

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Restore offsite circuit to OPERABLE status.	72 hours <u>AND</u> 6 days from discovery of failure to meet LCO
B. One required DG inoperable.	B.1 Perform SR 3.8.1.1 for the offsite circuits.  <u>AND</u> B.2 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.  <u>AND</u> B.3.1 Determine OPERABLE DGs are not inoperable due to common cause failure.  <u>OR</u> B.3.2 Perform SR 3.8.1.2 for OPERABLE DGs.  <u>AND</u>	1 hour  <u>AND</u> Once per 8 hours thereafter  4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)  12 hours  12 hours  (continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>B. (continued)</p>	<p>B.4 Restore required DG to OPERABLE status.</p>	<p>14 days</p> <p><u>AND</u></p> <p>17 days from discovery of failure to meet LCO</p>
<p>C. Two required DGs in Train A inoperable.</p> <p><u>OR</u></p> <p>Two required DGs in Train B inoperable.</p>	<p>C.1 Perform SR 3.8.1.1 for the offsite circuits.</p> <p><u>AND</u></p> <p>C.2 Declare required feature(s) supported by the inoperable DGs inoperable when its required redundant feature(s) is inoperable.</p> <p><u>AND</u></p> <p>C.3.1 Determine OPERABLE DGs are not inoperable due to common cause failure.</p> <p><u>OR</u></p> <p>C.3.2 Perform SR 3.8.1.2 for OPERABLE DGs.</p> <p><u>AND</u></p>	<p>1 hour</p> <p><u>AND</u></p> <p>Once per 8 hours thereafter</p> <p>4 hours from discovery of Condition C concurrent with inoperability of redundant required feature(s)</p> <p>12 hours</p> <p>12 hours</p> <p>(continued)</p>

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. (continued)	C.4 Restore at least one required DG to OPERABLE status.	72 hours <u>AND</u> 6 days from discovery of failure to meet LCO
D. Two offsite circuits inoperable.	D.1 Declare required feature(s) inoperable when its redundant required feature(s) is inoperable.  <u>AND</u> D.2 Restore one offsite circuit to OPERABLE status.	12 hours from discovery of Condition D concurrent with inoperability of redundant required features  24 hours

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ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>E. One offsite circuit inoperable.</p> <p><u>AND</u></p> <p>One or more required DG(s) in Train A inoperable.</p> <p><u>OR</u></p> <p>One or more required DG(s) in Train B inoperable.</p>	<p>-----NOTE-----</p> <p>Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems Operating," when Condition E is entered with no AC power source to any train.</p> <p>-----</p> <p>E.1 Restore offsite circuit to OPERABLE status.</p> <p><u>OR</u></p> <p>E.2 Restore required DG(s) to OPERABLE status.</p>	<p>12 hours</p> <p>12 hours</p>
<p>F. One or more required DG(s) in Train A inoperable.</p> <p><u>AND</u></p> <p>One or more required DG(s) in Train B inoperable.</p>	<p>F.1 Restore required DGs in Train A to OPERABLE status.</p> <p><u>OR</u></p> <p>F.2 Restore required DGs in Train B to OPERABLE status</p>	<p>2 hours</p> <p>2 hours</p>
<p>G. Required Action and Associated Completion Time of Condition A, B, C, D, E or F, not met.</p>	<p>G.1 Be in MODE 3.</p> <p><u>AND</u></p> <p>G.2 Be in MODE 5.</p>	<p>6 hours</p> <p>36 hours</p>

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ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>H. Two offsite circuits inoperable.</p> <p><u>AND</u></p> <p>One or more required DG(s) in Train A inoperable.</p> <p><u>OR</u></p> <p>One or more required DG(s) in Train B inoperable.</p>	<p>H.1 Enter LCO 3.0.3.</p>	<p>Immediately</p>
<p>I. One offsite circuit inoperable.</p> <p><u>AND</u></p> <p>One or more required DG(s) in Train A inoperable.</p> <p><u>AND</u></p> <p>One or more required DG(s) in Train B inoperable.</p>	<p>I.1 Enter LCO 3.0.3.</p>	<p>Immediately</p>

BASES

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ACTIONS

A.3 (continued)

As in Required Action A.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time Condition A was entered.

