Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-16-137

October 13, 2016

10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 1
Facility Operating License No. NPF-90
NRC Docket No. 50-390

Watts Bar Nuclear Plant, Unit 2
Facility Operating License No. NPF-96
NRC Docket No. 50-391

Subject: **Watts Bar Nuclear Plant Units 1 and 2 - Response to Request for Additional Information Regarding Request to Revise Technical Specifications for Diesel Generator Completion Time Extension for Technical Specification 3.8.1, AC Sources – Operating (TAC Nos. MF7147 AND MF7148)**

Reference:
1. TVA Letter to NRC, CNL-16-040, "Revised Request for License Amendments – Diesel Generator Completion Time Extension for Technical Specification 3.8.1, 'AC Sources – Operating' (TS-WBN-15-09)," dated March 11, 2016 (ML16071A456)
2. NRC Electronic Mail to TVA, "Watts Bar - Request for Additional Information Regarding Request to Extend Completion Time for an Inoperable Diesel Generator (CAC Nos. MF7147 and MF 7148)," dated August 3, 2016 (ML16217A090)
3. TVA Electronic Mail to NRC, "Extension to Due date for Response to Watts Bar - Request for Additional Information Regarding Request to Extend Completion Time for an Inoperable Diesel Generator (CAC Nos. MF7147 and MF 7148)," dated September 23, 2016

In Reference 1, Tennessee Valley Authority (TVA) submitted a request for an amendment to the Watts Bar Nuclear Plant (WBN) Units 1 and 2 Technical Specifications (TS) to revise TS 3.8.1, "AC Sources – Operating." The request was to extend the Completion Time (CT) for one inoperable Diesel Generator (DG) from 72 hours to 14 days based on the availability of an alternate alternating current (AC) power source (i.e., a 6.9 kilovolt (kV) FLEX DG). In Reference 2, the Nuclear Regulatory Commission (NRC) provided a Request for Additional Information (RAI) requesting TVA respond to the RAI by September 3, 2016. In Reference 3, TVA informed the NRC that the due date for this RAI response would be extended to October 14, 2016.

Enclosure 1 provides TVA's response to the RAI. As noted in the response to NRC Request 1b, TVA has revised the proposed extended CT for one inoperable DG from 14 days to 10 days, which is more representative of the actual time to restore a DG outage to operable status from either a planned or an unplanned outage. In addition, TVA identified a proposed change in the WBN Unit 1 TS 3.8.1, required actions B.3.1 and B.3.2 CT that was included in the Reference 1 submittal but not explained. This proposed change is identified in the WBN Unit 1 TS in Enclosure 2 and an explanation is included in Enclosure 1, Attachment 1.

Enclosure 2 provides the existing TS pages marked-up to show the proposed changes in response to the RAI. Enclosure 3 provides the existing TS Bases pages marked-up to show the proposed changes in response to the RAI. Enclosure 4 provides the proposed TS pages retyped to show the changes incorporated in response to the RAI. Enclosure 5 provides the proposed TS Bases pages retyped to show the changes incorporated in response to the RAI. Changes to the existing TS Bases, are provided for information only and will be implemented under the TS Bases Control Program. The TS and TS Bases that are provided in Enclosures 2 through 5 supersede those provided in Reference 1.

An updated list of regulatory commitments is provided in Enclosure 6 and supersedes those provided in Reference 1. These responses do not change the no significant hazards considerations determination contained in Reference 1. Please address any questions regarding this response to Gordon Arent at 423-365-2004.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 13th day of October 2016.

Respectfully,

for

J. W. Shea
Vice President, Nuclear Licensing

Enclosures

cc: See Page 3

Enclosures:

1. Response to Request for Additional Information Regarding Request to Revise Technical Specifications for Diesel Generator Completion Time Extension for Technical Specification 3.8.1, AC Sources – Operating (TAC Nos. MF7147 AND MF7148) for Watts Bar Nuclear Plant Units 1 and 2

2. Proposed Technical Specification Changes (Mark-Ups) for WBN Units 1 and 2

3. Proposed Technical Specification Bases Changes (Mark-Ups) for WBN Units 1 and 2 (For Information Only)

4. Proposed Technical Specification Changes (Final Typed) for WBN Units 1 and 2

5. Proposed Technical Specification Bases Changes (Final Typed) for WBN Units 1 and 2 (For Information Only)

6. Updated List of New Regulatory Commitments

cc (Enclosures):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Watts Bar Nuclear Plant
NRR Project Manager - Watts Bar Nuclear Plant

Enclosure 1

Response To Request for Additional Information Regarding Request to Revise Technical Specifications for Diesel Generator Completion Time Extension for Technical Specification 3.8.1, AC Sources – Operating (TAC Nos. MF7147 AND MF7148) for Watts Bar Nuclear Plant Units 1 and 2

Tennessee Valley Authority
Watts Bar Nuclear Plant Units 1 and 2
Docket Nos. 50-390 and 50-391

"The license amendment request (LAR) for Watts Bar Nuclear Plant (WBN) Units 1 and 2, dated March 11, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16071A456) proposes revision to Technical Specifications (TS) 3.8.1, "AC Sources – Operating," to extend the Completion Time (CT) for one inoperable Diesel Generator (DG) from 72 hours to 14 days based upon the availability of a supplemental alternating current (ac) power source (i.e., a 6.9 kilovolt (kV) FLEX DG). The changes are requested to provide operational and maintenance flexibility. The LAR states that the proposed CT will allow sufficient time to perform planned maintenance activities that cannot be performed within a 72-hour CT . . .

In view of the unique design of the WBN Units, the NRC staff has determined that the following additional information is needed to complete the review of the LAR":

<u>Nuclear Regulatory Commission (NRC) Request 1</u>

"BTP 8-8 specifies that licensees must provide justification for the duration of the requested completion time extension, based on plant-specific operating experience. The NRC Staff notes that at WBN, each DG set is furnished by Power Systems (a Morrison-Knudsen Division) and consists of two 16-cylinder engines type EMD 16-645E4. The staff notes that some plants with similar design and DGs supplied by the same manufacturer have DG allowed outage time (AOT) or CT of 7 days.

TVA provided information in Section 2.3.2 regarding planned DG maintenance activities in Table 1 and actual DG maintenance activity completion times in Table 2. The information provided in Table 2 regarding actual maintenance completion times indicated that the longest duration activity (VLF cable testing) was 179 hours (7.5 days). TVA did not indicate whether the subject longest duration activity represented an outlier from typical estimated and actual completion times for performance of the subject maintenance. The staff notes that Table 2 indicates that the actual completion times for this testing on the other 3 DGs was in the range of 132 to 145 hours (5.5 to 6 days). The staff also notes that Table 2 does not indicate the estimated duration for VLF testing, unlike the line-items for the 4- and 12-year inspections. The data in Table 2 and the information presented in Section 2.3.2 do not provide sufficient information for the staff to assess whether these completion times are representative of typical actual completion times, or are outliers relative to planned and actual maintenance completion times. Please provide the following information:

a) The estimated and actual time taken for all 6-year, 12-year and/or 18-year maintenance activities at WBN Unit 1 (and 2) for each of the four DGs, other than the values provided in Table 2 of the LAR.*

b) Explain why WBN needs up to 14 days for 6-year, 12-year and 18-year maintenance related activities compared to 7 days at other plants with similar DGs.*

**As applicable if the 12-year overhaul frequency has been changed to 18 years"*

Tennessee Valley Authority (TVA) Response:

a) Table 1 represents unavailability time for the 6-year, 12-year, and very low frequency (VLF) cable testing conducted by the Watts Bar Nuclear Plant (WBN) since commercial operation of Unit 1. Also included is the period the diesel generators (DGs) were inoperable during the 12-year maintenance outages. The unavailability values do not include the time to perform paperwork and final post-maintenance testing (PMT) required for operability, the inoperability time is longer, as it includes these activities. The lone 12-year overhaul was completed at WBN in 2003. In 2015, WBN implemented the Engine Systems Incorporated-Electro Motive Division (ESI-EMD) Owner's Group optimized program of conditional monitoring to allow the 12-year overhaul to be moved to 18 years. The next 18-year overhaul, which will consist of maintenance performed under the old 12-year overhaul, is due in 2021. The 6-year maintenance was satisfied in 2003 with completion of the 12-year maintenance. The next 6-year maintenance was performed in 2009, with results shown in the below table. However, because the DG completion time (CT) was revised from 14 days to 72 hours (Reference 1), the next 6-year maintenance has been extended to Spring 2017 to avoid the possibility of a unit shutdown and now, with the licensing of WBN Unit 2, a dual-unit shutdown. The timeframes for the VLF cable initial testing are shown in Table 1 and discussed further in the response to NRC Request 11.

Table 1
Unavailability time for the DG 6-year, 12 year, and VLF cable testing conducted since Commercial Operation.

Maintenance	DG 1A-A	DG 1B-B	DG 2A-A	DG 2B-B
12 Year Overhaul (Includes 6 Year) (unavailability)	Aug 2003 107 Hours	July 2003 126 Hours	June 2003 117 Hours	June 2003 138 Hours
(TS Inoperable)	111 Hours	129 Hours	120 Hours	147 Hours
6 Year Maintenance	April 2009 89 Hours	May 2009 96 Hours	April 2009 88 Hours	May 2009 99 Hours
VLF Cable Testing	May 2014 179 Hours	June 2014 134 Hours	May 2014 145 Hours	Jan 2014 132 Hours

b) TVA has revised the proposed DG CT for one inoperable DG from 14 days to 10 days, which is more representative of the actual time to restore a DG to operable status from either a planned or an unplanned outage. The basis for the 10-day CT is provided below.

As shown in Table 1, the longest planned maintenance activity for the DGs was 179 hours (about 7.5 days). However, as noted in the response to NRC Request 11, a design change has been implemented reducing the VLF testing to 24 hours, which is performed following completion of the diesel preventive maintenance. Therefore, the longest DG anticipated maintenance outage would be 171 hours (147 hours + 24 hours), which is the 12-year

maintenance for DG 2B-B plus the VLF cable testing. Adding 50% to account for unforeseen issues, results in 256 hours (10.7 days). In addition, the Tennessee Valley Authority (TVA) plans to include replacement of circuit cards, seven-day fuel oil tank inspections, and 480-volt DG board cleaning resulting in additional out-of-service time.

The extension of the 72-hour CT to 10 days provides additional time for repairing and reestablishing operability of the inoperable DG; thus, reducing the risk of a dual-unit shutdown because of exceeding the 72-hour CT. A 10-day CT is justifiable as a contingency provision for unexpected DG failures and minimizes the need for expedited licensing actions seeking approval of an extended CT (e.g., enforcement discretion). Therefore, increasing the CT duration to 10 days to provide for unexpected complications is reasonable.

Enclosures 2 through 5 provide the revised technical specification (TS) and TS Bases to reflect the change in the DG CT from 14 days to 10 days. These enclosures supersede those submitted in Reference 2.

<u>NRC Request 2</u>

"At WBN, the safe shutdown loads are divided into load group A and load group B for dual unit operation. There are electric motors powered by the onsite distribution system of one unit that drive safety-related motors (such as essential raw cooling water (ERCW)pumps, component cooling system (CCS) pumps) required for safe shutdown of the other unit. The ERCW system is arranged in two headers (trains) each serving certain components in each unit. The current licensing basis (CLB) of WBN Units 1 and 2 requires support systems such as ERCW and the CCS in each train to be operable. According to current licensing basis (CLB), the minimum combined safety requirements for one accident unit and one non-accident unit or two non-accident units are met by two pumps on the same plant train. With one unit in a shutdown mode and the other unit in Mode 1, some or all the 'common' loads may be operating and can potentially impact the testing of systems/components associated with the shutdown units. The electrical ac and dc systems have common buses, and safety-related loads are fed from Train 'A ' or Train 'B' power supplies. In view of the shared systems for dual unit operation, if the WBN units are in Modes 1, 2, 3 and 4, TS LCO 3.8.1 requires four operable DGs. With one or more DGs in a train inoperable, TS 3.8.1 Condition B currently requires the inoperable DG(s) to be restored to operable status within 72 hours to avoid entering TS 3.8.1 Condition F, which requires a plant shutdown. If both units are at power and the inoperable DG(s) was not restored within the 72-hour CT, a dual-unit shutdown would be required. Please clarify the following:

a) The LAR states that the CT extension will 'allow sufficient time to perform planned (emphasis added) maintenance activities that cannot be performed within a 72-hour CT.' Please confirm that the proposed CT extension time will be used for preplanned 6-year, 12-year/18-year maintenance activities ONLY; and for routine testing and maintenance activities, the extended CT will not be invoked.

b) The LAR also states that 'TVA anticipates (emphasis added) that the above planned maintenance activities will be performed with one or both units in Mode 4 or above.' From a defense-in-depth perspective, clarify if the preplanned 6-year and 12/18-year maintenance activities on the DGs, one at a time, will be performed with the associated Unit in Mode 5 or Mode 6."

TVA Response

a) TVA does not plan to limit the CT extension only to planned maintenance activities, outages, or only once per cycle. TVA may also use the CT extension for unplanned outages. As noted in the response to NRC Request 1b, TVA has revised the proposed DG CT from 14 days to 10 days, which is more representative of the actual time to restore a DG to operable status from either a planned or an unplanned outage. TVA has revised the list of commitments that were provided in Reference 2 to reflect this determination. The list of commitments in Enclosure 6 supersedes those provided in Reference 2.

   Although TVA does not plan to limit the CT extension to planned maintenance activities, outages, or only once per cycle, in order for TVA to extend the CT for one inoperable DG from 72 hours to 10 days the availability of the FLEX DGs must be confirmed as required by proposed Condition B CTs. Condition B, "One Inoperable DG," includes five required actions:

   1) Perform surveillance requirement (SR) 3.8.1.1, verifying the availability of the required offsite circuit(s)
   2) Evaluate the availability of the 6.9 kV FLEX DG
   3) Declare required supported features inoperable as necessary
   4) Determine redundant DGs are operable by evaluation or testing
   5) Restore the DG to operable status

   Condition B, Required Action 5, restore the DG to operable status, has four CTs. The first two CTs limit the DG inoperability time to 72 hours with an unavailable 6.9 kV FLEX DG. The third CT limits the DG inoperability time to 10 days, and the fourth to 13 days. Only when the FLEX DG is determined to be available is the 72-hour CT not applicable allowing the 10-day CT to be limiting.

b) Branch Technical Position (BTP) 8-8, "Onsite (Emergency Diesel Generators) and Offsite Power Sources Allowed Outage Time Extensions," discusses the defense-in-depth aspects for onsite and offsite power sources from a deterministic perspective. The defense-in-depth philosophy has traditionally been applied in reactor design and operation to provide multiple means to accomplish safety functions and prevent the release of radioactive material. BTP 8-8 states that the staff considers that a replacement (i.e., supplemental) alternating current (AC) power source is needed to back up an inoperable DG or offsite power source during an extended CT to maintain the defense-in-depth of the electrical power sources. BTP 8-8 also states that the licensee must provide a permanent or a temporary power source as a substitute for the EDG in an extended CT to maintain the same level of defense-in-depth for safe shutdown of the plant. Limiting the Modes in which the DG maintenance can be performed is not identified as part of a defense-in-depth strategy in BTP 8-8.

