SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.1.7	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts from standby condition and achieves, in ≤ 10 seconds, voltage ≥ 3924 V and ≤ 4796 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	184 days
SR 3.8.1.8	----------NOTE---------- Credit may be taken for unplanned events that satisfy this SR. ---------- Verify automatic and manual transfer of AC power sources from the normal offsite circuit to each alternate required offsite circuit.	24 months

(continued)

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources – Operating

BASES

BACKGROUND

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

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

One source of offsite power (Offsite circuit #1) for each unit is normally provided through Reserve Auxiliary transformers XR1 and XR2 for the specific unit. XR1 feeds one 4.16 KV ESF bus (Train A) A04 and XR2 feeds the other 4.16 KV ESF bus (Train B) A06 of the onsite Class 1E AC distribution system for each unit. The second source of offsite power (Offsite circuit #2) is provided by the other unit's Reserve Auxiliary Transformers XR1 and XR2 through the train oriented 4.16 KV ESF bus crossties between the two units. In addition, each class 1E Switchgear can be connected to a third offsite power source via the Unit Auxiliary Transformers by manually removing the link in the isolated phase bus between the Main Generator and the Main transformer of the non-operating Unit and racking-in the 4.16 KV circuit breaker which is normally left racked-out (withdrawn) into the fully equipped cubicle connected to the Unit Auxiliary transformer of the same Unit.

An offsite circuit includes all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the onsite Class 1E ESF bus or buses.

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite Class 1E

(continued)

BASES

BACKGROUND (continued)

Distribution System. Within 77 seconds after the initiating signal is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service via the programmed time interval load sequence.

The onsite standby power source for each 4.16 kV ESF bus is a dedicated DG. DGs G002 and G003 are dedicated to ESF buses A04 and A06, respectively. A DG starts automatically on a safety injection actuation signal (SIAS) (i.e., low pressurizer pressure or high containment pressure signals) or on an ESF bus degraded voltage or undervoltage signal. After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage, independent of or coincident with an SIAS signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SIAS alone. Following the trip of offsite power, an undervoltage signal strips nonpermanent loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the programmed time interval load sequence. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA).

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Within 77 seconds after the initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for Train A and Train B DGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each DG is 4700 kW with 10% overload permissible for up to 2 hours in any 24 hour period. However, for standby class of service like the San Onofre DGs the manufacturer allows specific overload values up to 116.1% of continuous duty rating based on the total hours the DG is

(continued)

BASES

BACKGROUND (continued)

operated per year. The ESF loads that are powered from the 4.16 kV ESF buses are listed in Reference 2.

APPLICABLE SAFETY ANALYSES

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

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

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

b. A worst case single failure.

The AC sources satisfy Criterion 3 of NRC Policy Statement.

LCO

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

Qualified offsite circuits are those that are described in the UFSAR and are part of the licensing basis for the unit.

(continued)

BASES

LCO
(continued)

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

One source of offsite power (Offsite circuit #1) for each unit is normally provided through Reserve Auxiliary Transformers XR1 and XR2 for the specific unit. XR1 feeds one 4.16 KV ESF bus (Train A) A04 and XR2 feeds the other 4.16 KV ESF bus (Train B) A06 of the onsite Class 1E AC distribution system for each unit. The second source of offsite power (Offsite circuit #2) is provided by the other unit's Reserve Auxiliary Transformers XR1 and XR2 through the train oriented 4.16 KV ESF bus crossties between the two units. In addition, each class 1E Switchgear can be connected to a third offsite power source via the Unit Auxiliary Transformers by manually removing the link in the isolated phase bus between the Main Generator and the Main transformer of the non-operating Unit and racking-in the 4.16 KV circuit breaker which is normally left racked-out (withdrawn) into the fully equipped cubicle connected to the Unit Auxiliary transformer of the same Unit.

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as: DG in standby with the engine hot, DG in standby with the engine at ambient conditions, and DG operating in a parallel test mode. A DG is considered already operating if the DG voltage is $\geq$ 3924 and $\leq$ 4796 volts and the frequency is $\geq$ 58.8 and $\leq$ 61.2 Hz.

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

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 DGs, separation and independence are complete.

(continued)

BASES

LCO (continued)

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus, with fast transfer capability to the other circuit OPERABLE, and not violate separation criteria.

APPLICABILITY

The AC sources and associated automatic load sequence timers are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources – Shutdown."

