

CCNPP TS Extended AOT LAR to support the Electrical Distribution Reliability Improvement Project (EDRIP)

NRC Pre-Submittal Meeting
June 14 2018



Agenda / Opening Remarks

- Introductions
- Expected outcome for meeting
- EDRIP description
- LAR Overview
- BTP 8-8 Compliance
- CREVS/CRETS
- Additional Insights
- Closing Remarks

Introductions

EDRIP

Lennie Daniels

LAR Licensing Lead

Frank Mascitelli

Licensing CCNPP Lead

Rick Villar

Site Regulatory

Ken Greene

LAR Technical Lead

Bob Stark

LAR Risk Engineer

Jon Facemire

LAR Operations

John Phillippi

Manager-System Eng.

David Baker

Expected Outcome of Meeting

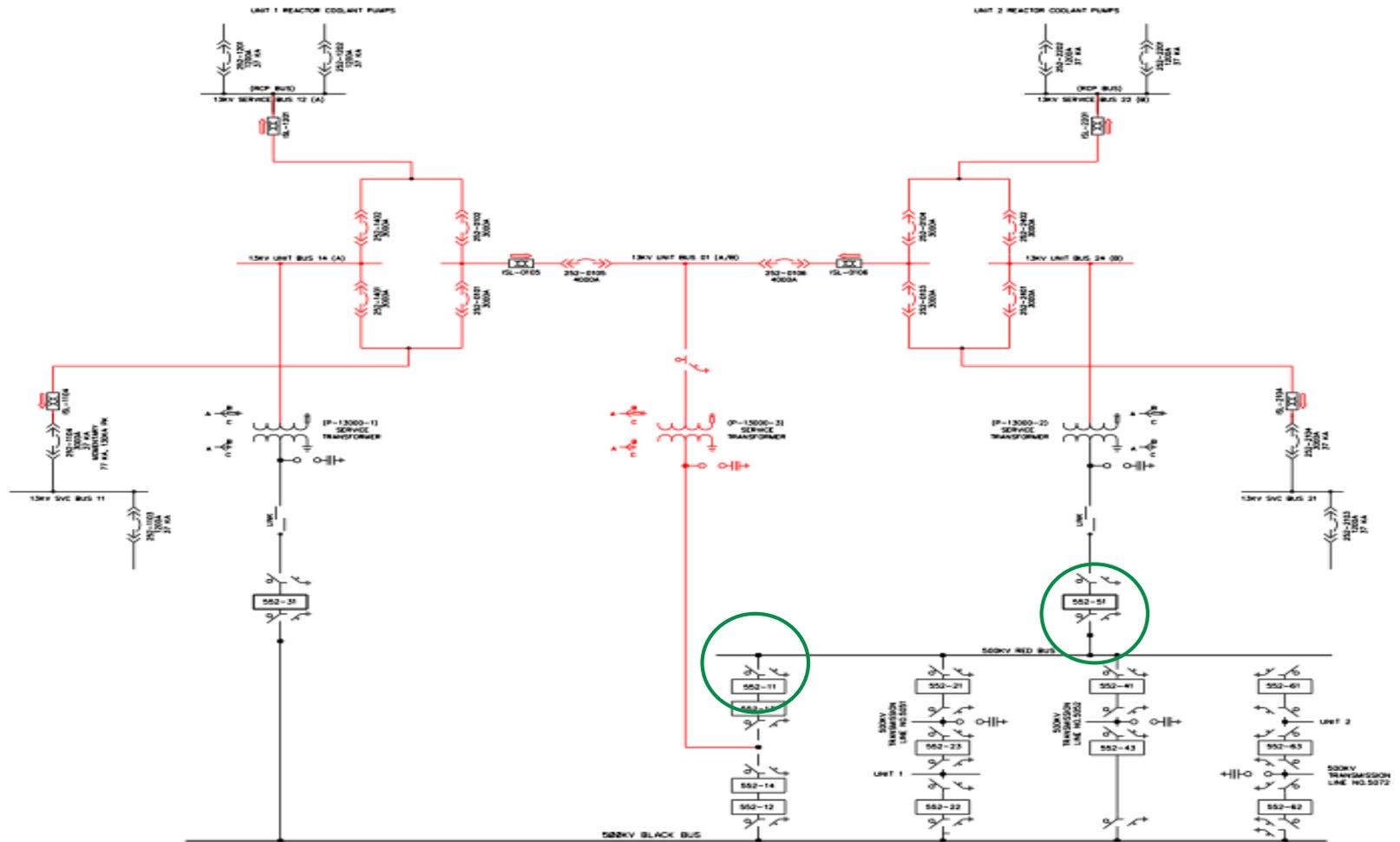
- NRC has clear understanding of basis for 14-day AOT request.
- NRC communicates requirements that are needed to facilitate a timely 4-5 month review.
- CCNPP personal have a clear understanding of what is required.
- Minimize need for RAIs.

