CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.3	Verify the combustion turbine generator (CTG) is functional by verifying the CTG starts ~~from standby condition~~ and achieves steady state voltage and frequency within 10 minutes.	72 hours
	AND		
	A.4	Verify the CTG circuit breakers are capable of being aligned to each of three 6.9 kV essential AC buses.	72 hours AND once per 8 hours thereafter
	AND		
	A.5	Restore required offsite circuit to OPERABLE status.	7 days AND 1 day from discovery of two divisions with no power available from an OPERABLE offsite circuit AND 8 days from discovery of failure to meet the LCO

(continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. ---------NOTE--------- Required Action B.3.1 or B.3.2 shall be completed if this Condition is entered. ---------- One required DG inoperable.	B.1	Perform SR 3.8.1.1 for OPERABLE required offsite circuit(s).	1 hour AND Once per 8 hours thereafter
	AND		
	B.2	Declare required feature(s), supported by the inoperable DG, inoperable when the redundant required feature(s) are inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	AND		
	B.3.1	Determine OPERABLE DG(s) are not inoperable due to common cause failure.	24 hours
	OR		
	B.3.2	Perform SR 3.8.1.2 for OPERABLE DG(s).	24 hours
	AND		
	B.4	Verify the combustion turbine generator (CTG) is functional by verifying the CTG starts ~~from standby condition~~ and achieves steady state voltage and frequency within 10 minutes.	72 hours
	AND		

(continued)

Table 3.8.1-1 (page 1 of 1)
Diesel Generator Test Schedule

NUMBER OF FAILURES IN LAST 25 VALID TESTS[a]	FREQUENCY
≤ 3	31 days
≥ 4	7 days[b] (but ≥ 24 hours)

(a) Criteria for determining number of failures and valid tests shall be in accordance with Regulatory Position C.2.1 of Regulatory Guide 1.9, Revision 3, where the number of tests and failures is determined on a per DG basis.

(b) This test frequency shall be maintained until seven consecutive failure free starts from standby conditions and load and run tests have been performed. This is consistent with Regulatory Position [ ], of Regulatory Guide 1.9, Revision 3. If, subsequent to the 7 failure free tests, 1 or more additional failures occur such that there are again 4 or more failures in the last 25 tests, the testing interval shall again be reduced as noted above and maintained until 7 consecutive failure free tests have been performed.

Note: If Revision 3 of Regulatory Guide 1.9 is not approved, the above table will be modified to be consistent with the existing version of Regulatory Guide 1.108, GL 84-15, or other approved version.

9

Rev. 3 is issued and accepted by GE.

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources—Operating

LCO 3.8.4 The Division 1, Division 2, Division 3, and Division 4 DC electrical power subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One DC electrical power subsystem (either Division 1, 2, or 3) inoperable.	A.1	Restore inoperable DC electrical power subsystem to OPERABLE status.	12 hours
	AND		
	A.2	Determine OPERABLE DC electrical subsystems are not inoperable due to common cause failure.	2 hours
B. Division 4 DC electrical power subsystem inoperable.	B.1	Restore Division 4 DC electrical power subsystem to OPERABLE status.	[12] hours
	OR		
	B.2	Enter applicable Conditions and Required Actions of LCO 3.3.1.1.	~~[12] hours~~ Immediately

(continued)

This completion time should be consistent with that in LCO 3.3.1.1 since Div. 4 DC is only for SSLC logic. For one of four logic division inoperable, a 30-day Completion Time is allowed in LCO 3.3.1.1.*

*SSLC logic is still 2-out-of-three single failure proof.