   Therefore, during the preplanned 6-year, 12-year, and 18-year maintenance activities on the DGs, TVA plans to have one or both units in Modes 1, 2, 3, or 4. This does not preclude performance of the DG maintenance when one unit is in Mode 5 or 6, nor from performing the maintenance with both units in Modes 1, 2, 3, or 4.

NRC Request 3

"Based on the information provided in Enclosure 2 of letter dated August 31, 1992 and the LAR Section 3.5 related to coping with SBO:

a) *Please explain the sequence of events of a LOOP (both Units) when Unit 1 DG 1A-A (or 1B-B) is under maintenance, the redundant DG 1B-B (or 1A-A) fails to start (SBO Unit 1) and a Unit 2 DG has a single failure.*

b) *Please explain if the response is also applicable for SBO in Unit 2 and single failure of a DG in Unit 1*

c) *According to the Watts Bar licensing basis, safe shutdown is considered as placing both units in a hot standby (Technical Specification MODE 3) condition and maintaining such a condition. However in view of proposed extended maintenance on one standby DG, BTP 8-8 recommends that the supplemental AC source, used to support extended CT, have the capacity and capability to bring the Unit to cold shutdown. Please confirm that one 6.9 kV FLEX DG coupled with one standby DG is adequate to place both units in cold shutdown and maintain cold shutdown conditions."*

TVA Response

a) In the event of a complete loss of offsite power (LOOP) (i.e., loss of 500 kiloVolt (kV) and 161 kV power supplies), both units would trip due to the load rejection. The loss of voltage to the 6.9 kV SDBs would initiate a turbine driven auxiliary feedwater (TDAFW) pump start on both units. Refer to Figure 1 for a flow path example of the activities the WBN staff would perform to bring the units to cold shutdown.

Event Initiation

In the example shown in Figure 1, initially both units at WBN are at 100% power with DG 1A-A out-of-service for maintenance. The other DGs are operable and in a standby condition. As defined in NRC Request 3a, the event is initiated when a LOOP occurs; DG 1B-B fails to start, and DG 2-A-A also fails to start as the single failure, leaving DG 2B-B as the only DG in operation. These failures result in WBN Unit 1 in a station blackout (SBO) condition with no offsite or onsite power available to the Unit 1 6.9 kV shutdown boards (SDBs) (1A-A and 1B-B). WBN Unit 2 DG 2B-B is powering 6.9 kV SDB 2B-B while the 2A-A 6.9 kV SDB is de-energized.

Common Response

The LOOP would cause the following to occur at both units:

- trip of all reactor coolant pumps
- reactor trip
- start of the auxiliary feedwater pumps

When this occurs, decay heat would be removed by natural circulation in the reactor coolant system to the steam generators. In the steam generators, the water is turned into steam and the steam released through the atmospheric dump valves (ADVs). Makeup to the steam generators is via the auxiliary feedwater system.

Unit 1 Response

WBN Unit 1 operators would enter emergency operating instruction ECA-0.0, "Loss of shutdown power," when both trains of SDBs are de-energized. ECA-0.0 provides guidance from the point that a loss of shutdown power condition is diagnosed until shutdown power is restored and the operator selects one of the two recovery guidelines for plant recovery. As shown in Figure 1, the relevant guidance in this procedure is to restore power to a 6.9 kV SDB and depressurize the steam generator(s) (SGs) to 160 psig (approximately 370°F). After a 6.9 kV SDB is energized, an essential raw cooling water (ERCW) pump is started. Then ECA-0.1, "Recovery from Loss of Shutdown Power without SI Required," is entered where a component cooling system (CCS) and a charging pump is started. ECA-0.1 then directs entry into ES-0.2, "Natural Circulation Cooldown." ES-0.2, continues the unit cool down, if necessary, to less than 375°F and less than 400 psig where residual heat removal (RHR) is placed in service to continue cool down to less than 200°F.

In ECA-0.0, if power to an SDB cannot be restored within 30 minutes, an extended loss of AC power (ELAP) is declared and direction is given to enter three FLEX support instructions (FSIs). The FSIs were developed in response to NRC Order EA-12-051, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events," which was reviewed by the NRC (Reference 3). The three FSIs directed to be entered are 0-FSI-4, "DC Bus Management/Load Shed and 480V FLEX DG Alignment/Loading," 0-FSI-5.01, "Initial Assessment and FLEX Equipment Staging," and 0-FSI-8, "Alternate RCS Boration." After the FSIs are entered, a recovery plan must be developed either to transfer from the FLEX equipment power to an available DG or offsite power source or to continue using the FLEX DGs to place the unit in cold shutdown.

0-FSI-4 provides actions to prolong essential equipment and control power long enough to deploy and use FLEX equipment for plant recovery. This FSI implements FLEX strategies to place a 480V FLEX DG in operation or to extend DC battery lifetime to 8 hours. Extending battery lifetime is accomplished by performing a DC load shed within the first 90 minutes of the event if neither 480V FLEX DGs can be initially placed in operation. If no 480V FLEX DG is available when the 6.9 kV FLEX DG(s) are available, guidance is provided to power the 6.9 kV SDB(s) with the available 6.9 kV FLEX DG which would allow the 480V SDB(s) to be energized from the 6.9 kV SDB. After the 480V SDB(s) are energized, power can be restored to the 125V DC vital battery boards and the 120V AC Vital Instrument Power Boards from the 6.9 kV FLEX DG(s). In addition, within 4 hours an offsite power supply or normal DG is assumed to be restored, based on the WBN SBO coping study, with the ability to repower the batteries.

0-FSI-5.01 provides actions to support the overall FLEX strategy at WBN, which is to simultaneously pursue optimal and contingency responses to an ELAP. The optimal response depends on starting one or both 6.9 kV FLEX DGs and loading installed plant equipment as needed to accomplish the following goals:

- Maintain the SGs as a heat sink for the reactor coolant system (RCS)
- Cool down and depressurize the RCS
- Replenish RCS inventory
- Establish safe shutdown boron concentration
- Control containment pressure and temperature

- Ensure decay heat removal from spent fuel

One of the high-level actions of the FSI-5.01 strategy is to perform actions required within a short timeframe of the ELAP declaration for optimal mitigation of the ELAP. Some of these actions are to:

- Ensure that 0-FSI-4 is being performed
- Dispatch Assistant Unit Operators (AUOs) to perform the following:
  - 0-FSI-5.02, 6900V FLEX DG Startup and Alignment
  - 0-FSI-5.03, 6.9kV & 480V Shutdown Board Initial FLEX Alignment
- Initiate 0-FSI-5.04, 6900 FLEX DG Plant Equipment Loading, when both 0-FSI-5.02 and 0-FSI-5.03 are complete

As described above, one of the overall FLEX goals is to maintain the SGs as a heat sink for the RCS. If control air is not restored when ECA-0.0 directs depressurizing the SGs, ECA-0.0 directs the operators to 0-FSI-7, "Loss of Vital Instrumentation or Control Power." Attachments 5 and 6 of 0-FSI-7 provide guidance on aligning and operating the SG power operated relief valves (PORVs) with nitrogen while attachments 7 and 8 provide guidance on aligning and operating the SG PORVs by the hand wheel. In 0-FSI-5.04, guidance is provided to energize non-faulted SDBs then place equipment in operation that include an auxiliary air compressor(s) and a motor-driven AFW pump. A note prior to placing equipment in service states, "ERCW, Aux Air Compressors, and CCS should be placed in service if available. Remaining systems are at discretion of SED [site emergency director]." When an auxiliary air compressor is placed in service, control air is supplied to the SG PORVs.

As stated in ECA-0.0, a recovery plan is needed after FLEX implementation is started to energize a shutdown board when a plant DG or offsite power has been made available. The flowpath outlined in Figure 1 would provide guidance on placing the unit in cold shutdown whether offsite power, DG power, or FLEX DG power is used.

In accordance with the WBN SBO Coping Study (Reference 4), within 4 hours a source of power would be available (offsite or a DG) to power a 6.9 kV SDB. Once a source of power is available to a 6.9 kV SDB, a recovery plan would be implemented to energize the 6.9 kV SDBs and continue following ECA-0.0 through ECA-0.1 to ES-02, placing RHR in service and cooling down to < 200°F (Mode 5).

If an offsite or DG source of power is not available to a 6.9 kV SDB, a recovery plan would be implemented to maintain the 6.9 kV SDB energized by the FLEX 6.9 kV DG and continue following ECA-0.0 through ECA-0.1 to ES-02, placing RHR in service and cooling down to < 200°F.

<u>Unit 2 Response</u>

On Unit 2, a 6.9 kV SDB would be supplied from a DG (either 2A-A or 2B-B). The emergency core cooling system (ECCS) equipment would be available including a charging pump and the motor driven AFW (MDAFW) pump.

The auxiliary air compressors are supplied from the Unit 2 SDBs, so one train would immediately be powered. This train would supply control air for the atmospheric PORV on two SGs on both units. The AFW level control valves would continue to have air from either the remaining auxiliary control air system (ACAS) train or the plant nitrogen system.

The vital direct current (DC) system would be available for 4 hours with no load shedding required. However, after 30 minutes the available 480V FLEX DG(s) would be started and aligned to supply the vital battery chargers. Each of these DGs has sufficient capacity to supply one train of battery chargers. If there is no 480V FLEX DG available, a load shed is performed that increases the battery life to 8 hours.

Prior to 4 hours, the 6.9 kV FLEX DG would be aligned to the Unit 1 6.9 kV SDB of the same train as the remaining Unit 2 standby DG. Cool down could then be commenced.

b) The response to this question is slightly different from the response to NRC request 3a for an SBO in WBN Unit 2 and single failure of a WBN Unit 1 DG. In the event of a complete LOOP, both units would be tripped due to the load rejection. The loss of voltage to the 6.9 kV SDBs would initiate a TDAFW pump start on both units. If the 6.9 kV SDB 1A-A is supplied from the remaining standby DG, the A train ECCS equipment would be available.

   If the 6.9 kV SDB 1B-B is supplied by the remaining standby DG, the Unit 1 ECCS would be initially unavailable because no CCS pump is connected to the B header. The centrifugal charging pump (CCP) 1B would have to be shut down due to a lack of cooling water for the bearings. The MDAFW and ERCW pump would remain available because the bearings are not cooled by CCS.

   Because power to the auxiliary air compressors is supplied from the Unit 2 SDBs, neither train of the ACAS compressor would be powered. None of the atmospheric PORVs would have control air, so the steam generator pressure would initially be controlled by the atmospheric relief valves. To commence the unit cooldown, the PORVs could be controlled using nitrogen or by the hand wheel until control air is restored. The AFW level control valves would continue to have air from the plant nitrogen system.

   The vital DC System would be available for 4 hours with no load shedding required. After 30 minutes, the 480V FLEX DGs would be started and aligned to supply the vital battery chargers. Each of these DGs has sufficient capacity to supply one train of battery chargers. If there is no 480V FLEX DG available, a load shed is performed that increases the battery life to 8 hours.

   Prior to 4 hours, one or more 6.9 KV FLEX diesel(s) would be aligned to the Unit 2 6.9 kV SDB of the same train as the remaining Unit 2 DG. The one ACAS compressor could then be started to control the atmospheric PORVS and AFW level control valves or they could be continued to be controlled from the manifold stations and plant nitrogen.

c) One standby DG and one 6.9 kV FLEX DG are sufficient to place both units in cold shutdown and maintain cold shutdown conditions. Section 3.8.1, “6.9 kV FLEX DGs,” of Enclosure 1 to Reference 2 identifies the loading required for the FLEX DG. The standby DG is bounded by the DG loading analysis, EDQ00099920080014. To place both units in cold shutdown with no design basis accident (DBA) on either unit, two ERCW pumps on one train would accomplish cold shutdown within 37 Hours.

FLEX procedure 0-FSI-5.04 Appendix A," 6900V FLEX DG Load Management," contains two tables: Table 1, "6900V FLEX DG(s) Operating Limits," and Table 2, "Essential Equipment Estimated Loading Limit." Table 1 lists the 6.9 kV FLEX DG operating limits as 3250 kilowatt (kW) and 4062 kilovolt-amp (kVA). Table 3-1 below lists those loads needed to remove decay heat and place the units in the cold shutdown condition from 0-FSI-5.04, Appendix A, Table 2. Note that some of the loads listed are not needed simultaneously. If the SGs are relied on to remove decay heat, then the AFW pump is needed but the RHR pump is not. If the RHR system is relied on to remove decay heat, the AFW pump is not needed. Similarly, the charging pump and the safety injection pump are both used for RCS inventory control.

Table 3-1
6.9 kV FLEX Diesel Generator Loads

Equipment	KW	KVA
Auxiliary Air Compressor	15 KW	20 KVA
Auxiliary Feedwater Pump[(a)]	450 KW	560 KVA
Centrifugal Charging Pump[(b)]	450 KW	560 KVA
Component Cooling Water Pump	265 KW	330 KVA
Essential Raw Cooling Water Pump	600 KW	750 KVA
Residual Heat Removal Pump[(a)]	300 KW	375 KVA
Safety Injection Pump[(b)]	300 KW	375 KVA
Pressurizer Heaters	500 KW	500 KVA
Total	2880 KW	3470 KVA
Remaining FLEX 6.9 kV DG Capacity	370 KW	592 KVA

(a) – Provide similar function of decay heat removal and are not necessarily run concurrently
(b) - Provide similar function of inventory and boron control and are not necessarily run concurrently

This table replaces the Load Identification table included in Reference 2.