EDRI Project Scope

Calvert Cliffs is installing a third “swing” transformer. This transformer will be tied to both 500 kV electrical buses (Red and Black) and both Units 13 kV distribution system. The plan to have all of the 13 kV power systems connected in a “ring” bus configuration.

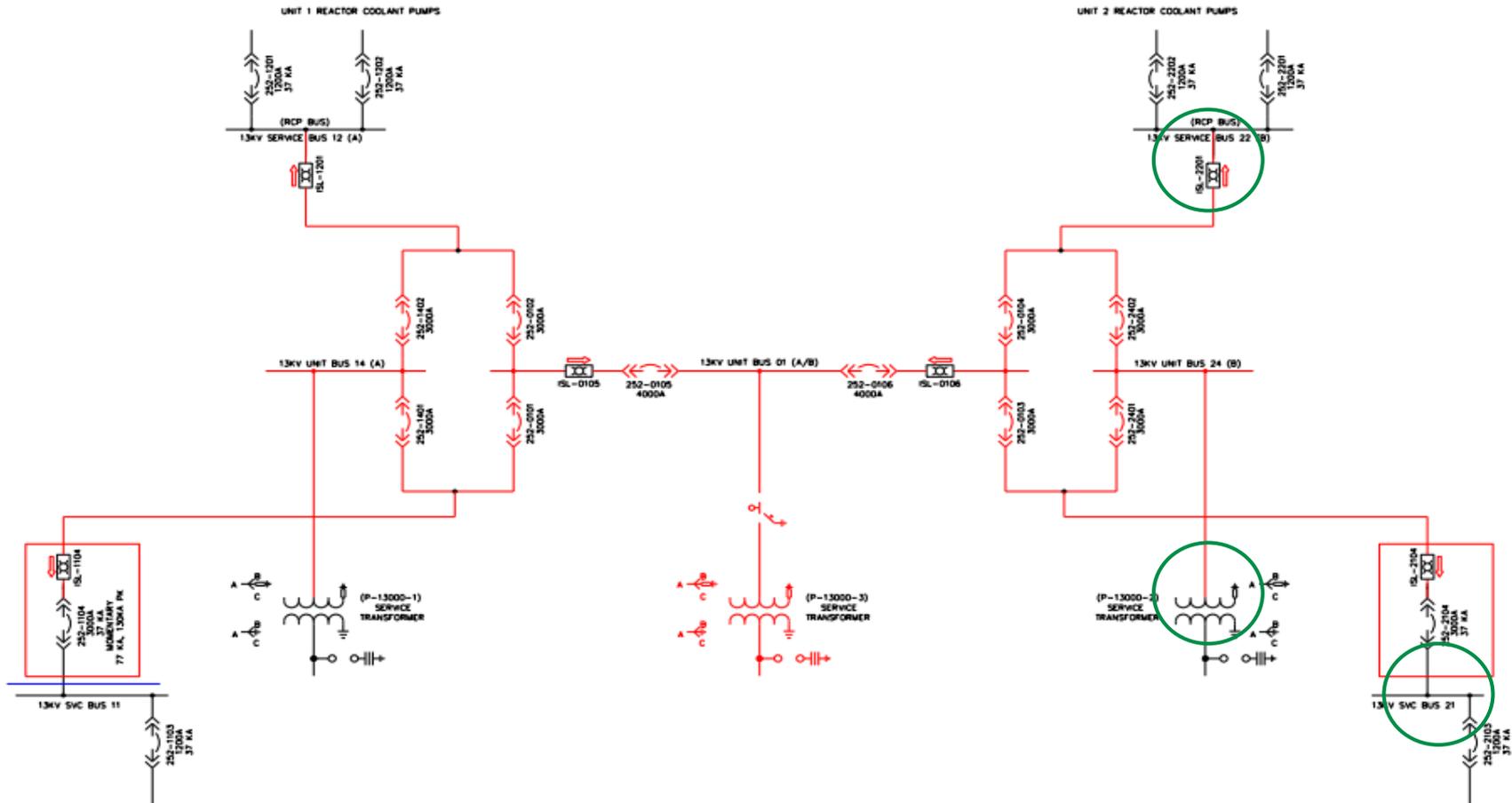


EDRIP Description - High Voltage Scope



EDRIP Description – Medium Voltage Scope

Ring and Split Bus Arrangement.



EDRIP Description AOT request basis

- Minimal 14-Day AOT period requested for TS 3.8.1.A.3 and D.3.

EDRIP LAR 14 DAY LCO				07-Jun-18 08:43				
Activity Name	Dur	Start	Finish	March 2019				
				18	25	04	11	
EDRIP LAR 14 DAY LCO								
2019 UNIT TWO REFUELING OUTAGE								
2019 Unit Two Refueling Outage	26	18-Feb-19	16-Mar-19					
Hang System Tags	1	21-Feb-19	21-Feb-19					
Offsite Power Unavailable	14	21-Feb-19	07-Mar-19					
Clear System Tags	1	06-Mar-19	07-Mar-19					
SWITCHYARD								
Switchyard	13	21-Feb-19	06-Mar-19					
Hybrid Towers	3	21-Feb-19	24-Feb-19					
Red Bus Expansion	4	21-Feb-19	25-Feb-19					
Red Bus Relays	4	22-Feb-19	25-Feb-19					
Hybrid Breaker Wiring	4	24-Feb-19	28-Feb-19					
Relay Trip Path Testing	6	28-Feb-19	06-Mar-19					
P13000-2								
P13000-2	13	21-Feb-19	06-Mar-19					
P13000-2 Testing	6	21-Feb-19	27-Feb-19					
Transformer Secondary	2	27-Feb-19	01-Mar-19					
Bus 21 Non-Seg Connections	2	27-Feb-19	01-Mar-19					
Bus 22 Non-Seg Connections	2	27-Feb-19	01-Mar-19					
