

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

1

10-105

Points: 1.00

Given:

- Unit 2 is at 100% Reactor Power.
- Reactor Trip Breaker testing is in progress.
- Reactor Trip Breakers (RTB) 'A' and 'B' are closed.
- Operators have just closed Reactor Trip Bypass Breaker (BYB) 'A'.

Subsequently the following occurs:

- A valid Reactor Trip demand signal is actuated.
- SSPS Train A actuates as designed.
- SSPS Train B fails to actuate.

Which ONE of the following describes how the RTB 'B' and BYB 'A' will respond?

	<u>RTB 'B'</u>	<u>BYB 'A'</u>
A.	OPEN	OPEN
B.	CLOSED	OPEN
C.	CLOSED	CLOSED
D.	OPEN	CLOSED

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Answer: C

Explanation / Justification:

- A. Incorrect. The RTB 'B' and BYB 'A' will not open with a failure of SSPS Train B to actuate. Plausible because the operator may believe that either SSPS Train will open all of the RTBs.
- B. Incorrect. BYB 'A' will not open with a failure of SSPS Train B. Plausible because the operator may believe that SSPS Train A will open BYB A.
- C. Correct. SSPS Train A will deenergize the UV coils for RTB 'A' and BYB 'B' and only energize the shunt coil for RTB 'A'. SSPS Train B will deenergize the UV coils for RTB 'B' and BYB 'A' and only energize the shunt coil for RTB 'B'. The shunt coils on the RTBs and BYBs will also energize from; 1) Manual SI from either train, 2) either Pistol Grip switches, or 3) RTB 'A' or RTB 'B' PB bezels on CC2 (trips the associated train RTBs only).
- D. Incorrect. RTB 'B' will not open with a failure of SSPS Train B.

Technical References:

Logic drawing 221051, simplified ESF-2

Proposed References to be provided:

None

Learning Objective:

NOS05RXPROT, Objective 7, Describe the function of the following Solid State Protection System (SSPS) components and how their normal and abnormal operation affects the Reactor Protection System: f & g, Reactor Trip Breaker and Bypass Breakers

Question Source:

Bank – Beaver Valley 2018 NRC RO36

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.7

Level:

RO

Category/System:

10-Reactor Trip

K/A #:

EPE07 EK2.02

Knowledge of the interrelations between a reactor trip and the following: Breakers, relays and disconnects

Importance:

2.6

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate requires knowledge of how the reactor protection system operates the reactor trip and bypass breakers. The operator needs to recognize which reactor trip breaker will respond given a failure of a SSPS Train.

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Additional References: (lesson plan NOS05RXPROT)

LESSON NAME: REACTOR PROTECTION SYSTEM
NOS05RXPROT-15

02/21/2020

- 1) Trip signals may be generated automatically or manually
 - a) Auto reactor trip (includes an Auto SI)
 - b) Manual reactor trip
 - c) Manual safety injection
 - d) Console pushbuttons
- 2) Breaker tripping can occur via the UV coils, or by the shunt trip coils
 - a) The local Trip pushbutton is a mechanical trip
 - b) Bypass Breakers have local trip (shunt coil) and close pushbuttons
- 3)

Action	Effect
Auto RT – A Train	RTA UV & Shunt; BYB UV
Auto RT – B Train	RTB UV & Shunt; BYA UV
General Warning	Auto Rx Trip on both trains
Manual RT	All 4 UVs; all 4 Shunts (everything)
Manual SI	All 4 Shunts
RTA Console PB	RTA Shunt
RTB Console PB	RTB Shunt
	Reference: Logic Diagram 221051

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2

11-140

Points: 1.00

Given:

- A manual reactor trip and SI have been actuated on Unit 1.
- A PZR safety valve has been stuck slightly open for ten minutes.
- RCS pressure is 1900 psig and slowly lowering.
- PZR vapor space temperature is 630 °F and stable.
- PRT level is 80% and slowly rising.
- PRT pressure is 35 psig and slowly rising.
- Containment pressure is 4 psig and slowly rising.

Currently, safety valve tailpipe temperature indication should be reading approximately:

- A. 282 °F
- B. 265 °F
- C. 230 °F
- D. 200 °F

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Answer: A

Explanation / Justification:

- A. Correct. The safety valve leak is a throttling process that follows a constant enthalpy process across the valve. The RCS pressure of 1900 psig (1915 psia) equates to an saturated vapor enthalpy (hf) of 1140 BTU/lb. Using the Mollier diagram and following the 1140 BTU/lb enthalpy line (horizontal) until it intersects with the pressure line for the PRT of 35 psig (50 psia). Then follow up the 50 psia line to determine the temperature which will be approx. 282 °F.
- B. Incorrect. Plausible if the applicant misapplies the Mollier diagram by throttling to PRT pressure of 35 psia and not 50 psia (35 psig).
- C. Incorrect. Plausible if the applicant misapplies the Mollier diagram by throttling to containment pressure of 4 psig (19 psia). The current conditions support the PRT rupture disc remaining intact, therefore this is incorrect.
- D. Incorrect. Plausible if the applicant misapplies the Mollier diagram by throttling to the saturation curve.

Technical References:

GFES Fundamentals, Steam Table Mollier Diagram

Proposed References to be provided:

None

Learning Objective:

NOS05PZR&L-12, Objective 16. Given any of the following and appropriate control room reference material, evaluate and determine the effect on the Pressurizer Pressure and Level Control System: Malfunctioning Valves

Question Source:

Bank – Bryon 2019 NRC RO1 (October exam)

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.7

Level:

RO

Category/System:

11-Pressurizer Vapor Space Accident

K/A #:

APE08 AK2.02

Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: Sensors and detectors

Importance:

2.7

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the applicant must determine the expected tailpipe temperature for a PZR safety valve that is leaking is different than that provided by sensor indication. The applicant must understand that a leak across a valve is a constant enthalpy (throttling) process and then using the Mollier diagram, use the enthalpy and throttling to PRT pressure to determine the approx. temperature of the tailpipe.

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3

10-119

Points: 1.00

Given:

- Unit 2 reactor tripped and Safety Injection actuated due to a small break LOCA.
- The crew has entered 2-EOP-TRIP-1, Reactor Trip or Safety Injection.
- The crew is performing step 12, Safeguard Valve Alignment.
- The RO notices on 2CC1 SAFEGUARDS ACTUATION Bezels that the “**ØA ISOLATION OPERATE**” Red light is lit for one train and is out for the other train.

Which ONE of the following completes both statements?

1. The train of Phase A (ØA) with the Red light __ (1) __ failed to actuate.
2. In accordance with 2-EOP-TRIP-1, control room operators will attempt to reposition the components associated with the lights on 2RP4 that are __ (2) __ on the train that failed to actuate.

- A. 1) lit
 2) lit
- B. 1) lit
 2) out
- C. 1) out
 2) lit
- D. 1) out
 2) out

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Answer: D

Explanation / Justification:

- A. Incorrect. Red light lit indicates the train actuated. Status lights on 2RP4 lit indicates that the component reposition to its safeguard position. Plausible because the operator may incorrectly determine how the status lights should indicate for a Phase A actuation and RP4 status panel.
- B. Incorrect. Red light lit indicates the train actuated. Second part is correct. Plausible because the operator may incorrectly determine how the status lights should indicate for a Phase A actuation and RP4 status panel.
- C. Incorrect. The first part is correct. Status lights on 2RP4 lit indicates that the component reposition to its safeguard position. Plausible because the operator may incorrectly determine how the status lights should indicate for a Phase A actuation and RP4 status panel.
- D. Correct. Red light not lit indicates that the train failed to actuate. The Phase A lights (Green) on 2RP4 not lit indicates that the component failed to reposition. IAW EOP-TRIP-1 step 12, if any safeguards valve is not in the required position, then place the valves in the safeguards position.

Technical References:

2-EOP-TRIP-1 (R40)

Proposed References to be provided:

None

Learning Objective:

NOS05TRP001-08, Objective 21. Determine the indications that are monitored to ensure proper system/component operation for each step in 2-EOP-TRIP-1.

Question Source:

Bank – Diablo Canyon 2019 NRC RO28

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.5 / 45.6

Level:

RO

Category/System:

10-Small Break LOCA

K/A #:

EPE09 EA1.08

Ability to operate and monitor the following as they apply to a small break LOCA: Containment isolation system.

Importance:

4.0

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is required to know how to determine if Phase A actuated properly by observing control room indications and the action required should a Phase A component failed to reposition.

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4

10-106

Points: 1.00

Given:

- Unit 1 is performing 1-EOP-APPX-7, CONTAINMENT SUMP BLOCKAGE.
- ALL RCPs are stopped.
- Attempts to establish containment sump recirculation have failed.
- 1-EOP-APPX-7, Step 43, **MAINTAINING RCS HEAT REMOVAL**, is in progress.
- The crew is dumping steam to the condensers from the intact SGs.

In accordance with 1-EOP-APPX-7, which ONE of the following is the reason for dumping steam from the intact SGs?

- A. To prevent a SG tube rupture.
- B. To allow time to make-up to the RWST.
- C. To raise injection flow provided by ECCS.
- D. To promote Core Reflux Cooling.

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Answer: D

Explanation / Justification:

- A. Incorrect. Plausible because the differential temperature between the primary and the secondary sides of the SG tubes would increase the potential for a tube rupture.
- B. Incorrect. Plausible since make-up would be something the crew would do to raise level in the RWST, but this is not the reason for performing step 43 in EOP-APPX-7.
- C. Incorrect. Plausible because dumping steam will increase the cooling down of the primary and lower primary plant pressure. This in turn will increase flow from the RH pumps and provide more cooling and more water inventory.
- D. Correct. IAW 2-EOP-APPX-7, step 43 bases document, the operator is instructed to maintain heat removal by either use of RHR System or by dumping steam. If the RCS is not full of liquid at this time, it is especially important to keep the secondary system adequately full of water to promote reflux cooling. Reflux cooling is the mechanism by which steam generated in the RCS enters the SG tubes and is condensed by the cold water on the SG secondary side. This liquid then remains in the primary system and promotes cooling.

Technical References:	1-EOP-APPX-7, Rev 2
Proposed References to be provided:	None
Learning Objective:	NOS05APPX00, Objective 3. Given any step, caution, or note in the EOP-APPX procedures, describe the basis
Question Source:	Bank – Byron 2019 NRC RO3 (Jan exam)
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.8 / 41.10 / 45.3
Level:	RO
Category/System:	10-Large Break LOCA
K/A #:	EPE 11 EK1.01
	Knowledge of the operational implications of the following concepts as they apply to the large break LOCA: Natural circulation and cooling, including reflux boiling.
Importance:	4.1
Tier/Group	Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is being ask why steam is being dumped in EOP-APPX-7 for promoting reflux boiling and natural circulation in the primary side during a large break LOCA.

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Additional Reference: 1-EOP-APPX-7 Bases for step 43

1-EOP-APPX-7, Rev. 2
Containment Sump Blockage Guideline

Basis Document
Page 95

EOP Step No: Step 43

ERG Step No: Step 43

EOP Step:

(CAS) MAINTAIN RCS heat removal:

[This step directs the Operator to maintain RCS heat removal capability either utilizing the RHR System, or by dumping steam from intact steam generators utilizing either the steam dumps (preferred) or MS10s.]

Purpose:

To ensure RCS heat removal.

ERG Basis:

This step instructs the operator to maintain RCS heat removal either by continued RHR System operation (if available) or by dumping steam, since at this time the ECCS may be unable to provide makeup flow to the RCS. If no intact SGs are available for dumping steam and the RHR System is not in service, the guideline instructs the operator to use a faulted SG to maintain RCS heat removal.

EOP Basis:

Same as ERG basis.

Supplemental Information:

If the RCS is not full of liquid at this time, it is especially important to keep the secondary system adequately full of water to promote reflux cooling. Reflux cooling is the mechanism by which steam generated in the RCS enters the SG tubes and is condensed by the cold water on the SG secondary side. This liquid then remains in the primary system and promotes cooling.

This is a Continuous Action Step (CAS).

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5

11-125

Points: 1.00

Given:

- Unit 1 is in MODE 3 at normal operating temperature and pressure.
- While performing troubleshooting activities, the 1CC190, CCW Thermal Barrier Isolation Valve, closes.

Which ONE of the following completes the statement concerning the impact this failure will have on the RCPs?

Thermal Barrier CCW return flow has been lost from ...

- A. ALL RCPs. RCP operation may continue.
- B. ONLY 1 RCP. RCP operation may continue.
- C. ALL RCPs. All RCPs must be stopped within 2 minutes due to loss of cooling.
- D. ONLY 1 RCP. The affected RCP must be stopped within 2 minutes due to loss of cooling

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Answer: A

Explanation / Justification:

- A. Correct. The1CC190 is on the common CCW return line and will isolate the CCW return from all RCP Thermal Barriers. So long as charging flow is supplied to the RCP seals, the RCPs can continue running. The stem did not indicate any issues with charging flow, therefore RCP operation may continue.
- B. Incorrect. Plausible because each RCP has individual isolation valves (CC130s) on the CCW return line. Second part is plausible because all reactor coolant loops (RCPs) are required to be in service only during Modes 1 and 2 per TS 3.4.1.1, so it's plausible to believe that you can operate with one RCP out of service in Mode 3.
- C. Incorrect. The1CC190 is on the common CCW return line and will isolate the CCW return from all RCP Thermal Barriers. Second part is plausible because this is an action in S1.OP-AB.RCP-0001 when there is a loss of CCW to the Thermal Barrier and loss of charging for 2 minutes. The applicant may incorrectly interpret this action and believe that with a loss of all CCW to the Thermal Barriers that the RCP must be tripped in 2 minutes.
- D. Incorrect. Plausible because each RCP has individual isolation valves (CC130s) on the CCW return line. Second part is plausible because this is an action in S1.OP-AB.RCP-0001 when there is a loss of CCW to the Thermal Barrier and loss of charging for 2 minutes. The applicant may incorrectly interpret this action and believe that with a loss of all CCW to the Thermal Barriers that the RCP must be tripped in 2 minutes.

Technical References:

S1.OP-AB.RCP-0001 (R26), CCW-2 simplified

Proposed References to be provided:

None

Learning Objective:

NOS05ABRCP0, Objective 3, Describe, in general terms, the actions taken in S2.OP-AB.RCP-0001 and the bases for the actions in accordance with the Technical Bases Document.

Question Source:

Bank – DC Cook 2018 NRC RO4

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.7 / 45.7

Level:

RO

Category/System:

11-Reactor Coolant Pump Malfunctions

K/A #:

APE 15 AK2.08

Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following:
CCWS

Importance:

2.6

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the applicant requires knowledge on how the CCW system malfunctions can affect RCP operation.

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6

11-142

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- 23 Charging Pump is in service.
- All systems are in AUTO.
- A failure occurs with the Master Flow Controller (MFC).
- The RO reports that the indicated demand on the MFC bezel is LOWERING.

Which ONE of the following completes both statements?

1. Assuming the MFC demand continues to lower after being placed in Manual, charging flow will lower to a MINIMUM flow rate of ____ gpm.
 2. In accordance with S2.OP-AB.CVC-0001, Charging System Malfunction, what is the NEXT required action?
- A. 1) 47
2) take manual control of 2CV55, Charging Flow Control Valve
- B. 1) 47
2) take manual control of 23 Charging Pump Speed Controller
- C. 1) 0
2) take manual control of 23 Charging Pump Speed Controller
- D. 1) 0
2) take manual control of 2CV55, Charging Flow Control Valve

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Answer: B

Explanation / Justification:

- A. Incorrect. First part is correct. Second part is incorrect, the 2CV55 only controls charging flow when a centrifugal charging pump is in service. Plausible because the 2CV55 is used to control charging flow when a centrifugal charging pump is in service.
- B. Correct. Lowering demand from the Master Flow Controller will cause the 23 Charging Pump speed controller to lower until the speed controller hits the low speed stop which will maintain a minimum charging flow rate of 47 gpm to ensure adequate seal injection to the RCPs. IAW S2.OP-AB.CVC-0001, step 3.109, if a malfunctioning MFC, then the operator is directed to take manual control of 2CV55 or 23 Charging Pump. Since 23 Charging Pump is in service, operating the 2CV55 will have no effect on charging flow. The operator will first attempt to take manual control of the MFC and raise the demand which should raise the speed controller demand on 23 Charging Pump and therefore, raise charging flow. If charging flow does not respond, then the operator should place the speed controller for 23 Charging Pump in Manual and raise the output of the speed controller to raise charging flow.
- C. Incorrect. First part is incorrect. Plausible if the operator does not recall that the 23 charging pump speed controller has a low speed stop to maintain 47 gpm to the RCPs. Second part is correct.
- D. Incorrect. First part is incorrect. Plausible if the operator does not recall that the 23 charging pump speed controller has a low speed stop to maintain 47 gpm to the RCPs. Second part is incorrect. The 2CV55 only controls charging flow when a centrifugal charging pump is in service. Plausible because the 2CV55 is used to control charging flow when a centrifugal charging pump is in service.

Technical References:

S2.OP-AB.CVC-0001 Rev 14

Proposed References to be provided:

None

Learning Objective:

NOS05ABCVC1, Objective 2, Describe, in general terms, the actions taken in AB.CVC-0001 and the bases for these actions in accordance with the Technical Bases Document

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.5 / 45.6

Level:

RO

Category/System:

11-Loss of Reactor Coolant Makeup

K/A #:

APE22 AA1.04

Ability to operate and/or monitor the following as they apply to the Loss of Reactor Coolant Makeup: Speed demand controller and running indicators (positive displacement pump).

Importance:

3.3

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate requires knowledge of a malfunctioning Master Flow Controller and subsequent actions to take manual control of 23 Charging Pump speed controller to restore charging flow.

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7

11-143

Points: 1.00

Given:

- Unit 2 is in MODE 4 with RCS heat up in progress IAW S2.OP-IO.ZZ-0002, Cold Shutdown to Hot Standby.
- 2RH1 and 2RH2, RHR Suction Isolation Valves, are OPEN.
- Pressurizer Overpressure Protection System (POPS) Channels are ARMED.
- 21 RHR Pump is in shutdown cooling mode.
- 22 RHR Pump is aligned for ECCS injection.

Subsequently, the following events occurs;

- 21 RHR Pump trips.
- 22 RHR Pump fails to start.
- RCS pressure is 350 psig and rising.

Which ONE of the following completes both statements?

1. 2RH1 and 2RH2 __ (1) __ close automatically when RCS pressure exceeds 375 psig.
2. Closing the 2RH1 and 2RH2 is required to prevent exceeding the design pressure of the RHR system __ (2) __.

- A. 1) will
2) suction piping ONLY
- B. 1) will
2) suction AND discharge piping
- R * ~~C~~ D
1) will NOT
2) suction AND discharge piping
- R * ~~D~~ C
1) will NOT
2) suction piping ONLY

* "RO Q7, Choices 'C' and 'D', were mislabeled (i.e., swapped) on the As-Administered Exam Question sheet. Choice 'C', as annotated, is the correct answer, as reflected on the As-Administered Exam Answer Key."

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Answer: C

Explanation / Justification:

- A. Incorrect. First part is incorrect. Plausible because POPs does automatically open the PR1 and PR2 PZR PORVs when RCS pressure is greater than 375 psig, but could confuse the RH1 and RH2 interlock that keeps them close if RCS > 375 psig. Second part is correct.
- B. Incorrect. First part is incorrect. Plausible because POPs does automatically open the PR1 and PR2 PZR PORVs when RCS pressure is greater than 375 psig, but could confuse the RH1 and RH2 interlock that keeps them close if RCS > 375 psig. Second part is incorrect. Plausible if the operator believes that the RHR discharge piping is rated at the same design pressure as the suction piping.
- C. Correct. 2RH1 and 2RH2 do not automatically close if RCS pressure exceeds 375 psig. The 2RH1 and 2RH2 are interlocked to prevent opening until PT-403 and PT-405 are less than 375 psig. POPs will actuate when RCS pressure exceeds 375 psig (PT-403 or PT-405) and open both PZR PORVs. By station procedures (S2.OP.IO-ZZ-0002) 2RH1 and 2RH2 will be manually closed during RCS heat up to prevent exceeding the design pressure rating of the RHR system piping (discharge pipe rating 600 psig and suction pipe rating 450 psig, design temperature is 400 °F). The RHR system has relief valves at the discharge and suction line. These relief valves will lift to prevent exceeding the system design limit if RCS pressure continued to increase with RH1 and RH2 open. In this case, based on the condition in the stem with the RCS pressure at 350 psig, closing the RH1 and RH2 is necessary to prevent exceeding the design limits of the suction piping. If RCS pressure continues to increase the suction relief valve will lift at 350 psig to prevent overpressurizing the suction piping and exceeding it's design limit of 450 psig. The discharge piping is not affected in this case because the RCS pressure is well below its design rating of 650 psig.
- D. Incorrect. First part is correct. Second part is incorrect. Plausible if the operator believes that the RHR discharge piping is rated at the same design pressure as the suction piping.

Technical References:	S2.OP-IO.ZZ-0002
Proposed References to be provided:	None
Learning Objective:	NOS05RHR00, Objective 2, Describe the design bases of the Residual Heat Removal System
Question Source:	New
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.5, 41.10 / 45.5 / 45.13
Level:	RO
Category/System:	11-Loss of Residual Heat Removal
K/A #:	APE 25 AK3.02
	Knowledge of the reasons for the following responses as they apply to the Loss of Residual Heat Removal System: Isolation of RHR low-pressure piping prior to pressure increase above specified level.
Importance:	3.3
Tier/Group	Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

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K/A Match: The K/A is matched because the candidate is asked the reason why the RHR system is isolated during RCS heat up. The candidate is also asked how the RHR suction isolation valves are closed (automatic versus manual) if an RCS pressure excursion occurs.

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11-144

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- The RO reports the following:
 - CCW Surge Tank Levels are lowering slowly.
 - 2DR107, Surge Tank Make-up Valve, is opened and Surge Tank level is stable at 42 %.
 - OHA A-41, AUX ALM SYS PRINTER, annunciates for Containment Sump Pump start then stops 5 seconds later.
 - The RO reports 23 RCP motor bearing temperatures are 160 °F and rising at 0.5 °F per minute.
- The crew enters S2.OP-AB.CC-0001, Component Cooling Abnormality.

Based on current plant conditions and in accordance with S2.OP-AB.CC-0001, which ONE of the following is the **MAXIMUM** time allowed before tripping the reactor and stopping the RCP?

- A. 15 minutes
- B. 20 minutes
- C. 25 minutes
- D. 35 minutes

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Answer: C

Explanation / Justification:

- A. Incorrect. At 15 minutes the temperature will be 167.5 °F which is still below the 175 °F limit.
- B. Incorrect. At 20 minutes the temperature will be 170 °F which is still below the 175 °F limit.
- C. Correct. IAW S2.OP-AB.CC-0001 Attachment 1, reactor trip and stopping affected RCP is required when motor bearing temperature reaches 175 °F. At 25 minutes RCP bearing temperature will be 172.5 °F which is still below the 175 °F limit. Note: S2.OP-AB.RCP-0001 Attachment 1 uses motor bearing temperature greater than 175 °F.
- D. Incorrect. At 35 minutes the temperature will be 177.5 °F which has exceed the 175 °F limit.

Technical References:

S2.OP-AB.CC-0001 Rev 19

Proposed References to be provided:

None

Learning Objective:

NOS05ABCC01 Objective 4, Describe, in general terms, the actions taken in S2.OP-AB.CC-0001 and the bases for the actions in accordance with the Technical Bases Document.

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

43.5 / 45.13

Level:

RO

Category/System:

11-Loss of Component Cooling Water

K/A #:

APE 26 AA2.04

Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: The normal values and upper limits for the temperatures of the components cooled by CCW.

Importance:

2.5

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is asked at what time will the RCP motor bearing temperature reach its procedural limit requiring reactor trip and stopping the affected RCP. In order to determine the maximum time allowed, the candidate needs to know what the RCP motor bearing limit (175 F) is in AB.CC-0001.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

9

11-145

Points: 1.00

Given:

- Unit 1 is at 100% Power.
- ALL systems are in AUTO.
- 1PS1, PZR Spray Valve, fails open.
- All PZR Heaters have energized.
- The RO places 1PS1 in manual and will NOT close

In accordance with S1.OP-AB.PZR-0001, Pressurizer Pressure Malfuction, which ONE of the following completes both statements?

1. The reactor is required to be tripped when RCS pressure lowers to __ (1) __ psig.
 2. The reason this action is performed is to prevent challenging an automatic reactor trip on __ (2) __.
-
- A.
 1. 1900
 2. OTΔT
 - B.
 1. 1900
 2. Low PZR pressure
 - C.
 1. 2000
 2. Low PZR pressure
 - D.
 1. 2000
 2. OTΔT

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: D

Explanation / Justification:

- A. Incorrect. First part is incorrect. Plausible because the automatic reactor trip for low pressure is 1865 psig and is rate compensated, tripping the reactor at 1900 psig would be above the automatic setpoint. Second part is correct.
- B. Incorrect. First part is incorrect. Second part is incorrect. Plausible because the applicant may believe that the first reactor trip condition reached would be on low PZR pressure since RCS pressure is dropping rapidly. The automatic reactor trip for low pressure is 1865 psig and is rate compensated, tripping the reactor at 1900 psig would be above the automatic setpoint.
- C. Incorrect. First part is correct. Second part is incorrect. Plausible because the applicant may believe that the first reactor trip condition reached would be on low PZR pressure since RCS pressure is dropping rapidly.
- D. Correct. With the 1PS1 spray valve failed open, RCS pressure will rapidly lower. Based on the rapidly lowering RCS pressure, S1.OP-AB.PZR-0001 will direct the crew to manually trip the reactor, when RCS pressure is 2000 psig and lowering. The bases in the procedure states that the reason a manually reactor trip is performed is to prevent challenging the automatic reactor on OTΔT.

Technical References:	S1.OP-AB.PZR-0001
Proposed References to be provided:	None
Learning Objective:	NOS05PZRPL Objective 15. Given a Pressurizer Pressure and Level Control System failure, predict the effect of the Pressurizer Pressure and Level Control System failure on the following: RCS
Question Source:	New
Question Cognitive Level:	Comprehension/Analysis
10CFR Part 55 Content:	41.5 / 41.10 / 45.13
Level:	RO
Category/System:	11-Pressurizer Pressure Control System Malfunction
K/A #:	APE 27 AK3.03 Knowledge of the reasons for the following response as they apply to the Pressurizer Pressure Control Malfunctions: Actions contained in the AOP for PZR PCS malfunction
Importance:	3.7
Tier/Group	Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the applicant must have knowledge of the overall mitigating actions in the abnormal procedure for PZR pressure malfunctions.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

10

10-107

Points: 1.00

Given:

- Unit 2 experienced a valid reactor trip demand but the reactor failed to trip.
- The RO attempted a MANUAL reactor trip by operating both reactor trip switches (pistol grip) and depressing the reactor trip breaker pushbuttons, but was unsuccessful in tripping the reactor.

In accordance with 2-EOP-FRSM-1, Response to Nuclear Power Generation – ATWS, which ONE of the following is the **NEXT** required action?

- A. INITIATE Emergency Boration.
- B. INSERT control rods at maximum rate using MANUAL and/or AUTO rod control.
- C. TRIP the Main Turbine.
- D. OPEN both Rod Drive M-G Set breakers 2E6D and 2G6D.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. Initiating emergency boration comes at step 4 of FRSM-1. Plausible since this is an action performed in FRSM-1
- B. Correct. IAW 2-EOP-FRSM-1 step 1 (Immediate Actions) the reactor is tripped in the following order: 1) Reactor Trip Switches, 2) Trip Breaker Bezel, 3) Insert control rods at maximum rate using MANUAL and AUTO rod control, 4) open breakers 2E6D and 2G6D, and then 5) send operators to locally open reactor trip breakers. Therefore, based on the choices provided the next action is for the operator to insert control rods at maximum rate using AUTO and MANUAL control rods.
- C. Incorrect. Tripping the Main Turbine comes after all attempts in step 1 are performed to trip the reactor. Plausible since this is an action performed in FRSM-1.
- D. Incorrect. Opening MG set supply breakers comes after rods are inserted at maximum rate. Plausible since this is an action performed in FRSM-1.

Technical References:	2-EOP-FRSM-1, Rev 40
Proposed References to be provided:	None
Learning Objective:	NOS05FRSM00, Objective 2, Describe the EOP mitigation strategy for a: Response To Nuclear Power Generation
Question Source:	Bank - Salem
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.10 / 45.3 / 45.13
Level:	RO
Category/System:	10- Anticipated Transient Without Scram
K/A #:	EPE 29 G2.4.6
	Knowledge of EOP mitigation strategies
Importance:	3.7
Tier/Group	Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is asked the strategy implemented in EOP-FRSM-1 to trip the reactor and the order in which these actions are performed.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

11

10-108

Points: 1.00

Given:

- Unit 2 experienced a SGTR on 23 SG and a Loss of Offsite Power.
- The crew is performing actions in accordance with 2-EOP-SGTR-1, Steam Generator Tube Rupture.
- The crew is at step 38.1, Monitoring for Natural Circulation Flow.

Which ONE of the following completes both statements?

1. To verify natural circulation is occurring, the Reactor Operator will verify the RCS T-Cold temperatures in the unaffected loops are approximately __ (1) __.
 2. If natural circulation is NOT occurring, then the Plant Operator will adjust the __ (2) __ on the intact steam generators to raise steam flow.
-
- A. 1) 548 °F
2) Atmospheric Relief Valves
 - B. 1) 548 °F
2) Steam Dumps
 - C. 1) 552 °F
2) Atmospheric Relief Valves
 - D. 1) 552 °F
2) Steam Dumps

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. In EOP-SGTR-1 step 38.1, Monitor for Natural Circulation, one of the indications for verifying natural circulation is determining if the RCS T-Colds are at saturation temperature for SGs. The unaffected loop SG pressure should be around the setpoint of the MS10s which are normally set at 1015 psig (or 1030 psia). The affected loop SG pressure with the SGTR will have its MS10 set to 1045 psig (1060 psia) per step 3 of EOP-SGTR-1. Using steam tables, the saturation temperature at 1030 psia is approximately 548 °F and for 1060 psia is approximately 552 °F. Therefore the saturation temperature expected for the unaffected loops (intact SG) would be 548 °F. Per step 38.1 of EOP-SGTR-1, if natural circulations is not occurring, then raise the steam flow. In this case with a loss of offsite power, the PO would adjust (open) the MS10s on the unaffected loops to raise the steam flow.
- B. Incorrect. First part is correct. Second part is incorrect. With a loss of offsite power steam dumps are not available and only MS10s can be used. Plausible because the operator may believe that steam dumps are still available. Incorrect in that with the Loss of all Offsite Power (LOOP) all of the circulators are without power and be out of service. At least one circulator must be in service in a condenser section in order for that condenser section steam dump valves to operate. So in this case, when the LOOP occurs and all circulators trip, the steam dumps will receive a blocking signal and all steam dumps will close.
- C. Incorrect. First part is incorrect. This is the saturation temperature using the SG pressure on the ruptured SG (1045 psig or 1060 psia). Second part is correct. Plausible because the operator may incorrectly use the SG pressure on the ruptured SG instead of the intact SGs.
- D. Incorrect. First part is incorrect. This is the saturation temperature using the SG pressure on the ruptured SG (1060 psia). Second part is incorrect. Second part is incorrect. With a loss of offsite power steam dumps are not available and only MS10s can be used. Incorrect in that with the Loss of all Offsite Power (LOOP) all of the circulators are without power and be out of service. At least one circulator must be in service in a condenser section in order for that condenser section steam dump valves to operate. So in this case, when the LOOP occurs and all circulators trip, the steam dumps will receive a blocking signal and all steam dumps will close. Plausible because the operator may incorrectly use the SG pressure on the ruptured SG instead of the intact SGs.

Technical References:

2-EOP-SGTR-1 Rev 40

Proposed References to be provided:

None

Learning Objective:

NOS05SGTR01-06, Objective 6, Determine the indications that are monitored to ensure proper system/component operation for each step in 2-EOP-SGTR-1

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.5 / 45.6

Level:

RO

Category/System:

10- Steam Generator Tube Rupture

K/A #:

EPE 38 EA1.33

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Ability to operate and monitor the following as they apply to a
SGTR: Use of S/G for natural circulation cooldown.

Importance:

4.4

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is being asked to monitor parameters used to verify natural circulation and what actions the operator will take to raise steam flow to re-establish natural circulation conditions.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

12

11-146

Points: 1.00

Given

- Unit 2 reactor tripped due to a Main Generator fault
- All immediate actions of 2-EOP-TRIP-1, Reactor Trip or Safety Injection, are complete
- The RO now reports the following plant status:
 - RCS Pressure is 1950 psig and lowering
 - RCS Tavg is 542 °F and lowering
 - PZR Level is 30% and lowering
 - Containment Pressure is 5.3 psig and rising
 - 21-23 SG Pressures are 895 psig and lowering
 - 24 SG Pressure is 810 psig and lowering
 - 24 SG Steam Flow is indicating 42% and 21-23 SG Steam Flows are indicating 41%

Based on the above conditions, which ONE of the following completes the statement?

Main Steam Line Isolation actuated due to...

- A. high steam flow with low SG pressure.
- B. high steam flow with low-low Tavg.
- C. Containment Pressure high.
- D. SG Pressure ΔP .

RO EXAMINATION ANSWER KEY

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Answer: B

Explanation / Justification:

- A. Incorrect. High steam flow setpoint (>40%) has been exceeded, but the low SG pressure of < 600 psig has not been exceeded. Plausible since this is condition for actuating MSLI.
- B. Correct. Based on the given plant conditions, MSLI actuated due to high steam flows (>40%) on 2/4 SGs and low Tav_g (≤ 543 °F) on 2/4 Tav_g loops.
- C. Incorrect. Containment Pressure at 5.3 psig exceeds the Safety Injection setpoint of 4 psig. For a MSLI a high Containment Pressure needs to exceed 15 psig. Plausible since this is condition for actuating MSLI.
- D. Incorrect. This will actuate an SI signal when a high SG differential pressure needs to exceed the setpoint of > 100 psig lower than the other SGs. Plausible because the operator may incorrectly determine that this SI signal also actuates MSLI.

Technical References:

NOS05FLUNCY

Proposed References to be provided:

None

Learning Objective:

NOS05FLUNCY, Objective 2.K, State those items in the Licensed Operator Fluency List: Steamline Isolations.

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 41.10 / 45.6 / 45.13

Level:

RO

Category/System:

11-Steam Line Rupture – Excessive Heat Transfer

K/A #:

APE 40 AK3.01

Knowledge of the reasons for the following responses as they apply to the Steam Line Rupture: Operation of steam line isolation valves.

Importance:

4.2

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is being asked the reason for a MSLI actuation based on plant conditions. In this case, the candidate must assess plant conditions and determine why a MSLI actuated.

RO EXAMINATION ANSWER KEY

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Additional Reference: Fluency List excerpt from NOS05FLUNCY

STEAMLINE ISOLATION		
Manual	1/2 PBs per steam line	Closes MS7, 18 and 167
Containment Press Hi-Hi	15 psig	2/4 detectors
High Steam Flow with Low <u>Tavg</u> or Steam Pressure	> 40% ramped to 110% 20-100% power. 0-20% fixed at 40% <u>Tavg</u> < 543°F, Steam Pressure < 600 psig	1/2 on 2/4 SGs. 2/4 Low <u>Tavgs</u> or 2/4 Low Steam Pressures, Interlocked with P-4 and P- 12. P-4 resets logic to 40%

RO EXAMINATION ANSWER KEY

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13

11-147

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- A Main Feedwater Line Break inside containment occurs on 21 Steam Generator.

Which ONE of the following completes both statements?

1. On a Main Feedwater Line Break, Narrow Range levels in the 21 SG will lower __(1)__ when compared to a Steam Line Break.
 2. Immediately following the reactor trip, the RCS cooldown rate will be __(2)__ when compared to an equivalent size Steam Line Break.
- A. 1) slower
2) less
- B. 1) slower
2) more
- C. 1) faster
2) more
- D. 1) faster
2) less

RO EXAMINATION ANSWER KEY

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Answer: D

Explanation / Justification:

- A. Incorrect. First part is incorrect. SG levels will lower faster during a feedwater line break. Second part is correct. Plausible because the operator may incorrectly determine that on a feed line break SG levels will lower slower compared to a steam line break.
- B. Incorrect. First part is incorrect. SG levels will lower faster during a feedwater line break. Second part is incorrect. Feedwater line break will have a lesser effect on RCS cooling. Plausible because the operator may incorrectly determine that on a feed line break SG levels will lower slower compared to a steam line break.
- C. Incorrect. First part is correct Second part is incorrect. Feedwater line break will have a lesser effect on RCS cooling. Plausible because the operator may incorrectly determine how feed line break will effect RCS cooldown.
- D. Correct. A Main Feedwater Line Break is expected to generate a Low-Low SG Level reactor trip due to the loss of feedwater at 100% power. Post Trip, RCS Tav_g will rise due to lowering feed flow to the affected SG causing a decrease in heat transfer in that SG. A FW line break creates less cooling on the RCS because the loss of FW from the SG and out the break does not involve the removal of latent heat as occurs in a steam break.

Technical References:	NOS05LOSC01
Proposed References to be provided:	None
Learning Objective:	NOS05LOSC01, Objective 6, For the following FSAR transients stated as items 6.1, 6.2, and 6.3 perform the tasks specified in the below requirements A, B, C, and D: Main Feed piping break
Question Source:	New
Question Cognitive Level:	Comprehension/Analysis
10CFR Part 55 Content:	41.8 / 41.10 / 45.3
Level:	RO
Category/System:	11- Loss of Main Feedwater
K/A #:	APE 54 AK1.01 Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): MFW line break depressurizes the S/G (similar to a steam line break).
Importance:	4.1
Tier/Group	Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is being asked the differences between a main feedwater line break as compared to a steam line break. In this case, the candidate is being asked to determine how plant parameters will change on a feedwater line break when compared to a steam line break.

RO EXAMINATION ANSWER KEY

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14

11-148

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- The crew is performing S2.OP-ST.SJ-0001, Inservice Testing – 21 Safety Injection Pump.
- 21 SI Pump is running.

Subsequently, the following occurs;

- Loss of Offsite Power.
- OHA J-2, 2B 4KV VTL BUS DIFF PROT, is LIT

After 2 minutes has elapsed, which ONE of the following describes the operational status of the Safety Injection Pumps?

- A. ONLY 21 SI Pump is running.
- B. ONLY 22 SI Pump is running.
- C. BOTH SI Pumps are running.
- D. NEITHER SI Pumps are running.

