



Watts Bar Nuclear Plant (WBN)
Pre-Submittal Meeting for Proposed License Amendment
Request Regarding Shutdown Board Cleaning

September 6, 2018



Agenda

- Opening Remarks
- Scope of 6.9 kilovolt (kV) General Electric (GE) Metal Clad Switchgear Maintenance
- System Overview
- WBN Electrical Design
- Safety Related Load Distribution
- Effects of De-energized 6.9 kV Shutdown Board (SDBD)
- Proposed Technical Specification (TS) Changes
- Regulatory Precedent
- Schedule for Submittal
- Summary and Closing Remarks



Opening Remarks

- Due to WBN Unit 1 and Unit 2 sharing the alternating current (AC) electrical power distribution system and sharing several other systems, performing maintenance on a AC electrical power distribution subsystem (6.9 kV SDBD and associated 480 V SDBDs) for a shutdown unit also affects the operating unit.
- The current eight-hour completion time for a de-energized AC electrical power distribution subsystem does not support maintenance on a set of 6.9 kV/480 V SDBDs.
- The proposed license amendment request (LAR) will extend the completion time from eight hours to the most limiting Completion Time of the 'associated required features' when maintenance is performed on a set of 6.9 kV/480 V SDBDs with one unit in operation.

Scope of 6.9 kV GE Metal Clad Switchgear Maintenance

<u>ACTIVITIES</u>	<u>DURATION</u>
Clearance placement and removal (including load alignment)	12 hours
Ground placement and removal	9 hours
Compartment Inspections (21 compartments)	42 hours
E-16 light resistor replacements	
Pull-out fuse block tension	
Relay and Instrument	
PT drawer operation	
Circuit Breaker Interface Inspections and adjustments (17 breakers)	34 hours
Primary/Secondary disconnects	
Shutters	
Breaker position and interface measurements and adjustments	
Bus Inspection and Tests	8 hours
As-found and as-left megger	
DLRO	
Torque checks	

Note: The preventive maintenance activities for the 6.9 kV switchgear has the longest duration. The associated 480 V SDBDs and 1E MCCs will also be de-energized during this period. Preventive maintenance inspections for these boards is normally performed during the same outage window to minimize impact to the operating unit and to increase outage schedule efficiency.



System Overview

- The onsite Class 1E AC electrical distribution system supplies electrical power to two power trains shared between the two units.
- Some safety-related systems (e.g., Essential Raw Cooling Water (ERCW), Component Cooling (CCS), Emergency Gas Treatment (EGTS), Auxiliary Building Gas Treatment (ABGTS), Control Room Emergency Ventilation (CREVS), and Control Room HVAC (CRACS)) are shared between the units.
- Shared loads are distributed across both unit's AC electrical power distribution subsystems.