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters—Operating

LCO 3.8.7 The Division 1, Division 2, Division 3, and Division 4 inverters shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One inverter (either Division 1, 2, or 3) inoperable.	----------NOTE---------- Immediately enter applicable Conditions and Required Actions of LCO 3.8.9 "Distribution Systems - Operating," for de-energized AC Vital buses. ----------	
	A.1 Restore inverters to OPERABLE status.	24 hours

(continued)

This CT should be a long time, i.e., 14 days for the following reasons:

1. Losing AC power to one division of SSLC is governored by LCO 3.3.1.2 RPS & MSIV Actuation, and the logic reverts to 2/3, half of the scram pilot valves and half of the MSIV pilot valves will be de-energized. These are safe conditions.
2. Replacement of such large inverters is not feasible in 24 hours.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Division 4 inverter inoperable.	----------NOTE---------- Immediately enter applicable Conditions and Required Actions of LCO 3.8.9 "Distribution Systems - Operating," for de-energized AC Vital buses. ----------	* This CT should be consistent with that in LCOs 3.3.1.1 and 3.3.1.2 which is 30 days.
	B.1 Restore Division 4 inverter to OPERABLE status. OR	[12] hours
	B.2 Enter applicable Conditions and Required Actions of LCO 3.3.1.1 and LCO 3.3.1.2.	~~[12] hours~~ e Immediately
C. One inverter (either Division 1, 2, or 3) inoperable AND Division 4 inverter inoperable.	C.1 Restore inoperable inverter (other than Division 4) to OPERABLE status. OR	2 hours
	C.2 Restore Division 4 inverter to OPERABLE status.	2 hours
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND	12 hours
	D.2 Be in MODE 4.	36 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. Division 4 AC vital bus inoperable.	C.1	Restore Division 4 AC vital bus to OPERABLE status.	[12] hours
	OR		
	C.2	Enter applicable Conditions and Required Actions of LCO 3.3.1.1 and LCO 3.3.1.2.	[12] hours
D. One AC vital bus electrical power distribution subsystem (either Division 1, 2, or 3) inoperable. AND Division 4 AC vital bus inoperable.	D.1	Restore inoperable AC vital bus (other than Division 4) to OPERABLE status.	2 hours
	OR		
	D.2	Restore inoperable Division 4 AC vital bus to OPERABLE status.	2 hours
E. One DC electrical power distribution subsystem (either Division 1, 2, or 3) inoperable.	E.1	Restore DC electrical power distribution subsystems to OPERABLE status.	12 hours AND 24 hours from discovery of failure to meet LCO

Same comment as in LCO 3.8.7 page 3.8-2.

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
F. One Division 4 DC electrical power distribution subsystem inoperable.	F.1	Restore inoperable Division 4 DC electrical power distribution subsystems to OPERABLE status.	12 hours
	OR		
	F.2	Enter applicable Conditions and Required Actions of LCO 3.3.1.1.	12 hours
G. One DC electrical power distribution subsystem (either Division 1, 2, or 3) inoperable. AND One Division 4 DC electrical power distribution subsystem inoperable.	G.1	Restore inoperable DC electrical power distribution subsystems (other than Division 4) to OPERABLE status.	2 hours
	OR		
	G.2	Restore inoperable Division 4 DC electrical power distribution subsystems to OPERABLE status.	2 hours
H. Required Action and associated Completion Time of Condition A, B, C, D, E, F, or G not met.	H.1	Be in MODE 3.	12 hours
	AND		
	H.2	Be in MODE 4	36 hours

Same comment as in LCO 3.8.4 page 3.8-1.

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One required DG inoperable.	B.1 Verify the combustion turbine generator (CTG) is functional by verifying the CTG starts ~~from standby condition~~ and achieves steady state voltage and frequency within 10 minutes.	1 hour
	AND	
	B.2 Verify the CTG circuit breakers are aligned to the 6.9 kV essential AC bus associated with the inoperable required DG.	1 hour AND once per 8 hours thereafter
	AND	
	B.3 Restore required DG to OPERABLE status.	[30] days

(continued)

BASES

BACKGROUND (continued)

Distribution System. Initiating signals (i.e., load shedding and buses-ready-to-load) for returning certain plant loads to service are generated by the control system for the electrical power distribution system. Individual timers for each major load are reset and started by their electrical power distribution system signals and/or LOCA signals. After the initiating signals are received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service in a preset sequence via timer delays on each load.