B.1 and C.1

To ensure a highly reliable power source remains with one or more DGs inoperable in Train A OR with one or more DGs inoperable in Train B, it is necessary to verify the availability of the offsite circuits 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 being not met. However, if a circuit fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

B.2 and C.2

Required Actions B.2 and C.2 are intended to provide assurance that a loss of offsite power, during the period that a DG is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related trains. This includes motor driven auxiliary feedwater pumps. Single train systems, such as the turbine driven auxiliary feedwater pump, are not included. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has inoperable DG(s).

The Completion Time for Required Actions B.2 and C.2 are intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

- a. An inoperable DG exists; and

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BASES

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ACTIONS                    B.2 and C.2 (continued)

- b.    A required feature on the other train (Train A or Train B) is inoperable.

If at any time during the existence of this Condition (one or more DGs inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering one or more required DGs in Train A or one or more DGs in Train B inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DGs, results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is Acceptable because it minimizes risk while allowing time for restoration before subjecting the plant to transients associated with shutdown.

In this Condition, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

B.3.1, B.3.2, C.3.1 and C.3.2

Required Actions B.3.1 and C.3.1 provide an allowance to avoid unnecessary testing of OPERABLE DG(s). If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on other DG(s), the other DG(s) would be declared inoperable upon discovery and Condition F of LCO 3.8.1 would be entered if the other inoperable DGs are not on the same train, otherwise, if the other inoperable DGs are on the same train, the unit is in Condition C. Once the failure is

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BASES

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ACTIONS

B.3.1, B.3.2, C.3.1 and C.3.2 (continued)

repaired, the common cause failure no longer exists, and Required Actions B.3.1 and B.3.2 are satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining DG(s), performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1, B.3.2, C.3.1 or C.3.2, the corrective action program will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 12 hour constraint imposed while in Condition B or C.

B.4

In Condition B, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 14 day Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

The second Completion Time for Required Action B.4 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, an offsite circuit is inoperable and that circuit is subsequently restored OPERABLE, the LCO may already have been not met for up to 14 days. This could lead to a total of 17 days, since initial failure to meet the LCO, to restore the DGs. At this time, an offsite circuit could again become inoperable, the DGs restored OPERABLE, and an additional 72 hours (for a total of 20 days) allowed prior to complete restoration of the LCO. The 17 day Completion Time provides a limit on time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 14 day and 17 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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BASES

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ACTIONS

B.4 (continued)

In addition, the contingency actions listed in Bases Table 3.8.1-2 must be invoked whenever the outage period will extend beyond 72 hours.

As in Required Action B.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time Condition B was entered.

According to TVA's probabilistic safety analysis described in Reference 11, 12 hours is reasonable to confirm the OPERABLE DGs are not affected by the same problem as the inoperable DG.

C.4

According to Regulatory Guide 1.93, (Ref. 6), operation may continue in Condition C for a period that should not exceed 72 hours.

In Condition C, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period. Restoration of at least one DG within 72 hours results in reverting back under Condition B and continuing to track the "time zero" completion time for one DG inoperable.

The second Completion Time for Required Action C.4 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition C is entered while, for instance, an offsite circuit is inoperable and that circuit is subsequently restored OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the DGs. At this time, an offsite circuit could again become inoperable, the DGs restored OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to

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BASES

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ACTIONS

C.4 (continued)

complete restoration of the LCO. The 6 day Completion Time provides a limit on time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 72 hour and 6 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

As in Required Action C.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time Condition C was entered.