NRC Request 4

"Section 4.3 of Enclosure 1 of the LAR provides an assessment of DG completion time extension and has the following statements 'Each of the four DGs can supply one of the four separate Class 1E 6.9 kV shutdown boards. Each DG is started automatically on a LOOP or LOCA. The DG arrangement provides adequate capacity to supply the ESF and protection systems for the DBA, assuming the failure of a single active component in the system. Because the standby power systems can accommodate a single failure, extending the CT for an out-of-service DG has no impact on the system design basis. Safety analyses acceptance criteria as provided in the UFSAR are not impacted by the changes.' With the proposed 6.9 kV FLEX DG as a replacement for a DG under maintenance, please explain if the conclusion is applicable for all postulated events (coupled with single failure) that are considered in the licensing basis."

TVA Response

The statement in section 4.3 of Enclosure 1 to Reference 2 was intended to mean that with one DG out of service, the opposite complete train DGs are still capable of mitigating a DBA. Because the FLEX DG is not automatically load sequencing, it would be incapable of mitigating a DBA; however, the one intact DG train is still capable of mitigating the event.

NRC Request 5

"In its LAR Section 2.3.2, TVA stated, 'By procedure, the 6.9 kV FLEX DG will power only one 6.9 kV shutdown board (and associated 480 V shutdown boards) and will have sufficient capacity to bring a unit to safe shutdown in the event of a LOOP concurrent with a single failure during plant operations (i.e. Modes 1 through 4).'

The NRC staff notes the following:

- *The single failures to consider are a complete loss of A train (DG 1A-A and 2A-A) or B train (DG 1B-B and 2B-B) as stated in paragraph 3.4 of the LAR and FSAR sections 9.2.1, 9.2.2, and 9.2.5.*

- *The regulatory guidelines of BTP 8-8 specify that the supplemental power source for an inoperable DG must have the capacity to bring a unit to safe shutdown (cold shutdown) in case of a loss of offsite power (LOOP) concurrent with a single failure during plant operation.*

- *The 6.9 kV shutdown boards are shared between units.*

- *Each unit has individual technical specifications and the supplemental power source (FLEX DG), which would power one of the shared 6.9 kV shutdown boards, must serve both units in complying with their respective TS 3.8.1 when both units are in Modes 1-4.*

- *The licensee's LAR did not clearly include analysis of a LOOP and a single failure*

Considering a single failure of 'A' train power after a dual unit LOOP, the 'B' train power must be able to bring both units to cold shutdown to comply with BTP 8-8 and General Design Criteria (GDC)-5. Likewise, considering a single failure of 'B' train power after a dual unit LOOP, the 'A' train power must be able to bring both units to cold shutdown to comply with BTP 8-8 and GDC-5.

Based on analysis, demonstrate that the FLEX DG will perform its intended function of serving as the supplemental power source for an inoperable DG while satisfying the guidelines of BTP 8-8 and the requirements of GDC-5 in the following scenarios and for all the unit Mode combinations (1-4) allowed by the proposed TS changes:

a) The FLEX DG is substituting for a Train 'A' DG and a dual unit LOOP and dual unit cooldown with loss of emergency power Train 'B', such that both units are relying on Train A power.

b) The FLEX DG is substituting for a Train B DG and a dual unit LOOP and dual unit cooldown with loss of emergency power Train 'A', such that both units are relying on Train 'B' power

c) *In the above scenarios, identify which loads on the shutdown switchboard powered by the FLEX DG would not receive power because the FLEX DG cannot supply the same power capacity as the DG and explain why that would be satisfactory in each of the above scenarios.*

d) *In the above scenarios, discuss which ERCW pumps and CCS pumps are running and what heat exchange function each CCS heat exchanger is performing."*

TVA Response

The ability of the supplemental source to have the capacity to bring a unit to safe shutdown (cold shutdown) in case of a loss of offsite power (LOOP) concurrent with a single failure during plant operation (Mode 1) is not a part of the plant design and licensing bases but is only a criterion of BTP 8-8 for the implementation of the extended DG CT. A 6.9 kV FLEX DG does not replace a normal 6.9 kV DG. The scenarios in NRC Request 5 result in an SBO condition at WBN as shown in the below Table 5-1. The WBN licensing basis is that when the unit enters a TS Condition due to failure to meet an LCO, the single failure criteria is relaxed. This relaxation of the single failure criteria is discussed in Generic Letter 80-30, "Clarification of the Term "Operable" as It Applies to Single Failure Criterion for Safety Systems Required by TS," which states the following.

> *"The NRC's Standard Technical Specifications (STS) were formulated to preserve the single failure criterion for systems that are relied upon in the safety analysis report. By and large, the single failure criterion is preserved by specifying Limiting Conditions for Operation (LCOs) that require all redundant components of safety related systems to be OPERABLE. When the required redundancy is not maintained, either due to equipment failure or maintenance outage, action is required, within a specified time, to change the operating mode of the plant to place it in a safe condition. The specified time to take action, usually called the equipment out-of-service time, is a temporary relaxation of the single failure criterion, which, consistent with overall system reliability considerations, provides a limited time to fix equipment or otherwise make it OPERABLE. If equipment can be returned to OPERABLE status within the specified time, plant shutdown is not required."*

Table 5-1
RAI 5.a Scenario Example

	Unit 1		Unit 2	
	DG 1A-A (Train A)	DG1-B-B (Train B)	DG 2A-A (Train A)	DG 2B-B (Train B)
Initial Condition	Maintenance	Standby	Standby	Standby
Time = 0	Maintenance	Single Failure	Operating	Single Failure
	SBO Condition		SDB 2A-A Energized	

Because this question results in WBN being in an SBO condition, Figure 1 and the response to NRC Request 3 can be referenced.

a) The unit with a standby DG available would have ECCS capability for the A train. A single ERCW pump would provide adequate cooling for the remaining DG and ECCS pump cooling. The unit without a standby DG would maintain the unit using the TDAFW. Prior to 4 hours, the FLEX DG would be aligned to the unpowered A train SDB. Once powered, the required ECCS equipment could be restarted. Two ERCW pumps would be available on one train and cold shutdown of both units can commence.

b) The following two scenarios address the NRC question:

<u>6.9 kV SDB 1B-B Powered:</u>

In this case, there would be no CCS pump available on the B train. Initially the 1B centrifugal charging pump would start; however, it eventually would be secured due to the lack of CCS flow for bearing cooling. The Unit 1 TDAFW and MDAFW pumps would remain available. Unit 2 would continue using the TDAFW pump. Prior to 4 hours, the FLEX DG would be aligned to the unpowered 2B-B train SDB. Once powered, the desired required ECCS equipment would be restarted. Two ERCW pumps would be available on one train and cold shutdown of both units could commence.

<u>6.9 kV SDB 2B-B Powered</u>

Standby DG 2B-B would have ECCS capability for the Unit 2 B train. The CCS pump CS and the B train CCS train would be available for B train cooling. To ensure adequate long term cooling to the 2B-B DG, flow would be restricted to CCS heat exchanger C. Unit 1 would continue using the TDAFW. Prior to 4 hours, the 6.9 kV FLEX DG would be aligned to the unpowered 1B train SDB. Once powered, the desired Unit 1 ECCS equipment would be restarted. Two ERCW pumps would be available on one train and cold shutdown of both units could commence

c) Major loads not required to be loaded onto the FLEX DG:
- containment spray pump (CSP) - because no DBA has occurred, the CSP is not required
- MDAFW pump - the RCS is cooled using the TDAFW pump.
- safety injection (SI) pump - because no DBA has occurred, the SI pump is not required.

d) In the above scenarios, the following information discusses the ERCW pumps and CCS pumps that are running and the function each CCS HX is performing.

<u>Standby DG 1A-A aligned to 6.9 kV SDB 1A-A remains available, with a FLEX DG aligned to 6.9 kV SDB 2A-A:</u>

- ERCW pump A-A or C-A (immediately)
- ERCW pump B-A or D-A (post FLEX DG connection)
- CCS pump 1A-A (immediately) aligned to A HX
- CCS pump 2A-A (post FLEX DG connection) aligned to B HX

Standby DG 2A-A aligned to 6.9 kV SDB 2A-A remains available, with a FLEX DG aligned to 6.9 kV SDB 1A-A:

- ERCW pump B-A or D-A (immediately)
- ERCW pump A-A or C-A (post FLEX DG connection)
- CCS pump 2A-A (immediately) aligned to B HX
- CCS pump 1A-A (post FLEX DG connection) aligned to A HX

Standby DG 1B-B aligned to 6.9 kV SDB 1B-B remains available, with a FLEX DG aligned to 6.9 kV SDB 2B-B:

- ERCW pump E-B and/or G-B (immediately)
- ERCW pump F-B and/or H-B (post FLEX DG connection)
- CCS pump CS (post FLEX DG connection) aligned to C HX

Standby DG 2B-B aligned to 6.9 kV SDB 2B-B remains available, with a FLEX DG aligned to 6.9 kV SDB 1B-B:

- ERCW pump F-B and/or H-B (immediately)
- ERCW pump E-B and/or G-B (post FLEX DG connection)
- CCS pump CS (immediately) aligned to C HX

NRC Request 6

"Please provide details of DG loadings for the scenarios considered in question 5 above. In view of the differences in DG loadings, please indicate which case is the limiting case. Also, provide a time-line based on plant procedures, for connecting the proposed 6.9 kV FLEX DG to the associated safety-related bus/busses in the above scenarios."

TVA Response:

The loading for the FLEX DGs, as shown in Table 3-1 would be approximately the same for all alignments with exception of the alignment to the 6.9 kV SDB 1B-B because it would not have a CCS pump connected. In this case, the loading would be 265 kW less. The timeline, based on plant procedures, for connecting the proposed 6.9 kV FLEX DG to the associated safety-related busses is shown on Figure 2, approximately 2 hours.

NRC Request 7

"Please clarify whether the FLEX DGs have been (or will be) tested to start and run loads that will be required for scenarios listed in Questions above."

TVA Response:

The FLEX DGs have been tested to start and carry a load equivalent to the loads of the scenarios listed in the above NRC requests. Specifically, testing was performed on the FLEX DGs in October 2014. During the test, the FLEX DGs were loaded to a resistive load bank through a 6900 V to 480 V transformer. The FLEX DGs were loaded to 3250 kiloWatts (kW).

NRC Request 8

"Section 3.7.2 'FLEX DG Implementation' of Enclosure 1 of the LAR provides steps associated with 6.9 kV FLEX DG alignment and states 'These actions would be the same actions the operators would take if the FLEX DG were needed to operate when a DG is inoperable for maintenance during the DG extended CT.' Action #2 states 'Align and place 480 V FLEX DGs in service.' According to the Watts Bar response to NRC Order EA-12-049, during the first phase of an extended loss of ac power event, WBN will be relying on the Class 1 E station batteries to cope until additional power supplies (i.e., FLEX DGs) can be aligned and connected to the Watts Bar electrical distribution system (Phase 2). Transitioning to Phase 2 includes aligning and placing into service the pre-staged 480 V FLEX DGs and the 6.9 kV FLEX DGs. Based on the information provided on the FLEX DGs, the Staff requests following additional information:

a) *Please confirm whether the 480 V FLEX DGs are part of the proposed extension request for DGs and will have the same requirements for testing and availability checks as the 6.9 kV FLEX DGs.*

b) *Assuming that it takes the proposed TS allowed time of 2 hours to establish the availability of the 6.9 kV FLEX DG, please provide a time line, using current plant procedures, for connecting the proposed 6.9 kV FLEX DG and the 480 V FLEX DG (if required) to each of the associated safety busses if an unplanned DG maintenance was being conducted and a LOOP event is experienced.*

c) *For the event postulated in item b) above, please confirm if the Unit with DG undergoing maintenance will first enter SBO procedures if the associated DG fails to start."*

TVA Response:

a) The 480 V FLEX DG should be available during the period of the proposed extension. However, FLEX procedures provide direction to shed loads on the batteries to increase their life to 8 hours if a battery is not repowered by a 480 V FLEX DG. IF not repowered by a 480 V FLEX DG, the vital battery chargers can be supplied by the 6.9 kV FLEX DG via the plant distribution system. In addition, the WBN SBO coping duration is 4 hours, after which an offsite power supply or another DG would be available to repower the batteries. Therefore, the 480V FLEX DGs are not credited as part of the proposed DG extension request.

   The 480V FLEX Diesel Generators each have a 185 gal "day tank" that maintains enough fuel for a minimum of 8 hours operation with level switches that start and stop the associated fuel oil transfer pump to automatically maintain the day tank fuel level. The "day tanks" are located in the 480V FLEX DG rooms. The fuel oil supply for each 480V FLEX DG has an associated fuel oil transfer pump and piping that takes suction from one of the fuel oil seven day tanks located in the EDG building. Manual action is required to align and power the fuel oil supply from the seven-day tank to the 480 V FLEX DG day tank.

   Each 480V FLEX DG has an operating limit of 180 kW, 225 kVA and 271 amps. Although a 480V FLEX DG is not needed to reach cold shutdown, using 38 kW for each vital battery charger, even if all four battery chargers were aligned to one 480V FLEX DG the accumulated load would be within the limitation of the DG.

b) Figure 2 contains a pictorial display of the timeline. ECA-0.0 states that if power is not restored to a 6.9 kV SDB within 30 minutes an ELAP is declared and FSI-4 and FSI-5.01 are entered to manage the DC distribution system and FLEX strategies. FSI-4 starts the 480 V FLEX DG or, if they are not available, provides guidance on shedding loads on the batteries and alignment to the 6.9 kV FLEX DG. Estimated time for energizing the 6.9 kV SDB(s) with a 6.9 kV FLEX DG is 2 hours. Further information is provided in the response to NRC Request 3a.

c) When operators determine that no vital power is available, unit specific Emergency Operating Instructions 1-E-0/2-E-0, "Reactor Trip or Safety Injection," or Emergency Contingency Action Procedures 1-ECA-0.0/2-ECA-0.0, "Loss of All AC Power," direct the operators to take action to restore either one of the DGs, or an offsite power source. If this cannot be completed immediately, ECA-0.0 contains directions to mitigate a complete LOOP. If the determination cannot be made that power can be restored within 30 minutes, the FLEX instructions would be implemented as described in ECA-0.0. These instructions direct the start-up of both the 480 V and 6.9 kV FLEX DGs to restore power.