RO EXAMINATION ANSWER KEY

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Answer: D

Explanation / Justification:

- A. Incorrect. Plausible distractor if the candidate believes that the 21 SI pump that was already running will remain running following SEC actuation, similar to a SEC Mode 1 (Accident only) actuation. The candidate may also believe that the OHA J-2 will prevent the start of the 22 SI Pump.
- B. Incorrect. Plausible distractor if the candidate believes that the 22 SI pump will be the only pump running based on the Bus Differential protection lockout on 2B 4KV Vital Bus affecting the 21 SI Pump. SI pumps are not powered from 2B 4KV Vital bus.
- C. Incorrect. Plausible distractor if the candidate believes that the SECs will start both SI pumps during a SEC Mode 2 (Blackout). In SEC Mode 2, only the Charging Pumps will start. The SI pumps will only start when an accident SI signal is present during an SEC Mode 1 (Accident only) or SEC Mode III or IV (Accident plus Blackout) conditions.
- D. Correct. On a loss of offsite power the SECs will strip the loads on the 2A and 2C 4KV Vital buses, start the EDGs and close the output breakers, and then load the safeguards equipment using the load sequencer. The 21 and 22 SI pumps are powered from 2A and 2C 4KV Vital buses. Since no SI signal is present, the SECs are in Mode 2 (Blackout only). In Mode 2 the SEC load sequencers will only start the Charging Pumps. No SI or RHR pumps will be started since no SI accident signal is present. The OHA J-2 alarm identifies that the 2B 4KV Vital Bus will be de-energized and lockout, which has no impact to the SI Pumps power source. Therefore, on a Blackout only, the SI pumps will NOT start.

Technical References:	NOS05SEC000
Proposed References to be provided:	None
Learning Objective:	NOS05SEC000-09, Objective 4. Describe in detail each Mode of Safeguards Equipment Control System operation, including setpoints for automatic actuation
Question Source:	Bank – Salem 2016 NRC RO19
Question Cognitive Level:	Comprehension/Analysis
10CFR Part 55 Content:	43.5 / 45.13
Level:	RO
Category/System:	11- Loss of Offsite Power
K/A #:	APE 56 AA2.03 Ability to determine and interpret the following as they apply to: Loss of Offsite Power: Operational status of safety injection pump.
Importance:	3.8
Tier/Group	Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate needs to interpret the conditions in the stem and how the loss of offsite power will affect the operation of the SEC load sequencer. In this case the candidate will need to determine the correct SEC mode of operation and what ECCS pumps are started based on the conditions in the stem. Knowledge of SI pump power supplies is also necessary interpret stem conditions,

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for example OHA J-2. The candidate will also need to interpret the impact of the 2B 4KV Bus differential protection lockout on the operation of the SI pumps, which in this case has no affect.

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SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

15

11-149

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- OHA B-2, 2A 125VDC CNTRL BUS VOLT LO, is LIT.
- RO reports the following indications on 2RP9 for the 2A 125 VDC Battery:
 - DC Volts meter indicates 124 VDC and slowly lowering.
 - DC Amperes meter indicates 50 Amps.

Based on the above conditions, which ONE of the following completes both statements?

1. The 2A 125 VDC bus is being supplied from the __ (1) __.
 2. Plant operation may continue by __ (2) __.
-
- A.
 - 1) battery
 - 2) cross-tying the 2A 125 VDC Bus loads to the 2B 125 VDC Bus.
 - B.
 - 1) battery
 - 2) placing the standby battery charger in service.
 - C.
 - 1) battery charger
 - 2) placing the standby battery charger in service.
 - D.
 - 1) battery charger
 - 2) cross-tying the 2A 125 VDC Bus loads to the 2B 125 VDC Bus

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Answer: B

Explanation / Justification:

- A. Incorrect. First part is correct. Second part is incorrect. The 2A 125 VDC Bus distribution panels cannot be supplied (cross-tied) from an alternate DC bus (B Bus) during Modes 1-4. Plausible since the DC buses can be cross-tied but only during Modes 5,6, and Defueled.
- B. Correct. The OHA B-2 comes in when bus voltage is ≤ 128 VDC. The 2A1 125VDC battery charger normally maintains the DC loads with the battery floating on the battery charger. Indications in the control room are available on the 2RP9 panel that provides indication for battery voltage and amps. During normal operation the indications will read approx. 134 VDC and zero amps. The zero amps indicate that the battery charger is supplying the DC loads and not the battery. Based on the conditions in the stem, the lower bus voltage and amps indicated on the bus means that the battery charger is no longer supplying the DC bus and now the battery is supplying the bus. To remain at power, the standby (2A2 125 VDC) battery charger must be manually aligned to the bus. The 2A 125 VDC Bus distribution panels can be supplied (cross-tied) from an alternate DC bus (B Bus) but only during Modes 5, 6, or Defueled.
- C. Incorrect. First part is incorrect. Based on the stem, with lower bus voltage and amps greater than zero, these are indications that the battery charger is no longer supplying the bus and the battery is. Second part is correct. Plausible because the operator may incorrectly determine the status of the DC bus based on the conditions provided in the stem.
- D. Incorrect. First part is incorrect. Based on the stem, with lower bus voltage and amps greater than zero, these are indications that the battery charger is no longer supplying the bus and the battery is. Part 2 is incorrect. The 125 VDC bus loads cannot be cross-tied during Modes 1-4. Plausible since the DC buses can be cross-tied but only during Modes 5, 6, and Defueled. See Ans. B for further explanation.

Technical References:

S2.OP-AR.ZZ.0002, S2.OP-SO.125-0005 (R27)

Proposed References to be provided:

None

Learning Objective:

NOS05DCELEC, Objectives 4.a & b. Describe the function of the following components and how their normal and abnormal operation affects the DC Electrical System: Batteries, Battery Chargers.

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

43.5 / 45.13

Level:

RO

Category/System:

11-Loss of DC Power

K/A #:

APE58 AA2.01

Ability to determine and interpret the following as they apply to the Loss of DC Power: That a loss of dc power has occurred, verification that substitute power sources have come on line

3.7

Importance:

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is asked to assess the plant conditions associated with the 2A 125VDC system and determine if the 125 VDC system is being supplied from the battery

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charger or the battery. Based on the status of the 125 VDC system the candidate is asked if the standby battery charger needs to be manually aligned or not.

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16

11-150

Points: 1.00

Given:

- Salem 2 is at 100% Power
- The following OHA alarms are received:
 - OHA B-13, 21 SW HDR PRESS LO, is LIT
 - OHA B-14, 22 SW HDR PRESS LO, is LIT
 - OHA B-15, TURB AREA SW HDR PRESS LO, is LIT
 - OHA B-48, SW VLV RM FLOODED, is LIT
- The standby Service Water (SW) Pump starts automatically and OHAs B-13, B-14, and B15 are now clear.

Which ONE of the following describes the reason for the loss of SW?

SW leak is on piping associated with a...

- A. CFCU.
- B. Main Turbine Lube Oil Cooler.
- C. Charging Pump Room Cooler.
- D. Control Room Chiller condenser unit.

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Answer: A

Explanation / Justification:

- A. Correct. OHA B-48, SW VLV RM FLOODED indicates that the SW leak is inside the SW valve room located on the 78' Mechanical Penetration Area. CFCU piping is located inside this room before it goes into Containment. A leak on the CFCU piping in this area would give the indications for OHA B-48.
- B. Incorrect. Plausible because the candidate may believe that OHA B-15 is indicative of a SW leak in the Turbine Building.
- C. Incorrect. Plausible because the candidate may believe that the Charging Room cooler leak is located in the 78' Mechanical Penn Area associated with the SW Valve Room.
- D. Incorrect. Plausible because the candidate may believe that the Chiller condenser unit leak is located in the 78' Mechanical Penn Area associated with the SW Valve Room.

Technical References:

S2.OP-AB.SW-0001

Proposed References to be provided:

None

Learning Objective:

NOS05ABSW01, Objective 3, Describe, in general terms, the actions taken in S1/S2.OP-AB.SW-0001 and the bases for the actions in accordance with the Technical Bases Document

Question Source:

Bank – Salem

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

43.5 / 45.13

Level:

RO

Category/System:

11-Loss of Nuclear Service Water

K/A #:

APE62 AA2.02

Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: The cause of possible SWS loss

Importance:

2.9

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is asked to assess plant conditions and determine the source of the SW leak. In this case, the candidate must determine which component would cause a SW leak inside the SW Valve Room Area.

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17

11-151

Points: 1.00

Given:

- Both Units 1 and 2 are at 100% power with Voltage Regulators in AUTO.
- Unit 1 reactive load is 250 MVARs OUT.
- Unit 2 reactive load is 250 MVARs OUT.
- The 500 KV Ring Bus is closed.

Subsequently, Unit 2 trips.

Which ONE of the following completes both statements?

1. Unit 1 Main Generator Reactive (MVAR) loading will __(1)__.
 2. Generator field current will __(2)__.
-
- A. 1) rise by less than 250 MVAR
2) rise
 - B. 1) rise by less than 250 MVAR
2) lower
 - C. 1) rise 250 MVAR
2) rise
 - D. 1) rise 250 MVAR
2) lower

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. The reactive load that was being supplied by the tripped unit will be shared amongst the generators connected to the grid, therefore the reactive load increase on the operating unit will be less than 250 MVAR. The increased reactive loading on the operating unit will result in a sensed drop in terminal voltage and the voltage regulator will increase the generator field current to return the terminal voltage to setpoint.
- B. Incorrect. First part is correct. Second part is incorrect. Lowering the voltage regulator amps output will lower MVARs. Plausible because the operator may incorrectly understand the correct operation of the voltage regulator in response to changes in terminal voltage and MVARs.
- C. Incorrect. First part is incorrect. Second part is correct. Plausible because the applicant may believe that when Unit 2 trips, Unit 1 will pick up the full 250 MVARs based on Unit 1 being in close proximity to Unit 2 as opposed to other generator units located so far away from the island.
- D. Incorrect. First part is incorrect. Second part is incorrect. Plausible because the applicant may believe that when Unit 2 trips, Unit 1 will pick up the full 250 MVARs based on Unit 1 being in close proximity to Unit 2 as opposed to other generator units located so far away from the island. For Part 2, lowering the voltage regulator amps output will lower MVARs. Plausible because the operator may incorrectly understand the correct operation of the voltage regulator in response to changes in terminal voltage and MVARs.

Technical References:

NOS05EXCTR2-12

Proposed References to be provided:

None

Learning Objective:

NOS05EXCTR2-12, Objective 6. Describe the function and operating characteristics for the following Unit 2 Main Generator Exciter and Voltage Regulator components: Voltage Regulator.

Question Source:

Bank – Byron 2019 NRC RO15 (October exam)

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7

Level:

RO

Category/System:

11- Generator Voltage and Electric Grid Disturbances

K/A #:

APE 77 G2.1.27

Knowledge of the system purpose and/or function.

Importance:

3.9

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the applicant must have the understanding on how reactive load is shared between units and how the voltage regulator controls will function to the change in reactive loading.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

18

10-109

Points: 1.00

Given:

- A LOCA Outside Containment has occurred on Unit 2.
- The crew is performing actions to isolate the leak in accordance with 2-EOP-LOCA-6, LOCA Outside Containment.

In accordance with 2-EOP-LOCA-6, which ONE of the following completes both statements?

1. In order to operate the SJ49s, Cold Leg Isolation Valves, what action(s) MUST be performed?
 2. Following valve closure, what parameter is monitored to determine if leak isolation was successful?
-
- A. 1) Reset Phase A AND place the affected SJ49 CMC switch in VALVE OPERABLE.
2) RCS Pressure
 - B. 1) Reset Phase A AND place the affected SJ49 CMC switch in VALVE OPERABLE.
2) PZR Level
 - C. 1) Place the affected SJ49 CMC switch in VALVE OPERABLE ONLY.
2) PZR Level
 - D. 1) Place the affected SJ49 CMC switch in VALVE OPERABLE ONLY.
2) RCS Pressure

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: D

Explanation / Justification:

- A. Incorrect. First part is incorrect. To close the SJ49's, only the CMC switch on 2RP4 needs to be placed in Valve Operable. SJ49s are not closed by an SI signal. Second part is correct. Plausible because the operator may incorrectly believe that these valves are Phase A valves.
- B. Incorrect. First part is incorrect. To close the SJ49's, only the CMC switch on 2RP4 needs to be placed in Valve Operable. SJ49s are not closed by an SI signal. Second part is incorrect. RCS pressure is monitored to determine if leak is isolated. Plausible because the operator may incorrectly believe that these valves are Phase A valves.
- C. Incorrect. First part is correct. Second part is incorrect. RCS pressure is monitored to determine if leak is isolated. Plausible because PZR level is an indication that may change when the leak is isolation, but it's not the parameter used in the EOP.
- D. Correct. To close the SJ49's, only the CMC switch on 2RP4 needs to be placed in Valve Operable. SJ49s are normally open and are not closed by an SI signal or a Phase A signal. IAW 2-EOP-LOCA-6, when each valve is closed, the operator monitors RCS pressure rise to determine if the leak is isolated.

Technical References:

2-EOP-LOCA-6, Rev. 40

Proposed References to be provided:

None

Learning Objective:

NOS05ALOCA06, Objective 5, Determine the indications that are monitored to ensure proper system/component operation for each step in the EOP for LOCA OUTSIDE CONTAINMENT RECIRCULATION.

Question Source:

New

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.7 / 45.5. / 45.6

Level:

RO

Category/System:

10-LOCA Outside Containment

K/A #:

WE04 EA1.1

Ability to operate and/or monitor the following as they apply to the (LOCA Outside Containment): Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Importance:

4.0

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is being asked what interlocks or signals need to be reset or satisfied in order to operate the SJ49 valves on the RHR system cold leg injection valves IAW EOP-LOCA-6. The question also asks the candidate what indications are monitored to determine if the leak is isolated.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

19

11-152

Points: 1.00

Given:

- Unit 1 is at 45% Power.
- Control Rod Bank D is at 155 steps.
- Rod Control is in AUTO.

Subsequently at time 0930:

- OHA E-48, ROD BOTTOM, is LIT.
- The crew suspects a dropped rod in control rod Bank D near the outer periphery of the core.

Which ONE of the following completes both statements?

1. The Power Range NIS Channel **NEAREST** the dropped rod will indicate ___(1)___ as compared to the other Power Range Channels.
2. At time 1305, repairs are made and permission to recover the drop rod is authorized. Rod withdrawal restrictions ___(2)___ apply.

- A. 1) higher
2) will NOT
- B. 1) higher
2) will
- C. 1) lower
2) will NOT
- D. 1) lower
2) will

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. First part is incorrect. The PR channel near the dropped rod will indicate lower. The operator may believe that the PR channel would indicate higher. Second part is correct.
- B. Incorrect. First part is incorrect. Second part is correct. Plausible because the operator may believe that insufficient time has elapsed since the indication of a dropped rod and that withdrawal rate restrictions are applicable..
- C. Correct. The Power Range Channel near the dropped rod will indicate lower as compared to the other PR channels. Since less than 4 hours has elapsed since the first indication of a dropped rod, then step 3.36 applies and no withdrawal rate, power level or ramp rate restrictions apply.
- D. Incorrect. First part is correct. Second part is incorrect. Plausible because the operator may believe that insufficient time has elapsed since the indication of a dropped rod and that withdrawal rate restrictions are applicable.

Technical References:

NOSABROD2, S1.OP-AB.ROD-0002 (R11)

Proposed References to be provided:

None

Learning Objective:

NOS05ABROD2, Objective 4.a.1. For the following analyzed transients/accidents: Dropped Rod, Determine the expected alarms and indications

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

43.5 / 45.13

Level:

RO

Category/System:

11-Dropped Control Rod

K/A #:

APE 3 AA2.03

Ability to determine and interpret the following as they apply to the Dropped Control Rod: Dropped rod, using in-core / ex-core instrumentation, in-core or loop temperature measurements.

Importance:

3.6

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the candidate is being asked to determine how the excore NIS Power Range channels will respond to a dropped rod. In this case, the PR channels nearest the dropped rod will indicate lower than the other channels. The candidate is also being asked if withdrawal rate restrictions apply based on the time elapsed since the first indication of a dropped rod.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

20

11-153

Points: 1.00

Given:

- Unit 2 is performing a controlled load reduction.

The following sequence of events occurs:

- OHA E-24, ROD DEV OR SEQ, is LIT.
- The RO reports a group 1 control rod in D bank is at 175 steps.
- The group demand counter is reading 160 steps.
- The crew enters S2.OP-AB.ROD-0001, Immovable/Misaligned Control Rods.
- Control rods are placed in Manual.
- The load reduction is stopped with reactor power at 87%.

Subsequently, the following occurs:

- The misaligned control rod issue has been corrected and is restored to Operations.
- Reactor Engineering approves recovery of the misaligned rod.

In accordance with S2.OP-AB.ROD-0001, which ONE of the following completes the statement?

Prior to recovering the misaligned rod, the operator will place the Lift Coil Disconnect Switches for all rods in the affected bank, except for the misaligned rod, in the __ (2) __ position, and then place the Rod Bank Selector Switch to the __ (2) __ position.

Note: ON = connected
OFF = disconnected

- A. 1) ON
2) SBD
- B. 1) ON
2) CBD
- C. 1) OFF
2) CBD
- D. 1) OFF
2) SBD

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. Plausible because the operator may confuse how the operation of the lift coils work when the switches are placed in ON or OFF position. First part is incorrect. Second part is incorrect. Plausible because the operator may confuse the rod bank selector switch position for shutdown rod versus control rod. See Ans. C for further explanation.
- B. Incorrect. Plausible because the operator may confuse how the operation of the lift coils work when the switches are placed in ON or OFF position. First part is incorrect. Second part is correct. See Ans. C for further explanation.
- C. Correct. IAW S2.OP-AB.ROD-0001, when recovering a misaligned rod, the lift coils for all the rods in the affected bank are placed in the disconnect or OFF position, with the exception of the misaligned rod which the lift coil needs to remain connected or ON position in order to recover the misaligned rod. Based on the condition of the stem, the misaligned rod is a control rod in D bank. Therefore, in order to insert the misaligned control rod, the operator must place the rod bank selector switch to the CBD position. The CBD position stands for control bank D rods. The SBD position is for selecting rods in shutdown bank D.
- D. Incorrect. First part is correct. Second part is incorrect. Plausible because the operator may confuse the rod bank selector switch position for shutdown rod versus control rod. See Ans. C for further explanation.

Technical References:

S2.OP-AB.ROD-0001, S2.OP-AR.ZZ-0005

Proposed References to be provided:

None

Learning Objective:

NOS05ABROD1, Objective 1, Describe, in general terms, the actions taken in S2.OP-AB.ROD-0001 and the bases for the actions in accordance with the Technical Bases Document.

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.7

Level:

RO

Category/System:

11- Immovable/Stuck Control Rod

K/A #:

APE05 AK2.02

Knowledge of the interrelations between the Inoperable / Stuck Control Rod and the following: Breakers, relays, disconnects, and control room switches

Importance:

2.5

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the candidate must know what actions or manipulations (rod selector switch and lift coil disconnects) are performed in the control room IAW AB.ROD-0001 during misaligned rod recovery.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

21

11-154

Points: 1.00

Given:

- Unit 2 is operating at 100% Power.
- ALL systems are in AUTO.
- A leak develops on the reference leg on the controlling Pressurizer (PZR) Level Channel.

Which ONE of the following completes the statement concerning the effect on Pressurizer Level assuming no operator action?

Indicated PZR Level will be __ (1) __ and actual PZR Level will __ (2) __.

- A. 1) higher; 2) rise
- B. 1) higher; 2) lower
- C. 1) lower; 2) rise
- D. 1) lower; 2) lower

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. First part is correct. Actual PZR level will lower due to the higher indicated PZR level causing the Master Flow Controller to lower charging flow. Plausible because the operator may incorrectly determine the effect on the DP transmitter following a reference leg failure. See Answer B for further explanation.
- B. Correct. A leak on the reference leg will result in a lower differential pressure sensed across the level transmitter causing the indicated PZR level to indicate higher than the actual level. Due to the higher indicated PZR level on the controlling channel, the Master Flow Controller will lower charging flow resulting in the actual PZR level to lower.
- C. Incorrect. First part is incorrect. Second part is incorrect. Plausible because the operator may incorrectly determine the effect on the DP transmitter following a reference leg failure. See Answer B for further explanation.
- D. Incorrect. First part is incorrect. Second part is correct. Plausible because the operator may incorrectly determine the effect on the DP transmitter following a reference leg failure. See Answer B for further explanation.

Technical References:

NOS05PZRL, GFES Fundamentals

Proposed References to be provided:

None

Learning Objective:

NOS05PZRPL-12, Objective 4b. Describe how the following components impact the Pressurizer Pressure and Level Control System during normal and abnormal conditions: Pressurizer Level Control and Alarm Channels.

Question Source:

Bank – Salem 2015 NRC RO8

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.8 / 41.10 / 45.3

Level:

RO

Category/System:

11- Pressurizer (PZR) Level Control Malfunction

K/A #:

APE 28 AK1.01

Knowledge of the operational implications of the following concepts as they apply to Pressurizer Level Control Malfunctions and the following: PZR reference leak abnormalities

Importance:

2.8

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the candidate is being asked on indicated and actual PZR level will respond due to a reference leg leak on the controlling PZR level.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

22

11-155

Points: 1.00

Given:

- Unit 2 is in a refueling outage.
- A fuel handling incident occurs in the spent fuel pool from a dropped fuel assembly.

Which of the following describes the expected alarm(s) and/or indication(s) for this event?

1. CAV shifts to ACCIDENT PRESSURIZED Mode
2. 2R5 or 2R9 radiation monitors in Warning or Alarm
3. 2R2 or 2R10A/B radiation monitors in Warning or Alarm
4. BOTH FHB Exhaust Fans running
5. FHB LOW PRESSURE Alarm is LIT
6. FHB HEPA 22 PLUS CHAR is LIT

A. 1, 3, and 5 Only

B. 1, 2, and 4 Only

C. 3, 5, and 6 Only

D. 2, 4, and 6 Only

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: D

Explanation / Justification:

- A. Incorrect. Credible distractor if the operator believes the fuel handling incident is inside containment which would cause the 2R2 or 2R10A/B to be in warning or alarm. In addition, the operator may also believe that 2R2 or 2R10A/B radiation monitors would also actuate the Control Room Ventilation to Accident Pressurize Mode because this would be a response to a release to the outside environment. The FHB low pressure alarm is plausible because the applicant may believe that during actuation of the fans through the charcoal filters this may be an expected condition due to more restricted air flow.
- B. Incorrect. Plausible distractor because the operator may believe that the CAV system will operate in AP Mode to protect the control room operators from the radiation release.
- C. Incorrect. Plausible distractor because the containment radiation area monitors could be in Alarm if the fuel incident was inside containment. The FHB low pressure alarm is plausible because the applicant may believe that during actuation of the fans through the charcoal filters this may be an expected condition due to more restricted air flow.
- D. Correct. During a fuel handling incident in the spent fuel pool, the 2R5 or 2R9 area radiation monitors would detect the release of radioactivity from the pool. When either the 2R5 or 2R9 reaches the alarm setpoint, the FHB ventilation will start both exhaust fans and shift the filter alignment to HEPA Plus Charcoal filters as indicated on the control console.

Technical References:

S2.OP-AB.FUEL-0001

Proposed References to be provided:

None

Learning Objective:

NOS05ABFUEL1-08, Objective 4. For the following analyzed transient/accidents: Dropped Fuel Assembly – Determine the expected alarms and indications

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.10 / 43.5 / 45.3 / 45.12

Level:

RO

Category/System:

11- Fuel-Handling Incidents

K/A #:

APE 36 G2.4.46

Ability to verify that the alarms are consistent with the plant conditions

Importance:

4.2

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the candidate must have knowledge of the expected indications or alarms when a fuel handling incident occurs. In this case, several indications/alarms are provided and the candidate must select which items are expected for the plant condition.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

23

11-156

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- A release of 21 Waste Gas Decay Tank is in progress in accordance with S2.OP-SO.WG-0008, Discharge of 21 Gas Decay Tank to Plant Vent.
- A Containment Pressure Relief is also in progress in accordance with S2.OP-SO.CBV-0002, Containment Pressure – Vacuum Relief System Operation, due to containment pressure at 0.2 psig.
- The RO reports that the 2R41D, Plant Vent, radiation monitor is in ALARM.

Which ONE of the following describes the plant response?

Note: 2WG41, GDT VENT CONT VLV
2VC5 and 2VC6, CONT PRESS RELIEF DAMPER

- A. The 2WG41 and the 2VC5 and 2VC6 will automatically close terminating the decay tank release and the pressure relief.
- B. The 2WG41 and the 2VC5 and 2VC6 require manual actions to close to terminate the pressure relief and the decay tank release.
- C. The 2WG41 will automatically close terminating the decay tank release and the 2VC5 and 2VC6 require manual actions to close to terminate the pressure release.
- D. The 2WG41 requires manual action to close to terminate the decay tank release and the 2VC5 and 2VC6 will automatically close to terminate the pressure release.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. When the 2R41D is in alarm, it will automatically close the 2WG41 (waste gas release valve), 2VC1 and 2VC4 dampers (containment purge), and the 2VC5 and 2VC6 dampers (containment pressure relief). It also aligns the 2R45 skid to the accident sampling loop.
- B. Incorrect. Plausible because the operator may incorrectly determine that no automatic actions will occur for these components.
- C. Incorrect. Plausible because the operator may incorrectly determine that the VC5 and VC6 dampers need to be manually closed.
- D. Incorrect. Plausible because the operator may incorrectly determine that the 2WG41 does not automatically close on high radiation signal.

Technical References:

S2.OP-AB.RAD-0001

Proposed References to be provided:

None

Learning Objective:

NOS05ABRAD1-07, Objective 1. Describe the operation of radiation monitors as applied to S2.OP-AB.RAD-0001: Radiation monitor response to high radiation; including actions that occur as a result of the channel in warning or alarm.

Question Source:

Bank - Salem

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.7 / 45.7

Level:

RO

Category/System:

11- Accidental Gaseous Radwaste Release

K/A #:

APE 60 AK2.02

Knowledge of the interrelations between the Accidental Gaseous Radwaste Release and the following: Auxiliary building ventilation system.

Importance:

2.7

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the candidate is being asked knowledge of the response from the plant vent radiation monitor when in warning or alarm condition and the expected response on components/systems associated with the Aux Building Ventilation system. The conditions in the stem meets the K/A because a release of the accidental gaseous radwaste could be due to a hot (high curie content) waste gas decay tank and a bad sample of the tank contents. This would lead to an unexpected release of higher than expected radioactive gas.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

24

10-103

Points: 1.00

Given:

- Unit 2 experienced a small break LOCA.
- The crew is implementing 2-EOP-FRCC-1, Response to Inadequate Core Cooling, and is currently attempting to restore core cooling.
- RCS pressure is 1600 psig.
- NO Charging Pumps can be started.
- ALL RCPs have been stopped.
- SG depressurization was NOT effective in restoring core cooling.
- CETs are 1205 °F and rising slowly.
- 21 SG NR level is 10% and all other SG NR levels are 6%.
- Containment pressure is 3.5 psig.
- The crew is performing step 18, RCP START FOR TEMPORARY CORE COOLING.

Which ONE of the following describes how the crew will operate the RCP(s) in accordance with 2-EOP-FRCC-1?

- A. Start ALL RCPs.
- B. Start 21 RCP ONLY.
- C. Do NOT start any RCPs and open one PZR PORV ONLY.
- D. Do NOT start any RCPs and open BOTH PZR PORVs.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

(A) Incorrect. Plausible because the operator may believe there is adequate NR levels in all SGs that meets the requirement to start and sacrifice all RCPs. However, SG NR levels do not support starting all RCPs. Starting an RCP with insufficient level in the SG can lead to creep failure of the SG tubes.

(B) Correct. IAW 2-EOP-FRCC-1 step 18, if CETs are greater than 1200 °F and at least one SG NR level is greater than 9% (15% adverse), then the crew will start one RCP at a time for each idle loop with a SG NR level greater than 9%. After the RCP is started the crew will loop around step 18 until CETs are less than 1200 °F. Based on the condition in the stem, the crew should only start 21 RCP since 21 SG is the only SG will NR level greater than 9% and the containment pressure is Normal or < 4 psig. If no SG NR levels are greater than 9%, then the crew will reset Phase A, open both CA330s and then open both PZR PORVs and Rx Head Vents to reduce RCS pressure.

(C) Incorrect. Plausible because the operator may believe that only one PORV is required to adequately reduce RCS pressure similar to actions performed in other EOPs. For example, in EOP-SGTR, the procedure directs the crew to open only one PZR PORV to reduce RCS pressure.

(D) Incorrect. Plausible if the operator believes that the RCP start criteria for an adequate SG NR level is not meet. See Ans. B for further explanation.

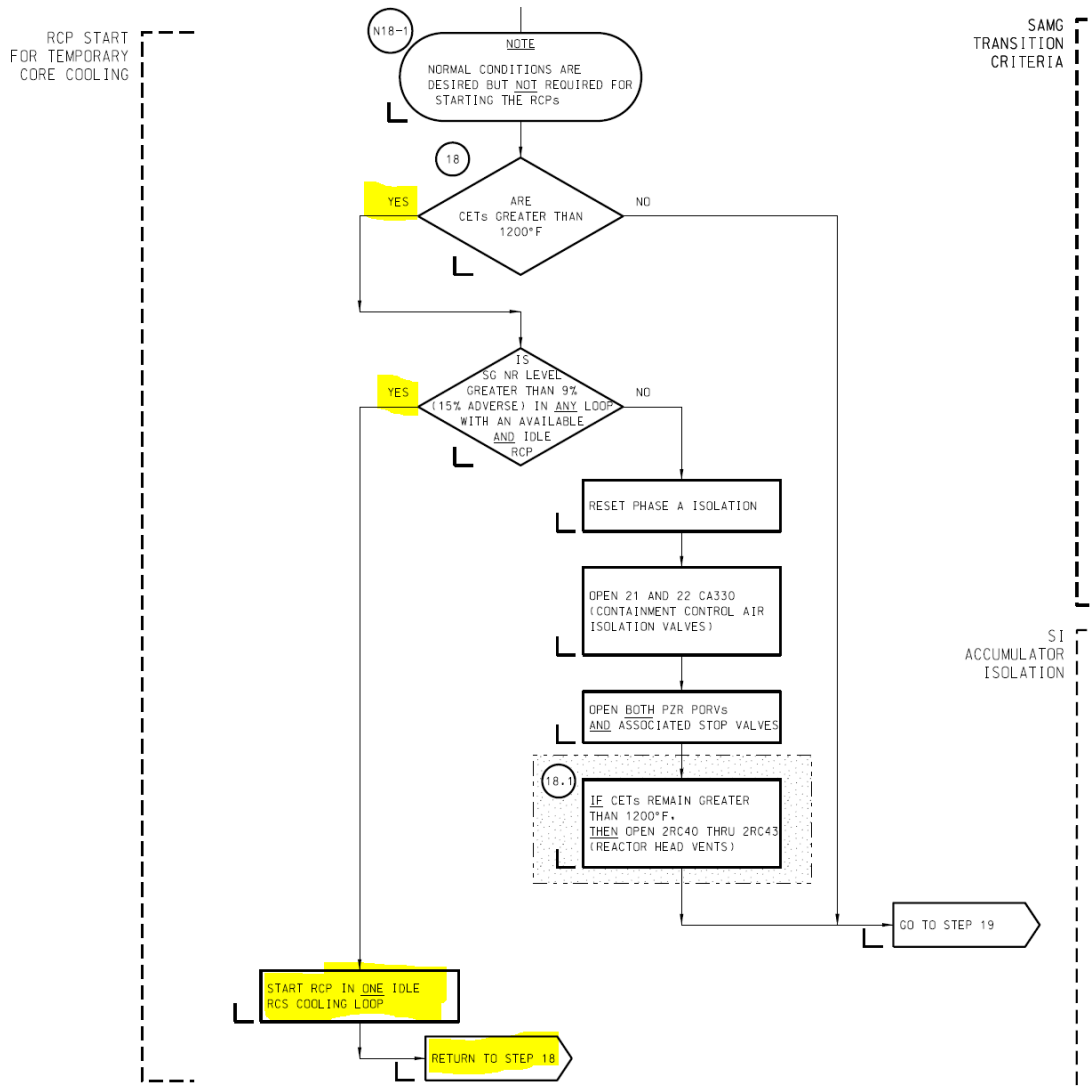
Technical References:	2-EOP-FRCC-1 (R40)
Proposed References to be provided:	None
Learning Objective:	NOS05FRCC00-06, Objective 5, Determine the indications that are monitored to ensure proper system/component operation for each step in the following: 2-EOP-FRCC-1
Question Source:	New
Question Cognitive Level:	Comprehension/Analysis
10CFR Part 55 Content:	41.7 / 45.5 / 45.6
Level:	RO
Category/System:	10-Inadequate Core Cooling
K/A #:	EPE 74 EA1.06 Ability to operate and monitor the following as they apply to a Inadequate Core Cooling: RCPs
Importance:	3.6
Tier/Group	Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the candidate must assess the plant conditions and determine how to operate the RCPs in response to a loss of core cooling. In this case, the operator must monitor the given SG NR levels and determine which RCPs can be started, if any. This meets the ability to operate and monitor K/A.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: 2-EOP-FRCC-1 sheet 3



RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

25

10-110

Points: 1.00

Given:

- Unit 2 has completed all actions in 2-EOP-LOSC-1, Faulted Steam Generator Isolation, to isolate a steam leak on 21 steam generator.
- The crew has just transitioned to 2-EOP-TRIP-3, SI Termination.
- The crew now reports the following plant conditions:
 - PZR level is lowering.
 - RCS pressure is lowering.
 - ALL SG pressures are stable.
 - 21 SG WR level is rising.
 - 2R19A, SG Blowdown, radiation monitor is in alarm.
- The CRS is unsure of the transition to 2-EOP-TRIP-3 and enters 2-EOP-TRIP-7, Rediagnosis.

In accordance with 2-EOP-TRIP-7, which ONE of the following procedures will the crew transition to NEXT?

- A. 2-EOP-LOCA-1, Loss of Reactor Coolant
- B. 2-EOP-LOSC-1, Faulted Steam Generator Isolation
- C. 2-EOP-TRIP-1, Reactor Trip or Safety Injection
- D. 2-EOP-SGTR-1, Steam Generator Tube Rupture

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: D

Explanation / Justification:

- A. Incorrect. Plausible because EOP-TRIP-7 allows transition to EOP-LOCA-1 and the operator may believe based on lowering PZR level and pressure that a LOCA is in progress and transition to 2-EOP-LOCA-1.
- B. Incorrect. Plausible because EOP-TRIP-7 allows transition to EOP-LOSC-1 and the operator may incorrectly believe that EOP-TRIP-7 will direct you back to procedure in effect which was EOP-LOSC-1.
- C. Incorrect. Plausible because the operator may incorrectly believe that EOP-TRIP-7 will direct you to EOP-TRIP-1 where diagnosis are performed for symptoms of a LOCA, SGTR and LOSC.
- D. Correct. IAW 2-EOP-TRIP-7 and the conditions given in the stem, conditions are not symptoms of a faulted or a loss of RCS, and therefore, the next procedure to transition to would be 2-EOP-SGTR-1 due to rising SG levels and SG high radiation. EOP-TRIP-3 only transitions to EOP-LOCA-1, LOCA-2, IOP-6 & 8 procedures and therefore, if the crew remains in EOP-TRIP-3 with the above condition, there will be no transition directed in the aforementioned EOPs to EOP-SGTR-1.

Technical References:

2-EOP-TRIP-7, Rev 40

Proposed References to be provided:

None

Learning Objective:

NOS05TRP007-03, Objective 1. Determine the indications that are monitored to ensure proper system/component operation for each step in EOP-TRIP-7

Question Source:

Bank – Byron 2019 NRC RO25

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 41.10 / 45.6 / 45.13

Level:

RO

Category/System:

10-Rediagnosis

K/A #:

W E01 EK3.2

Knowledge of the reasons for the following responses as they apply to the (Reactor Trip or Safety Injection/Rediagnosis):
Normal, abnormal, and emergency operating procedures associated with (Reactor Trip or Safety Injection/Rediagnosis).

Importance:

3.0

Tier/Group

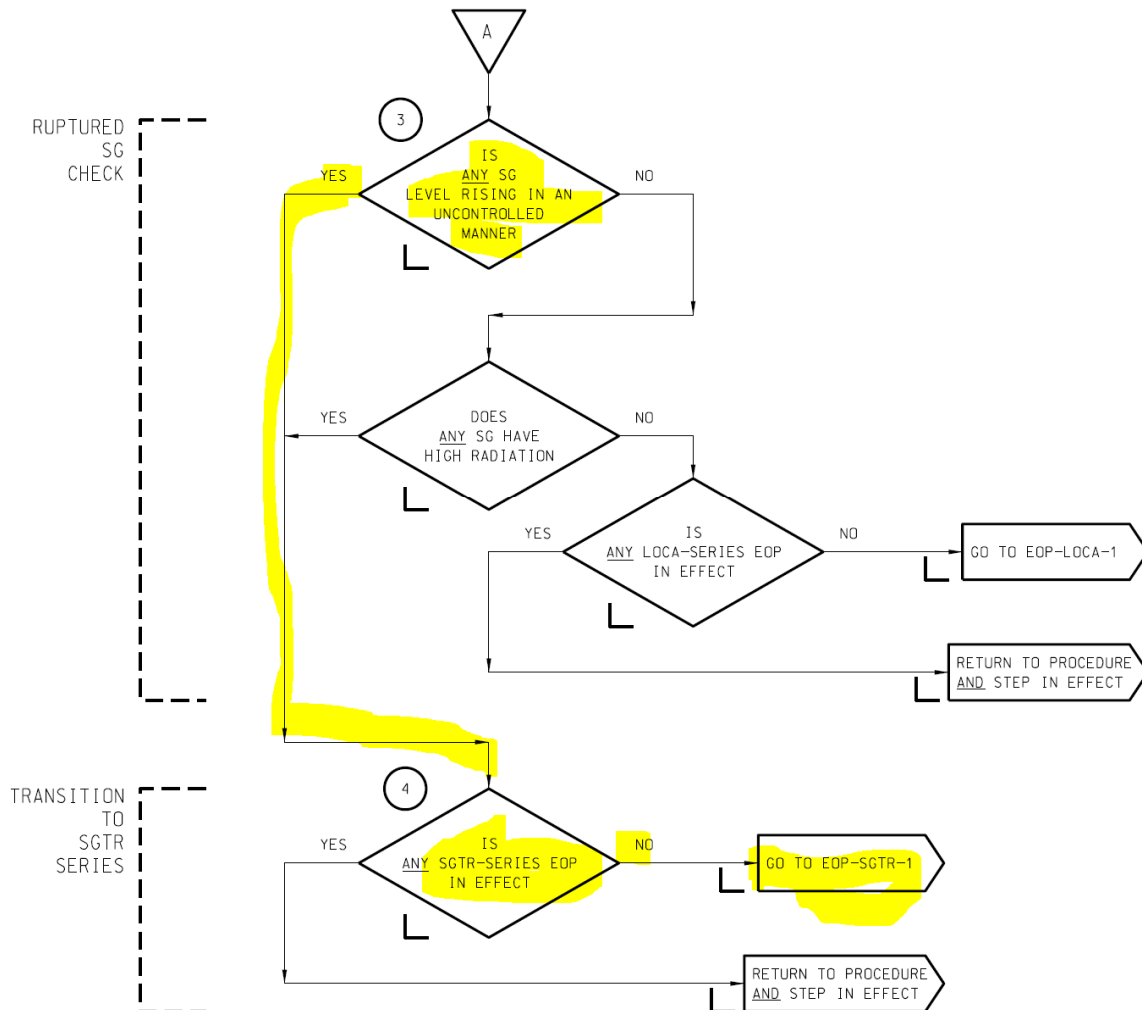
Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the candidate is being asked which EOP the crew should transition to while performing rediagnosis EOP-TRIP-7 based on the given plant conditions.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional Reference: 2-EOP-TRIP-7



RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

26

10-111

Points: 1.00

Given:

- Unit 2 is implementing 2-EOP-FRHS-2, Response to Steam Generator Overpressure, due to high pressure in 21 Steam Generator.
- The crew is at Caution step C6-1 that reads “AFW FLOW SHOULD REMAIN ISOLATED TO AFFECTED SG(s) UNTIL A STEAM RELEASE PATH IS ESTABLISHED”.