The onsite standby power source for each 6.9 kV ESF bus is a dedicated DG. A DG starts automatically on loss of coolant accident (LOCA) signal (i.e., signal generated from low reactor water level and high drywell pressure that are arranged in two-out-of four logic combinations) or on an ESF bus undervoltage signal (refer to LCO 3.3.8.1, "Loss of Power (LOP) Instrumentation"). In addition, the CTG provides another independent source of AC power that can be manually aligned to any ESF bus. The CTG provides an extra level of redundancy that can be utilized under certain conditions.

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 LOCA.

Certain required plant loads are returned to service in a predetermined sequence in order to prevent overloading the diesel generator power supply to the onsite Class 1E Distribution System. Initiating signals (i.e., load shedding and buses-ready-to-load signals) for returning certain plant loads to service are generated by the control system for the electrical power distribution system. Individual timers for each major load are reset and started by their electrical power distribution systems signals. After the initiating signals are received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service in a preset sequence via timer delays on each load.

Repeat ¶ TP on top ¶ page

(continued)

BASES

BACKGROUND (continued)

Ratings for DGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating for each DG is 5000 kW, with 10% overload permissible for up to 2 hours in any 24 hour period.

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the SSAR, 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 (not including the CTG) is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining 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.

AC sources satisfy the requirements of Criterion 3 of the NRC Policy Statement.

The CTG is required because it is the ABWR's design source of alternate AC power designated to satisfy the requirements of the station blackout rule, 10 CFR 50.63, "Loss of all alternating current power." The CTG is also important because verification of its functionality is the basis for the 7 day restoration time allowed for an inoperable diesel generator or offsite circuit.

(continued)

BASES

ACTIONS

A.2 (continued)

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, A.4, and A.5

If Condition A is entered, Required Action A.5 allows 7 days to restore the inoperable offsite circuit to OPERABLE status, provided the combustion turbine generator (CTG) is verified functional through testing within 72 hours and its capability of being aligned to the three 6.9 kV essential AC buses is verified, initially within 72 hours, and once per 8 hours thereafter. This 7-day Completion Time is reasonable because it accounts for the reliability and convenience of the CTG. Since the CTG can be aligned as a temporary backup offsite source, there are sufficient offsite sources available if Required Actions A.3 and A.4 are completed. The LCO is not completely satisfied at this point, but the AC electrical power system is verified to be sufficiently reliable to allow for the 7-day Completion Time of Required Action A.5. The 7-day Completion Time is also reasonable because the capabilities of the remaining AC sources are adequate for this time period, and because of the low probability of a DBA occurring during this time period. See the discussion for Required Action B.6 for additional justification of this Completion Time.

If the CTG cannot be made available to function as a temporary backup offsite circuit within 72 hours, the configuration of the AC sources is as described in Regulatory Guide 1.93 (Ref. 6), which states that operation in the applicable modes may continue as described by Condition A for a period that should not exceed 72 hours. Therefore, if Required Actions A.3 and A.4 cannot be completed within 72 hours of entering Condition A, then Required Actions F.1 and F.2 must be followed. Upon restoring the offsite circuit to OPERABLE status, the LCO is met, Conditions A and F are exited, and operation may continue.

(continued)

BASES

ACTIONS

D.1 and D.2 (continued)

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

The status of the CTG was not a consideration in establishing the appropriate Completion Times for Required Actions D.1 and D.2.

E.1

With two DGs inoperable, there is one remaining standby AC source. 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 the majority of ESF equipment at this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability, which could result in a total loss of AC power). Since any inadvertent generator trip could also result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

Statement is not true with generator breaker in the design

According to Regulatory Guide 1.93 (Ref. 6), with both DGs inoperable, operation may continue for a period that should not exceed 2 hours. This Completion Time assumes complete loss of onsite (DG) AC capability to power the minimum loads needed to respond to analyzed events.