Non-Seg Bus Tests	3	01-Mar-19	04-Mar-19					
Bus 01 and 14 Testing	3	02-Mar-19	05-Mar-19					
DCS Testing	3	03-Mar-19	06-Mar-19					

EDRIP Description-Project status



EDRIP Description-Project status





LAR Overview

PROPOSED CHANGES

- TS 3.8.1 Actions A.3 and D.3

BACKGROUND

- Offsite Circuit Electrical Distribution
- Onsite Circuit Electrical Distribution
- Emergency Diesel Generators (EDGs)
- Station Blackout (SBO) Description
- Control Room Emergency Ventilation System (CREVS) and Control Room Emergency Temperature Control System (CRETS)
- Electrical Distribution Reliability Improvement Project (EDRIP) Description

TECHNICAL ANALYSIS

- Station Electrical Power Configuration during the 14-day AOT Period
- NUREG-0800 Branch Technical Position (BTP) 8-8 Requirements
- CREVS/CRETS
- Risk Analysis Insights

REGULATORY ANALYSIS

- Applicable Regulatory Requirements/Criteria
- Precedent
- No Significant Hazards Consideration
- Conclusions
- Request a relatively quick turnaround (need by mid-Dec 2018). Submittal expected by mid-July 2018 (5 month NRC review time)



LAR Overview (continued)

- TS LCO 3.8.1.a, Action A.3

A footnote will be added to TS LCO 3.8.1.a, Action A.3 to extend the 72-hour AOT (or Completion Time) for one inoperable offsite circuit to 14 days:

Insert * after 72 hours in TS LCO 3.8.1.a, Action A.3:

Add the following footnote:

“ *Or 14 days, once during each applicable 2019 and 2020 Refuel Outage, for the connection of the new P-13000-3 Service Transformer.”