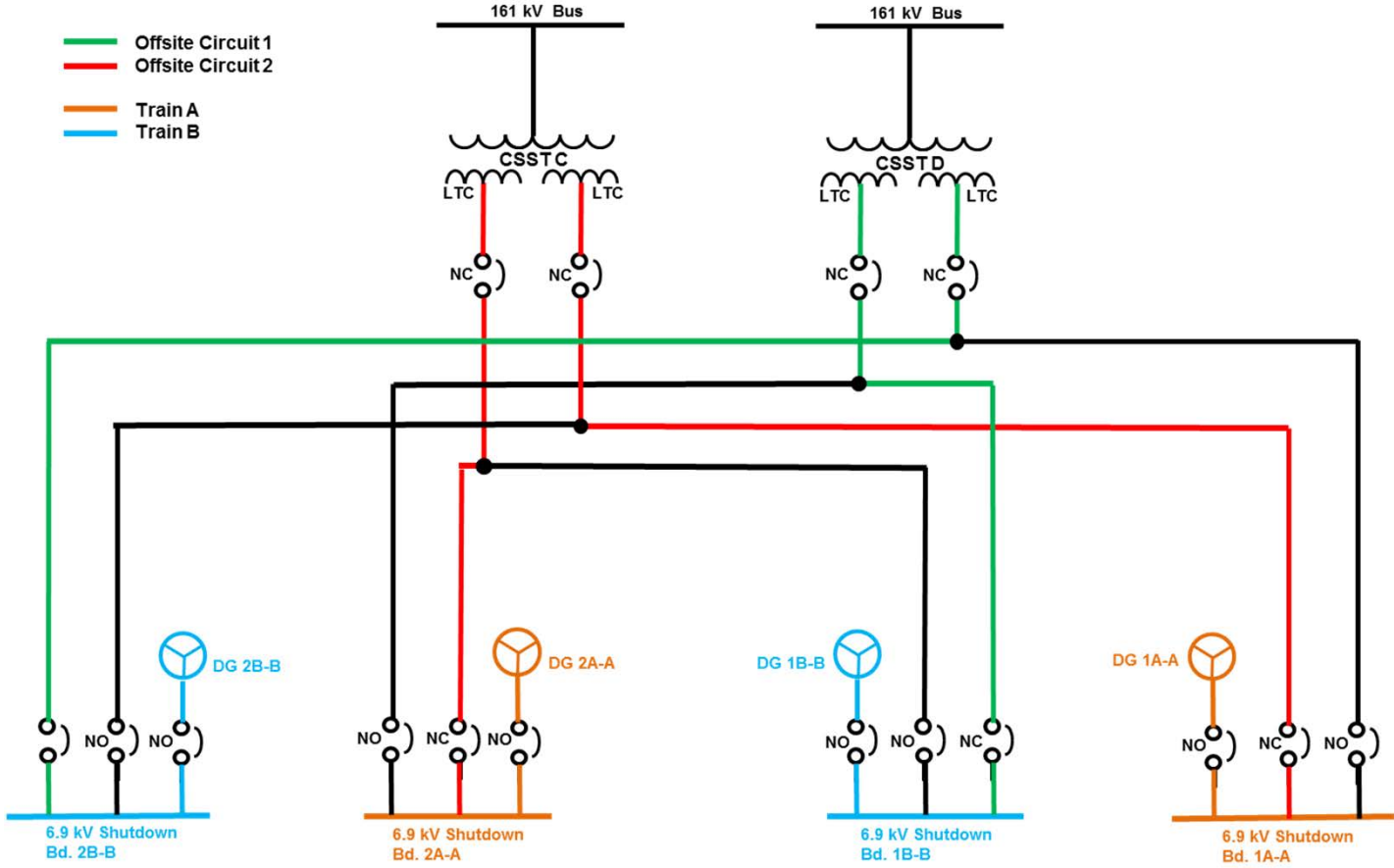


System Overview

- The core cooling and containment cooling system loads (e.g., Safety Injection (SI) pumps, Auxiliary Feedwater (AFW) pumps, Residual Heat Removal (RHR) pumps, Centrifugal Charging pumps, Containment Spray (CS) pumps, and Air Return System (ARS) fans) are unitized to the respective unit's 6.9 kV/480 V SDBDs.
- The impacts of an inoperable offsite power source or diesel generator (DG) on an opposite unit's SDBD differ from the impacts of an inoperable offsite power source or DG on an associated unit's SDBD, due to the loads powered from the respective board.

