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

CNL-16-040

March 11, 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: **Revised Request for License Amendments – Diesel Generator Completion Time Extension for Technical Specification 3.8.1, "AC Sources – Operating" (TS-WBN-15-09)**

References:

1. TVA Letter to NRC, CNL-15-084, "Request for License Amendments – Diesel Generator Completion Time Extension for Technical Specification 3.8.1, 'AC Sources – Operating' (TS-WBN-15-09)," dated December 8, 2015 [ML15342A477]

2. 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]

3. NRC letter to TVA, "Watts Bar Nuclear Plant, Unit 1 – Issuance of Amendment Regarding Technical Specification 3.8.1, 'AC [Alternating Current] Sources – Operating' Surveillance Requirements Notes (TAC No. ME6980)," dated November 22, 2011 [ML11234A258]

In accordance with the provisions of Title 10 of the *Code of Federal Regulations* (CFR) 50.90, "Application for amendment of license, construction permit, or early site permit," Tennessee Valley Authority (TVA) submitted a request for an amendment to the Watts Bar Nuclear Plant (WBN) Unit 1 Facility Operating License No. NPF-90, and to WBN Unit 2 Facility Operating License No. NPF-96 (Reference 1). The proposed amendment revises WBN Units 1 and 2 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 on the availability of an alternate alternating current (AC) power source (i.e., a 6.9 kilovolt (kV) FLEX DG).

Reference 1 was based on a risk-informed assessment. However, based on discussions with the NRC staff, TVA has determined that a deterministic based amendment is appropriate. As a result, TVA is revising the original submittal (Reference 1) with a deterministic engineering justification including availability of a FLEX DG during the proposed extended completion times. This revised License Amendment Request (LAR) supersedes the LAR submitted in Reference 1 in its entirety.

In addition, two changes are being proposed to clarify changes made to WBN Unit 1 TS 3.8.1 with Amendment No. 84 (Reference 2) and Amendment No. 89 (Reference 3). Amendment No. 84, in part, removed the allowance to substitute the C-S DG for any of the required DGs. With the removal of this allowance, the remaining DGs are all required. Therefore, it is no longer necessary to refer to the DGs as "required DGs" in the TS 3.8.1 Conditions and Required Actions. Amendment No. 89 revised several TS 3.8.1 Surveillance Requirement (SR) Notes to allow performance of the SRs on WBN Unit 2 6.9 kV shutdown boards and DGs while WBN Unit 1 is operating in Modes 1, 2, 3 and 4. However, the amendment created a potential conflict between the requirements of SR 3.8.1.19 and the Note modifying SR 3.8.1.19. As currently written, the SR could be read to restrict its performance to only when WBN Units 1 and 2 are in Mode 5, Mode 6, or are defueled. The proposed change clarifies the SR to remove the potential restriction.

A related WBN Unit 2 TS Bases change is also included. When revising the WBN Unit 2 TS Bases to include Bases Table 3.8.1-2, a difference between WBN Unit 1 and Unit 2 Bases Table 3.8.1-2 was identified associated with contingency actions for SR 3.8.1.14, which verifies each DG can operate for 24 hours. The contingency actions included in the WBN Unit 1 TS Bases are being added to the WBN Unit 2 TS Bases.

Enclosure 1 provides a description and technical basis for the proposed changes. Attachments 1 and 2 to Enclosure 1 provide the WBN Units 1 and 2 TS and Bases pages marked-up to show the proposed changes. Attachments 3 and 4 to Enclosure 1 provide the WBN Units 1 and 2 TS and Bases pages retyped to show the proposed changes. Attachment 5 provides a WBN electrical diagram indicating the location where the alternate AC power source interconnects with the existing electrical system.

Enclosure 2 provides a discussion of the implementation of the guidance contained in NRC Branch Technical Position 8-8, "Onsite (Emergency Diesel Generators) and Offsite Power Sources Allowed Outage Time Extensions." Enclosure 3 provides a list of new regulatory commitments associated with this change.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

The WBN Plant Operations Review Committee and the TVA Nuclear Safety Review Board have reviewed this proposed change and determined that operation of WBN in accordance with the proposed change will not endanger the health and safety of the public.

Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and the enclosures to the Tennessee Department of Environment and Conservation.

TVA requests that this amendment be approved by July 29, 2016, with implementation within 60 days of receipt of the approved amendment.

Please address any questions regarding this request to Gordon Arent at 423-365-2004.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 11th day of March 2016.

Respectfully,

J. W. Shea

Digitally signed by J. W. Shea
DN: cn=J. W. Shea, o=Tennessee Valley Authority, ou=Nuclear Licensing, email=jwshea@tva.gov, c=US
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J. W. Shea
Vice President, Nuclear Licensing

Enclosures:

1. Evaluation of Proposed Change
2. Implementation of Branch Technical Position 8-8, "Onsite (Emergency Diesel Generators (EDGs)) and Offsite Power Sources Allowed Outage Time Extensions"
3. List of New Regulatory Commitments

cc (see following page)

cc (Enclosures):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Watts Bar Nuclear Plant, Unit 1
NRC Senior Resident Inspector - Watts Bar Nuclear Plant, Unit 2
Director, Division of Radiological Health - Tennessee State Department of Environment and Conservation
NRC Project Manager - Watts Bar Nuclear Plant

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EVALUATION OF PROPOSED CHANGE

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ENCLOSURE 1

EVALUATION OF PROPOSED CHANGE

1.0 SUMMARY DESCRIPTION

By letter dated August 7, 2001 (Reference 1), the Tennessee Valley Authority (TVA) requested changes to the Watts Bar Nuclear Plant (WBN), Unit 1, Technical Specifications (TS). The requested changes to diesel generator (DG) Limiting Conditions for Operation (LCO) Action Statements would revise the 72-hour Completion Time (CT) specified in LCO 3.8.1, "AC Sources – Operating." Specifically, the revised TS allowed 14 days to restore an inoperable DG to operable status. The purpose of the proposed changes was to provide the flexibility to perform DG maintenance, particularly 6-year and 18-year maintenance, during power operation. The risk informed justification for the 14-day CT was based on operation of WBN Unit 1 as a single unit.

By letter dated July 1, 2002 (Reference 2), the Nuclear Regulatory Commission (NRC) issued Amendment No. 39 to WBN Unit 1 Facility Operating License No. NPF-90, thereby revising the TS 3.8.1 CT for restoring one inoperable DG to an operable status from 72 hours to 14 days.

By letter dated November 30, 2009 (Reference 3), TVA requested an amendment to WBN Unit 1 Facility Operating License No. NPF-90. The proposed changes revised the CT for inoperable DGs in TS 3.8.1. Specifically, the proposed changes revise the CT from 14 days to 72 hours for restoring one or more inoperable DG(s) in one train to an operable status. The amendment request was necessary due to the planned completion and startup of WBN Unit 2. Because Amendment No. 39 for the 14-day DG CT was based on operation of WBN Unit 1 as a single unit, the justification that the amendment was predicated upon would no longer be valid for two-unit operation.

By letter dated July 6, 2010 (Reference 4), the NRC issued Amendment No. 84 to WBN Unit 1 Facility Operating License No. NPF-90. Amendment 84 revised the TS 3.8.1 CT for restoring one or more inoperable DG(s), in one train, from 14 days to 72 hours. This amendment will be implemented prior to WBN Unit 2 entry into Mode 4, "Hot Shutdown."

The enclosed evaluation supports a request for an amendment to WBN Unit 1 Facility Operating License No. NPF-90, and to WBN Unit 2 Facility Operating License No. NPF-96.

The proposed amendment revises WBN Units 1 and 2 TS 3.8.1, "AC Sources – Operating," to extend the CT for one inoperable DG from 72 hours to 14 days based upon the availability of an alternate alternating current (AC) power source (i.e., a 6.9 kilovolt (kV) FLEX DG). The changes will provide operational and maintenance flexibility. They will allow sufficient time to perform planned maintenance activities that cannot be performed within a 72-hour CT.

In addition, two changes are being proposed to clarify changes made to WBN Unit 1 TS 3.8.1 with Amendment No. 84 (Reference 4) and Amendment No. 89 (Reference 5). Amendment No. 84, in part, removed the allowance to substitute the common spare (C-S) DG for any of the required DGs. With the removal of this allowance, the remaining DGs are all required. Therefore, it is no longer necessary to refer to the DGs as "required DGs" in the TS 3.8.1 Conditions and Required Actions. Amendment No. 89 revised several TS 3.8.1 Surveillance Requirement (SR) Notes to allow performance of

the SRs on WBN Unit 2 6.9 kV shutdown boards and DGs while WBN Unit 1 is operating in Modes 1, 2, 3 and 4. However, the amendment created a possible conflict between the requirements of SR 3.8.1.19 and the Note modifying SR 3.8.1.19. As currently written, the SR could be read to restrict its performance to only when WBN Units 1 and 2 are in Mode 5, Mode 6, or are defueled. The proposed change will clarify the SR to remove the potential restriction.

The proposed new CT is based on the WBN deterministic justification provided in this enclosure, additional considerations and compensatory actions, and is consistent with the 14-day CT permitted in Branch Technical Position (BTP) 8-8 (Reference 30).

2.0 DETAILED DESCRIPTION

2.1 Proposed Changes

Descriptions of the proposed TS changes are provided below. The specific changes to the WBN Units 1 and 2 TS are indicated in the markups provided in Attachment 1 to this enclosure. The specific changes to the WBN Units 1 and 2 TS Bases (For Information Only) are indicated in the markups provided in Attachment 2 to this enclosure. The retyped pages of the WBN Units 1 and 2 TS and Bases are provided in Attachments 3 and 4 to this enclosure, respectively.

2.1.1 WBN Units 1 and 2, TS 3.8.1 - New Required Actions and Associated Completion Times

Condition B, One or more DGs in Train A or Train B inoperable, is being split into two separate Conditions, Condition B and Condition C. Condition B is proposed to cover when one DG is inoperable in either Train with Condition C covers when two DGs in Train A or Train B are inoperable. Condition C retains the Required Actions and associated Completion Times from the current Condition B. Proposed Condition B retains most of the Required Actions and associated Completion Times while adding Required Action B.2 with associated Completion Times and additional Completion Times for proposed Required Action B.5. The following table shows the relationship between the current and proposed Required Actions for the proposed Condition B.

Current to Proposed Condition B Required Actions		
Current Required Action	Proposed Required Action	
B.1	B.1	
	B.2	New
B.2	B.3	
B.3	B.4	
B.4	B.5	Additional CTs

The following is proposed to be added as Required Action B.2.

B. One DG inoperable	AND B.2 Evaluate availability of 6.9 kV FLEX DG.	2 hours AND Once per 12 hours thereafter

The following is proposed to be added as Required Action B.5 Completion Times.

B. One DG inoperable	AND B.5 Restore DG to OPERABLE status.	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 14 days AND 17 days from discovery of failure to meet LCO

2.1.2 WBN Units 1 and 2, TS 3.8.1 - Maximum Completion Time - Required Action A.3

The maximum CT for Required Action A.3 is proposed to be extended from 6 days to 17 days. The maximum CT limits the total time that LCO 3.8.1 is not met while concurrently or simultaneously in Condition A and the new Condition B. Currently, this CT is the sum of the CT for existing Required Action A.3 (i.e., 72 hours) and B.4 (i.e., 72 hours). TVA is proposing a new Condition B for one inoperable DG. The new Required Action B.5 will allow one DG to be inoperable for up to 14 days, if one 6.9 kV

FLEX DG is available. Therefore, the maximum CT for Required Action A.3 will be increased from 6 days to 17 days.

2.1.3 WBN Units 1 and 2, TS 3.8.1 - Clarification of Conditions and Required Actions

The current wording of the following WBN Unit 1 TS 3.8.1, Conditions, and Required Actions use the word “required” when referring to the DGs.

- Required Action B.4
- Condition D
- Required Action D.2
- Condition E
- Required Actions E.1 and E.2
- Condition G
- Condition H

Changes are proposed to delete the word “required” when immediately preceding “DGs” or “DG(s).” This proposed change was incorporated in the WBN Unit 2 TS approved October 22, 2015 (Reference 6), except for Required Action E.2. The proposed change to WBN Unit 2 TS 3.8.1, Required Action E.2 includes this deletion of the word "required."

2.1.4 WBN Unit 1, TS 3.8.1 - Clarification of SR 3.8.1.19

The current wording of SR 3.8.1.19.c is proposed to be changed from “DGs of the same power train auto-start from standby condition. . .” to “DG auto-starts from standby condition. . .” Because the Note modifying SR 3.8.1.19 precludes performance of the SR for DGs 1A-A and 1B-B in Modes 1, 2, 3, and 4, this proposed change clarifies that the DGs in the same power train can be tested individually. This proposed change was incorporated in the WBN Unit 2 TS (Reference 6).

2.1.5 WBN Unit 2, SR 3.8.1.14 – Add Contingency Actions to Bases

This TS Bases change is being made to match the contingency actions included in the WBN Unit 1 TS Bases for SR 3.8.1.14. By letter dated October 19, 1998 (Reference 7) the NRC approved WBN Unit 1 License Amendment No. 12 that revised the TS to allow testing of DGs, pursuant to SR 3.8.1.14, during operational Modes 1 or 2. These contingency actions were subsequently moved to TS Table 3.8.1-2 and are included in the WBN Unit 2 TS Bases.

2.2 Condition the Proposed Changes are Intended to Resolve

The TS changes are being requested to allow sufficient time to perform planned DG surveillance testing and adequate preventive maintenance to ensure DG reliability and availability. The proposed changes also provide flexibility to resolve DG deficiencies and avoid a potential unplanned plant shutdown and associated thermal transient, along with the potential challenges to safety systems during an unplanned shutdown, should a condition occur requiring DG corrective maintenance.

The main purpose of the proposed changes is to extend the TS CT for an inoperable DG from 72 hours to 14 days. The 14-day CT is needed to (1) provide the necessary time to support planned DG surveillance testing, and (2) reduce the likelihood and unnecessary burden of a dual-unit shutdown should an unplanned DG outage occur with the units at power by providing additional time to repair and reestablish operability of the inoperable DG. To justify the 11-day CT extension, a supplemental AC power source capable of bringing the affected unit to a safe shutdown condition during a loss of offsite power (LOOP) is required. In response to NRC Order EA-12-049, TVA added two 6.9 kV FLEX DGs as part of the mitigating strategies for beyond-design-basis-events (Reference 8). The 6.9 kV FLEX DGs have the capability to power any 6.9 kV shutdown board and the capacity to bring the affected unit to a safe shutdown condition following a LOOP. (See Section 3.5.3 for additional information regarding TVA compliance with NRC Order EA-12-049; see Section 3.8 for additional information regarding the 6.9 kV FLEX DGs.)

The 14-day CT, applicable to both the Unit 1 TS and the Unit 2 TS, is needed to perform planned DG surveillance testing and 6-year and 18-year DG maintenance. The TS changes will provide operational and maintenance flexibility. They will also allow more time for unanticipated repairs. If these activities are combined with other DG maintenance activities and performed over an extended DG CT, the number of entries into the TS Actions and the number of associated DG starts performed for post-maintenance testing prior to exiting the TS will be reduced.