NRC Request 9

"LCO 3.8.1 proposed Required Action (RA) B.2 uses the word 'evaluate' when assessing the availability of 6.9 kV FLEX DG. However this wording apparently disagrees with the basis written for RA B.2 which states that it is necessary to 'verify' that the availability of the FLEX DG. Per 10 CFR 50.36(a)(1) the basis is a summary statement or reasons for the specification. The proposed reasoning and basis used in the LAR is that the FLEX DG be available during the longer proposed CT for the standby DG. Propose a reworded RA B.2 that agrees with the proposed basis."

TVA Response:

TVA has revised the TS Bases for TS 3.8.1, Required Action B.2 (see Enclosures 3 and 5). The revised TS Bases state:

> "In order to extend the Required Action B.5 Completion Time for an inoperable DG from 72 hours to 10 days, it is necessary to evaluate the availability of the 6.9 kV FLEX DG within 2 hours upon entry into LCO 3.8.1 and every 12 hours thereafter. Since Required Action B.2 only specify "evaluate," discovering the FLEX DGs unavailable does not result in the Required Action being not met (i.e., the evaluation is performed). However, on discovery of an unavailable FLEX DG, the Completion Time for Required Action B.5 starts the 72 hour and/or 24 hour clock."

NRC Request 10

"In the LAR new wording is proposed for SR 3.8.1.19 for Unit 1. The existing wording indicates that all DGs of the same power train must auto-start from a standby condition, permanently energize connected loads in ≤ 10 seconds, energize auto-connected loads through a load sequencer, achieve steady state voltage and frequency within a range and supply connected loads and auto-connected loads for ≥ 5 minutes. Proposed wording removes the plural form of DG and the words of the same power train. While the proposed SR more closely matches that in NUREG-1431, Rev. 4, the wording in the NUREG is based on typical plant design where a single DG has the capacity and capability to supply all necessary accident and safe shutdown

loads for the specific Unit. At Watts Bar both DGs of the same load group are necessary to supply all necessary accident and safe shutdown loads.

a. *Explain how the proposed wording results in a SR that is equivalent in purpose to the existing SR.*

b. *In your answer address the question of whether both DGs of the same load group will be simultaneously started and loaded during surveillance testing at WB for SR 3.8.1.19 and if not why not?*

c. *Explain how both DGs of the same load group start if there is an accident and a LOOP event in one Unit only."*

<u>TVA Response:</u>

a) The change to SR 3.8.1.19 is consistent with the design basis for WBN during two-unit operation. As noted in Enclosure 1 to Reference 2:

> "As each DG in a power train auto-starts on an undervoltage condition on its respective 6.9 kV SDB and a Unit 1 engineered safety feature (ESF) signal auto-starts DGs 1A-A and 1B-B, but not DGs 2A-A and 2B-B, there is no safety-related signal that auto-starts both DGs in the same power train. Therefore, the SR is more appropriately stated on an individual DG basis. This change will allow the auto-start of DGs 2A-A and 2B-B with Unit 1 in Mode 1, 2, 3, or 4. The performance of SR 3.8.1.19, for DGs 1A-A and 1B-B, will be performed when Unit 1 is in Mode 5, Mode 6, or is defueled."

The change to SR 3.8.1.19 is also reflected in the change to the TS Bases for SR 3.8.1.19. The current TS Bases for SR 3.8.1.19 makes the following statement associated with testing the DG required by SR 3.8.1.19.

> "With WBN in one unit operation, this test will be conducted on a per train basis. Since the Unit 2 DGs are required to carry the common loads during a loss of offsite power event, the respective Unit 2 DG on the same power train will be tested with its respective Unit 1 DG. This is to minimize shutdown board room alignment and restoration."

Two items are identified in the TS Bases: 1) this was when WBN was in one unit operation, and 2) the purpose was to minimize SDB room alignment and restoration. With WBN in two-unit operation, the purpose of minimizing SDB room alignments and restoration is no longer applicable. Thus, in Reference 2, TVA deleted the above quote from TS Bases 3.8.1.19.

TVA performed a search of WBN's licensing basis and found that the above quote from TS Bases SR 3.8.1.19 was added to the WBN Unit 1 TS between May 16, 1995 (Reference 5) and October 18, 1995 (Reference 6). No reason other than what is contained in the TS Bases was found for the SR 3.8.1.19 statement of, "DGs of the same power train auto-start from standby condition…"

Therefore, with WBN no longer a one-unit plant, the need to minimize the SDB room alignment and restoration is not supported and this test is being modified similar to that

originally proposed in 1993 stating that the DG auto-starts from standby condition (Reference 7).

b) See the response to NRC request 10a, simultaneous DG start is not required.

c) Each DG receives a start signal on undervoltage or degraded voltage from its respective 6.9 kV SDB. If a LOOP were to occur on one unit, both unit's 6.9 kV SDBs would sense the loss of voltage condition generating a start signal to both 6.9 kV SDBs' respective DG. Both units DGs receive a start signal from the units safety injection signal should a LOCA occur. Although not safety related, all DGs receive a start signal for the common start circuit if one DG starts. Table 10-1 shows which DG starts for the various conditions without crediting the common start circuit. Table 10-2 credits the common start circuit.

Table 10-1
Without Common Start Circuit

	Unit 1		Unit 2	
	1A-A	1B-B	2A-A	2B-B
LOOP Unit 1	UV	UV		
LOOP Unit 2			UV	UV
LOCA Unit 1	SI	SI		
LOCA Unit 2			SI	SI
LOOP/LOCA Unit 1	UV/SI	UV/SI		
LOOP/LOCA Unit 2			UV/SI	UV/SI
UV – undervoltage signal, SI - safety injection signal				

Table 10-2
With Common Start Circuit

	Unit 1		Unit 2	
	1A-A	1B-B	2A-A	2B-B
LOOP Unit 1	UV	UV	CS	CS
LOOP Unit 2	CS	CS	UV	UV
LOCA Unit 1	SI	SI	CS	CS
LOCA Unit 2	CS	CS	SI	SI
LOOP/LOCA Unit 1	UV/SI	UV/SI	CS	CS
LOOP/LOCA Unit 2	CS	CS	UV/SI	UV/SI
UV – undervoltage signal, SI - safety injection signal, CS – common start signal				

Based on WBN's 161 kV offsite power distribution system, a LOOP on one unit only is an unlikely event. For this to occur, at least two failures would need to occur, a breaker failure on the supply from common station service transformer (CSST) C and another breaker failure on the supply from CSST D. This would cause a loss of offsite power to only one unit.

At WBN one offsite circuit supplies power to one load group. For example, during normal operation CSST C supplies power to 6.9 kV SDBs 1A-A and 2A-A while CSST D supplies power to 6.9 kV SDBs 1B-B and 2B-B. A loss of one of these power supplies causes an undervoltage condition to occur on the respective 6.9 kV SDBs starting the associated DG.

NRC Request 11

"Table 2 in Enclosure 1 of the LAR provides an overview of historical record of DG Maintenance Activity Completion Times (hours). The staff notes that VLF cable testing has consistently taken longer than maintenance activities associated with the DGs. If future cable testing is projected to take longer than the 6-year or 18-year maintenance testing, please provide a listing of cables and associated equipment that render the respective DG to be inoperable and the corresponding estimated time for each cable testing."

TVA Response:

The affected VLF cables are the main supply cables from the DG to the respective SDB. Thus, when testing is being performed, the DG would not be able to provide power to its SDB and would not be able to perform its design function. The VLF cable testing was last performed in 2014 (see the response to NRC Request 1a). During this testing, a design change was implemented to allow for new cable runs and quick disconnects, so that future VLF testing should only take approximately 24 hours. Henceforth, the VLF testing is anticipated to be combined with a regularly scheduled maintenance outage (2, 6, or 18 year).

NRC Request 12

"Section 3.12 'Work Control and Scheduling' of Enclosure 1 of the LAR provides the TVA method of risk assessment and work control. TS Bases Table 3.8.1-2 in Attachment 2 and 4 the LAR provides additional precautions that will be taken during the proposed extended CT for DG maintenance. Please provide a succinct summary or listing of all compensatory actions (such as protected train concept, allowable entry and maintenance of offsite power system switchyard, elective maintenance activities, etc.) that have been considered and incorporated into procedures for extended DG outages."

TVA Response:

WBN Technical Instruction TI-12.16, "Diesel Generator Outage T/S or SR Contingency Actions," includes the contingency actions to be taken for a planned or unplanned DG outage and performance of the DG 24-hour load runs.

The compensatory measures listed in the WBN TI-12.16 are listed below.

- determine the stability state of the offsite power system in the vicinity of WBN is within the single contingency limit

- obtain the expected weather condition forecast for the expected duration of the DG outage period and determine if severe thunderstorms or heavy snowfall is forecast
- ensure the SDB room heating, ventilation, and air conditioning (HVAC) system, 480 V shutdown transformer room ventilation system, 480 V auxiliary board and battery room HVAC system supply to the Unit 2 480 V SDB room are in service or placement of a suitable portable fan as a compensatory measure
- notify the unit senior reactor operator (SRO) and the work control center (WCC) SRO and the work week manager not to remove the following from service: a) TDAFW pump; b) AFW level control valves to the steam generators; and c) opposite train residual heat removal (RHR) pump
- notify the unit SRO and the WCC SRO and work week manager not to remove reactor trip breakers A and B for any DG outage
- contact the WBN PSO (Power System Operations) group and verify the hydro transmission switchyard is locked down or have TVA operations walkdown and approve risk management actions (RMAs) such as placards and stanchions or flagging barriers are in place to protect the 161 kV off-site breakers and relays
- place placards on operable DG mode selector switches
- limit access to the Watts Bar Hydro switchyard
- place placards and approved barriers at the inside entrance to the operable DG rooms
- place placard and approved barrier at the entrance to the 480 V diesel auxiliary board rooms
- place approved portable sign stand, placards and stanchions or flagging barriers to protect the 6.9 kV SDBs
- place placard on the entrance to the terry turbine room
- limit access to the WBN 161 kV switchyard

The additional compensatory measures added by this license amendment request are provided in Enclosure 3 of Reference 2, except as noted in the response to NRC Request 2a. These additional compensatory measures are listed below.

- One 6.9 kV FLEX Diesel Generator will be protected, as defense-in-depth, during the extended diesel generator Completion Time.
- One 6.9 kV FLEX Diesel Generator will be routinely monitored during Operator Rounds, with monitoring criteria identified in the Operator Rounds. One 6.9 kV FLEX Diesel Generator will be monitored for fire hazards during Operator Rounds.
- Component testing or maintenance of safety systems and important non-safety equipment in the offsite power systems, which can increase the likelihood of a plant transient or loss-of-offsite-power, will be avoided during the extended diesel generator Completion Time.
- No elective switchyard maintenance will be allowed during the extended diesel generator Completion Time.
- Licensed Operators and Auxiliary Operators, for the operating crews on-shift when the extended diesel generator Completion Time is in use, will be briefed on the DG work plan, the revised Technical Specification 3.8.1, and procedural actions regarding loss-of-offsite-

power and 6.9 kV FLEX Diesel Generator alignment and use prior to entering the extended diesel generator Completion Time

- The steam-driven Auxiliary Feedwater Pump will be controlled as “protected equipment,” during the extended diesel generator Completion Time.
- The availability of one 6.9 kV FLEX Diesel Generator will be verified within the last 30 days before entering the extended diesel generator Completion Time by operating the 6.9 kV FLEX Diesel Generator at its rated voltage and frequency for 5 minutes and ensuring the skid-mounted auxiliary support systems are available.

In addition, the following two new compensatory measures are being added to TS Bases Table 3.8.1-2, which are not contained in current WBN procedures:

- Do not remove the AFW level control valves to the steam generators from service concurrently with a Unit 1(2) DG outage.
- Do not remove the opposite train residual heat removal (RHR) pump from service concurrently with a Unit 1(2) DG outage.

NRC Request 13

“In general, the LAR refers to the 6.9 kV FLEX DGs as ‘3 MWe FLEX DG 6.9 kV FLEX Generators.’ Section 3.8 of the LAR states ‘Each FLEX DG is a 6.9 kV, 3-phase, 60 Hz synchronous machine with a continuous rating of 4062.5 kilovolt-amp (kVA) at 0.8 power factor, from MTU Onsite Energy’ indicating that each DG has a continuous rating of 3.250 MW at 0.8 power factor. Please clarify the rating of the FLEX DGs and output power available from each DG to support safe shutdown of the Unit(s)”

TVA Response:

The nomenclature "3 MWe FLEX DG 6.9 kV FLEX Generators” is the identifier name used by WBN to identify the FLEX DG. The rating and output power available of each FLEX DG is 3250 kW, 4062.5 kVA, power factor 0.8, and 340 full load amps.