ACTIONS

A.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 Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

A.2

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition A for a period that should not exceed 72 hours. With one offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.6 (continued)

to maintain an adequate volume of fuel oil in the day tanks during or following DG testing. In such a case, a 31 day Frequency is appropriate.

SR 3.8.1.7

See SR 3.8.1.2.

SR 3.8.1.8

Transfer of each 4.16 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The 24 month Frequency of the Surveillance is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, 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 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note which acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.9

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. For this unit, the single load for each DG is the Auxiliary Feedwater pump and its horsepower rating is 800 HP. As required by IEEE-308 (Ref. 13), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous

(continued)

ATTACHMENT "B"
(Existing Specifications)
Unit 3

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.1.7	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts from standby condition and achieves, in ≤ 10 seconds, voltage ≥ 3924 V and ≤ 4796 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	184 days
SR 3.8.1.8	----------NOTE---------- Credit may be taken for unplanned events that satisfy this SR. ---------- Verify automatic and manual transfer of AC power sources from the normal offsite circuit to each alternate required offsite circuit.	24 months

(continued)

(continued)

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources – Operating

BASES

BACKGROUND

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

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

One source of offsite power (Offsite circuit #1) for each unit is normally provided through Reserve Auxiliary transformers XR1 and XR2 for the specific unit. XR1 feeds one 4.16 KV ESF bus (Train A) A04 and XR2 feeds the other 4.16 KV ESF bus (Train B) A06 of the onsite Class 1E AC distribution system for each unit. The second source of offsite power (Offsite circuit #2) is provided by the other unit's Reserve Auxiliary Transformers XR1 and XR2 through the train oriented 4.16 KV ESF bus crossties between the two units. In addition, each class 1E Switchgear can be connected to a third offsite power source via the Unit Auxiliary Transformers by manually removing the link in the isolated phase bus between the Main Generator and the Main transformer of the non-operating Unit and racking-in the 4.16 KV circuit breaker which is normally left racked-out (withdrawn) into the fully equipped cubicle connected to the Unit Auxiliary transformer of the same Unit.

An offsite circuit includes all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the onsite Class 1E ESF bus or buses.

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite Class 1E

(continued)

BASES

BACKGROUND (continued)

Distribution System. Within 77 seconds after the initiating signal is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service via the programmed time interval load sequence.

The onsite standby power source for each 4.16 kV ESF bus is a dedicated DG. DGs G002 and G003 are dedicated to ESF buses A04 and A06, respectively. A DG starts automatically on a safety injection actuation signal (SIAS) (i.e., low pressurizer pressure or high containment pressure signals) or on an ESF bus degraded voltage or undervoltage signal. After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage, independent of or coincident with an SIAS signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SIAS alone. Following the trip of offsite power, an undervoltage signal strips nonpermanent loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the programmed time interval load sequence. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA).

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Within 77 seconds after the initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for Train A and Train B DGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each DG is 4700 kW with 10% overload permissible for up to 2 hours in any 24 hour period. However, for standby class of service like the San Onofre DGs the manufacturer allows specific overload values up to 116.1% of continuous duty rating based on the total hours the DG is

(continued)

BASES

BACKGROUND (continued)

operated per year. The ESF loads that are powered from the 4.16 kV ESF buses are listed in Reference 2.

APPLICABLE SAFETY ANALYSES

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

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

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

b. A worst case single failure.

The AC sources satisfy Criterion 3 of NRC Policy Statement.

LCO

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

Qualified offsite circuits are those that are described in the UFSAR and are part of the licensing basis for the unit.

(continued)

BASES

LCO (continued)

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

One source of offsite power (Offsite circuit #1) for each unit is normally provided through Reserve Auxiliary Transformers XR1 and XR2 for the specific unit. XR1 feeds one 4.16 KV ESF bus (Train A) A04 and XR2 feeds the other 4.16 KV ESF bus (Train B) A06 of the onsite Class 1E AC distribution system for each unit. The second source of offsite power (Offsite circuit #2) is provided by the other unit's Reserve Auxiliary Transformers XR1 and XR2 through the train oriented 4.16 KV ESF bus crossties between the two units. In addition, each class 1E Switchgear can be connected to a third offsite power source via the Unit Auxiliary Transformers by manually removing the link in the isolated phase bus between the Main Generator and the Main transformer of the non-operating Unit and racking-in the 4.16 KV circuit breaker which is normally left racked-out (withdrawn) into the fully equipped cubicle connected to the Unit Auxiliary transformer of the same Unit.