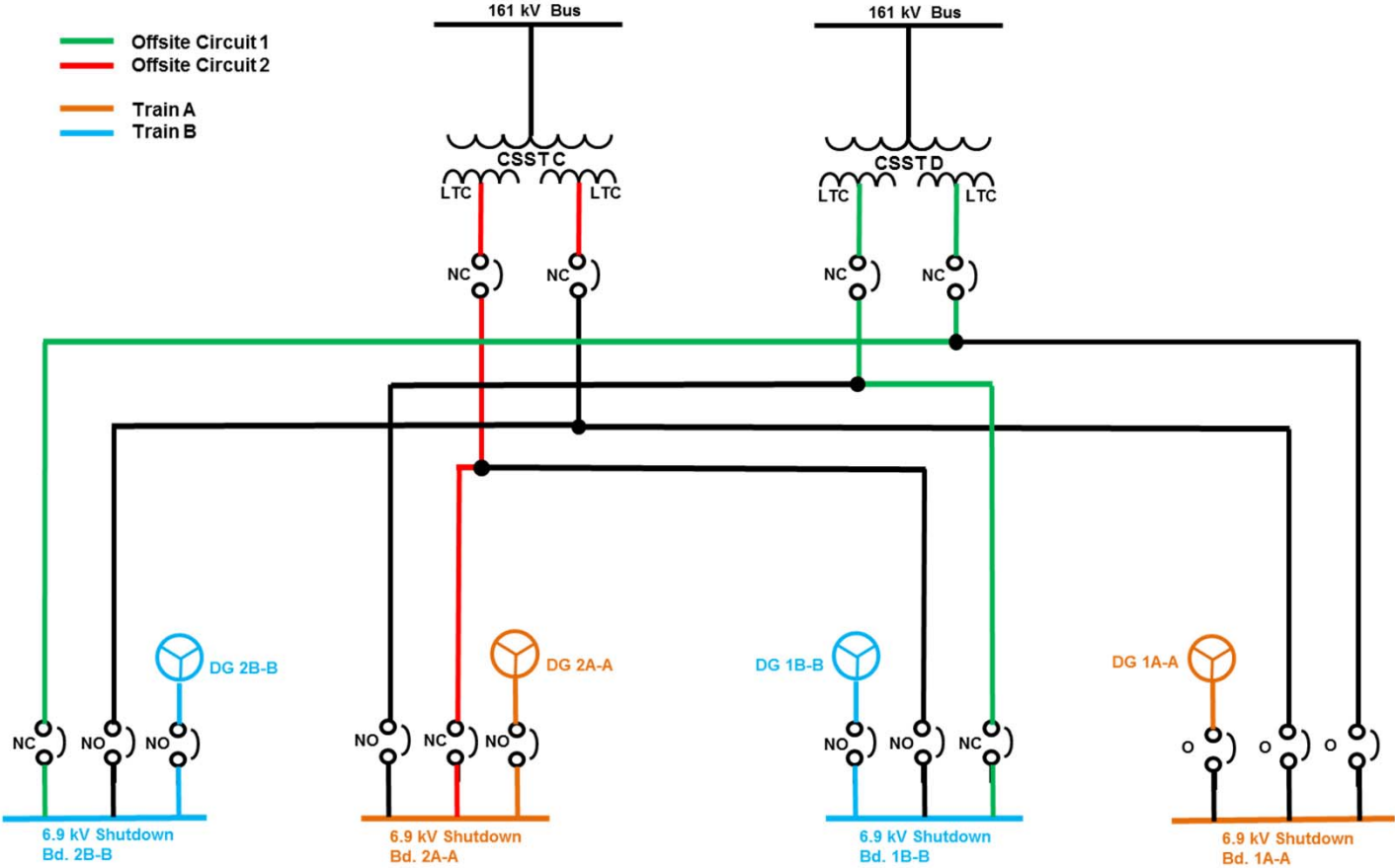
Watts Bar Electrical Design – Both Units in Operation