In accordance with 2-EOP-FRHS-2, which ONE of the following is the reason for this step?

- A. Operation of the Turbine Driven AFW Pump at high steam pressure may cause turbine damage.
- B. AFW is a high pressure system which may cause further overpressure in a SG with no steam release path.
- C. Differential temperatures between the existing high pressure conditions in the SG and the cold AFW will cause tube failure due to thermal stress.
- D. AFW pumps would operate near their shutoff head which could result in pump overheating or damage.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. Plausible the 23 AFW Pump is used as a means to vent the SG(s) and the candidate may believe that high pressure in the affected SG could cause damage to the turbine blades.
- B. Correct. IAW 2-EOP-FRHS-2, step C6-1 bases, if AFW flow is reestablished to an affected SG prior to establishing a steam release path, the AFW flow could further increase the affected SG pressure.
- C. Incorrect. Plausible since this bases is used on other FRHS procedures but it is not the reason for this action in FRHS-2.
- D. Incorrect. Plausible because the applicant may fail to recall that the AFW pumps have min flow protection.

Technical References:

2-EOP-FRHS-2, Rev 40

Proposed References to be provided:

None

Learning Objective:

NOS05FRHS00, Objective 10. Describe the basis for each step, caution, and note, in 2-EOP-FRHS-1 Thru 5.

Question Source:

Bank – DC Cook 2018 NRC RO25

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.5 / 41.10 / 45.6 / 45.13

Level:

RO

Category/System:

10- Steam Generator Overpressure

K/A #:

W E13 EK3.2

Knowledge of the reasons for the following responses as they apply to the (Steam Generator Overpressure): Normal, abnormal and emergency operating procedures associated with (Steam Generator Overpressure).

Importance:

2.9

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 22

K/A Match: The K/A is matched because the candidate is being asked the reason for isolating AFW flow to the affected SGs during a SG Overpressure event in EOP-FRHS-2.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

27

10-112

Points: 1.00

Given:

- Salem Unit 2 is performing 2-EOP-LOCA-2, Post LOCA Cooldown and Depressurization.
- ALL ECCS Pumps are running.
- 21 Charging Pump was stopped at step 13, Charging Pump Reduction.
- The crew is at step 14, SI Pump Reduction.
- Conditions are met for stopping one Safety Injection (SI) Pump.

In accordance with 2-EOP-LOCA-2, which ONE of the following identifies the SI Pump that should be stopped and the reason for the selection?

- A. 21 SI Pump to reduce the load on the bus for starting additional loads later.
- B. 22 SI Pump to reduce the load on the bus for starting additional loads later.
- C. 22 SI Pump to ensure ECCS injection flow if any single vital bus failure occurs.
- D. 21 SI Pump to ensure ECCS injection flow if any single vital bus failure occurs.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. First part is incorrect. 21 SI pump is supplied from A bus. If C bus is lost, then both 22 Charging and 22 SI pump will be lost and resulting in a complete or significant loss of ECCS flow. Second part is incorrect. Credible distractor if the operator believes that stopping the SI pump is to reduce load on the bus. Reducing load on the bus is not the reason for stopping an SI pump on an alternate bus.
- B. Incorrect. First part is correct. Second part is incorrect. Reducing load on the bus is not the reason for stopping an SI pump on an alternate bus.
- C. Correct. IAW 2-EOP-LOCA-2 Note on step N13-2, "The centrifugal charging pumps and SI pumps should be stopped on alternate ECCS trains when possible". Since 21 Charging pump (B bus) was stopped and that leaves 22 Charging pump running on C bus. 21 SI pump is supplied from A bus and 22 SI pump supplied from C bus, the operator should stop 22 SI pump (C bus) to ensure ECCS flow if a loss of a vital bus occurs (21 CV pump B bus and 21 SI pump A bus).
- D. Incorrect. 21 SI pump is supplied from A bus. If C bus is lost, then both 22 Charging and 22 SI pump will be lost and resulting in a complete or significant loss of ECCS flow.

Technical References:

2-EOP-LOCA-2, Rev 40

Proposed References to be provided:

None

Learning Objective:

NOS05LOCA02-06, Objective 1, Determine the indications that are monitored to ensure proper system/component operation for each step in the EOP for POST LOCA COOLDOWN AND DEPRESSURIZATION

Question Source:

Bank – Salem 2011 NRC RO23

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.5 / 45.6

Level:

RO

Category/System:

10-LOCA Cooldown - Depressurization

K/A #:

W E03 EA1.1

Ability to operate and/or monitor the following as they apply to the (LOCA Cooldown and Depressurization): Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Importance:

4.0

Tier/Group

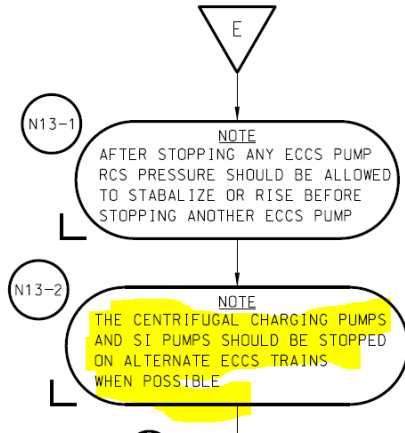
Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the candidate is being asked which SI Pump should be selected next to be stopped next and the reason why. In this case, since 22 Charging Pump is running supplied from 2C 4KV bus, the candidate needs to stop 22 SI Pump is supplied from 2C 4KV bus. This will ensure that on a loss of a vital bus on either CV or SI pump will be running.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional Reference: 2-EOP-LOCA-2 Rev 40 Sheet 2



RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

28

04-041

Points: 1.00

Which ONE of the following is a design feature of the Reactor Coolant Pump #2 seal?

- A. Film riding seal with a design leak-off of 3 gph to the RCP standpipe; allows the RCP to operate indefinitely without restrictions upon a loss of the #1 seal.
- B. Film riding seal with a design leak-off of 100 cc/hr to the RCP standpipe; serves as only an emergency backup upon a total loss of the #1 seal.
- C. Face rubbing seal with a design leak-off of 3 gph to the RCP standpipe; serves as only an emergency backup upon a total loss of the #1 seal.
- D. Face rubbing seal with a design leak-off of 100 cc/hr to the RCP standpipe; allows the RCP to operate indefinitely without restrictions upon a loss of the #1 seal.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. First part is incorrect. #2 seal is not a film riding seal. Second part is incorrect. Plausible because the #1 seal is a film riding seal design.
- B. Incorrect. First part is incorrect. #2 seal is not a film riding seal. Second part is correct. Plausible because the #1 seal is a film riding seal design and the 100 cc/hr is for a #3 seal leakage.
- C. Correct. The #2 RCP seal is designed as a face rubbing seal. Normal leakage past the #2 seal is 3 gph and is directed to the #3 seal and the RCP standpipe. Upon a failure of the #1 seal, the #2 seal converts from face rubbing to film riding seal. In this condition, the #2 seal is NOT a controlled leakage seal. Not designed for high flow and high temperatures conditions when #1 seal fails. Acts as only an emergency backup to the loss of #1 seal. The RCP must be shutdown. RCP standpipe provides backpressure to limit #2 seal leakage and to maintain a certain pressure against #3 seal.
- D. Incorrect. First part is incorrect. #2 seal leakage is 3 gph, 100 cc/hr is the design leakage for #3 seal. Second part is incorrect. RCP cannot operate indefinitely following loss of #1 seal, the RCP must be shutdown.

Technical References:

NOS05RCPUMP-16, RCP-1 simplified

Proposed References to be provided:

None

Learning Objective:

NOS05RCPUMP-16, Objective 4. Describe the function of the following components and how their normal and abnormal operation affects the Reactor Coolant Pump: Controlled Leakage Seal Assembly

Question Source:

Bank – Salem

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.7

Level:

RO

Category/System:

04-Reactor Coolant Pump

K/A #:

003 K4.07

Knowledge of the RCPS design feature(s) and/or interlock(s) which provide for the following: Minimizing RCS leakage (mechanical seals)

Importance:

3.2

Tier/Group

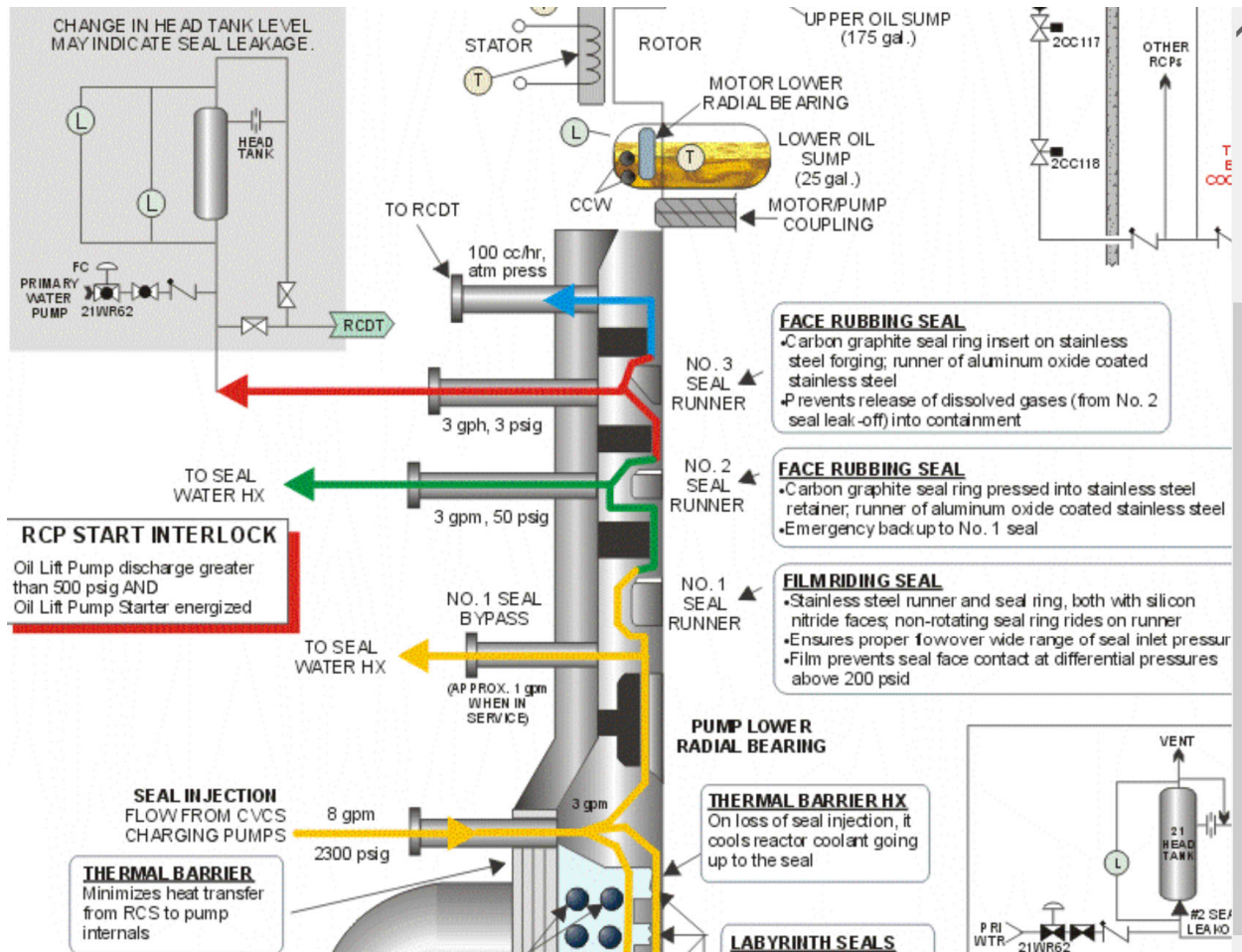
Plant Systems - Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked about the design features of the #2 RCP seal. In this case the candidate is being asked to specific design features such as design leakage past the seal and whether the #2 seal serves as an emergency backup for the #1 seal failure.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional Reference: Simplified RCP-1



RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

29

01-012

Points: 1.00

Given:

- Salem Unit 2 is at 100% Power.
- All systems are in normal alignment and in Automatic.
- 21 Mixed Bed Demineralizer is in service.
- A malfunction occurs with the 2CC71, Letdown HX Temperature Controller, while operating in AUTO.
- 2TI130A, Letdown Temperature, indicates 120 °F and RISING.

Which ONE of the following completes both statements?

1. Based on the above condition, RCS boron concentration will __ (1) __.
 2. What is the expected operator response to prevent exceeding procedural limits, assuming the 2CC71 does not respond?
-
- A. 1) rise
2) Ensure 2CV21 diverts to VCT
 - B. 1) rise
2) Ensure 2CV35 diverts to Hold-up Tanks
 - C. 1) lower
2) Ensure 2CV21 diverts to VCT
 - D. 1) lower
2) Ensure 2CV35 diverts to Hold-up Tanks

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. Letdown temperature rising will result in the demineralizer releasing boron into the RCS and raising RCS boron concentration. If letdown temperature continues to rise, then the operator should ensure that the 2CV21 automatically diverts to the VCT to bypass the demineralizers when letdown temperature reaches 136 °F. The operator can manually select 2CV21 to divert to VCT if the auto function fails. S2.OP-SO.CVC-0012 states a Limitation of 140 °F to prevent resin damage.
- B. Incorrect. First part is correct. Second part is incorrect. The 2CV35 is downstream of the demineralizers and therefore will not bypass the demineralizers. 2CV35 diverts to CVCS HUT on only a high VCT level. Plausible because the operator may incorrectly determine that the 2CV35 is used to bypass the demineralizers.
- C. Incorrect. First part is incorrect. RCS boron will be released on rising letdown temperature. Second part is correct.
- D. Incorrect. First part is incorrect. RCS boron will be released on rising letdown temperature. Second part is incorrect. The 2CV35 is downstream of the demineralizers and therefore will not bypass the demineralizers. 2CV35 diverts to CVCS HUT on high VCT level. Plausible because the operator may incorrectly determine that the 2CV35 is used to bypass the demineralizers.

Technical References:

NOS05CVCS00-18, S2.OP-SO.CVC-0012

Proposed References to be provided:

None

Learning Objective:

NOS05CVCS00-18, Objective 16. Given a Chemical and Volume Control System failure, predict the effect of the Chemical and Volume Control System failure on the following: Reactor Coolant System

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.10 43.2 / 45.12

Level:

RO

Category/System:

01-Chemical and Volume Control

K/A #:

004 G2.1.32

Ability to explain and apply system limits and precautions.

Importance:

3.8

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to describe the effects of the failure of the 2CC71 and rising letdown temperature will have on RCS boron concentration. In addition, the candidate is being asked what action is expected if letdown temperature continues to rise to prevent exceeding procedural limits.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: S2.OP-SO.CVC-0001

S2.OP-SO.CVC-0001(Q)

3.0 PRECAUTIONS AND LIMITATIONS

- ___ 3.1 Two boration flow paths are required in Modes 1-3. When 2CV55 is isolated, 2CV81 OR 2CV82 must be throttled, with ≥ 33 gpm (as verified by Charging/Letdown mismatch), AND 2CV48 and 2CV53 must be LOCKED OPEN, to satisfy boration flowpath requirements.
- ___ 3.2 2CA2015, Control Air Supply to 2CV55 Bypass Valve, does NOT have a bumpless transfer feature when placed in the NORMAL or BYPASS position. The Charging Flow controller must be above the minimum flow setpoint prior to manipulating 2CA2015.
- ___ 3.3 Closing 2CV7 in Section 5.16 will isolate Component Cooling Water to the Letdown Heat Exchanger due to interlock between the 2CV7 and the 2CC71. Jumpers should be installed to ensure adequate cooling is lined up to the Letdown Heat Exchanger during the remainder of the RCS Cooldown on RHR.
- ___ 3.4 Letdown temperature should be monitored routinely to ensure proper operation of 2CC71. Lower than normal temperatures can result in changes to RCS boron concentration due to effects on demineralizer bed resin.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional Reference: S2.OP-SO.CVC-0012

S2.OP-SO.CVC-0012(Q)

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CVCS DEMINERALIZER - NORMAL OPERATION

Rev: 35

- _____ 2.1.19. During the initial fill and vent of a demineralizer following resin replacement, additional fill and vent time (i.e., in excess of the specified minimum fill and vent time) should be considered to ensure the demineralizer is completely filled and vented. Ensuring a demineralizer is completely, filled and vented minimizes the possibility of an unexpected drop in VCT level, when placing the demineralizer in service.
- _____ 2.1.20. **IF** in Mode 6, ensure compliance with S2.OP-ST.ZZ-0007, Refueling Operations/Unborated Water Source Isolation Valves.
- _____ 2.1.21. The preferred method for operating the CV18 when closing orifice valves is in AUTO during normal operations. The primary concern when closing orifice valves is flashing in the Letdown line. Letdown pressure will initially lower (~100 psig) until the CV18 can adjust. Saturation temperature at 100 psig is approximately 338 degrees Fahrenheit. Regen heat exchanger outlet temperatures should be monitored to ensure temperatures are not expected to reach saturation temperature.

2.2 Limitations

- _____ 2.2.1. Resin damage will occur when CVCS demineralizer inlet temperature exceeds 140°F. 2CV21, Letdown Demin Bypass Valve, when in AUTO will divert to VCT when temperature reaches 136°F as indicated on 2TI-130A.
- _____ 2.2.2. Design pressure of CVCS Demins is 200 psig.
- _____ 2.2.3. Maximum design flowrate of a Cation Bed Demin is 75 gpm.
- _____ 2.2.4. The maximum Letdown flowrate is 180 gpm during RHR Letdown Booster Pump operation.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

30

01-013

Points: 1.00

Given:

- Salem Unit 2 is at 100% Power.
- The 2CV4, Letdown Orifice Isolation Valve, is in service.
- The crew is transferring CVCS Letdown to the 2CV3, Letdown Orifice Isolation Valve, in accordance with S2.OP-SO.CVC-0001, Charging, Letdown, and Seal Injection.
- 2CV18, Letdown Pressure Control Valve, is in MANUAL.
- 2CC71, Letdown HX Temperature Control Valve, is in AUTO
- The RO opens 2CV3.

Which ONE of the following describes how the 2CV18 will be adjusted and how the 2CC71 will respond to maintain letdown pressure and temperature within limits?

The 2CV18 will be...

- A. throttled CLOSE as pressure rises and the 2CC71 will modulate OPEN in response to higher temperature.
- B. throttled OPEN as pressure rises and the 2CC71 will modulate OPEN in response to higher temperature.
- C. throttled CLOSE as pressure lowers and the 2CC71 will modulate CLOSE in response to lower temperature.
- D. throttled OPEN as pressure lowers and the 2CC71 will modulate CLOSE in response to lower temperature.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. First part is incorrect. The 2CV18 will be throttled open as pressure rises. Second part is correct. Plausible because the operator may incorrectly determine how letdown pressure will respond when two orifice valves are open.
- B. Correct. When the 2CV3 (45 gpm orifice) is opened, along with 2CV4 already being open, letdown pressure and flow will rise. With the 2CV18 in Manual, the operator will be required to throttle open the 2CV18 to maintain letdown pressure around 300 psig. The 2CV6 letdown relief valve lifts at 600 psig. As letdown flow rises through the Letdown HX (Non-Regen HX), letdown temperature will rise resulting in the 2CC71 controller demand to rise and open the 2CC71 more to raise CCW flow through the Letdown HX. If letdown temperature reaches 136 °F, then the 2CV21 will automatically divert flow to the VCT to prevent damage to the Mixed Bed Resin.
- C. Incorrect. First part is incorrect. The 2CV18 will be throttled open as pressure rises. Second part is incorrect. The 2CC71 will throttle open to lower letdown temperature. Plausible because the operator may incorrectly determine how letdown pressure will respond when two orifice valves are open.
- D. Incorrect. First part is incorrect. The 2CV18 will be throttled open as pressure rises. Second part is incorrect. The 2CC71 will throttle open to lower letdown temperature. Plausible because the operator may incorrectly determine how the 2CV18 should respond when letdown pressure rises.

Technical References:

NOS05CVCS00-18

Proposed References to be provided:

None

Learning Objective:

NOS05CVCS00-18, Objective 4, Describe the function and how their normal and abnormal operations affects the Chemical and Volume Control System: (ix) Letdown Heat Exchanger, (x) Low Pressure Letdown Control Valve, CV18

Question Source:

Bank – Salem 2006 NRC RO31

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7

Level:

RO

Category/System:

01-Chemical and Volume Control

K/A #:

004 K4.11

Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following: Temperature/pressure control in letdown line, prevent boiling, lifting reliefs, hydraulic shock, piping damage, and burst.

Importance:

3.1

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked how letdown pressure and temperature are controlled when placing a letdown orifice in service to prevent exceeding temperature and pressure limits. Proper operation of letdown pressure and temperature within limits prevents inadvertent lifting of the letdown relief valve (2CV6) and prevents high letdown temperatures from damaging demineralizers.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

31	04-042	Points: 1.00
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Given:

- Salem Unit 2 is in MODE 4.
- 21 RHR loop is in Shutdown Cooling.
- 22 RHR loop is aligned for ECCS injection.
- 21RH18, RHR HX Outlet Valve, and 2RH20, RHR HX Bypass Valve, are being throttled to maintain RHR flow at 3000 gpm.
- A loss of the 2A 115V Vital Instrument Bus occurs.

Which ONE of the following describes the impact to the RHR loop in service and the RCS temperature?

- A. 21RH18 will CLOSE; 2RH20 will remain as-is; RCS temperature will rise.
- B. 21RH18 will CLOSE; 2RH20 will OPEN; RCS temperature will rise.
- C. 21RH18 will OPEN; 2RH20 will remain as-is; RCS temperature will lower.
- D. 21RH18 will OPEN; 2RH20 will OPEN; RCS temperature will lower.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. 21RH18 fails open on a loss of 2A VIB and the 2RH20 fails open on a loss of 2D VIB. Since only 2A VIB was lost, the 21RH18 will open and the 2RH20 will remain as-is. RCS temperature will lower due to 21RH18 failing open. Plausible because the operator may incorrectly determine how the valve fails on loss of power.
- B. Incorrect. Same reason as Ans. A with the exception that the 2RH20 will fail open only when a loss of 2D VIB. Plausible because the operator may incorrectly determine how the valve fails on loss of power.
- C. Correct. Per S2.OP-AB.115-0001, a loss of 2A 115V Vital Instrument Bus will cause the 21RH18 to fail open. 2RH20 will remain as-is and will only fail open when there is a loss of the 2D 115V Vital Instrument Bus. Failed open 21RH18 will result in an increase in flow through the RHR HX and RCS temperature lowering.
- D. Incorrect. The 2RH20 will only fail open on a loss of the 2D VIB. 21RH18 failing open will result in the RCS temperature lowering. Plausible if the operator believes that both valves will fail open on loss of the 2A VIB.

Technical References:

NOS05RHR000-19, S2.OP-AB.115-0001

Proposed References to be provided:

None

Learning Objective:

NOS05RHR000-19, Objective 4, Describe how the following components impact the Residual Heat Removal System during normal and abnormal conditions: (e) Air Operated Valves: RH18 & RH20

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.6

Level:

RO

Category/System:

04-Residual Heat Removal

K/A #:

005 K3.01

Knowledge of the effect that a loss or malfunction of the RHRS will have on the following: RCS

Importance:

3.9

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked how air operated valves in the RHR system is impacted by a loss of an vital instrument bus and based on this impact how does it affect the RCS temperature.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

32

04-043

Points: 1.00

Given:

- Salem Unit 2 is in MODE 5.
- The RCS is in **solid plant** operation at 300 psig.
- One train of RHR is in service.
- One Charging Pump is running.
- RHR letdown is in service through the 2CV8, Letdown Isolation for RHR, with all letdown orifices open.
- Letdown Booster Pump is NOT in service.
- 2CV18, Letdown Pressure Control Valve, is in AUTOMATIC.

Subsequently, the running RHR Pump trips.

Which ONE of the following completes the following statement?

Initially, RCS pressure will _____, and Letdown pressure will _____.

- A. lower; rise
- B. lower; lower
- C. rise; rise
- D. rise; lower

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: D

Explanation / Justification:

- A. Incorrect. First part is incorrect. RCS pressure rises due to charging adding inventory, while no RHR pump is running to remove inventory. Second part is incorrect. Plausible because the operator may believe that when RCS pressure lowers the 2CV18 will close more resulting in more line resistance in the letdown line and an increase in pressure due to non-compressibility of water.
- B. Incorrect. First part is incorrect. Second part is correct. Plausible because if RCS pressure lowers, 2CV18 would normally be expected to throttle closed.
- C. Incorrect. First part is correct. Second part is incorrect. The 2CV18 will throttle closed. When the RHR pump trips, RHR discharge pressure, and the pressure at the letdown line will lower. 2CV18 will throttle closed to attempt to maintain pressure. Plausible because the operator may believe that when RCS pressure rise, the 2CV18 will close more to reduce pressure resulting in more line resistance in the letdown line and an increase in pressure due to non-compressibility of water.
- D. Correct. Flow into (charging) and out of (RHR letdown) the RCS was initially balanced. When RHR pump tripped two things resulted: 1) the RCS pressure rose due to the flow imbalance, and 2) letdown line pressure lowered due to the loss of discharge pressure when the RHR pump tripped. 2CV18 will respond to the lowering letdown line pressure by closing to attempt to maintain pressure at setpoint.

Technical References:

S2.OP-IO.ZZ-0006 (R52)

Proposed References to be provided:

None

Learning Objective:

NOS05CVCS00-18, Objective 4, Describe the function and how their normal and abnormal operations affects the Chemical and Volume Control System: (x) Low Pressure Letdown Control Valve, CV18

Question Source:

Bank – Diablo Canyon 2016 NRC RO04

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 45.7

Level:

RO

Category/System:

04-Residual Heat Removal

K/A #:

005 K5.05

Knowledge of the operational implications of the following concepts as they apply to the RHRS: Plant response during “solid plant” pressure change due to the relative incompressibility of water

Importance:

2.7

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked how RCS pressure will respond during solid plant operations when a RHR pump trips. In addition, the candidate is being asked based on letdown pressure response how to operate the 2CV18 to restore RCS pressure to 300 psig.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

33

02-023

Points: 1.00

Given:

- Salem Unit 2 is experiencing a LOCA.
- 2C 4KV Vital Bus is de-energized.
- ALL available ECCS pumps are running.
- RCS pressure is currently 300 psig.

Which ONE of the following identifies the approximate ECCS flow based on current RCS pressure?

- A. 560 gpm
- B. 1235 gpm
- C. 1910 gpm
- D. 10,235 gpm

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. Plausible if the operator believes that the charging pump is the only ECCS pump providing flow and all other pumps are above their shutoff head. This is the total flow for 1 charging pump.
- B. Correct. With 2C 4KV Vital Bus de-energized only 21 Charging Pump, 21 SI Pump, and both RHR Pumps are running. With RCS pressure at 300 psig, the Charging pump is running at runout flow condition which is 560 gpm per pump. The SI pumps are operating at runout flow conditions which is 675 gpm per pump. The RHR pumps are running at shutoff head (>170 psid) so no flow is expected. Therefore, total ECCS flow at 300 psig = $560 \text{ gpm} + 675 \text{ gpm} = 1235 \text{ gpm}$.
- C. Incorrect. Plausible if the operator believes that both SI pumps are still running and doesn't take into account that the 2C 4KV bus supplies one of the SI pumps. This is the total flow with 1 charging pump and 2 SI pumps running.
- D. Incorrect. Plausible if the operator believes that the RHR pumps are below their shutoff head. RHR is placed in service during shutdown when RCS pressure is below 340 psig. The RHR pumps are at shutoff head so no flow is expected with RCS pressure at 300 psig. The RHR pumps can only deliver design accident flow of 4500 gpm when RCS pressure is less than 170 psid or 170 psig during injection. This is the total flow with 1 Charging, 1 SI, and 2 RHR pumps running [$560 \text{ gpm} + 675 \text{ gpm} + 4500 \times 2 = 10,235 \text{ gpm}$].

Technical References:

NOS05ECCS00-10 & NOS05RHR000-19

Proposed References to be provided:

None

Learning Objective:

NOS05ECCS00-10, Objective 16. Given a Emergency Core Cooling System failure, predict the effect of the Emergency Core Cooling System failure on the following: Reactor Coolant System

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 45.7

Level:

RO

Category/System:

02-Emergency Core Cooling

K/A #:

006 K5.06

Knowledge of the operational implications of the following concepts as they apply to the ECCS: Relationship between ECCS flow and RCS pressure

Importance:

3.3

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to determine the total ECCS flow based on current RCS pressure. In this case, the candidate needs to know the approximate runout flows at runout pressure for each ECCS pump.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: NOS05ECCS00

ELO 5a

- e. Power Supplies
 - 1) 21 Charging Pump: 2B 4KV Vital Bus
 - 2) 22 Charging Pump: 2C 4KV Vital Bus
- f. Operational Numbers (Conversion for feet to psid - .433 psi = 1ft.)
 - 1) Design ~2511 psid at 150 gpm
 - 2) **Runout** ~550 psid at 560 gpm
 - 3) **Shutoff Head** ~2670 psid

2. Safety Injection Pumps

- a. 400 HP motor-driven 10 stage, horizontal, centrifugal pump

ELO 5b

- b. Power supplies
 - 1) 21 SI pump: 2A 4KV Vital Bus
 - 2) 22 SI pump: 2C 4KV Vital Bus
- c. Operational Numbers
 - 1) ~1082 psid at 425 gpm
 - 2) **Runout** ~675 psid at 675 gpm
 - 3) **Shutoff Head** ~1520 psid

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: NOS05ECCS00

with common pump and motor shaft (no coupling)

ELO 5c

- c. Power Supplies
 - 1) 21 RHR pump: 2A 4KV Vital Bus
 - 2) 22 RHR pump: 2B 4KV Vital Bus
- d. Design specs
 - 1) Design - 3000 gpm at ~150 psid
 - 2) **Pump runout** of 4800 gpm has been limited to ~4500 gpm by flow restricting orifices at 130 psid.
 - 3) **Shutoff head** ~170 psid
 - 4) Minimum flow - 500 gpm for pump cooling
 - 5) Maximum suction temperature - 400°F
 - 6) Maximum discharge pressure - 600 psig

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

34

05-009

Points: 1.00

Given:

- Unit 2 is responding to a Loss of Heat Sink.
- During cycling of the PZR PORVs due to high PZR pressure, 2PR1 failed open.
- The crew closed 2PR6, PZR PORV Block Valve, to isolate the failed open 2PR1.

Subsequently, Console Bezel Alarm, PRT PRESS HI, is now LIT

- PRT Pressure is indicating 12 psig.

Which ONE of the following completes both statements?

1. What would be the impact to the PRT if the PZR PORV could not be isolated?
 2. In accordance with the Alarm Response Procedure for “PRT PRESS HI”, what action can be performed to reduce PRT pressure?
-
- A. 1) A rupture disc will rupture at 100 psig.
2) Drain the PRT to lower level and pressure.
 - B. 1) A relief valve will open at 100 psig.
2) Drain the PRT to lower level and pressure.
 - C. 1) A rupture disc will rupture at 100 psig.
2) Open the 2PR15 to vent the PRT.
 - D. 1) A relief valve will open at 100 psig.
2) Open the 2PR15 to vent the PRT.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. A stuck open PZR PORV will cause the PRT pressure, level, and temperature to rise. PRT pressure at 10 psig will close the 2PR15 and cannot be open until PRT pressure is less than 10 psig. IAW S2.OP-SO.PZR-0003 step 4.2.2, if 2PR15 cannot open due to PRT pressure of 10 psig, then the PRT level adjustment is necessary to lower PRT pressure and clear the interlock to allow 2PR15 to open. IAW step 4.1.2 for PRT level high, the 2PR14 drain valve is opened first to lower level then the 2PR15 is opened to vent PRT down to 3 psig. The ARP for PRT PRESS HI also states to drain the PRT to lower level and pressure. The PRT rupture discs rupture at 100 psig.
- B. Incorrect. Plausible if the operator believes that the PRT has a relief valve. First part is incorrect. The PRT does not have a relief valve and instead uses a rupture disc that opens at 100 psig. Second part is correct.
- C. Incorrect. First part is correct. Second part is incorrect. 2PR15 vent valve will not open when PRT pressure is ≥ 10 psig.
- D. Incorrect. Plausible if the operator believes that the PRT has a relief valve and that the 2PR15 vent valve is still available when PRT pressure is above 10 psig. First part is incorrect. The PRT does not have a relief valve and instead uses a rupture disc that opens at 100 psig. Second part is incorrect. 2PR15 vent valve will not open when PRT pressure is ≥ 10 psig.

Technical References:

NOS05PZRPRT-08, S2.OP-SO.PZR-0003, S2.OP-AR.ZZ-0012

Proposed References to be provided:

None

Learning Objective:

NOS05PZRPRT-08, Objective 15. Given a Pressurizer and Pressurizer Relief Tank failure, predict the effect of the Pressurizer and Pressurizer Relief Tank failure on the following: Containment

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 43.5 / 45.3 / 45.13

Level:

RO

Category/System:

05-Pressurizer Relief/Quench Tank

K/A #:

007 A2.03

Ability to (a) predict the impacts of the following malfunctions or operations on the PRTS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:

Overpressurization of the PZR

Importance:

3.6

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to predict the impact to the PRT during overpressurization of the PZR. The candidate is specifically asked how the PRT is protected if the PZR overpressurization event was not terminated. In addition, the candidate is asked what actions from

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

S2.OP-SO.PZR-0003 are performed to correct or mitigate the PRT high pressure from rupturing the rupture discs.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: S2.OP-SO.PZR-0003

S2.OP-SO.PZR-0003(Q) PRESSURIZER RELIEF TANK OPERATION

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- ___ 4.1.2. IF PRT level is high,
___ THEN PERFORM the following:

CAUTION

- ___ • RCDT Pump cavitation may occur if RCDT level falls below 10% OR the PRT pressure falls below 3 psig.
- ___ • A positive pressure nitrogen blanket should be maintained on the PRT to prevent air intrusion and formation of explosive hydrogen/oxygen mixtures.
- ___ • Opening 2PR14 opens 2WL12, which starts an RCDT pump and defeats the RCDT Low Level Cutoff Switch.

- ___ 1. OPEN 2PR14, DRAIN to commence PRT draining.
- ___ 2. IF the PRT is NOT vented to the containment,
___ THEN CYCLE 2NT25, N2 SUPPLY to maintain PRT pressure positive.
- ___ 3. WHEN PRT level is greater or equal to 59%,
___ THEN PERFORM the following:
 - ___ a. CLOSE 2PR14, DRAIN.
 - ___ b. ENSURE 2NT25, N2 SUPPLY is CLOSED.
- ___ 4. IF the PRT pressure needs to be reduced,
___ THEN PERFORM the following:
 - ___ a. OPEN 2PR15, VENT.
 - ___ b. WHEN the PRT pressure is at desired pressure
(greater than or equal to 3 psig and less than 10 psig),
___ THEN CLOSE 2PR15, VENT.

RO EXAMINATION ANSWER KEY

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35

08-010

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- Console bezel alarm, SURGE TANK LEVEL HI-LO, is LIT.
- CCW Surge Tank Level Channels A and B are LOWERING rapidly.
- The crew is implementing S2.OP-AB.CC-0001, Component Cooling Abnormality.

In accordance with S2.OP-AB.CC-0001, which ONE of the following completes the statement assuming the surge tank levels continue to lower?

When Surge Tank levels lowers to less than __ (1) __, the operator is required to trip the reactor and ____ (2) ____.

- A. 1) 17%
 2) stop all RCPs, isolate Letdown, and swap Charging pump suction to the RWST
- B. 1) 17%
 2) stop all RCPs ONLY
- C. 1) 5%
 2) stop all RCPs ONLY
- D. 1) 5%
 2) stop all RCPs, isolate Letdown, and swap Charging pump suction to the RWST

RO EXAMINATION ANSWER KEY

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Answer: D

Explanation / Justification:

- A. Incorrect. First part is incorrect. Surge tank level less than 5% requires stopping RCPs IAW Attachment 2. Plausible since the 17% level is expected knowledge to the operators to take immediate actions associated with low VCT level. Second part is correct.
- B. Incorrect. First part is incorrect. Surge tank level less than 5% requires stopping RCPs IAW Attachment 2. Plausible since the 17% level is expected knowledge to the operators to take immediate actions associated with low VCT level. Second part is incorrect. Per Attachment 2, if loss of CCW was the cause of the event, then in addition to stopping RCPs, letdown needs to be isolated and the charging pumps suction swapped over to the RWST.
- C. Incorrect. First part is correct. Second part is incorrect. Per Attachment 2, if loss of CCW was the cause of the event, then in addition to stopping RCPs, letdown needs to be isolated and the charging pumps suction swapped over to the RWST.
- D. Correct. IAW S2.OP-AB.CC-0001 Attachment 1, if surge tank level can NOT be maintained greater than 5%, then stop RCPs IAW Attachment 2. Per Attachment 2, the Rx is tripped, all RCPs are stopped, letdown is isolated, charging pump suctions are swapped to the RWST and then go to EOP-TRIP-1.

Technical References:

S2.OP-AB.CC-0001(R19)

Proposed References to be provided:

None

Learning Objective:

NOS05ABCC01-10, Objective 5. Given a set of initial plant conditions: Describe the final plant condition that is established by the abnormal procedure

Question Source:

Bank – Wolf Creek 2017 NRC RO8

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 43.5 / 45.3 / 45.13

Level:

RO

Category/System:

08-Component Cooling Water

K/A #:

008 A2.02

Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: High/Low surge tank level

Importance:

3.2

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to predict the impact to the CCW system operation when surge tank levels are lowering and based on the low level what are the procedural requirements to mitigate the event.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

36

08-011

Points: 1.00

Which of the following choices identifies potential sources of **RCS INLEAKAGE** into the Component Cooling System?

1. Seal Water Heat Exchanger
2. CCW Heat Exchangers
3. Regenerative Heat Exchanger
4. Spent Fuel Pool Heat Exchanger
5. RCP Thermal Barrier Heat Exchanger

- A. 4 and 5 ONLY
- B. 1 and 2 ONLY
- C. 2 and 3 ONLY
- D. 1 and 5 ONLY

RO EXAMINATION ANSWER KEY

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Answer: D

Explanation / Justification:

- A. Incorrect. A leak at the spent fuel pool HX would cause out leakage of the CCW system. Plausible since a leak in the thermal barrier would cause RCS leakage into CCW.
- B. Incorrect. Plausible since a leak in the CCW HX would result in leakage into the CCW but it would be Service Water and not RCS.
- C. Incorrect. Plausible since the CCW HX would result in leakage into CCW, but CCW HX is SW leakage into RCS. In addition, the applicant may confuse the operation of the Regen HX and believe that the discharge of charging would leak into CCW which CCW does not cool the Regen HX, but letdown flow does.
- D. Correct. IAW S2.OP-AB.CC-0001 Step 3.10, the RCP Thermal Barriers, Letdown HX, and Seal Water HX are all sources of RCS inleakage into the CCW system.