An additional purpose of this LAR is to provide clarifications to changes previously made. WBN Unit 1 License Amendment No. 84 removed the allowance to substitute the C-S DG for any of the required DGs. With the removal of this allowance, the remaining DGs are all required. Therefore, it is no longer necessary to refer to the DGs as “required DGs” in the TS 3.8.1 Conditions and Required Actions.

WBN Unit 1 License Amendment No. 89 revised several TS 3.8.1 SR Notes to allow performance of the SRs on WBN Unit 2 6.9 kV shutdown boards and DGs while WBN Unit 1 is operating in Modes 1, 2, 3 and 4. However, the wording of SR 3.8.1.19.c could be read to require both DGs in a power train to auto-start on a loss of offsite power in conjunction with an engineered safety feature (ESF) actuation. As currently written, SR 3.8.1.19 could be read to restrict its performance when WBN Units 1 and 2 are in Mode 5, Mode 6, or are defueled. The proposed change clarifies the SR to remove the potential restriction.

2.3 Bases for Proposed Changes

2.3.1 Clarification of TS Requirements

With the removal of the allowance to substitute the C-S DG for any of the required DGs, the remaining DGs are all required to be operable by LCO 3.8.1. Therefore, it is no longer necessary to refer to the DGs as “required DGs” in the TS 3.8.1 Conditions and Required Actions. This change is consistent with Technical Specification Task Force (TSTF) guidance TSTF-GG-05-01, “Writer’s Guide for Plant-Specific Improved Technical Specifications,” Revision 1 (Reference 9), which states:

"Required" is specifically used in Conditions, Required Actions and Surveillances to denote reference to equipment which is "required" by the LCO for the specific existing Applicability. Typically (for operating MODES), any component referred to is "required." In this case no clarification is needed and "required" is not specifically stated in the Conditions, Required Actions, and Surveillances. In cases where the LCO only requires some of all possible components be used to satisfy the LCO requirement, then the clarification of "required" is used in the Conditions, Required Actions, and Surveillances.

With respect to SR 3.8.1.19, the requirement to verify the DGs in the same power train auto-start from the standby condition can be verified by individually simulating the auto-start of each DG in the same power train. As each DG in a power train auto-starts on an undervoltage condition on its respective 6.9 kV shutdown board and a Unit 1 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.

2.3.2 DG Allowed Outage Time

The purpose of the proposed change is to extend the TS CT for an inoperable DG from 72 hours to 14 days. The 14-day CT is needed to (1) provide the necessary time to support planned DG maintenance, and (2) reduce the likelihood and unnecessary burden of a dual-unit shutdown should an unplanned DG outage occur with the units at power by providing additional time to repair and reestablish operability of the inoperable DG. To justify the 11-day CT extension, a 6.9 kV FLEX DG that is capable of powering any one of the four 6.9 kV shutdown boards during a LOOP is required. In response to NRC Order EA-12-049, TVA added two 6.9 kV FLEX DGs as part of the mitigation strategies for beyond-design-basis-events (Reference 8). At least one of the 6.9 kV FLEX DGs will be available to power one 6.9 kV shutdown board during the extended DG CT.

Planned maintenance activities for each emergency DG for the period 2016 through 2021 include activities requiring an extended 14-day DG CT. Specific planned DG testing, preventive maintenance, and/or major maintenance requiring a 14-day CT is provided below in Table 1.

Table 1 - Planned DG Maintenance Activities 2016 - 2021

Planned Outages	DG 1A-A	DG 1B-B	DG 2A-A	DG 2B-B
Spring 2016 (duration 96 hours each DG)	• 6-year mechanical maintenance[1] • 10-year Governor controller capacitor change out • 10-year 7-day tank clean and inspect • 18-month battery service test	• 6-year mechanical maintenance[1] • 10-year Governor controller capacitor change out • 10-year 7-day tank clean and inspect • 18-month battery service test	• 6-year mechanical maintenance[1] • 10-year Governor controller capacitor change out • 10-year 7-day tank clean and inspect • 18-month battery service test	• 6-year mechanical maintenance[1] • 10-year Governor controller capacitor change out • 10-year 7-day tank clean and inspect • 18-month battery service test
Summer to Fall 2017 (duration 72 hours each DG)	• 2-year mechanical maintenance[2] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • replace critical relays • Air System checks • 18-month battery service test	• 2-year mechanical maintenance[2] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • replace critical relays • Air System checks • 18-month battery service test	• 2-year mechanical maintenance[2] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • replace critical relays • Air System checks • 18-month battery service test	• 2-year mechanical maintenance[2] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • replace critical relays • Air System checks • 18-month battery service test
2019 (duration 96 hours each DG)	• 4-year mechanical maintenance[4] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • VLF[6] cable testing • 18-month battery service test	• 4-year mechanical maintenance[4] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • VLF[6] cable testing • 18-month battery service test	• 4-year mechanical maintenance[4] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • VLF[6] cable testing • 18-month battery service test	• 4-year mechanical maintenance[4] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • VLF[6] cable testing • 18-month battery service test

Table 1 - Planned DG Maintenance Activities 2016 - 2021 (continued)

Planned Outages	DG 1A-A	DG 1B-B	DG 2A-A	DG 2B-B
2021 (duration 120 hours each DG)	• 18-year major overhaul[5] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • replace critical relays • Air System checks • 18-month battery service test	• 18-year major overhaul[5] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • replace critical relays • Air System checks • 18-month battery service test	• 18-year major overhaul[5] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • replace critical relays • Air System checks • 18-month battery service test	• 18-year major overhaul[5] • 2-year electrical panel clean and inspect[3] • 2-year generator inspection[3] • replace critical relays • Air System checks • 18-month battery service test

Notes:
1. 6-year mechanical maintenance includes: replacement of key engine pumps (jacket water, lube oil, and fuel oil), inspection of engine internals, verification of head torques, gaskets, valve conditions, and fuel injectors.
2. 2-year mechanical maintenance includes: filter change out and general inspections.
3. 2-year electrical maintenance includes: generator inspections, generator stator and rotor megger, panel clean and inspects.
4. 4-year mechanical maintenance includes: filter change out and general inspections.
5. 18-year major over-haul includes: power pack change-outs, pump replacements, and fuel system qualification.
6 VLF = very low frequency.

TVA anticipates that the above planned maintenance activities will be performed with one or both units in Mode 4 or above. Therefore, the 14-day CT is applicable to both WBN Unit 1 TS and Unit 2 TS, and is needed to perform this work.

As a condition for implementing an extended 14-day CT for a single inoperable DG, at least one 6.9 kV FLEX DG will be available. The 6.9 kV FLEX DG is provided to supply power to any one of the four 6.9 kV shutdown boards via the existing transfer switches. 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). A description of the 6.9 kV FLEX DGs is provided in Section 3.8.

TVA has performed these inspections and other maintenance on these DGs. Table 2 provides actual times for performance of selected inspections and other maintenance activities. The longest DG outage duration listed in Table 2 is 179 hours (7.5 days). Increasing this duration by 50% to provide for unexpected complications results in 11 days. TVA is requesting a CT of 14-days to bound the 11-days and prevent unnecessary regulatory requests for discretion. In addition, a review of industry TS showed that approximately 50% of the facilities have a 14-day CT for an inoperable DG.

Table 2 Actual DG Maintenance Activity Completion Times (hours)				
	1A-A	1B-B	2A-A	2B-B
12-year inspection[1] (120 hours estimated)	107	126	117	138
4-year inspection (96 hours estimated)	111	96	93	100
VLF Cable Testing	179	135	145	132
Emergent Generator Replacement	--	133	160	--

[1] The 12-year overhaul frequency has been changed and is now 18 years

With the implementation of License Amendment No. 84, prior to WBN Unit 2 entering Mode 4, the units are subject to a dual-unit shutdown should an unplanned DG outage occur, with the DG not restored to operable status within 72 hours. The extension of the 72-hour CT to 14 days gives additional time for repairing and reestablishing operability of the inoperable DG; thus, reducing the risk of dual-unit shut down because of exceeding the 72-hour CT. A 14-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). Given the conclusions reached by the evaluations that follow, extending the CT associated with an inoperable DG would also provide the following:

1. Efficient Use of Resources

   The extended CT, to permit a DG to be removed from service for 14 days to perform recommended maintenance or to troubleshoot and repair an inoperable DG while the unit is in Mode 1-4, will avert unplanned unit shutdowns and minimize the potential need for expedited licensing actions seeking approval of more completion time.

   This change will allow some maintenance activities that improve DG reliability to be performed on-line that would otherwise require performance during a refueling outage. On-line preventive maintenance and scheduled overhauls provide the flexibility to focus more quality resources on any required or elective DG maintenance. For example, during refueling outages, resources are required to support many systems; during on-line maintenance, plant resources can be more focused on the DG overhaul. The extended CT associated with an inoperable DG will improve the effectiveness of the allowed maintenance period. A significant portion of on-line maintenance activities are associated with preparation and return to service activities, such as, tagging, fluid system drain down, fluid system fill and vent, and cylinder block heat-up. The duration of these activities is relatively constant. A longer Required Action CT duration allows more maintenance to be accomplished during a given on-line maintenance period and therefore would improve maintenance efficiency.

Performance of more DG maintenance on-line will improve DG availability during plant refueling outages. Performing more DG overhaul activities on-line should reduce the risk and synergistic effects on risk due to DG unavailability occurring concurrently with other activities and equipment outages during a refueling outage.

2. Reduction in Unnecessary Burden

The proposed changes provide a reduction in unnecessary burden, because they:

- Allow additional time to perform routine maintenance activities on the DG enhancing the ability to focus quality resources on the activity, and improve maintenance efficiency.

- Increase the time to troubleshoot, repair, and reestablish operability of an inoperable DG during Modes 1, 2, 3, and 4.

- Avert unplanned dual-unit shut down and minimizes the potential need for requests for enforcement discretion.

3.0 BACKGROUND

3.1 System Description

As required by Title 10 of the Code of Federal Regulations (CFR) 50, Appendix A, General Design Criterion (GDC) 17, the design of the offsite and onsite electrical power systems provide independence and redundancy to ensure an available source of power to the ESF systems.

A description of the relevant portions of the WBN electrical power system is provided below as background for evaluation of the proposed changes. A WBN electrical diagram indicating the location that the alternate AC power source interconnects with the existing electrical system is provided in Attachment 5 to this enclosure.

3.1.1 Offsite AC Power System

Two dedicated 161 kV transmission lines from the WBN Hydro Plant switchyard provide preferred offsite power to four 161 kV / 6.9 kV common station service transformers (CSSTs) located in the WBN 161 kV switchyard. The four CSSTs and their associated switchgear are designed in accordance with GDC 17 and are connected and arranged to provide two physically independent offsite power circuits to the onsite Class 1E distribution system. The two independent offsite power circuits (designated P and R) are designed and located to minimize to the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. A detailed description of the offsite power transmission system and the offsite power circuits associated with the Class 1E shutdown boards are found in WBN Updated Final Safety Analysis Report (UFSAR) Section 8.

3.1.2 Onsite AC Power System

The safety function of the onsite AC power system is to supply power to permit functioning of components and systems required to assure that: (1) fuel design limits and reactor coolant pressure boundary design conditions are not exceeded due to anticipated operational occurrences, and (2) the core is cooled and vital functions are maintained in the event of a postulated accident, subject to loss of the preferred offsite power system and subject to any single failure in the standby power system.

The onsite AC power system supplies electrical power to two redundant load groups. Each load group is composed of two power trains, i.e., Trains 1A and 2A, and Trains 1B and 2B. Each train is powered by one independent Class 1E 6.9 kV shutdown board. Each 6.9 kV shutdown board has two separate and independent offsite power sources, as well as a dedicated onsite DG source. When the preferred (offsite) power system is not available, each shutdown board is energized from a separate standby DG. The two DGs associated with one load group can provide all safety related functions to mitigate a loss-of-coolant accident (LOCA) in one unit and achieve hot standby in the opposite unit.

A loss of voltage on the 6.9 kV shutdown board starts the associated DG and initiates logic that trips the supply feeder breakers, all 6.9 kV loads (except the 480 V shutdown board transformers), and the major 480 V loads. The bypass breaker for the 480 V shutdown board current-limiting inductive reactor is also closed as part of this logic. When the DG has reached rated speed and voltage, the generator is automatically connected to the 6.9 kV shutdown board. This return of voltage to the 6.9 kV shutdown board initiates logic that connects the required loads in sequence. The standby (onsite) power system's automatic sequencing logic is designed to automatically connect the required loads in proper sequence should the logic receive an accident signal, concurrent with, or following a loss of all nuclear unit and preferred (offsite) power.

There are two loading sequences: (1) one is applied in the absence of a safety injection signal (SIS) (i.e., the “non-accident condition”), and (2) the other is applied when an SIS is received following or coincident with a sustained loss of voltage on the 6.9 kV shutdown board (i.e., the “accident condition”). A LOOP coincident with an SIS is the design basis event. An SIS received during the course of a non-accident shutdown loading sequence will cause the actions described below.

- Loads already sequentially connected that are not required for an accident will be disconnected.
- Loads already sequentially connected that are required for an accident will remain connected.
- Loads pending sequential loading that are not required for an accident will not be connected.

Loads pending sequential loading that are required for an accident will either be sequentially loaded as a result of the non-accident loading sequence or have their sequential timers reset to time zero from which they will then be sequentially loaded in accordance with the accident sequence.

An SIS received in the absence of a sustained loss of voltage on a 6.9 kV shutdown board will start the DGs but will not connect them to the 6.9 kV shutdown boards.

Each DG consists of two 16-cylinder diesel engines directly connected to a 6.9 kV generator. The continuous rating of each DG is 4400 kilowatts (kW) at 0.8 power factor, 6.9 kV, 3 phase, and 60 Hz. Each DG also has an additional rating of 4840 kW for 2 hours out of 24 hours.

3.2 Grid Reliability

3.2.1 Generic Letter 2006-02, Grid Reliability and the Impact on Risk and the Operability of Offsite Power

For WBN Unit 1, the TVA response to Generic Letter (GL) 2006-02 was provided on April 3, 2006 (Reference 10) and supplemented on January 31, 2007 (Reference 11). The NRC completed their review of GL 2006-02 as documented in their letter dated May 3, 2007 (Reference 12).

For WBN Unit 2, the NRC completed their review of GL 2006-02 as documented in their letter dated January 20, 2010 (Reference 13), in NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2," Supplement 29 (Reference 14), and NRC Integrated Inspection Report 05000391/2015607 (Reference 15).

The proposed amendment does not adversely affect TVA's compliance with NRC regulatory requirements governing electric power sources and associated personnel training.

