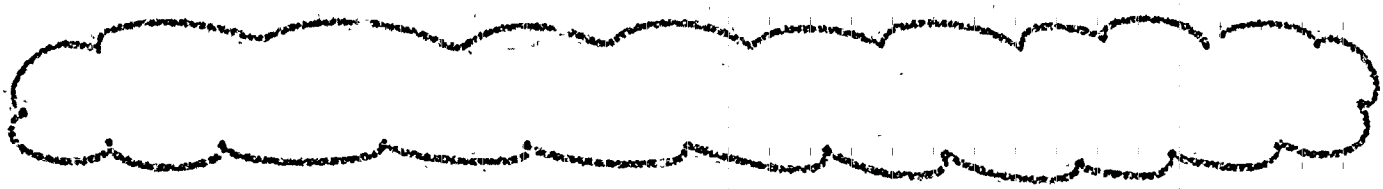
[1] Momentary transients outside the load range do not invalidate this test.
[2] This Surveillance shall not be performed in MODE 1 or 2.
[4] **The EDG may be prelubed, warmed up, and loaded in accordance with the manufacturer's recommendations.**



NOTE: Exception taken to APPLICABILITY - During movement of irradiated fuel assemblies.

The APPLICABILITY statement in NUREG 1432 STS 3.8.2 is worded as:

> MODES 5 and 6,
> During movement of irradiated fuel assemblies.

The applicable STS BASES section refers to "The AC sources required to be OPERABLE in MODES 5 and 6, and during movement of irradiated fuel assemblies." It is not clear if STS intends for the condition to be applicable with or without the conjunction "and." Therefore, the decision was made to apply the LCO only to MODES 5 and 6.

BASES FOR TS 3.8.1.2 LCO

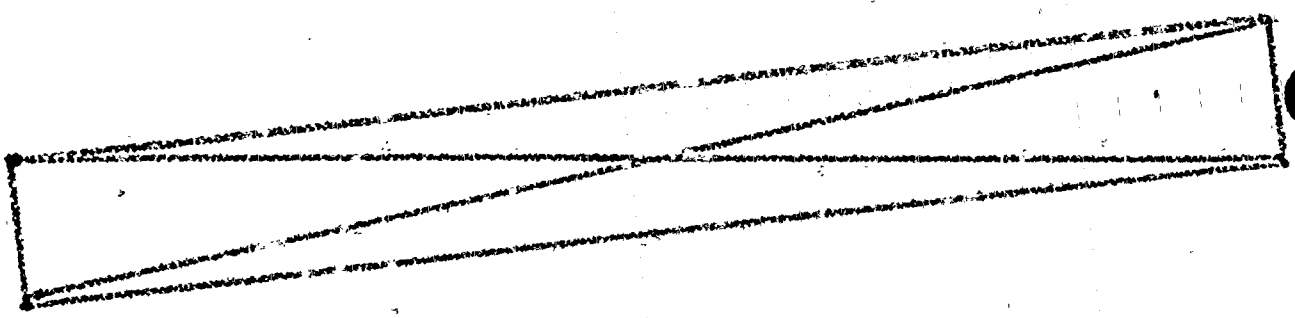
The OPERABILITY of the minimum specified AC power sources during shutdown and refueling ensures that (1) the unit can be maintained in the shutdown or refueling condition for extended time periods, (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit 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.

~~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 AC source.~~

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.



OLD TS 4.8.1.2 SR

4.8.1.2 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4.8.1.1.1, 4.8.1.1.2, and 4.8.1.1.3. NEW TEXT

NEW TS 4.8.1.2 SR

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.10, and SR 4.8.1.1.2.e, are applicable.[2]

SR 4.8.1.1.2.d.4

[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.

DESCRIPTION OF CHANGES TO TS 4.8.1.2 SR

THIS SECTION IS CONSISTENT WITH NUREG 1432 STS SR 3.8.2.1

MODIFIED: Specified the ~~three~~ four SRs that are not applicable.