Technical References:	S2.OP-AB.CC-0001(R19)
Proposed References to be provided:	None
Learning Objective:	NOS05ABCC01-10, Objective 1. Describe the operation of the following system as applied to S2.OP-AB.CC-0001: CC System loads
Question Source:	Bank – Salem
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.2 to 41.9 / 45.7 to 45.8
Level:	RO
Category/System:	08-Component Cooling Water
K/A #:	008 K1.04
	Knowledge of the physical connections and/or cause-effect relationships between the CCWS and the following systems: RCS, in order to determine source(s) of RCS leakage into the CCWS
Importance:	3.3
Tier/Group	Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to identify which components supplied by CCW would cause RCS inleakage into the CCW system.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

37

03-021

Points: 1.00

Given:

- Unit 2 is at 100% Power
- All systems are in normal alignment and in AUTO
- The controlling PZR Pressure channel fails HIGH

Which ONE of the following completes both statements?

1. In order to restore RCS pressure to program, the RO will manually __(1)__ demand on the Master Pressure Controller.
2. If RCS pressure lowers to less than __(2)__ psig, LCO 3.2.5, DNB Parameters, for minimum DNBR will **NOT** be MET.

- A. 1) lower
2) 2200
- B. 1) lower
2) 2185
- C. 1) raise
2) 2200
- D. 1) raise
2) 2185

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. First part is correct. Second part is incorrect. The TS limit for minimum DNBR for RCS Pressure is ≥ 2200 psia (or < 2185 psig).
- B. Correct. A failed high controlling PZR pressure channel will raise the demand of the MPC to 100% and opening all spray valves. The Master Pressure Controller (MPC) demand will have to be lowered in order to close the spray valves and turn on all the PZR heaters to restore RCS pressure to program. The TS limit for minimum DNBR for RCS Pressure is ≥ 2200 psia (or < 2185 psig).
- C. Incorrect. First part is incorrect. A failed high controlling PZR pressure channel will raise the demand of the MPC to 100% and opening all spray valves. Second part is incorrect. The TS limit for minimum DNBR for RCS Pressure is ≥ 2200 psia (or < 2185 psig).
- D. Incorrect. First part is incorrect. A failed high controlling PZR pressure channel will raise the demand of the MPC to 100% and opening all spray valves. Second part is correct.

Technical References:

NOS05PZRP&L-12, TS LCO 3.2.5

Proposed References to be provided:

None

Learning Objective:

NOS05PZRP&L-12, Objective 15. Given a Pressurizer Pressure and Level Control System failure, predict the effect of the Pressurizer Pressure and Level Control System failure on the following: Reactor Coolant System

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 45.5

Level:

RO

Category/System:

03-Pressurizer Pressure Control

K/A #:

010 A1.07

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PZR PCS controls including: RCS pressure

Importance:

3.7

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to predict how the MPC will respond to a failed high PZR Pressure channel and what effect the lowering RCS pressure will have on TS limits for minimum DNBR.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

38

07-014

Points: 1.00

Given:

- Unit 2 is at 100% Power
- The reactor automatically trips
- **ONLY** Reactor Trip Breaker “B” OPENS

Based on the above condition, which ONE of the following components will trip the Main Turbine?

- A. 20-AST
- B. 20-2AST
- C. 20-ET
- D. 2EH61

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. The 20-AST energizes from RTB “A” which failed to open.
- B. Incorrect. The 20-2AST energizes from RTB “A” which failed to open.
- C. Correct. Trip of RTB “B” will energize the Emergency Trip Fluid Solenoid valve (20-ET) dumping EH fluid directly to the reservoir causing all turbine steam valves to close and tripping the turbine. The 20-ET serves as a backup to the interface valve (2EH61). The 2EH61 interface valve will open when either the 20-AST or 20-2AST solenoids energize to dump ASO oil from the top of the 2EH61 valve resulting in the 2EH61 valve opening and dumping EH fluid to the reservoir. Trip of RTB “A” will energize either the 20-AST or 20-2AST solenoids. Since RTB “A” did not open, the only component that will actuate to cause a turbine trip will be the actuation of the 20-ET solenoid.
- D. Incorrect. The 2EH61 opens when the 20-AST or the 20-2AST energizes from RTB A which failed to open.

Technical References:	NOS05DEHC00-16, 221065, 205318, 604273
Proposed References to be provided:	None
Learning Objective:	NOS05RXPROT-15, Objective 27. Given a Reactor Protection System failure, predict the effect of the Reactor Protection System failure on the following: Main Turbine/Generator
Question Source:	New
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.7 / 45.6
Level:	RO
Category/System:	07-Reactor Protection
K/A #:	012 K3.02
	Knowledge of the affect that a loss or malfunction of the RPS will have on the following: T/G
Importance:	3.2
Tier/Group	Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to describe how the Main Turbine will trip when only the “B” Reactor Trip Breaker opens following an automatic reactor trip.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

39

02-024

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- Containment Pressure channel I has failed.
- ALL required actions to remove the channel from service in accordance with S2.OP-SO.RPS-0005, Placing Containment Pressure Channel in Tripped Condition, were completed.
- Subsequently, Containment Pressure channel IV fails HIGH.

Which ONE of the following describes the Phase B and Safety Injection response?

- A. NEITHER Safety Injection or Phase B will actuate
- B. BOTH Safety Injection and Phase B will actuate.
- C. ONLY Phase B will actuate.
- D. ONLY Safety Injection will actuate.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. Following the removal of the Containment Pressure channel 1 from service IAW S2.OP-SO.RPS-0005, the CS/Phase B actuation logic will change from 2/4 to 2/3 and Safety Injection actuation logic will remain at 2/3 since only channels II, III, and IV provide the inputs for containment pressure high SI actuation. Therefore, when Containment Pressure channel IV fails high, no CS/Phase B will actuate since the 2/3 logic is not satisfied. As for the Safety Injection logic, channel 1 does not input into the 2/3 logic and therefore, channel IV failure will not satisfy the Safety Injection actuation logic of 2/3.
- B. Incorrect. Plausible if the operator believes that both of these channels input into the SI and Phase B logic. Channel IV only inputs into CS/Phase logic.
- C. Incorrect. Plausible because a SI on 2/3 high containment pressure is from channels II thru IV only. Containment Spray/Phase B is actuated from 2/4 high containment pressure channels I thru IV. Therefore, the operator may incorrectly interpret that a Phase B will actuate because channels I and IV satisfy the coincidence for Phase B actuation, however, the stem states that channel I was removed from service which makes the Phase B logic now 2/3 and channel I no longer provides an input into Phase B. The operator will also determine that Channel I does not input into the SI logic, which is correct.
- D. Incorrect. Plausible if the operator believes both these channels input into the SI logic and that Phase B does not actuate since channel was removed from service, it takes the CS/Phase logic to 2/3.

Technical References:

S2.OP-SO.RPS-0005

Proposed References to be provided:

None

Learning Objective:

NOS05RXPROT-15, Objective 27. Given a Reactor Protection System failure, predict the effect of the Reactor Protection System failure on the following: Engineering Safeguards System

Question Source:

Bank – Beaver Valley U1 2018 NRC RO37

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.5 to 45.8

Level:

RO

Category/System:

02-Engineered Safety Features Actuation

K/A #:

013 K6.01

Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: Sensors and detectors

Importance:

2.7

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to determine the effect on RPS and ESFAS systems when a Containment Pressure channel was previously removed from service and the expected response when another Containment Pressure channel fails high.

RO EXAMINATION ANSWER KEY

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RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

40

02-025

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- OHA A-42, SSPS TRN B TRBL, is LIT
- Investigation reveals that a 48 VDC power supply on SSPS Train B is tripped.

Which ONE of the following describes the impact, if any, of this failure?

- A. The Train B Reactor Trip breaker shunt trip is unavailable.
- B. NONE of the Train B SSPS components will automatically actuate when required.
- C. ALL of Train B SSPS components will automatically actuate when required.
- D. A portion of the Train B SSPS components will NOT automatically actuate when required.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. Plausible if the operator believes that the shunt coil is supplied from 48 VDC from SSPS. The 48 VDC power supplies feed the UV coils for each reactor trip breaker. A loss of both 48 VDC power supplies in one SSPS train will cause a reactor trip due to the UV coils de-energizing. The Shunt coils are supplied by 125 VDC and are energized to actuate.
- B. Incorrect. Plausible because the operator may believe that the loss of 48 VDC will prevent the actuation of the SSPS train by affecting either the logic or the output cabinet slave relays which are supplied for their respective 115 VAC train (A or B). Loss of one 48 or 15 VDC power supply will have no adverse effect on the function of SSPS due to the auctioneered design. However, a loss of the 115 VAC B Vital Instrument bus will prevent the slave relays from energizing and will prevent the Train B SSPS from actuating components and equipment which is not the case.
- C. Correct. Two of four vital instrument buses (VIB) supply one set of 48V and 15V power supplies. SSPS Train A is supplied from A and D VIB and SSPS Train B is supplied from B and C VIB. B and D VIBs are supplied from the same "B" 230 V VIB, so a loss of the "B" 230V VIB would cause a loss of all 48V and 15V power supplies resulting in an RPS actuation. The 48V and 15V power supplies are auctioneered such that a loss of one power supply will NOT cause or prevent an RPS/ESFAS actuation. Therefore, a loss of one 48 VDC power supply will have no adverse effects on the Train B SSPS to function as design, with the exception of a loss of 48 VDC power supply redundancy.
- D. Incorrect. Plausible if the operator believes that a loss of one power supply could affect the SSPS train from fully actuating components. See Ans. C for further explanation.

Technical References:

NOS05RXPROT

Proposed References to be provided:

None

Learning Objective:

NOS05RXPROT-15, Objective 26. Given plant conditions, relate the Reactor Protection System with the following: 115V vital power

Question Source:

Bank – DC Cook 2008 NRC RO46

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7

Level:

RO

Category/System:

02-Engineered Safety Features Actuation

K/A #:

013 K4.07

Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following: Power supply loss

Importance:

3.7

Tier/Group

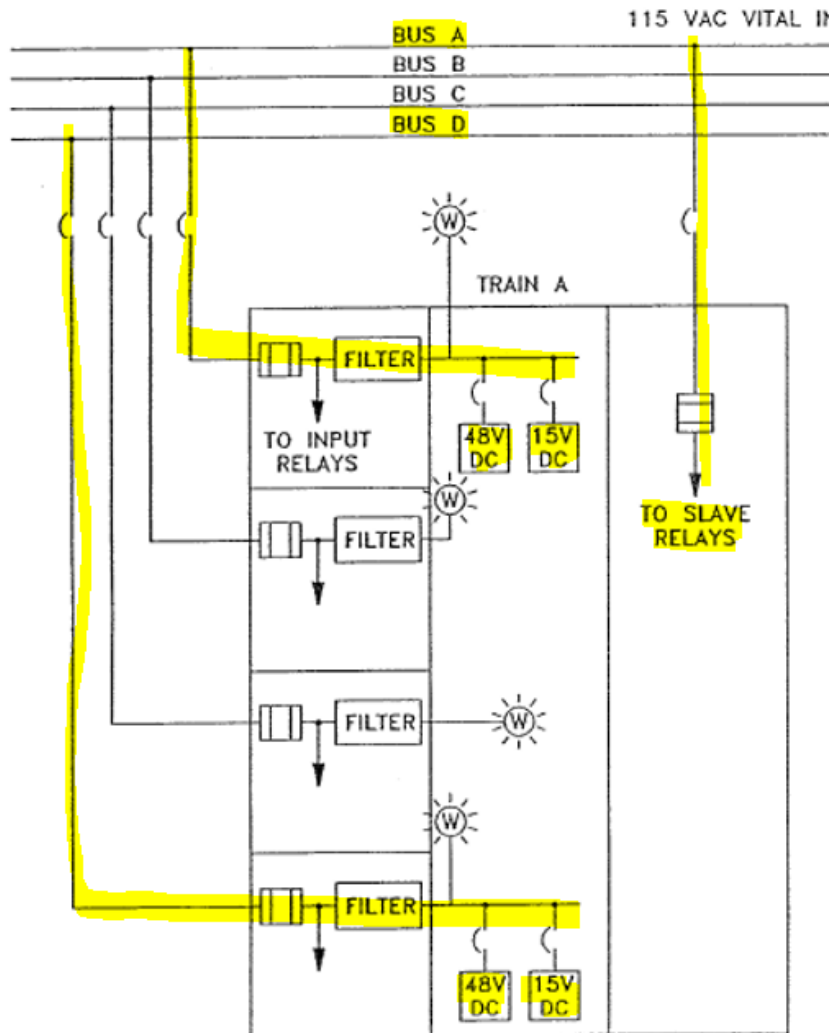
Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to describe the design features of the SSPS power supplies. Specifically, the candidate is being asked the impact to a loss of one 48 VDC power supply on the ability of a SSPS train to function as designed. The candidate needs to know that the 48 and 15 VDC power supplies are redundant and that a loss of one power supply has no adverse effects on the SSPS to function as designed.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: NOS05RXPROT power point slide



RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

41

05-010

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- The crew is performing surveillance testing on 21 CFCU in accordance with S2.OP-ST.CBV-0003, Containment Systems – Cooling System.

Which ONE of the following describes how the CFCU will respond when the operator shifts from HIGH to LOW speed operation?

The 21SW223, CFCU Outlet Flow Control Valve, will ____ (1) ____ and the service water flow through the CFCU will ____ (2) ____ as compared to the flow when operating at HIGH speed.

- A. 1) throttle or modulate
2) be higher
- B. 1) throttle or modulate
2) remain the same
- C. 1) open to a fixed position
2) be higher
- D. 1) open to a fixed position
2) remain the same

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: D

Explanation / Justification:

- A. Incorrect. First part is incorrect. SW223 has a mechanical stop set to approximately 50% travel. Second part is incorrect. Credible distractor if the operator believes that service flow will increase during accident (Low Speed) conditions.
- B. Incorrect. First part is incorrect. SW223 has a mechanical stop set to approximately 50% travel. Second part is correct.
- C. Incorrect. First part is correct. Second part is incorrect. Credible distractor if the operator believes that service flow will increase during accident (Low Speed) conditions.
- D. Correct. The CFCUs employ a fixed resistance flow scheme, with two orifices on the inlet of each CFCU, and two orifices on the outlet of each CFCU; these orifices, along with a mechanical stop on the open travel of the SW223 valves, ensure that the SW flow is greater than that required by Tech Specs for the minimum flow to the CFCU for Containment Cooling requirements in an accident condition and that SW flow to all safety related equipment can be met. The SW223 valves are closed when the CFCU is O/S and open to the mechanical stop when the CFCU is in service; the mechanical stops are set at approximately 50% travel. Based on the operation of the SW223, service flow will remain the same in High and Low speed operation.

Technical References:

NOS05SW0NUC

Proposed References to be provided:

None

Learning Objective:

NOS05SW0NUC-15, Objective 4. Describe the function of the following components and how their normal and abnormal operation affects the Service Water – Nuclear Header System: Containment Fan Coil Units and SW58, SW72, and SW223
Modified – Salem 2014 NRC RO46

Question Source:

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.7 / 45.5 to 45.8

Level:

RO

Category/System:

05-Containment Cooling

K/A #:

022 A4.04

Ability to manually operate and/or monitor in the control room:
Valves in the CCS

Importance:

3.1

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to determine the expected service water flow when operating the CFCUs in High and Low speed. In this case, the operator needs to know how the outlet flow control valves (SW223) operates and that the service water flow remains the same in both High and Low speeds.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Parent Question: Salem 2014 NRC RO46

RO SkyScraper	SRO SkyScraper	RO System/Evolution List	SRO System/Evolution List	Outline Changes																				
Question Topic RO 46																								
21 CFCU is running in Low speed during its weekly exercise and flush.																								
Which of the following identifies how steady state service water flow through 21 CFCU would be affected when the CFCU is transferred from Low Speed to High Speed?																								
Service water flow will...																								
a. rise.																								
b. lower.																								
c. remain the same.																								
d. rise or lower based on initial SW header pressure.																								
Answer	c	Exam Level	R	Cognitive Level Memory																				
Facility:	Salem 1 & 2		ExamDate:	12/15/2014																				
KA:	022000A104	A1.04	RO Value:	3.2																				
SRO Value:	3.3	Section:	SYS	RO Group:																				
1	SRO Group:	1	55.43																					
System/Evolution Title Containment Cooling System 022																								
KA Statement:	Ability to predict and/or monitor changes in parameters associated with operating the Containment Cooling System controls including: Cooling water flow																							
Explanation of Answers:	55.41.b(9,8) The CFCU SW flow control valve SW223 has a position limiter on it, typically 50% travel. The SW223 opens on a start signal from either low speed or high speed. With a mechanical stop employed, SW flow will be the same for high speed or low speed operation. The stem states "steady state SW flow" because the CFCU is normally stopped for 30 seconds when transferring speed. Distracter D is plausible if it is thought that SW header pressure would change, which would affect SW system flows, but in steady state to steady state comparisons it would not.																							
<table border="1"><thead><tr><th>Reference Title</th><th>Facility Reference Number</th><th>Reference Section</th><th>Page No.</th><th>Revision</th></tr></thead><tbody><tr><td>IST CFCU SW Valves</td><td>S2.OP-ST.SW-0010</td><td></td><td>18</td><td>20</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>					Reference Title	Facility Reference Number	Reference Section	Page No.	Revision	IST CFCU SW Valves	S2.OP-ST.SW-0010		18	20										
Reference Title	Facility Reference Number	Reference Section	Page No.	Revision																				
IST CFCU SW Valves	S2.OP-ST.SW-0010		18	20																				

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

42

05-011

Points: 1.00

Given:

- Unit 2 experienced a Large Break LOCA.
- The crew is performing actions per 2-EOP-TRIP-1, Reactor Trip or Safety Injection.
- The crew is at step 9, **Containment Spray Actuation Verification**.
- BOTH trains of Phase B/CS have actuated.
- Containment Pressure is 25 psig and rising.
- NO Containment Spray (CS) Pumps are running.
- 2C 4KV Vital Bus is de-energized on bus differential protection.

Which ONE of the following action(s) is/are required to start a CS Pump?

- A. Start 21 CS Pump by depressing the start pushbutton ONLY.
- B. Start 22 CS Pump by depressing the start pushbutton ONLY.
- C. Block and reset its associated SEC, then start 21 CS Pump using the keyswitch.
- D. Block and reset its associated SEC, then start 22 CS Pump using the keyswitch.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. 2A SEC must be blocked and reset first then the keyswitch must be operated to start 21 CS Pump. Plausible if the operator believes that since CS has actuated that starting the pump is only required.
- B. Incorrect. 22 CS Pump is powered from 2C 4KV Vital bus which is locked out on bus differential. Plausible if the operator believes that since CS has actuated that starting the pump is only required.
- C. Correct. The operator must evaluate the plant conditions and determine that the SECs have not been reset. 21 CS Pump is powered from 2A 4KV Vital Bus. Since SECs actuated, the operator must first regain control by blocking and resetting 2A SEC only, then the operator must use the key switch to start 21 CS Pump.
- D. Incorrect. 22 CS pump is powered from 2C 4KB bus which is locked out on bus differential.

Technical References:

NOS05CSPRAY

Proposed References to be provided:

None

Learning Objective:

NOS05CSPRAY-07, Objective 5. State the power supply to the following Containment Spray System components:

Containment Spray Pumps

Question Source:

Bank - Salem

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7

Level:

RO

Category/System:

05-Containment Spray

K/A #:

026 K2.01

Knowledge of bus supplies to the following: Containment spray pumps

Importance:

3.4

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to determine what actions are required to start a CS Pump based on the available 4KV Vital buses.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

43

04-044

Points: 1.00

Given:

- Unit 2 is at 15% Power with a startup in progress.
- Tavg is 552 °F and stable.
- Steam Dumps are in AUTO MS PRESS control mode set to 980 psig.
- 2PT-507, Steam Header Pressure transmitter, fails **LOW**.

Which ONE of the following describes how the steam dump system will respond?

The steam dump valves will __(1)__ and the steam generator pressure will IMMEDIATELY __(2)__.

- A. 1) CLOSE
 2) LOWER due to the reactor adding less heat to the RCS.
- B. 1) CLOSE
 2) RISE due to less heat removal from the RCS.
- C. 1) OPEN
 2) LOWER due to more heat removal from the RCS.
- D. 1) OPEN
 2) RISE due to the reactor adding more heat the RCS.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. First part is correct. Second part is incorrect. SG pressure will rise due steam flows lowering and less heat removal from the SGs. Plausible because the operator may incorrectly determines that SG pressure will lower when steam flow decreases.
- B. Correct. 2PT-507 failing low will cause the steam dumps to close. When the steam dumps closes, steam flow from the SGs will lower, Rx power will lower, and SG pressure will immediately rise due to less heat removal from the SGs until SG pressure is maintained by the MS10s opening.
- C. Incorrect. First part is incorrect. Steam dumps will close on failure of 2PT-507. Second part is incorrect. SG pressure will rise due steam flows lowering and less heat removal from the SGs.
- D. Incorrect. First part is incorrect. Second part is correct. Steam dumps will close on failure of 2PT-507. Credible distractor because the operator may incorrectly determines how the steam dumps will respond on the instrument failure. Second part is plausible because the applicant may incorrectly determine that with the steam dumps open, reactor power will increase and also increase the RCS temperature (incorrect assumption) which will result in more heat transfer to the SG and a rise in SG pressure.

Technical References:

NOS05STDUMP-13

Proposed References to be provided:

None

Learning Objective:

NOS05STDUMP-13, Objective 10.b. Identify and describe the Control Room controls, indications, and alarms associated with the Steam Dump System, including: The function of each Steam Dump System Control Room control and indication

Question Source:

Modified Bank – Byron 2017 NRC RO62

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.5 to 45.8

Level:

RO

Category/System:

04-Main and Reheat Steam

K/A #:

039 A4.07

Ability to manually operate and/or monitor in the control room:
Steam dump valves

Importance:

2.8

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the applicant is being asked how the steam dump valves respond when 2PT-507 fails low and additionally how the SG pressure will be affected based on the operation of the steam dump valves.

Modified Question Justification - The question was deemed modified based on changing a condition in the stem (i.e., 2PT-507 failing low), which changes the answer from the original question.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Parent Question: Byron 2017 NRC RO62

EXAMINATION ANSWER KEY

2017 NRC

62

ID: 2017 NRC Q62A

Points: 1.00

The Unit is in MODE 1 making preparations to roll the main turbine.

- Reactor Power is 14%.
- Steam Dumps are in STM PRESS mode and in AUTO.
- The Moderator Temperature Coefficient (MTC) is negative.

1PT-507, S/G HDR PRESS, fails HIGH.

The Steam Dump Valves will ____ (1) ____

and

S/G pressure will IMMEDIATELY ____ (2) ____

- A.
 - 1. OPEN
 - 2. LOWER due to more heat removal from the RCS.
- B.
 - 1. OPEN
 - 2. RISE due to the reactor adding more heat to the RCS.
- C.
 - 1. CLOSE
 - 2. RISE due to less heat removal from the RCS.
- D.
 - 1. CLOSE
 - 2. LOWER due to the reactor adding less heat to the RCS.

Answer: A

Answer Explanation

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

44

04-045

Points: 1.00

Given:

- Unit 2 is at 100% Reactor Power.

Subsequently, the following occurs:

- A malfunction with 21BF19 causes the SG level to rise uncontrollably.
- The reactor automatically trips.

Which ONE of the following describes the expected plant response?

- A. BOTH SGFPs trip and the BF13s, BF19s, and BF40s close.
- B. BOTH SGFPs trip and ONLY the BF19s and BF40s close.
- C. ONLY the BF19s and BF40s close.
- D. ONLY the BF13s, BF19s and BF40s close.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. SG HI-HI Level Rx Trip (P-14, 2/3 NR levels on 1 SG > 67%) will actuate Feedwater Isolation that will trip the Main Turbine and both SGFPs, and then close all the BF13s, BF19s, and BF40s.
- B. Incorrect. Plausible because the applicant may confuse the valves that close on a Feedwater Interlock which are the BF19s and Bf40s only.
- C. Incorrect. The BF19s and BF40s will ONLY close when there is a Feedwater Interlock signal (P-4 and Tav_g < 554 F). In this case, a P-14 signal was generated from a SG level HI-HI resulting in a FW Isolation signal.
- D. Incorrect. Plausible because the applicant may confuse the actions of a Feedwater Isolation with Feedwater Interlock and that the Main Turbine and SGFPs will not trip on a Feedwater Isolation.

Technical References:

NOS05CNFDW-19

Proposed References to be provided:

None

Learning Objective:

NOS05CNFDW-19, Objective 4.S. Describe how the following components impact the Condensate and Feedwater System during normal and abnormal conditions: Main Feedwater Containment Isolation Valves

Question Source:

Bank – Salem

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.57

Level:

RO

Category/System:

04-Main Feedwater

K/A #:

059 K4.19

Knowledge of MFW design feature(s) and/or interlocks which provide for the following: Automatic feedwater isolation of MFW

Importance:

3.2

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the applicant is being asked about the actions that occur on a Feedwater Isolation from a P-14 (SG Hi-HI signal)..

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

45

04-046

Points: 1.00

Given:

- Unit 2 is at 30% Power and stable.
- ALL Steam Generator Narrow Range levels are 45%.

Based on the above condition, which ONE of the following completes both statements?

1. Steam Generator Narrow Range levels are __(1)__ program setpoint.
2. Assuming SGFP speed remains constant, to return Steam Generator levels to program setpoint, the demand on the BF19's will automatically __(2)___.

- A. 1) above
2) decrease
- B. 1) above
2) increase
- C. 1) below
2) decrease
- D. 1) below
2) increase

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. IAW S2.OP-AB.CN-0001, Attachment 2, SG program level with power above 20% is 44% NR level. With a SG NR level at 45%, the actual SG NR level is above the program setpoint of 44%. The digital feedwater system will lower the demands to the BF19's to throttle the valves closed to reduce feedwater flow with SGFP speed remaining constant.
- B. Incorrect. First part is correct. Second part is incorrect. The BF19 demand will lower to throttle the valves closed more to reduce feed flow to lower SG levels. Plausible in that the applicant may incorrectly believe that the operation of the BF19 works opposite to the demand signal.
- C. Incorrect. First part is incorrect. SG program level above 20% is 44%. Plausible because the operator may incorrectly recall the proper level setpoint for digital feedwater. Plausible in that the applicant may incorrectly believe that the operation of the BF19 works opposite to the demand signal. Second part is correct.
- D. Incorrect. First part is incorrect. SG program level above 20% is 44%. Plausible because the operator may incorrectly recall the proper level setpoint for digital feedwater and how the BF19s should respond. Second part is incorrect. The BF19 demand will lower to throttle the valves closed more to reduce feed flow to lower SG levels. Plausible in that the applicant may incorrectly believe that the operation of the BF19 works opposite to the demand signal.

Technical References:

S2.OP-AB.CN-0001

Proposed References to be provided:

None

Learning Objective:

NOS05CNFDW-19, Objective 15. Given plant conditions, relate the Condensate and Feedwater System with the following:
Advance Digital Feedwater Control System

Question Source:

Bank – Commanche Peak 2016 RO17

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.5

Level:

RO

Category/System:

04-Main Feedwater

K/A #:

059 A3.02

Ability to monitor automatic operation of the MFW, including:
Programmed levels of the S/G.

Importance:

2.9

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to determine if the current SG NR levels are on program and if not how will the FW regulating valves change to restore NR levels to program.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

46

04-047

Points: 1.00

Given:

- Unit 2 was at 100% Power when a reactor trip occurred.
- BOTH Motor Driven AFW Pumps are running.
- 21 AFW Pump discharge pressure transmitter (2PA-3450) for the pump runout protection circuit fails to ZERO.

Based on the above condition, which ONE of the following completes both statements?

1. The 21 AFW Pump flow control valves (AF21s) will __(1)___.
2. To regain control of these valves from the control room, the operator will __(2)___ for 21 AFW Pump.

- A. 1) open
2) select LOCAL MANUAL
- B. 1) open
2) depress PRESS OVERRIDE DEFEAT
- C. 1) close
2) depress PRESS OVERRIDE DEFEAT
- D. 1) close
2) select LOCAL MANUAL

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. First part is incorrect. The 23AF21 and 24AF21 will fail closed when the pressure transmitter fails to zero. Second part is incorrect. The LOCAL MANUAL is indication only in the control room. When illuminated no auto start signals will start the AFW Pump. Plausible because the operator may believe that when the AFW pump is in LOCAL MANUAL that this will allow the operators in the control room to manually control the AF valves.
- B. Incorrect. First part is incorrect. The 23AF21 and 24AF21 will fail closed when the pressure transmitter fails to zero. Second part is correct. Plausible is the operator believes that the AF21s will go open when the pressure instrument fails to zero.
- C. Correct. The AFW discharge pressure transmitter inputs into the Pressure Override Protection circuit. The Pressure Override circuit will limit the position of the AF21s based on the discharge pressure of the AFW pump to prevent pump runout conditions. If discharge pressure is insufficient, then the circuit will throttle the AF21s closed. With the pressure transmitter failed to zero, then the Pressure Override circuit associated with 21 AFW pump will close both the 23AF21 and 24AF21. In order for the operator to regain control of these valves, the operator is required to depress the PRESS OVERRIDE DEFEAT pushbutton which will removes the runout protection circuit and allows operator to control the AF21s.
- D. Incorrect. First part is correct. Second part is incorrect. The LOCAL MANUAL is indication only in the control room. When illuminated no auto start signals will start the AFW Pump. Plausible because the operator may believe that when the AFW pump is in LOCAL MANUAL that this will allow the operators in the control room to manually control the AF valves.

Technical References:

NOS05AFW000-18

Proposed References to be provided:

None

Learning Objective:

NOS05AFW000-18, Objective 17. Given any of the following and appropriate control room reference material, evaluate and determine the effect on the Auxiliary Feedwater System:
Failure of sensors and detectors

Question Source:

Bank – Salem

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.7

Level:

RO

Category/System:

04-Auxiliary/Emergency Feedwater

K/A #:

061 K6.01

Knowledge of the effect of a loss of or malfunction of the following will have on the AFW components: Controllers and positioners.

Importance:

2.5

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked how the failure of the AFW pump discharge pressure transmitter will affect the operation of the flow control valves and what action is required in order for the operator to regain control of the valves. The runout protection circuit uses a pressure sensor input from the discharge of the AFW pumps and the circuit will throttle or maintain the AFW valves close if

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

the AFW discharge pressure is less than setpoint to prevent runout of the AFW pump. This runout protection circuit meets the K/A as a controller since its controlling the AFW valves to prevent pump runout.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

47

06-020

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- 2A Emergency Diesel Generator (EDG) monthly surveillance test is in progress in accordance with S2.OP-ST.DG-0001, 2A Diesel Generator Surveillance Test.
- The 2A EDG is currently running and paralleled to the grid.
- Subsequently, a Loss of Offsite Power occurs.

Which ONE of the following describes the effect on the 2A EDG?

- A. The diesel generator output breaker opens and the diesel remains running; after the bus loads are stripped, the output breaker must be manually closed to allow the load sequencer to sequentially start safeguard loads.
- B. The diesel generator output breaker opens and the diesel remains running; after the bus loads are stripped, the output breaker automatically closes and the load sequencer sequentially starts safeguard loads.
- C. The diesel generator output breaker remains closed; non safeguards loads are automatically stripped.
- D. The diesel generator output breaker remains closed; non safeguards loads must be manually stripped.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. The EDG output breaker will automatically reclose when the bus is stripped and infeed breakers are open by the SEC. Plausible because the operator may believe that the output breaker needs to be manually closed when the EDG was paralleled to the grid. Same Ans. B for further explanation.
- B. Correct. With the EDG running paralleled to the grid and a loss of offsite power occurs, the SEC will actuate in Mode 2 (blackout), the EDG output breaker will open, the diesel will remain running, then the SEC will open both infeed breakers to the 2A 4KV bus, strip all loads from the 4KV vital bus, then reclose the output breaker, and re-start loads using the SEC load sequencer.
- C. Incorrect. Plausible because the operator may believe that since the EDG is in test and running with its output breaker already closed, that the SEC will not open the output breaker and only need to strip the loads off the bus.
- D. Incorrect. Plausible because the operator may believe that since the EDG is in test and running with its output breaker already closed, that the SEC will not strip the bus with the EDG in test and manual action will be needed to manually strip and load the safeguard loads.

Technical References:

NOS05SEC000-08

Proposed References to be provided:

None

Learning Objective:

NOS05SEC000-08, Objective 4. Describe in detail each Mode of Safeguards Equipment Control System operation, including setpoints for automatic actuation

Question Source:

Bank – Salem

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.7 / 45.6

Level:

RO

Category/System:

06-AC Electrical Distribution

K/A #:

062 K3.02

Knowledge of the effect of a loss of or malfunction of the ac distribution system will have on the following: ED/G.

Importance:

4.1

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked how a loss of offsite power will affect the operation of a EDG paralleled to the grid.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

48

06-021

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- 2C 4KV Vital Bus is aligned to 24 SPT (24CSD breaker is closed)
- Subsequently, the following sequence of events occurs:
 - OHA B-18, 2C 125VDC CNTRL BUS VOLT LO, is LIT.
 - 2C 125 VDC bus indicates 0 volts.
 - 24 SPT de-energizes on fault protection.

Based on the above condition, which ONE of the following describes the effect on the 2C 4KV Vital Bus?

- A. Energized from the 2C Emergency Diesel Generator.
- B. De-energized with ALL infeed breakers tripped.
- C. Energized from 23 SPT (23CSD breaker is closed).
- D. De-energized with the infeed breaker 24CSD closed.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: D

Explanation / Justification:

- A. Incorrect. With a loss of 2C 125 VDC, the 2C EDG will not start and the output breaker cannot close to energize the 2C bus. The operator may believe that the EDG still has the capability to start and re-energize the bus.
- B. Incorrect. The 24CSD breaker will remain in the closed position. The operator may believe that the 24CSD breaker will still open on loss of 125 VDC.
- C. Incorrect. The other (23) SPT cannot close its infeed breaker to the bus (fast transfer scheme) because it has an interlock which requires the other SPTs infeed breaker to be open.
- D. Correct. DC power is required to operate relays and contacts for the 4KV Vital Bus breakers. When DC power is lost, breakers will remain “as-is”. The EDG breaker cannot close even though it is de-energized because one of the interlocks to close the EDG output breaker is both infeed breakers open. The other (23) SPT cannot close its infeed breaker to the bus (fast transfer scheme) because it has an interlock which requires the other SPTs infeed breaker (24CSD) to be open.

Technical References:

NOS05DCELEC-11, S2.OP-AR.ZZ-0002 (R38)

Proposed References to be provided:

None

Learning Objective:

NOS05DCELEC-11, Objective 14. Given a DC Electrical System failure, predict the effect of the DC Electrical System failure on the following: Emergency Diesel Generators & Components using DC control power

Question Source:

Bank – Salem 2011 NRC RO56

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.6

Level:

RO

Category/System:

06-DC Electrical Distribution

K/A #:

063 K3.02

Knowledge of the effect of a loss of or malfunction of the DC electrical system will have on the following: Components using DC control power.

Importance:

3.5

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked how the loss of 125 VDC and a loss of the 24 SPT will affect the 2C 4KV vital bus.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

49

06-022

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- The 2A1 125 VDC Battery Charger is being transferred to the standby charger in accordance with S2.OP-SO.125-0001, 2A 125VDC Battery Charger Operation.

Which ONE of the following completes both statements?

1. The 2A1 and 2A2 125 VDC Battery Chargers are located in the __ (1) __.
 2. The proper sequence for placing the standby charger in service is to __ (2) __.
-
- A.
 - 1) 100 ft. Relay Room
 - 2) remove 2A1 charger from service, then place 2A2 charger in service
 - B.
 - 1) 84 ft. Switchgear Room
 - 2) remove 2A1 charger from service, then place 2A2 charger in service
 - C.
 - 1) 100 ft. Relay Room
 - 2) place 2A2 charger in service, then remove 2A1 charger from service
 - D.
 - 1) 84 ft. Switchgear Room
 - 2) place 2A2 charger in service, then remove 2A1 charger from service

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. First part is incorrect. All the 125 VDC Battery Chargers are located in the 84 ft. Switchgear Room. Credible distractor since the A and B 125 VDC batteries are located in the 100 ft. Relay Room. Second part is correct.
- B. Correct. All the 125 VDC Battery Chargers are located in the 84 ft. Switchgear Room. IAW S2.OP-SO.125-0001, Precaution and Limitation, 3.2, Do NOT operate the 2A1 and 2A2 Battery Chargers in parallel in Modes 1-4. This is to prevent cross connecting the 230 VAC Vital buses. Therefore, the procedure removes the inservice battery charger first, then place the standby charger in service.
- C. Incorrect. First part is incorrect. All the 125 VDC Battery Chargers are located in the 84 ft. Switchgear Room. Credible distractor since the A and B 125 VDC batteries are located in the 100 ft. Relay Room. Second part is incorrect. Paralleling battery chargers is not permitted by procedure. Plausible because the applicant may believe that the battery chargers are paralleled first before removing the inservice charger.
- D. Incorrect. First part is correct. Second part is incorrect. Paralleling battery chargers is not permitted by procedure. Plausible because the applicant may believe that the battery chargers are paralleled first before removing the inservice charger.

Technical References:

NOS05DCELEC-11

Proposed References to be provided:

None

Learning Objective:

NOS05DCELEC-11, Objective 13. Given plant conditions, relate the DC Electrical System with the following: Battery charger and battery

Question Source:

New

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.7 / 45.7

Level:

RO

Category/System:

06-DC Electrical Distribution

K/A #:

063 G2.1.30

Ability to locate and operate components, including local controls.

Importance:

4.4

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked how the location of the 125 VDC Battery Chargers and how to operate the chargers when placing the standby battery charger in service.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

50

06-023

Points: 1.00

Given:

- Unit 1 is at 100% Power.
- The 1A EDG surveillance test is in progress in accordance with S1.OP-ST.DG-0001, 1A Diesel Generator Surveillance Test.
- The operator has just closed the generator output breaker.
- 1A diesel generator output meter (1WM182) indicates 50 KW.

In accordance with S1.OP-ST.DG-0001, which ONE of the following completes both statements?

The operator is required to immediately raise diesel generator load to __(1)__ KW to prevent __(2)__.

- A. 1) 250
 2) excessive accumulation of oil in the exhaust system during low load conditions
- B. 1) 250
 2) tripping the output breaker on reverse power
- C. 1) 500
 2) tripping the output breaker on reverse power
- D. 1) 500
 2) excessive accumulation of oil in the exhaust system during low load conditions

RO EXAMINATION ANSWER KEY

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Answer: C

Explanation / Justification:

- A. Incorrect. First and second parts are incorrect. Minimum is 500 KW to prevent tripping output breaker on reverse power. Plausible because the operator may incorrectly determine the required KW loading and the reason for raising EDG output promptly to prevent the output breaker from tripping. S1.OP-SO.DG-0001 P&L 2.19 states the following; Exhaust Fire: Low load operation allows oil to accumulate in the exhaust system. If a significant amount of oil is allowed to accumulate in the exhaust system followed immediately by sudden high diesel loading, there is a potential of initiating an exhaust fire. Gradual diesel loading will help avoid an exhaust fire. If an exhaust fire starts, it should be allowed to burn itself out by continuing to run the engine.
- B. Incorrect. First part is incorrect. Minimum is 500 KW to prevent tripping output breaker on reverse power. Second part is correct. Plausible because the operator may incorrectly determine the required KW loading.
- C. Correct. IAW S2.OP-ST.DG-0001 step 4.3.8.1.c Caution, to prevent tripping the EDG output breaker on reverse power, generator load must be immediately raised to ≥ 500 KW after the breaker is closed.
- D. Incorrect. First part is correct. Second part is incorrect. Minimum load is to prevent tripping the output breaker on reverse power. Plausible because the applicant may confuse the P&L from S1.OP-SO.DG-0001 for low load operation to prevent exhaust fire.