- TS LCO 3.8.1.c, Action D.3

A footnote will be added to TS LCO 3.8.1.c Action D.3 to extend the 72-hour AOT (or Completion Time) to declare the CREVS and CRETS train supported by the inoperable offsite circuit inoperable to 14 days:

Insert * after 72 hours in TS LCO 3.8.1.c, Action D.3:

Add the following footnote:

“ *Or 14 days, once during each applicable 2019 and 2020 Refuel Outage, for the connection of the new P-13000-3 Service Transformer.”

- TS Markups



BTP 8-8 Compliance

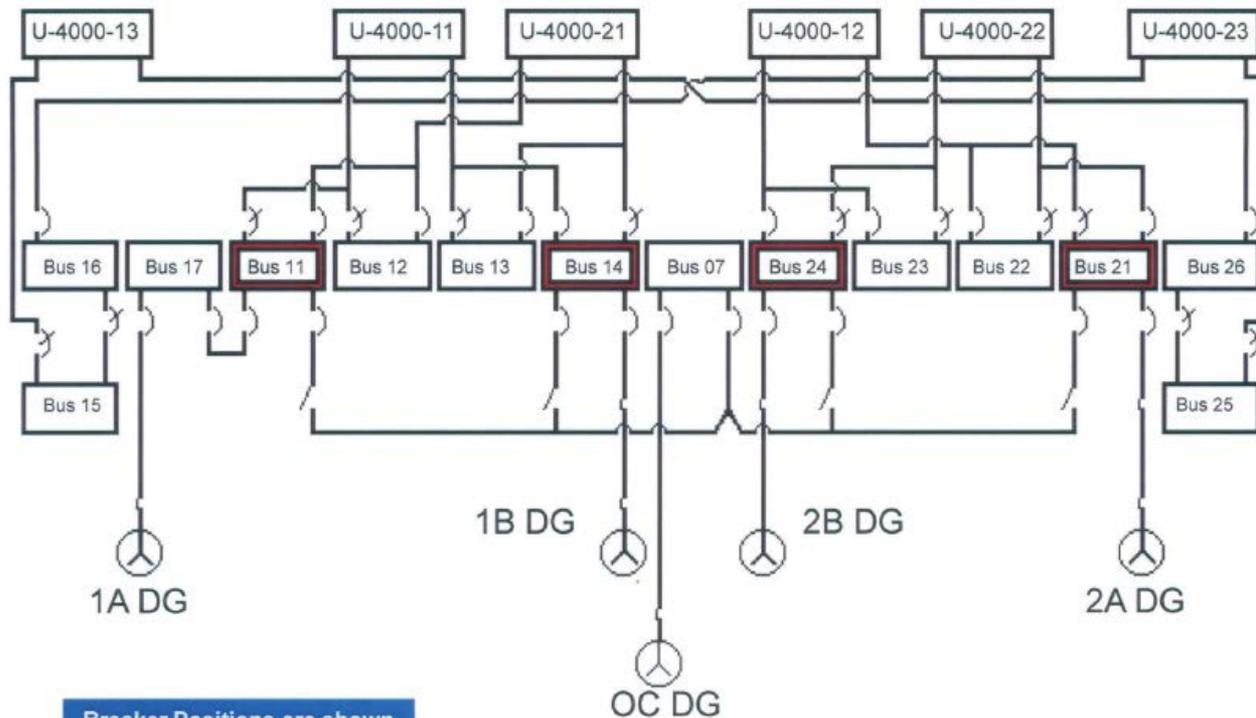
- RFO CC2R23 plant configuration during February 2019 14-day AOT period:
 - Unit 1 is full power operation, Unit 2 is approximately 3rd day into refuel outage Mode 5 or 6 and all plant ESF buses are being supplied by one offsite circuit.
- NOTE – the following discussion is based on the plant configuration during the 2019 refuel outage (CC2R23); however, it will also be applicable to the plant configuration during the 2020 refuel outage (CC1R25) where Unit 1 would be the plant in Mode 5 or 6 and Unit 2 would be the full power unit. All required emergency safety related diesel generators (1A, 1B, 2A or 2B) will be protected and maintained operable through the duration of the AOT extension for both outages.

