

Level RO Tier 1 Group 1 K/A# 055 2.2.25 Imp. RO 2.5 Imp. SRO 3.7

12. The coping study that was done to support the analysis for a loss of all AC power event at Prairie Island took credit for the condensate storage tanks (CSTs). The minimum volume of water in the CSTs ensures the affected unit can be...
- a. placed in MODE 5 within 20 hours.
  - b. maintained in HOT STANDBY for at least 36 hours.
  - c. maintained in HOT SHUTDOWN for at least 36 hours.
  - d. placed in MODE 4 within 20 hours.

ANSWER: D

- Explanation:
- a. Plausible because it matches the timeline for CST volume but not correct because cooling using the CST can not ensure Tavg can be reduced below 200°F.
  - b. Plausible because the CST basis discusses maintaining MODE 3 but incorrect because the CST does not have enough water for 36 hours.
  - c. Plausible because the CST can provide the water needed to cool down to MODE 4 but incorrect because the CST does not have enough water for 36 hours.
  - d. Correct.

Technical References: T.S. LCO 3.7.6 Bases  
Design Basis Document for Station Blackout

Objective: P8186L-008

KA Statement: Equipment Control: Knowledge of bases in technical specification for limiting conditions for operation and safety limits. (Station Blackout)

Cog. Level:	HIGH	10CFR55.41:	10CFR55.43:	YES	New Question:	YES
Bank:		Ques. ID:	Modified:		Last NRC Exam:	

**Recommend RO Question #12 be deleted from the examination.**

The Station Blackout (SBO) Rule Compliance Report credits the T.S. (3.4.B.1.d) minimum volume of 100,000 gallons with meeting the requirement of the SBO rule.

The Basis for T.S. LCO 3.7.6 discusses the minimum quantity of water in a CST on a single unit basis with the unit drawing water from its associated CST.

The exam question refers to CSTs (plural) and affected unit (singular). The normal plant configuration for Prairie Island (PI) has the Condensate Storage Tanks (CSTs) crosstied via valve C-41-2. We ensure this valve is maintained open by placing a Safeguards Hold card on the valve in accordance with SWI O-3, "Safeguards Hold Cards & Component Blocking or Locking."

This normal alignment provides a minimum of 200,000 gallons to a single affected unit. This is double the water discussed to in the LCO basis. Since the answer was based on the LCO basis and the question stem establishes conditions that are different, there is no correct answer for RO Question #21.

Ref: Design Bases Document Station Blackout, page 67 of 80  
T.S. Bases, CSTs, Pages B3.7.6-2 and 3  
Flow Diagram NF-39220 (in area D7)  
SWI O-3 Table 1, Page 16 of 30  
Checklist C28-1, Page 9 of 15

## STATION BLACKOUT

- RCS Inventory Control
- RCS Pressure Control
- RCS Wide Range Pressure
- RCS Wide Range Temperature
- Reactor Trip
- Reactor Vessel Level (RVLIS)
- Reactor Vessel Head Vent
- Safeguards Chilled Water
- Steam Generator Heat Removal
- Steam Generator Level
- Steam Generator Wide Range Level
- Steam Release Radiation/Flow Monitors
- T (SAT) Meter

The equipment identified in the Coping Study to perform the functions above includes the reactor trip breakers, the charging pumps, the refueling water storage tank, hot and cold leg temperatures, RCS pressure transmitters, component cooling to RCPs, motor driven auxiliary feedwater pump, turbine driven auxiliary feedwater pump, main steam safety valves, and instrumentation to monitor the listed functions.

**4.2.4 Station Blackout Coping Capability Analyses.** Section (a)(2) of 10 CFR 50.63 requires that “the capability for coping with a station blackout of [4 hours] shall be determined by an appropriate coping analysis” [Reference 6.1.1]. References 6.1.3 and 6.1.4 provide guidance acceptable to the NRC for performing the required analysis. Since the AAC source is available within ten minutes, a full coping analysis is not required [Reference 6.1.1 Section (c)(2)]. However, it is necessary to demonstrate the availability of sufficient condensate inventory for the four hour coping duration.

- A. **Condensate Inventory.** Sufficient condensate inventory shall be available for decay heat removal during a 4-hour SBO at PINGP.

The Station Blackout Rule Compliance Report [Reference 6.3.1] states that 89,000 gallons of water is required for rapid cooldown of the RCS in accordance with 1ECA-0.0 and 2ECA-0.0 [Also see Reference 6.2.4]. Since the AAC power source is available, rapid cooldown is not necessary. The 89,000 gallons required for rapid cooldown is a bounding value of what PINGP needs for responding to a 4-hour SBO. PINGP Technical Specification 3.4.B.1.d [Reference 6.2.13] requires a minimum of 100,000 gallons in the Condensate Storage Tanks [Reference 6.6.16]. In addition, the Cooling Water system can provide an unlimited supply of river water for decay heat removal.