- Offsite Circuit 1
- Offsite Circuit 2
- Train A
- Train B

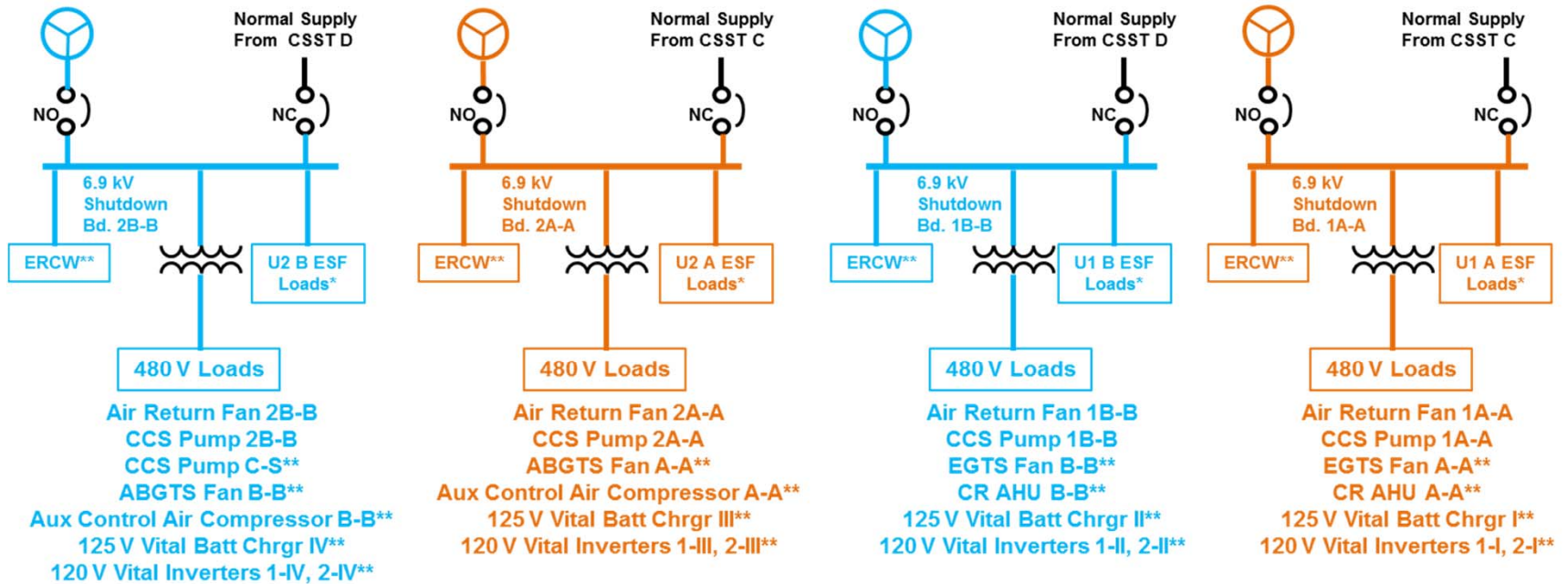


Watts Bar Electrical Design – 6.9 kV SDBD 1A-A De-energized

- Offsite Circuit 1
- Offsite Circuit 2
- Train A
- Train B



Safety Related Load Distribution - Both Units in Operation



*Unit Specific ESF Loads
CCP, SIP, RHR, AFW, CSS,
Przr Heaters

**Shared System

Example Effects of De-energized 6.9 kV SDBD

(For 6.9 kV SDBD 1A-A, Assuming Unit 1 in Mode 6 or defueled, Unit 2 in Mode 1)

<u>Unit 1 Systems</u>	<u>Required Modes</u>	<u>U1 / U2 TS Allowed Outage Time (AOT)</u>
SI pump 1A-A	1, 2, 3, 4	NA / NA
AFW pump 1A-A	1, 2, 3, 4	NA / NA
RHR pump 1A-A	1, 2, 3, 4, 5	NA / NA
Charging pump 1A-A	1, 2, 3, 4	NA / NA
CS pump 1A-A	1, 2, 3, 4	NA / NA
ARS fan 1A-A	1, 2, 3, 4	NA / NA
Pressurizer (Przr) Htr Grps 1A-A, 1D	1, 2, 3	NA / NA
<u>Shared Systems</u>	<u>Required Modes</u>	<u>U1 / U2 TS AOT</u>
ERCW pumps J-A, Q-A	1, 2, 3, 4, 5	NA / 72 hours
CCS pump 1A-A	1, 2, 3, 4, 5	NA / NA*
CCS pump C-S (Alt. Feeder)	1, 2, 3, 4, 5	NA / NA*
EGTS fan A-A	1, 2, 3, 4	NA / 7 days
Control Room (CR)		
Air Handling Unit (AHU) A-A	1, 2, 3, 4, 5, 6, During Irradiated Fuel Movement	7 days / 7 days
125 V Vital Battery Charger I	1, 2, 3, 4, 5, 6, During Irradiated Fuel Movement	NA* / 2 hours
120 V Vital Inverters: 1-I, 2-I	1, 2, 3, 4, 5, 6, During Irradiated Fuel Movement	NA* / 24 hours
AC electrical power distribution	1, 2, 3, 4, 5, 6, During Irradiated Fuel Movement	NA* / 8 hours
DG 1A-A	1, 2, 3, 4, 5, 6, During Irradiated Fuel Movement	NA* / 10 days
One offsite circuit	1, 2, 3, 4, 5, 6, During Irradiated Fuel Movement	NA* / 72 hours
DG 1A-A & one offsite circuit	1, 2, 3, 4, 5, 6, During Irradiated Fuel Movement	NA* / 12 hours