ADDED: Footnote of SRs that are not required.

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.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 a EDG that is not required to be OPERABLE. ADD NEW TEXT

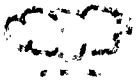
The reason for the footnote (The following SRs are not required to be performed) is to preclude requiring the OPERABLE EDG from being paralleled with the offsite power network or otherwise rendered inoperable. With limited AC sources available, a single event could compromise both the required circuit 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.

These changes are consistent with NUREG 1432, CE STS SR 3.8.2.1

BASES FOR TS 4.8.1.2 SR

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

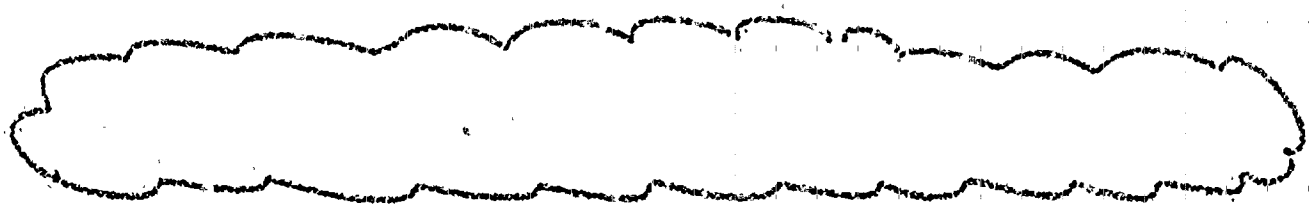


Additional text for SR 4.8.1.2 DESCRIPTION OF CHANGES Section (Page 5)

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.



ADD NEW TEXT

is not required to be met since only one offsite circuit is required to be OPERABLE. 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.

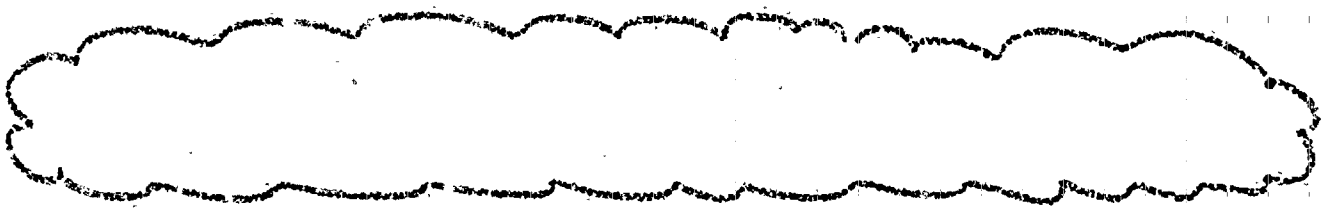
Additional text for SR 4.8.1.2 BASES Section (Page 6)

[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.



OLD TS 3.8.1.3.1 ACTIONS

OLD TS 3.8.1.1.b and 3.8.1.2.b states:

2. A fuel storage system with a minimum level of 80% (71,500 gallons of fuel), and

NEW TS 3.8.1.3.1 ACTIONS

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 fuel oil properties not within limits, restore fuel oil to within limits within 30 days or declare the associated EDG inoperable. [1]

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

DESCRIPTION OF CHANGES TO TS 3.8.1.3.1 ACTIONS

THIS SECTION IS CONSISTENT WITH NUREG 1432 STS 3.8.3 ACTION A, D, and F

a. RELOCATED: Fuel Oil Storage System requirements from old TS LCO 3.8.1.1.b.2 and TS LCO 3.8.1.2.b.2 and created corresponding LCO, ACTION, and SR.

ADDED: 48 hour LCO completion time to restore fuel level. This change is consistent with NUREG 1432 CE STS 3.8.3 ACTION A.