Technical References:	NOS05EDG000-15, S1.OP-SO.DG-00001 (R39)
Proposed References to be provided:	None
Learning Objective:	NOS05EDG000-15, Objective 12. Discuss the procedural requirements associated with the Emergency Diesel Generator, including an explanation of major precaution and limitations in the Emergency Diesel Generator procedure
Question Source:	New
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.5 / 45.5
Level:	RO
Category/System:	06-Emergency Diesel Generator
K/A #:	064 A1.08 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ED/G system controls including: Maintaining minimum load on the ED/G (to prevent reverse power)
Importance:	3.1
Tier/Group	Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to assess current conditions following closure of the EDG output breaker and determine the minimum load required to prevent the EDG output breaker from tripping on reverse power.

RO EXAMINATION ANSWER KEY

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Additional References: S2.OP-ST.DG-0001

CAUTION

To prevent tripping the Diesel Generator Breaker on reverse power, generator load must be IMMEDIATELY raised to ≥ 500 KW after the breaker is closed. [C0119]

1. **COORDINATE** the following when the synchroscope is at "12 o'clock" (+zero, -2 minutes):
 - a. **CLOSE** 2A-DF-GCP-3, GENERATOR CIRCUIT BREAKER SWITCH (BCS).
 - b. **START** the Stopwatch.
 - c. **RAISE** 2A Diesel Generator load to ≥ 500 KW using SPEED CONTROL SWITCH (GS) to prevent tripping the Diesel Generator Breaker on reverse power.
2. **RAISE** 2A Diesel Generator load to 2409 - 2531 KW within 60 seconds as indicated on 2WM182 using SPEED CONTROL SWITCH (GS).

RO EXAMINATION ANSWER KEY

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51

07-015

Points: 1.00

Given:

- BOTH Units 1 and 2 are at 100% Power.
- Unit 2 RO reports OHA A-6, RMS HI RAD OR TRBL, is LIT
- The 2R1B-1, Control Room Intake Radiation Monitor Channel 1, is in ALARM.
- BOTH control rooms Control Area Ventilation (CAV) Systems are operating in **NORMAL Mode**.

Which ONE of the following completes both statements?

1. What is the expected response of the CAV systems?
2. Based on the above condition, how should the control room operators respond in accordance with S2.OP-AR.ZZ-0001, Overhead Annunciators - Window A?

Note: AP = ACCIDENT PRESSURIZE

- A.
 - 1) BOTH Units 1 and 2 CAV systems should be operating in AP Mode.
 - 2) Manually initiate AP Mode from Unit 1.
- B.
 - 1) BOTH Units 1 and 2 CAV systems should be operating in AP Mode.
 - 2) Manually initiate AP Mode from Unit 2.
- C.
 - 1) ONLY Unit 2 CAV system should be operating in AP Mode.
 - 2) Manually initiate AP Mode from Unit 2.
- D.
 - 1) ONLY Unit 2 CAV system should be operating in AP Mode.
 - 2) Manually initiate AP Mode from Unit 1.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. First part is correct. Second part is incorrect. Plausible if the operator believes that you need to actuate CAV in AP Mode from the opposite unit. Actuating CAV from Unit 1 is not the correct response to a high radiation signal from the Unit 2 intake duct. Actuating CAV from Unit 1 will open the Unit 2 intake dampers on the unit that potentially has the accident or radiological release.
- B. Correct. A tear in the detector foil will cause the detector to read or fail high. A detector failing high would result in the 2R1B-1 going into Alarm. This should result in the automatic actuation of the CAV systems in Accident Pressurize (AP) Mode on BOTH units. The unit that initiated the actuation signal will have its intake close and the opposite units intake dampers will open. Since the high radiation actuation signal came from Unit 2 and based on the stem that both CAV systems are still operating in Normal Mode, then the control room operators should manually initiate CAV to AP Mode from Unit 2 only. This will ensure that the intake dampers on Unit 2 are closed during an accident from Unit 2. Manually actuating AP Mode from Unit 2 will place both units CAV systems in the AP Mode.
- C. Incorrect. Plausible if the operator believes that on a 2R1B-1 high alarm that only the Unit 2 CAV will actuate in AP Mode only. Second part is correct.
- D. Incorrect. Plausible if the operator believes that on a 2R1B-1 high alarm that only the Unit 2 CAV will actuate in AP Mode and to actuate the Unit 1 CAV the operator will need to manually actuate from Unit 1.

Technical References:

S2.OP-SO.CAV-0001 (R43), S2.OP-AB.RAD-0001 (R30)

Proposed References to be provided:

None

Learning Objective:

NOS05RM000-20, Objective 15. Given a Radiation Monitoring System failure, predict the effect of the Radiation Monitoring System failure on the following: Radioactive effluent releases
New

Question Source:

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 43.5 / 45.3 / 45.13

Level:

RO

Category/System:

07-Process Radiation Monitoring

K/A #:

073 A2.02

Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Detector failure

Importance:

2.7

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to predict the response of the CAV system when an control room intake radiation monitor is in alarm and what actions per S2.OP-SO.CAV-0001 is required to place the CAV systems in the proper mode of operation. In this case, the candidate

RO EXAMINATION ANSWER KEY

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needs to know from which unit to actuate AP Mode since it determines which emergency intake dampers will be open during an accident.

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52

04-048

Points: 1.00

Which ONE of the following identifies when the 21(22)SW122, CC HX Inlet Valves, automatically reposition and why?

The 21(22)SW122 valves...

- A. close on a SI signal coincident with a LOOP to ensure SW pump runout does not occur with all CFCUs running.
- B. fully open on a SI signal coincident with a LOOP to ensure cool CCW is supplied to the RHR HXs and pump seals.
- C. fully open on a SI signal to ensure cool CCW is supplied to the RHR HXs and pump seals.
- D. close on a SI signal to ensure SW pump runout does not occur with all CFCUs running.

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Answer: A

Explanation / Justification:

- A. Correct. The SW122s will only close on a SEC Mode III (SI and Blackout or LOOP). The purpose of this is to ensure that the SW pumps do not reach runout conditions with all CFCUs running and considering only two SW pumps are running (single active failure).
- B. Incorrect. Plausible because the SW122s will be throttled to maintain CC HX outlet temperature at setpoint during SEC Mode I (SI only) or Mode II (blackout only). The applicant may confuse the SEC Mode ops and determine that the SW122s will go fully open during a SEC Mode Op III condition.
- C. Incorrect. Plausible because the SW122s will be throttled to maintain CC HX outlet temperature at setpoint during SEC Mode I (SI only). The SW122s will not go fully open upon receipt of an SI signal. The applicant may confuse the operation of the SW122 during SEC Mode ops and believe that the valve will go fully open. It is also plausible to believe that SW122 opening does allow for maximum cooling of the CCW system.
- D. Incorrect. Plausible because the applicant may confuse the SEC Modes of operation and believe that the Mode I (SI only) closes the SW122's.

Technical References:

NOS05SW0NUC-15

Proposed References to be provided:

None

Learning Objective:

NOS05SW0NUC-15, Objective 4.f. Describe the function of the following components and how their normal and abnormal operation affects the Service Water – Nuclear Header System: CC HX and SW122, SW127, SW380/383, SW376/379

Question Source:

Bank – Salem 2015 NRC RO16

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.2 to 41.9 / 45.7 to 45.8

Level:

RO

Category/System:

04-Service Water

K/A #:

076 K1.16

Knowledge of the physical connection and/or cause-effect relationships between the SWS and the following systems:

ESF

Importance:

3.6

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the applicant must have knowledge of how the SWS responds to SEC Mode Op signal and how the CC HX SW valves respond and why.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

53

08-012

Points: 1.00

Given:

- Both Units are at 100% Power.
- #1 Station Air Compressor (SAC) is running.
- #2 SAC is in AUTO and next to load.
- #3 SAC is C/T for maintenance.
- There is no air usage at either unit's condensate polisher system.
- Control Air headers A and B on both units are indicating 105 psig.

Subsequently, the following occurs;

- Unit 1 reactor trips and the 4KV Group Busses fail to automatically transfer resulting in **ALL** 4KV Group Busses being de-energized.
- Unit 2 is NOT affected.

15 minutes later, which ONE of the following would be an expected air pressure indication for both control air headers on Units 1 and 2?

- A. 60 psig and lowering rapidly.
- B. 80 psig and lowering slowly.
- C. Stable at approximately 85-88 psig.
- D. Stable at approximately 100 psig.

RO EXAMINATION ANSWER KEY

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Answer: D

Explanation / Justification:

- A. Incorrect. Plausible if you believe that the ECACs cannot maintain control air headers around 85-90 psig when all SACs are lost.
- B. Incorrect. Plausible if you believe that the ECACs cannot maintain control air headers around 85-90 psig when all SACs are lost.
- C. Incorrect. Plausible if you believe that no SACs are running and both units Emergency Air Compressors (ECACs) have started and are maintaining both CA headers around the auto start setpoint of 85 to 90 psig. The Unit 1 ECAC (B CA header) is supplied from 1C 460 V Vital Bus and the Unit 2 ECAC (A CA header) is supplied from the 2C 460 V Vital Bus
- D. Correct. Instrument air is supplied from one of three station air compressors. Unit 1 has two station air compressors (SAC), #1 SAC supplied from 1H 4KV group bus and #3 SAC supplied from 1G 4KV group buses and Unit 2 has one SAC (#2 SAC) supplied from the 2G 4KV group bus. Therefore, with a loss of the 4KV Group Buses on Unit 1 only, the #2 SAC on Unit 2 would start (if not already running) and supply station air to both units control air headers. One SAC is capable of supplying both unit's station air and control air headers to maintain around 100 psig (assuming no demands from the polisher).

Technical References:

NOS05STAAIR-18 & NOS05CONAIR-13

Proposed References to be provided:

None

Learning Objective:

NOS05STAAIR-18, Objective 5. State the power supply to the following Station Air/Service Air System components: Station Air Compressors (SACs)

Question Source:

Bank – Diablo Canyon 2016 NRC RO26

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.7

Level:

RO

Category/System:

08-Instrument Air

K/A #:

078 K2.01

Knowledge of bus power supplies to the following: Instrument air compressor

Importance:

2.7

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to identify the vital bus power supply for the Station Air Compressors which supply the instrument air system.

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Additional Reference: NOS05CONAIR

A. General

1. The Station Service Air system consists of three 100% capacity station air compressors (SACs) located on Unit 1.
 - a) Each SAC is capable of providing the total service and control air requirements for both units.
2. The Station Service Air System for each unit is identical, arranged in a dual header arrangement (A & B), each header having an associated air receiver.
3. The Station Service Air headers are both normally charged and cross-connected to form a "Ring" header.

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LESSON NAME:	CONTROL AIR SYSTEM	
	NOS05CONAIR-13	04/17/19

4. Control Air (CA) is normally fed from the Station Service Air System through heat-less, desiccant type air dryers.
 - a) Two CA headers per unit (A & B).
 - b) One header charged by Unit 1 Station Service Air System (Header B) and the other header charged by the Unit 2 Station Service Air System (Header A).
 - c) Normally cross-connected.

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54

05-012

Points: 1.00

Given:

- A reactor trip and Safety Injection are actuated
- PZR level is 25% and stable.
- 1CV2 and 1CV277, Letdown Isolation Valves, are open.
- 1CV3 and 1CV5, Letdown Orifice Isolation Valves, were closed prior to the reactor trip.
- 1CV4, Letdown Orifice Isolation Valve, is open.
- 1CV7, Letdown Containment Isolation Valve, is open.

Which ONE of the following completes the statement?

The 1CV4...

- A. is responding as designed since it is interlocked with the closure of the 1CV2 or 1CV277.
- B. is responding as designed since it is interlocked with the closure of the 1CV7.
- C. has failed open since it receives a signal directly from Safety Injection.
- D. has failed open since it receives a signal directly from Phase A.

RO EXAMINATION ANSWER KEY

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Answer: D

Explanation / Justification:

- A. Incorrect. Plausible because the 1CV2 or 1CV277 closing will close the orifice isolation valves. The 1CV2 and 1CV277 close only on PZR low level <17%. The applicant may confuse this interlock and believe that since the 1CV2 and 1CV277 are still open in the stem that this is the reason for the 1CV4 not closing as designed by the interlock.
- B. Incorrect. Plausible because the 1CV7 does close on Phase A signal and is interlocked with the 1CC71 valve to close isolating CCW to the letdown HX. The applicant may confuse 1CV7 is interlocked with the closure of the letdown orifice valves 1CV3, 4, and 5. Since the 1CV7 didn't close, then its plausible to believe that's the reason for the 1CV4 not closing as designed.
- C. Incorrect. Per logic drawing 221057, plausible because the applicant may confuse that a SI signal directly actuates the letdown isolation valves (i.e., 1CV4). The SI signal does directly actuate some valves, for example the 1CV68 and 1CV69 valves receive a closure signal directly from SI only and not Phase A. The Phase A is actuated from either an Auto or Manual SI signal or manual actuation from the safeguards bezel in the control room.
- D. Correct. The 1CV4 closes on the following signals/interlocks; Phase A, 1CV2 or 1CV277 closing, PZR level < 17%, the trip all charging pumps, or manual actuation (Phase A) from the safeguards bezel in the control room. The stem states that a SI has actuated which results in the actuation of Phase A signal to isolate containment penetrations and valves. The 1CV4 closes directly from a Phase A signal, which is actuated from the SI signal. Since the 1CV4 is open, this means that the 1CV4 failed to close.

Technical References:

Simplified dwg CV-2, 221057 (R23)

Proposed References to be provided:

None

Learning Objective:

NOS05CVCS00-18, Objective 4. Describe the function and how their normal and abnormal operations affects the Chemical and Volume Control System: containment orifice isolation valves CV3, CV4, CV5

Question Source:

Modified Bank – Byron 2017 NRC RO30

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.5

Level:

RO

Category/System:

05-Containment

K/A #:

103 A3.01

Ability to monitor automatic operation of the containment system, including: Containment isolation

Importance:

3.9

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the applicant must have knowledge of which ESFAS signal directly actuates Containment Ventilation Isolation signal and how the letdown isolation valves respond to a Phase A signal to verify proper containment isolation.

RO EXAMINATION ANSWER KEY

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Modified Question Justification: The question is modified based on the condition in the stem is a design difference and changes the answer based on Salem's design associated with interlocks with Phase A valves.

Parent Question:

EXAMINATION ANSWER KEY

2017 NRC

30

ID: 2017 NRC Q30

Points: 1.00

At 1000

A Reactor Trip and Safety Injection are initiated:

- RCS pressure is 2300 PSIG and stable
- Pressurizer level is 25% and stable
- 1CV8152, LTDWN LINE CNMT ISOL VLV, is closed
- 1CV8160, LTDWN LINE CNMT ISOL VLV, failed to close

At 1001

Letdown orifice isolation valves indicate:

- 1CV8149A OPEN
- 1CV8149B OPEN
- 1CV8149C CLOSED

The Letdown orifice isolation valves _____(1)_____

AND

1CV8149A and B have _____(2)_____.

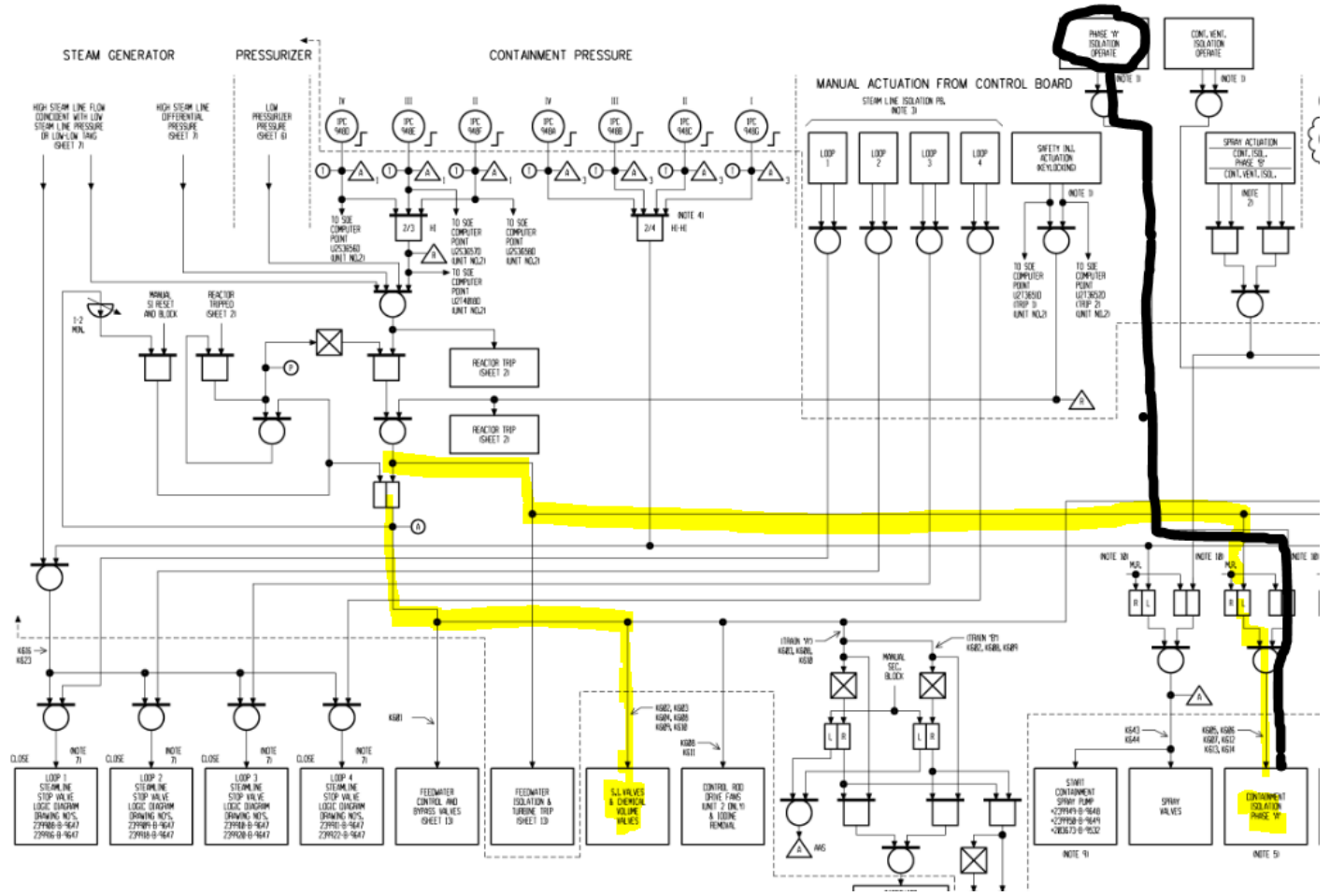
- A.
 - 1. receive a close signal DIRECTLY from SI
 - 2. failed open
- B.
 - 1. receive a close signal DIRECTLY from SI
 - 2. responded as designed
- C.
 - 1. are interlocked with 1CV8160
 - 2. failed open
- D.
 - 1. are interlocked with 1CV8160
 - 2. responded as designed

Answer: D

RO EXAMINATION ANSWER KEY

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Additional Reference: Logic drawing 221057 (R23)



Note:

Yellow highlight is from the Auto SI signal

Black highlight is the Manual Phase A from the control room

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55

05-013

Points: 1.00

Given:

- Unit 2 is at 100% Power
- 21, 22, 23, and 24 CFCUs are running in high speed with the 25 CFCU in standby.

Subsequently, a LOCA inside Containment occurs and a Safety Injection (SI) signal actuates.

Which ONE of the following describes the response of the CFCUs following the SI actuation?

- A. 21, 22, 23, and 24 CFCUs start 20 seconds later in low speed, and the 25 CFCU starts immediately in low speed.
- B. 21, 22, 23, and 24 CFCUs start immediately in low speed, and the 25 CFCU starts 20 seconds later in low speed.
- C. ALL CFCUs will start 20 seconds later in low speed.
- D. ALL CFCUs start immediately in low speed.

RO EXAMINATION ANSWER KEY

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Answer: C

Explanation / Justification:

- A. Incorrect. Plausible because the operator may believe that there is no time delay when for a CFCU in standby. ALL CFCU high speed 460V breakers will trip during ALL MODES of SEC operation. The CFCU Low speed 460V breakers will close after 20 seconds. CFCUs do not immediately start in low speed, even in standby.
- B. Incorrect. Plausible if the operator believes that running CFCUs can shift over to Low speed since the CFCUs are already running and no time delay is necessary. See Ans. C for further explanation.
- C. Correct. An SI signal will actuate the SEC in MODE 1 operation. MODE 1 does not use the SEC load sequencers. The SEC will trip open all High speed 460V breakers during all Modes of SEC operation (see 203670). The SEC assumes that the CFCUs were running in high speed. After a 20 second time delay the SEC will start all CFCUs in Low speed (see 203667 & 203673). In this case, the operator must determine how a CFCU in standby will operate following an SI signal, the 25 CFCU in standby will start in low speed after a 20 second delay.
- D. Incorrect. Plausible if the operator believes that during Mode 1 there is no time delay to start CFCUs. See Ans. C for further explanation.

Technical References:	NOS05SEC00, 203667, 239670, 203673
Proposed References to be provided:	N/A
Learning Objective:	NOS05SEC00-09, Objective 4, Describe in detail each Mode of Safeguards Equipment Control System operation, including setpoints for automatic actuation
Question Source:	Modified Bank – Salem
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.2 to 41.9 / 45.7 to 45.8
Level:	RO
Category/System:	05-Containment
K/A #:	103 K1.01
	Knowledge of the physical connections and/or cause and effect relationships between the containment system and the following systems: CCS
Importance:	3.6
Tier/Group	Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because LOCA inside containment resulting in an SI actuation signal requires applicant knowledge of the operation of SEC during an SI (Mode I) and how the safeguards/ESFAS equipment is stripped from the bus and re-loaded in accordance with SEC operation. Specifically, the operator needs to know that the CFCUs need 20 seconds to coast down before they can be re-started in Low speed to prevent damage to the CFCU motors.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Parent Question: Salem Bank

Given:

- Unit 2 is at 100% Power
- 21, 23, and 24 CFCUs are running in HIGH speed
- 22 CFCU is running in LOW speed to support surveillance testing in accordance with S2.OP-ST.CBV-0003, Containment Systems – Cooling Systems

Subsequently, a LOCA occurs and a Safety Injection (SI) signal actuates.

Which ONE of the following describes the response of the CFCUs following SI actuation?

- A. All HIGH and LOW speed breakers receive a trip signal; ALL CFCUs start in LOW speed after a time delay.
- B. All HIGH and LOW speed breakers receive a trip signal; ALL CFCUs immediately start in LOW speed.
- C. ONLY the HIGH speed breakers receive a trip signal; 22 CFCU remains running in LOW speed; ALL remaining CFCUs start in LOW speed after a time delay.
- D. ONLY the HIGH speed breakers receive a trip signal; ALL remaining CFCUs immediately start in LOW speed.

Answer: C

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

56

01-014

Points: 1.00

Given:

- Unit 2 is at 85% Power following a rapid load reduction.
- OHA E-8, ROD INSERT LMT LO, is now LIT.
- Tavg is 571 °F and stable.
- Tref is 570 °F and stable.

Which ONE of the following completes both statements?

1. The Control Rod Insertion Limit of the Core Operating Limits Report (COLR) __ (1) __ been exceeded.
 2. Per the OHA Alarm Response Procedure for E-8, the NEXT action that the operating crew is required to perform is ____ (2) ____.
-
- A. 1) has NOT
2) initiate an emergency boration IAW S2.OP-SO.CVC-0008, Rapid Borate
 - B. 1) has NOT
2) initiate a normal boration IAW S2.OP-SO.CVC-0006, Boron Concentration Control
 - C. 1) has
2) initiate a normal boration IAW S2.OP-SO.CVC-0006, Boron Concentration Control
 - D. 1) has
2) initiate an emergency boration IAW S2.OP-SO.CVC-0008, Rapid Borate

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. Part 1 is correct. Part 2 is incorrect. Plausible because emergency boration was required when OHA E-16, ROD INSERT LO-LO, was in alarm. This requirement has been removed from the OHA alarm procedures.
- B. Correct. OHA E-8 alarms when the rods are 10 steps from the Rod Insertion Limit. Therefore, the RIL for the COLR has not been exceeded. IAW with the OHA alarm response procedure, the crew is required initiate a normal boration IAW S2.OP-SO.CVC-0006 to restore rods to their normal band.
- C. Incorrect. Part 1 is incorrect. The OHA E-8 alarm indicates the rods are within 10 steps of the RIL. Part 2 is correct.
- D. Incorrect. Part 1 is incorrect. The OHA E-8 alarm indicates the rods are within 10 steps of the RIL. Part 2 is incorrect. Plausible because emergency boration was required when OHA E-16, ROD INSERT LO-LO, was in alarm. This requirement has been removed from the OHA alarm procedures.

Technical References:

S2.OP-AR.ZZ-0005 (R26)

Proposed References to be provided:

None

Learning Objective:

NOS05RODS00-14, Objective 6, Describe the function of the following components and how their normal and abnormal operations affects the Rod Control and Position Indication Systems: Rod Insertion Limit Comparator

Question Source:

Bank – Beaver Valley 2018 NRC RO61

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 45.7

Level:

RO

Category/System:

01-Control Rod Drive

K/A #:

001 K5.04

Knowledge of the following operational implications as they apply to the CRDS: Rod insertion limits

Importance:

4.3

Tier/Group

Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the candidate is being asked if the rod insertion limit has been exceeded based on OHA E-8 being lit. The question also asks what action will the crew take in response to the OHA E-8 being lit.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

57

07-016

Points: 1.00

Given:

- Unit 2 is performing a planned shutdown for a refueling outage.
- Current reactor power is 30%.
- 2N35, Intermediate Range NIS channel fails HIGH.

Which ONE of the following describes the plant impact from this failure?

- A. Reactor trips immediately on 1/2 Intermediate Range channels exceeding the high flux trip.
- B. Reactor trips ONLY when 2/2 Intermediate Range channels exceed the high flux trip.
- C. Reactor trips when 3/4 Power Range channels are less than the P-10 permissive.
- D. Reactor trips when 2/4 Power Range channels are less than the P-10 permissive.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. P-10 (2/4 PR channels > 10%) is blocking the 1/2 IR high flux trip. Plausible because the operator may incorrectly assess the plant conditions and believe that a Rx trip will occur when one IR channel fails high.
- B. Incorrect. P-10 (2/4 PR channels > 10%) is blocking the 1/2 IR high flux trip. Plausible because the operator may incorrectly believe that both (2/2) IR channels exceeding the high flux setpoint are required to cause a Rx trip.
- C. Correct. When at least 3/4 PR NIS channels are less than P-10 setpoint (approx. 9%), P-10 will automatically unblock and reinstate the 1/2 IR high flux trip (25%) and 2/4 PR high flux low setpoint trip (25%). In this case, with the 2N35 failed high, the Rx will automatically trip when below P-10 permissive.
- D. Incorrect. When at least 3/4 PR NIS channels are less than P-10 setpoint (approx. 9%), P-10 will automatically unblock and reinstate the 1/2 IR high flux trip (25%) and 2/4 PR high flux low setpoint trip (25%). Plausible because the operator may incorrectly determine that P-10 permissive will clear when 2/4 PR channels are less than the P-10 permissive.

Technical References:	NOS05EXCORE-14
Proposed References to be provided:	None
Learning Objective:	NOS05EXCORE-14, Objective 7. Outline the control interlocks associated with the following Excore Nuclear Instrumentation System components: P-10, Enable At-Power trips
Question Source:	Bank - Salem
Question Cognitive Level:	Comprehension/Analysis
10CFR Part 55 Content:	41.7
Level:	RO
Category/System:	07-Nuclear Instrumentation
K/A #:	015 K4.07 Knowledge of the NIS design feature(s) and/or interlock(s) which provide for the following: Permissives
Importance:	3.7
Tier/Group	Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the candidate is being asked to describe the plant impact when a IR NIS channel is failed and power is continued to lower. In this case, the candidate needs to understand how the P-10 permissive operates when reactor power is lowering. When 3/4 PR channels are less 10% (about 9%), then the P-10 permissive will clear to unblock or reinstate the 1/2 IR high flux trip.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

58

07-017

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- ALL systems are in normal alignment and in AUTO.
- The steam pressure channel associated with the Ovation Digital Feedwater Control System fails HIGH on 21 Steam Generator.

Which ONE of the following describes how the Ovation Digital Feedwater Control System will respond to this failure?

Note: MS10 – Atmospheric Steam Dump Relief Valve

- A. 21MS10 will switch to MANUAL.
- B. 21MS10 will OPEN.
- C. ALL MS10's will remain in AUTO.
- D. ALL MS10s will switch to MANUAL.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. The operator needs to have knowledge on how the ADFCS system handles instrument failures. Many instrumentation failures are fault tolerant and a few are not. In this case, a failure of one channel of steam pressure will result in the associated MS-10 loop switching to Manual control, and OHAs G-7 ADFCS Alternate Action and G-15 ADFCS TRBL. Ovation uses one pressure channel from each SG (4 total) into a Medium Signal Select (MSS) algorithm and with a failure, will select another good input and the other remaining MS10's will remain in auto.
- B. Incorrect. One steam pressure channel failure will not cause the associated MS-10 to open. Plausible because since only one pressure channel from each SG is used into Ovation system that the operator may incorrectly believe that only one pressure channel failing will cause the MS10 to open on the affected SG pressure channel.
- C. Incorrect. Plausible because the Ovation system is redundant and fault tolerant to loss of inputs. However, in this case, a loss of one SG pressure channel will cause the associated MS10 to swap to Manual.
- D. Incorrect. Plausible because since only one pressure channel from each SG is used into Ovation system that the operator may incorrectly believe that the Medium Signal Select (MSS) algorithm is not used and therefore with only one pressure channel failing will cause Ovation to select all the MS10s to swap to Manual.

Technical References:

NOS05ODFWCS-03

Proposed References to be provided:

None

Learning Objective:

NOS05ODFWCS-03, Objective 8.g. Describe the function and operating characteristics for the following Advanced Digital Feedwater Control System components: Steam Pressure Bank - Salem

Question Source:

Bank - Salem

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.6

Level:

RO

Category/System:

07-Nonnuclear Instrumentation

K/A #:

016 K3.12

Knowledge of the effect that a loss or malfunction of the NNIS will have on the following: S/G

Importance:

3.4

Tier/Group

Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the candidate is being asked how the MS10s will operate following a loss of one of the steam generator pressure channels that inputs into Ovation Digital Feedwater Control System.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: NOS05ODFWCS-03

7. Steam Pressure

ELO-8.g Sheet 302, 318, 326, 328

- ▲ a. Four (4) Steam Pressures are input into the system (1 from each loop)
- b. Validated Loop Steam pressure is used to control the associated MS10 (ARV).
- c. The Four (4) Inputs also pass through a series of MSS and High Value Select algorithm so that the output should be the second highest channel
 - ▲ 1) The output is used to density compensate the Loop Steam flow.

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\\NJNBUFF19\PSEG Power\Training\VDrive\TRAINING DOCUMENTS\Operations Training\Salem\Plant Technology\System\Ovation Advanced Digital Feedwater Control\Master\Lesson Plan\NOS05ODFWCS-03 Ovation Advanced Digital Feedwater Control System (M).doc

LESSON NAME: OVATION ADVANCED DIGITAL FEEDWATER CONTROL SYSTEM
NOS05ODFWCS-03 **6/7/2021**

- d. Failure Protection
 - 1) If 1 loop fails, the following occurs:
 - a) Switches MS-10 control for that loop to MANUAL
 - b) Gives "ADFCS Alternate Action", OHA G-7
 - c) Gives "ADFCS TRBL", OHA G-15
 - 2) If additional steam pressure channels fail that warrant alternate action then ADFCS ALTERNATE ACTION (G7)
 - a) FW control remains in automatic
 - b) Lagged value of the SG Pressure prior to the failure used.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

59

05-014

Points: 1.00

Which ONE of the following completes the statement regarding operation of the Containment Iodine Removal Units (IRUs)?

The Containment IRUs should only be placed in service when directed by ____ (1) ____ and can be operated from the ____ (2) ____.

- A. 1) the EOPs
 2) Control Room OR Hot Shutdown Panel
- B. 1) the EOPs
 2) Control Room ONLY
- C. 1) Radiation Protection
 2) Control Room ONLY
- D. 1) Radiation Protection
 2) Control Room OR Hot Shutdown Panel

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. Part 1 is incorrect. Plausible because the operator may believe that only EOPs give the direction to start IRUs during an accident condition. Part 2 is incorrect. The IRUs can only be operated from the control room, but plausible because equipment can be operated from the Hot Shutdown Panel.
- B. Incorrect. Part 1 is incorrect. Plausible because the operator may believe that only EOPs give the direction to start IRUs during an accident condition. Part 2 is correct.
- C. Correct. Per S2.OP-SO.CBV-0001, section 4.3 note states “IRUs should only be run when iodine is present in Containment, when requested by Radiation Protection, OR at the discretion of the SM/CRS to support testing. The IRUs can only be operated from the main control room.
- D. Incorrect. Part 1 is correct. Part 2 is incorrect. The IRUs can only be operated from the control room, but plausible because equipment can be operated from the Hot Shutdown Panel.

Technical References:

NOS05CONTMT-14, S2.OP-SO.CBV-0001 (R36)

Proposed References to be provided:

None

Learning Objective:

NOS05CONTMT-14, Objective 7.b. Identify and describe the Control Room controls, indications, and alarms associated with the Containment and Containment Support Systems, including: The function of each Containment and Containment Support Systems Control Room control and indication

Question Source:

Bank – Salem 2010 NRC RO48

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.7 / 45.5 to 45.8

Level:

RO

Category/System:

05-Containment Iodine Removal

K/A #:

027 A4.03

Ability to manually operate and/or monitor in the control room:
CIRS fans

Importance:

3.3

Tier/Group

Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the candidate is being asked when IRUs are placed in service and how the IRUs are operated.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: S2.OP-SO.CBV-0001 for IRUs

S2.OP-SO.CBV-0001(Q) CONTAINMENT VENTILATION OPERATION

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Rev:36

4.3 Containment Iodine Removal Units (IRUs) Operation

NOTE

IRUs should only be run when iodine is present in Containment, when requested by Radiation Protection, QR at the discretion of the SM/CRS to support testing.

4.3.1. IF starting IRU(s),

THEN **PERFORM** the following:

1. IF starting 21 IRU,

THEN **PRESS** 21 START bezel.

2. IF starting 22 IRU,

THEN **PRESS** 22 START bezel.

3. **ENSURE** SEQUENCE COMPLETE bezel illuminated for Unit(s) started.

4. **ENSURE** AIR FLOW LO bezel alarms NOT illuminated.

5. **RECORD** Charcoal Filter in service time in the Control Room Narrative Log.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

60

05-015

Points: 1.00

Given

- A LOCA has occurred
- 21 Hydrogen Recombiner is inoperable
- The crew is preparing to place 22 Hydrogen Recombiner in service
 - Containment Temperature **PRIOR** to the LOCA was 90 °F
 - Containment Temperature is currently 120 °F
 - Containment pressure peaked at 10 psig
 - Containment pressure is currently 5 psig as indicated on 2PI-948A



Which ONE of the following completes the statement below?

The crew will set the 22 Hydrogen Recombiner Power Setting to _____ KW.

REFERENCE PROVIDED

- A. 62
- B. 60
- C. 54
- D. 52

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. This is power setting if you use Cp at 10 psig and 90 °F (Cp=1.425). $1.425 \times 42.63 = 60.74$ KW or rounded off the next higher setting would be 62 KW.
- B. Incorrect. This is power setting if you use Cp at 10 psig and 120 °F (Cp=1.4). $1.4 \times 42.63 = 59.68$ KW or rounded off the next higher setting would be 60 KW.
- C. Correct. IAW S2.OP-SO.CAN-0001, Attachment 1 and 2, for 22 Hydrogen Recombiner the power setting is calculated as follows: Power Correction factor (Cp) x Reference Power = Recombiner Power Setting; Cp at 5 psig and 90 °F (Cp=1.24) and Reference Power = 42.63 KW; therefore Power Setting = $1.24 \times 42.63 = 52.86$ KW; per step 5 of Attachment 1 round off to next higher setting which can be read on meter which would be 54 KW. (assuming a lower Cp value of 1.225; then $1.225 \times 42.63 = 52.22$ KW or still 54 KW)
- D. Incorrect. This is power setting if you use Cp at 5 psig and 120 °F (Cp=1.21). $1.21 \times 42.63 = 51.58$ KW or rounded off the next higher setting would be 52 KW.

Technical References:

S2.OP-SO.CAN-0001 (R9)

Proposed References to be provided:

S2.OP-SO.CAN-0001; embedded reference 22 Hydrogen Combiner Control Power Out KW Meter

Learning Objective:

NOS05CONTMT-17, Objective 3.g, Describe how the following components impact the Containment and Containment Support Systems during normal and abnormal conditions: Hydrogen Recombiner System

Question Source:

Modified Bank – Salem 2019 NRC RO32 (modified question to use 22 Hydrogen Recombiner, changed Containment Pressure, and changed answer choices)

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 45.5 to 45.8

Level:

RO

Category/System:

05-Hydrogen Recombiner and Purge Control

K/A #:

028 A4.01

Ability to manually operate and/or monitor in the control room: HRPS controls

Importance:

4.0

Tier/Group

Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the candidate is being asked how to manually operate the Hydrogen Recombiner by determining the power setting when placing 22 Hydrogen Recombiner in service and performing a calculation per S2.OP-SO.CAN-0001 using the provided plant conditions in the question stem. The operator must also know how to round off the setting to the next higher setting which can be read on the meter (photo embedded in question).

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Parent Question: Salem 2019 NRC Exam RO32

REFERENCES PROVIDED

Given

- A LOCA has occurred
- 22 Hydrogen Recombiner is inoperable
- The crew is preparing to place 21 Hydrogen Recombiner in service
 - Containment Temperature **PRIOR** to the LOCA was 90 °F
 - **CURRENT** Containment Temperature is 120 °F
 - **CURRENT** Containment pressure as indicated on 2PI-948A is 4.0 psig



Which ONE of the following completes the statement below?

The crew will set the 21 Recombiner Power setting to _____ KW.

- A. 56
- B. 54
- C. 52
- D. 50

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

61

08-013

Points: 1.00

Given:

- Unit 1 is at 100% Power.
- Spent Fuel Pool makeup is required when responding to OHA C-36, SFP LVL LO, which has been determined to be caused by normal evaporation over the course of several months.

In accordance with S1.OP-SO.SF-0001, Fill and Transfer of the Spent Fuel Pool, which ONE of the following is the **LEAST** preferred source of makeup water to the Spent Fuel Pool?