BASES

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BACKGROUND  
(continued)

Although the CSTs are a principal secondary side water source for removing residual heat from the RCS, they are not designed to withstand earthquakes and other natural phenomena, including missiles that might be generated by natural phenomena. However, the backup CL safety-related source is designed to withstand such phenomena.

A description of the CSTs is found in the USAR (Ref. 1).

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APPLICABLE  
SAFETY  
ANALYSES

The CSTs may provide high purity cooling water to remove decay heat and to cool down the unit following events in the accident analysis as discussed in the USAR (Ref. 2).

The 100,000 gallon CSTs useable volume requirement for each unit in MODE 1, 2, or 3 is sufficient to:

- a. Remove the decay heat generated by one reactor in the first 12 hours after shutdown; and
- b. Ensure sufficient water is available to cool down a reactor from 547°F to 350°F using natural circulation at 25°F/hour; or
- c. Ensure sufficient water is available to hold the unit in MODE 3 for 2 hours, followed by a cooldown to RHR entry conditions within the next 6 hours.

These calculations take into account the decay heat and reactor coolant system stored energy (Ref. 1).

The CST satisfies Criteria 2 and 3 of 10 CFR 50.36(c)(2)(ii).

BASES (continued)

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LCO                      The CSTs are considered OPERABLE when the CSTs' contents have at least 100,000 useable gallons per operating unit (MODES 1, 2, or 3).

This basis is established in Reference 2 and exceeds the volume required by the accident analysis.

The OPERABILITY of the CSTs is determined by maintaining the tank level at or above the minimum required level.

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APPLICABILITY        In MODES 1, 2, and 3, and MODE 4, when steam generator is being relied upon for heat removal, the CSTs are required to be OPERABLE.

In MODE 5 or 6, the CSTs are not required because the AFW System is not required.

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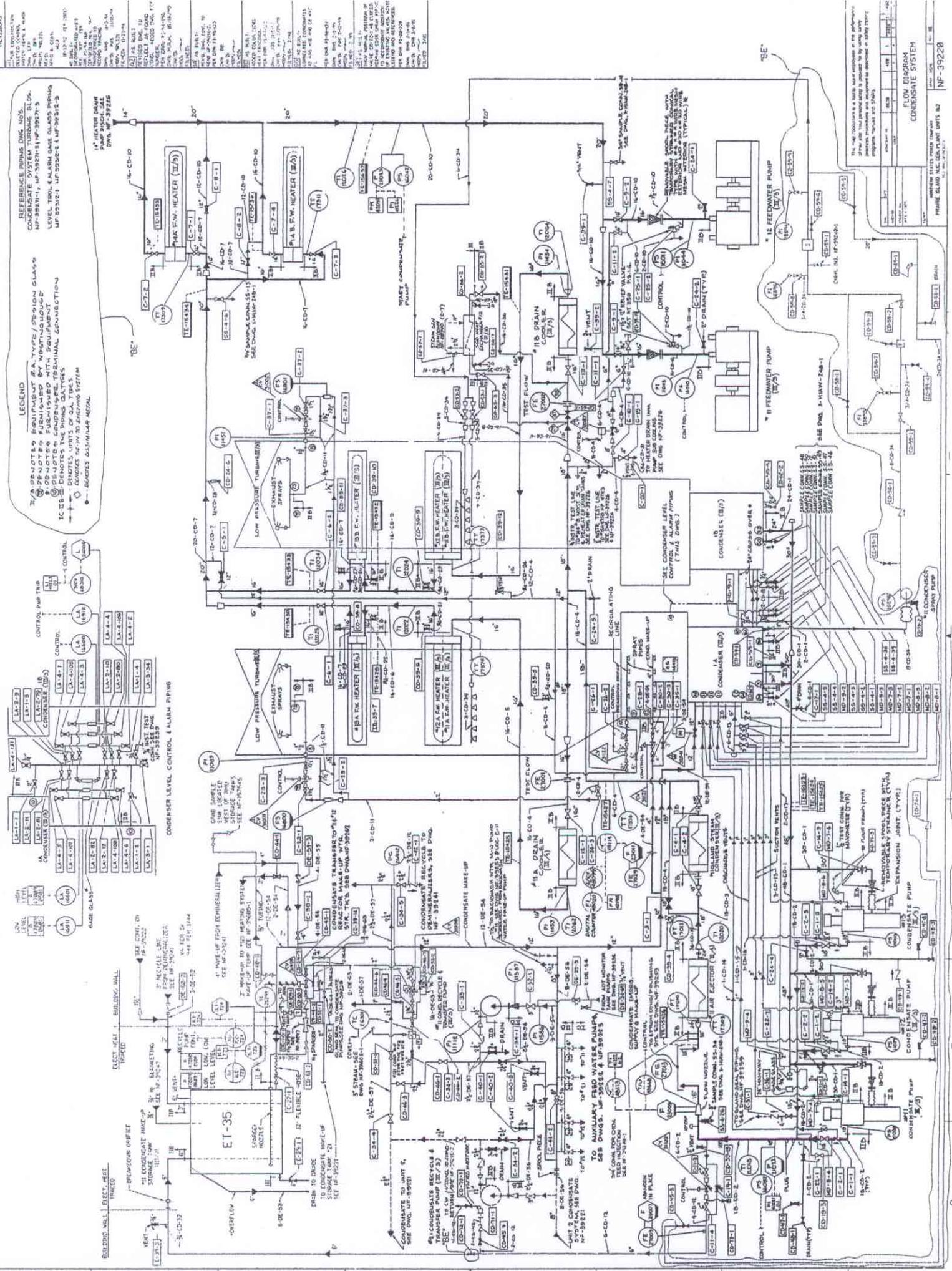
ACTIONS                A.1 and A.2