3.2.2 Recent Offsite AC Power System Reliability Improvements

As described in the TVA LAR for WBN Unit 1, dated August 1, 2013 (Reference 16), as supplemented in letters dated April 21, 2014 (Reference 17) and January 29, 2015 (Reference 18), TVA performed a study to evaluate the existing WBN AC Power System to determine its adequacy for dual-unit operation. The scope of the study included CSSTs A, B, C, and D; 6.9 kV shutdown boards; 6.9 kV start buses; 6.9 kV common boards; 6.9 kV unit boards; downstream 6.9 kV-480 V transformers; 480 V distribution systems loads, and all interconnections.

The study specifically evaluated existing CSSTs A and B to determine their acceptability as qualified offsite power sources for the safety related boards when used for safe shutdown of the units under a design basis LOCA. The study recommended adding an automatic On Load Tap Changer (OLTC) on the primary side of CSSTs A and B. Because of the study, TVA upgraded CSSTs A and B as alternate sources of offsite power in order to increase defense-in-depth and add increased reliability to the offsite power sources.

The WBN Design Change Notices that facilitated the use of CSSTs A and B as qualified offsite sources for the 6.9 kV shutdown boards to support safe shutdown of the unit during a design basis event have been completed. The proposed LAR in Reference 16

credited upgrades made to CSSTs A and B to provide two new qualified offsite power circuits, in addition to the current qualified offsite power circuits. This LAR was approved by the NRC staff as License Amendment No.103 (Reference 19).

3.3 Emergency Core Cooling System (ECCS) Operation

The major subsystems comprising the ECCS are listed below.

- Refueling Water Storage Tank (RWST) (1 each unit)
- Centrifugal Charging Pumps (2 each unit)
- Boron Injection Tank (1 each unit)
- Safety Injection Pumps (2 each unit)
- Cold Leg Accumulators (4 each unit)
- Residual Heat Removal Pumps and Heat Exchangers (2 each unit)
- Containment Sump (1 each unit)

Injection Mode

The immediate automatic ECCS response to a LOCA or overcooling transient is known as the injection mode. During this mode, ECCS is designed to immediately, upon receipt of an SIS, inject cold, borated water from the RWST into the reactor coolant system (RCS) to prevent overheating of the fuel and subsequent fuel damage.

Small Break Event - For small to medium size primary breaks the RCS would depressurize slowly. Two high head, low flow capacity centrifugal charging pumps (CCPs) and two intermediate head safety injection pumps (SIPs) would make up the lost RCS inventory and allow the steam generators (SGs) to cool the RCS.

- CCPs begin injecting at normal RCS pressure ≈2235 PSIG.
- SIPs begin injecting at ≈1500 PSIG decreasing pressure

Thermal energy would be removed from the RCS by two methods:

- The hot RCS fluid from the break would be replaced by cold SI water injection from the CCPs and SIPs which are aligned from the RWST.
- Energy would be transferred from the primary system to the secondary system via the SGs, provided generator water level is being maintained. Secondary heat removal would still be necessary to prevent fuel overheating and damage during a small break LOCA.

Large Break Event - For intermediate and large breaks, the RCS would depressurize more rapidly. Flow rate out of the break would be sufficient to remove core decay heat. Initial core cooling is provided by Cold Leg Accumulators (CLAs) followed by the low head/high flow capacity RHR pumps.

- CLAs begin injecting at ≈ 660 - 610 PSIG decreasing.
- RHR pumps begin injecting at ≈195 PSIG decreasing.
- Additional core cooling would be provided by the CCPs and SIPs

Cold Leg Recirculation Mode

Cold leg recirculation provides the capability for continuously removing decay heat from the core over an extended period following a design basis event. The injection phase would continue until the following conditions are met.

- RWST level ≤ 34%
- Containment sump level ≥ 16.1%
- SI signal present / sealed in

When these conditions occur, the cold leg recirculation phase would be initiated by automatic realignment of RHR pump suction from the RWST to the containment sump. The time required to automatically initiate the recirculation phase after SI initiation depends upon the size of the LOCA, but at least ten minutes would be available prior to initiation of ECCS switchover.

Hot Leg Recirculation Mode

Approximately three hours following cold leg recirculation initiation, Operators would manually align ECCS components for hot leg recirculation (SIS flow to the top of the core) to reverse coolant flow through the core. Hot leg recirculation would help terminate reactor core boiling, thus preventing subsequent precipitation of boric acid from solution. Boric acid precipitation on the fuel rods would decrease heat transfer, which may cause the fuel rods to overheat causing fuel cladding damage.

3.4 LOOP-LOCA with an Inoperable DG

The WBN design basis is for a complete loss of A train (DG 1A-A and 2A-A) or B train (DG 1B-B and 2B-B). The consequences of a single DG out of service is therefore much less severe.

DG 1A-A Out of Service (Unit 1 LOOP LOCA)

As noted in WBN Unit 1 UFSAR Section 8.1.4, the design basis for the standby power system includes an LOOP concurrent with a LOCA. In such an event, with DG 1A-A out of service, 6.9 kV Shutdown Board 1A-A is initially lost. The A train of ECCS equipment would be lost for Unit 1; however, the Unit 1 B train ECCS equipment, supplied by DG 1B-B, and the turbine driven auxiliary feed water (TDAFW) pump would be available to mitigate the consequences of the event. Both trains of Unit 2 ECCS equipment would still be available because it is supplied from DGs 2A-A and 2B-B.

The A train of the emergency gas treatment system (EGTS) and control room emergency ventilation (CREV) system would not be available; however, the B train of the EGTS and CREV system would be available to mitigate the event. Both trains of the auxiliary control air compressors would be available because they are supplied by the 2A-A and 2B-B shutdown boards.

One of the Train A essential raw cooling water (ERCW) pumps would be lost; however, flow would be sufficient to maintain the 2A-A DG. If needed, a second ERCW pump could be started on the 2A-A shutdown board, but should not be required. Unit 1 shutdown cooling would be supplied by the B train. Unit 2 shutdown cooling could be supplied from either train dependent on plant conditions.

DG 1B-B Out of Service (Unit 1 LOOP LOCA)

In the event of an LOOP coincident with a LOCA on Unit 1, with DG 1B-B out of service, 6.9 kV shutdown board 1B-B is initially lost. The B train of ECCS equipment would be lost for Unit 1; however, the Unit 1 A train ECCS equipment, supplied by DG 1A-A, and the TDAFW pump would be available to mitigate the consequences of the event. Both trains of Unit 2 ECCS equipment would still be available because it is supplied from DGs 2A-A and 2B-B.

The B train of the EGTS and the CREV system would not be available; however, the A train of the EGTS and the CREV system would be available to mitigate the event. Both trains of auxiliary control air compressors would be available because they are supplied by the 2A-A and 2B-B shutdown boards.

One of the Train B ERCW pumps would be lost; however, flow would be sufficient to maintain the 2B-B DG. If needed, a second ERCW pump could be started on the 2B-B shutdown board, but should not be required. Unit 1 shutdown cooling would be supplied by the A train. Unit 2 shutdown cooling could be supplied from either train dependent on plant conditions.

DG 2A-A Out of Service (Unit 2 LOOP LOCA)

In the event of an LOOP coincident with a LOCA on Unit 2, with DG 2A-A out of service, 6.9 kV shutdown board 2A-A is initially lost. The A train of ECCS equipment would be lost for Unit 2; however, the Unit 2 B train ECCS equipment, supplied by DG 2B-B, and the TDAFW pump would be available to mitigate the consequences of the event. The Unit 1 ECCS equipment would still be available because it is supplied from DGs 1A-A and 1B-B.

Both trains of the EGTS and CREV system would be available because they are supplied by the 1A-A and 1B-B shutdown boards. The A train of auxiliary control air compressor would not be available; however, the B Train would be available to mitigate the event. Additionally, auxiliary feed water level control valves and atmospheric pressure operated relief valves have nitrogen backup sources.

One of the Train A ERCW pumps would be lost; however, flow would be sufficient to maintain the 1A-A DG. If required, a second ERCW pump could be started on the 1A-A

shutdown board. Unit 2 shutdown cooling would be supplied by the B train. Unit 1 shutdown cooling could be supplied from either train depending on plant conditions.

DG 2B-B Out of Service (Unit 2 LOOP LOCA)

In the event of an LOOP coincident with a LOCA on Unit 2, with DG 2B-B out of service, 6.9 kV shutdown board 2B-B is initially lost. The B train of ECCS equipment would be lost for Unit 2; however, the Unit 2 A train ECCS equipment, supplied by DG 2A-A, and the TDAFW pump would be available to mitigate the consequences of the event. The Unit 1 ECCS equipment would still be available because it is supplied from DGs 1A-A and 1B-B.

Both trains of the EGTS and CREV system would be available because they are supplied by the 1A-A and 1B-B shutdown boards. The B train of auxiliary control air compressor would not be available; however, the A Train would be available to mitigate the event. Additionally, auxiliary feed water level control valves and atmospheric pressure operated relief valves have nitrogen backup sources.

One of the Train B ERCW pumps would be lost; however, flow would be sufficient to maintain the 1B-B DG. If needed a second ERCW pump could be started on the 1B-B shutdown board. Unit 1 and Unit 2 shutdown cooling would be supplied by A train because the B train of component cooling system (CCS) C-S pump for both Units is supplied by the 2B-B shutdown board. However, the CCS C-S pump does have an alternate supply to the 1A-A shutdown board, so power can be restored if required.

3.5 Station Blackout Capability

3.5.1 Introduction

Station Blackout (SBO) refers to a complete loss of all offsite and onsite AC power. The SBO rule (10 CFR 50.63) requires utilities to assess the impact of a loss of preferred power (i.e., offsite power) concurrent with a loss of the unit's standby DGs. The TVA SBO analysis has been performed in accordance with the guidelines provided in RG 1.155, “Station Blackout” (Reference 20), and Nuclear Utility Management and Resources Council (NUMARC) 87-00, “Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors” (Reference 21). The NRC's evaluation of WBN's compliance with the SBO rule is included in WBN Supplemental Safety Evaluation Report (SSER) Supplement 22 (Reference 31).

WBN utilizes the AC-independent approach and is subject to a minimum station blackout coping capability of four hours with a DG Reliability Target of 0.975.

The SBO analysis applies to an SBO on either unit; one unit is in an SBO condition, and the other unit has lost one of two DGs, in a non-blackout condition. For the purposes of the analysis, one SBO unit is analyzed without any dependence on the AC power potentially available (for common systems/areas) from the non-blackout unit.

The existing shared design of the WBN fluid systems, in particular the ERCW system and the CCS, requires certain components to be energized from the common or Unit 2

power sources to achieve and maintain hot standby on Unit 1. Similarly, certain components need to be energized from Unit 1 sources for Unit 2.

Furthermore, to achieve hot standby, both Train A DGs or both Train B DGs must be operable. For example, hot standby on Unit 1, with only DG 1A-A available, requires that DG 2A-A (not DG 1B-B or 2B-B) also be available. The converse is true for DG 1B-B. Thus, hot standby for Unit 1 (or Unit 2) requires power from both DG 1A-A and 2A-A, or from both DG 1B-B and 2B-B, and cannot be achieved from DG 1A-A or 1B-B alone.

For SBO coping duration analyses, the determination of how many DGs are necessary must account for the need of two specific DGs. The 6.9 kV FLEX DG is a defense-in-depth measure for SBO and is not credited in the SBO analysis.

3.5.2 Coping Duration

WBN is an AC-independent plant subject to a minimum SBO coping capability of four hours. The required SBO coping duration for WBN was calculated in accordance with the guidance provided in NUMARC 87-00 (Reference 21).

Unique plant site parameters and plant design equipment characteristics for compliance with 10 CFR 50.63 are:

Power Design Characteristic Group (P):	P1
Extremely Severe Weather (ESW Group):	1
Severe Weather (SW Group):	2
Emergency AC Power Configuration (EAC)	D
Independence of Offsite Power (I Group):	I 1/2
DG Reliability Target:	0.975

TVA monitors the DG reliability under the Maintenance Rule Program. Increasing the DG CT will not affect the DG reliability target used in the SBO coping time calculation.

The AC-independent approach evaluates the capability of a WBN unit to cope with and recover from a SBO event. The SBO unit relies on available process steam, DC power, and compressed air supplies to operate equipment necessary to achieve and maintain a hot standby SBO safe shutdown condition until emergency AC power from the “A-A” DGs, “B-B” DGs, or offsite AC power is restored. During the SBO event, the equipment relied upon is electrically independent of the offsite or DG AC power sources. A single SBO safe shutdown (hot standby) path is used and is sufficient to stabilize the plant by achieving and maintaining hot standby.

3.5.3 Beyond Design Basis External Event

On March 12, 2012, the NRC issued Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (Reference 22). This order directed licensees

to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment integrity, and spent fuel pool (SFP) cooling capabilities in the event of beyond-design-basis external events (BDBEE).

The purpose of the WBN FLEX system is to maintain each unit's reactor in a stable, shutdown condition, protect the reactor core, ensure containment integrity, and maintain SFP level during a BDBEE, which includes an extended loss of AC power (ELAP) and simultaneous loss of normal access to the ultimate heat sink to either or both WBN Units.

The FLEX system utilizes DGs, portable pumps (both diesel and electrically driven), valves, hoses and support equipment. This equipment is located in hardened buildings and storage areas that are designed to survive BDBEE defined events, which include seismic conditions, high and low outside air temperatures, floods, and high winds or tornados. The guiding procedure for an ELAP will be the Emergency Contingency Action (ECA)-0.0, Loss of Shutdown Power of the Emergency Operating Instructions.

The FLEX equipment and connections provide multiple methods to: supply all four steam generators with water for reactor cooling, maintain water level in the Reactor Coolant System (RCS), increase RCS boration to a safe shutdown concentration, and maintain water level in the SFP. The FLEX equipment also provides for the control of containment cooling and hydrogen levels.

By letter dated March 12, 2015 (Reference 23), TVA submitted its full compliance letter and revised final integrated plan for WBN Units 1 and 2. By letter dated March 27, 2015 (Reference 8), the NRC transmitted its safety evaluation of the WBN BDBEE mitigation strategies, concluding that, "TVA has developed guidance to maintain or restore core cooling, SFP cooling, and containment following a BDBEE which, if implemented appropriately, should adequately address the requirements of NRC Order EA-12-049."

By letter dated June 22, 2015 (Reference 24), the NRC provided the results of their inspection of TVA's implementation of FLEX mitigating strategies at WBN, using NRC Temporary Instruction 2515/191 (Reference 25) for the inspection. The NRC staff stated that the team verified that TVA satisfactorily implemented appropriate elements of the FLEX strategy as described in the WBN submittal(s) and the associated safety evaluation and did not identify any issues of a more than minor significance concerning TVA's compliance with NRC Order EA-12-049 at WBN.