References:

1. NRC letter to TVA, “Watts Bar Nuclear Plant, Unit 1 – Issuance of Amendment Regarding the Completion Time for the Inoperable Emergency Diesel Generator(s) (TAC No. ME2985),” dated July 6, 2010 (ML101390154)

2. TVA Letter to NRC, CNL-16-040, “Revised Request for License Amendments – Diesel Generator Completion Time Extension for Technical Specification 3.8.1, ‘AC Sources – Operating’ (TS-WBN-15-09),” dated March 11, 2016 (ML16071A456)

3. NRC letter to TVA, "Watts Bar Nuclear Plant, Units 1 and 2 - Safety Evaluation Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Instrumentation Related to Orders EA-12-049 AND EA-12-051 (TAC NOS. MF0950, MF0951, MF1177, AND MF1178)," dated March 27, 2015 (ML15078A193)

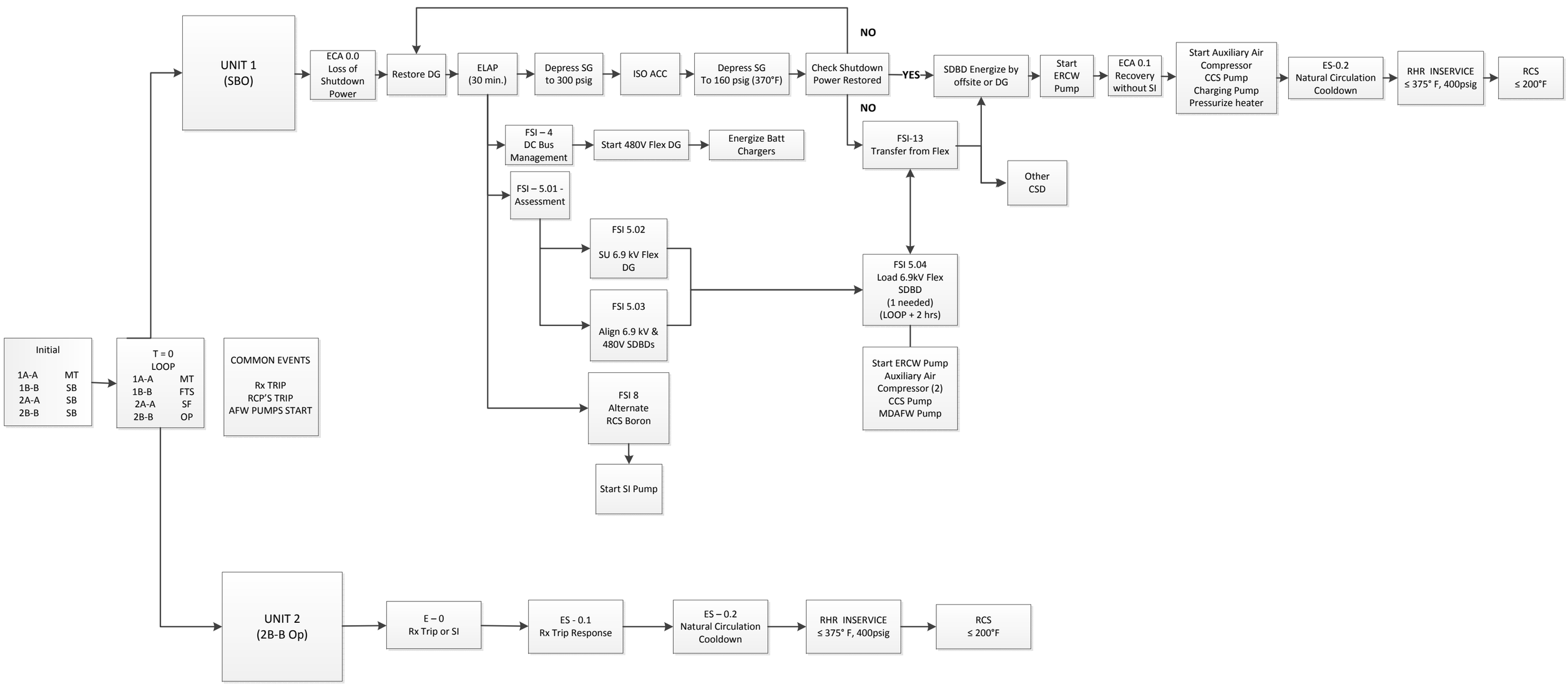
4. NRC letter to TVA, "Watts Bar Nuclear Plant - Compliance With 10 CFR 50.63, Station Blackout (TAC Nos. M68624, M68625)," dated March 18, 1993 (ML073200312)

5. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Response to NRC Questions on Technical Specifications (TS),” dated May 16, 1995 (ML073200537)

6. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Photo-Ready Version of WBN Unit 1 Technical Specifications," dated October 18, 1995 (ML073200588 and ML073460315)

7. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 1 – Comments on Proof and Review Technical Specifications," dated June 4, 1993 (ML073230460 and ML073190382)

Figure 1
Watts Bar Nuclear Plant Example
Station Blackout with FLEX Diesel Generators



NOTES: MT = Maintenance, FTS = Fails to Start, SF = Single Failure, OP = Operating, SB = Standby

Figure 2

FLEX DG STARTUP

TIMELINE

00:00 - 00:30	00:30 - 00:50	00:50 - 02:00	OPERATE FLEX DG(s)
Declare ELAP	Start 480V FLEX DG	Start 6.9kV FLEX DG	

90 mins - to Load Shed any unpowered battery

Attachment 1

Completion Time Change for Determining Operable Diesel Generator are not Inoperable

Change Previously Unidentified

In TVA's March 2016 submittal (Reference 1), a change to WBN Unit 1 TS was not identified. This change is associated with the CT required actions B.3.1 and B.3.2, 12 hours (proposed C.3.1 and C.3.2). As TVA was responding to these NRC RAIs, a review was performed of the proposed TS change noting that the current CT for WBN Unit 1 TS 3.8.1 required action B.3.1 and B.3.2 was 12 hours whereas the TS pages submitted in Reference 1 showed the CT as 24 hours. Because TVA's March 2016 submittal did not identify this as a change the following provides TVA's request for the change.

Proposed Change to WBN Unit 1 TS 3.8.1, Required Actions B.3.1 and B.3.2

The maximum CT for Required Action B.3.1 and B.3.2 is proposed to be increased from 12 hours to 24 hours. The maximum CT limits the total time that LCO 3.8.1 is not met while determining that operable DG(s) are not inoperable due to common cause failure or perform SR 3.8.1.2 for the operable DG(s). SR 3.8.1.2 verifies the DG starts from standby conditions and achieves steady state voltage ≥ 6800 V and ≤ 7260 V, and frequency 60 Hz nominal. TVA is proposing a new Condition B for one inoperable DG. The current Condition B is proposed to be changed to Condition C limiting the condition to apply when two DGs in a train are inoperable, changing the current required actions B.3.1 and B.3.2 to C.3.1 and C.3.2, respectively. The proposed change from required actions B.3.1 and B.3.2 to C.3.1 and C.3.2 are included in the March 2016 submittal (Reference 1). Therefore, the maximum CT for Required Actions B.3.1 and B.3.2 is proposed to be increased from 12 hours to 24 hours.

Basis for Proposed Change

TVA is proposing the change to the CT for WBN Unit 1 TS 3.8.1, required actions B.3.1 and B.3.2 for consistency with similar action in WBN Unit 1 and Unit 2 TS. This proposed change is also consistent with Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability."

Similar WBN Unit 1 proposed TS 3.8.1 required actions B.4.1 and B.4.2 for determining the operable DGs remain operable have a CT of 24 hours. Similar WBN Unit 2 proposed TS 3.8.1 required actions B.4.1 and B.4.2 for determining the operable DGs remain operable have a CT of 24 hours. WBN Unit 2 TS 3.8.1 current required actions B.3.1 and B.3.2 (proposed required actions C.3.1 and C.3.2) for determining the operable DGs remain operable have a CT of 24 hours.

This proposed change is also consistent with Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," that identifies 24 hours as reasonable to confirm that the operable DG(s) is not affected by the same problem as the inoperable DG.

Reference:

1. TVA Letter to NRC, CNL-16-040, “Revised Request for License Amendments – Diesel Generator Completion Time Extension for Technical Specification 3.8.1, ‘AC Sources – Operating’ (TS WBN 15 09),” dated March 11, 2016 (ML16071A456)

Enclosure 2

Proposed Technical Specification Changes (Mark-Ups) for WBN Units 1 and 2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Restore required offsite circuit to OPERABLE status.	72 hours AND ~~6~~13 days from discovery of failure to meet LCO
B. One DG inoperable.	B.1 Perform SR 3.8.1.1 for the required offsite circuits. AND B.2 Evaluate availability of 6.9 kV FLEX DG. AND B.3 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable. AND	1 hour AND Once per 8 hours thereafter 2 hours AND Once per 12 hours thereafter 4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s) (continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.4.1 Determine OPERABLE DGs are not inoperable due to common cause failure. OR B.4.2 Perform SR 3.8.1.2 for OPERABLE DGs. AND B.5 Restore DG to OPERABLE status.	24 hours 24 hours 72 hours from discovery of unavailability of 6.9 kV FLEX DG AND 24 hours from discovery of Condition B entry ≥ 48 hours concurrent with unavailability of 6.9 kV FLEX DG AND 10 days AND 13 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C~~B~~. ~~One or more~~Two DG~~(~~s~~)~~ in Train A inoperable. OR ~~One or more~~Two DG~~(~~s~~)~~ in Train B inoperable.	C~~B~~.1 Perform SR 3.8.1.1 for the required offsite circuits. AND C~~B~~.2 Declare required feature(s) supported by the inoperable DGs inoperable when its required redundant feature(s) is inoperable. AND C~~B~~.3.1 Determine OPERABLE DGs are not inoperable due to common cause failure. OR C~~B~~.3.2 Perform SR 3.8.1.2 for OPERABLE DGs. AND	1 hour AND Once per 8 hours thereafter 4 hours from discovery of Condition C~~B~~ concurrent with inoperability of redundant required feature(s) 24~~12~~ hours 24~~12~~ hours (continued)

ACTIONS

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

(continued)

ACTIONS (continued)

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

(continued)

ACTIONS (continued)

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

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.19	----------NOTE---------- For DGs 1A-A and 1B-B, this Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR. ---------- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; c. DG~~s of the same power train~~ auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected emergency loads through load sequencer, 3. achieves steady state voltage: ≥ 6800 V and ≤ 7260 V, 4. achieves steady state frequency ≥ 59.8 Hz and ≤ 60.1 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	18 months
SR 3.8.1.20	Verify during idle operation that any automatic or emergency start signal disables the idle start circuitry and commands the engine to full speed.	18 months

(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.3	Restore required offsite circuit to OPERABLE status.	72 hours AND ~~6~~13 days from discovery of failure to meet LCO
B. One DG inoperable.	B.1	Perform SR 3.8.1.1 for the required offsite circuits.	1 hour AND Once per 8 hours thereafter
	AND		
	B.2	Evaluate availability of 6.9 kV FLEX DG.	2 hours AND Once per 12 hours thereafter
	AND		
	B.3	Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required features(s)
	AND		
			(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.4.1 Determine OPERABLE DGs are not inoperable due to common cause failure. OR B.4.2 Perform SR 3.8.1.2 for OPERABLE DGs. AND B.5 Restore DG to OPERABLE status.	24 hours 24 hours 72 hours from discovery of unavailability of the 6.9 kV FLEX DG AND 24 hours from discovery of Condition B entry ≥ 48 hours concurrent with unavailability of the 6.9 kV FLEX DG. AND 10 days AND 13 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
~~B~~C. ~~One or more~~Two DG~~(~~s~~)~~ in Train A inoperable. OR ~~One or more~~Two DG~~(~~s~~)~~ in Train B inoperable.	~~B~~C.1	Perform SR 3.8.1.1 for the required offsite circuits.	1 hour AND Once per 8 hours thereafter
	AND		
	~~B~~C.2	Declare required feature(s) supported by the inoperable DG~~(~~s~~)~~ inoperable when its required redundant feature(s) is inoperable	4 hours from discovery of Condition ~~B~~C concurrent with inoperability of redundant required feature(s)
	AND		
	~~B~~C.3.1	Determine OPERABLE DG~~(~~s~~)~~ ~~is~~are not inoperable due to common cause failure.	24 hours
	OR		
	~~B~~C.3.2	Perform SR 3.8.1.2 for OPERABLE DG~~(~~s~~)~~.	24 hours
	AND		
			(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~B~~C. (continued)	~~B~~C.4 Restore DG~~(s)~~ to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO
~~C~~D. Two required offsite circuits inoperable.	~~C~~D.1 Declare required feature(s) inoperable when its redundant required feature(s) is inoperable. AND ~~C~~D.2 Restore one required offsite circuit to OPERABLE status.	12 hours from discovery of Condition ~~C~~D concurrent with inoperability of redundant required features 24 hours
~~D~~E. One required offsite circuit inoperable. AND One or more DG(s) in Train A inoperable. OR One or more DG(s) in Train B inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating," when Condition ~~D~~E is entered with no AC power source to any train. ---------- ~~D~~E.1 Restore required offsite circuit to OPERABLE status. OR ~~D~~E.2 Restore ~~required~~ DG(s) to OPERABLE status.	12 hours 12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~E~~F. One or more DG(s) in Train A inoperable. AND One or more DG(s) in Train B inoperable.	~~E~~F.1 Restore DG(s) in Train A to OPERABLE status. OR ~~E~~F.2 Restore DG(s) in Train B to OPERABLE status.	2 hours 2 hours
~~F~~G. Required Action and Associated Completion Time of Condition A. B, C, D, E, or ~~E~~F not met.	~~F~~G.1 Be in MODE 3. AND ~~F~~G.2 Be in MODE 5.	6 hours 36 hours
~~G~~H. Two required offsite circuits inoperable. AND One or more DG(s) in Train A inoperable. OR One or more DG(s) in Train B inoperable.	~~G~~H.1 Enter LCO 3.0.3.	Immediately
~~H~~I. One required offsite circuit inoperable. AND One or more DG(s) in Train A inoperable. AND One or more DG(s) in Train B inoperable.	~~H~~I.1 Enter LCO 3.0.3.	Immediately

Enclosure 3

Proposed Technical Specification Bases Changes (Mark-Ups) for WBN Units 1 and 2
(For Information Only)

BASES

BACKGROUND (continued)

A single offsite circuit is capable of providing the ESF loads. Two of these circuits are required to meet the Limiting Condition for Operation.

The onsite standby power source for each 6.9 kV shutdown board is a dedicated DG. WBN uses 4 DG sets for Unit 1 operation. These same DGs will be shared for Unit 2 operation. A DG starts automatically on a safety injection (SI) signal (i.e., low pressurizer pressure or high containment pressure signals) or on an 6.9 kV shutdown board degraded voltage or loss-of-voltage signal (refer to LCO 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation"). After the DG has started, it will automatically tie to its respective 6.9 kV shutdown board after offsite power is tripped as a consequence of 6.9 kV shutdown board loss-of-voltage or degraded voltage, independent of or coincident with an SI signal. The DGs will also start and operate in the standby mode without tying to the 6.9 kV shutdown board on an SI signal alone. Following the trip of offsite power, a loss-of-voltage signal strips all nonpermanent loads from the 6.9 kV shutdown board. When the DG is tied to the 6.9 kV shutdown board, loads are then sequentially connected to its respective 6.9 kV shutdown board by the automatic sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the 6.9 kV shutdown boards 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 DG in the process. Within the required interval (FSAR Table 8.3-3) after the initiating signal is received, all automatic and permanently connected loads needed to recover the plant or maintain it in a safe condition are returned to service.

Ratings for Train 1A, 1B, 2A and 2B DGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each DG is 4400 kW with 10% overload permissible for up to 2 hours in any 24 hour period. The ESF loads that are powered from the 6.9 kV shutdown boards are listed in Reference 2.