- A. Demineralized Storage Tank
- B. Primary Water Storage Tank
- C. CVCS Holdup Tanks
- D. Refueling Water Storage Tank

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: D

Explanation / Justification:

- A. Incorrect. Plausible because the Demineralized Storage Tank is one of the sources of makeup, but it is the first preferred source of makeup to the SFP.
- B. Incorrect. Plausible because the Primary Water Storage Tank is one of the sources of makeup, but it is the second preferred source of makeup to the SFP.
- C. Incorrect. Plausible because the CVCS Holdup Tanks are one of the sources of makeup, but it is the third preferred source of makeup to the SFP.
- D. Correct. Per S1.OP-SO.SF-0001 prerequisite step 2.3, the preferred order of SFP makeup water sources are: Demineralized Water, Primary Water, CVCS Holdup Tanks, and RWST or Refueling Cavity. Therefore, using the RWST as a makeup source is the least preferred.

Technical References:

S1.OP-SO.SF-0001 (R20)

Proposed References to be provided:

None

Learning Objective:

NOS05SFP000-12, Objective 11. Discuss the procedural requirements associated with the Spent Fuel Pool Cooling System, including an explanation of major precaution and limitations in the Spent Fuel Pool Cooling procedures

Question Source:

Bank – Salem 2016 NRC RO46

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.2 to 41.9 / 45.7 to 45.8

Level:

RO

Category/System:

08-Spent Fuel Pool Cooling

K/A #:

033 K1.05

Knowledge of the physical connections and/or cause-effect relationship between the Spent Fuel Pool Cooling System and the following system: RWST

Importance:

2.7

Tier/Group

Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the applicant is being asked how the RWST relates to the Spent Fuel Pool with regards to a source of makeup water as compared to other makeup sources.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

62

08-014

Points: 1.00

Which ONE of the following describes an interlock on the Unit 2 Spent Fuel Handling Crane?

- A. Overload Cutoff prevents crane travel with loads in excess of 2200 pounds over the fuel assemblies.
- B. A high radiation signal on 2R32A, Fuel Handling Crane, Radiation Area monitor will lockout ALL crane motion.
- C. Slack Cable prevents BOTH upward and downward motion of the hoist.
- D. A high radiation signal on 2R9, New Fuel Storage Area, Radiation Area monitor prevents upward motion of the hoist.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. Overload Cutoff prevents crane travel with loads in excess of 2200 pounds over the fuel assemblies. This is a TRM surveillance requirement per TR Surveillance 4.9.7 and checked within 7 days IAW SC.MD-ST.CRN-0003 prior to crane use.
- B. Incorrect. 2R32A in alarm ONLY prevents upward motion of the hoist. Lowering the hoist is still enabled. Plausible in that the operator may believe that ALL crane motion is locked out.
- C. Incorrect. Slack Cable interlock ONLY prevents downward direction of the hoist. Plausible if the operator believes that this interlock prevents hoist motion in either direction.
- D. Incorrect. 2R5 or 2R9 Area radiation monitors only actuate the FHB Ventilation System and has no interlocks with the Fuel Handling crane operation. The operator may believe that these radiation monitors also interlock with the crane like the 2R32A.

Technical References:	NOS05REFUEL-13
Proposed References to be provided:	None
Learning Objective:	NOS05REFUEL-13, Objective 5. Outline the interlocks associated with the following Refueling System components: Fuel Handling Crane
Question Source:	Bank - Salem
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.7
Level:	RO
Category/System:	08-Fuel-Handling Equipment
K/A #:	034 K4.02 Knowledge of design feature(s) and/or interlock(s) which provide for the following: Fuel movement
Importance:	2.5
Tier/Group	Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the question is asking the candidate on knowledge of interlocks associated with the Spent Fuel Handling Crane.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

63

04-049

Points: 1.00

Given:

- Unit 2 reactor was tripped and is cooling down for a planned refueling outage.
- Steam Dumps are in MANUAL MS PRESSURE Control Mode
- RCS cooldown rate is 70 °F per hour.

Which ONE of the following completes the following statement concerning the expected operation of the steam dump system during the cooldown?

1. The RCS cooldown will stop when Tavg is less than the MAXIMUM setpoint of __ (1) __.
2. In order to re-establish RCS cooldown, the operator will depress TRAIN __ (2) __ BYPASS ON pushbutton(s).

- A. 1. 543 °F
 2. A OR B
- B. 1. 543 °F
 2. A AND B
- C. 1. 547 °F
 2. A AND B
- D. 1. 547 °F
 2. A OR B

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. First part is correct. Second part is incorrect. Plausible because the applicant may incorrectly believe that when the BYPASS TAVG are depressed, then all group dump valves can be reopen and forget that only the cooldown (Group 1) valves can only be opened.
- B. Correct. When Tavg drops below 543 °F (low-low Tavg 2/4 < 543 °F, P-12), then all of the steam dump valves will close and the cooldown will stop and Tavg will eventually start to rise again. In order to reopen the steam dump valves following low-low Tavg, the operator is required to depress both Train A and Train B Bypass ON pushbuttons. This will allow only the Group 1 cooldown valves to be opened when Tavg Bypass is depressed.
- C. Incorrect. First part is incorrect. Second part is correct. Plausible because 547 °F is the setpoint for maintaining Tavg when the steam dumps are operating in Tavg Plant Trip Mode.
- D. Incorrect. First part is incorrect. Second part is incorrect. Plausible because 547 °F is the setpoint for maintaining Tavg when the steam dumps are operating in Tavg Plant Trip Mode. Plausible because the applicant may incorrectly believe that when the BYPASS TAVG are depressed, then all group dump valves can be reopen and forget that only the cooldown (Group 1) valves can only be opened.

Technical References:	NOS05STDUMP-13
Proposed References to be provided:	None
Learning Objective:	NOS05STDUMP-13, Objective 8.d. Describe the function of the following components and how their normal and abnormal operation affects the Steam Dump System: Low-Low Tavg
Question Source:	New
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.5 / 45.5
Level:	RO
Category/System:	04-Steam Dump/Turbine Bypass Control
K/A #:	041 A1.01
	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SDS controls including: T-ave., verification above low/low setpoint
Importance:	2.9
Tier/Group	Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the candidate is being asked to predict the response of the steam dump valves following receiving the P-12 (2/4 Tavg channels < 543 F) and depressing the Bypass Tavg pushbuttons. In this case, the operator should know that only the Group 1 cooldown valves are allowed to be operated.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

64

04-050

Points: 1.00

Given:

- Unit 2 is at 89% Power.
- Main Turbine Valve testing is in progress in accordance with S2.OP-PT.TRB-0003, Main Turbine Valve Stroke Testing.

In accordance with S2.OP-PT.TRB-0003, which ONE of the following completes the statement?

While performing the valve stroke test, if a __ (1) __ valve does NOT reopen, then the operator is required to __ (2) __.

- A. 1) Reheat or Intercept
 2) reduce turbine load to < 75% within an hour
- B. 1) Reheat or Intercept
 2) trip the reactor
- C. 1) Governor or Stop
 2) reduce turbine load to < 75% within an hour
- D. 1) Governor or Stop
 2) trip the reactor

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. Plausible if the operator believes that the requirement to reduce power to 75% within one hour is for a Reheat of Intercept valves. First part is incorrect. IAW S2.OP-PT.TRB-0003 P&L step 3.12.6, except for short periods during testing, the Main Turbine should NOT be operated above 80% load with a Reheat Stop Valve or Intercept Valve closed. Do Not exceed 5 minutes with any valve closed before beginning to reduce load at 10%/hr. Continue load reduction until either the valve is open or less than 80% load is achieved. Second part is correct.
- B. Incorrect. Plausible if the operator believes that the requirement to reduce power to 75% within one hour is for a Reheat of Intercept valves. First part is incorrect. IAW S2.OP-PT.TRB-0003, P&L step 3.12.3, except for short periods during testing, if any HP turbine inlet valve (MS28/MS29) closes and does not reopen or must be isolated by the operator, then turbine load should be reduced to 75% within one hour. Second part is incorrect. Reactor trip is not required by procedure.
- C. Correct. IAW S2.OP-PT.TRB-0003, P&L step 3.12.3, except for short periods during testing, if any HP turbine inlet valve (MS28/MS29) closes and does not reopen or must be isolated by the operator, then turbine load should be reduced to 75% within one hour.
- D. Incorrect. Plausible if the operator believes that a reactor trip is required when a Governor or Stop valve is closed. See Ans. C for further explanation.

Technical References:

S2.OP-SO.TRB-0001 (R49)

Proposed References to be provided:

None

Learning Objective:

NOS05GEN002-07, Objective 12. Identify and describe the Control Room controls, indications, and alarms associated with the Unit 2 Main Generator and Hydrogen Cooling System, including: The plant conditions or permissives required for Unit 2 Main Generator and Hydrogen Cooling System Control Room controls to perform their intended function

Question Source:

New

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.10 / 43.5 / 45.2 / 45.6

Level:

RO

Category/System:

04-Main Turbine Generator

K/A #:

045 G2.1.23

Ability to perform specific system and integrated plant procedures during all modes of operation.

Importance:

4.3

Tier/Group

Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the candidate is being asked what action is required when performing main turbine valve testing at power if a Governor or Stop valve does not reopen.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

65

04-051

Points: 1.00

Given:

- Unit 2 is at 75% Power.
- Power was reduced 2 days ago when 21 Condensate Pump tripped.
- 21 Condensate Pump remains out of service.
- Condensate Polisher is in service with full flow.

Subsequently, 22 Condensate Pump trips.

Which ONE of the following completes both statements?

1. Based on the above condition, which plant parameter is expected to be impacted **FIRST**?
 2. In accordance with S2.OP-AB.CN-0001, Main Feedwater/Condensate System Abnormality, what is the **NEXT** required action to mitigate this event?
-
- A. Lowering SG NR levels. Initiate a rapid load reduction at 15%/min to a maximum power level not to exceed 30%.
 - B. Lowering SG NR levels. Open 21-23 CN108s Polisher Bypass Valves.
 - C. Lowering SGFP suction pressure. Initiate a rapid load reduction at 15%/min to a maximum power level not to exceed 30%.
 - D. Lowering SGFP suction pressure. Open 21-23 CN108s Polisher Bypass Valves.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: D

Explanation / Justification:

- A. Incorrect. First part is incorrect. Second part is incorrect. Plausible because the SG levels will be impacted but SGFP suction pressure will be the first parameter to see the effect. Part 2 is plausible because the procedure will direct a load reduction to 30% power, however the applicant may believe that reducing load is the priority to stabilize the plant and that 15%/min ramp is reasonable since its used for a SGFP trip runback which is not the rate specified in the procedure of a maximum of 5%/min. Restoring SGFP suction pressure is the priority to prevent loss of the SGFPs.
- B. Incorrect. First part is incorrect. Second part is correct. Plausible because the operator may believe that SG levels will be impacted first. SGFP suction pressure will be the first indication seen by the operators and has the priority to open the CN108s to bypass the polishers and restore SGFP suction pressure to avoid losing the feedpumps.
- C. Incorrect. First part is correct. Second part is incorrect. Part 2 is plausible because the procedure will direct a load reduction to 30% power, however the applicant may believe that reducing load is the priority to stabilize the plant and that 15%/min ramp is reasonable since its used for a SGFP trip runback which is not the rate specified in the procedure of a maximum of 5%/min. Restoring SGFP suction pressure is the priority to prevent loss of the SGFPs..
- D. Correct. At 75% power and with only one condensate pump running, the first operational impact will be seen by rapidly lowering SGFP suction pressure. The SGFPs speed will increase in an attempt to increase flow and the BF19s will throttle open more to increase feedwater flow. Subsequently, SG NR levels will start to lower based on reduction of condensate flow, until the 21-23 CN108s are opened, and if necessary, the 2CN47 bypass is opened. The CN108s and CN47 do not open automatically on a condensate pump trip. Opening the CN108's first will bypass the condensate polishers and help restore SGFP suction pressure to prevent the loss of the feedpumps.

Technical References:

S2.OP-AB.CN-0001 (R31)

Proposed References to be provided:

None

Learning Objective:

NOS05ABCN01-07, Objective 2. Describe, in general terms, the actions taken in AB.CN-0001 and the bases for the actions in accordance with the technical bases document.

Question Source:

Bank – Salem 2011 NRC RO53

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 43.5 / 45.3 / 45.13

Level:

RO

Category/System:

04-Condensate

K/A #:

056 A2.04

Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of condensate pumps.

Importance:

2.6

Tier/Group

Plant Systems-Tier 2/Group 2

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

K/A Match: The K/A is matched because the candidate is being asked to predict the impact to plant operations following a condensate pump trip and what action is required in response to the loss of condensate pump IAW S2.OP-AB.CN-0001. In this case, with a loss of a condensate pump at 75% power, the first parameter that will be impacted will be SGFP suction pressure. SG NR levels will subsequently be impacted if the condensate polishers are not bypassed and a load reduction is not commenced to 30%.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

66

14-048

Points: 1.00

In accordance with OP-AA-104-101, Communications, which ONE of the following evolutions would require a plant announcement?

- A. Swapping a 28 VDC battery charger to the standby charger.
- B. Commencing a fill of the Main Generator bulk hydrogen bottles from a vendor supply truck.
- C. Commencing a Containment Pressure Relief to lower Containment pressure.
- D. Performing radiography in the Turbine Building.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: D

Explanation / Justification:

- A. Incorrect. Plausible because the operator may believe that this evolution meets the requirement for energizing of major electrical switchgear and buses. Swapping 28 VDC battery chargers does not meet the requirements of OP-AA-104-10 for page announcements.
- B. Incorrect. Plausible because the operator may believe that this evolution meets the requirements for alerting plant personnel of an unexpected event or condition. The candidate may believe that since Chemical off-loading at the polisher is announced, that off-loading Hydrogen would also be announced. Filling bulk hydrogen bottles does not meet the requirements of OP-AA-104-10 for page announcements.
- C. Incorrect. Plausible because the operator may believe that this evolution meets the requirements for alerting plant personnel of an unexpected event or condition or possibly changing radiation levels in the plant. Containment pressure relief does not meet the requirements of OP-AA-104-10 for page announcements.
- D. Correct. IAW OP-AA-104-101, Communications, step 4.1.3.6, states in part the following; make public address announcements prior to activities that could change plant radiation levels. In this case, radiography performed in the Turbine Building will change radiation levels in the area and can expose personnel in the area to high radiation fields. Radiography performed in the Turbine Building are typically performed during refueling outages.

Technical References:	OP-AA-104-101 (R5)
Proposed References to be provided:	None
Learning Objective:	NOS05CONDOP-14, Objective 5. Describe requirements for the following Control Room or Field Activities in accordance with applicable Conduct of Operations Manual Administrative Procedures: Supervisor Involvement
Question Source:	New
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.10 / 45.13
Level:	RO
Category/System:	14-Conduct of Operations
K/A #:	G2.1.1 Knowledge of conduct of operations requirements.
Importance:	3.8
Tier/Group	Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the candidate is being asked which type of evolutions require a public page announcement per station conduct of operations procedures.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: OP-AA-104-101

 PSEG <i>Nuclear LLC</i>	Salem and Hope Creek Common		Page 9 of 17
		LEVEL 3 - INFORMATIONAL USE	
OP-AA-104-101			Rev: 5
COMMUNICATIONS			

4.1.3 (continued)

6. MAKE public address announcements:
 - a. Prior to activities that could change plant radiation levels.
 - b.** Prior to starting equipment where personnel safety is a concern.
 - c. Prior to changes in plant power that could have a noticeable effect on plant systems.
 - d. Prior to plant start-ups, mode changes, criticality, etc.
 - e.** Prior to energizing or de-energizing major electrical switchgear and buses.
 - f. To alert plant personnel of an unexpected event or condition as appropriate.
 - g. Fires
 - h. Injuries
 - i. Emergency Plan assembly

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

67

14-049

Points: 1.00

In accordance with OP-AA-112-101, Shift Turnover and Relief, a shift turnover **SHALL NOT** be conducted in which of the following circumstances?

- A. A plant startup is in progress. The generator has just been synched to the grid, and SG level control is in manual.
- B. A reactor startup in progress. SR NIS have indicated 3 doublings since rod withdrawal commenced.
- C. A diesel surveillance is in progress, diesel is running unloaded.
- D. A power ascension is in progress at 10% per hour.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. Plausible if the applicant believes that with the SG level control in manual that this task is critical enough that the operator should not be distracted for turnover.
- B. Correct. IAW OP-AA-112-101 step 4.1.2, evolutions that may interfere with or distract the operators during turnovers such as the approach to criticality, rapid down-power, significant plant evolution, transient response, etc. should not be performed. The diesel surveillance, SG level control in manual and a 10% per hour power ascension does not interfere with the operators from performing a shift turnover. Shift turnovers should not be performed during the approach to criticality and closing of the first generator output breaker during synchronization evolutions since these are important evolutions requiring continued operator attention
- C. Incorrect. Plausible if the applicant believes that running a diesel surveillance is a critical task that the operator should not be distracted for turnover.
- D. Incorrect. Plausible if the applicant believes that a 10% per hour power ascension is a critical task that the operator should not be distracted for turnover

Technical References:

OP-AA-112-101 (R7)

Proposed References to be provided:

None

Learning Objective:

NOS05CONDOP-14, Objective 5. Describe requirements for the following Control Room or Field Activities in accordance with applicable Conduct of Operations Manual Administrative Procedures: Shift Relief and Turnover

Question Source:

Bank – Beaver Valley NRC 2017 RO67

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.10 / 45.13

Level:

RO

Category/System:

14-Conduct of Operations

K/A #:

G2.1.3

Knowledge of shift or short-term relief turnover practices.

Importance:

3.7

Tier/Group

Plant Systems-Tier 3

K/A Match: The K/A is matched because the candidate is being asked which plant evolutions can be performed during shift turnover.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: OP-AA-112-101

OP-AA-112-101
Revision 7
Page 2 of 14

4.0 MAIN BODY

4.1 General Guidelines For Shift Turnover And Relief:

NOTE

These turnover requirements apply only to positions that are staffed.

- 4.1.1. **CONDUCT** shift relief and turnover in a professional, disciplined, and formal manner. All turnovers should follow a similar protocol. The turnovers transfer specific legal responsibilities to qualified individuals.
- 4.1.2. **PERFORM** control room shift turnovers without interfering with or distracting the operator from important evolutions requiring continued operator attention, such as the approach to criticality, rapid down-power, significant plant evolution, transient response, etc.
- 4.1.3. **PERFORMANCE** of reactivity manipulations through shift turnover should be avoided unless no other alternative is available.
- 4.1.4. **VERIFY** important operating parameters, especially those relating to safety systems, as identified on the turnover sheet prior to assuming the shift. Each licensed person must be cognizant at all times of the position of the other shift licensed Reactor Operators, Supervisors, Shift Technical Advisor, and Fire Brigade Liaison.
- 4.1.5. **VERIFY** the on-coming person is properly licensed and/or qualified to assume the shift position.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

68

14-050

Points: 1.00

In accordance with SA-AA-114, Confined Space Program, which ONE of the following completes both statements regarding a PERMITTED confined space entry?

1. Who must be present at the confined space entry point while Entrants are in the space?
 2. Who may enter the space if an emergency rescue must be performed?
-
- A.
 - 1) Attendant
 - 2) Fire Brigade
 - B.
 - 1) Attendant
 - 2) Site Safety Professional
 - C.
 - 1) Entry Supervisor
 - 2) Fire Brigade
 - D.
 - 1) Entry Supervisor
 - 2) Site Safety Professional

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. IAW SA-AA-114, when entry into a Permit Required Confined Space is performed, the Attendant must always be present when entrants are in the confined space, and the Fire Brigade will serve as the Rescue Team.
- B. Incorrect. Part 1 is correct. Part 2 is incorrect. Credible distractor if the operator believes that the Site Safety Professional is authorized to enter for rescue based on being knowledgeable on safety procedures.
- C. Incorrect. Part 1 is incorrect. Plausible because the Entry Supervisor has the responsibility to ensure all individuals are qualified and briefed on the confined space entry, however he is not required to remain present during the entry. Part 2 is correct.
- D. Incorrect. Part 1 is incorrect. Plausible because the Entry Supervisor has the responsibility to ensure all individuals are qualified and briefed on the confined space entry, however he is not required to remain present during the entry. Part 2 is incorrect. . Credible distractor if the operator believes that the Site Safety Professional is authorized to enter for rescue based on being knowledgeable on safety procedures.

Technical References:

SA-AA-114 (R18)

Proposed References to be provided:

None

Learning Objective:

NOS05CONDOP-14, Objective 5. Describe requirements for the following Control Room or Field Activities in accordance with applicable Conduct of Operations Manual Administrative Procedures: Industrial Safety Practices

Question Source:

Bank – Salem

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.10 / 45.12

Level:

RO

Category/System:

14-Conduct of Operations

K/A #:

G2.1.26

Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).

Importance:

3.4

Tier/Group

Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the candidate is being asked the industrial safety requirements associated with entering a permitted confined space.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: SA-AA-114

SA-AA-114 CONFINED SPACE PROGRAM

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Rev:18

Attachment 2, Duties of Attendant for Permit-Required Confined Space (PRCS)

CAUTION

The Primary and only focus of the Attendant is the health and safety of personnel entering or working in the confined space. **At NO time can an Attendant perform collateral duties** unless a JHA is completed and approved by the Site Safety Professional. Refer to JHA SH2020-070, Combined Duties of FME and Confined Space Attendants.

READ AND SIGN-IN on Form 3, Acknowledgement of Responsibilities when assuming duties of the Attendant.

KNOW the hazards that may be faced during the entry including information on the mode, signs or symptoms, and consequences of the exposure.

BE AWARE of possible behavioral effects from hazard exposure.

Continuously **MAINTAIN** an accurate count of authorized Entrants in the PRCS.

REMAIN outside the PRCS during entry operations until relieved by another Attendant.

COMMUNICATE with authorized Entrants as necessary to monitor Entrant status and alert Entrants to evacuate the space when a hazardous condition arises.

MONITOR activities inside and outside the confined space to determine if it is safe for Entrants to remain in the confined space **AND ORDER** the authorized Entrants to evacuate the PRCS immediately under any of the following conditions:

- **IF** the Attendant detects a prohibited condition; **OR**
- **IF** the Attendant detects behavioral effects of hazard exposures in an Entrant; **OR**
- **IF** the Attendant detects a situation outside of the confined space that could endanger the Entrants; **OR**
- **IF** the Attendant **CANNOT** effectively and safely perform all of the duties required in this attachment; **OR**
- **IF** Engineering Controls, such as ventilation, have failed; **OR**
- **IF** the control room, fire department (rescue team), or safety orders evacuation; **OR**
- **IF** a personal monitor alarms.

LOCATE the nearest communications device and ensure it is in working order to report an emergency.

SUMMON rescue **AND** other emergency services as soon as the Attendant determines that Entrants need urgent assistance to escape from the PRCS.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: SA-AA-114 (continued)

2.34 Rescue Service

- 2.34.1. Fire Protection, the Public Service Fire Department (PSFD) are the personnel designated to rescue employees from all confined spaces.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

69

11-157

Points: 1.00

In accordance with AD-AA-101-101, Implementing and Technical Procedure On-The-Spot Change (OTSC) Process, which ONE of the following would be considered a change to the **INTENT** of a procedure?

- A. Altering an Inspection Hold Point in a procedure.
- B. Increasing the amount or level of management oversight or level of approval.
- C. Adding text to clarify the purpose of a procedure step.
- D. Changing an implementing procedure step reference to the correct attachment.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. Deleting a Hold Point is conserved a change to the intent of the procedure and needs to go through the formal procedure change process.
- B. Incorrect. Plausible if the applicant believes that changing a title of a position is a change of intent.
- C. Incorrect. Plausible if the applicant believes that clarifying a purpose of a procedure is changing the purpose of a procedure and is a change of intent.
- D. Incorrect. Plausible if the applicant believes that changing a step in a procedure in which the step incorrectly refers to the incorrect attachment is a change of intent.

Technical References:	AD-AA-101-101 (R7)
Proposed References to be provided:	None
Learning Objective:	NOS05ECCS00-10, Objective 12. Summarize the differences between Unit 1 and Unit 2 Emergency Core Cooling System components, parameters, and operation
Question Source:	Bank – ANO Unit 1 2017 NRC RO69
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.10 / 43.3 / 45.13
Level:	RO
Category/System:	11-Equipment Control
K/A #:	G2.2.6
Importance:	Knowledge of the process for making changes to procedures.
Tier/Group	3.0
	Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the applicant must know the process for making changes to procedures. In this case, the applicant is being asked which condition is a change to intent of a procedure that prevents the use of a OTSC process.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional Reference:

AD-AA-101-101

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IMPLEMENTING AND TECHNICAL PROCEDURE ON-THE-SPOT CHANGE (OTSC) PROCESS

Rev: 7

Attachment 1, Change of Intent Criteria

Changes of Intent are text changes that meet ANY ONE (or more) of the following conditions:

1. Alters purpose or scope statement of procedure.
2. Affects operating parameter(s) being monitored by Technical Specification Implementing Procedures.
3. Affects testing methodology for Technical Specification–required implementing, troubleshooting or special test procedures.
4. Affects technical content of Technical Specification acceptance criteria, a setpoint, or a required operating parameter range unless change is to bring procedure into alignment with Technical Specifications.
5. Affects a condition or activity that could result in exceeding limits allowed by Technical Specifications.
6. Affects facility as described in UFSAR or which causes a deviation from Technical Specifications or UFSAR.
7. Affects a step or section of a procedure described in the UFSAR. Note that a procedure being “named by title” in UFSAR is not the same as a procedure “described in the UFSAR.” See LS AA 104-1000 for further definition.
8. A change to a proposed test or experiment not described in UFSAR.
9. A change to technical content of a Non-Technical Specification acceptance criteria, setpoint, or required operating parameter range, without documented technical justification in the form of an approved calculation, engineering procedure or engineering evaluation, etc.
10. Causes entry into a Limiting Condition for Operation (LCO) Action Statement if not required by or resulting from original procedure.
11. A change in the manner in which equipment or a component is operated that is not consistent with design or function of equipment or component, or causes uncertainty as to how change may affect or impact operation or function of equipment or component.
12. A change to initial conditions or prerequisites of procedure such that change is not consistent with purpose of procedure.
13. Alters or deletes an Inspection Hold Point (IHP).
14. Affects a current commitment or commitment step(s) such that original intent of commitment is no longer satisfied.
15. Affects safe condition of personnel or equipment, or which has potential to introduce ALARA concerns not previously evaluated.
16. A change in amount or level of management oversight or level of approval authority, unless change results in an increased amount or level of oversight or level of approval.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

70

14-051

Points: 1.00

In an emergency, which position has the authority to authorize the repositioning of a component with a Red Blocking Tag attached?

- A. Shift Manager
- B. Control Room Supervisor
- C. Senior Director of Operations
- D. Shift Operations Manager

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: A

Explanation / Justification:

- A. Correct. IAW OP-AA-109-115, Attachment 3, Tagging Rules, in an emergency, the Shift Manager can authorize the repositioning of a RBT component if it presents an immediate challenge to safety or personnel or plant equipment.
- B. Incorrect. Plausible because CRS do authorization to approve tagouts and releases.
- C. Incorrect. Plausible because the applicant may believe that a higher level in the operations organization is needed to perform such an action with repositioning of a RBT.
- D. Incorrect. Plausible because the applicant may believe that a higher level in the operations organization is needed to perform such an action with repositioning of a RBT.

Technical References:	OP-AA-109-115 (R15)
Proposed References to be provided:	None
Learning Objective:	NOS05CONDOP-14, Objective 5. Describe requirements for the following Control Room or Field Activities in accordance with applicable Conduct of Operations Manual Administrative Procedures: Industrial Safety Practices
Question Source:	New
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.10 / 45.13
Level:	RO
Category/System:	14-Equipment Control
K/A #:	G2.2.13 Knowledge of tagging and clearance procedures.
Importance:	4.1
Tier/Group	Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the candidate is being asked knowledge of the tagging procedures with regards to who can reposition a component with a RBT affixed.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional Reference: OP-AA-109-115

OP-AA-109-115

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SAFETY TAGGING OPERATIONS

Rev: 15

Attachment 3, Tagging Rules

1. RED BLOCKING TAG (RBT)

- ❑ A RBT shall be applied to an energy isolation device for the protection of personnel.
- ❑ RBT stickers vice tags may be used when the blocking point is a switch/bezel so as to not obstruct the view of other remote switches in the area.
- ❑ SM/CRS/WCCS shall only authorize the manipulation of a blocking point with a RBT affixed in the tagged direction for position verification or in an attempt to limit leakage. This manipulation/verification SHALL only be performed by a Qualified Operator.
- ❑ In an emergency, the SM can authorize the repositioning of a RBT component if it presents an immediate challenge to safety of personnel or plant equipment.
 - Prior to component operation, all personnel shall be verified clear of affected equipment, and, following component manipulation, all personnel signed on the Tagout will be notified.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

71

15-027

Points: 1.00

Given:

- A large break LOCA is in progress and core damage has occurred with high radiation levels in accessible plant areas.
- To prevent further core damage, the Operations Support Center (OSC) is dispatching an NEO to locally operate a failed MOV in an area surveyed at 100 R/hr.

Which ONE of the following is the **MAXIMUM** stay time (in minutes) for the operator to perform the task **without** exceeding the authorized planned emergency exposure limit?

- A. 3
- B. 6
- C. 15
- D. 45

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. Plausible if you use the 10 CFR 20 Federal annual limit of 5 Rem TEDE as the maximum exposure limit.
- B. Incorrect. Plausible if you use 10 Rem as the maximum limit for protecting valuable property IAW RP-AA-203.
- C. Correct. IAW NC.EP-EP.ZZ-0304, Attachment 3, 25 Rem is the planned emergency exposure limit (PEEL) for accident mitigation. Therefore, maximum stay time is $[(25 \text{ R} / 100 \text{ R/hr}) \times 60 \text{ min/hr} = 15 \text{ minutes}]$
- D. Incorrect. Plausible if you use 75 Rem as the planned emergency exposure limit (PEEL) for life saving.

Technical References:

NC.EP-EP.ZZ-0304 (R17), RP-AA-203 (R6)

Proposed References to be provided:

None

Learning Objective:

NOS05RADCON-06, Objective 3. Discuss the emergency exposure limits in accordance with applicable station procedures pertaining to: Guidelines for personnel receiving emergency exposure

Question Source:

Modified Bank – Byron 2019 NRC RO72 (October exam)

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.12 / 43.4 / 45.10

Level:

RO

Category/System:

15-Radiation Control

K/A #:

G2.3.4

Knowledge of radiation exposure limits under normal or emergency conditions.

Importance:

3.2

Tier/Group

Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the candidate is being asked the emergency exposure limits for accident mitigation under emergency conditions IAW NC.EP-EP.ZZ-020304 procedure limits.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional Reference: NC.EP-EP.ZZ-0304

3.0 EXPOSURE CRITERIA LIFE SAVING EMERGENCY

- Any and all actions necessary to preserve life, including, but not limited to:
 - ◆ Removal of injured personnel.
 - ◆ Providing medical treatment/first aid.
 - ◆ Providing ambulance service to injured personnel.
- Planned Emergency Exposure Limit (PEEL) for life saving is 75 rem EDE.

4.0 ACCIDENT MITIGATION EMERGENCY EXPOSURE CRITERIA

- Any and all actions necessary to mitigate an accident, including, but not limited to:
 - ◆ Performance of actions to prevent immediate deterioration of the plant status.

NUCLEAR COMMON

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Rev. 17

NC.EP-EP.ZZ-0304(Q)

ATTACHMENT 3 SELECTION AND AUTHORIZATION FOR EMERGENCY EXPOSURES Page 3 of 5

- ◆ Performance of actions to cause significant reduction of onsite or offsite radiological hazards.
- Planned Emergency Exposure Limit (PEEL) for accident mitigation is 25 rem EDE.
- Emergency Exposure should be voluntary.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Parent Question: Bryon 2019 RO72 (October exam)

EXAMINATION ANSWER KEY

NRC 2019-2

72

ID: 2019 NRC-2 Q 72

Points: 1.00

Units 1 and 2 are at 100% power.

- A leak must be repaired on a pipe in the Aux. Bldg. pipe tunnel.
- The general area dose rate in the location of the repair is 600 mR/HR.
- The worker must transit through a 6 R/HR high radiation area for 2 minutes, perform the repair, and RETURN via the same path.
- The worker currently has an accumulated annual dose of 400 mR.

Calculate the MAXIMUM allowable time that the worker can participate in the repairs AT THE JOB SITE and NOT exceed the Current Annual TEDE Administrative Dose Control Level IAW RP-AA-203, EXPOSURE CONTROL AND AUTHORIZATION.

- A. 70 minutes
- B. 120 minutes
- C. 140 minutes
- D. 160 minutes

Answer: B

Answer Explanation
Explanation:
A) Incorrect. Answer is based on an Administrative Dose Control Level of 1500 mR instead of a 2000 mR limit.
B) Correct. The TEDE Administrative Dose Control Level is 2000 mrem annually. The operator possesses 400 mR already + will receive 400 mR during 4 minutes of transiting a 6 R/HR field and therefore will be limited to 120 minutes in a 600 mR/HR field to conduct the repairs.
C) Incorrect. Answer is plausible for a 2000 mR/YR limit, but only considers transiting in one direction.
D) Incorrect. Answer is plausible for a 2000 mR/YR limit, but forgets to include transit time or the operators previously accrued dose.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

72

15-028

Points: 1.00

Given:

- An Equipment Operator is needed to place a Cation Bed Demineralizer in service.
- Radiological readings in the area are 1100 mR/hr.

In accordance with RP-AA-460, Controls for High and Very High Radiation Areas, which ONE of the following completes both statements?

1. The radiological posting requirement for this area is __ (1) __.
 2. Personnel entering this area will require __ (2) __ RP coverage.
-
- A. 1) High Radiation Area
2) continuous
 - B. 1) High Radiation Area
2) periodic
 - C. 1) Locked High Radiation Area
2) periodic
 - D. 1) Locked High Radiation Area
2) continuous

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: D

Explanation / Justification:

- A. Incorrect. Part 1 is incorrect. Plausible if the operator believes that greater than 1000 mR/hr is the posting requirement for a High Radiation Area (HRA). Part 2 is correct.
- B. Incorrect. Part 1 is incorrect. Plausible if the operator believes that greater than 1000 mR/hr is the posting requirement for a High Radiation Area (HRA). Part 2 is incorrect. Plausible because the operator may believe the posting is a HRA and the RP coverage would only require periodic surveillance.
- C. Incorrect. Part 1 is correct. Part 2 is incorrect. Plausible is the operator believes that the RP coverage for the area is periodic and not continuous.
- D. Correct. IAW RP-AA-460 step 4.2, LHRA is defined as dose rates > 1000 mR/hr @ 30 cm. Step 4.2.5 states access into this area requires continuous surveillance/coverage

Technical References:

RP-AA-460 (R20) & RP-AA-376 (R10)

Proposed References to be provided:

None

Learning Objective:

NOS05RADCON-06, Objective 4. Describe the following posting requirements, as well as any applicable restrictions: Locked High Radiation Area

Question Source:

New

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.12 / 45.9 / 45.10

Level:

RO

Category/System:

15-Radiation Control

K/A #:

G2.3.12

Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, access to locked high radiation areas, aligning filters, etc.

Importance:

3.2

Tier/Group

Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the candidate is being asked knowledge of radiological postings for a room with a dose rate > 1 R/hr and the required RP coverage to access this area.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

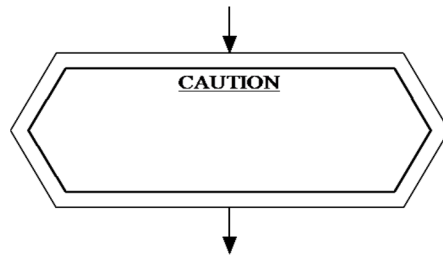
73

14-052

Points: 1.00

Given:

- The crew has just entered 2-EOP-FRSM-1, Response to Nuclear Power Generation – ATWS.
- The below Caution symbol appears prior to step 1.



In accordance with OP-SA-108-101-2002, Emergency Operating Procedure User's Guide, which ONE of the following completes the statement?

Because the Caution appears before step 1, the Caution _____.

- A. provides no instruction or operator action, only information to support the operator action
- B. applies only to step 1
- C. applies to step 1 and may apply to subsequent procedure steps
- D. informs the operator of an action that must be taken if conditions are met at any time while in the procedure

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. Plausible if the operator believes this is the description of a Caution but it is a description of a Note used in EOPs.
- B. Incorrect. Plausible if the operator believes this is a Caution symbol (single border) versus a Continuous Caution symbol (double border). This Caution will only apply to the step it proceeded and not throughout the EOP.
- C. Correct. IAW OP-SA-108-101-2002 section 2.15 (Notes and Cautions), Cautions contain information about potential hazards to personnel or equipment. They also advise on action or transitions which may become necessary depending on changes in plant conditions. Based on the symbol (double borders) in the stem, this is a Continuous Caution. Per step 2.15.12, a Continuous Caution which precedes the first operator action step may also apply to the entire EOP guideline.
- D. Incorrect. Plausible if the operator believes this is the description of a Caution, but it is a description of a continuous action step used in EOPs.

Technical References:

OP-SA-108-101-2002 (R0)

Proposed References to be provided:

None

Learning Objective:

NOS05RADCON-06, Objective 4. Describe the following posting requirements, as well as any applicable restrictions:
Locked High Radiation Area

Question Source:

Bank – Diablo Canyon 2016 NRC RO67

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.10 / 45.13

Level:

RO

Category/System:

14-Emergency Procedures/Plan

K/A #:

G2.4.17

Knowledge of EOP terms and definitions.

Importance:

3.9

Tier/Group

Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the candidate is being asked knowledge of terms and definitions used in Salem EOPs. In this case, the operator is being asked how Caution steps apply in EOPs.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional References: OP-SA-108-101-2002

OP-SA-108-101-2002

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EMERGENCY OPERATING PROCEDURE USER'S GUIDE

Rev: 0

2.15 Notes and Cautions:

2.15.1. Certain special information is also presented. This information is of two types:

- NOTES contain administrative or advisory information which supports operator action.
- CAUTIONS contain information about potential hazards to personnel or equipment. They also advise on actions or transitions which may become necessary depending on changes in plant conditions.

2.15.2. CAUTIONS shall precede the step to which they apply, and shall be placed on the same page or sheet as the step to which they apply. The Caution symbol is shown below.

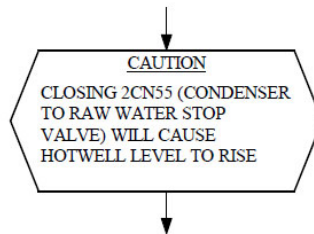


Figure 3

2.15.3. A **CONTINUOUS CAUTION** applies from the point at which it is encountered through the remainder of the EOP. The Continuous Caution symbol has double borders, as shown below. The use of Continuous Cautions should be minimized.

