

*****JUNE 15, 1993 PRELIMINARY DRAFT*****

3.8 ELECTRICAL POWER SYSTEMS

3.8.Y Ac Sources—Shutdown (Low Water Level)

LCO 3.8.Y The following ac electrical power sources ~~and load sequencers~~ shall be OPERABLE and capable of supplying both divisions of required OPERABLE features:

- a. One qualified circuit between ^{two divisions} the offsite transmission network capable of supplying ~~both trains~~ of the onsite Class 1E ac electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown and Refueling".
- b. Two diesel generators (DGs) capable of supplying two ^{divisions} ~~trains~~ of the onsite Class 1E ac electrical power distribution subsystem(s) required by LCO 3.8.10.
- ~~c. Automatic load sequencers associated with the two DGs capable of sequencing onto the DGs as a minimum, the support systems necessary for continued operation of the DGs.~~

APPLICABILITY: MODES 4 and 5 with water level in the refueling cavity < 23 ft above the reactor pressure vessel flange.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
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~~Model STS for BWR/2/3/4/5 Plants~~
ABWR STS

<p>A. One required qualified offsite circuit inoperable or incapable of supplying both trains of the onsite Class 1E ac electrical power distribution subsystem(s).</p>	<p>A.1² Initiate action to restore required off-site power circuit to OPERABLE status.</p>	<p>Immediately</p>
<p><u>AND</u></p>		
<p><i>or onsite CTG power</i></p>	<p>A.2³ Declare affected required features with no offsite power available inoperable and enter applicable Conditions and Required Actions of the LCOs for the inoperable required features.</p>	<p>8 hours</p>

(continued)

A.1 Operate the CTG and align it to the required AC buses.

Immediately

AND

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or more required DG or its associated load sequencer inoperable.	B.1 Declare the DG of an inoperable load sequencer inoperable.	Immediately
	<u>AND</u>	
	B.2 Initiate action to restore required DG to OPERABLE status.	Immediately
	<u>AND</u>	
	B.3 Declare affected required feature(s) supported by the inoperable DG inoperable and enter Applicable Conditions and Required Actions of the LCOs for the inoperable required feature(s).	8 hours

With no DG or CTG Support

B.1 Verify the onsite CTG is available and capable of being aligned to the required AC buses.

4 hours

AND

Once per 24 hours thereafter.

AND

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Two or more required ac sources or DG load sequencers inoperable.	C.1 Declare the DG of an inoperable load sequencer inoperable.	Immediately
	AND	
	C.2 ¹ Declare affected required feature(s) normally supported by the inoperable ac sources inoperable and enter applicable Conditions and Required Actions of the LCOs for the inoperable required feacure(s).	Immediately
	AND	
	C.3 ² Initiate action to restore required ac sources to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.Y.1 For ac sources required to be OPERABLE, the following SRs are required to be met: SR 3.8.1.1 SR 3.8.1.5 SR 3.8.1.11. SR 3.8.1.2 SR 3.8.1.6 SR 3.8.1.15 *SR 3.8.1.3 SR 3.8.1.7 SR 3.8.1.16 SR 3.8.1.4 SR 3.8.1.8 SR 3.8.1.18 SR 3.8.1.9 SR 3.8.1.10	In accordance with applicable SRs

*Only required when more than the minimum AC sources of LCO 3.8.Y are available but at least once every six months.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.2^Y AC Sources—Shutdown (*Low Water Level*)

BASES

BACKGROUND A description of the AC sources is provided in the Bases for LCO 3.8.1, "AC Sources—Operating."