D.1 and D.2

Required Action D.1, which applies when two offsite circuits are inoperable, is intended to provide assurance that an event with a coincident single failure will not result in a complete loss of redundant required safety functions. The Completion Time for this failure of redundant required features is reduced to 12 hours from that allowed for one train without offsite power (Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete safety trains are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are powered from redundant AC safety trains. This includes motor driven auxiliary feedwater pumps. Single train features, such as the turbine driven auxiliary pump, are not included in the list.

The Completion Time for Required Action D.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

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BASES

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ACTIONS

D.1 and D.2 (continued)

- a. All required offsite circuits are inoperable; and
- b. A required feature is inoperable.

If at any time during the existence of Condition D (two offsite circuits inoperable) a required feature becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition D for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable (e.g., combinations that involve an offsite circuit and one DG inoperable, or one or more DGs in each train inoperable). However, two factors tend to decrease the severity of this level of degradation:

- a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure; and
- b. The time required to detect and restore an unavailable offsite power source is generally much less than that required to detect and restore an unavailable onsite AC source.

With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the plant in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an

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BASES

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ACTIONS

D.1 and D.2 (continued)

AC electrical power system capable of meeting its design criteria.

According to Reference 6, with the available offsite AC sources, two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with Condition A.

E.1 and E.2

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable, resulting in de-energization. Therefore, the Required Actions of Condition E are modified by a Note to indicate that when Condition E is entered with no AC source to any train, the Conditions and Required Actions for LCO 3.8.9, "Distribution Systems - Operating," must be immediately entered. This allows Condition E to provide requirements for the loss of one offsite circuit and one or more DGs in a train, without regard to whether a train is de-energized. LCO 3.8.9 provides the appropriate restrictions for a de-energized train.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition E for a period that should not exceed 12 hours.

In Condition E, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition D (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, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

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BASES

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ACTIONS

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F.1

With one or more required DGs in Train A inoperable simultaneous with one or more required DGs in Train B inoperable, there are no remaining standby AC sources. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. Since the offsite electrical power system is the only source of AC power for this level of degradation, the risk associated with continued operation for a 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.

According to Reference 6, with one or more required DGs in Train A inoperable simultaneous with one or more required DGs in Train B inoperable, operation may continue for a period that should not exceed 2 hours.

G.1 and G.2

If the inoperable AC electric power sources cannot be restored to OPERABLE status within the required 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 6 hours and to MODE 5 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.

H.1 and I.1

Condition H and Condition I corresponds to a level of degradation in which all redundancy in the AC electrical power supplies cannot be guaranteed. At this severely degraded level, any further losses in the AC electrical

(continued)

BASES

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ACTIONS                    H.1 and I.1 (continued)

power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The plant is required by LCO 3.0.3 to commence a controlled shutdown.

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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, Appendix A, 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 1.9 (Ref. 3) and Regulatory Guide 1.137 (Ref. 9), as addressed in the FSAR.

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. 6800 volts is the minimum steady state output voltage and the 10 second transient value. 6800 volts is 98.6% of the nominal bus voltage of 6900 V corrected for instrument error and is the upper limit of the minimum voltage required for the DG supply breaker to close on the 6.9 kV shutdown board. The specified maximum steady state output voltage of 7260 V is 110% of the nameplate rating of the 6600 V motors. The specified 3 second transient value of 6555 V is 95% of the nominal bus voltage of 6900 V. The specified maximum transient value of 8880 V is the maximum equipment withstand value provided by the DG manufacturer. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to  $\pm 2\%$  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

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BASES

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SURVEILLANCE  
REQUIREMENTS

SR 3.8.1.14 (continued)

- 1) Unexpected operational events which cause the equipment to perform the function specified by this Surveillance, for which adequate documentation of the required performance is available; and
- 2) Post corrective maintenance testing that requires performance of this Surveillance in order to restore the component to OPERABLE, provided the maintenance was required, or performed in conjunction with maintenance required to maintain OPERABILITY or reliability.