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as: DG in standby with the engine hot, DG in standby with the engine at ambient conditions, and DG operating in a parallel test mode. A DG is considered already operating if the DG voltage is $\geq$ 3924 and $\leq$ 4796 volts and the frequency is $\geq$ 58.8 and $\leq$ 61.2 Hz.

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

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 DGs, separation and independence are complete.

(continued)

BASES

LCO (continued)

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus, with fast transfer capability to the other circuit OPERABLE, and not violate separation criteria.

APPLICABILITY

The AC sources and associated automatic load sequence timers are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources – Shutdown."

ACTIONS

A.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 Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

A.2

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition A for a period that should not exceed 72 hours. With one offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.6 (continued)

to maintain an adequate volume of fuel oil in the day tanks during or following DG testing. In such a case, a 31 day Frequency is appropriate.

SR 3.8.1.7

See SR 3.8.1.2.

SR 3.8.1.8

Transfer of each 4.16 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The 24 month Frequency of the Surveillance is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, 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 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note which acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.9

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. For this unit, the single load for each DG is the Auxiliary Feedwater pump and its horsepower rating is 800 HP. As required by IEEE-308 (Ref. 13), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous

(continued)

ATTACHMENT "C"
(Proposed Specifications)
Unit 2

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.1.7	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts from standby condition and achieves, in ≤ 10 seconds, voltage ≥ 3924 V and ≤ 4796 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	184 days
SR 3.8.1.8	----------NOTES---------- 1. Credit may be taken for unplanned events that satisfy this SR. 2. Testing to satisfy this SR shall include actual automatic and manual transfer to at least one alternate offsite circuit. The other alternate offsite circuit may be verified by overlapping circuit tests. ---------- Verify capability of automatic and manual transfer of AC power sources from the normal offsite circuit to each alternate required offsite circuit.	24 months

(continued)

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources – Operating

BASES

BACKGROUND

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

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

~~One~~ In Modes 1 through 4, the normal preferred power source ~~of offsite power~~ (Offsite circuit #1) for each unit is ~~normally provided through~~ Reserve Auxiliary transformers XR1 and XR2 for the specific unit. XR1 feeds one 4.16 kV ESF bus (Train A) A04 and XR2 feeds the other 4.16 kV ESF bus (Train B) A06 of the onsite Class 1E AC distribution system for each unit. The ~~second~~ alternate preferred power source ~~of offsite power~~ (Offsite circuit #2) is ~~provided by~~ the other unit's Reserve Auxiliary Transformers XR1 and XR2, or the other unit's Unit Auxiliary Transformer XU1 through the train oriented 4.16 kV ESF bus crossties between the two units. The 4.16 kV ESF bus alignment in the other unit determines which transformer(s) serves as the alternate preferred power source. If the 4.16 kV ESF bus in the other unit is aligned to the Reserve Auxiliary Transformer (XR1 or XR2), then that transformer is the required alternate preferred power source. If the 4.16 kV ESF bus in the other unit is aligned to the Unit Auxiliary Transformer (XU1), then that transformer is the required alternate preferred power source.

~~In addition,~~ In Modes 5 and 6, when the main generator is not operating, each Class 1E Switchgear can be connected to a third ~~offsite~~ preferred power source via the Unit Auxiliary Transformers by manually removing the links in the isolated phase bus between the Main Generator and the Main

(continued)

BASES

BACKGROUND (continued)

transformer of the non-operating (Modes 5 and 6) Unit and closing~~racking in~~ the 4.16 kV circuit breaker ~~which is normally left racked out (withdrawn) into the fully equipped cubicle connected~~ to the Unit Auxiliary transformer of the same Unit. In this alignment, the Unit Auxiliary Transformer (XU1) serves as the required alternate preferred power source for the ESF bus(es) in the other unit.

An offsite circuit includes all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the onsite Class 1E ESF bus or buses.

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite Class 1E Distribution System. Within 77 seconds after the initiating signal is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service via the programmed time interval load sequence.

The onsite standby power source for each 4.16 kV ESF bus is a dedicated DG. DGs G002 and G003 are dedicated to ESF buses A04 and A06, respectively. A DG starts automatically on a safety injection actuation signal (SIAS) (i.e., low pressurizer pressure or high containment pressure signals) or on an ESF bus degraded voltage or undervoltage signal. After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage, independent of or coincident with an SIAS signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SIAS alone. Following the trip of offsite power, an undervoltage signal strips nonpermanent loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the programmed time interval load sequence. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA).