ADDED: "indicated" to minimum fuel level of 80% and relocated specified gallons value to the BASES section. Per calculation 13-MC-DG-306, the minimum number of gallons required for a 7 day fuel oil supply has been reduced by ~~2000~~ 1800 gallons from 71,500 gallons to ~~69,500~~ 69,700 gallons.

b. ADDED: 30 day LCO completion time to restore fuel oil properties. This change is consistent with NUREG 1432 CE STS 3.8.3 ACTION D.

BASES FOR TS 3.8.1.3.1 ACTIONS

ACTIONS:

a. In this condition (i.e., < 80% indicated level but ≥ 71% indicated level), the 7 day fuel oil supply (~~69,500~~ 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 (~~60,200~~ 60,500 gallons of fuel). These circumstances may be caused by events such as full load operation required after an inadvertent start

C. REVISED PROPOSED TECHNICAL SPECIFICATION SECTION 3/4.8.1 AND BASES FOR 3/4.8

UNIT 1/2/3

INDEX

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

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]

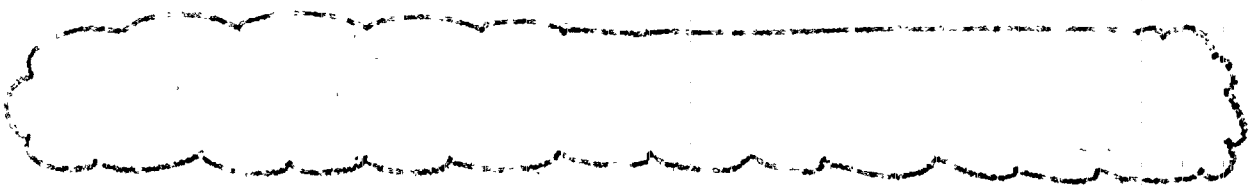
3. Verifying the EDG is synchronized to its appropriate bus and gradually loaded to 4950 - 5500 kW and operates for at least 60 minutes. [3]

---

[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 slow EDG start involving gradual acceleration to synchronous speed may be used for the SR as recommended by the manufacturer. When the slow 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 loading.
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)

b. Verifying the fuel oil transfer system operates to transfer fuel oil from the storage tank to the day tank at a frequency corresponding to the inservice testing requirements for pumps as contained in TS 4.0.5.

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 maintains steady state voltage at 4160 ± 420 volts and frequency at 60 +1.2/-0.3 Hz. [1]

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.

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]

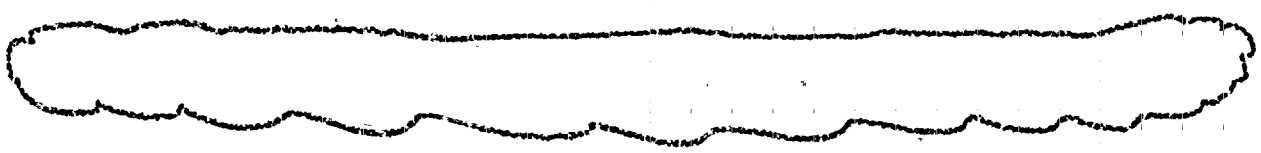
5. Verifying on a simulated loss of offsite power signal in conjunction with an ESF actuation test signal: [3]
   a. Deenergization of the emergency buses;
   b. Load shedding from emergency buses;
   c. EDG auto-starts and:
      1. energizes the emergency buses with permanently connected loads in ≤ 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.

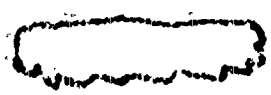
SURVEILLANCE REQUIREMENTS

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]

---

[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 fuel oil properties not within limits, restore fuel oil to within limits within 30 days or declare the associated EDG inoperable. [1]

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

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.

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 emergency diesel generators (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.

BASES

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. 4 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.