(continued)

BASES

ACTIONS

E.1 (continued)

The status of the CTG was not a consideration in establishing the appropriate Completion Time for Required Action E.1.

F.1 and F.2

If the inoperable AC electrical power sources cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

G.1

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

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, GDC 18 (Ref. 8). Periodic component tests are supplemented by extensive functional tests during refueling outages under simulated accident conditions. The SRs for demonstrating the OPERABILITY of the DGs are in accordance with the recommendations of Regulatory Guide 1.108 (Ref. 9), and Regulatory Guide 1.137 (Ref. 10).

9 1.9 3

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

Where the SRs discussed herein specify voltage and frequency tolerances, the following summary is applicable. The minimum steady state output voltage of 6210 V is 90% of the nominal 6.9 kV output voltage. This value, which is specified in ANSI C84.1 (Ref. 11), allows for voltage drop to the terminals of 6600 V motors whose minimum operating voltage is specified as 90%, or 5980 V. It also allows for voltage drops to motors and other equipment down through the 200 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of 6674 V is equal to the maximum operating voltage specified for 6600 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 6600 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ± 2% of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).

SR 3.8.1.1

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

SR 3.8.1.2 and SR 3.8.1.7

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

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SRs have been modified by Notes (Note 1 for SR 3.8.1.7 and Note 2 for SR 3.8.1.2) to indicate that all DG starts for these

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.2 and SR 3.8.1.7 (continued)

Surveillances may be preceded by an engine prelube period and followed by a warmup period prior to loading.

For the purposes of this testing, the DGs are started from standby conditions. Standby conditions for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations.

In order to reduce stress and wear on diesel engines, some manufacturers recommend that the starting speed of DGs be limited, that warmup be limited to this lower speed, and that DGs be gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of Note 3, which is only applicable when such procedures are recommended by the manufacturer.

SR 3.8.1.7 requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 20 seconds. The 20 second start requirement supports the requirements set forth in the SSAR Chapter 8 (Ref. 2). The 20 second start requirement may not be applicable to SR 3.8.1.2 (see Note 3 of SR 3.8.1.2), when a modified start procedure as described above is used. If a modified start is not used, the 20 second start requirement of SR 3.8.1.7 applies. Since SR 3.8.1.7 does require a 20 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This procedure is the intent of Note 1 of SR 3.8.1.2.

The normal 31 day Frequency for SR 3.8.1.2 (see Table 3.8.1-1, "Diesel Generator Test Schedule") is consistent with Regulatory Guide 1.108 (Ref. 9). The 184 day Frequency for SR 3.8.1.7 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

1.9

comment: 1.108 is superseded by 1.9 Rev. 2

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.7

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

In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, testing shall be performed using a power factor less than or equal to 0.9. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent tear down inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

The normal 31 day Frequency for this Surveillance (see Table 3.8.1-1) is consistent with Regulatory Guide 1.108 → 1.9 (Ref. 9).

Note 1 modifies this Surveillance to indicate that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized.

Note 2 modifies this Surveillance by stating that momentary transients because of changing bus loads do not invalidate this test.

Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations. Similarly, momentary power factor transients above the limit do not invalidate the test.

Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.4

This SR provides verification that the level of fuel oil in the day tank is at or above the level at which fuel oil is automatically added. The level is expressed as an equivalent volume in liters, and is selected to ensure adequate fuel oil for a minimum of 1 hour of DG operation at full load plus 10%.

The 31 day Frequency is adequate to assure that a sufficient supply of fuel oil is available, since low level alarms are provided and facility operators would be aware of any large uses of fuel oil during this period.

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day tanks once every 31 days eliminates the necessary environment for bacterial survival. This is most effective means in controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 10). This SR is for preventive maintenance. The presence of water does not necessarily represent a failure of this SR provided that accumulated water is removed during performance of this Surveillance.

SR 3.8.1.6

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. It is required to support the continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.6 (continued)

system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

This test may be performed by a simulated or actual automatic initiation signal.