* With appropriate system lineup.

Proposed TS Changes to Facilitate SDBD Maintenance

<u>TS</u>	<u>Current</u>	<u>Proposed</u>	<u>Note</u>
LCO 3.8.1, AC Sources - Operating, Condition A	72 hours	New Condition C 7 days	When due to inoperable power source to opposite unit shutdown board.
LCO 3.8.1, AC Sources - Operating, Condition E	12 hours	Conditions B and C 10 days / 7 days	Enter Condition for inoperable DG and Condition for inoperable offsite circuit due to inoperable power source to opposite unit shutdown board.
LCO 3.8.7, Inverters - Operating Condition A	24 hours	NA	Remove AC power supply to inverter requirement.
LCO 3.8.9, Distribution Systems - Operating, Condition A	8 hours	New Condition D to declare affected features inoperable	When due to opposite unit AC shutdown board inoperable.
LCO 3.7.8, ERCW, Condition A	72 hours	7 days	Separate LAR to extend AOT for planned SDBD maintenance
LCO 3.8.4, DC Sources - Operating, Condition A	2 hours	7 days	Separate LAR to Adopt TSTF-500

Proposed WBN 1 TS 3.8.1 Changes (same for WBN 2)

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources - Operating

- LCO 3.8.1 The following AC electrical sources shall be OPERABLE:
- a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System; and
 - b. Four diesel generators (DGs) capable of supplying the onsite Class 1E AC Electrical Power Distribution System.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

NOTES

1. LCO 3.0.4.b is not applicable to DGs.
2. Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating," when any Condition(s) is entered with no AC power source to any shutdown board resulting in a de-energized shutdown board.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable <u>for reasons other than Condition D.</u>	A.1 Perform SR 3.8.1.1 for required OPERABLE offsite circuit.	1 hour AND Once per 8 hours thereafter
	A.2 Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to <u>6.9 kV Shutdown Board 1A-A or 1B-B</u> one train concurrent with inoperability of redundant required feature(s)
	AND	

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One required offsite circuit inoperable solely due to an offsite power source to <u>6.9 kV Shutdown Board 2A-A or 2B-B inoperable.</u>	D.1 Perform SR 3.8.1.1 for required OPERABLE offsite circuit.	1 hour AND Once per 8 hours thereafter
	AND	
	D.2 Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to <u>6.9 kV Shutdown Board 2A-A or 2B-B</u> concurrent with inoperability of redundant required feature(s)
	AND	
	D.3 Restore required offsite circuit to OPERABLE status.	7 days
DE. Two required offsite circuits inoperable.	DE.1 Declare required feature(s) inoperable when its redundant required feature(s) is inoperable.	12 hours from discovery of Condition D-E concurrent with inoperability of redundant required features.
	AND	
	DE.2 Restore one required offsite circuit to OPERABLE status.	24 hours

(continued)

Proposed WBN 1 TS 3.8.1 Changes (Continued) (same for WBN 2)

ACTIONS (continued)

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

(continued)

ACTIONS (continued)

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

Proposed WBN 1 TS 3.8.7 Changes (same for WBN 2)

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters-Operating

LCO 3.8.7 Two inverters in each of four channels shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One inverter in one channel inoperable.	A.1 -----NOTE----- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems-Operating", with any AC Vital Bus deenergized. Restore inverter to OPERABLE status.	24 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours
	<u>AND</u> B.2 Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.7.1 Verify correct inverter voltage, frequency, and alignment to required AC vital bus and from associated vital battery board and 480 V shutdown board.	7 days