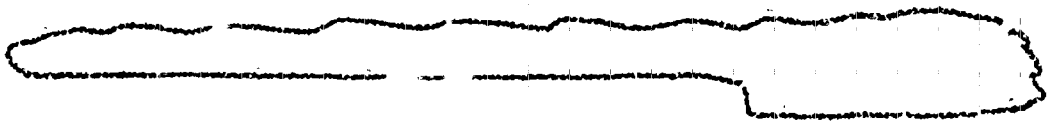
The remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to onsite Class 1E PDS. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour completion time takes into account 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.

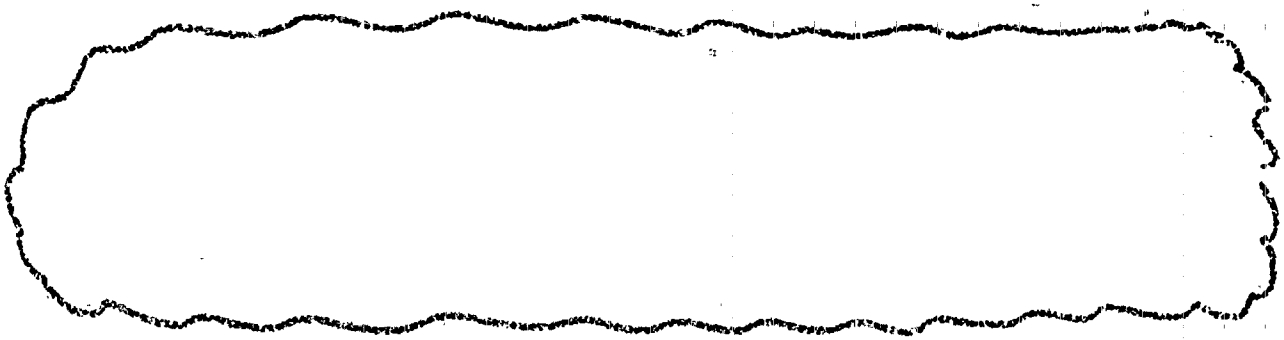
b.3 This ACTION provides an allowance to avoid unnecessary testing of OPERABLE EDGs. If it can be determined that the cause of the inoperable EDG does not exist on the OPERABLE EDG, SR 4.8.1.1.2.a does not have to be performed. If the cause of inoperability exists on the other EDG, the other EDG would 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.

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.

SURVEILLANCE REQUIREMENTS:

The surveillance requirements for demonstrating the OPERABILITY of the emergency diesel generators (EDG) are based on the recommendations of Regulatory Guide (RG) 1.9 "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971 and July 1993; and RG 1.108 "Periodic Testing of Diesel Generator

Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977 except as noted in Updated FSAR Section 1.8.

All 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, EDG in standby with the engine at normal standby conditions, and EDG operating in a parallel test mode. 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. Rapid cooling of the EDG down to normal standby conditions should be minimized.

The timed start (≤ 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 ± 420 volts and frequency at 60 +1.2/-0.3 Hz.

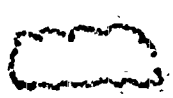
The required steady state frequency range for the EDG is 60 +1.2/-0.3 Hz to be consistent with the safety analysis to provide adequate safety injection flow. In accordance with the guidance provided in RG 1.9, where steady state conditions do not exist (i.e., transients), the frequency range should be 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.

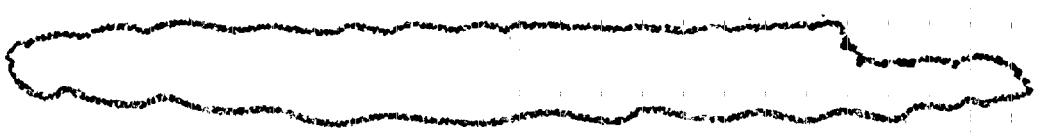
a.2 This SR helps to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and to maintain the unit in a safe shutdown condition.

In order to reduce stress and wear on diesel engines, the EDG may be tested using a slow start as opposed to a fast start (≤ 10 seconds) during the 31 day SR. 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 guidance 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 EDGs' present level of reliability and availability. However, if a slow 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.