The Frequency for this SR is variable, depending on individual system design, with up to a 92 day interval. The 92 day Frequency corresponds to the testing requirements for pumps as contained in the ASME Boiler and Pressure Vessel Code, Section XI (Ref. 12); however, the design of fuel transfer systems is such that pumps operate automatically or must be started manually in order 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. Since proper operation of fuel transfer systems is an inherent part of DG OPERABILITY, the Frequency of this SR should be modified to reflect individual designs.

SR 3.8.1.7

See SR 3.8.1.2.

The manual transfer should be performed using the DG to carry the loads (i.e., not a dead bus transfer).

SR 3.8.1.8

Manual transfer of each 6.9 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The [18 month] Frequency of the Surveillance is based on engineering judgment taking into consideration the plant 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 on the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by two Notes. The reason for Note 1 is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge entwined steady state operation and, as a result, plant

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.8 (continued)

safety systems. Note 2 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. The load referenced for Division 2 and Division 3 DGs is the 1400 kW high pressure core flooder (HPCF) pump; for the Division 1 DG, the 540 kW residual heat removal (RHR) pump. The Reactor Building Cooling Water (RCW) system load was not used. Even though the load to DG 1 is 640 kW, that value consists of 2 RCW pumps of 320 kW each. 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 speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower.

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The 3 seconds specified is equal to 60% of the 5 second load sequence interval associated with sequencing of this largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.9.a corresponds to the maximum frequency excursion, while SR 3.8.1.9.b and SR 3.8.1.9.c are steady state voltage and frequency values to which the system must recover following load rejection. The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9).

In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, testing must be performed using a power factor ≤ [ ]. This power factor is chosen to be representative

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.11

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions encountered from the loss of offsite power, including energization of the emergency buses and respective loads from the DG. It further demonstrates the capability of the DG to automatically achieve the required voltage and frequency within the specified time.

The DG auto-start time of 20 seconds is derived from requirements stated in the SSAR Chapter 8 (Ref. 2). The frequency should be restored to within 2% of nominal following a load sequence step. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability has been achieved.

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

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.13 (continued)

Frequency was concluded to be acceptable from a reliability standpoint.

The SR is modified by two Notes. The reason for Note 1 is that performing the Surveillance removes a required DG from service. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

[Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

a. Performance of the SR will not render any safety system or component inoperable;

b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and

c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.]

SR 3.8.1.14

Regulatory Guide 1.108 (Ref. ~~9~~ 3), paragraph ~~2.a.(3)~~ 2.2.9 g, requires demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours—22 hours of which is at a load equivalent to the continuous rating of the DG, and 2 hours of which is at a load equivalent to 110% of the continuous ~~duty~~ rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelube and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.14 (continued)

≤ 0.9. This power factor is chosen to be representative of the actual design basis inductive loading that the DG could experience.

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3); takes into consideration plant conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by three Notes. Note 1 states that momentary transients due to changing bus loads do not invalidate this test. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent tear down inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. Similarly, momentary power factor transients above the limit do not invalidate the test. The reason for Note 2 is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that would challenge continued steady state operation and, as a result, plant safety systems. Note 3 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 20 seconds. The 20-second time is derived from the requirements set forth in the SSAR Chapter 8 (Ref. 2).

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(5).

This SR has been modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.15 (continued)

achieving hot conditions. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent tear down inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

SR 3.8.1.16

As required by Regulatory Guide 1.108 (Ref. 3), paragraph 2.a.(6), this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and that the DG can be returned to ready-to-load status when offsite power is restored. It also ensures that the auto-start logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready-to-load status when the DG is at rated speed and voltage, the output breaker is open and can receive an auto-close signal on bus undervoltage, and the load timers are reset.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 3), paragraph 2.a.(6), and takes into consideration plant conditions required to perform the Surveillance.