BTP 8-8 Compliance (continued)

- Discuss how BTP 8-8 Requirements are being satisfied.
 - Well defined existing Defense-in-Depth (DID) Strategy for Loss-of-Offsite Power (LOOP), Station Blackout (SBO) and Extended Loss of AC Power (ELAP) events.
 - Existing installed capability and procedures are adequate in lieu of additional new alternate AC power source.
 - FLEX Equipment and supporting procedures available to both operating and shutdown unit during 14-AOT period.
 - Existing SBO EDG credited as supplemental source for Unit 1 with capacity for Unit 2 SBO loads during shutdown condition.
 - Additional DID - SMECO offsite circuit available via 13kV bus 11 and 480V FLEX EDG's for Unit 2 480V Buses.

BTP 8-8 Compliance (continued)

4.16 KV Distribution



Breaker Positions are shown in the NORMAL Lineup

BTP 8-8 Compliance (continued)

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

Technical Basis for Conformity:

- Per the existing EDG loading calculation, E-88-015, “Diesel Generator Accident Loading,” worst case shutdown loading for 4 kV bus 11 is 3515.3 KW and 4 kV bus 14 is 2338.6 KW.
- Assume a Loss-of-Coolant Accident (LOCA) in the operating unit with a concurrent Loss-of-Offsite Power (LOOP) and the most limiting single failure being the 1A EDG (which supplies bus with the highest load and supplies the back-up power for one train of CREVS and CRETS).
- The OC EDG continuous rating is 5400 KW, thus it can meet the electrical load requirements for 4 kV bus 11 or 14 during a LOOP concurrent with a single failure.

BTP 8-8 Compliance (continued)

- b) *The permanent or temporary power source can be either a diesel generator, gas or combustion turbine, or power from nearby hydro units. This source can be credited as a supplemental source, that can be substituted for an inoperable EDG during the period of extended AOT in the event of a LOOP, provided the risk-informed and deterministic evaluation supports the proposed AOT and the power source has enough capacity to carry all LOOP loads to bring the unit to a cold shutdown.*

Technical Basis for Conformity:

- Two sources of supplemental power are available to be substituted for an inoperable EDG.
 - OC EDG (SBO) EDG
 - Air cooled EDG purchased to the same equipment specifications as the safety related 1A EDG.
 - Sufficient capability (5400 KW) to carry all LOOP loads.
 - OC EDG can be aligned to any of the safety buses within 40 to 60 minutes.
 - SMECO offsite source (5 MW)
 - Can be made available within 10 minutes to power the 11, 14, 24, 21 ESF Buses.
 - SMECO line designed with capability for accident loads on one unit and shutdown loads on the other.
 - Alignment is done using procedures EOP-0 and OI-27E.

BTP 8-8 Compliance (continued)

c) 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.

Technical Basis for Conformity:

- As described above, the OC EDG has sufficient capability (5400 KW) to carry all Unit 1 LOOP loads to bring Unit 1 to a cold shutdown condition.
- Unit 2 will be in cold shutdown or refueling condition during the AOT with its EDGs protected.
- In the event of a SBO condition in Unit 1, the OC EDG (SBO EDG) has the capacity to carry all the necessary loads and can be connected in under 60 minutes.
- Additional DID actions are provided with the ability of the SMECO feed:
 - Can be made available within 10 minutes to power any two of the (11, 14, 24, 21) ESF Buses.
 - SMECO line designed with capability for accident loads on one unit and shutdown loads on the other.
 - Alignment is done using procedures EOP-0 and OI-27E.

BTP 8-8 Compliance (continued)

d) For plants using Alternate Alternating Current (AAC) or supplemental power sources discussed above, the time to make the AAC or supplemental power source available, including accomplishing the cross-connection, should be approximately one hour to enable restoration of battery chargers and control reactor coolant system inventory.

Technical Basis for Conformity:

- CCNPP has a defined SBO coping time of 1 hour per the UFSAR.
- Total time to power any of the four ESF 4kV buses by the SBO Diesel for either unit is less than 60 minutes.
- This time considered a Time Critical Action (TCA) and the Operations expected performance time to re-align the OC EDG is 40 minutes.

BTP 8-8 Compliance (continued)

e) *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.*

Technical Basis for Conformity:

- The OC EDG is tested on a monthly frequency per Performance Evaluation O-024-08-O-M. This test is performed in accordance with procedure OI-21C and is a two hour fully loaded run of the SBO diesel connected to one of the 4kV ESF buses. The selected 4kV ESF bus is rotated every month it is performed.
- The OC EDG will be tested prior to entering the extended AOT to eliminate the need of testing during the extended AOT.