The capability is provided to connect a 6.9 kV FLEX DG to supply power to any of the four 6.9 kV shutdown boards. The 6.9 kV FLEX DG is commercial-grade and not designed to meet Class 1E requirements. The FLEX DG is made available to support extended Completion Times in the event of an inoperable DG. The FLEX DG is made available as a defense-in-depth alternate source of AC power to mitigate a loss of offsite power event. The FLEX DG would remain disconnected from the Class 1E distribution system unless required during a loss of offsite power.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

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

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the plant. This results in maintaining at least two DG's associated with one load group or one offsite circuit OPERABLE during Accident conditions in the event of:

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

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii)~~NRC Policy Statement~~.

LCO

Two qualified circuits between the Watts Bar Hydro 161 kV switchyard and the onsite Class 1E Electrical Power System and separate and independent DGs for each train ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

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

Each offsite circuit must be capable of maintaining acceptable frequency and voltage, and accepting required loads during an accident, while connected to the 6.9 kV shutdown boards.

Offsite power from the Watts Bar Hydro 161 kV switchyard to the onsite Class 1E distribution system is from two independent immediate access circuits. Each of the two required circuits are routed from the switchyard through a 161 kV transmission line and one of four 161 to 6.9 kV transformers (common station service transformers (CSSTs)) to the onsite Class 1E distribution system. Normally the two required circuits are aligned to power the 6.9 kV shutdown boards through CSST C and CSST D. However, one of the two required circuits may also be aligned to power two shutdown boards in the same load group through either CSST A or CSST B and its associated Unit Boards, either directly from the CSST through the Unit Board or by automatic transfer from the Unit Station Service Transformer (USST) to the CSST. Use of CSST A or B as an

(continued)

BASES

ACTIONS (continued)

A.3

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

The second Completion Time for Required Action A.3 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 A is entered while, for instance, a DG is inoperable and that DG is subsequently returned OPERABLE, the LCO may already have been not met for up to 10 days ~~72 hours~~. This could lead to a total of 13 days~~144 hours~~, since initial failure to meet the LCO, to restore the offsite circuit. At this time, a DG could again become inoperable, the circuit restored OPERABLE, and an additional 10 days~~72 hours~~ (for a total of 23~~9~~ days) allowed prior to complete restoration of the LCO. The 13~~6~~ day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 72 hour and 13~~6~~ day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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.

(continued)

BASES

ACTIONS (continued)

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 required 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 required offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

B.2

In order to extend the Required Action B.5 Completion Time for an inoperable DG from 72 hours to 10 days, it is necessary to evaluate the availability of the 6.9 kV FLEX DG within 2 hours upon entry into LCO 3.8.1 and every 12 hours thereafter. Since Required Action B.2 only specifies "evaluate," discovering the 6.9 kV FLEX DG unavailable does not result in the Required Action being not met (i.e., the evaluation is performed). However, on discovery of an unavailable 6.9 kV FLEX DG, the Completion Time for Required Action B.5 starts the 72 hour and/or 24 hour clock.

6.9 kV FLEX DG availability requires that:

1) 6.9 kV FLEX DG fuel tank level is verified locally to be ≥ 8-hour supply; and
2) 6.9 kV FLEX DG supporting system parameters for starting and operating are verified to be within required limits for functional availability (e.g., battery state of charge).

The 6.9 kV FLEX DG is not used to extend the Completion Time for more than one inoperable DG at any one time.

B.~~2~~3 and C.2

Required Action B.~~2~~3 and C.2 are ~~is~~ 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~~3 and C.2 are ~~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:

(continued)

BASES

ACTIONS

B.3 and C.3 (continued)

a. An inoperable DG exists; and

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.

(continued)

BASES

ACTIONS

B.~~2~~3 and C.2 (continued)

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~~4.1, ~~and~~ B.~~3~~4.2, C.3.1, and C.3.2

Required Actions B.~~3~~4.1and C.3.1 provide~~s~~ an allowance to avoid unnecessary testing of OPERABLE DG~~(s)~~. If it can be determined that the cause of the inoperable DG(s) does not exist on the OPERABLE DG~~(s)~~, SR 3.8.1.2 does not have to be performed. For the performance of a Surveillance, Required Action B.~~3~~4.1 is considered satisfied since the cause of the DG(s) being inoperable is apparent. If the cause of inoperability exists on other DG(s), the other DG(s) would be declared inoperable upon discovery and Condition ~~E~~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 repaired, the common cause failure no longer exists, and Required Actions B.~~3~~4.1 and B.~~3~~4.2 are satisfied. If the cause of the initial inoperable DG(s) 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(s).

In the event the inoperable DG(s) is restored to OPERABLE status prior to completing either B.~~3~~4.1 ~~or~~ B.~~3~~4.2, 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 24 hour constraint imposed while in Condition B or C.

According to Generic Letter 84-15 (Ref. 11), 24 hours is reasonable to confirm that the OPERABLE DG(s) is not affected by the same problem as the inoperable DG(s).

B.5

In Condition B, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 10-day Completion Time takes into account the capacity and capability of the remaining AC sources (including the 6.9 kV FLEX DG), a reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS B.5 (continued)

If the 6.9 kV FLEX DG is or becomes unavailable with an inoperable DG, then action is required to restore the 6.9 kV FLEX DG to available status or to restore the DG to OPERABLE status within 72 hours from discovery of an unavailable 6.9 kV FLEX DG. However, if the 6.9 kV FLEX DG unavailability occurs sometime after 48 hours of continuous DG inoperability, then the remaining time to restore the 6.9 kV FLEX DG to available status or to restore the DG to OPERABLE status is limited to 24 hours.

The 72 hour and 24 hour Completion Times allow for an exception to the normal "time zero" for beginning the allowed outage time "clock." The 72 hour Completion Time only begins on discovery that both an inoperable DG exists and the 6.9 kV FLEX DG is unavailable. The 24 hour Completion Time only begins on discovery that an inoperable DG exists for ≥ 48 hours and the 6.9 kV FLEX DG is unavailable.

Therefore, when one DG is inoperable due to either preplanned maintenance (preventive or corrective) or unplanned corrective maintenance work, the Completion Time can be extended from 72 hours to 10 days if the 6.9 kV FLEX DG is verified available for backup operation.

The third Completion Time for Required Action B.5 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 10 days. This could lead to a total of 13 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 13-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 10-day and 13-day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

(continued)

BASES

ACTIONS

B.5 (continued)

Compliance with the contingency actions listed in Bases Table 3.8.1-2 is required whenever Condition B is entered for a planned or unplanned outage that will extend beyond 72 hours. If Condition B is entered initially for an activity intended to last less than 72 hours or for an unplanned outage, the contingency actions should be invoked as soon as it is established that the outage period will be longer than 72 hours.

As in Required Action B.3, 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 B was entered.

(continued)

BASES

ACTIONS (continued)

~~B~~C.4

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

In Condition ~~B~~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 ~~B~~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 ~~B~~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 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~~C 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 ~~B~~C.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 ~~B~~C was entered.

(continued)

BASES

ACTIONS (continued)

~~C~~D.1 and ~~C~~D.2

Required Action ~~C~~D.1, which applies when two required 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 ~~C~~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:

a. All required offsite circuits are inoperable; and

b. A required feature is inoperable.

If at any time during the existence of Condition D~~C~~ (two required 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 ~~C~~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:

(continued)

BASES

ACTIONS

~~C~~D.1 and ~~C~~D.2 (continued)

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 required 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 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.

~~D~~E.1 and ~~D~~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 ~~D~~E are modified by a Note to indicate that when Condition ~~D~~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 ~~D~~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 ~~D~~E for a period that should not exceed 12 hours.

(continued)

BASES

ACTIONS

~~D~~E.1 and ~~D~~E.2 (continued)

In Condition ~~D~~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 ~~C~~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.

~~E~~F.1 and F.2

With one or more ~~required~~ DG(s) in Train A inoperable simultaneous with one or more ~~required~~ DG(s) 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~~ DG(s) in Train A inoperable simultaneous with one or more ~~required~~ DG(s) in Train B inoperable, operation may continue for a period that should not exceed 2 hours.

~~F~~G.1 and ~~F~~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.

(continued)

BASES

ACTIONS (continued)

H~~G~~.1 and ~~H~~I.1

Condition ~~G~~H and Condition ~~H~~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 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.

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. The steady state minimum and maximum frequency values are 59.8 Hz and 60.1 Hz. These values ensure that the safety related plant equipment powered from the DGs is capable of performing its safety functions.

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.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.19 (continued)

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.

For the purpose of this testing, the DGs shall be started from standby conditions, that is, with the engine coolant and oil being continuously circulated and temperature maintained consistent with manufacturer recommendations. The DG engines for WBN have an oil circulation and soakback system that operates continuously to preclude the need for a prelube and warmup when a DG is started from standby. ~~With WBN in one unit operation, this test will be conducted on a per train basis. Since the Unit 2 DGs are required to carry the common loads during a loss of offsite power event, the respective Unit 2 DG on the same power train will be tested with its respective Unit 1 DG. This is to minimize shutdown board room alignment and restoration.~~

This SR is modified by a Note. The reason for the Note is that the performance of the Surveillance for DG 1A-A or 1B-B would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR. Examples of unplanned events may include:

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.

SR 3.8.1.20

This SR verifies that DG availability is not compromised by the idle start circuitry, when in the idle mode of operation, and that an automatic or emergency start signal will disable the idle start circuitry and command the engine to go to full speed. The 18 month frequency is consistent with the expected fuel cycle lengths and is considered sufficient to detect any degradation of the idle start circuitry.

(continued)

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

	Contingency Actions to be Implemented	Applicable TS Action or SR	Applicable Modes
1.	Verify that the offsite power system is stable. This action will establish that the offsite power system is within single-contingency limits and will remain stable upon the loss of any single component supporting the system. If a grid stability problem exists, the planned DG outage will not be scheduled.	SR 3.8.1.14 Action B.5	1, 2 1, 2, 3, 4
2.	Verify that no adverse weather conditions are expected during the outage period. The planned DG outage will be postponed if inclement weather (such as severe thunderstorms or heavy snowfall) is projected.	SR 3.8.1.14 Action B.5	1, 2 1, 2, 3, 4
3.	Do not remove from service the ventilation systems for the 6.9 kV shutdown boardrooms, the elevation 772 transformer rooms, or the 480-volt shutdown board rooms, concurrently with the DG, or implement appropriate compensatory measures.	Action B.5	1, 2, 3, 4
4.	Do not remove the reactor trip breakers from service concurrently with planned DG outage maintenance.	Action B.5	1, 2, 3, 4
5.	Do not remove the turbine-driven auxiliary feedwater (AFW) pump from service concurrently with a Unit 1 DG outage.	Action B.5	1, 2, 3, 4
6.	Do not remove the AFW level control valves to the steam generators from service concurrently with a Unit 1 DG outage.	Action B.5	1, 2, 3, 4
7.	Do not remove the opposite train residual heat removal (RHR) pump from service concurrently with a Unit 1 DG outage.	Action B.5	1, 2, 3, 4

BASES

BACKGROUND (continued)

The onsite standby power source for each 6.9 kV shutdown board is a dedicated DG. WBN uses 4 DG sets for Unit 2 operation. These same DGs are shared for Unit 1 operation. A DG starts automatically on a safety injection (SI) signal (i.e., low pressurizer pressure or high containment pressure signals) or on a 6.9 kV shutdown board degraded voltage or loss-of-voltage signal (Refer to LCO 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation."). After the DG has started, it will automatically tie to its respective 6.9 kV shutdown board after offsite power is tripped as a consequence of 6.9 kV shutdown board loss-of-voltage or degraded voltage, independent of or coincident with an SI signal. The DGs will also start and operate in the standby mode without tying to the 6.9 kV shutdown board on an SI signal alone. Following the trip of offsite power, a loss-of-voltage signal strips all nonpermanent loads from the 6.9 kV shutdown board. When the DG is tied to the 6.9 kV shutdown board, loads are then sequentially connected to its respective 6.9 kV shutdown board by the automatic sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the 6.9 kV shutdown boards 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 DG in the process. Within the required interval (FSAR Table 8.3-3) after the initiating signal is received, all automatic and permanently connected loads needed to recover the plant or maintain it in a safe condition are returned to service.

Ratings for Train 1A, 1B, 2A and 2B DGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each DG is 4400 kW with 10% overload permissible for up to 2 hours in any 24 hour period. The ESF loads that are powered from the 6.9 kV shutdown boards are listed in Reference 2.

The capability is provided to connect a 6.9 kV FLEX DG to supply power to any of the four 6.9 kV shutdown boards. The 6.9 kV FLEX DG is commercial-grade and not designed to meet Class 1E requirements. The FLEX DG is made available to support extended Completion Times in the event of an inoperable DG. The FLEX DG is made available as a defense-in-depth alternate source of AC power to mitigate a loss of offsite power event. The FLEX DG would remain disconnected from the Class 1E distribution system unless required during a loss of offsite power.

(continued)

BASES

ACTIONS

A.2 (continued)

Discovering no offsite power to one train of the onsite Class 1E Electrical Power Distribution System coincident with one or more inoperable required support or supported features, or both, that are associated with the other train that has offsite power, results in starting the Completion Times for the Required Action. Twenty four hours is acceptable because it minimizes risk while allowing time for restoration before subjecting the plant to transients associated with shutdown.

The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to Train A and Train B of the onsite Class 1E Distribution System. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature.

Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

A.3

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

The second Completion Time for Required Action A.3 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 A is entered while, for instance, a DG is inoperable and that DG is subsequently returned OPERABLE, the LCO may already have been not met for up to 10 days~~72 hours~~. This could lead to a total of 13 days~~144 hours~~, since initial failure to meet the LCO, to restore the offsite circuit. At this time, a DG could again become inoperable, the circuit restored OPERABLE, and an additional 10 days~~72 hours~~ (for a total of 23~~9~~ days) allowed prior to complete restoration of the LCO. The 13~~6~~ day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet

(continued)

BASES

ACTIONS

A.3 (continued)

considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 72 hour and 13~~6~~ day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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 required 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 required offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

B.2

In order to extend the Required Action B.5 Completion Time for an inoperable DG from 72 hours to 10 days, it is necessary to evaluate the availability of the 6.9 kV FLEX DG within 2 hours upon entry into LCO 3.8.1 and every 12 hours thereafter. Since Required Action B.2 only specifies, "evaluate," discovering the 6.9 kV FLEX DG unavailable does not result in the Required Action being not met (i.e., the evaluation is performed). However, on discovery of an unavailable 6.9 kV FLEX DG, the Completion Time for Required Action B.5 starts the 72 hour and/or 24 hour clock.