This SR is modified by two Notes. The reason for Note 1 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.17

Demonstration of the test mode override ensures that the DG availability under accident conditions is not compromised as the result of testing. Interlocks to the LOCA sensing circuits cause the DG to automatically reset to

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.17 (continued)

ready-to-load operation if an ECCS initiation signal is received during operation in the test mode. Ready-to-load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. 13), paragraph 6.2.6(2).

The requirement to automatically energize the emergency loads with offsite power is essentially identical to that of SR 3.8.1.12. The intent in the requirement associated with SR 3.8.1.17.b is to show that the emergency loading is not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(8); takes into consideration plant conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

This SR has been modified by two Notes. The reason for Note 1 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.18

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(2), each DG is required to demonstrate proper operation for the DBA loading sequence to ensure that voltage and frequency are maintained within the required limits. Under accident conditions, prior to connecting the DGs to their respective bus, all loads are shed except load center feeders and those motor control centers that power Class 1E loads (referred to as "permanently connected" loads). Upon reaching 90% rated voltage and frequency, the

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.18 (continued)

DGs are then connected to their respective bus. Load shedding and buses-ready-to-load signals are generated by the control systems for the electrical power distribution system. Individual timers for each major load are reset and started by their electrical power distribution systems signals (Ref. 2). The 10% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Regulatory Guide 1.9 (Ref. 3) provides a summary of the automatic loading of ESF buses.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(2); takes into consideration plant conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by two Notes. The reason for Note 1 is that performing the Surveillance during these MODES would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge plant safety systems. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

[Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

a. Performance of the SR will not render any safety system or component inoperable;

b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and

c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.]

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.19

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

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

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

This SR is modified by three Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil being continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge plant safety systems. Note 3 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.20

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

(continued)

BASES

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.b, and Regulatory Guide 1.137 (Ref. 10), paragraph C.2.f.

SURVEILLANCE REQUIREMENTS

SR 3.8.1.20 (continued)

This SR is modified by a Note. The reason for the Note is to minimize wear on the DG during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations.

Diesel Generator Test Schedule

The DG test schedule (Table 3.8.1-1) implements the recommendations of Revision 3 to Regulatory Guide 1.9 (Ref. 3). The purpose of this test schedule is to provide timely test data to establish a confidence level associated with the goal to maintain DG reliability at > 0.95 per test.

According to Regulatory Guide 1.9 (Ref. 3), Revision 3, each DG unit should be tested at least once every 31 days. Whenever a DG has experienced 4 or more valid failures in the last 25 valid tests, the maximum time between tests is reduced to 7 days. Four failures in 25 valid tests is a failure rate of 0.16, or the threshold of acceptable DG performance, and hence may be an early indication of the degradation of DG reliability. When considered in the light of a long history of tests, however, 4 failures in the last 25 valid tests may only be a statistically probable distribution of random events. Increasing the test Frequency allows a more timely accumulation of additional test data upon which to base judgment of the reliability of the DG. The increased test Frequency must be maintained until seven consecutive failure free tests have been performed.

The Frequency for accelerated testing is 7 days, but no less than 24 hours. Therefore, the interval between tests should be no less than 24 hours, and no more than 7 days. A successful test at an interval of less than 24 hours should be considered an invalid test and not count towards the seven consecutive failure free starts. A test interval in excess of 7 days constitutes a failure to meet SRs.

(continued)

BASES

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. ABWR SSAR, Chapter 8.
3. Regulatory Guide 1.9, Revision 3.
4. ABWR SSAR, Chapter 6.
5. ABWR SSAR, Chapter 15.
6. Regulatory Guide 1.93.
7. Generic Letter 84-15, July 2, 1984.
8. 10 CFR 50, Appendix A, GDC 18.
9. ~~Regulatory Guide 1.108.~~ e
9 ~~10.~~ Regulatory Guide 1.137.
10 ~~11.~~ ANSI C84.1, 1982.
11 ~~12.~~ ASME, Boiler and Pressure Vessel Code, Section XI.
12 ~~13.~~ IEEE Standard 308.

BASES (continued)

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in SSAR, Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5), assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, reactor coolant system, 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.