Proposed WBN 1 TS 3.8.8 Changes (same for WBN 2)

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters - Shutdown

LCO 3.8.8 Inverters shall be OPERABLE to support the onsite Class 1E AC vital bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems - Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required inverter channels inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	<u>AND</u>	
	A.2.4 Initiate action to restore required inverters to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.8.1	Verify correct inverter voltage, frequency, and alignments to required AC vital bus and from associated vital battery board and 480-V shutdown-board.	7 days

Proposed WBN 1 TS 3.8.9 Changes (same for WBN 2)

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems - Operating

LCO 3.8.9 Train A and Train B AC, four channels of vital DC, and four channels of AC vital bus electrical power distribution subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more AC electrical power distribution subsystems inoperable, due to one or more Unit 1 AC shutdown boards inoperable.	A.1 Restore Unit 1 AC electrical power distribution subsystem to OPERABLE status.	8 hours <u>AND</u> 16 hours from discovery of failure to meet LCO
B. One or more Unit 1 AC vital buses in one channel inoperable.	B.1 Restore AC vital bus(es) to OPERABLE status.	2 hours <u>AND</u> 16 hours from discovery of failure to meet LCO
<p>NOTES:</p> <p>1. Only applicable during planned maintenance of a Unit 2 AC vital bus.</p> <p>2. Only applicable when Unit 2 is in MODE 5, MODE 6, or defueled.</p>		
C. One Unit 2 AC vital bus in one channel inoperable.	C.1 Restore the Unit 2 AC vital bus to OPERABLE status.	8 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or more Unit 2 AC vital buses in one channel inoperable for reasons other than Condition C.	D.1 Restore the Unit 2 AC vital bus(es) to OPERABLE status.	2 hours <u>AND</u> 16 hours from discovery of failure to meet LCO
E. One or more vital DC electrical power distribution buses inoperable.	E.1 Restore DC electrical power distribution bus to OPERABLE status.	2 hours <u>AND</u> 16 hours from discovery of failure to meet LCO
<p>NOTES:</p> <p>1. Only applicable during planned maintenance of a Unit 2 AC electrical distribution subsystem.</p> <p>2. Only applicable when Unit 2 is defueled or in MODE 6 following defueled with Unit 2 refueling, cavity level ≥ 23 ft. above top of reactor vessel flange.</p>		
F. One or more AC electrical distribution subsystems inoperable due to one or more Unit 2 AC shutdown boards inoperable.	F.1 Declare associated required feature(s) inoperable.	Immediately
G. One or more AC electrical distribution subsystems inoperable due to one or more Unit 2 AC shutdown boards inoperable for reasons other than Condition F.	G.1 Restore Unit 2 AC electrical power distribution subsystem(s) to OPERABLE status.	24 hours

(continued)



Regulatory Precedent

- The proposed changes are consistent with the changes made to the Sequoyah (SQN) TS during the ITS conversion (ML15238B460, ML15236A351, ML15258A511, ML15254A509, and ML15258A516).



Schedule for Submittal

- September 2018 – Pre-submittal meeting with NRC
- October 2018 – Submit LAR to NRC
- Request NRC approval by October 2019 with a 90-day implementation period to support the WBN Unit 1 outage scheduled for Spring 2020 (U1R16).
- December 2018 – Telecon or meeting to discuss any NRC questions



Summary

The proposed TS completion times for in-operable 6.9 kV and associated 480 V SDBDs considers the impact of shared loads required for an operating unit while providing a window for maximizing maintenance for the opposite unit when under outage conditions.

Closing Remarks

- Proposed LAR is needed to support a two-unit operating site at WBN.
- Due to the commonality of the AC electrical power systems, performing maintenance on 6.9 kV (and associated 480 V) SDBDs for a shutdown unit affects operability on the operating unit.
- The LAR will extend the completion times for inoperable AC electrical power systems when maintenance is performed on a shutdown unit when the opposite unit is in operation.
- This LAR is needed to support the WBN Unit 1 outage scheduled for Spring 2020.