6.9 kV FLEX DG availability requires that:

1. 6.9 kV FLEX DG fuel tank level is verified locally to be ≥ 8-hour supply; and
2. 6.9 kV FLEX DG supporting system parameters for starting and operating are verified to be within required limits for functional availability (e.g., battery state of charge).

The 6.9 kV FLEX DG is not used to extend the Completion Time for more than one inoperable DG at any one time.

(continued)

BASES

ACTIONS (continued)

B.~~2~~3 and C.2

Required Actions B.~~2~~3 and C.2 are ~~is~~ 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~~3 and C.2 are~~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:

a. An inoperable DG exists; and

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

(continued)

BASES

ACTIONS

B.~~2~~3 and C.2 (continued)

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~~4.1, ~~and~~ B.~~3~~4.2, C.3.1, and C.3.2

Required Actions B.~~3~~4.1 and C.3.1 provide~~s~~ an allowance to avoid unnecessary testing of OPERABLE DG~~(s)~~. If it can be determined that the cause of the inoperable DG(s) does not exist on the OPERABLE DGs, SR 3.8.1.2 does not have to be performed. For the performance of a Surveillance, Required Action B.~~3~~4.1 is considered satisfied since the cause of the DG(s) being inoperable is apparent. If the cause of inoperability exists on other DG(s), the other DG(s) would be declared inoperable upon discovery and Condition ~~E~~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 repaired, the common cause failure no longer exists, and Required Actions B.~~3~~4.1 and B.~~3~~4.2 are satisfied. If the cause of the initial inoperable DG(s) 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(s).

(continued)

BASES

ACTIONS

B.~~3~~4.1, ~~and~~ B.~~3~~4.2, C.3.1, and C.3.2 (continued)

In the event the inoperable DG(s) is restored to OPERABLE status prior to completing either B.~~3~~4.1, ~~or~~ B.~~3~~4.2, 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 24 hour constraint imposed while in Condition B or C.

According to Generic Letter 84-15 (Ref. 7), 24 hours is reasonable to confirm that the OPERABLE DG(s) are not affected by the same problem as the inoperable DG(s).

B.5

In Condition B, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 10-day Completion Time takes into account the capacity and capability of the remaining AC sources (including the 6.9 kV FLEX DG), a reasonable time for repairs, and the low probability of a DBA occurring during this period.

If the 6.9 kV FLEX DG is or becomes unavailable with an inoperable DG, then action is required to restore the 6.9 kV FLEX DG to available status or to restore the DG to OPERABLE status within 72 hours from discovery of an unavailable 6.9 kV FLEX DG. However, if the 6.9 kV FLEX DG unavailability occurs sometime after 48 hours of continuous DG inoperability, then the remaining time to restore the 6.9 kV FLEX DG to available status or to restore the DG to OPERABLE status is limited to 24 hours.

The 72 hour and 24 hour Completion Times allow for an exception to the normal “time zero” for beginning the allowed outage time “clock.” The 72 hour Completion Time only begins on discovery that both an inoperable DG exists and the 6.9 kV FLEX DG is unavailable. The 24 hour Completion Time only begins on discovery that an inoperable DG exists for ≥ 48 hours and the 6.9 kV FLEX DG is unavailable.

Therefore, when one DG is inoperable due to either preplanned maintenance (preventive or corrective) or unplanned corrective maintenance work, the Completion Time can be extended from 72 hours to 10 days if the 6.9 kV FLEX DG is verified available for backup operation.

(continued)

BASES

ACTIONS

B.5 (continued)

The third Completion Time for Required Action B.5 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 10 days. This could lead to a total of 13 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 13-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 10-day and 13-day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

Compliance with the contingency actions listed in Bases Table 3.8.1-2 is required whenever Condition B is entered for a planned or unplanned outage that will extend beyond 72 hours. If Condition B is entered initially for an activity intended to last less than 72 hours or for an unplanned outage, the contingency actions should be invoked as soon as it is established that the outage period will be longer than 72 hours.

As in Required Action B.3, 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 B was entered.

(continued)

BASES

ACTIONS (continued)

~~B~~C.4

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

In Condition C~~B~~, 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 ~~B~~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 ~~B~~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 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~~C 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 ~~B~~C.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 ~~B~~C was entered.

(continued)

BASES

ACTIONS (continued)

~~C~~D.1 and ~~C~~D.2

Required Action ~~C~~D.1, which applies when two required 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 ~~C~~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:

a. All required offsite circuits are inoperable; and

b. A required feature is inoperable.

If at any time during the existence of Condition D~~C~~ (two required 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 ~~C~~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.

(continued)

BASES

ACTIONS

~~C~~D.1 and ~~C~~D.2 (continued)

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 required 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 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.

~~D~~E.1 and ~~D~~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 ~~D~~E are modified by a Note to indicate that when Condition ~~D~~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 ~~D~~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 ~~D~~E for a period that should not exceed 12 hours.

(continued)

BASES

ACTIONS

~~D~~E.1 and ~~D~~E.2 (continued)

In Condition ~~D~~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 ~~C~~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.

~~E~~F.1 and ~~E~~F.2

With one or more ~~required~~ DG(s) in Train A inoperable simultaneous with one or more ~~required~~ DG(s) 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~~ DG(s) in Train A inoperable simultaneous with one or more ~~required~~ DG(s) in Train B inoperable, operation may continue for a period that should not exceed 2 hours.

~~F~~G.1 and ~~F~~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.

(continued)

BASES

ACTIONS (continued)

~~G~~H.1 and ~~H~~I.1

Condition ~~G~~H and Condition ~~H~~I correspond 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 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.

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 seconds 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 transient frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. The steady state minimum and maximum frequency values are 59.8 Hz and 60.1 Hz. These values ensure that the safety related plant equipment powered from the DGs is capable of performing its safety functions.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.14 (continued)

Note 3 establishes that credit may be taken for unplanned events that satisfy this SR. Examples of unplanned events may include:

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.

(continued)

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

	Contingency Actions to be Implemented	Applicable TS Action or SR	Applicable MODES
1.	Verify that the offsite power system is stable. This action will establish that the offsite power system is within single-contingency limits and will remain stable upon the loss of any single component supporting the system. If a grid stability problem exists, the planned DG outage will not be scheduled.	SR 3.8.1.14 Action B.5	1, 2 1, 2, 3, 4
2.	Verify that no adverse weather conditions are expected during the outage period. The planned DG outage will be postponed if inclement weather (such as severe thunderstorms or heavy snowfall) is projected.	SR 3.8.1.14 Action B.5	1, 2 1, 2, 3, 4
3.	Do not remove from service the ventilation systems for the 6.9 kV shutdown board rooms, the elevation 772 transformer rooms, or the 480-volt shutdown board rooms, concurrently with the DG, or implement appropriate compensatory measures.	Action B.5	1, 2, 3, 4
4.	Do not remove the reactor trip breakers from service concurrently with planned DG outage maintenance.	Action B.5	1, 2, 3, 4
5.	Do not remove the turbine-driven auxiliary feedwater (AFW) pump from service concurrently with a Unit 2 DG outage.	Action B.5	1, 2, 3, 4
6.	Do not remove the AFW level control valves to the steam generators from service concurrently with a Unit 2 DG outage.	Action B.5	1, 2, 3, 4
7.	Do not remove the opposite train residual heat removal (RHR) pump from service concurrently with a Unit 2 DG outage.	Action B.5	1, 2, 3, 4

Enclosure 4

Proposed Technical Specification Changes (Final Typed) for WBN Units 1 and 2

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.3	Restore required offsite circuit to OPERABLE status.	72 hours AND 13 days from discovery of failure to meet LCO
B. One DG inoperable.	B.1	Perform SR 3.8.1.1 for the required offsite circuits.	1 hour AND Once per 8 hours thereafter
	AND		
	B.2	Evaluate availability of 6.9 kV FLEX DG.	2 hours AND Once per 12 hours thereafter
	AND		
	B.3	Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	AND		
			(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.4.1 Determine OPERABLE DGs are not inoperable due to common cause failure. OR B.4.2 Perform SR 3.8.1.2 for OPERABLE DGs. AND B.5 Restore DG to OPERABLE status.	24 hours 24 hours 72 hours from discovery of unavailability of 6.9 kV FLEX DG AND 24 hours from discovery of Condition B entry ≥ 48 hours concurrent with unavailability of 6.9 kV FLEX DG AND 10 days AND 13 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Two DGs in Train A inoperable. OR Two DGs in Train B inoperable.	C.1 Perform SR 3.8.1.1 for the required offsite circuits.	1 hour AND Once per 8 hours thereafter
	AND	
	C.2 Declare required feature(s) supported by the inoperable DGs inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition C concurrent with inoperability of redundant required feature(s)
	AND	
	C.3.1 Determine OPERABLE DGs are not inoperable due to common cause failure. OR	24 hours
	C.3.2 Perform SR 3.8.1.2 for OPERABLE DGs.	24 hours
	AND	
		(continued)

ACTIONS

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

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. One required offsite circuit inoperable. AND One or more DG(s) in Train A inoperable. OR One or more DG(s) in Train B inoperable.	----------NOTE---------- 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. ---------- E.1 Restore required offsite circuit to OPERABLE status. OR E.2 Restore DG(s) to OPERABLE status.	 12 hours 12 hours
F. One or more DG(s) in Train A inoperable. AND One or more DG(s) in Train B inoperable.	F.1 Restore DG(s) in Train A to OPERABLE status. OR F.2 Restore DG(s) in Train B to OPERABLE status.	2 hours 2 hours
G. Required Action and Associated Completion Time of Condition A, B, C, D, E, or F not met.	G.1 Be in MODE 3. AND G.2 Be in MODE 5.	6 hours 36 hours

(continued)

ACTIONS (continued)

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

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.19	----------NOTE---------- For DGs 1A-A and 1B-B, this Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR. ---------- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected emergency loads through load sequencer, 3. achieves steady state voltage: ≥ 6800 V and ≤ 7260 V, 4. achieves steady state frequency ≥ 59.8 Hz and ≤ 60.1 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	18 months
SR 3.8.1.20	Verify during idle operation that any automatic or emergency start signal disables the idle start circuitry and commands the engine to full speed.	18 months

(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.3	Restore required offsite circuit to OPERABLE status.	72 hours AND 13 days from discovery of failure to meet LCO
B. One DG inoperable.	B.1	Perform SR 3.8.1.1 for the required offsite circuits.	1 hour AND Once per 8 hours thereafter
	AND		
	B.2	Evaluate availability of 6.9 kV FLEX DG.	2 hours AND Once per 12 hours thereafter
	AND		
	B.3	Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required features(s)
	AND		
			(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. (continued)	B.4.1	Determine OPERABLE DGs are not inoperable due to common cause failure.	24 hours
	OR		
	B.4.2	Perform SR 3.8.1.2 for OPERABLE DGs.	24 hours
	AND		
	B.5	Restore DG to OPERABLE status.	72 hours from discovery of unavailability of the 6.9 kV FLEX DG AND 24 hours from discovery of Condition B entry ≥ 48 hours concurrent with unavailability of the 6.9 kV FLEX DG. AND 10 days AND 13 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. Two DGs in Train A inoperable. OR Two DGs in Train B inoperable.	C.1	Perform SR 3.8.1.1 for the required offsite circuits.	1 hour AND Once per 8 hours thereafter
	AND		
	C.2	Declare required feature(s) supported by the inoperable DGs inoperable when its required redundant feature(s) is inoperable	4 hours from discovery of Condition C concurrent with inoperability of redundant required feature(s)
	AND		
	C.3.1	Determine OPERABLE DGs are not inoperable due to common cause failure.	24 hours
	OR		
	C.3.2	Perform SR 3.8.1.2 for OPERABLE DGs.	24 hours
	AND		
			(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. (continued)	C.4 Restore DGs to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO
D. Two required offsite circuits inoperable.	D.1 Declare required feature(s) inoperable when its redundant required feature(s) is inoperable. AND D.2 Restore one required offsite circuit to OPERABLE status.	12 hours from discovery of Condition D concurrent with inoperability of redundant required features 24 hours
E. One required offsite circuit inoperable. AND One or more DG(s) in Train A inoperable. OR One or more DG(s) in Train B inoperable.	----------NOTE---------- 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. ---------- E.1 Restore required offsite circuit to OPERABLE status. OR E.2 Restore DG(s) to OPERABLE status.	 12 hours 12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
F. One or more DG(s) in Train A inoperable. AND One or more DG(s) in Train B inoperable.	F.1	Restore DG(s) in Train A to OPERABLE status. OR	2 hours
	F.2	Restore DG(s) in Train B to OPERABLE status.	2 hours
G. Required Action and Associated Completion Time of Condition A. B, C, D, E, or F not met.	G.1	Be in MODE 3.	6 hours
	AND		
	G.2	Be in MODE 5.	36 hours
H. Two required offsite circuits inoperable. AND One or more DG(s) in Train A inoperable. OR One or more DG(s) in Train B inoperable.	H.1	Enter LCO 3.0.3.	Immediately
I. One required offsite circuit inoperable. AND One or more DG(s) in Train A inoperable. AND One or more DG(s) in Train B inoperable.	I.1	Enter LCO 3.0.3.	Immediately

Enclosure 5

Proposed Technical Specification Bases Changes (Final Typed) for WBN Units 1 and 2
(For Information Only)

BASES

BACKGROUND (continued)

A single offsite circuit is capable of providing the ESF loads. Two of these circuits are required to meet the Limiting Condition for Operation.

The onsite standby power source for each 6.9 kV shutdown board is a dedicated DG. WBN uses 4 DG sets for Unit 1 operation. These same DGs will be shared for Unit 2 operation. A DG starts automatically on a safety injection (SI) signal (i.e., low pressurizer pressure or high containment pressure signals) or on an 6.9 kV shutdown board degraded voltage or loss-of-voltage signal (refer to LCO 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation"). After the DG has started, it will automatically tie to its respective 6.9 kV shutdown board after offsite power is tripped as a consequence of 6.9 kV shutdown board loss-of-voltage or degraded voltage, independent of or coincident with an SI signal. The DGs will also start and operate in the standby mode without tying to the 6.9 kV shutdown board on an SI signal alone. Following the trip of offsite power, a loss-of-voltage signal strips all nonpermanent loads from the 6.9 kV shutdown board. When the DG is tied to the 6.9 kV shutdown board, loads are then sequentially connected to its respective 6.9 kV shutdown board by the automatic sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the 6.9 kV shutdown boards 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 DG in the process. Within the required interval (FSAR Table 8.3-3) after the initiating signal is received, all automatic and permanently connected loads needed to recover the plant or maintain it in a safe condition are returned to service.