Since diesel fuel oil, lube oil, and starting air subsystem support the operation of the standby AC power sources, they satisfy Criterion 3 of the NRC Policy Statement.

LCO

Stored diesel fuel oil is required to have sufficient supply for 7 days of full load operation. It is also required to meet specific standards for quality. Additionally, sufficient lube oil supply must be available to ensure the capability to operate at full load for 7 days. This requirement, in conjunction with an ability to obtain replacement supplies within 7 days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an anticipated operational occurrence (AOO) or a postulated DBA with loss of offsite power. DG day tank fuel requirements, as well as transfer capability from the storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources—Operating," and LCO 3.8.2, "AC Sources—~~Shutdown~~ Refueling."

The starting air system is required to have a minimum capacity for five successive DG start attempts without recharging the air start receivers.

APPLICABILITY

The AC sources, LCO 3.8.1 and LCO 3.8.2, are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an AOO or a postulated DBA. Since stored diesel fuel oil, lube oil, and starting air subsystem support LCO 3.8.1

(continued)

BASES (continued)

ACTIONS

A.1 and A.2

Condition A represents one of the Division I, II, or III DC electrical power subsystems with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of DC power to the affected division. The 12 hour limit is consistent with the allowed time for one DC distribution subsystem (either Division I, II, or III) being inoperable.

If one of the required Division I, II, or III DC electrical power subsystems is inoperable (e.g., inoperable battery, inoperable battery charger, or inoperable battery charger and associated inoperable battery), the remaining DC electrical power subsystems have the capacity to support a safe shutdown and to mitigate an accident condition. Since a subsequent worst case single failure could, however, result in the loss of minimum necessary DC electrical subsystems, continued power operation should not exceed 12 hours. The 12 hour Completion Time reflects a reasonable time to assess unit status as a function of the inoperable DC electrical power subsystem and, if the DC electrical power subsystem is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

Completion of Required Action A.2 within 2 hours provides further assurance that operation in Condition A for 12 hours is acceptable by determining that no common cause failure exist among the OPERABLE DC electrical power subsystems. Because of its potential safety significance, only 2 hours are allowed to verify that no common cause failure exists.

B.1 and B.2

In Condition B, Division IV DC electrical power subsystem is inoperable. Required Actions B.1 and B.2 allow 12 hours to either restore this subsystem to OPERABLE status or enter the applicable Conditions and follow the Required Actions of LCO 3.3.1.1 "~~Reactor Protection System Instrumentation~~." Division IV is less critical than the other three DC electrical power subsystems because of its limited role in actuating safety related functions. Division IV does not

→ SSLC Sensor Instrumentation

(continued)

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.7 Inverters—Operating

BASES

BACKGROUND

The inverters are the preferred source of power to the four AC vital buses. The inverter for each division is normally supplied power from the divisional 480 V AC motor control center (MCC) via an AC to DC rectifier. Because there are only three divisions of 480 V AC divisional power, the Division IV inverter is powered by the Division II 480 V AC MCC via an AC to DC rectifier. Each of the four divisions has access to its own Class 1E 125 V battery that provides a backup source of 125 V DC power through a transfer switch. The transfer switch automatically switches power from the AC to DC rectified normal power supply to the 125 V DC backup pwoer supply when AC power failure is sensed (Ref. 1). The inverter converts DC electrical power to AC electrical power. The transfer switch and inverter thus provide an uninterruptible AC power supply for ~~the instrumentation and controls for the Reactor Protection System (RPS) and the Emergency Core Cooling Systems (ECCS) initiation.~~ Class 1E of SSLC (RPS and MSIVs), and associated CVCF loads.

power

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the SSAR, Chapter 6 (Ref. 2) and Chapter 15 (Ref. 3), assume Engineered Safety Feature systems are OPERABLE. The inverters are designed to provide the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ~~the RPS and ECCS instrumentation and controls~~ so that the fuel, Reactor Coolant System, 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.