BTP 8-8 Compliance (continued)

f) 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.

Technical Basis for Conformity:

- CCNPP has a one-hour coping capability per UFSAR 1.8.2 (Station Blackout) and procedures EOPs-7-1 and 2 (Station Blackout) and EOP-7 Technical Basis Document.
- Evaluation in accordance with RG 1.155, “Station Blackout,” and one hour was considered adequate coping time for the various parameters (e.g., condensate inventory, Class 1E battery capacity, compressed air, loss of ventilation, etc., and additional modifications of a safety related EDG and non safety related OC (SBO) EDG.

BTP 8-8 Compliance (continued)

g) 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.

Technical Basis for Conformity:

- CCNPP EDG loading calculation, E-88-015 “Diesel Generator Accident Loading,” confirms the capability of the SBO Diesel to meet the shutdown load requirements.
- Calculation D-E-94-003 “Diesel Generator DG1A / DGOC Protective Relay Settings” contains protective settings and bases for the SBO Diesel. Calculation D-E-94-001 “Relay Settings and Coordination” contains protective setting bases for the associated 4kV bus breakers.
- During normal operations, OI-21C is the controlling procedure to start and load the SBO Diesel (OC EDG) on to any of the four 4kV ESF busses.
- In an SBO event, EOP-0, Post-Trip Immediate Actions and EOP-7, “Station Blackout,” directs starting and loading the OC EDG (SBO) Diesel on to the appropriate ESF bus as determined by the control room staff.
- Emergency Response Plan Implementing Procedure (ERPIP) – 611 allows for connecting more than one 4kV ESF bus to the SBO Diesel, if required.

BTP 8-8 Compliance (continued)

h) The EDG or offsite power AOT should be limited to 14 days to perform maintenance activities. The licensee must provide justification for the duration of the requested AOT (actual hours plus margin based on plant-specific past operating experience).

Technical Basis for Conformity:

- CCNPP is requesting a 14-day AOT period. See previous detailed EDRIP schedule (slide 7) of major installation activities planned in the 14-day AOT period.
- Possibility of extending to 16 days for extreme winter weather contingencies.

i) The Tech Specs (TS) must contain Required Actions and Completion Times to verify that the supplemental AC source is available before entering extended AOT.

Technical Basis for Conformity:

- The SBO Diesel has no Surveillance Requirements as it is Augmented Quality.
- However, procedure OI-21C, “OC Diesel Generator,” provides the direction for loading the SBO Diesel onto an ESF bus monthly per Performance Evaluation O-024-08-0-M.
- CCNPP will validate SBO Diesel functional availability by starting the SBO Diesel and loading onto an ESF bus within 60 minutes per OI-21C 30 days prior to entering the 14-day AOT period.

BTP 8-8 Compliance (continued)

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

Technical Basis for Conformity:

- CCNPP will check the availability of the SBO Diesel once per 12-hour shift per OI-21C.
- k) *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 or bus.*

Technical Basis for Conformity:

- The planned extended 14-day AOT will be used once for #21 13 kV bus out-of-service (OOS) window in the 2019 Unit 2 refueling outage and once for #11 13 kV bus OOS window in the 2020 Unit 1 refueling outage.
- l) *The preplanned maintenance will not be scheduled if severe weather conditions are anticipated.*

Technical Basis for Conformity:

- CCNPP will not perform any preplanned maintenance if severe weather conditions are anticipated.

BTP 8-8 Compliance (continued)

m) *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.*

Position:

- CCNPP will contact the system load dispatcher 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.

n) *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.*

Position:

- CCNPP will not conduct any 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 (unit trip) or LOOP.
- CCNPP will perform no discretionary switchyard maintenance on protected equipment.

BTP 8-8 Compliance (continued)

- o) 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.*

Technical Basis for Conformity:

- See answer to n). During the 2019 and 2020 refueling outages the remaining offsite power circuit and the SMECO feed will be controlled as protected equipment.

- p) Steam-driven emergency feedwater pump(s) (in the case of PWR units) will be controlled as protected equipment.*

Technical Basis for Conformity:

- The steam driven emergency feedwater pumps will be controlled as protected equipment.