(continued)

BASES

BACKGROUND (continued)

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Within 77 seconds after the initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for Train A and Train B DGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each DG is 4700 kW with 10% overload permissible for up to 2 hours in any 24 hour period. However, for standby class of service like the San Onofre DGs the manufacturer allows specific overload values up to 116.1% of continuous duty rating based on the total hours the DG is operated per year. The ESF loads that are powered from the 4.16 kV ESF buses are listed in Reference 2.

APPLICABLE SAFETY ANALYSES

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

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

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

b. A worst case single failure.

The AC sources satisfy Criterion 3 of NRC Policy Statement.

(continued)

BASES

LCO

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

Qualified offsite circuits are those that are described in the UFSAR and are part of the licensing basis for the unit. Required offsite circuits are those circuits that are credited and required to be Operable per LCO 3.8.1.

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

~~One~~ In Modes 1 through 4, the normal preferred power source ~~of offsite power~~ (Offsite circuit #1) for each unit is ~~normally provided through~~ Reserve Auxiliary Transformers XR1 and XR2 for the specific unit. XR1 feeds one 4.16 kV ESF bus (Train A) A04 and XR2 feeds the other 4.16 kV ESF bus (Train B) A06 of the onsite Class 1E AC distribution system for each unit. The ~~second~~ alternate preferred power source ~~of offsite power~~ (Offsite circuit #2) is ~~provided by~~ the other unit's Reserve Auxiliary Transformers XR1 and XR2, or the other unit's Unit Auxiliary Transformer XU1 through the train oriented 4.16 kV ESF bus crossties between the two units. The 4.16 kV ESF bus alignment in the other unit determines which transformer(s) serves as the alternate preferred power source. If the 4.16 kV ESF bus in the other unit is aligned to the Reserve Auxiliary Transformer (XR1 or XR2), then that transformer is the required alternate preferred power source. If the 4.16 kV ESF bus in the other unit is aligned to the Unit Auxiliary Transformer (XU1), then that transformer is the required alternate preferred power source.

~~In addition,~~ In Modes 5 and 6, when the main generator is not operating, each Class 1E Switchgear can be connected to a third ~~offsite~~ preferred power source via the Unit Auxiliary Transformers by manually removing the links in the isolated phase bus between the Main Generator and the Main transformer of the non-operating (Modes 5 and 6) Unit and closing~~racking in~~ the 4.16 kV circuit breaker ~~which is~~

(continued)

BASES

LCO (continued)

~~normally left racked-out (withdrawn) into the fully equipped cubicle connected~~ to the Unit Auxiliary transformer of the same Unit. In this alignment, the Unit Auxiliary Transformer (XU1) serves as the required alternate preferred power source for the ESF bus(es) in the other unit.

Each DG must be capable of starting, accelerating to ratedspeed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as: DG in standby with the engine hot, DG in standby with the engine at ambient conditions, and DG operating in a parallel test mode. A DG is considered already operating if the DG voltage is ≥ 3924 and ≤ 4796 volts and the frequency is ≥ 58.8 and ≤ 61.2 Hz.

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

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 DGs, separation and independence are complete.

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus, with ~~fast~~ transfer capability to the other circuit ~~OPERABLE~~, and not violate ESF bus separation criteria.

APPLICABILITY

The AC sources and associated automatic load sequence timers are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

(continued)

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SURVEILLANCE REQUIREMENTS

SR 3.8.1.6 (continued)

to maintain an adequate volume of fuel oil in the day tanks during or following DG testing. In such a case, a 31 day Frequency is appropriate.

SR 3.8.1.7

See SR 3.8.1.2.

SR 3.8.1.8

~~Transfer of~~ Verification of the capability to transfer each 4.16 kV ESF bus power supply from the normal preferred power source (offsite circuit) to ~~the~~ each required alternate preferred power source (offsite circuit), via the train-aligned 4.16 kV crosstie between Unit 2 and Unit 3, demonstrates the OPERABILITY of the alternate ~~circuit~~ preferred power distribution network to power the post-accident and shutdown loads. For 2A04 the normal offsite power source is 2XR1, and the alternate offsite power source is 3XR1 or 3XU1. For 2A06 the normal offsite power source is 2XR2, and the alternate offsite power source is 3XR2 or 3XU1. A required alternate offsite power source is the source that is credited as the alternate source of offsite power in LCO 3.8.1. Therefore, the alignment of the ESF buses in Unit 3 determines which alternate offsite circuit is the required circuit at any point in time.