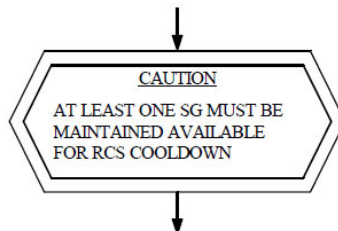


Figure 4

2.15.4. Cautions are always numbered within the step numbering scheme.

2.15.5. NOTE is used to present advisory or administrative information necessary to support or clarify the following action instruction. A NOTE may also be used to provide a contingent transition based on changes in plant conditions.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

74

14-053

Points: 1.00

Given:

- You are the assigned Primary Communicator.
- At time 1330, the Shift Manager declared an ALERT on Unit 2.
- At time 1335, the Shift Manager completed the Initial Contact Message Form (ICMF) and hands it to you to perform the State and Local notifications.

In accordance with EP-SA-325-F6, Primary Communicator Log, which ONE of the following completes both statements?

1. What time are the notifications to NJ and DE required to be completed by?
 2. When does the notification time end?
- A. 1) 1345
2) When the contacted organization is provided ALL information from the ICMF.
- B. 1) 1345
2) When the contacted organization is provided the Emergency Classification Level ONLY.
- C. 1) 1350
2) When the contacted organization is provided the Emergency Classification Level ONLY.
- D. 1) 1350
2) When the contacted organization is provided ALL information from the ICMF.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: B

Explanation / Justification:

- A. Incorrect. First part is correct. Second part is incorrect, only the Emergency Level Classification needs to be provided. Plausible because the operator may believe that the entire ICMF needs to be read.
- B. Correct. IAW EP-SA-325-F6, the notification must be completed within 15 minutes from the declared emergency. In this case, the ALERT was declared at 1330, therefore, the notifications must be completed by 1345. The notification ends when the contacted organization is provided the Emergency Classification Level.
- C. Incorrect. First Part is incorrect. Same reason as Ans. B. Second Part is correct. Plausible if the operator believes that the notification time starts from when the SM hands the ICMF to the communicator.
- D. Incorrect. First Part is incorrect. Same reason as Ans. B. Second Part is incorrect same reason as Ans. B. Plausible because the operator may believe that the entire ICMF needs to be read.

Technical References:

EP-SA-325-F6 (R9)

Proposed References to be provided:

None

Learning Objective:

NEPCOMMDTYQG, B.3 Demonstrate a satisfactory level of knowledge by discussing each item with a Subject matter Expert designated to evaluate the task. 3) List all time requirements for the following status reports: Initial Contact Message Form

Question Source:

Bank - Salem

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.10 / 45.11

Level:

RO

Category/System:

14-Emergency Procedures/Plan

K/A #:

G2.4.39

Knowledge of RO responsibilities in emergency plan implementation.

Importance:

3.9

Tier/Group

Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the operator is being tested on the knowledge of performing Primary Communicator duties IAW EP-SA-325-F6 during an emergency.

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

75

14-054

Points: 1.00

Given:

- An ALERT has been declared on Unit 2.
- You are the Primary Communicator.
- You are directed to perform the State and Local notifications.

Which ONE of the following is the **preferred** or primary communication method?

Note: NETS – Nuclear Emergency Telecommunications System
NAWAS – North America Warning Alert System (DE only)
EMRAD – Emergency Radio (NJ only)
ESSX -1 – PSEG microwave phone system

- A. Radios (EMRAD and NAWAS)
- B. ESSX-1 phone
- C. NETS phone
- D. Satellite phone

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Answer: C

Explanation / Justification:

- A. Incorrect. Plausible because use of radios (NAWAS and EMRAD) is used as the backup to NETS.
- B. Incorrect. Plausible because the ESSX-1 is a microwave private phone system operated by PSEG and serves as the secondary means to the NETS phones..
- C. Correct. IAW EP-SA-325-F6, Primary Communicator Log, and NEPOVERVIEW, EP Overview, the primary communicator will use the NETS phone first, then use either ESSX 1 or DID system phones, then NAWAS radio for DE and EMRAD radio for NJ
- D. Incorrect. Plausible because Satellite phone is the last option if all other communications are unavailable.

Technical References:	EP-AA-325-F6 (R11), NEPOVERVIEW (R12)
Proposed References to be provided:	None
Learning Objective:	None
Question Source:	New
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.10 / 45.13
Level:	RO
Category/System:	14-Emergency Procedures/Plan
K/A #:	G2.4.43
	Knowledge of emergency communications systems and techniques.
Importance:	3.2
Tier/Group	Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the candidate is being asked knowledge of how the notification to the States are performed using the communication systems on the island and the preferred or primary communications used. .

RO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev. 1)

Additional Reference:

C. ESSX and Dimension/Direct Inward Dial (DID)

1. These systems provide the secondary means of communication to the New Jersey and Delaware states and counties over commercial telephone lines.
2. These telephones are placed at strategic locations throughout the emergency facilities.
3. ESSX 1 is also a privately controlled exchange that PSE&G operates with its own microwave signal system.
 - a. This system is also independent of local phone service since each circuit is independently wired. The microwave signal is generated from corporate facilities in Newark, NJ, and separated from any local effects of weather or telephone use.
 - b. The numbers are (973) 430-XXXX, the same as Newark exchanges.
 - c. The exchange is accessible from other exchanges, but circuits are located only in PSEG facilities. The ESSX 1 system is considered the primary backup for the NETS system and acts as a backup system for NETS in the PSEG internal communications network.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

76

10-113

Points: 1.00

Given:

At time 1000;

- A Reactor Trip First Out annunciator is in alarm with the reactor at power.
- The reactor did NOT trip.
- The crew entered 1-EOP-FRSM-1, Response to Nuclear Power Generation - ATWS.

At time 1010;

- Power Range NIS are indicating 5.2%.
- Intermediate Range Startup Rate is -0.19 DPM.
- OHA D-36, RCP VIB HI, is LIT.
- PO reports 11 RCP motor flange vibration is at 6 mils and stable.

Which ONE of the following completes both statements in accordance with 1-EOP-FRSM-1?

Based on the above conditions, 11 RCP ____ (1) ____ be stopped because ____ (2) ____.

- A. 1. should NOT
 2. RCP operation will ensure thorough mixing of boron in the core
- B. 1. should NOT
 2. RCP operation can provide temporary core cooling during voided RCS conditions
- C. 1. should
 2. RCP trip criteria have been met
- D. 1. should
 2. the remaining RCPs would provide adequate heat removal

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: B

Explanation / Justification:

- A. Incorrect. Part 1 is correct. Part 2 is incorrect. Plausible because stopping an RCP could result in boron stratification in the inactive RC loop which could cause lower boron RCS to backflow into the core and adding positive reactivity.
- B. Correct. Per 1-EOP-FRSM-1 Caution C1-1, RCPs should not be tripped with reactor power greater than 5%. During an ATWS, RCP operation could be beneficial by temporarily cooling the core under voided RCS conditions. If reactor power is > 5%, the RCP should not be tripped even if all normal running conditions are not satisfied. Manually tripping the RCP during some ATWS events could result in reduced heat removal and a challenge to fuel integrity. Based on the stem, 11 RCP trip criteria is met due to exceeding abnormal parameter for motor flange vibration > 5 mils and therefore, should not be stopped since reactor power is still greater than 5%.
- C. Incorrect. Part 1 is incorrect. Part 2 is incorrect. Plausible because the motor flange vibration does exceed the RCP trip criteria of > 5 mils motor flange vibration and the SRO could believe the RCP should be tripped to prevent excessive motor and shaft vibration to damage the seals and potential loss of inventory.
- D. Incorrect. Part 1 is incorrect. Part 2 is incorrect. Plausible because the motor flange vibration does exceed the RCP trip criteria of > 5 mils motor flange vibration and the SRO could believe the RCP can be tripped with the remaining RCPs running will provide sufficient RC flow with the reactor subcritical (negative SUR).

Technical References:

1-EOP-FRSM-1 (R40)

Proposed References to be provided:

None

Learning Objective:

NOS05FRSM00-05, Objective 5. Determine the indications that are monitored to ensure proper system/component operation for each step in: Response to Nuclear Power Generation

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.10 / 43.1 / 45.13

Level:

SRO

Category/System:

10-Anticipated Transient Without Scram

K/A #:

EPE 29 G2.4.18

Knowledge of the specific bases for EOPs.

Importance:

4.0

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the question requires the SRO to assess plant conditions and determine if the RCP can be stopped based on the knowledge of EOP bases for the Caution step to stop RCPs when power is > 5%.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

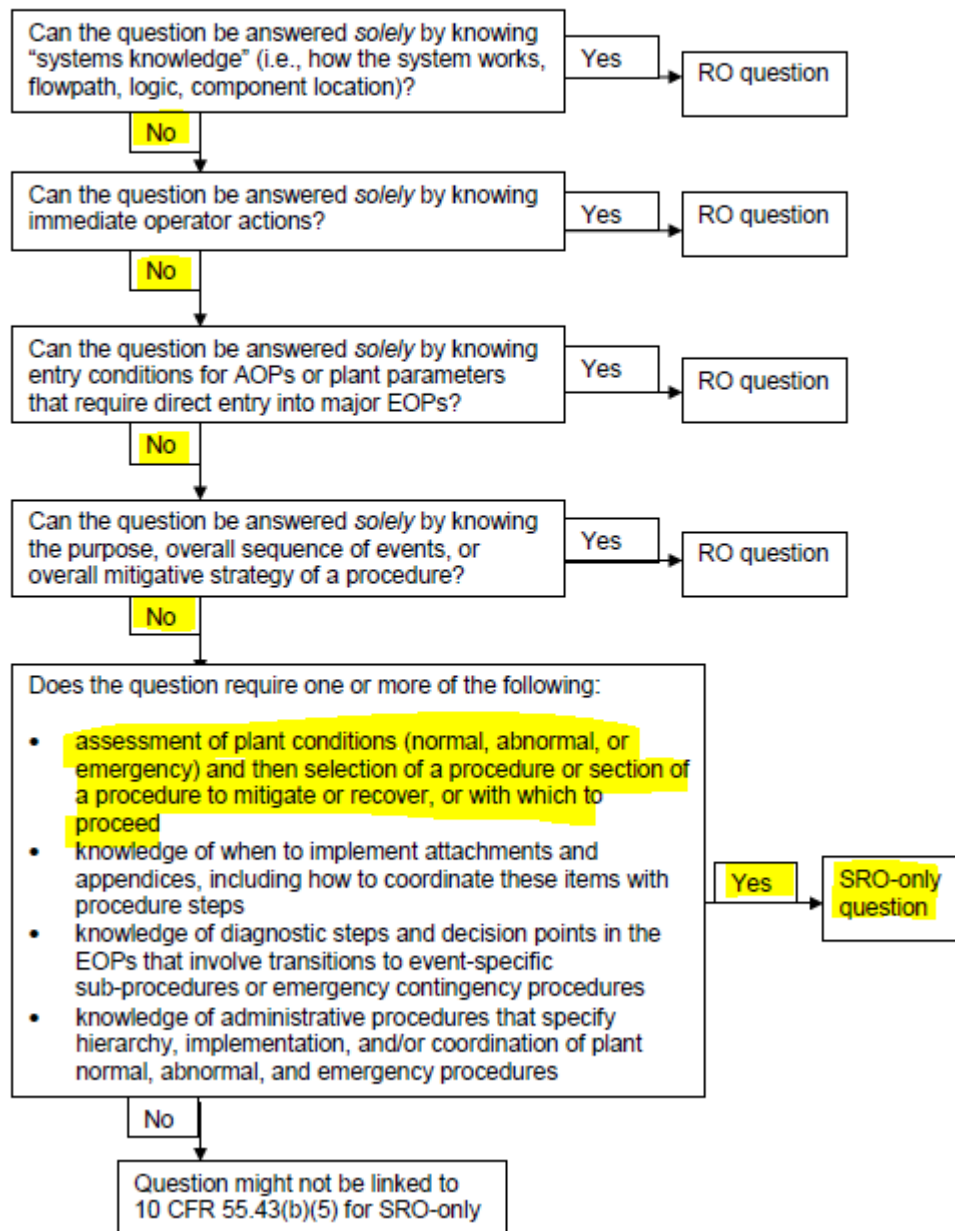
SRO Match Justification:

ES-401

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Attachment 2

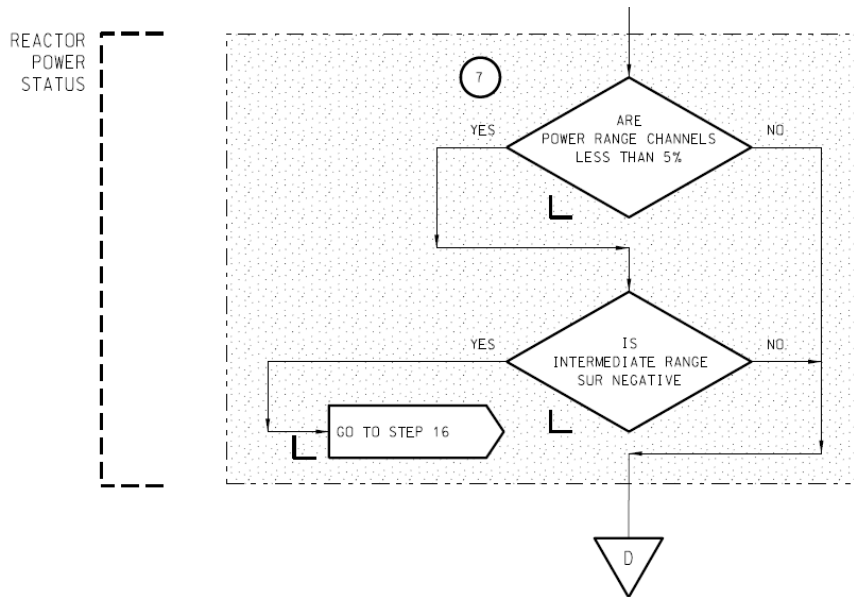
Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional References: (1-EOP-FRSM-1, Sheet 2)



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

77

10-114

Points: 1.00

Given:

- BOTH Units were at 100% Power when a Loss of Offsite and ALL AC Power occurs.
- Both crews enter EOP-LOPA-1, Loss of All AC Power.
- The RO on Unit 2 reports that the 2A and 2B control air headers are indicating 20 psig and lowering.
- The crew is at step 17.2, **ARE SG MS10s (RELIEF VALVES) OPERABLE FROM THE CONTROL ROOM.**

Which ONE of the following describes how the CRS will proceed and what is the MAXIMUM cooldown rate?

- A. 1) Manually open MS10s from the control room.
 2) 50 °F/hr.
- B. 1) Locally open MS10s from the field.
 2) 50 °F/hr.
- C. 1) Manually open MS10s from the control room.
 2) 100 °F/hr.
- D. 1) Locally open MS10s from the field.
 2) 100 °F/hr.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: C

Explanation / Justification:

- A. Incorrect. Part 1 is correct. Part 2 is incorrect. Plausible because the 50 °F/hr cooldown rate is used in other EOPs (For example, step 3 of EOP-TRIP-6, Natural Circulation Without RVLIS). The applicant may believe that the 50 °F/hr cooldown rate is required based on the limiting the cooldown with the plant in a Loss of all AC power condition, as well as considering the effects of a rapid cooldown on damaging the RCP seals.
- B. Incorrect. Part 1 is incorrect. Plausible because there are actions in procedures to operate the MS10s locally when a loss of instrument air is lost. Part 2 is incorrect. Plausible because the 50 °F/hr cooldown rate is used in other EOPs (For example, step 3 of EOP-TRIP-6, Natural Circulation Without RVLIS). The applicant may believe that the 50 °F/hr cooldown rate is required based on the limiting the cooldown with the plant in a Loss of all AC power condition, as well as considering the effects of a rapid cooldown on damaging the RCP seals.
- C. Correct. Loss of all control air will cause both CA330s to fail close isolating air to containment. The MS10's controls are available with DC battery power (also requires vital instrument power which is available from inverters via batteries). Each MS10 has bottle rack with four bottles of nitrogen at greater than or equal to 2000 psig. *A regulator reduces pressure to 20% less than normal operating pressure to maintain tank inventory until needed. On loss of control air, nitrogen will be supplied for control and to air operator. Bottle rack capacity designed for minimum of 72 hours of MS10 operation. Individual nitrogen bottles can be changed out to extend time until manual operation required. IAW 2-EOP-LOPA-1, step 17.2, the cooldown rate will not exceed 100 °F/hr.
- D. Incorrect. Part 1 is incorrect. Plausible because there are actions in procedures to operate the MS10s locally when a loss of instrument air is lost. Part 2 is correct. See Ans. C for further explanation.

Technical References:

EOP-LOPA-1, Rev 40, NOS05CONAIR, S2.OP-AB.CA-0001

Proposed References to be provided:

None

Learning Objective:

NOS05LOPA00, Objective 10, Given a specific step from the EOP-LOPA-1, determine the indications that are monitored to ensure proper system/component operation

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

43.5 / 45.13

Level:

SRO

Category/System:

10-Station Blackout

K/A #:

EPE 55 EA2.04

Ability to determine and interpret the following as they apply to a Station Blackout: Instruments and controls operable with only dc battery power available.

Importance:

4.1

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate requires knowledge of the impact on PZR PORV and SG Atmospheric Dump Valve availability to operate from the control room during a LOPA in conjunction with a loss of instrument air..

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

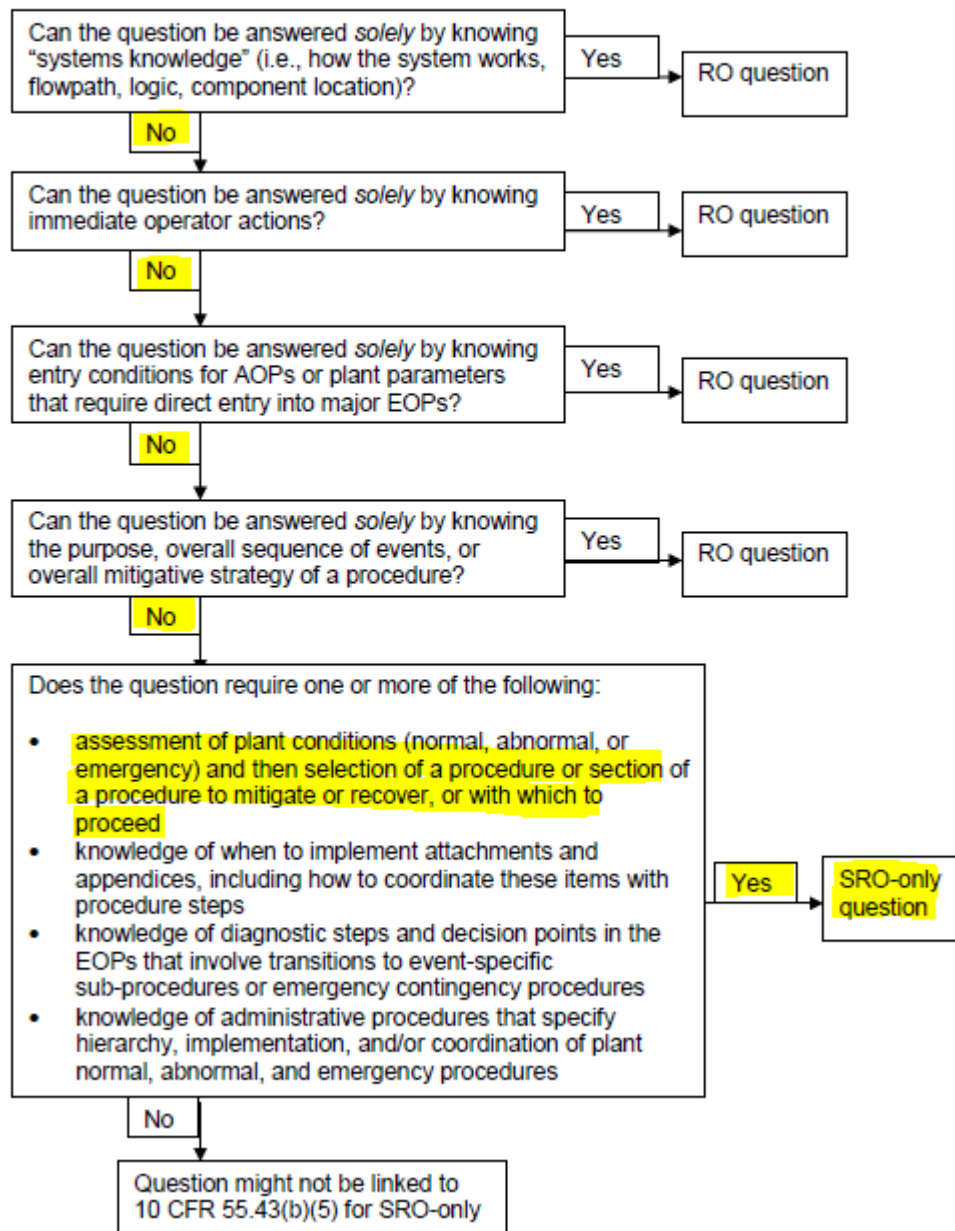
SRO Match Justification:

ES-401

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Attachment 2

Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference: (from EOP-LOPA-1 Bases, Step 17, Rev 40)

The MS10 controllers contain Lunkenheimer valves, which can swap between CA-A and CA-B headers to supply air to their associated valves. Therefore, for a loss of an air header due to failure of one unit's emergency air compressor, the other air header (which is supplied from the opposite unit's emergency air compressor) should provide sufficient air pressure to operate these valves. Refer to validation comment VA-625.

FLEX Mechanical Connections DCP added an additional source of pressure (nitrogen) for MS10 control to allow continued operation of the valves from the control room in the event a total loss of control air occurs due to an extended loss off all AC power event that affects both unit 1 and unit 2.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

78

11-158

Points: 1.00

Given:

- Unit 2 refueling is in progress.
- 2N31 is Operable and selected to the Audio Count Rate Drawer.
- 2N32 is Operable.
- BOTH channels of Gamma-Metrics are out of service for testing.
- Subsequently, a loss of 2A 115V Vital Instrument Bus occurs.

In accordance with Technical Specification, which ONE of the following describes if CORE ALTERATIONS can recommence and the reason why?

- A. YES, when EITHER Gamma-Metric channel is restored to OPERABLE status.
- B. YES, when ONLY both Gamma-Metric channels are restored to OPERABLE status.
- C. NO, because Gamma-Metric channels are only used for post-accident monitoring.
- D. NO, because Gamma-Metric channels are not backed up by an emergency power source.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: A

Explanation / Justification:

- A. Correct. Loss of the 2A 115 VAC Instrument Bus will render 2N31 Source Range NIS channel Inoperable. When power to 2N31 is lost, refueling would be suspended until the CRS determines if the required Source Range channels are Operable to continue refueling activities. IAW Technical Specification bases for LCO 3.9.2.2, any combination of NIS source range neutron flux monitors and/or Gamma-Metrics post-accident neutron flux monitors may be used to satisfy the LCO. Two of the four total source range neutron flux monitors are required to be Operable. In this case, only one operable Gamma-Metric channel is required to be restored to operable status and can be substituted for the Inoperable 2N31 SR channel meeting the requirements for two SR/Gamma-Metric channels being Operable and core alterations or refueling can recommence.
- B. Incorrect. Plausible if the operator believes that the TS bases requires both Gamma-Metric channels operable to satisfy an Inoperable SR channel. Only two of the four source range neutron flux monitors and Gamma-Metric channels needs to be Operable.
- C. Incorrect. The Gamma-Metric channels are used for post-accident monitoring of neutron flux, but TS 3.9.2 bases allows for the use Gamma-Metric channels to substitute for a SR channel. This is plausible because the operator may incorrectly believe that the Gamma-Metric channels can only be used for post-accident monitoring and cannot be used to satisfy TS 3.9.2.2 requirements.
- D. Incorrect. Plausible if the operator believes that Gamma-Metric channels are not supplied from an emergency backup source (Inverter or EDG) and therefore cannot be used to satisfy TS 3.9.2.2 requirements. The Gamma-Metric channels are supplied from 115 VAC Vital Instrument Power which is backed up by batteries and the associated EDG.

Technical References:

Proposed References to be provided:

Learning Objective:

Technical Specification TS 3.9.2.2 & Bases

None

NOS05TECHSPEC-14, Objective 11. Describe the general component and parameter categories that are addressed by Technical Specification Sections 3/4.1 through 3/4.12.

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 41.7 / 43.2

Level:

SRO

Category/System:

11-Loss of Vital AC Instrument Bus

K/A #:

APE 57 G2.2.25

Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

Importance:

4.2

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is required to know the basis for TS 3.9.2.2 and also know minimum operability requirements that supports the basis.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

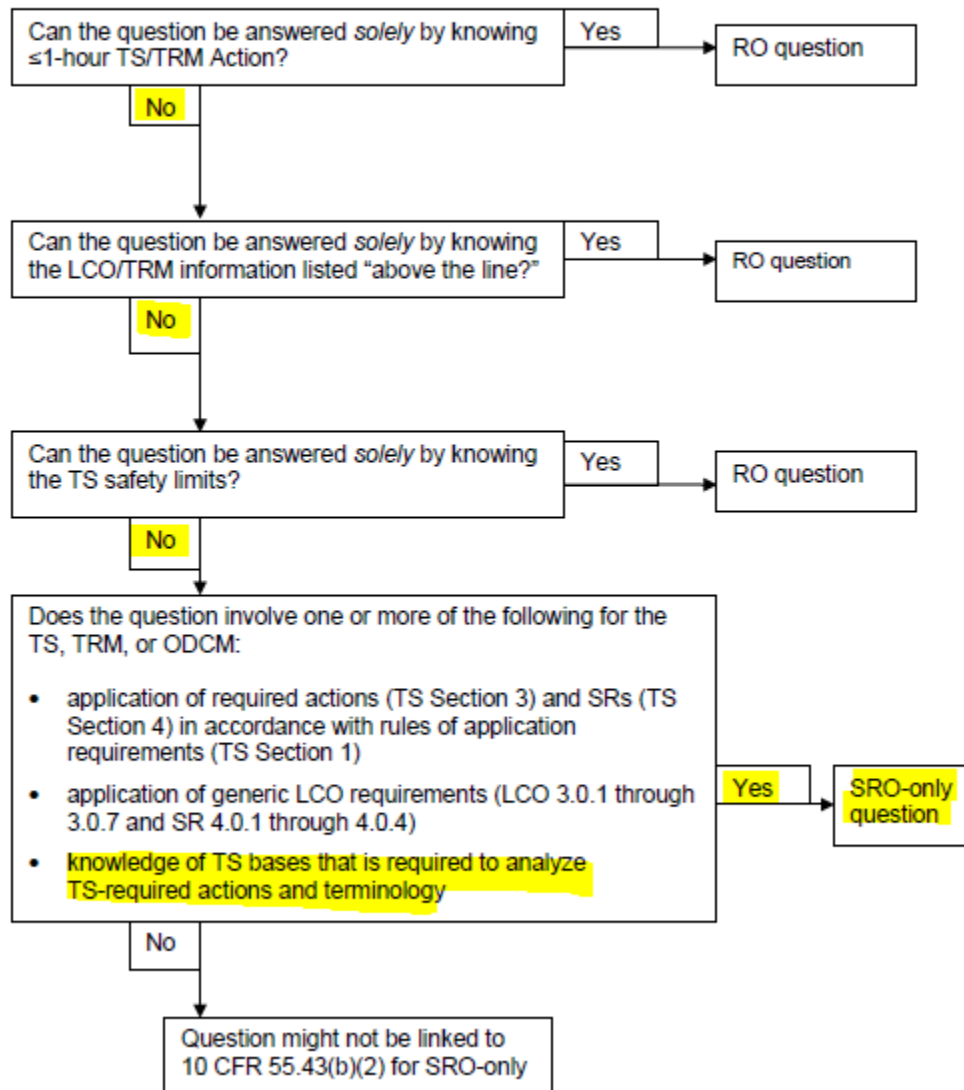
SRO Match Justification:

ES-401

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Attachment 2

Figure 2-1 Screening for SRO-Only Linked to 10 CFR 55.43(b)(2)
(Technical Specifications)



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference: Unit 2 Technical Specification TS 3.9.2.2

REFUELING OPERATIONS

3/4.9.2 INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.9.2.2 Two source range neutron flux monitors shall be OPERABLE.

APPLICABILITY: MODE 6.

ACTION:

- a. With one of the above required monitors inoperable, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity additions.
- b. With both of the required monitors inoperable; immediately suspend all operations involving CORE ALTERATIONS, positive reactivity additions, and initiate action to restore one source range monitor to OPERABLE status; and perform Surveillance Requirement 4.9.1 once per 12 hours.
- c. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.2.2 Each source range neutron flux monitor shall be demonstrated OPERABLE by performance of:

- a. A CHANNEL CHECK in accordance with the Surveillance Frequency Control Program, and

-----NOTE-----
Neutron detectors are excluded from CHANNEL CALIBRATION

- b. A CHANNEL CALIBRATION in accordance with the Surveillance Frequency Control Program.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference: Salem TS Bases for 3.9.2.2

3/4.9.2.2 INSTRUMENTATION

The source range neutron flux monitors are used during refueling operations to determine the core reactivity condition. Two OPERABLE source range neutron flux monitors are required to

SALEM - UNIT 2

B 3/4 9-1b

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(PSEG Issued)

3/4.9 REFUELING OPERATIONS

BASES

alert the operator to unexpected changes in core reactivity, such as a boron dilution event. This ensures that redundant monitoring capability is available to detect changes in core reactivity. Based on isolating all boron dilution paths per LCO 3.9.2.1, only the source range neutron flux monitor visual indication in the control room is required for OPERABILITY.

Any combination of NIS source range neutron flux monitors and/or Gamma-Metrics post-accident neutron flux monitors may be used to satisfy the LCO. Two of the four total source range neutron flux monitors are required to be OPERABLE.

With only one required source range neutron flux monitor OPERABLE, redundancy has been lost. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation.

With no required source range neutron flux monitor OPERABLE, action to restore a monitor to OPERABLE status shall be initiated immediately. With no source range neutron flux monitor OPERABLE, there is no direct means of detecting changes in core reactivity. However, since positive reactivity additions are not to be made, the core reactivity condition is stabilized until the source range neutron flux monitors are OPERABLE. This stabilized condition is confirmed by performing Surveillance Requirement 4.9.1 to ensure that the required boron concentration exists and adequate shutdown margin is maintained.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

79

11-159

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- 2MS132, 23 AFP TURBINE STEAM INLET VALVE, air supply line ruptures.

Based on the above failure, which ONE of the following completes the statement concerning the status of the Turbine Driven Auxiliary Feed Pump and the actions the crew take to mitigate this event?

1. The Turbine-Driven Auxiliary Feed Pump is __ (1) __.
 2. The crew will ____ (2) ____.
-
- A.
 1. shutdown
 2. ONLY enter TS 3.7.1.2, for INOPERABLE AFW Pump because 23 AFW Pump will not respond to any start signals, and repair the airline within 72 hours.
 - B.
 1. shutdown
 2. continue power operations because the TDAFW remains operable due to availability of the opposite train steam supply.
 - C.
 1. running
 2. implement S2.OP-AB.CA-0001, Loss of Control Air, Attachment 12, Local Control of SG Pressure and Level, to locally shutdown 23 AFW Pump.
 - D.
 1. running
 2. reduce turbine load using S2.OP-IO.ZZ-0004, Power Operation, until the reactor thermal overpower condition has cleared

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: D

Explanation / Justification:

- A. Incorrect. Part 1 is incorrect. Plausible if the applicant incorrectly determines that the MS132 fails closed instead of open on loss of air. Part 2 is incorrect. Plausible because this is the correct action (not the only action) for an Inoperable AFW pump, however, the overpower condition must also be addressed first and can be mitigated by performing a load reduction.
- B. Incorrect. Part 1 is incorrect. Plausible if the applicant incorrectly determines that the MS132 fails closed instead of open on loss of air. Part 2 is incorrect. Plausible because the applicant may confuse how the MS132 impacts the steam supply to the TDAFW pump. Steam is supplied from #1 and #3 SGs thru the MS45s. The applicant may believe that the MS132 failure impacts one of the steam supplies and that the other steam supply remains available.
- C. Incorrect. Part 1 is correct. 2MS132 fails open on loss of air. Part 2 is incorrect. Plausible because S2.OP-AB.CA-0001 can be used for a loss of control air, however, this procedure does not provide direction to shutdown 23 AFW pump and only directs local control of 23 AFW pump governor and AF21's.
- D. Correct. IAW S2.OP-AB.CA-0001, Attachment 2, on loss of instrument air the 2MS132 fails open which results in 23 AFW pump running. This will result in cold AFW entering the SGs causing reactor power to rise and exceed the reactor power limit of 3459 MWt (reactor overpower condition). The CRS should direct the crew to reduce turbine load to lower reactor power below the administrative limit using S2.OP-IO.ZZ-0004, Power Operation. Note: S2.OP-AB.LOAD-0001 is used only if turbine load rate is $\geq 5\%/min$ which in this case the crew should not require reducing turbine load at this rate.

Technical References:	S2.OP-AB.CA-0001 (R22), S2.OP-AB.CN-0001 (R31), S2.OP-IO.ZZ-004 (R87)
Proposed References to be provided:	None
Learning Objective:	NOS05ABCA01-08, Objective 2. Describe, in general terms, the actions taken in S2.OP-AB.CA-0001(Q) and the bases for the actions in accordance with the Technical Bases Document Bank – Beaver Valley U1 2016 SRO89
Question Source:	Comprehension/Analysis
Question Cognitive Level:	41.10 / 45.3
10CFR Part 55 Content:	SRO
Level:	11-Loss of Instrument Air
Category/System:	APE 65 G2.4.31
K/A #:	Knowledge of annunciator alarms, indications, or response procedures.
Importance:	4.1
Tier/Group	Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the candidate is being asked knowledge of the abnormal procedure step for loss of control air. In this case, the SRO must know the action required upon the loss of control air to the turbine driven AFW pump per the abnormal procedure and that the CRS should direct lowering

SRO EXAMINATION ANSWER KEY

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reactor power due to cold AFW being supplied to the SGs will result in reactor overpower exceeding the thermal limit of 3459 MWt.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

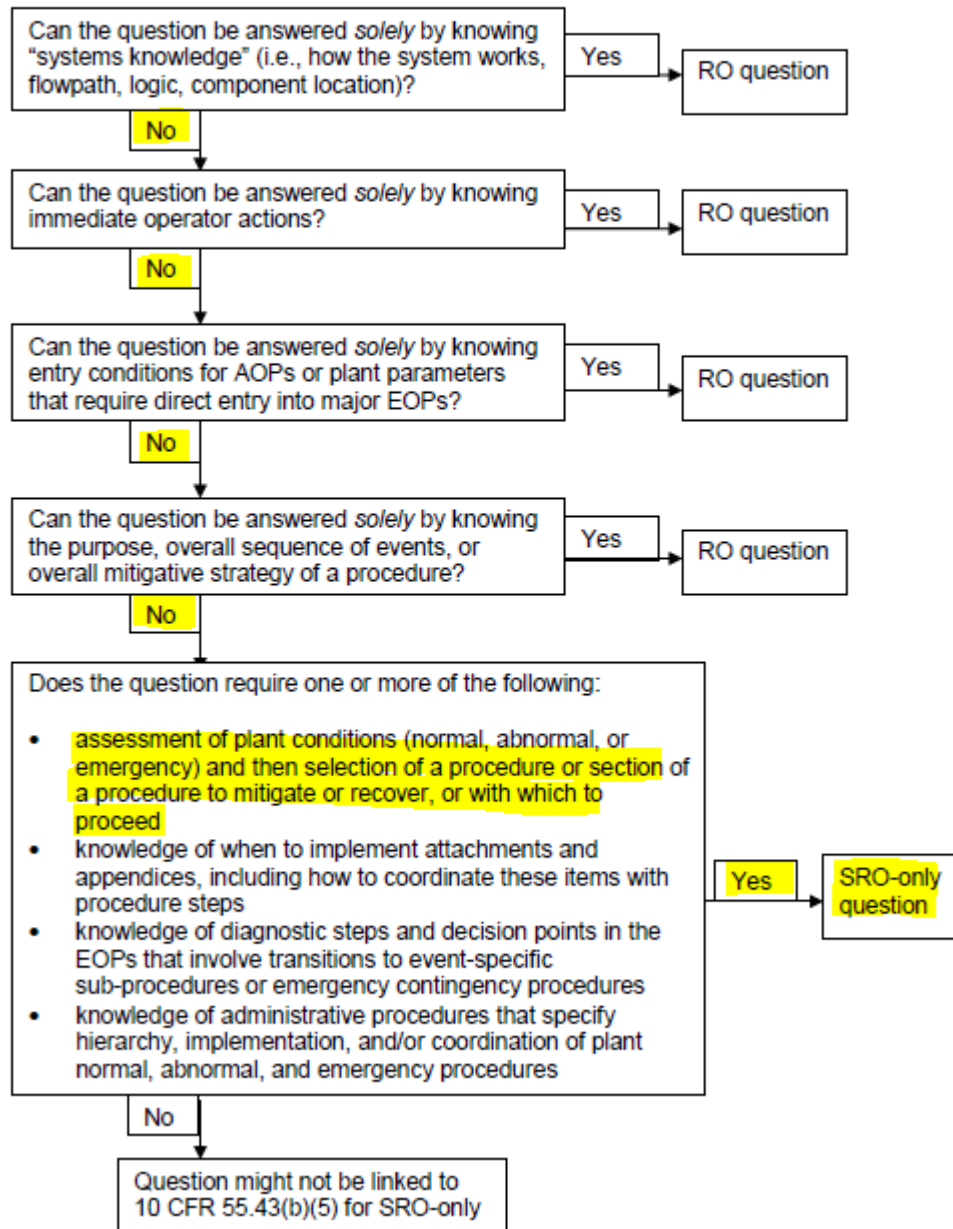
SRO Match Justification:

ES-401

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Attachment 2

Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

80

10-115

Points: 1.00

Given:

- A LOCA has occurred on Unit 2.
- The crew is performing 2-EOP-LOCA-5, Loss of Emergency Recirculation.
- Containment pressure is now 15.1 psig and rising.

Based on the above condition, which ONE of the following describes how the CRS should direct the operation of the Containment Spray Pumps and why?

The Containment Spray Pumps are operated as directed in...

Note: 2-EOP-FRCE-1 – Response to Excessive Containment Pressure
FRPs – Functional Restoration Procedures

- A. 2-EOP-LOCA-5 since FRPs are NOT implemented during performance of LOCA-5.
- B. 2-EOP-LOCA-5 because it establishes minimum required Containment Spray flow to conserve RWST inventory.
- C. 2-EOP-FRCE-1 because restoration of the critical safety function takes precedence.
- D. 2-EOP-FRCE-1 because it uses the same criteria for operating containment spray pumps as LOCA-5.