APPLICABLE SAFETY ANALYSES

The OPERABILITY of the minimum AC sources during MODES 4 and 5 ensures that:

- a. The unit can be maintained in the shutdown or refueling condition for extended periods;
- b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and
- c. Adequate AC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

In general, when the unit is shut down the Technical Specifications (TS) requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or loss of all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs), which are analyzed in MODES 1, 2, and 3, have no specific analyses in MODES 4 and 5. Worst case bounding events are deemed not credible in MODES 4 and 5 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the probabilities of occurrence significantly reduced or eliminated, and minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

During MODES 1, 2, and 3, various deviations from the analysis assumptions and design requirements are allowed within the ACTIONS. This allowance is in recognition that

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BASES

APPLICABLE
SAFETY ANALYSES
(continued)

certain testing and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 4 and 5, performance of a significant number of required testing and maintenance activities is also required. In MODES 4 and 5, the activities are generally planned and administratively controlled. Relaxations from typical MODE 1, 2, and 3 LCO requirements are acceptable during shutdown MODES based on:

- a. The fact that time in an outage is limited. This is a risk prudent goal as well as utility economic consideration.
- b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operating MODE analyses, or both.
- c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.
- d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODE 1, 2, and 3 OPERABILITY requirements) with systems assumed to function during an event.

In the event of an accident during shutdown, this LCO ensures the capability of supporting systems necessary to avoid immediate difficulty, assuming either a loss of all offsite power or a loss of all onsite (diesel generator (DG)) power.

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

LCO

One offsite circuit capable of supplying onsite Class 1E power distribution subsystem(s) of LCO 3.8.10, "Distribution Systems—Shutdown," ensures that all required ~~Division 1~~ loads, ~~Division 2~~ loads, or both, are powered from offsite power. An OPERABLE DG; associated with ~~a~~ Division 1, or 2, or 3 ~~Division 2~~ Distribution System Engineered Safety Feature (ESF) ~~bus~~ required OPERABLE by LCO 3.8.10, ensures a diverse

Two

buses

(continued)

BASES

LCO
(continued)

power source is available to provide electrical power support, assuming a loss of the offsite circuit. Similarly, when the high pressure core spray (HPCS) is required to be OPERABLE, a separate offsite circuit to the Division 3 Class 1E on-site electrical power distribution subsystem, or an OPERABLE Division 3 DG, ensure an additional source of power for the HPCS. Together, OPERABILITY of the required offsite circuit and DG ensure the availability of sufficient AC sources to operate the plant in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents, reactor vessel draindown). *(two DGs)*

The qualified offsite circuit(s) must be capable of maintaining rated frequency and voltage while connected to their respective ESF bus(es), and accepting required loads during an accident. Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the plant. ~~[The offsite circuit consists of incoming breaker and disconnect to the respective service transformers 11 and 21, the 11 and 21 service transformers, the ESF transformers 11 and 21, and the respective circuit path including feeder breakers to all 4.16 kV ESF buses required by LCO 3.8.10.]~~

DG^s
The required DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage, and accepting required loads. This sequence must be accomplished within *20* ~~10~~ seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must 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 parallel test mode.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY. ~~[In addition, proper sequencer operation is an integral part of offsite circuit OPERABILITY. Its inoperability in any way impacts on the ability to start and maintain energized any loads required OPERABLE by LCO 3.8.10.]~~

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During shutdown condition, it is acceptable for

BASES

LCO
(continued)

~~It is acceptable for divisions to be cross tied during shutdown conditions, permitting a single offsite power circuit to supply all required divisions. [No fast transfer capability is required for offsite circuits to be considered OPERABLE.]~~

As described in Applicable Safety Analyses, in the event of an accident during shutdown, the TS are designed to maintain the plant in a condition such that, even with a single failure, the plant will not be in immediate difficulty.

APPLICABILITY

The AC sources required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the ~~primary or 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 draindown 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
- d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The AC power requirements for MODES 1, 2, and 3 are covered in LCO 3.8.1.