For each 4.16 kV ESF bus (2A04 or 2A06) this surveillance requirement may be satisfied by performing both a manual transfer and an auto-transfer from the normal offsite power source to at least one of the alternate offsite power sources. The tested source may then be credited as the required alternate offsite power source per LCO 3.8.1. This surveillance may be satisfied for the remaining power source by performing a circuit functional test in addition to the transfer test above. This functional test shall be performed such that all components that are required to function for a successful manual or auto-transfer that were not included in the transfer tests above, are tested. This testing may include any series of sequential, overlapping, or total steps so that the entire manual and auto-transfer capability of the source is verified. This is explained in a note to this SR.

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ATTACHMENT "D"
(Proposed Specifications)
Unit 3

REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.7	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts from standby condition and achieves, in ≤ 10 seconds, voltage ≥ 3924 V and ≤ 4796 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	184 days
SR 3.8.1.8	----------NOTES---------- 1. Credit may be taken for unplanned events that satisfy this SR. 2. Testing to satisfy this SR shall include actual automatic and manual transfer to at least one alternate offsite circuit. The other alternate offsite may be verified by overlapping circuit tests. ---------- Verify capability of automatic and manual transfer of AC power sources from the normal offsite circuit to each alternate required offsite circuit.	24 months

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B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources – Operating

BASES

BACKGROUND

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

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

~~One~~ In Modes 1 through 4, the normal preferred power source ~~of offsite power~~ (Offsite circuit #1) for each unit is ~~normally provided through~~ Reserve Auxiliary transformers XR1 and XR2 for the specific unit. XR1 feeds one 4.16 kV ESF bus (Train A) A04 and XR2 feeds the other 4.16 kV ESF bus (Train B) A06 of the onsite Class 1E AC distribution system for each unit. The ~~second~~ alternate preferred power source ~~of offsite power~~ (Offsite circuit #2) is ~~provided by~~ the other unit's Reserve Auxiliary Transformers XR1 and XR2, or the other unit's Unit Auxiliary Transformer XU1 through the train oriented 4.16 kV ESF bus crossties between the two units. The 4.16 kV ESF bus alignment in the other unit determines which transformer(s) serves as the alternate preferred power source. If the 4.16 kV ESF bus in the other unit is aligned to the Reserve Auxiliary Transformer (XR1 or XR2), then that transformer is the required alternate preferred power source. If the 4.16 kV ESF bus in the other unit is aligned to the Unit Auxiliary Transformer (XU1), then that transformer is the required alternate preferred power source.

~~In addition,~~ In Modes 5 and 6, when the main generator is not operating, each Class 1E Switchgear can be connected to a third ~~offsite~~ preferred power source via the Unit Auxiliary Transformers by manually removing the links in the isolated phase bus between the Main Generator and the Main

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BASES

BACKGROUND (continued)

transformer of the non-operating (Modes 5 and 6) Unit and closing~~racking in~~ the 4.16 kV circuit breaker ~~which is normally left racked out (withdrawn) into the fully equipped cubicle connected~~ to the Unit Auxiliary transformer of the same Unit. In this alignment, the Unit Auxiliary Transformer (XU1) serves as the required alternate preferred power source for the ESF bus(es) in the other unit.

An offsite circuit includes all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the onsite Class 1E ESF bus or buses.

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite Class 1E Distribution System. Within 77 seconds after the initiating signal is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service via the programmed time interval load sequence.

The onsite standby power source for each 4.16 kV ESF bus is a dedicated DG. DGs G002 and G003 are dedicated to ESF buses A04 and A06, respectively. A DG starts automatically on a safety injection actuation signal (SIAS) (i.e., low pressurizer pressure or high containment pressure signals) or on an ESF bus degraded voltage or undervoltage signal. After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage, independent of or coincident with an SIAS signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SIAS alone. Following the trip of offsite power, an undervoltage signal strips nonpermanent loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the programmed time interval load sequence. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA).

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BASES

BACKGROUND (continued)

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Within 77 seconds after the initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for Train A and Train B DGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each DG is 4700 kW with 10% overload permissible for up to 2 hours in any 24 hour period. However, for standby class of service like the San Onofre DGs the manufacturer allows specific overload values up to 116.1% of continuous duty rating based on the total hours the DG is operated per year. The ESF loads that are powered from the 4.16 kV ESF buses are listed in Reference 2.

APPLICABLE SAFETY ANALYSES

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

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

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

b. A worst case single failure.