Class 1E CVCF loads

The OPERABILITY of the inverters is consistent with the initial assumptions of the accident analyses and is based on meeting the design basis of the unit. This includes

(continued)

BASES

APPLICABLE SAFETY ANALYSIS (continued)

maintaining electrical power sources OPERABLE during accident conditions in the event of:

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

b. A worst case single failure.

Inverters are a part of the distribution system and, as such, satisfy Criterion 3 of the NRC Policy Statement.

LCO

The inverters ensure the availability of AC electrical power for the RPS and ECCS instrumentation and controls required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Maintaining the required inverters OPERABLE ensures that the redundancy incorporated into the design of the RPS and ECCS instrumentation and controls is maintained. Each of the four inverters has a 125 V battery backup power source to ensure an uninterruptible supply of AC electrical power to the AC vital buses even if the 6.9 kV and 480 V safety buses are de-energized.

OPERABLE inverters require that the AC vital bus be powered by the inverter via an inverted DC voltage. This assumes correct DC voltages are applied from the AC to DC rectified and 125 V DC power supplies, a correct AC voltage is at the output, and these voltages are within the design voltage and frequency tolerances. If the vital AC bus is powered from the AC power supply through the 480 V/120 V bypass transformer, or the inverter ~~is powered by~~ only ~~one of~~ its ~~two DC power supplies~~, then the inverter is considered inoperable.

power is available to

from

AC source

(continued)

BASES

ACTIONS

A.1, B.1, and B.2 (continued)

interruptible AC electrical power sources (offsite and onsite). The uninterruptible, battery backed, inverter source to the AC vital buses is the preferred source for powering instrumentation trip setpoint devices. In Condition B, the Division IV inverter is inoperable. Required Actions B.1 and B.2 allow 12 hours to either restore this inverter to OPERABLE status or enter the applicable Conditions and follow the Required Actions of LCO 3.3.1.1, "~~Reactor Protection System Instrumentation,~~" and LCO 3.3.~~(1.2)~~, "~~Source Range Monitor Instrumentation.~~" Division IV is less critical than the other three inverters because of its limited role in actuating safety related functions. Its loss is not as critical as a loss of one of the other inverters, and the less restrictive ACTIONS of LCO 3.3.1.1 and LCO 3.3.1.2 are appropriate.

SSLC Sensor Instrumentation

RPS and MSIV Actuation

C.1 and C.2

In Condition C, the Division IV inverter and one other inverter are inoperable. Because this condition is more severe than that of Condition A or B, only 2 hours are allowed to restore one of the inoperable inverters to OPERABLE status. This 2 hour Completion Time reflects a reasonable time to assess unit status as a function of the two inoperable inverters and, if one of the inverters is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

D.1 and D.2

If the inoperable devices or components cannot be restored to OPERABLE status within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

(continued)

BASES (continued)

LCO

The inverters ensure the availability of AC electrical power for the RPS and ECCS instrumentation and controls required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or postulated DBA.

Maintaining the required inverter(s) OPERABLE ensures the availability of sufficient inverter power sources to operate the plant in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and inadvertent reactor vessel drain down). Each inverter has a 125 V battery backup power source to ensure an uninterruptible supply of AC electrical power to the AC vital buses even if the 6.9 kV safety buses are de-energized.

OPERABLE inverters require the AC vital bus be powered by the inverter through inverted DC voltage. This assumes correct DC voltages are applied from the AC to DC rectified and 125 V DC power supplies, a correct AC voltage is at the output, and these voltages are within the design voltage and frequency tolerances. If the vital AC bus is powered from the AC power supply through the 480 V/120 V bypass transformer or the inverter ~~is powered by only one of two DC power supplies~~ only its AC source from which power is available to, then the inverter is considered inoperable.

APPLICABILITY

The inverters required to be OPERABLE in MODES 4 and 5 and also any time during movement of irradiated fuel assemblies in the secondary containment provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core in case of an inadvertent drain down of the reactor vessel;

b. Systems needed to mitigate a fuel handling accident are available;

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

(continued)