ACTIONS

~~A.1~~

Insert ①
next
page

6.9

~~An offsite circuit is considered inoperable if it is not available to one required ESF division. If two or more ESE 4-16 kV buses are required per LCO 3.8.10, division(s) with offsite power available may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential~~

(continued)

INSERT 1, LCO 3.8.Y BASES

ACTIONS

A.1, A.2, A.3

An offsite circuit is considered inoperable if it is not available to two required ESF divisions. The onsite CTG is capable of supporting the required features of any two ESF divisions and hence operating the CTG and connect it to the required AC buses compensate for the loss of offsite power support. With no offsite power available, the DGs will supply the necessary AC power until the CTG is connected to the required AC buses. Immediate action is required to be initiated to restore the required offsite power circuit to OPERABLE status to provide long term power supply reliability to the site.

Required features with no offsite power or CTG power support are required to be declared inoperable and actions taken per applicable LCOs since the minimum diversity of AC power sources is not available.

B.1, B.2, B.3

With one or more DGs inoperable, it is required to verify that the onsite CTG is available and capable of being aligned to the required AC buses. the CTG has sufficient capacity to supply power to any two ESF divisions. To verify CTG capability, the CTG should be started and connected to the required AC buses. Continued operation of the CTG is however, not required. Although the CTG does not automatically connect to the required AC buses upon loss of offsite power, manual action to start and connect the CTG to the required AC buses are sufficient since the plant will not be in immediate difficulty in MODES 4 and 5 assuming a loss of offsite power. Immediate action is required to be initiated to restore the required DG(s) to OPERABLE status to provide long term power standby supply reliability.

Required features with no DG power or CTG power support are required to be declared inoperable and actions taken per applicable LCOs since the minimum diversity of AC power sources is not available.

C.1, C.2

With both required AC sources inoperable, the normally supported feature(s) must be immediately declared inoperable and appropriate LCOs enter and Required Actions taken. Immediate action is required to be initiated to restore the required AC sources to OPERABLE status to provide long term power supply reliability to the site.

BASES

ACTIONS

A.1 (continued)

for draining the reactor vessel. By the allowance of the option to declare required features inoperable with no offsite power available, appropriate restrictions can be implemented in accordance with the affected required feature(s) LCOs' ACTIONS.

A.2.1, A.2.2, A.2.3, A.2.4, B.1, B.2, B.3, and B.4

With the offsite circuit not available to all required divisions, the option still exists to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With the required DG inoperable, the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the ~~primary or secondary containment~~, and activities that could potentially result in inadvertent draining of the reactor vessel.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events. It is further required to initiate action immediately to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the plant safety systems.

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

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

See
inert (1)

(continued)

BASES

ACTIONS

~~A.2.1, A.2.2, A.2.3, A.2.4, B.1, B.2, B.3, and B.4
(continued)~~

~~Pursuant to LCO 3.0.6, the Distribution System ACTIONS are not entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A have been modified by a Note to indicate that when Condition A is entered with no AC power to one ESF bus, ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the offsite circuit whether or not a division is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized division.~~

~~C.1~~

~~When the HPCS is required to be OPERABLE, and the Division 3 DG is inoperable, the required diversity of AC power sources to the HPCS is not available. Since these sources only affect the HPCS, the HPCS is declared inoperable and the Required Actions of the affected Emergency Core Cooling Systems LCO entered.~~

~~In the event all sources of power to Division 3 are lost, Condition A will also be entered and direct that the ACTIONS of LCO 3.8.10 be taken. If only the Division 3 DG is inoperable, and power is still supplied to HPCS, 72 hours is allowed to restore the DG to OPERABLE. This is reasonable considering HPCS will still perform its function, absent an additional single failure.~~

SURVEILLANCE
REQUIREMENTS

SR 3.8.2.1

~~SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, and 3. SR 3.8.1.17 is not required to be met because the required OPERABLE DG(s) is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is excepted because starting independence is not required with the DG(s) that is not required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.~~

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BASES

SURVEILLANCE
REQUIREMENTS

~~SR 3.8.2.1 (continued)~~

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

REFERENCES

None.