BTP 8-8 Compliance (continued)

- Conclusion:
- Well defined existing DID Strategy and Procedures for LOOP, SBO and ELAP events:
 - EOP-0, “Post Trip Immediate Actions”
 - OI-27E, “SMECO Offsite Power System”
 - OP-CA-102-106, “Operator Response Time Program at Calvert Cliffs”
 - OI-21C, “OC Diesel Generator”
 - EOP-7-1, “Station Blackout,” Revision 20
 - EOP-7-2, “Station Blackout,” Revision 21
 - EOP-7 Technical Basis Document
 - ERPIP-611, “Severe Accident Management Restorative Actions”
Attachment 2, “Electrical Power Supplies”
 - OP-AA-108-117, “Protected Equipment Program”
- Note: not an all inclusive list of procedures and additional procedures are described in the LAR.



CREVS/CRETS

- CREVS/CRETS is embedded with LCO 3.8.1.c offsite circuit inoperable.
- Control Room Emergency Ventilation System (CREVS) and Control Room Emergency Temperature Control System (CRETS).
- The CREVS/CRETS consists of two trains (11 and 12).
 - Redundant trains cross powered from other unit.
- CREVS/CRETS 11 train is normally powered from the Unit 1 4.16 kV ESF Bus 11, which is connected to 13.8 kV Bus 11 offsite circuit.
 - backed up by 1A EDG.
- CREVS/CRETS 12 train is normally powered from the Unit 2 4.16 kV ESF Bus 24, which is connected to 13.8 kV Bus 21 offsite circuit.
 - backed up by 2B EDG.



CREVS/CRETS (continued)

- The TS bases for the Action TS 3.8.1.D.3 to declare the redundant CREVS/CRETS train inoperable when its offsite circuit is inoperable is consistent with RG 1.93, Revision 0, "Availability of Electric Power Sources," December 1974.
- With one offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased.
- The proposed TS actions to delay declaring the redundant CREVS/CRETS train inoperable for an additional 11 days (three days existing plus 11 days for total AOT of 14 days) is reasonable timeframe based on:
 - All safety analysis being satisfied for a DBA requiring CREVS/CRETS occurring during 14-day AOT period.
 - Availability and redundancy of the proposed SBO diesel and SMECO 69 kV line to feed 11 and 24 ESF Buses (reference slide 14 - 4 kV Distrib.)
 - low probability of a DBA requiring CREVS/CRETS occurring during 14-day AOT period.
 - Operability of all safety-related EDGs required for Tech Specs (2 online, 1 shutdown).
 - Operability of EDGs associated with both trains of CREVS/CRETS.



CREVS/CRETS (continued)

- Design Basis Impacts Analysis
 - Most relevant UFSAR Ch. 14 Safety Analysis Events:
 - Loss of Non-Emergency AC Power – No Impact
 - Loss of Coolant Accident – No Impact
 - Maximum Hypothetical Accident – No Impact
 - All of these events assume a concurrent loss of offsite power at the initiation of the accident. Having a reduced onsite electrical distribution system at the 500kV and 13kV level has no impact to the resultant plant configuration or response to any of the UFSAR Ch. 14 analyzed events. CCNPP is designed to rely on the Class 1E electrical distribution system beginning at the 4kV level.
- Station Blackout/Flex Impacts Analysis
 - CCNPP SBO Coping Time = 1 hour.
 - Flex Strategy Implemented at onset of Extended Loss of AC Power (ELAP) - 1 hour.
 - The proposed plant configuration in this LAR does not inhibit or alter CCNPP's procedures or approach to an experienced SBO or ELAP. This analysis assumes an extended loss of the regional grid and the resultant plant condition is unchanged.

Additional Insights

- Good Risk Metrics
 - 14-day AOT period risk is low (below RG 1.177 acceptance limits).
- Maintenance Rule Risk Review performed and additional measures will be taken for weather events.
- Additional contingency time being considered for AOT period.
 - February Outage in Mid Atlantic region.
 - Past OE.
 - Maintain safety focus versus schedule adherence.

Closing Remarks

- Review meeting outcome expectations.
- Summary of understandings.
- Questions/Follow-up.