Prior to performance of this SR in Modes 1 or 2, actions are taken to establish that adequate conditions exist for performance of the SR. The required actions are defined in Bases Table 3.8.1-2.

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 10 seconds. The minimum voltage and frequency stated in the SR are those necessary to ensure the DG can accept DBA loading while maintaining acceptable voltage and frequency levels. Stable operation at the

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BASES (continued)

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REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Appendix A, General Design Criterion (GDC) 17, "Electrical Power Systems."
2. Watts Bar FSAR, Section 8.2, "Offsite Power System," and Tables 8.3-1 to 8.3-3, "Safety-Related Standby Power Sources and Distribution Boards," "Shutdown Board Loads Automatically Tripped Following a Loss of Nuclear Unit and Preferred Power," and "Diesel Generator Load Sequentially Applied Following a Loss of Nuclear Unit and Preferred Power."
3. Regulatory Guide 1.9, Rev. 3, "Selection, Design, Qualification and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," July 1993.
4. Watts Bar FSAR Section 6, "Engineered Safety Features."
5. Watts Bar FSAR, Section 15.4, "Condition IV-Limiting Faults."
6. Regulatory Guide 1.93, Rev. 0, "Availability of Electric Power Sources," December 1974.
7. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.
8. Title 10, Code of Federal Regulations, Part 50, Appendix A, GDC 18, "Inspection and Testing of Electric Power Systems."
9. Regulatory Guide 1.137, Rev. 1, "Fuel Oil Systems for Standby Diesel Generators," October 1979.
10. Watts Bar Drawing 1-47W605-242, "Electrical Tech Spec Compliance Tables."
11. TVA's letter to NRC dated August 7, 2001, Technical Specification Change TS-01-04, Diesel Generator (DG) Risk Informed Allowed Outage Time (AOT) Extension

BASES (continued)

**Bases Table 3.8.1-2  
TS Action or Surveillance Requirement (SR) Contingency Actions**

	<b>Contingency Actions to be Implemented</b>	<b>Applicable TS Action or SR</b>	<b>Applicable Modes</b>
1.	The stability of the offsite power system in the vicinity of WBN shall be verified. This action establishes that the power system is within "single contingency limits" and is capable of remaining stable upon the loss of any single component supporting the system.	Action B.4	1, 2, 3, 4
2.	The expected weather conditions for the outage/maintenance/testing period shall be established.	SR 3.8.1.14 Action B.4	1, 2 1, 2, 3, 4
3.	If during the outage/maintenance/testing period, a stability problem with the offsite power system arises or inclement weather (i.e., tornado watch or warning, heavy snowfall, etc.) is experienced, the activity is to be suspended or postponed, if possible.	SR 3.8.1.14 Action B.4	1, 2 1, 2, 3, 4
4.	During the outage/maintenance/testing period the following equipment should not be removed from service concurrent with the DGs; 1) the transformer room ventilation, 2) the 6.9-kV board room ventilation, 3) the Unit 2 480V shutdown board room ventilation. If the equipment must be removed from service during a DG outage, the compensatory measures contained in System Description N3-30AB-4001, "Auxiliary Building Heating, Ventilation, Air Conditioning," shall be implemented.	SR 3.8.1.14 Action B.4	1, 2 1, 2, 3, 4
5.	During the outage/maintenance/testing period the Reactor Trip Breakers are not to be removed from service concurrent with a DG.	Action B.4	1, 2, 3, 4
6.	During the outage/maintenance/testing period the turbine-driven auxiliary feedwater pump shall not be removed from service concurrent with a Unit 1 DG.	Action B.4	1, 2, 3, 4
7.	During the outage/maintenance/testing period the AFW discharge supply valves to the steam generators shall not be removed from service concurrent with a Unit 1 DG.	Action B.4	1, 2, 3, 4
8.	During the outage/maintenance/testing period the opposite train RHR pump shall not be removed from service concurrent with a Unit 1 DG.	Action B.4	1, 2, 3, 4