3.6 Appendix R

In NUREG-0847 SSER Supplement 26 (Reference 26) the NRC staff documented its review of the as-designed Fire Protection Report (FPR) submitted by TVA for WBN, Units 1 and 2, and stated:

> On the basis of its review of TVA's as-designed FPR and TVA's supplemental information as referenced by this evaluation, the NRC staff concludes that the fire protection program for WBN, with the exception of Unit 1 specific OMAs [operator manual actions], meets 10 CFR 50.48(a) and GDC [General Design Criterion] 3 of Appendix A to 10 CFR Part 50, and is consistent with Sections III.G, III.J, III.L, and III.O of Appendix R to 10 CFR Part 50 and Appendix A to

> BTP [branch technical position] (APCSB) 9.5-1, May 1976, with properly justified deviations and exceptions. Therefore, the NRC staff finds the as-designed FPR acceptable, contingent on the completion of the confirmatory items identified in Section 8.0 of this evaluation (Open items 140, 141, 142, and 143, Appendix HH). NRC approval of the Unit 1 OMAs is documented in SSER 18, October 1995, of NUREG-0847, 'Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2'."

Subsequent to the issuance of SSER Supplement 26, TVA submitted a revised FPR. Appendix FF of SSER Supplement 29 (Reference 27) documents the NRC staff's review of the revised WBN FPR. On the basis of its review of TVA's as-constructed FPR and TVA's supplemental information as referenced by the SSER Supplement 29 evaluation, the NRC staff concluded that, subject to the completion of the action in WBN, Unit 2 license condition 2.C(9) (as described in section 4.3(b) of the staff's evaluation in Appendix FF of SSER 29), the fire protection program for WBN, with the exception of WBN, Unit 1 specific OMAs, meets 10 CFR 50.48(a) and GDC 3 of Appendix A to 10 CFR Part 50, and is consistent with Sections III.G, III.J, III.L, and III.O of Appendix R to 10 CFR Part 50 and Appendix A to BTP (APCSB) 9.5-1, May 1976, with properly justified deviations and exceptions. Therefore, the NRC staff concludes that the as-constructed FPR is acceptable. NRC approval of the WBN, Unit 1 OMAs is documented in WBN SSER Supplement 18 (Reference 32), October 1995, of NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2." The NRC staff stated they considered Open Items 140, 141, 142, and 143 closed.

3.7 FLEX Strategy

3.7.1 Order EA-12-049 Compliance

TVA transmitted a notification of full compliance with Order EA-12-049, for WBN Units 1 and 2 in the letter dated March 12, 2015 (Reference 23). This letter provided a summary of compliance to each of the requirements described in Attachment 2 of Order EA-12-049. The letter stated that either the modifications supporting the FLEX strategies for WBN Units 1 and 2 are closed, or the equipment has been turned over to Operations with the FLEX Design Change Notices (DCNs) and Engineering Design Change Requests (EDCRs) in the closeout process in accordance with the station design control process. Also, common and WBN Unit 2 FLEX procedures have been prepared, reviewed, and validated, but cannot be issued until final verification after the systems under construction, including interfacing systems, have been turned over to Operations under the site procedure control process. In addition it stated that WBN Unit 1 and 2 training required for implementation of the FLEX strategies is complete. However, some documentation actions associated with the TVA design closeout process remain open pending WBN Unit 2 system turnover.

The FLEX strategy for WBN was developed in accordance with NEI 12-06 which was endorsed by the NRC in JLD-ISG-201 2-01 (Reference 28). The key aspects of the strategy are as follows:

- A large seismically robust reservoir of water that is automatically aligned to the TDAFW pump if the normal supply is lost due to a severe seismic event and emergency power supplies are lost due to a loss of all power event.

- FLEX Support Guidelines that can be used by operations to cool down and de-pressurize the Reactor Coolant System and minimize Reactor Coolant Pump (RCP) seal leakage within the assumptions evaluated in the strategy for preservation of the core cooling function.

- An array of portable water supply equipment and electrical equipment that can be aligned to provide a source of reactor makeup and reactivity control, restore power to vital batteries and provide an even longer-term source of secondary heat removal from the ultimate heat sink (UHS).

- Staffing and communications and associated training to support all near term and long term actions that are part of the strategy.

- Additional equipment and procedures from a Regional Response center within a few days of event initiation that can re-establish some electrical power needs and containment cooling.

In the NRC SE regarding implementation of mitigating strategies and reliable spent fuel instrumentation related to orders EA-12- 049 and EA-12-051 (Reference 8) for WBN the NRC provided the results of their staff's review of TVA's strategies for WBN. The NRC determined that TVA has developed guidance to maintain or restore core cooling, SFP cooling, and containment following a BDBEE that addresses the requirements of Order EA-12-049.

3.7.2 FLEX DG Implementation

The basic sequence of events, associated with the FLEX 6.9 kV DG, are identified below. 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.

1. Declare an ELAP
2. Align and place 480 V FLEX DGs in service.
3. Verify 125 V DC vital chargers energized and supplying required load to the 125 V DC vital batteries
4. Stage and align the LP FLEX pumps
5. Initiate RCS depressurization and cooldown to commence as soon as possible due to RCP seal failure probability
6. Complete 3 MWe FLEX DG (6.9 kV FLEX Generators), 6.9 kV shutdown boards and emergency feeder breakers and 480 V shutdown board alignment
7. Energize the 6.9 kV shutdown boards with the 6.9 kV FLEX DGs and place the CCS pumps and SI pumps in service to maintain RCS pressurizer level
8. Place the following equipment in service, if required. Verify 6.9 kV FLEX DG loading between starts. Auxiliary Air Compressors, Motor Driven Auxiliary Feedwater Pumps (MDAFWPs) and/or SFP Cooling Pump.

To connect the existing 6.9 kV Shutdown Power System to the 6.9 kV FLEX DGs for FLEX implementation and operation, the connection to the existing safety-related DG circuit is opened and the circuits to the 6.9 kV FLEX DGs are closed by operating the existing interlocked (Kirk-Key) transfer switches 1A-A, 1B-B, 2A-A, or 2B-B located in the respective DG room.

The permanently installed electrical connection points for the 6.9 kV FLEX DGs are from the FLEX DGs integral output connection switchgear through conduits within the FLEX Equipment Storage Building (FESB) to underground conduits located on the outside of the FESB south wall. One 6.9 kV FLEX DG is assigned to power Train A on both units and the second 6.9 kV FLEX DG is assigned to power Train B of both units.

'A' 6.9 kV FLEX DG can supply one or both 1A-A and 2A-A 6.9 kV shutdown boards through their respective Kirk-Key transfer switches and shutdown board emergency feeder breaker. 'B' 6.9 kV FLEX DG can supply one or both 1B-B and 2B-B 6.9 kV shutdown boards. Mechanical and electrical connections to the installed safety related DG equipment meet safety related requirements at the interfaces. Refueling of the 6.9KV FLEX DGs is accomplished by separate diesel fuel transfer pumps taking suction from two separate designated DG 7-day fuel oil tanks and transferring and maintaining fuel to the 6.9 kV FLEX DGs' fuel oil day tanks.

For drawings of these strategies, refer to TVA compliance status letter and final integrated plan in response to the March 12, 2012 Commission Order modifying licenses with regard to requirements for mitigation strategies for beyond-design-basis external events (Order Number EA-12-049) for WBN dated October 29, 2014 (Reference 29).

3.8 Alternate AC Sources

Two 6.9 kV FLEX DGs are permanently mounted in the FESB located north of the DG building. 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.

3.8.1 6.9 kV FLEX DGs

Each 6.9 kV FLEX DG skid consists of an air-cooled, local electric start, diesel engine with a shaft driven, stationary electric generator. Each DG consists of a 20-cylinder engine directly connected to a 6.9 kV generator with exciter. Each DG has a continuous rating of 3250 kW and has the capability to bring the affected unit to a safe shutdown condition following a LOOP.

The best estimate cold shutdown loads from the time that the 6.9 kV FLEX DG is manually aligned to a 6.9 kV shutdown board (first 72 hours after reactor shutdown) are:

LOAD IDENTIFICATION	kW
Centrifugal Charging Pump	396.9
Essential Raw Cooling Water Pump	600.5
Residual Heat Removal Pump	276.0
Component Cooling System Pump	282.0
Pressurizer Heaters	500.0
Miscellaneous loads	1104.0
Total Load	3159.4

The 6.9 kV FLEX DGs can supply either unit's 6.9 kV shutdown boards and associated 480 V shutdown boards in the event of a BDBEE. The permanently installed electrical connection points for the 6.9 kV FLEX DGs are from the DG integral output connection panel, through conduits within the FESB, to underground conduits located on the outside of the FESB south wall. One 6.9 kV FLEX DG is assigned to Train A on both units and the second 6.9 kV FLEX DG is assigned to Train B of both units.

Each 6.9 kV FLEX DG supplies a bus with two output breakers. Each output breaker is connected to the high side of a transfer switch previously reserved for the C-S (5th) DG. Each output breaker can supply power to two 6.9 kV shutdown boards. A jumper connects the high side of two transfer switches. The transfer switches are interlocked to prevent connecting the 6.9 kV FLEX DGs with a DG.

The 6.9 kV FLEX DGs are located in the FESB. The FESB is a seismically hardened building that will resist tornado missiles and high wind speeds. The building is sited in a suitable location above the Probable Maximum Flood grade. The building contains a stand-alone heating, ventilation and air conditioning, fire protection, and electrical system.

Each 6.9 kV FLEX DG is supplied with a 2,900 gallon "day tank" that provides a minimum of 8 hours of operation before make-up fuel is needed. Make-up fuel for each FLEX DG is supplied by separate 15 gallon per minute (gpm) positive displacement rotary gear fuel oil pumps. The pumps take suction from the 2A-A and the 1B-B seven-day DG Fuel Oil Supply Tanks. Each pump is powered from its associated 6.9 kV FLEX DG.

A battery charger rated for 10 amps and 24 volts is located on each 6.9 kV FLEX DG skid to maintain the 24 VDC battery charged. The battery charger is connected to a station supply of AC to ensure the 6.9 kV FLEX DG is available for quick start when needed.

Factory testing was performed by the manufacturer on the assembled FLEX DGs. Factory testing included start, load acceptance, and load capability demonstration. TVA performs a monthly inspection, a semi-annual inspection and start test, and an annual inspection and load test.

3.8.2 Fire Detection and Protection

The fire alarm system in the FESB utilizes five flame and smoke detection cameras and one standard smoke detector. The fire alarm control panel contains the fire alarm signal processing electronics and communicates to the main fire alarm panel via dedicated telephone connection. Four manual pull-stations are placed appropriately throughout the building for manual initiation of an alarm condition. The stations are wired to the fire alarm data network via remote input modules local to the devices.

The FESB is provided with a fire protection system connected to the plant's high-pressure fire protection system northwest of the FESB. The system is a wet pipe sprinkler system that includes an isolation valve, a strainer, an alarm check valve, closed sprinkler heads, and interconnecting piping. The system actuates when the heat from a fire fuses a sprinkler head. Water flowing through the alarm check valve actuates an alarm when the retard chamber on the check valve trim is filled with water. The retard chamber drains quickly enough that leakage through the check valve should not cause a false alarm.

3.8.3 Availability

The 6.9 kV FLEX DG will be operated and maintained according to approved procedures.

The proposed TS will require evaluation of 6.9 kV FLEX DG availability within 2 hours of entry into TS 3.8.1, Condition B, for an inoperable DG. Following initial verification of FLEX DG availability, the proposed TS will require ongoing verification of availability on a once per 12-hour frequency.

The 6.9 kV FLEX DG will be routinely monitored during Operator Rounds, with monitoring criteria identified in the Operator Rounds. The FLEX DGs will be protected, as defense-in-depth, during the extended DG CT.

The marked-up TS Bases include information to verify the availability of the 6.9 kV FLEX DG as follows:

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).

3.8.4 FLEX DG Staffing and Training

Alignment of the 6.9 kV FLEX DGs to the 6.9 kV shutdown boards is the primary strategy the station will utilize during an ELAP condition to restore shutdown power.

Operators will use existing procedures to align and operate the FLEX DGs. Licensed Operators and Auxiliary Operators have received training on the purpose and use of the 6.9 kV FLEX DGs and the associated alignment procedures. Licensed Operators and

Auxiliary Operators, for the operating crews on-shift when the extended DG CT is in use, will be briefed on the DG work plan, the revised TS 3.8.1, and procedural actions regarding an ELAP and 6.9 kV FLEX DG alignment and use prior to entering the extended DG CT.

3.8.5 FLEX DG Unavailability

In NEI 12-06, Section 11.5, "Maintenance and Testing," it states that the unavailability of equipment and applicable connections that directly performs a FLEX mitigation strategy for the core, containment, and spent fuel pool should be managed such that risk to mitigating strategy capability is minimized.

TVA has reviewed the configuration needed to support the DG CT extension relative to FLEX mitigation strategies and determined that the FLEX DG is fully capable of supporting its FLEX mitigation strategies because its configuration and alignment are not changed. It is fully capable of supporting its FLEX strategies and supporting an inoperable DG.

3.8.6 FLEX DG Monitoring Program

The monitoring and assessment of FLEX equipment includes equipment designated as permanent and portable equipment including dedicated tools and equipment required to implement the FLEX strategies.

Monitoring of the FLEX DG includes reviewing system health reports for FLEX interfacing plant systems and reviewing performance packages from preventive maintenance, maintenance instructions, and work orders, etc. A corrective action program condition report is initiated for identified deficiencies or declining performance.

3.9 Diesel Generator Reliability Program

TVA maintains a DG reliability program that monitors and evaluates DG performance and reliability. The program requires remedial actions when one or more established reliability "trigger values" are exceeded, and requires an evaluation be performed and corrective actions taken. The DG reliability target for WBN is 0.975. This value represents the underlying unit DG reliability values for purposes of establishing a coping duration of four hours for a SBO Event. The DG reliability program will not be negatively impacted by the proposed amendment because DG testing frequencies are unaffected.

Using the full duration of the requested 14-day CT would be infrequent. Other TVA programs, including the Maintenance Rule Program (Section 3.10) and Work Control and Scheduling (Section 3.12) ensure the extended CT would not be abused. Frequent use of the full CT duration would adversely impact DG unavailability, which could result in exceeding Maintenance Rule goals, require corrective actions, and increased management attention to restore the DGs to Maintenance Rule (a)(2) status.

3.10 Maintenance Rule Program

The Maintenance Rule performance measure for unavailability provides a control mechanism on the usage of the extended CT. The Maintenance Rule requires an

evaluation be performed when equipment covered by the Maintenance Rule does not meet its performance criteria. The reliability and availability of the DGs are monitored under the Maintenance Rule Program. If the pre-established reliability or availability performance criteria are not achieved for the DGs, they are considered for 10 CFR 50.65(a)(1) actions. These actions would require increased management attention and goal setting to restore their performance to an acceptable level. The actual out-of-service time for the DGs is minimized to ensure that the reliability and availability performance criteria are met.

3.11 Configuration Risk Management Program

TVA uses a blended approach to configuration risk management, using both a quantitative and qualitative analysis of work activities prior to work authorization. The configuration risk management program is implemented using plant procedures for integrated scheduling of on-line processes and outage risk management during shutdown conditions as described in Section 3.12. These procedures, used in conjunction with fleet procedures for the Maintenance Rule Program, work management processes, and on-line equipment-out-of-service (EOOS) models for risk assessment, control the processes in which risk assessments are performed and integrated into the daily work schedule.