If the CSTs are not OPERABLE (e.g., level is not within limits), the OPERABILITY of the backup safety-related portion of the CL supply should be verified by administrative means within 4 hours and once every 12 hours thereafter. OPERABILITY of the backup safety-related portion of the CL supply must include verification that the flow paths from the backup water supply to the AFW pumps are OPERABLE in accordance with LCO 3.7.8. The CSTs must be restored to OPERABLE status within 7 days.

The 4 hour Completion Time is reasonable, based on operating experience, to verify the OPERABILITY of the backup safety-related portion of the Cooling Water supply. Additionally, verifying the backup water supply every 12 hours is adequate to ensure the backup water supply continues to be available. The 7 day Completion Time is reasonable, based on an OPERABLE backup

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**LEGEND**

TRAJECTORIES EQUIPMENT OR TYPE / DESIGN CLASS  
 CONDENSATE SYSTEM TURBINE CLASS  
 LEVEL TANK ALARM GASE GLASS PIPING  
 UP-39271-1, UP-39271-11, UP-39271-3  
 UP-39271-2, UP-39271-11, UP-39271-3  
 UP-39271-2, UP-39271-11, UP-39271-3

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REVIEWS

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CONDENSATE SYSTEM  
 FLOW DIAGRAM  
 CONDENSATE SYSTEM

CONDENSATE SYSTEM  
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 CONDENSATE SYSTEM



<b>C</b> CHECKLIST	<b>CONDENSATE SYSTEM - UNIT 1</b>	NUMBER:
		<b>C28-1</b>
		REV: <b>30</b>
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COMPONENTS	DESCRIPTION	STATUS	INITIAL
	<b>695' TURBINE BLDG (CONT'D)</b>		
C-34-3	11 COND RECYCLE AND TRANSFER PUMP DISCHARGE	OPEN	
C-34-1	11-21 COND RECYCLE AND TRANSFER PUMP CROSSOVER	CLOSED	
C-40-1	11 COND RECYCLE AND TRANSFER PUMP DISCH VLV DRAIN	CLOSED	
C-32-1	11 COND RECYCLE AND TRANSFER PUMP SUCTION VALVE	OPEN	
DE-29-5	ADT TO 11 COND RECYCLE AND TRANSFER PUMP	CLOSED	
C-41-2	U1/U2 COND X-CONN	BLOCKED & TAGGED OPEN	
C-40-4	21 COND RECYCLE AND TRANSFER PMP DISCH VALVE DRAIN	CLOSED	
C-34-2	21-11 COND RECYCLE AND TRANSFER PUMP CROSSOVER	CLOSED	
C-34-4	11-21 COND RECYCLE AND TRANSF PMP DISCH CROSSOVER	OPEN	
CD-113-5 ROOT ISOL	12 FW PMP SUCT PS-16011, 12 FW PMP SUCT PI-11044	OPEN	
CD-113-4 ROOT ISOL	11 FW PMP SUCT PS-16010, 11 FW PMP SUCT PI-11043	OPEN	
CP-30-1	11 BACKWASH WATER MAKEUP PUMP RECIRC	OPEN	
CP-12-1	11 BACKWASH WATER MAKEUP PUMP SUCTION	OPEN	
C-24-1	12 FWP SUCTION DRAIN	CLOSED	
C-24-2	11 FWP SUCTION DRAIN	CLOSED	
GS-10-12	SEAL INJECTION TO FW PUMP VENT	CLOSED	
CD-133-1 ROOT ISOL	1A CDSR COND M-U INLT F XMTR FT-23011 LO (E 0.7/4.1/695')	OPEN	