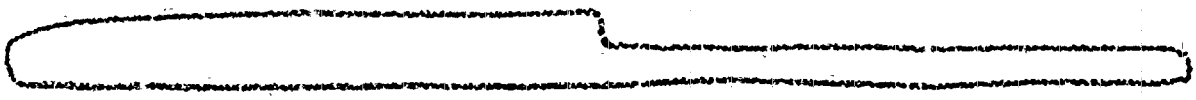
Consistent with the guidance provided in RG 1.9 for monthly SRs, the EDG can be loaded at a rate that is recommended by the manufacturer to minimize stress and wear (gradual loading).

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.

The frequency corresponding to the inservice testing requirements for pumps as contained in the ASME Code, Section XI is currently 92 days. The TS 4.0.5 frequency is appropriate since problems with the fuel oil transfer system would be readily detected if the pumps did not operate automatically in order to maintain an adequate volume of fuel oil in the day tank during the 31 day TS SR 4.8.1.1.2.a.3 (EDG runs greater than 1 hour). Performance-based initiatives and analysis may dictate a frequency other than 92 days which will be made mandatory under TS 4.0.5.

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. If a plant normally has in operation prewarm systems designed to maintain lube oil and jacket water cooling at certain temperatures, this would constitute normal standby conditions.

d. In general, unless otherwise specified, the SR frequency of 18 months is consistent with the recommendations of RG 1.108 and 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.

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 1.108, paragraph 2.a.(1).

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 1.108, paragraph 2.a.(3). 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 1.108, paragraph 2.a.(5).

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 1.108, paragraph 2.a.(6) and RG 1.9. 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 1.108, paragraph 2.a.(8) and RG 1.9.

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 1.108, paragraph 2.a.(2).

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 1.108, paragraph 2.b 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.

BASES

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.

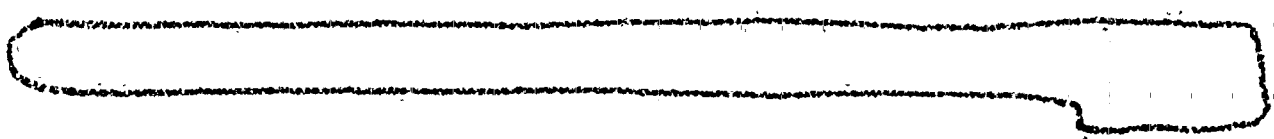
The completion time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the unit safety systems may be without sufficient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

BASES

ACTIONS:

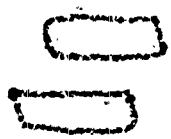
a. In this condition (i.e., < 80% indicated level but ≥ 71% indicated level), the 7 day fuel oil supply (69,700 gallons of fuel) for an EDG is not available. However, the condition is restricted to fuel oil level reductions that maintain at least a 6 day supply (60,500 gallons of fuel). These circumstances 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 fuel oil properties defined in the Bases for TS SR 4.8.1.3.2 not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to restore the stored fuel oil properties. 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 properties were outside 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.

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 30 day restoration period is acceptable because the fuel oil properties of interest, even if they



were not within stated limits, would not have an immediate effect on EDG operation. The frequency of this test (92 days) takes into consideration fuel oil degradation trends that indicate that particulate concentration is unlikely to change significantly between frequency intervals.

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 ELECTRICAL POWER SYSTEMS

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.

BASES

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 (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 "Selection of Diesel Generator Set Capacity for Standby Power Supplies," Revision 0, March 10, 1971, and "Selection, Design, Qualification and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," Revision 3, July 1993.
6. RG 1.93, "Availability of Electric Power Sources," Revision 0, December 1974.
7. RG 1.108 "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977
8. RG 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plant," Revision 1, February 1978
9. RG 1.137, "Fuel Oil Systems for Standby Diesel Generators," Revision 1, October 1979.
10. ASME, Boiler and Pressure Vessel Code, Section XI
11. IEEE Standard 308-[1978]
    IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."