Plant configurations and changes in plant configurations are assessed for risk at WBN. In accordance with plant procedures, when risk significant structures, systems and components (SSCs), such as DGs, are made unavailable, actions are taken to protect redundant/diverse SSCs. PRA-based risk assessments are performed for all planned plant configurations as part of the work planning process. These configurations are pre-planned to minimize the risk. If unplanned equipment unavailability occurs during DG maintenance activities, plant procedures direct that the risk be re-evaluated, and if found to be unacceptable, compensatory actions are taken until such a time that the risk is reduced to an acceptable level. Specific risk thresholds are procedurally specified for the assessment of the need for compensatory actions. If compensatory actions are insufficient, then procedural direction is to transition to a mode or other specified condition that reduces overall plant risk to an acceptable level.

3.12 Work Control and Scheduling

TVA uses a blended approach to risk assessment for work control and scheduling. The blended approach concept uses the best information available to assess and manage risk, including:

1. Quantitative insights from the Probabilistic Safety Assessment (PSA) and the EOOS computer on-line risk model.

2. Expert knowledge of plant operations by licensed Senior Reactor Operators.

3. Qualitative methods of assessing the adequacy of defense-in-depth, potential loss of function, and external factors (e.g., severe weather, offsite power instability due to demand).

Risk thresholds are established and include quantitative and qualitative classifications. Risk management actions address configurations that result in elevated risk profiles. These actions are aimed at providing increased risk awareness of appropriate personnel, providing more rigorous planning and control of the activity, and taking measures to control the duration and the magnitude of the increased risk.

TVA procedure NPG-SPP-07.1, “On Line Work Management,” provides the process for assessing and managing on-line risk.

TVA procedure NPG-SPP-07.3.4, “Protected Equipment,” and WBN plant periodic instruction (PI) 1/2-PI-OPS-1-PE, “Protected Equipment,” provide guidance for the protected equipment process, methodology, and posting.

TVA procedure MMDP-1, “Maintenance Management System,” ensures maintenance is performed in a manner that enhances the reliability and availability of SSCs that is commensurate with safety pursuant to 10 CFR 50.65.

WBN Technical Instruction TI-12.16, “Diesel Generator Outage T/S or SR Contingency Actions,” protects the offsite AC sources and the other DGs, during a DG outage.

TVA procedure NPG-SPP-07.2.11, “Shutdown Risk Management,” addresses shutdown risk management. The WBN Refueling Outage Safety Plan:

1. Contains the site-specific configurations required for various shutdown conditions.

2. Contains the site-specific configurations required to implement the shutdown risk management program, including key safety functions (e.g., decay heat removal capability, electric power availability, inventory control, reactivity control, secondary containment, SFP cooling).

Protocols are in place for daily communications between the Power System (Grid) Operator and the WBN Control Room to discuss the status of the plant and the transmission system and review upcoming plans and work activities, and for weekly communications between the WBN Outage and Scheduling Group and the Power System Operator to coordinate activities and generation planning. All fieldwork activities and switching evolutions are assessed for the risks involved. The WBN Control Room is responsible for the decision to proceed with activities that involve risk to the plant systems. When it is intended to use the extended DG CT, the WBN Control Room will ensure:

1. Component testing or maintenance of safety systems and important non-safety equipment in the offsite power systems that can increase the likelihood of a plant transient (i.e., unit trip) or LOOP, will be avoided during the extended DG CT. No elective switchyard maintenance will be allowed during the extended DG CT.

2. Weather conditions will be evaluated prior to intentionally entering the extended DG CT and will not be entered if official weather forecasts are predicting adverse weather conditions (e. g., severe thunderstorms or heavy snowfall). Operators will monitor weather forecasts each shift during the extended DG CT. If severe

weather or grid instability is expected after a DG outage begins, station management will assess the conditions and determine the best course for returning the DG to an operable status.

3.13 Current Technical Specifications and Limitations

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.

TVA intends to perform the 6-year and 18-year DG maintenance activities with one or both units in Mode 4 or above. Therefore, each unit must enter the TS 3.8.1 Required Actions and associated CTs for an inoperable DG, because each unit's TS LCO 3.8.1 requires four operable DGs. Without the extended DG CT, both units would be required to shut down to support the planned maintenance activities.

3.14 Traditional Engineering Considerations

For a LOOP, the redundant DGs have sufficient capacity to power one train of LOOP loads. The Safety Function Determination Program will be utilized to ensure that cross-train checks are performed to determine if a loss of safety function exists if there are concurrent equipment inoperabilities, and will ensure the appropriate actions are taken if a loss of safety function is identified. Since the probability of these events occurring concurrently during a planned maintenance window is low, there is minimal safety impact due to the proposed CT extension.

The combination of defense-in-depth and safety margin inherent in the onsite emergency power system ensures an emergency supply of power will be available to perform the required safety function. This supports the CT extension to allow a DG to be out-of-service for a longer period, as discussed further below.

3.14.1 Defense-In-Depth

The proposed changes to the CTs maintain system redundancy, independence, and diversity commensurate with the expected challenges to system operation. The other DGs, offsite power sources, and the associated engineered safety equipment will remain operable to mitigate the consequences of any previously analyzed accident. Otherwise, the Safety Function Determination Program will require that a loss of safety function be declared, and the appropriate TS Conditions and Required Actions taken. In addition to the Safety Function Determination Program, the Work Management Process, Integrated Scheduling Program, and Maintenance Rule Program provide for controls and assessments to preclude the possibility of simultaneous outages of redundant load groups and ensure system reliability. The Maintenance Rule performance measure for unavailability also provides a control mechanism on the usage of the extended CT. The proposed increase in the CT associated with an inoperable DG while the unit is in Mode 1, 2, 3, or 4, will not alter the assumptions relative to the causes or mitigation of an accident.

With a DG inoperable, a loss of function has not occurred. The remaining offsite power sources and DGs are capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure.

This proposed amendment is consistent with the defense-in-depth principle elements and consistency with the defense-in-depth philosophy is maintained as discussed below and in Enclosure 2, Implementation of BTP 8-8.

1. A reasonable balance is preserved among prevention of core damage, prevention of containment failure, and consequence mitigation.

   The proposed changes are not accomplished by degrading core damage prevention and compensating with improved containment integrity nor do the changes degrade containment integrity and compensate with improved core damage prevention. The balance between prevention of core damage and prevention of containment failure is maintained. Consequence mitigation remains unaffected by the proposed changes. Furthermore, no new accident or transients are introduced with the proposed changes and the likelihood of accidents or transients is not impacted.

   The balance between mitigation of core damage and containment failure are preserved by the implementation of this 14-day CT for the DGs in that the overall DG reliability is expected to be improved in the near term, and over the long term, the DG unavailability is expected to be improved with fewer emergent issues. Additionally, the 6.9 kV FLEX DG, which provides an additional AC power source, will add to the overall ability to prevent core damage and prevent containment challenge or failure. Thus, the DG's ability to support the mitigation of both core damage and containment failure is preserved and in the long term enhanced.

2. Over-reliance on programmatic activities as compensatory measures associated with the changes is avoided.

   A supplemental power source (i.e., the 6.9 kV FLEX DG) will be available as a backup to the inoperable DG to maintain the defense-in-depth design philosophy for the electrical system to meet its intended safety function. The 6.9 kV FLEX DG reduces the reliance on programmatic activities as compensatory measures associated with the changes.

   Plant safety systems are designed with redundancy so when one train is inoperable, a redundant train can provide the necessary design function. During the timeframe when a DG is inoperable, a redundant source of power will be maintained operable. In the event other equipment becomes inoperable concurrent with the DG inoperability, the Safety Function Determination Program requires cross-division checks to ensure a loss of safety function does not go undetected. If a loss of safety function is identified, TS LCO 3.0.6 will require entry into the applicable Conditions and Required Actions for the system(s) that have lost safety function. Proposed TS 3.8.1, Required Action B.3 (as shown in the markup provided in Attachment 1 to this enclosure) requires declaring supported feature(s), supported by the inoperable DG, inoperable when the redundant

required feature(s) are inoperable. These features are designed to be powered from redundant safety related 6.9 kV shutdown boards. Redundant required feature failures consist of inoperable features associated with a shutdown board redundant to the shutdown board that has an inoperable DG.

3. System redundancy, independence, and diversity are preserved commensurate with the expected frequency, consequences of challenges to the system, and uncertainties.

   The redundancy, independence, and diversity of the onsite emergency power system will be maintained during the extended CTs. With the exception of the DG seven-day fuel oil tanks, the 6.9 kV FLEX DG is not susceptible to the same common cause failures as the currently installed DGs; thus, the proposed configuration improves the independence and diversity of the on-site AC power sources.

4. Defenses against potential common cause failures are preserved, and the potential for the introduction of new common cause failure mechanisms is assessed.

   Defenses against common cause failures are preserved. No new common cause failure mechanisms are created by the proposed changes. The operating environment and operating parameters for the DGs remain constant; therefore, no new common cause failure modes are created. Redundant and backup systems are not impacted by the changes and no new common cause links between the primary and backup systems are introduced; therefore, no new potential common cause failure mechanisms have been introduced by the proposed changes.

5. Independence of barriers is not degraded.

   The barriers protecting the public and the independence of these barriers are maintained. Multiple DGs, systems, or electrical distribution systems will not be intentionally taken out of service simultaneously. This could lead to degradation of these barriers and an increase in risk to the public. In the event other equipment becomes inoperable concurrent with the DG inoperability, the Safety Function Determination Program requires cross-train checks to ensure a loss of safety function does not go undetected. If a loss of safety function is identified, TS LCO 3.0.6 will require entry into the applicable Conditions and Required Actions for the system(s) that have lost safety function. Proposed TS 3.8.1, Required Action B.3 requires declaring supported feature(s), supported by the inoperable DG, inoperable when the redundant required feature(s) are inoperable. These features are designed to be powered from redundant safety related 6.9 kV shutdown boards. Redundant required feature failures consist of inoperable features associated with a shutdown board redundant to the shutdown board that has an inoperable DG. In addition, the extended CT does not provide a mechanism that degrades the independence of the barriers: fuel cladding, reactor coolant system, and containment.

6. Defenses against human errors are preserved.

   The proposed extension to the CT does not introduce any new operator actions for the existing plant equipment. However, operators will be required to align and operate the 6.9 kV FLEX DG. These actions to align and operate the FLEX DG include alignment actions that are the same as or are similar to current plant actions. Operators will use existing procedures to align and operate the FLEX DG. Licensed Operators and Auxiliary Operators have received training on the purpose and use of the 6.9 kV FLEX DG and the associated alignment procedures. Licensed Operators and Auxiliary Operators, for the on-shift operating crews, will be briefed on the DG work plan, the revised TS 3.8.1, and procedural actions regarding LOOP and FLEX DG alignment and use prior to entering the extended DG CT. An analysis has been performed for the required actions to start and align the 6.9 kV FLEX DG and it is concluded that these actions are feasible with adequate indications and time to perform.

7. The intent of the plant's design criteria is maintained.

   The design and operation of the remaining DGs are not altered by the proposed extension to the CT. The ability of the remaining TS required DGs to mitigate the consequences of an accident is not affected, because no additional failures are postulated while equipment is inoperable within the TS CT.

3.14.2 Safety Margin

For the extended CT associated with an inoperable DG while the unit is in Mode 1, 2, 3, or 4, the plant remains in a condition for which the plant has already been analyzed; therefore, from a deterministic aspect, these changes are acceptable. The 14-day and 17-day CTs are based on a plant specific analysis using the methodology defined in this LAR. The Maintenance Rule (10 CFR 50.65) requires each licensee to monitor the performance or condition of the DGs to ensure that the DGs are capable of fulfilling their intended functions. If the performance or condition of the DGs do not meet performance criteria, appropriate corrective action is required along with goals to monitor the effectiveness of the corrective action. The Maintenance Rule performance measure for unavailability also provides a control mechanism on the usage of the extended CT. Additionally, TVA has added a supplemental AC power source. For non-accident conditions, one 6.9 kV FLEX DG with the capability to power any 6.9 kV shutdown board within approximately 1 hour, has the capacity to bring the affected unit to cold shutdown in the event of a LOOP.

The overall margin of safety is not decreased due to the extended CT for the DGs, because:

1. Codes and standards or their alternatives approved for use by the NRC are met.

   The design and operation of the DGs are not altered by the proposed CT extension or use of the 6.9 kV FLEX DG. Redundancy and diversity of the electrical distribution system will be maintained, because the system design and operation are not altered by the proposed CT extension or use of the 6.9 kV FLEX DG. In

addition, the 6.9 kV FLEX DG provides an additional AC power source as a defense-in-depth measure in the event of a LOOP.

2. Safety analysis acceptance criteria in the Licensing Basis (e.g., FSAR, supporting analyses) are met or proposed revisions provide sufficient margin to account for analysis and data uncertainty.

   The safety analysis acceptance criteria stated in the UFSAR are not impacted by the changes. The ability of the remaining TS required DGs to mitigate the consequences of an accident is not affected, because no additional failures are postulated while equipment is inoperable within the TS CT.

   Given the above, TVA concludes that safety margins are not impacted by the proposed changes.

4.0 TECHNICAL EVALUATION

4.1 Current Licensing Basis for DG Completion Time

Under the current TS, if a DG is inoperable, the 6.9 kV shutdown board design is sufficient to allow operation to continue for a period not to exceed 72 hours. In this Condition, the three remaining operable DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E distribution system. The 72-hour CT 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.

4.2 Proposed TS 3.8.1 Changes and Benefits

The TS changes are being requested to allow sufficient time to perform adequate preventive maintenance to ensure DG reliability and availability. The proposed changes also provides flexibility to resolve DG deficiencies and avoid potential unplanned plant shut downs, along with the potential challenges to safety systems during an unplanned shut down, should a condition occur requiring DG corrective maintenance.

The proposed changes to TS are described in Section 2.1. The purpose of the proposed changes is to extend the TS CT for an inoperable DG from 72 hours to 14 days. The 14-day CT is needed to (1) provide the necessary time to support planned DG maintenance, and (2) reduce the likelihood and unnecessary burden of a dual-unit shutdown should an unplanned DG outage occur with both units at power by providing additional time to repair and reestablish operability of the inoperable DG. To justify the 11-day CT extension, a supplemental AC power source capable of powering any of the four 6.9 kV shutdown boards during a LOOP is required. In response to NRC Order EA-12-049, TVA added two 6.9 kV FLEX DGs as part of the mitigation strategies for beyond-design-basis-events. At least one 6.9 kV FLEX DG will be utilized as a supplemental AC power source during the extended DG CT.

The TS changes will provide operational and maintenance flexibility. The changes will also allow more time for unanticipated DG repairs.

The proposed change to WBN Unit 1 TS 3.8.1 Conditions and Required Actions and SR 3.8.1.19 will clarify the requirements and remove potential conflicts with the current wording.