Ratings for Train 1A, 1B, 2A and 2B DGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each DG is 4400 kW with 10% overload permissible for up to 2 hours in any 24 hour period. The ESF loads that are powered from the 6.9 kV shutdown boards are listed in Reference 2.

The capability is provided to connect a 6.9 kV FLEX DG to supply power to any of the four 6.9 kV shutdown boards. The 6.9 kV FLEX DG is commercial-grade and not designed to meet Class 1E requirements. The FLEX DG is made available to support extended Completion Times in the event of an inoperable DG. The FLEX DG is made available as a defense-in-depth alternate source of AC power to mitigate a loss of offsite power event. The FLEX DG would remain disconnected from the Class 1E distribution system unless required during a loss of offsite power.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

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

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the plant. This results in maintaining at least two DG's associated with one load group or one offsite circuit OPERABLE during Accident conditions in the event of:

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

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Two qualified circuits between the Watts Bar Hydro 161 kV switchyard and the onsite Class 1E Electrical Power System and separate and independent DGs for each train ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

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

Each offsite circuit must be capable of maintaining acceptable frequency and voltage, and accepting required loads during an accident, while connected to the 6.9 kV shutdown boards.

Offsite power from the Watts Bar Hydro 161 kV switchyard to the onsite Class 1E distribution system is from two independent immediate access circuits. Each of the two required circuits are routed from the switchyard through a 161 kV transmission line and one of four 161 to 6.9 kV transformers (common station service transformers (CSSTs)) to the onsite Class 1E distribution system. Normally the two required circuits are aligned to power the 6.9 kV shutdown boards through CSST C and CSST D. However, one of the two required circuits may also be aligned to power two shutdown boards in the same load group through either CSST A or CSST B and its associated Unit Boards, either directly from the CSST through the Unit Board or by automatic transfer from the Unit Station Service Transformer (USST) to the CSST. Use of CSST A or B as an

(continued)

BASES

ACTIONS (continued)

A.3

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

The second Completion Time for Required Action A.3 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 A is entered while, for instance, a DG is inoperable and that DG is subsequently returned OPERABLE, the LCO may already have been not met for up to 10 days . This could lead to a total of 13 days, since initial failure to meet the LCO, to restore the offsite circuit. At this time, a DG could again become inoperable, the circuit restored OPERABLE, and an additional 10 days (for a total of 23 days) allowed prior to complete restoration of the LCO. The 13 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 72 hour and 13 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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.

(continued)

BASES

ACTIONS (continued)

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 required 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 required offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

B.2

In order to extend the Required Action B.5 Completion Time for an inoperable DG from 72 hours to 10 days, it is necessary to evaluate the availability of the 6.9 kV FLEX DG within 2 hours upon entry into LCO 3.8.1 and every 12 hours thereafter. Since Required Action B.2 only specifies "evaluate," discovering the 6.9 kV FLEX DG unavailable does not result in the Required Action being not met (i.e., the evaluation is performed). However, on discovery of an unavailable 6.9 kV FLEX DG, the Completion Time for Required Action B.5 starts the 72 hour and/or 24 hour clock.

6.9 kV FLEX DG availability requires that:

1) 6.9 kV FLEX DG fuel tank level is verified locally to be ≥ 8-hour supply; and
2) 6.9 kV FLEX DG supporting system parameters for starting and operating are verified to be within required limits for functional availability (e.g., battery state of charge).

The 6.9 kV FLEX DG is not used to extend the Completion Time for more than one inoperable DG at any one time.

B.3 and C.2

Required Action B.3 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.3 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:

(continued)

BASES

ACTIONS

B.3 and C.3 (continued)

a. An inoperable DG exists; and

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 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.

(continued)

BASES

ACTIONS

B.3 and C.2 (continued)

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.4.1, B.4.2, C.3.1, and C.3.2

Required Actions B.4.1and C.3.1 provide an allowance to avoid unnecessary testing of OPERABLE DGs. If it can be determined that the cause of the inoperable DG(s) does not exist on the OPERABLE DGs, SR 3.8.1.2 does not have to be performed. For the performance of a Surveillance, Required Action B.4.1 is considered satisfied since the cause of the DG(s) being inoperable is apparent. 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 repaired, the common cause failure no longer exists, and Required Actions B.4.1 and B.4.2 are satisfied. If the cause of the initial inoperable DG(s) cannot be confirmed not to exist on the remaining DGs, performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG(s).

In the event the inoperable DG(s) is restored to OPERABLE status prior to completing either B.4.1 B.4.2, 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 24 hour constraint imposed while in Condition B or C.

According to Generic Letter 84-15 (Ref. 11), 24 hours is reasonable to confirm that the OPERABLE DG(s) is not affected by the same problem as the inoperable DG(s).

B.5

In Condition B, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 10-day Completion Time takes into account the capacity and capability of the remaining AC sources (including the 6.9 kV FLEX DG), a reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS

B.5 (continued)

If the 6.9 kV FLEX DG is or becomes unavailable with an inoperable DG, then action is required to restore the 6.9 kV FLEX DG to available status or to restore the DG to OPERABLE status within 72 hours from discovery of an unavailable 6.9 kV FLEX DG. However, if the 6.9 kV FLEX DG unavailability occurs sometime after 48 hours of continuous DG inoperability, then the remaining time to restore the 6.9 kV FLEX DG to available status or to restore the DG to OPERABLE status is limited to 24 hours.

The 72 hour and 24 hour Completion Times allow for an exception to the normal "time zero" for beginning the allowed outage time "clock." The 72 hour Completion Time only begins on discovery that both an inoperable DG exists and the 6.9 kV FLEX DG is unavailable. The 24 hour Completion Time only begins on discovery that an inoperable DG exists for ≥ 48 hours and the 6.9 kV FLEX DG is unavailable.

Therefore, when one DG is inoperable due to either preplanned maintenance (preventive or corrective) or unplanned corrective maintenance work, the Completion Time can be extended from 72 hours to 10 days if the 6.9 kV FLEX DG is verified available for backup operation.

The third Completion Time for Required Action B.5 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 10 days. This could lead to a total of 13 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 13-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 10-day and 13-day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

(continued)

BASES

ACTIONS

B.5 (continued)

Compliance with the contingency actions listed in Bases Table 3.8.1-2 is required whenever Condition B is entered for a planned or unplanned outage that will extend beyond 72 hours. If Condition B is entered initially for an activity intended to last less than 72 hours or for an unplanned outage, the contingency actions should be invoked as soon as it is established that the outage period will be longer than 72 hours.

As in Required Action B.3, 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 B was entered.

(continued)

BASES

ACTIONS (continued)

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 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 C 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 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 C was entered.

(continued)

BASES

ACTIONS (continued)

D.1 and D.2

Required Action D.1, which applies when two required 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:

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 required 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:

(continued)

BASES

ACTIONS

D.1 and D.2 (continued)

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 required 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 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.

(continued)

BASES

ACTIONS

E.1 and E.2 (continued)

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.

F.1 and F.2

With one or more DG(s) in Train A inoperable simultaneous with one or more DG(s) 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 DG(s) in Train A inoperable simultaneous with one or more DG(s) 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.

(continued)

BASES

ACTIONS (continued)

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 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.

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. The steady state minimum and maximum frequency values are 59.8 Hz and 60.1 Hz. These values ensure that the safety related plant equipment powered from the DGs is capable of performing its safety functions.

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.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.19 (continued)

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.

For the purpose of this testing, the DGs shall be started from standby conditions, that is, with the engine coolant and oil being continuously circulated and temperature maintained consistent with manufacturer recommendations. The DG engines for WBN have an oil circulation and soakback system that operates continuously to preclude the need for a prelube and warmup when a DG is started from standby.

This SR is modified by a Note. The reason for the Note is that the performance of the Surveillance for DG 1A-A or 1B-B would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR. Examples of unplanned events may include:

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.

SR 3.8.1.20

This SR verifies that DG availability is not compromised by the idle start circuitry, when in the idle mode of operation, and that an automatic or emergency start signal will disable the idle start circuitry and command the engine to go to full speed. The 18 month frequency is consistent with the expected fuel cycle lengths and is considered sufficient to detect any degradation of the idle start circuitry.

(continued)

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

	Contingency Actions to be Implemented	Applicable TS Action or SR	Applicable Modes
1.	Verify that the offsite power system is stable. This action will establish that the offsite power system is within single-contingency limits and will remain stable upon the loss of any single component supporting the system. If a grid stability problem exists, the planned DG outage will not be scheduled.	SR 3.8.1.14 Action B.5	1, 2 1, 2, 3, 4
2.	Verify that no adverse weather conditions are expected during the outage period. The planned DG outage will be postponed if inclement weather (such as severe thunderstorms or heavy snowfall) is projected.	SR 3.8.1.14 Action B.5	1, 2 1, 2, 3, 4
3.	Do not remove from service the ventilation systems for the 6.9 kV shutdown boardrooms, the elevation 772 transformer rooms, or the 480-volt shutdown board rooms, concurrently with the DG, or implement appropriate compensatory measures.	Action B.5	1, 2, 3, 4
4.	Do not remove the reactor trip breakers from service concurrently with planned DG outage maintenance.	Action B.5	1, 2, 3, 4
5.	Do not remove the turbine-driven auxiliary feedwater (AFW) pump from service concurrently with a Unit 1 DG outage.	Action B.5	1, 2, 3, 4
6.	Do not remove the AFW level control valves to the steam generators from service concurrently with a Unit 1 DG outage.	Action B.5	1, 2, 3, 4
7.	Do not remove the opposite train residual heat removal (RHR) pump from service concurrently with a Unit 1 DG outage.	Action B.5	1, 2, 3, 4

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.3	Restore required offsite circuit to OPERABLE status.	72 hours AND 13 days from discovery of failure to meet LCO
B. One DG inoperable.	B.1	Perform SR 3.8.1.1 for the required offsite circuits.	1 hour AND Once per 8 hours thereafter
	AND		
	B.2	Evaluate availability of 6.9 kV FLEX DG.	2 hours AND Once per 12 hours thereafter
	AND		
	B.3	Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required features(s)
	AND		
			(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. (continued)	B.4.1	Determine OPERABLE DGs are not inoperable due to common cause failure.	24 hours
	OR		
	B.4.2	Perform SR 3.8.1.2 for OPERABLE DGs.	24 hours
	AND		
	B.5	Restore DG to OPERABLE status.	72 hours from discovery of unavailability of the 6.9 kV FLEX DG AND 24 hours from discovery of Condition B entry ≥ 48 hours concurrent with unavailability of the 6.9 kV FLEX DG. AND 10 days AND 13 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. Two DGs in Train A inoperable. OR Two DGs in Train B inoperable.	C.1	Perform SR 3.8.1.1 for the required offsite circuits.	1 hour AND Once per 8 hours thereafter
	AND		
	C.2	Declare required feature(s) supported by the inoperable DGs inoperable when its required redundant feature(s) is inoperable	4 hours from discovery of Condition C concurrent with inoperability of redundant required feature(s)
	AND		
	C.3.1	Determine OPERABLE DGs are not inoperable due to common cause failure.	24 hours
	OR		
	C.3.2	Perform SR 3.8.1.2 for OPERABLE DGs.	24 hours
	AND		
			(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. (continued)	C.4 Restore DGs to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO
D. Two required offsite circuits inoperable.	D.1 Declare required feature(s) inoperable when its redundant required feature(s) is inoperable. AND D.2 Restore one required offsite circuit to OPERABLE status.	12 hours from discovery of Condition D concurrent with inoperability of redundant required features 24 hours
E. One required offsite circuit inoperable. AND One or more DG(s) in Train A inoperable. OR One or more DG(s) in Train B inoperable.	----------NOTE---------- 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. ---------- E.1 Restore required offsite circuit to OPERABLE status. OR E.2 Restore DG(s) to OPERABLE status.	 12 hours 12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
F. One or more DG(s) in Train A inoperable. AND One or more DG(s) in Train B inoperable.	F.1	Restore DG(s) in Train A to OPERABLE status. OR	2 hours
	F.2	Restore DG(s) in Train B to OPERABLE status.	2 hours
G. Required Action and Associated Completion Time of Condition A. B, C, D, E, or F not met.	G.1	Be in MODE 3.	6 hours
	AND		
	G.2	Be in MODE 5.	36 hours
H. Two required offsite circuits inoperable. AND One or more DG(s) in Train A inoperable. OR One or more DG(s) in Train B inoperable.	H.1	Enter LCO 3.0.3.	Immediately
I. One required offsite circuit inoperable. AND One or more DG(s) in Train A inoperable. AND One or more DG(s) in Train B inoperable.	I.1	Enter LCO 3.0.3.	Immediately

Enclosure 6

Updated List of Regulatory Commitments

No.	Commitment	Due Date/Event
1	One 6.9 kV FLEX Diesel Generator will be protected, as defense-in-depth, during the extended diesel generator Completion Time.	Prior to implementing the approved Technical Specification 3.8.1 diesel generator Completion Time extension.
2	One 6.9 kV FLEX Diesel Generator will be routinely monitored during Operator Rounds, with monitoring criteria identified in the Operator Rounds. One 6.9 kV FLEX Diesel Generator will be monitored for fire hazards during Operator Rounds.	
3	Component testing or maintenance of safety systems and important non-safety equipment in the offsite power systems which can increase the likelihood of a plant transient or loss-of-offsite-power, will be avoided during the extended diesel generator Completion Time.	
4	No elective switchyard maintenance will be allowed during the extended diesel generator Completion Time.	
5	Licensed Operators and Auxiliary Operators, for the operating crews on-shift when the extended diesel generator Completion Time is in use, will be briefed on the DG work plan, the revised Technical Specification 3.8.1, and procedural actions regarding loss-of-offsite-power and 6.9 kV FLEX Diesel Generator alignment and use prior to entering the extended diesel generator Completion Time.	
6	The steam-driven Auxiliary Feedwater Pump will be controlled as “protected equipment,” during the extended diesel generator Completion Time.	
7	The availability of one 6.9 kV FLEX Diesel Generator will be verified within the last 30 days before entering the extended diesel generator Completion Time by operating the 6.9 kV FLEX Diesel Generator at its rated voltage and frequency for 5 minutes and ensuring the skid-mounted auxiliary support systems are available.	