The AC sources satisfy Criterion 3 of NRC Policy Statement.

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

Qualified offsite circuits are those that are described in the UFSAR and are part of the licensing basis for the unit. Required offsite circuits are those circuits that are credited and required to be Operable per LCO 3.8.1.

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

~~One~~ In Modes 1 through 4, the normal preferred power source ~~of offsite power~~ (Offsite circuit #1) for each unit is ~~normally provided through~~ Reserve Auxiliary Transformers XR1 and XR2 for the specific unit. XR1 feeds one 4.16 kV ESF bus (Train A) A04 and XR2 feeds the other 4.16 kV ESF bus (Train B) A06 of the onsite Class 1E AC distribution system for each unit. The ~~second~~ alternate preferred power source ~~of offsite power~~ (Offsite circuit #2) is ~~provided by~~ the other unit's Reserve Auxiliary Transformers XR1 and XR2, or the other unit's Unit Auxiliary Transformer XU1 through the train oriented 4.16 kV ESF bus crossties between the two units. The 4.16 kV ESF bus alignment in the other unit determines which transformer(s) serves as the alternate preferred power source. If the 4.16 kV ESF bus in the other unit is aligned to the Reserve Auxiliary Transformer (XR1 or XR2), then that transformer is the required alternate preferred power source. If the 4.16 kV ESF bus in the other unit is aligned to the Unit Auxiliary Transformer (XU1), then that transformer is the required alternate preferred power source.

~~In addition,~~ In Modes 5 and 6, when the main generator is not operating, each Class 1E Switchgear can be connected to a third ~~offsite~~ preferred power source via the Unit Auxiliary Transformers by manually removing the links in the isolated phase bus between the Main Generator and the Main transformer of the non-operating (Modes 5 and 6) Unit and closing~~racking in~~ the 4.16 kV circuit breaker ~~which is~~

(continued)

BASES

LCO (continued)

~~normally left racked-out (withdrawn) into the fully equipped cubicle connected~~ to the Unit Auxiliary transformer of the same Unit. In this alignment, the Unit Auxiliary Transformer (XUI) serves as the required alternate preferred power source for the ESF bus(es) in the other unit.

Each DG must be capable of starting, accelerating to ratedspeed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as: DG in standby with the engine hot, DG in standby with the engine at ambient conditions, and DG operating in a parallel test mode. A DG is considered already operating if the DG voltage is ≥ 3924 and ≤ 4796 volts and the frequency is ≥ 58.8 and ≤ 61.2 Hz.

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

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 DGs, separation and independence are complete.

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus, with ~~fast~~ transfer capability to the other circuit ~~OPERABLE~~, and not violate ESF bus separation criteria.

APPLICABILITY

The AC sources and associated automatic load sequence timers are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.6 (continued)

to maintain an adequate volume of fuel oil in the day tanks during or following DG testing. In such a case, a 31 day Frequency is appropriate.

SR 3.8.1.7

See SR 3.8.1.2.

SR 3.8.1.8

~~Transfer of~~ Verification of the capability to transfer each 4.16 kV ESF bus power supply from the normal preferred power source (offsite circuit) to ~~the~~ each required alternate preferred power source (offsite circuit), via the train-aligned 4.16 kV crosstie between Unit 2 and Unit 3, demonstrates the OPERABILITY of the alternate ~~circuit~~ preferred power distribution network to power the post-accident and shutdown loads. For 2A04 the normal offsite power source is 2XR1, and the alternate offsite power source is 3XR1 or 3XU1. For 2A06 the normal offsite power source is 2XR2, and the alternate offsite power source is 3XR2 or 3XU1. A required alternate offsite power source is the source that is credited as the alternate source of offsite power in LCO 3.8.1. Therefore, the alignment of the ESF buses in Unit 3 determines which alternate offsite circuit is the required circuit at any point in time.

For each 4.16 kV ESF bus (3A04 or 3A06) this surveillance requirement may be satisfied by performing both a manual transfer and an auto-transfer from the normal offsite power source to at least one of the alternate offsite power sources. The tested source may then be credited as the required alternate offsite power source per LCO 3.8.1. This surveillance may be satisfied for the remaining power source by performing a circuit functional test in addition to the transfer test above. This functional test shall be performed such that all components that are required to function for a successful manual or auto-transfer that were not included in the transfer tests above, are tested. This testing may include any series of sequential, overlapping, or total steps so that the entire manual and auto-transfer capability of the source is verified. This is explained in a note to this SR.

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