4.3 Assessment of Proposed DG Completion Time Extension

The effect of this LAR would be to allow continued power operation up to an additional 11 days while DG maintenance or testing is performed. The DG is a standby electrical power supply whose safety function is required when both the normal and alternate offsite power supplies are unavailable and there is an event that requires operation of the plant ESF and protection systems.

Independent standby power systems (DGs) are provided with adequate capacity and testability to supply the required ESF and protection systems. The standby power source is designed with adequate independency, redundancy, capacity, and testability to ensure power is available for the ESF and protection systems required to avoid undue risk to the health and safety of the public. This power source will successfully provide this capacity when a failure of a single active component is assumed.

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.

To ensure that the single failure design criterion is met, LCOs are specified in the plant TS requiring all redundant components of the onsite power system to be operable. In the event that a DG is inoperable in Modes 1, 2, 3, and 4, existing TS 3.8.1 Condition B requires verification of the operability of the offsite circuits on a more frequent basis. When the required redundancy is not maintained, action is required to initiate a plant shutdown after the specified CT expires. The CT provides a limited time to restore equipment to operable status and represents a balance between the risk associated with continued plant operation with less than the required system or component redundancy and the risk associated with initiating a plant transient while transitioning the unit to a shutdown condition. Thus, the acceptability of the maximum length of the extended CT interval relative to the potential occurrences of design basis events is considered. Since extending the CT for a single inoperable DG does not change the design basis for the standby emergency power system (i.e., DGs), extending the CT by 11 days is acceptable and consistent with BTP 8-8 (Reference 30).

The WBN coping time during SBO is not affected by the proposed changes. The coping time is calculated based on guidance provided in NUMARC 87-00 (Reference 21). The assumptions and the results of the SBO analyses are not changed by an extension of the CT, and compliance with 10 CFR 50.63 will be maintained, as it does not affect the reliability of the DGs. In addition, DG reliability is maintained at or above the SBO target level of 0.975, and the effectiveness of maintenance on the DGs and support systems is monitored pursuant to the Maintenance Rule. The Maintenance Rule performance

measure for unavailability also provides a control mechanism on the usage of the extended CT.

Based on the above discussion, extending the CT for a single inoperable DG from 72 hours to 14 days is acceptable because the proposed change will not affect the plant design basis.

To ensure that the risk associated with extending the CT for a DG is minimized and consistent with the philosophy of maintaining defense-in-depth compensatory measures will be applied. The availability of the 6.9 kV FLEX DG for extending the DG CT is incorporated into the proposed TS. Other measures are provided in the list of new commitments provided in Enclosure 4. These measures will ensure the risks associated with removing a DG from service are managed to minimize the increase in risk during the extended DG CT.

Without this proposed LAR, extended scheduled DG maintenance (i.e., 6-year or 18-year) would require a dual-unit shutdown so that a DG could be removed from service without TS implication. Additionally, if an unplanned DG outage occurred with both units at power, and the DG was not restored to operable status within 72 hours, this would require a dual-unit shutdown upon expiration of the 72-hour CT provided in TS 3.8.1, Condition B. Shutdown of the plant involves many plant operator activities and plant evolutions. These activities and evolutions provide challenges to plant equipment, opportunities for operator errors and increase the possibility of a plant trip. The proposed LAR allows continued steady state operation; therefore, additional operator activities and plant operations evolutions associated with plant shutdown can be avoided. The increased possibility for plant trip may also be avoided. This LAR proposes an additional 11 days as a reasonable time for which a regulatory basis exists for CT extension. This additional time is considered small. Due to the short time period, the probability of a DBA occurring during this interval is low.

4.4 Configuration Risk Management Program

The methods of evaluating risk during maintenance and the station procedure for configuration risk management are designed to control and minimize the risks involved with this proposed CT extension.

TVA currently manages risk with a procedurally controlled program that governs the scheduling of maintenance activities. This program involves review from a probabilistic and/or deterministic standpoint of all, planned and unplanned, maintenance activities. Maintenance is normally assessed from a probabilistic standpoint using a computerized on-line risk monitor that uses the EPRI sponsored software called EOOS. The on-line risk monitor uses the actual WBN PRA model to quantify results. In cases where a quantitative solution is not possible because the functions or systems being evaluated are not modeled, a qualitative assessment is used. Under certain risk significant conditions, both quantitative and qualitative assessments are required. TVA implements the appropriate restrictions through work planning, risk assessment, and during the performance of DG maintenance, precludes simultaneous equipment outages that would erode the principles of redundancy and diversity.

Work Planning

The long-term maintenance plan at WBN specifies the frequency for implementation of maintenance and surveillance activities necessary for the reliability of components in each system. The rolling schedule includes the preliminary defense-in-depth assessment that documents the allowable combinations of system and functional equipment groups (FEG) that may be simultaneously worked on-line or during shutdown conditions. FEGs are common sets of boundaries encompassing equipment that has been evaluated for acceptable out-of-service combinations. They are used to schedule planned maintenance and establish equipment clearances.

Predetermined system or FEG work windows are established for on-line maintenance and outage periods. The work windows are based on recommended maintenance frequencies and are sequenced to minimize the risk of on-line maintenance. Work windows are defined by week and repeat at 13-week intervals. The work windows ensure required surveillances are performed within their required frequency and that division/train/loop/channel interferences are minimized. The WBN scheduling organization maintains a long-range schedule based on required surveillance testing for on-line activities and plant conditions.

The long-term maintenance plan is implemented by the surveillance-testing schedule. In addition, other periodic activities, such as preventive maintenance items, are scheduled to coincide with related surveillance tests to maximize component availability. System FEGs are used to ensure work on related components is evaluated for inclusion in the work window. Related corrective maintenance activities are also evaluated for inclusion in the work window. The inclusion of all identified work (surveillance tests, preventive and corrective maintenance items) in the FEG work window maximizes component availability and operability.

Risk Assessment

The effectiveness of maintenance on the DGs and support systems is monitored pursuant to the Maintenance Rule, which requires licensees to assess and manage the increase in risk that may result from proposed maintenance activities before performing such activities. Therefore, before performing maintenance activities on a DG during the extended CT, pursuant to 10 CFR 50.65(a)(4), TVA assesses and manages any increase in risk that may result from such activities. This assessment is performed in accordance with the configuration risk management process. This ensures that PRA-informed processes are in place to assess the overall impact of maintenance activities on plant risk before entering the TS Condition for planned activities.

The assessment includes the following:

- The schedule is evaluated against the risk bases derived from the WBN PRA.
- The scheduled activities are assessed before starting work to maximize safety (reduce risk) when performing on-line work.
- Avoidance of recurrent entry into a specific TS Condition for multiple activities. Activities that require entering the same TS Condition are combined to limit the

number of times a TS Condition entry is made, thus maximizing the equipment's availability.
- If the risk associated with a particular activity cannot be determined, a risk assessment is performed.

Work Activity Risk Management is the tool used to enhance the preparation, execution, and oversight of high-risk work activities. It includes the following three-phase process used to evaluate the risk associated with work activities:

- Risk Characterization of the Work Activities
- Development of High Risk Management Plans for High Risk Activities
- Aggregate Risk Assessment

Work activity risk characterization and evaluation is performed as early in the work control/planning process as possible. Emergent, support, and repetitive activities are addressed individually with specific actions for risk management.

DG Maintenance

During power operation, the DGs help to ensure that sufficient power is available to the safety-related equipment needed for safe shutdown of the plant and for mitigation and control during accident conditions. During shutdown and refueling conditions, the DGs help to ensure that the facility is able to maintain shutdown or refueling conditions for extended periods.

Experience has shown that, even with careful planning, maintenance duration sometimes approaches the CT limit. In order to accommodate unanticipated problems, TVA has developed the practice of scheduling work for only 50 to 60 percent of the CT for planned maintenance (schedules work only if the work is anticipated to take no more than 50 to 60 percent of the CT). Compared to the 72-hour CT, the proposed 14-day CT will significantly reduce DG unavailability for the 6-year and 18-year maintenance. Maintenance activities that can be performed within a CT of 72 hours are not expected to change. By combining activities into fewer DG outages, based on the extended CT, the DG availability is expected to improve, which would result in a net reduction in risk.

4.5 Compensatory Measures

To manage the risk activities associated with the DG CT extension, compensatory measures involving additional operational restrictions may be taken when performing extended-scheduled maintenance on a DG (i.e., using the extended 14-day CT). The following contingency actions (i.e., limitations for planned maintenance during power operation) are being incorporated into the TS 3.8.1 Bases.

- 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.

- 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.
- Do not remove from service the ventilation systems for the 6.9 kV shutdown board rooms, the elevation 772 transformer rooms, or the 480-V shutdown board rooms, concurrently with the DG, or implement appropriate compensatory measures.
- Do not remove the reactor trip breakers from service concurrently with planned DG outage maintenance.
- Do not remove the TDAFW pump from service concurrently with the planned DG outage of the same unit.
- Do not remove the AFW level control valves to the steam generators from service concurrently with planned DG outage of the same unit.
- Do not remove the opposite train RHR pump from service concurrently with planned DG outage of the same unit.

4.6 Conclusion

The results of the deterministic evaluation described above provide assurance that the equipment required to safely shut down the plant and mitigate the effects of a LOOP, SBO, or DBA (without a single failure) will remain capable of performing their safety functions when a DG is out-of-service in accordance with the proposed 14-day CT.

The proposed CT is consistent with NRC policy and will continue to provide protection of the public health and safety. In addition, the proposed changes meet the following principles:

1. It meets the current regulations.
2. It is consistent with the defense-in-depth philosophy.
3. It maintains sufficient safety margins.
4. Its impact will be monitored using performance measurement strategies.

Therefore, based on the above evaluations and conclusions, the proposed changes are acceptable and operation in the proposed manner will not present undue risk to public health and safety or be inimical to the common defense and security.

5.0 REGULATORY EVALUATION

5.1 Applicable Regulatory Requirements and Criteria

10 CFR 50.63(a), “Loss of all alternating current power,” requires that each light water-cooled nuclear power plant licensed to operate be able to withstand for a specified duration and recover from a station blackout. The proposed changes do not affect TVA's compliance with the intent of 10 CFR 50.63(a).

10 CFR 50.65, “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” requires that preventive maintenance activities must not reduce the overall availability of the systems, structures and components (SSCs). It also requires that before performing maintenance activities, the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities. The proposed changes do not affect TVA's compliance with the intent of 10 CFR 50.65.

10 CFR 50, Appendix A, GDC 17, “Electric power systems,” states, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of SSCs that are important to safety. The onsite system is required to have sufficient independence, redundancy, and testability to perform its safety function, assuming a single failure. The offsite power system is required to be supplied by two physically independent circuits that are designed and located to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. The proposed changes do not affect TVA's compliance with the intent of GDC 17.

GDC 18, “Inspection and testing of electric power systems,” states that electric power systems that are important to safety must be designed to permit appropriate periodic inspection and testing of important areas and features, such as insulation and connections to assess the continuity of the systems and the condition of their components. The proposed changes do not affect TVA's compliance with the intent of GDC 18.

RG 1.155, “Station Blackout,” describes a method acceptable to the NRC staff for complying with the Commission regulation that requires nuclear power plants to be capable of coping with a SBO event for a specified duration. The proposed changes do not affect TVA's compliance with the intent of RG 1.155.

5.2 Precedent

Similar TS amendments approved for other plants are listed below.

- DC Cook, ML052720032, Amendment No. 273 & 291, 09/30/2005
- Prairie Island, Units 1 and 2, ML071310023, Amendment No. 178, 05/30/2007
- Waterford 3, ML003734973, Amendment No. 166, 07/21/2000
- Browns Ferry, ML11227A258, Amendments 280, 307, and 266, 10/05/2011.

5.3 Significant Hazards Consideration

The Tennessee Valley Authority (TVA) proposes to revise Technical Specification (TS) 3.8.1, “AC Sources – Operating,” to extend the Completion Time (CT) for an inoperable diesel generator (DG) from 72 hours to 14 days. Secondly, changes are proposed to TS 3.8.1 to clarify the Conditions and Required Actions by removing the word “required” when immediately preceding “DGs” and “DG(s).” Lastly, changes are proposed to the wording of Surveillance Requirement (SR) 3.8.1.19 to remove a potential conflict between the SR wording and the Note modifying SR 3.8.1.19.

TVA has concluded that the changes to TS 3.8.1 do not involve a significant hazards consideration. This conclusion is based on an evaluation in accordance with 10 CFR 50.91(a)(1) of the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. *Does the proposed amendment involve a significant increase in the probability or consequence of an accident previously evaluated?*

   Response: No.

   The proposed changes do not affect the design of the DGs, the operational characteristics or function of the DGs, the interfaces between the DGs and other plant systems, or the reliability of the DGs. Required Actions and their associated CTs are not considered initiating conditions for any UFSAR accident previously evaluated, nor are the DGs considered initiators of any previously evaluated accidents. The DGs are provided to mitigate the consequences of previously evaluated accidents, including a loss of off-site power.

   The consequences of previously evaluated accidents will not be significantly affected by the extended DG CT, because a sufficient number of onsite Alternating Current power sources will continue to remain available to perform the accident mitigation functions associated with the DGs, as assumed in the accident analyses. In addition, as a risk mitigation and defense-in-depth action, an independent AC power source, an available FLEX DG, will be available to support the ESF bus with the inoperable DG during a SBO.

   Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?*

   Response: No.

   The proposed change does not involve a change in the permanent design, configuration, or method of operation of the plant. The proposed changes will not alter the manner in which equipment operation is initiated, nor will the functional demands on credited equipment be changed. The proposed changes allow operation of the unit to continue while a DG is repaired and retested with the FLEX DG in standby to mitigate a SBO event. The proposed extensions do not affect the interaction of a DG with any system whose failure or malfunction can initiate an accident. As such, no new failure modes are being introduced.

   Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No.

The proposed changes do not alter the permanent plant design, including instrument set points, nor does it change the assumptions contained in the safety analyses. The FLEX DG alternate AC system is designed with sufficient redundancy such that a DG may be removed from service for maintenance or testing. The remaining DGs are capable of carrying sufficient electrical loads to satisfy the UFSAR requirements for accident mitigation or unit safe shutdown. The proposed changes do not affect the redundancy or availability requirements of offsite power supplies or change the ability of the plant to cope with station blackout events.

Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Based on the above, TVA concludes that the proposed change does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Technical Specification Change TS-01-04, Diesel Generator (DG) Risk Informed Allowed Outage Time (AOT) Extension," dated August 7, 2001. [ML012290076]

2. NRC letter to TVA, “Watts Bar Nuclear Plant, Unit 1 – Issuance of Amendment Regarding Increase In Allowed Outage Times for Emergency Diesel Generators (TAC No. MB2720),” dated July 1, 2002. [ML021840589]

3. TVA letter to NRC, “Technical Specification Change Request to Revise Completion Time for Inoperable Diesel Generator(s),” dated November 30, 2009. [ML093640790]

4. 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]

5. NRC letter to TVA, “Watts Bar Nuclear Plant, Unit 1 – Issuance of Amendment Regarding Technical Specification 3.8.1, ‘AC [Alternating Current] Sources - Operating,’ Surveillance Requirements Notes (TAC No. ME6980),” dated November 22, 2011. [ML11234A258]

6. NRC letter to TVA, "Issuance of Facility Operating License No. NPF-96, Watts Bar Nuclear Plant Unit 2," dated October 22, 2015. [ML15251A587]

7. NRC letter to TVA, "Issuance of Amendment on Diesel Generator Systems Testing (TAC No. M98919)," dated October 19, 1998. [ML020780221]

8. 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]

9. TSTF-GG-05-01, “Writer’s Guide for Plant-Specific Improved Technical Specifications,” Revision 1, dated August 2010. [ML12046A089]

10. TVA letter to NRC, “Browns Ferry Nuclear Plant (BFN) Units 1, 2 & 3, Sequoyah Nuclear Plant (SQN) Units 1 & 2 and Watts Bar Nuclear Plant (WBN) Unit 1 - Nuclear Regulatory Commission (NRC) Generic Letter (GL) 2006-02: Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power - Response,” dated April 3, 2006. [ML060950306]

11. TVA letter to NRC, “Browns Ferry Nuclear Plant (BFN) Units 1, 2 & 3, Sequoyah Nuclear Plant (SQN) Units 1 & 2 and Watts Bar Nuclear Plant (WBN) Unit 1 - Request For Additional Information Regarding Resolution of Generic Letter 2006-02, Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power (TAC Nos. MD0947 through MD1050),” dated January 31, 2007. [ML070330051]

12. NRC letter to TVA, “Watts Bar Nuclear Plant, Unit 1 - Response to Generic Letter 2006-02 “Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power” (TAC No. MD1049),” dated May 3, 2007. [ML071080225]

13. NRC letter to TVA, "Watts Bar Nuclear Plant, Unit 2 – Safety Evaluation Regarding Generic Letters 2006-02, 'Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power' (TAC No. MD6728)," dated January 20, 2010. [ML100080768]

14. NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2," Supplement 29, published October 2015. [ML15282A051]

15. NRC letter to TVA, "Watts Bar Nuclear Plant Unit 2 Construction - NRC Integrated Inspection Report 05000391/2015607 and Notice of Violation," dated September 29, 2015. [ML15273A452]

16. TVA letter to NRC, “Application to Modify Watts Bar Nuclear Plant, Unit 1 Technical Specifications Regarding AC Sources - Operating (TS-WBN-13-02),” dated August 1, 2013. [ML13220A103]

17. TVA letter to NRC, CNL-14-015, “Response to NRC Requests for Additional Information Related to Application to Modify Watts Bar Nuclear Plant, Unit 1 Technical Specifications Regarding AC Sources - Operating (TS-WBN-13-02),” dated April 21, 2014. [ML14112A341]

18. TVA letter to NRC, CNL-14-107, “Response to NRC Requests for Additional Information Related to Application to Modify Watts Bar Nuclear Plant, Unit 1 Technical Specifications Regarding AC Sources - Operating (TS-WBN-13-02),” dated January 29, 2015. [ML15041A732]

19. NRC letter to TVA, "Watts Bar Nuclear Plant, Unit 1 – Issuance of Amendment Regarding Alternating Current Sources (TAC NO. MF2549)," dated September 29, 2015. [ML15225A094]

20. RG 1.155, Revision 0, “Station Blackout,” August 1988. [ML003740034]

21. NUMARC 87-00, “Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors,” Revision 1, August 1991.

22. NRC Order EA-12-049, “Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” dated March 12, 2012.

23. TVA letter to NRC, CNL-14-233, “Compliance Letter and Final Integrated Plan in Response to the March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Watts Bar Nuclear Plant (TAC Nos. MF0950 and MF1177),” dated March 12, 2015. [ML15072A116]

24. NRC letter to TVA, "Watts Bar Nuclear Plant Units 1 and 2 – NRC Team Inspection Report 05000390/2015009 and 05000391/2015616," dated June 22, 2015. [ML15173A317]

25. NRC Inspection Manual Temporary Instruction 2515/191, "Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans," dated October 6, 2014. [ML14273A444]

26. NUREG-0847, Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2," Supplement 26 (SSER 26), published June 2013. [ML13205A136]

27. NUREG-0847, Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2," Supplement 29 (SSER 29), published October 2015. [ML15282A051]

28. NRC JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated August 29, 2012. [ML12229A174]

29. TVA letter to NRC, "Compliance Status Letter and Final Integrated Plan in Response to the March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Watts Bar Nuclear Plant (TAC Nos. MF0950 and MF1177)," dared October 29, 2014.

30. BTP 8-8, “Onsite (Emergency Diesel Generators) and Offsite Power Sources Allowed Outage Time Extensions,” Initial - February 2012. [ML113640138]

31. NUREG-0847, Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2," Supplement 22, published February 2011. [ML110390197]

32. NUREG-0847, Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2," Supplement 18, published October 1995. [ML070530364]

ENCLOSURE 1

EVALUATION OF PROPOSED CHANGE

ATTACHMENT 1

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

ENCLOSURE 1

EVALUATION OF PROPOSED CHANGE

Proposed TS Changes (Mark-Ups) for WBN Unit 1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Restore required offsite circuit to OPERABLE status.	72 hours AND ~~6~~17 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	1 hour AND Once per 8 hours thereafter
	B.2 Evaluate availability of 6.9 kV FLEX DG. AND	2 hours AND Once per 12 hours thereafter
	B.3 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable. AND	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 14 days AND 17 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. AND	1 hour AND Once per 8 hours thereafter
	~~B~~C.2 Declare required feature(s) supported by the inoperable DG~~(s)~~ inoperable when its required redundant feature(s) is inoperable. AND	4 hours from discovery of Condition ~~B~~C concurrent with inoperability of redundant required feature(s)
	~~B~~C.3.1 Determine OPERABLE DG~~(s)~~ are not inoperable due to common cause failure. OR	24 hours
	~~B~~C.3.2 Perform SR 3.8.1.2 for OPERABLE DG~~(s)~~. AND	24 hours (continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~B~~C.(continued)	~~B~~C.4 Restore ~~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	12 hours from discovery of Condition ~~C~~D concurrent with inoperability of redundant required features
	~~C~~D.2 Restore one required offsite circuit to OPERABLE status.	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 Restored ~~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 Restored ~~required~~ DG(s) in Train A to OPERABLE status. OR ~~E~~F.2 Restored ~~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)

Proposed TS Changes (Mark-Ups) for WBN Unit 2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Restore required offsite circuit to OPERABLE status.	72 hours AND ~~6~~17 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	1 hour AND Once per 8 hours thereafter
	B.2 Evaluate availability of 6.9 kV FLEX DG. AND	2 hours AND Once per 12 hours thereafter
	B.3 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable. AND	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 14 days AND 17 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. AND	1 hour AND Once per 8 hours thereafter
	~~B~~C.2 Declare required feature(s) supported by the inoperable DG~~(s)~~ inoperable when its required redundant feature(s) is inoperable. AND	4 hours from discovery of Condition ~~B~~C concurrent with inoperability of redundant required feature(s)
	~~B~~C.3.1 Determine OPERABLE DG~~(s)~~ ~~is~~ are not inoperable due to common cause failure. OR	24 hours
	~~B~~C.3.2 Perform SR 3.8.1.2 for OPERABLE DG~~(s)~~. AND	24 hours (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

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~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

ATTACHMENT 2

Proposed TS Bases Changes (Mark-Ups) for WBN Units 1 and 2

Proposed TS Bases Changes (Mark-Ups) for WBN Unit 1

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

(continued)

BASES

BACKGROUND (continued)

Class 1E distribution system unless required during a loss of offsite power.

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.

(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 14 days~~72 hours~~. This could lead to a total of 17 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 14 days~~72 hours~~ (for a total of 31~~9~~ days) allowed prior to complete restoration of the LCO. The 17~~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 17~~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)

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 14 days, it is necessary to verify 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)

ACTIONS (continued)

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

Required Actions B.2~~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~~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.

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.

(continued)

BASES

ACTIONS (continued)

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

Required Action~~s~~ 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 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 14-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.

(continued)

BASES

ACTIONS

B.5 (continued)

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 14 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 14 days. This could lead to a total of 17 days, since initial failure to meet the LCO, to restore the DGs. At this time, an offsite circuit could again become inoperable, the DGs restored OPERABLE, and an additional 72 hours (for a total of 20 days) allowed prior to complete restoration of the LCO. The 17-day Completion Time provides a limit on time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 14-day and 17-day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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. The contingency actions applicable to Surveillance Requirement (SR) 3.8.1.14 must be invoked prior to initiation of the test.

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.

~~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

(continued)

BASES

ACTIONS

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

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 ~~C~~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 ~~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:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure; and

(continued)

BASES

ACTIONS

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

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.

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

(continued)

BASES

ACTIONS

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

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 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.

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SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.18

Under accident and loss of offsite power conditions loads are sequentially connected to the 6.9 kV shutdown board by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The load sequence time specified in FSAR Table 8.3-3 ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load block and that safety analysis assumptions regarding ESF equipment time delays are not violated. The allowable values for the time delay relays are contained in system specific setpoint scaling documents. Reference 2 provides a summary of the automatic loading of ESF buses.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), Table 1, takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing 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 3.8.1.19

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

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

(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 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 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

Proposed TS Bases Changes (Mark-Ups) for WBN Unit 2

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 will be 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 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

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 14 days~~72 hours~~. This could lead to a total of 17 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 14 days~~72 hours~~ (for a total of 31~~9~~ days) allowed prior to complete restoration of the

(continued)

BASES

ACTIONS

A.3 (continued)

LCO. The 17~~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 17~~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 14 days, it is necessary to verify 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).

(continued)

BASES

ACTIONS

B.2 (continued)

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 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.

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 Action~~s~~ 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 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 Action~~s~~ B.~~3~~4.1and 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) 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 14-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.

(continued)

BASES

ACTIONS B.5 (continued)

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 14 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 14 days. This could lead to a total of 17 days, since initial failure to meet the LCO, to restore the DGs. At this time, an offsite circuit could again become inoperable, the DGs restored OPERABLE, and an additional 72 hours (for a total of 20 days) allowed prior to complete restoration of the LCO. The 17-day Completion Time provides a limit on time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 14-day and 17-day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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 ~~C~~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 ~~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.

(continued)

BASES

ACTIONS

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

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

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

(continued)

BASES

ACTIONS

~~F~~G.1 and ~~F~~G.2 (continued)

reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

~~G~~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)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.14

Regulatory Guide 1.9 (Ref. 3), paragraph C2.2.9, requires demonstration once per 18 months that the DGs can start and run continuously for an interval of not less than 24 hours, ≥ 2 hours of which is at a load between 105% and 110% of the continuous duty rating and the remainder of the time at a load equivalent to 90% to 100% of the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor of ≥ 0.8 and ≤ 0.9. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

This Surveillance is modified by three Notes. Note 1 states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the power factor limit will not invalidate the test. Note 2 establishes that this SR may be performed on only one DG at a time while in MODE 1, 2, 3, or 4. This is necessary to ensure the proper response to an operational transient (i.e., loss of offsite power, ESF actuation). Therefore, three DGs must be maintained operable and in a standby condition during performance of this test. In this configuration, the plant will remain within its design basis, since at all times safe shutdown can be achieved with two DGs in the same train.

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.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.14 (continued)

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

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The minimum voltage and frequency stated in the SR are those necessary to ensure the DG can accept DBA loading while maintaining acceptable voltage and frequency levels. Stable operation at the nominal voltage and frequency values is also essential to establishing DG OPERABILITY, but a time constraint is not imposed. This is because a typical DG will experience a period of voltage and frequency oscillations prior to reaching steady state operation if these oscillations are not dampened out by load application. This period may extend beyond the 10 second acceptance criteria and could be a cause for failing the SR. In lieu of a time constraint in the SR, WBN will monitor and trend the actual time to reach steady state operation as a means of ensuring there is no voltage regulator or governor degradation which could cause a DG to become inoperable. The 10 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), Table 1.

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 to ensure that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test.

(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

ATTACHMENT 3

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

Proposed TS Changes (Final Typed) for WBN Unit 1

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.3	Restore required offsite circuit to OPERABLE status.	72 hours AND 17 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 14 days AND 17 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. AND	1 hour AND Once per 8 hours thereafter
	C.2 Declare required feature(s) supported by the inoperable DGs inoperable when its required redundant feature(s) is inoperable. AND	4 hours from discovery of Condition C concurrent with inoperability of redundant required feature(s)
	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. AND	24 hours

(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	12 hours from discovery of Condition D concurrent with inoperability of redundant required features
	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 Restored 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 Restored DG(s) in Train A to OPERABLE status. OR F.2 Restored 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)

Proposed TS Changes (Final Typed) for WBN Unit 2

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.3	Restore required offsite circuit to OPERABLE status.	72 hours AND 17 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 14 days AND 17 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. AND	1 hour AND Once per 8 hours thereafter
	C.2 Declare required feature(s) supported by the inoperable DGs inoperable when its required redundant feature(s) is inoperable. AND	4 hours from discovery of Condition C concurrent with inoperability of redundant required feature(s)
	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. AND	24 hours

(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	12 hours from discovery of Condition D concurrent with inoperability of redundant required features
	D.2 Restore one required offsite circuit to OPERABLE status.	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 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

ATTACHMENT 4

Proposed TS Bases Changes (Final Typed) for WBN Units 1 and 2

Proposed TS Bases Changes (Final Typed) for WBN Unit 1

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

(continued)

BASES

BACKGROUND (continued)

disconnected from the Class 1E distribution system unless required during a loss of offsite power.

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.

(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 14 days. This could lead to a total of 17 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 14 days (for a total of 31 days) allowed prior to complete restoration of the LCO. The 17 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 17 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 14 days, it is necessary to verify 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.3 and C.2

Required Actions 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:

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.

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.

(continued)

BASES

ACTIONS (continued)

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

Required Actions B.4.1 and 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 14-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.

(continued)

BASES

ACTIONS

B.5 (continued)

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 14 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 14 days. This could lead to a total of 17 days, since initial failure to meet the LCO, to restore the DGs. At this time, an offsite circuit could again become inoperable, the DGs restored OPERABLE, and an additional 72 hours (for a total of 20 days) allowed prior to complete restoration of the LCO. The 17-day Completion Time provides a limit on time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The “AND” connector between the 14-day and 17-day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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. The contingency actions applicable to Surveillance Requirement (SR) 3.8.1.14 must be invoked prior to initiation of the test.

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.

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

(continued)

BASES

ACTIONS

D.1 and D.2 (continued)

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:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure; and

(continued)

BASES

ACTIONS

D.1 and D.2 (continued)

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.

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

(continued)

BASES

ACTIONS

E.1 and E.2 (continued)

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 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 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 (continued)

SR 3.8.1.18

Under accident and loss of offsite power conditions loads are sequentially connected to the 6.9 kV shutdown board by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The load sequence time specified in FSAR Table 8.3-3 ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load block and that safety analysis assumptions regarding ESF equipment time delays are not violated. The allowable values for the time delay relays are contained in system specific setpoint scaling documents. Reference 2 provides a summary of the automatic loading of ESF buses.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), Table 1, takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing 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 3.8.1.19

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

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

(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 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 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

Proposed TS Bases Changes (Final Typed) for WBN Unit 2

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 will be 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 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 DGs 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 14 days. This could lead to a total of 17 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 14 days (for a total of 31 days) allowed prior to complete restoration of the LCO. The 17 day Completion

(continued)

BASES

ACTIONS

A.3 (continued)

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 17 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 14 days, it is necessary to verify 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).

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(continued)

BASES

ACTIONS

B.2 (continued)

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 Actions 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:

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.4.1 and 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).

(continued)

BASES

ACTIONS

B.4.1, B.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.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. 7), 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 14-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.

(continued)

BASES

ACTIONS

B.5 (continued)

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 14 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 14 days. This could lead to a total of 17 days, since initial failure to meet the LCO, to restore the DGs. At this time, an offsite circuit could again become inoperable, the DGs restored OPERABLE, and an additional 72 hours (for a total of 20 days) allowed prior to complete restoration of the LCO. The 17-day Completion Time provides a limit on time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 14-day and 17-day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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.

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).

(continued)

BASES

ACTIONS

D.1 and D.2 (continued)

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:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure; and

(continued)

BASES

ACTIONS

D.1 and D.2 (continued)

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.

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.

(continued)

BASES

ACTIONS

E.1 and E.2 (continued)

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 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 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.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.14

Regulatory Guide 1.9 (Ref. 3), paragraph C2.2.9, requires demonstration once per 18 months that the DGs can start and run continuously for an interval of not less than 24 hours, ≥ 2 hours of which is at a load between 105% and 110% of the continuous duty rating and the remainder of the time at a load equivalent to 90% to 100% of the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor of ≥ 0.8 and ≤ 0.9. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

This Surveillance is modified by three Notes. Note 1 states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the power factor limit will not invalidate the test. Note 2 establishes that this SR may be performed on only one DG at a time while in MODE 1, 2, 3, or 4. This is necessary to ensure the proper response to an operational transient (i.e., loss of offsite power, ESF actuation). Therefore, three DGs must be maintained operable and in a standby condition during performance of this test. In this configuration, the plant will remain within its design basis, since at all times safe shutdown can be achieved with two DGs in the same train.

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.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.14 (continued)

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

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The minimum voltage and frequency stated in the SR are those necessary to ensure the DG can accept DBA loading while maintaining acceptable voltage and frequency levels. Stable operation at the nominal voltage and frequency values is also essential to establishing DG OPERABILITY, but a time constraint is not imposed. This is because a typical DG will experience a period of voltage and frequency oscillations prior to reaching steady state operation if these oscillations are not dampened out by load application. This period may extend beyond the 10 second acceptance criteria and could be a cause for failing the SR. In lieu of a time constraint in the SR, WBN will monitor and trend the actual time to reach steady state operation as a means of ensuring there is no voltage regulator or governor degradation which could cause a DG to become inoperable. The 10 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), Table 1.

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 to ensure that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test.

(continued)

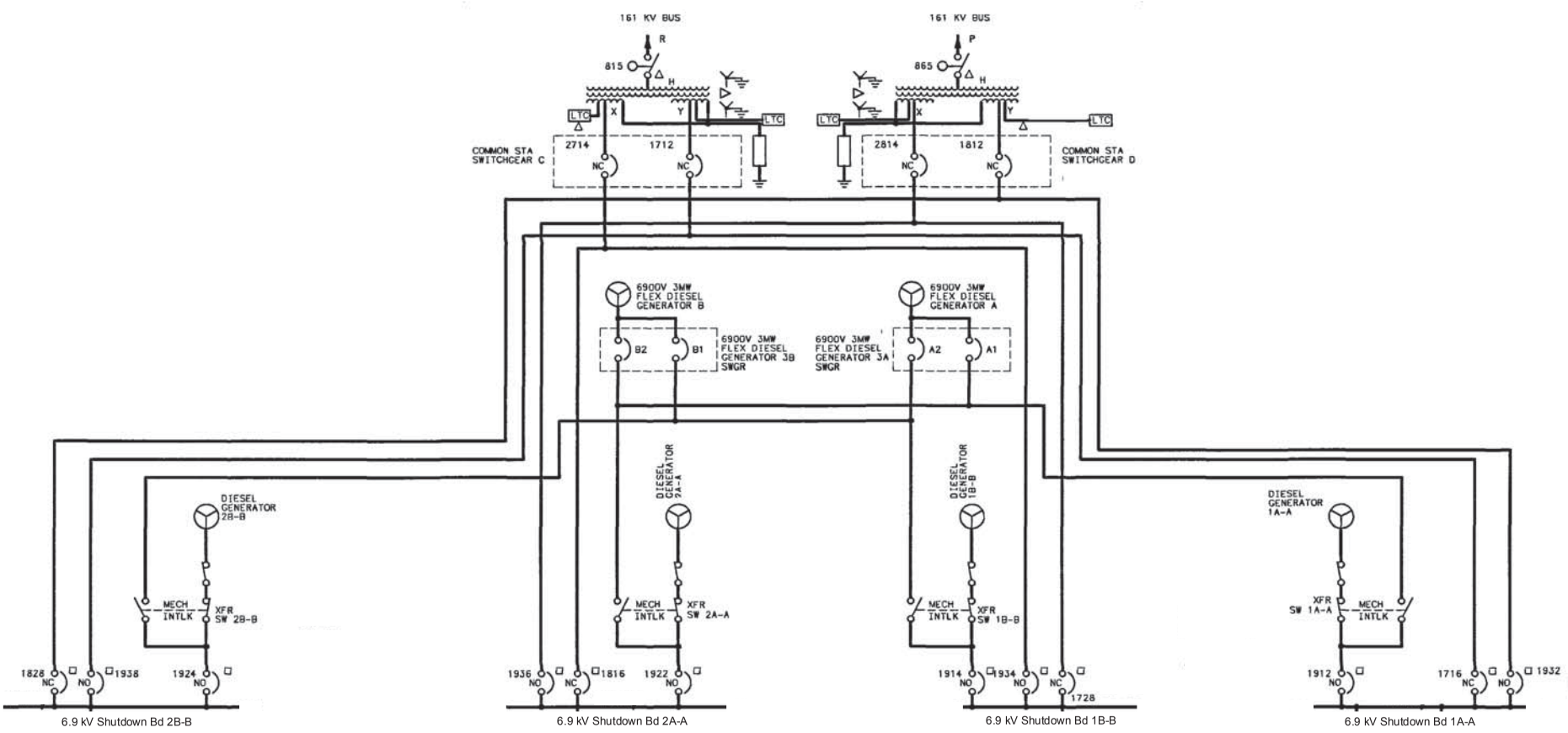
Bases Table 3.8.1-2
TS Action or Surveillance Requirement (SR) Contingency Actions

	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

ATTACHMENT 5

WBN Electrical Diagram Showing 6.9 kV FLEX DG Connection

Enclosure 1
Attachment 5



Simplified Diagram - 6.9 kV Flex Diesel Generator Connection to 6.9 kV Shutdown Boards

ENCLOSURE 2

Implementation of Branch Technical Position 8-8

Onsite (Emergency Diesel Generators (EDGs)) and Offsite Power Sources Allowed Outage Time Extensions

The Tennessee Valley Authority (TVA) reviewed the NRC's NUREG 0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Branch Technical Position (BTP) 8-8 Onsite (Emergency Diesel Generators) and Offsite Power Sources Allowed Outage Time Extensions," (Reference 1) as acceptable approach to analyzing and evaluating changes for AOT extensions. This enclosure discuses TVA's implementation of the guidance provided in BTP 8-8. TVA extracted the salient points from BTP 8-8 and discusses below how they have been implemented in this WBN submittal.

IMPLEMENTATION OF BTP 8-8

What follows is a listing of the guidance provided in BTP 8-8 followed by a discussion explaining how TVA implemented this guidance in WBN proposed Technical Specification change WBN-TS-15-09.

1. A supplemental power source should be available as a backup to the inoperable EDG or offsite power source, to maintain the defense-in-depth design philosophy of the electrical system to meet its intended safety function.

   TVA Implementation – TVA is using a FLEX 6.9 kV diesel generator. This DG is discussed in Enclosure 1, Section 3.8

2. The supplemental source must have capacity to bring a unit to safe shutdown (cold shutdown)[1] in case of a loss of offsite power (LOOP) concurrent with a single failure during plant operation (Mode 1).

   TVA Implementation – The FLEX DG capability is discussed in Enclosure 1, section 3.8

3. Multi-unit sites that have installed a single AAC power source for SBO cannot substitute it for the inoperable diesel when requesting AOT extensions unless the AAC source has enough capacity to carry all LOOP loads to bring the unit to a cold shutdown as a substitute for the EDG in an extended AOT and carry all SBO loads for the unit that has an SBO event without any load shedding.

   TVA Implementation – TVA is not using a SBO AAC power source, WBN is using a FLEX DG. The capability of the FLEX DG is discussed in Enclosure 1, Section 3.8

4. The time to make the AAC or supplemental power source available, including accomplishing the cross-connection, should be approximately one hour.

   TVA Implementation – Time to make FLEX DG available is approximately 1 hour and is discussed in Enclosure 1, Section 3.10.2.

[1] By “cold shutdown” it is not implied that the plant needs to go to cold shutdown during LOOP. The unit can remain in either hot shutdown or hot standby in accordance with its licensing basis for the short term. However if the offsite power is not recovered in a timely manner it may become necessary for the unit to go to cold shutdown, therefore the supplemental or AAC power source must have the capacity and capability to accomplish this function if needed.

5. The availability of AAC or supplemental power source should be verified within the last 30 days before entering extended AOT by operating or bringing the power source to its rated voltage and frequency for 5 minutes and ensuring all its auxiliary support systems are available or operational.

   TVA Implementation – Enclosure 4 provides a commitment to ensure the availability of one 6.9 kV FLEX Diesel Generator is 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. (Commitment 7)

6. To support the one-hour time for making this power source available, plants must assess their ability to cope with loss of all AC power for one hour independent of an AAC power source.

   TVA Implementation – This item is discussed in Enclosure 1, Section 3.10.2.

7. The plant should have formal engineering calculations for equipment sizing and protection and have approved procedures for connecting the AAC or supplemental power sources to the safety buses.

   TVA Implementation – TVA has a formal engineering calculation to determine the voltage drop of and the ampacity of the power cabling systems associated with the two 6.9 kV 3MW Flex Diesel Generators supplying various loads on the 6.9-kV Shutdown Boards when the plant is in an outside of a design basis event. In addition, TVA has FLEX support instructions providing actions for the initial assessment of plant equipment and system status, staging FLEX equipment, and to align and start up the FLEX DGs in preparation for use in plant recovery.

8. The EDG or offsite power AOT should be limited to 14 days to perform maintenance activities.

   TVA Implementation – TS Required Action B.5, Restore DG to OPERABLE status, Completion Time limits the maximum allowed outage time to 14 days.

9 The TS must contain Required Actions and Completion Times to verify that the supplemental AC source is available before entering extended AOT.

   TVA Implementation – TS Required Action B.2 requires evaluation of the availability of the FLEX DG and Required Action B.5 extended outage Completion Time is contingent upon a FLEX DG being available.

10. The availability of AAC or supplemental power source shall be checked every 8-12 hours (once per shift).

TVA Implementation – TS Required Action B.2 requires that the availability of the FLEX DG be evaluated initially within 2 hours then once per 12 hours thereafter.

11. If the AAC or supplemental power source becomes unavailable any time during extended AOT, the unit shall enter the LCO and start shutting down within 24 hours.

    TVA implementation – One of the Completion Times for TS Required Action B.5 requires monitoring of the availability of the FLEX DG and the length of time from entry into Condition B, "One DG inoperable." If Condition B has been entered for ≥ 48 hours concurrent with the unavailability of the FLEX DG a maximum of 24 hours is allowed before entry into TS Condition G requiring a unit shutdown.

12 The staff expects that the licensee will provide the following Regulatory Commitments:

    a) The extended AOT will be used no more than once in a 24-month period (or refueling interval) on a per diesel basis to perform EDG maintenance activities, or any major maintenance on offsite power transformer and bus.

       TVA Implementation - Enclosure 3 provides a commitment to ensure the extended AOT will be used no more than once in a 18-month period (a refueling interval) on a per diesel basis to perform EDG planned maintenance activities. No limit is placed on the use of the extended AOT for unplanned maintenance. (Commitment 8)

    b) The preplanned maintenance will not be scheduled if severe weather conditions are anticipated.

       TVA Implementation – This activity has been implemented at WBN. Refer to WBN TS Bases Table 3.8.1-2, Item 2.

    c) The system load dispatcher will be contacted once per day to ensure no significant grid perturbations (high grid loading unable to withstand a single contingency of line or generation outage) are expected during the extended AOT.

       TVA Implementation – This activity is already in place at WBN. Refer to Enclosure 1, Section 3.8 for a discussion concerning this activity.

    d) Component testing or maintenance of safety systems and important non safety equipment in the offsite power systems that can increase the likelihood of a plant transient (unit trip) or LOOP will be avoided. In addition, no discretionary switchyard maintenance will be performed.

       TVA Implementation - Enclosure 4 provides two commitments to ensure component testing or maintenance of safety systems and important non safety

equipment in the offsite power systems that can increase the likelihood of a plant transient (unit trip) or LOOP will be avoided and to ensure no discretionary switchyard maintenance will be performed. (Commitments 3 and 4)

e) TS required systems, subsystems, trains, components, and devices that depend on the remaining power sources will be verified to be operable and positive measures will be provided to preclude subsequent testing or maintenance activities on these systems, subsystems, trains, components, and devices.

TVA Implementation - This activity is already in place at WBN. Refer to Enclosure 1, Section 3.8 for a discussion concerning this activity.

f) Steam-driven emergency feed water pump(s) in case of PWR units, and Reactor Core Isolation Cooling and High Pressure Coolant Injection systems in case of BWR units, will be controlled as "protected equipment."

TVA Implementation - Enclosure 4 provides a commitment to ensure the steam-driven emergency feed water pump will be controlled as "protected equipment." (Commitment 6)

For the commitments listed in Enclosure 4 TVA plans on placing this information in an operations technical instruction that provides the contingency actions to be taken for a planned or unplanned DG Outage or another nuclear power group standard program or process document.

REFERENCES:

1. BTP 8-8, "Onsite (Emergency Diesel Generators) and Offsite Power Sources Allowed Outage Time Extensions," dated February 2012. [ML113640138]

ENCLOSURE 3

List of New Regulatory Commitments

New 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.	
8	The extended diesel generator Completion Time will be used no more than once in an 18-month period on a per diesel generator basis to perform planned diesel generator maintenance activities.	