SRO EXAMINATION ANSWER KEY

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Answer: B

Explanation / Justification:

- A. Incorrect. Transition to FRPs are allowed in EOP-LOCA-5. Plausible in that EOP-LOCA-3 does not allow transition to FRPs during the transfer to cold leg recirculation.
- B. Correct. IAW 2-EOP-FRCE, step C3-1 Caution, if LOCA-5 is in effect, then operation of containment spray pumps should be IAW LOCA-5. LOCA-5 has less restrictive criteria which allows for reducing the number of operating containment spray pumps based on RWST level and CFCUs. The CRS can transition to EOP-FRCE-1, but will follow the direction from LOCA-5 when it comes to the operation of CS pumps.
- C. Incorrect. Plausible because the CRS can transition to EOP-FRCE-1.
- D. Incorrect. Plausible because the CRS can transition to EOP-FRCE-1. EOP-FRCE-1 will establish maximum available heat removal system operation to reduce containment pressure which is in contradiction to LOCA-5 priority to conserve RWST inventory. IAW 2-EOP-FRCE, step C3-1 Caution, if LOCA-5 is in effect, then operation of containment spray pumps should be IAW LOCA-5

Technical References:	2-EOP-LOCA-5 (R40)
Proposed References to be provided:	None
Learning Objective:	NOS05LOCA05-05, Objective 6. Given any step, caution, note, or Continuous Action Summary for LOSS OF EMERGENCY COOLANT RECIRCULATION, describe the basis.
Question Source:	Bank – Salem
Question Cognitive Level:	Comprehension/Analysis
10CFR Part 55 Content:	43.5 / 45.13
Level:	SRO
Category/System:	10-Loss of Emergency Coolant Recirculation
K/A #:	W E11 EA2.1 Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.
Importance:	4.2
Tier/Group	Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the SRO is required to have knowledge of procedure selection or sections of procedures and how to implement those sections to mitigate the event. In this case, the SRO must decide how to operate the CS pumps and the reason why.

SRO EXAMINATION ANSWER KEY

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Additional References: 2-EOP-FRCE-1 Bases Document

2-EOP-FRCE-1, Rev. 40

Response To High Containment Pressure

Basis Document

Page 4

EOP Step No: Caution 3-1

ERG Step No: Caution 3-1

EOP Step:

CAUTION: IF EOP-LOCA-5, LOSS OF EMERGENCY COOLANT RECIRCULATION, IS IN EFFECT, CONTAINMENT SPRAY SHOULD BE OPERATED AS DIRECTED IN EOP-LOCA-5 RATHER THAN STEP 3 BELOW
[CONTAINMENT SPRAY STATUS]

Purpose:

To ensure containment spray pumps are operated as directed in EOP-LOCA-5 instead of this procedure, if EOP-LOCA-5 is in effect.

ERG Basis:

This caution warns the operator that the operation of the containment spray pumps indicated in EOP-LOCA-5 takes precedence over that noted in this step. This procedure specifies maximum available heat removal system operability in order to reduce containment pressure. EOP-LOCA-5 uses a less restrictive criteria, which permits reduced spray pump operation depending on RWST level, containment pressure and number of emergency fan coolers operating. The less restrictive criteria for containment spray operation is used in EOP-LOCA-5 since recirculation flow to the RCS is not available and it is very important to conserve RWST water, if possible, by stopping containment spray pumps.

EOP Basis:

Same as ERG basis.

SRO EXAMINATION ANSWER KEY

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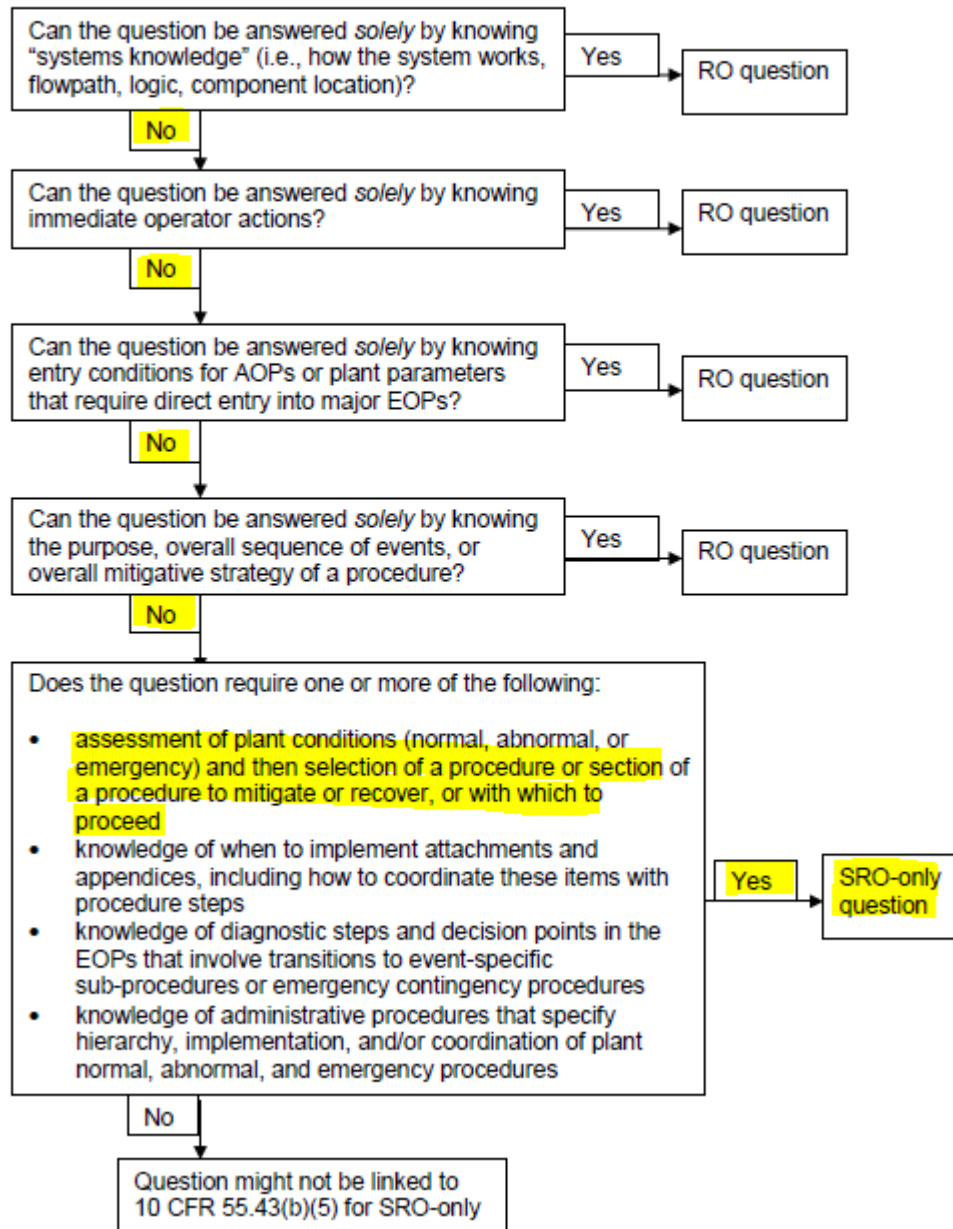
SRO Match Justification:

ES-401

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Attachment 2

Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

81

10-116

Points: 1.00

Given:

- Unit 2 reactor tripped.
- During performance of 2-EOP-TRIP-2, Reactor Trip Response, the crew transitions to 2-EOP-FRHS-1, Loss of Secondary Heat Sink, due to Loss of ALL AFW flow.

Subsequently;

- 21 SGFP is running providing feed flow to 22 SG.
- All SG Narrow Range levels are offscale low.
- 22 SG Wide Range level is slowly rising.

Which ONE of the following completes both statements?

1. In accordance with 2-EOP-FRHS-1, operator actions to establish a heat sink __ (1) __ complete.
2. Transition back to 2-EOP-TRIP-2 __ (2) __ allowed.

- A. 1) are
2) is
- B. 1) are
2) is NOT
- C. 1) are NOT
2) is
- D. 1) are NOT
2) is NOT

Answer: A

Explanation / Justification:

- A. Correct. IAW 2-EOP-FRHS-1, Step 6, if NR level in at least one SG is greater than 9% (15% adverse), then return to procedure in effect; OR, if feed flow is verified to at least one SG by either CETs lowering or WR level rising in one SG, then maintain flow to restore NR to greater than 9% and return to procedure in effect. Per the stem, 22 SG WR level is rising slowly so heat sink has been established in one SG and the CRS can return to EOP-TRIP-2.
- B. Incorrect. First part is correct. Second part is incorrect. Plausible because the SRO may incorrectly interpret Step 6.1 (Maintain flow to restore NR level to greater than 9% [15% adverse]) and believe that although heat sink has been established, FRHS-1 requires the SG NR level to be greater than 9% to exit the procedure.
- C. Incorrect. First part is incorrect. Heat sink has been established. Second part is correct. Plausible because SRO may believe that the heat sink requirements are not met due to insufficient SG levels in one SG, but can exit the procedure because adequate feedflow has been established.
- D. Incorrect. First part is incorrect. Heat sink has been established. Plausible because SRO may believe that the heat sink requirements are not met due to insufficient SG levels. Second part is incorrect. Return to TRIP-2 is allowed based on one SG WR level is rising. Plausible because if the operator believes heat sink is not established, then you cannot exit the procedure per FRHS-1.

Technical References:

2-EOP-FRHS-1 (R40)

Proposed References to be provided:

None

Learning Objective:

NOS05FRHS00-04, Objective 9, Determine the indications that are monitored to ensure proper system/component operation for each step in 2-EOP-FRHS-1 Thru 5.

Question Source:

Bank – Commanche Peak 2016 NRC SRO81

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

43.5 / 45.13

Level:

SRO

Category/System:

10-Loss of Secondary Heat Sink

K/A #:

W E05 EA2.2

Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink): Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

Importance:

3.7

Tier/Group

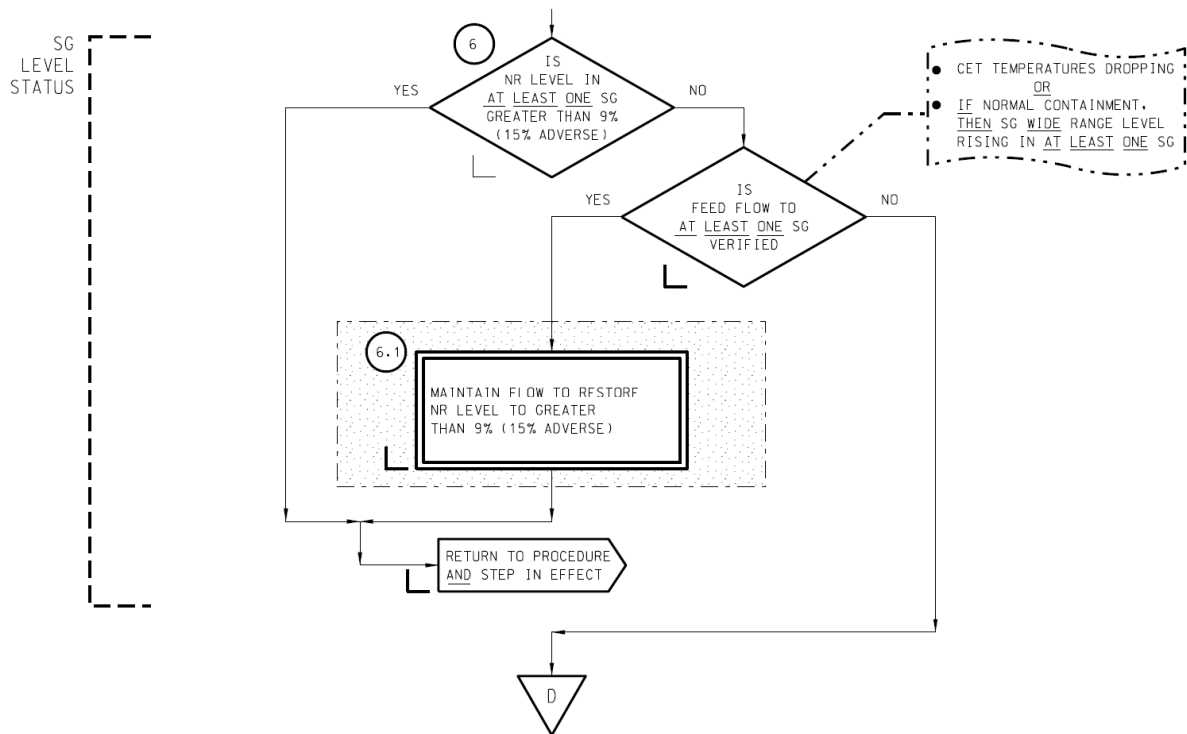
Emergency and Abnormal Plant Evolutions-Tier 1/Group 1

K/A Match: The K/A is matched because the SRO is required to assess plant conditions, determine if a heat sink is established, and then determine whether to return to procedure in effect or continue in 2-EOP-FRHS-1.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional References: 2-EOP-FRHS-1 sheet 2



SRO EXAMINATION ANSWER KEY

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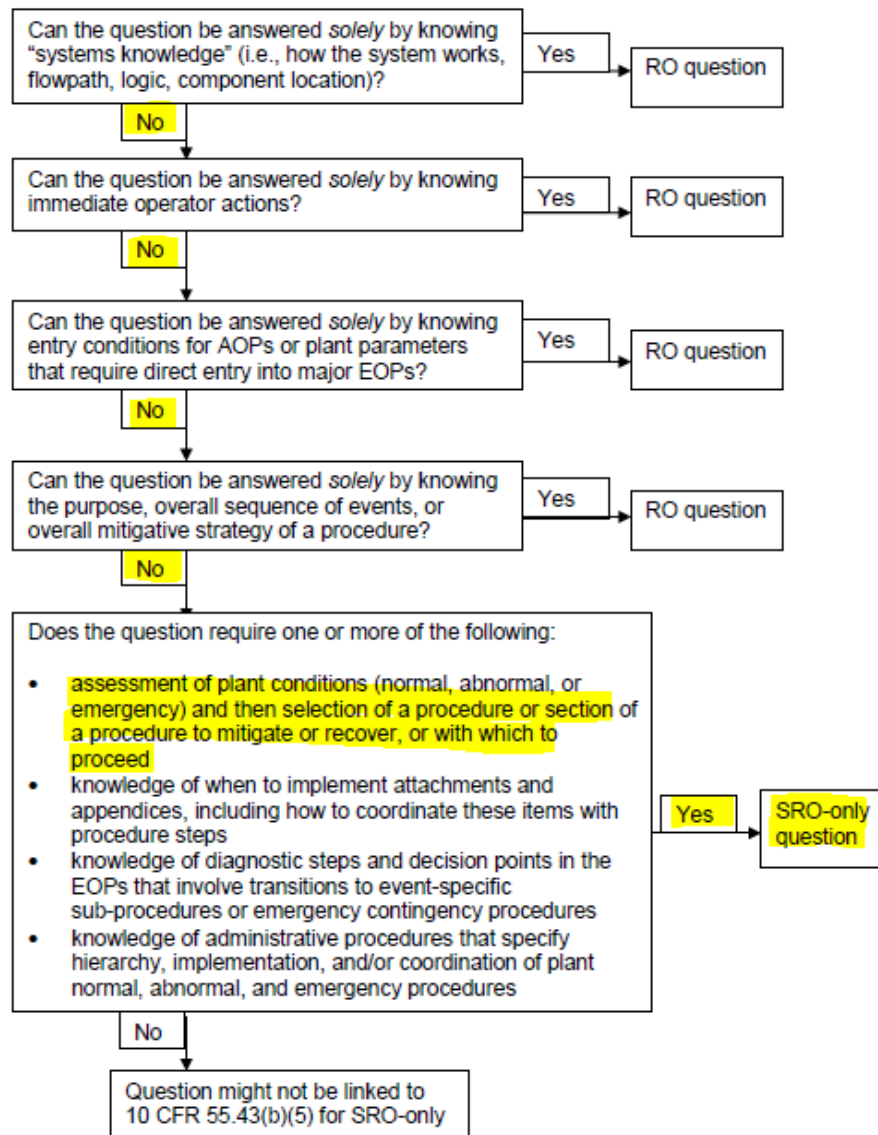
SRO Match Justification:

ES-401

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Attachment 2

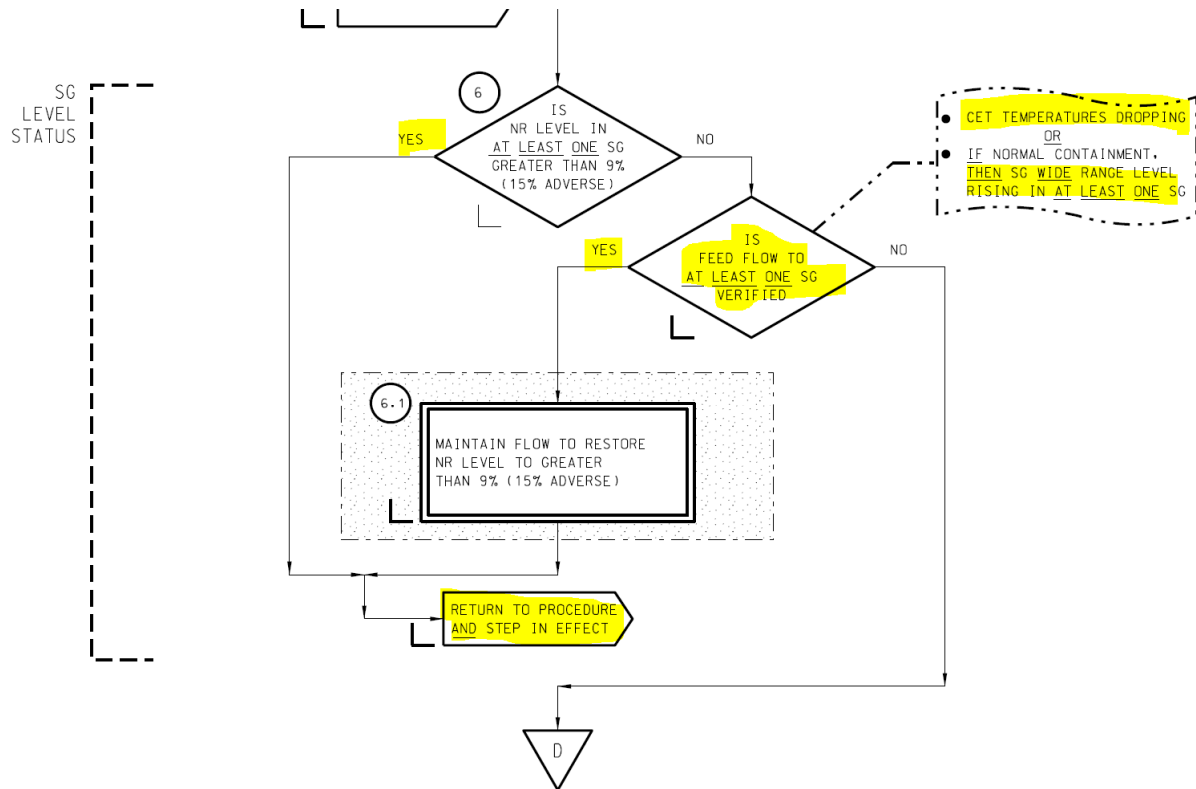
**Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)**



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional References: 2-EOP-FRHS-1 sheet 2



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

82

15-022

Points: 1.00

Given:

- Unit 2 is performing a reactor startup per S2.OP-IO.ZZ-0003, Hot Standby to Minimum Load.
- Reactor power is 1E-4%.

Subsequently, the following sequence of events occur;

- OHA E-6, LOSS OF IR, is LIT.
- 2N35, Intermediate Range (IR) NIS Channel, indicates zero on 2CC2.

In accordance with Technical Specifications LCO 3.3.1.1, Reactor Trip System Instrumentation, which ONE of the following identifies the required action, if any?

[REFERENCE PROVIDED]

Note: RTP – Reactor Thermal Power

- A. Immediately suspend the reactor startup and insert all control rods.
- B. Reduce RTP below P-6 OR raise RTP above P-10 within a maximum of 24 hours.
- C. Reduce RTP below P-6 within a maximum of 2 hours.
- D. No action is required since RTP is below P-6.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: B

Explanation / Justification:

- A. Incorrect. Plausible because the SRO may believe this the conservative action but not required by Tech Specs. Two IR channels inoperable will require the immediate suspension of adding positive reactivity and reducing RTP below P-6 within 2 hours.
- B. Correct. IAW Tech Specs 3.3.1.1 Functional Unit 5, Action 3, with only one IR NIS channel operable and Rx power above P-6 (1E-5% RTP per S2.OP-IO.ZZ-0003), then RTP will need to be reduced to below P-6 OR raise RTP above P-10 within 24 hours
- C. Incorrect. Plausible because the SRO may incorrectly apply the TS action. This action is required for two inoperable IR channels.
- D. Incorrect. Plausible because the SRO may incorrectly apply the TS action. This LCO is not applicable when RTP is below P-6. However, reactor power at 1E-4% is above P-6 (1E-5%)

Technical References:

Tech Specs 3.3.1.1 Action 3

Proposed References to be provided:

Tech Spec 3.3.1.1

Learning Objective:

NOS05ABNIS, Objective 1. Describe the operation of the following as applied to S2.OP-AB.NIS-0001(Q), in accordance with this lesson plan: Intermediate Range Instrumentation

Question Source:

Bank - Salem

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

43.5 / 45.13

Level:

SRO

Category/System:

11-Loss of Intermediate Range Nuclear Instrumentation

K/A #:

APE 33 AA2.08

Ability to determine and interpret the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation:
Intermediate range channel operability.

Importance:

3.4

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the candidate requires knowledge of how to apply TS action statements for when one IR NIS channel fails during Rx startup.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

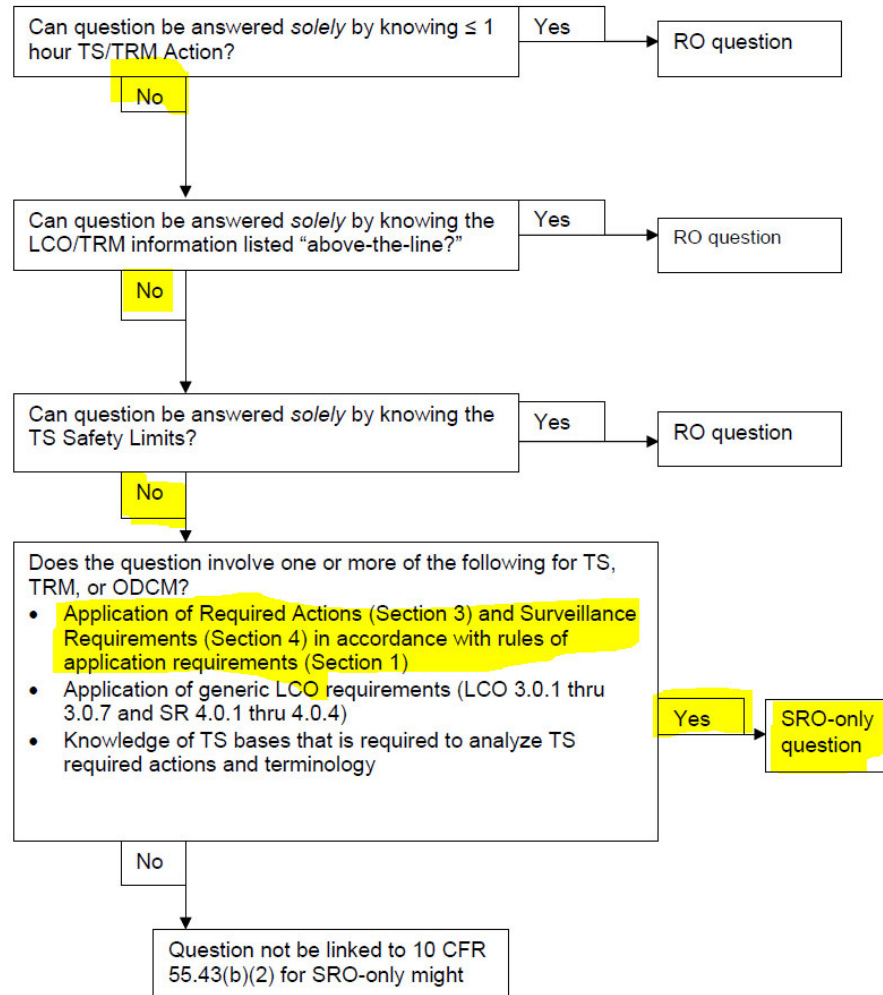
SRO Match Justification:

ES-401

5

Attachment 2

Figure 1: Screening for SRO-only linked to 10 CFR 55.43(b)(2) (Tech Specs)



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference: (TS 3.3.1.1)

TABLE 3.3-1

REACTOR TRIP SYSTEM INSTRUMENTATION

<u>FUNCTIONAL UNIT</u>	<u>TOTAL NUMBER OF CHANNELS</u>	<u>CHANNELS TO TRIP</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABLE MODES</u>	<u>ACTION</u>
1. Manual Reactor Trip	2	1	2	1,2 and *	12
2. Power Range, Neutron Flux	4	2	3	1,2 and 3*	2
3. Power Range, Neutron Flux High Positive Rate	4	2	3	1,2	2
4. Deleted					
5. Intermediate Range, Neutron Flux	2	1	2	1 ^(a) , 2 ^(b)	3
6. Source Range, Neutron Flux					
A. Startup	2	1	2	2 ^(c)	4
B. Shutdown	2	0	1	3,4 and 5	5
C. Shutdown	2	1	2	3*,4* and 5*	7

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference: (TS 3.3.1.1)

TABLE 3.3-1 (Continued)

TABLE NOTATION

(a)	Below the P-10 (Power Range Neutron Flux) interlocks	
(b)	Above the P-6 (Intermediate Range Neutron Flux) interlocks	
(c)	Below the P-6 (Intermediate Range Neutron Flux) interlocks	
*	With the reactor trip system breakers in the closed position and the control rod drive system capable of rod withdrawal.	
**	Limited plant cooldown or boron dilution is allowed provided the change is accounted for in the calculated SHUTDOWN MARGIN	
#	Above the P-9 (Power Range Neutron Flux) interlock.	
###	If ACTION Statement 1 is entered as a result of Reactor Trip Breaker (RTB) or Reactor Trip Bypass Breaker (RTBB) maintenance testing results exceeding the following acceptance criteria, NRC reporting shall be made within 30 days in accordance with Specification 6.9.2:	
1.	A RTB or RTBB trip failure during any surveillance test with less than or equal to 300 grams of weight added to the breaker trip bar.	
2.	A RTB or RTBB time response failure that results in the overall reactor trip system time response exceeding the Technical Specification limit.	

SRO EXAMINATION ANSWER KEY

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Additional Reference: (TS 3.3.1.1)

TABLE 3.3-1 (Continued)

ACTION 3 - With the number of channels OPERABLE:

- a. One less than required by the Minimum Channels OPERABLE requirement
 - 1. Reduce THERMAL POWER to < P-6 within 24 hours or,
 - 2. Increase THERMAL POWER to > P-10 within 24 hours.
- b. Two less than required by the Minimum Channels OPERABLE requirement
 - 1. Immediately suspend operations involving positive reactivity additions** and,
 - 2. Reduce THERMAL POWER to < P-6 within 2 hours.

SRO EXAMINATION ANSWER KEY

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Additional Reference: (TS 3.3.1.1 bases)

The Intermediate Range (IR) Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. This trip Function provides redundant protection to the Power Range (PR) Neutron Flux - Low Setting trip Function. In MODE 1 below the P-10 setpoint, and in MODE 2 above the P-6 setpoint, when there is a potential for an uncontrolled RCCA bank rod withdrawal accident during reactor startup, the IR Neutron Flux trip must be OPERABLE. Above the P-10 setpoint, the PR Neutron Flux - High Setpoint trip function provides core protection for a rod withdrawal accident. In MODE 2 below the P-6 setpoint, the Source Range (SR) Neutron Flux Trip provides core protection for reactivity accidents. In MODE 3, 4, or 5, the IR Neutron Flux trip does not have to be OPERABLE because the control rods must be fully inserted and only the shutdown rods may be withdrawn. The reactor cannot be started up in this condition.

SALEM - UNIT 2

B 3/4 3-1b

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(PSEG Issued)

INSTRUMENTATION

BASES

The 24 hour Action times for one inoperable IR channel allow for a slow and controlled power adjustment above P-10 or below P-6 and take into account the redundant capability afforded by the OPERABLE IR channel and its low probability of failure during this period.

If both IR channels are inoperable with THERMAL POWER between P-6 and P-10, immediate suspension of operations involving positive reactivity additions is required due to loss of all IR trip protection. Normal plant control operations that individually add limited positive reactivity (e.g. temperature or boron fluctuations associated with RCS inventory management or temperature control) are allowed by this Action provided they are accounted for in the calculated SHUTDOWN MARGIN. THERMAL POWER must also be reduced to below P-6 within two hours. This Action time will allow a slow and controlled power reduction to less than the P-6 setpoint and takes into account the low probability of occurrence of an event during this period that may require the protection afforded by the IR Neutron Flux trip.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

83

15-029

Points: 1.00

Given:

- Unit 2 reactor tripped due to a LBLOCA.
- RCS pressure is 60 psig.
- Containment pressure is 30 psig and lowering.
- CETs are 720 °F and lowering.
- 2R44A, Containment High Range, Radiation Monitor is indicating 2020 R/hr.
- 2R44B, Containment High Range, Radiation Monitor is indicating 2010 R/hr.

Which ONE of the following is the correct classification and barrier status?

[REFERENCE PROVIDED]

- A. Site Area Emergency; Loss of 2 barriers Only.
- B. Site Area Emergency; Loss of 1 barrier and Potential Loss of 2nd barrier.
- C. General Emergency; Loss of 2 barriers and Potential Loss of 3rd barrier.
- D. General Emergency; Loss of 3 barriers.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: C

Explanation / Justification:

- A. Incorrect. The classification should be for GE and the barrier status is incorrect since potential loss of 3rd barrier also exists. Plausible if one of the barriers is missed.
- B. Incorrect. . The classification should be for GE and the barrier status is incorrect since two barriers are lost and potential loss of 3rd barrier also exists. Plausible if one of the barriers is missed.
- C. Correct. IAW EP-SA-325-123, Fission Product Barrier Table, with a LBLOCA actuating SI and 2R44A and B reading above 2000 R/hr, then the following EALs apply; FB2.L (Loss 5 points), and RB1.L or RB2.L (Loss 5 points), and CB2.P (Potential 2 points). Total points = 12 point GE with a Loss of 2 barriers and a Potential Loss of 3rd barrier.
- D. Incorrect. 3 barriers have not been lost yet. Plausible if the SRO incorrectly evaluates the barrier status are 3 barriers are lost.

Technical References:	EP-SA-325-123 (R00)
Proposed References to be provided:	EP-SA-325-123
Learning Objective:	NOS05TRP001-09 Objective 20. Given the Salem Event Classification guide, classify the event.
Question Source:	Bank – ANO 1 2017 Retake NRC SRO84
Question Cognitive Level:	Comprehension/Analysis
10CFR Part 55 Content:	41.10 / 43.5 / 45.11
Level:	SRO
Category/System:	15-High Containment Radiation
K/A #:	W E16 G2.4.41
	Knowledge of the emergency action level thresholds and classifications.
Importance:	4.6
Tier/Group	Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the question is asking the SRO to assess plant conditions and using the ECG procedures classify the emergency event and determine the status of the barriers.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

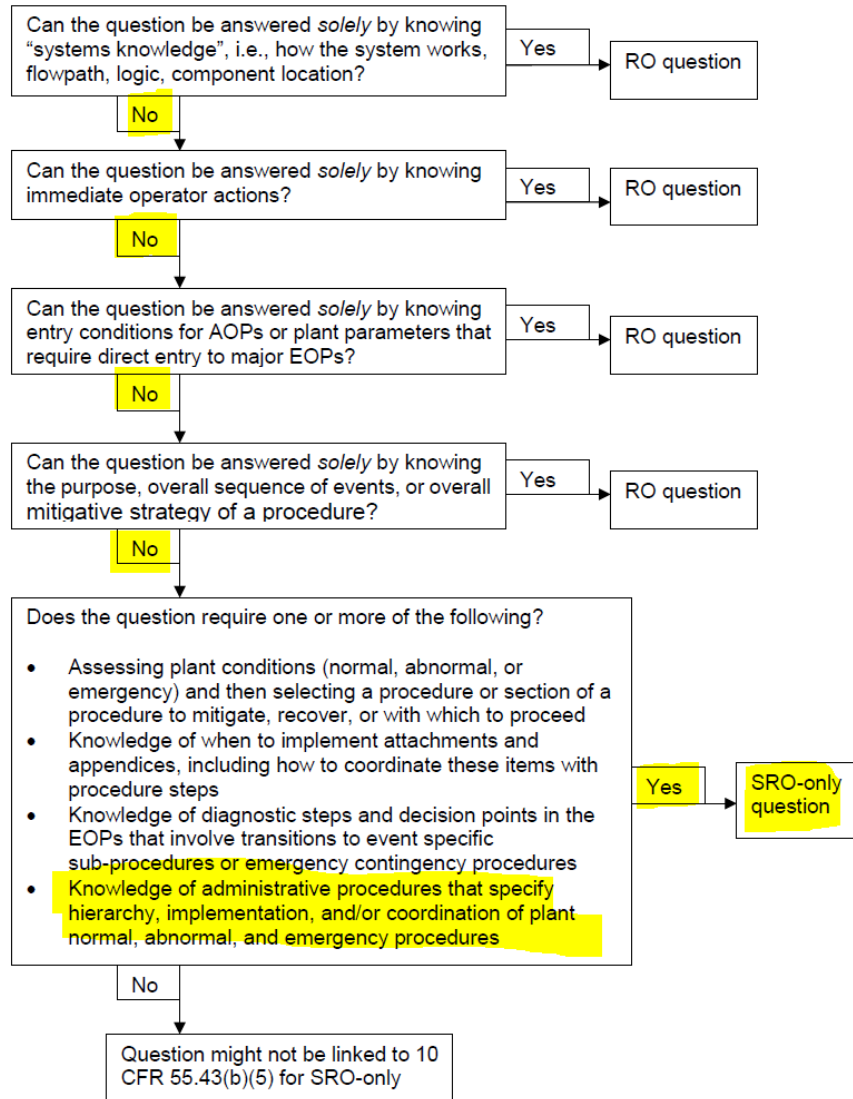
SRO Match Justification:

ES-401

8

Attachment 2

**Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5)
(Assessment and selection of procedures)**



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference: Fission Product Barrier Table

FBB Category ↓	Fuel Clad Barrier		Reactor Coolant System Barrier		Containment Barrier	
	Potential Loss (4 pts)	Loss (5 pts)	Potential Loss (4 pts)	Loss (5 pts)	Potential Loss (2 pts)	Loss (3 pts)
RCS or SG Tube Leakage	None	None	RB1.P RCS leakage > 50 gpm due to EITHER : • UNISOLABLE RCS leakage • SG tube leakage RB2.P CFST Thermal Shock RED path conditions met	RB1.L An automatic or manual ECCS (SI) actuation required by EITHER : • UNISOLABLE RCS leakage • SG tube RUPTURE	None	CB1.L A leaking or RUPTURED SG is FAULTED outside of containment
Inadequate Heat Removal	FB1.P CFST Core Cooling PURPLE path conditions met FB2.P CFST Heat Sink RED path exists due to actual loss of secondary heat sink and heat sink is required	FB1.L CFST Core Cooling RED path conditions met	RB3.P CFST Heat Sink RED path exists due to actual loss of secondary heat sink and heat sink is required	None	CB1.P CFST Core Cooling RED path conditions met AND Restoration procedure 1(2)EOP-FRCC-1 NOT effective within 15 min.	None
CMT Radiation / RCS Activity	None	FB2.L Containment radiation monitor 1(2)R44A or 1(2)R44B reading > 300 R/hr FB3.L Coolant activity > 300 µCi/gm dose equivalent I-131	None	RB2.L ANY of the following containment radiation monitor readings: • 1(2)R2 > 1000 mR/hr • 1(2)R44A > 10 R/hr • 1(2)R44B > 10 R/hr	CB2.P Containment radiation monitor 1(2)R44A or 1(2)R44B reading > 2000 R/hr	None
CMT Integrity or Damage	None	None	None	None	CB3.P CFST Containment RED path conditions met CB4.P Containment hydrogen concentration > 4%	CB2.L Containment isolation is required AND EITHER : • Containment integrity has been lost based on Emergency Coordinator judgment. • UNISOLABLE pathway from containment to the environment exists

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

84

10-117

Points: 1.00

Given:

- Unit 2 reactor tripped due to loss of all offsite power.
- The crew has verified natural circulation flow and is cooling down the plant per 2-EOP-TRIP-4, Natural Circulation Cooldown.
- Train A RVLIS is out of service for Maintenance.
- The Shift Manager directs the crew to perform a rapid cooldown and depressurization due to secondary inventory concerns.

Current plant conditions are:

- RCS Pressure is 1840 psig and stable.
- RCS Hot Leg temperatures are 540 °F and lowering.
- 2PT-405 Wide Range RCS Pressure has failed.

Based on the above conditions, what procedure will the CRS implement and what is the MAXIMUM allowable RCS cooldown rate in the procedure entered?

- A. 2-EOP-TRIP-5, Natural Circulation Cooldown with Steam Voids in Vessel (with RVLIS); 100 °F/hr.
- B. 2-EOP-TRIP-5, Natural Circulation Cooldown with Steam Voids in Vessel (with RVLIS); 50 °F/hr.
- C. 2-EOP-TRIP-6, Natural Circulation Cooldown with Steam Voids in Vessel (without RVLIS); 50 °F/hr.
- D. 2-EOP-TRIP-6, Natural Circulation Cooldown with Steam Voids in Vessel (without RVLIS); 100 °F/hr.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: C

Explanation / Justification:

- A. Incorrect. Based on the stem conditions, both trains of RVLIS are not available. Therefore, EOP-TRIP-5 is not the correct procedure to implement without RVLIS. Plausible because the SRO may believe that Train B RVLIS is still available because the SRO may confuse which Train of RVLIS the 2PT-405 inputs into and believe that it feeds Train A. The RCS cooldown rate is incorrect.
- B. Incorrect. Based on the stem conditions, both trains of RVLIS are not available. Therefore, EOP-TRIP-5 is not the correct procedure to implement without RVLIS. Plausible because the SRO may believe that Train B RVLIS is still available because the SRO may confuse which Train of RVLIS the 2PT-405 inputs into and believes that it feeds Train A. The RCS cooldown rate is correct.
- C. Correct. Based on plant conditions, Train B RVLIS is not available because 2PT-405 wide range pressure has failed and is an input into the RVLIS Train B. Both Trains of RVLIS are not available and the CRS should enter 2-EOP-TRIP-6. With RCS T-Hots > 500 °F, then the maximum allowable RCS cooldown rate is 50 °F/hr until RCS T-Hots are less than 450 °F, then the RCS cooldown rate is a maximum of 100 °F/hr.
- D. Incorrect. Cooldown rate of 100 °F/hr is allowed when RCS T-Hots are less than 450 °F. Plausible because both Trains of RVLIS are unavailable and could believe that the cooldown rate of 100 °F/hr is allowed based on the T-Hot temperatures.

Technical References:	2-EOP-TRIP-5 (R40), EOP-TRIP6 (R40)
Proposed References to be provided:	None
Learning Objective:	NOS05LOCA05-05 Objective 7. Determine a discrete path through the EOP for LOSS OF EMERGENCY COOLANT RECIRCULATION
Question Source:	Bank – Beaver Valley U2 2015 NRC SRO85
Question Cognitive Level:	Comprehension/Analysis
10CFR Part 55 Content:	43.5 / 45.13
Level:	SRO
Category/System:	10-Natural Circulation
K/A #:	W E10 EA2.2 Ability to determine and interpret the following as they apply to the (Natural Circulation with Steam Void in Vessel with/without RVLIS): Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.
Importance:	3.9
Tier/Group	Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the SRO must interpret the plant conditions to what the required action to control void growth in the vessel and select which procedure to perform based on the rapid cooldown and expected void in the vessel.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

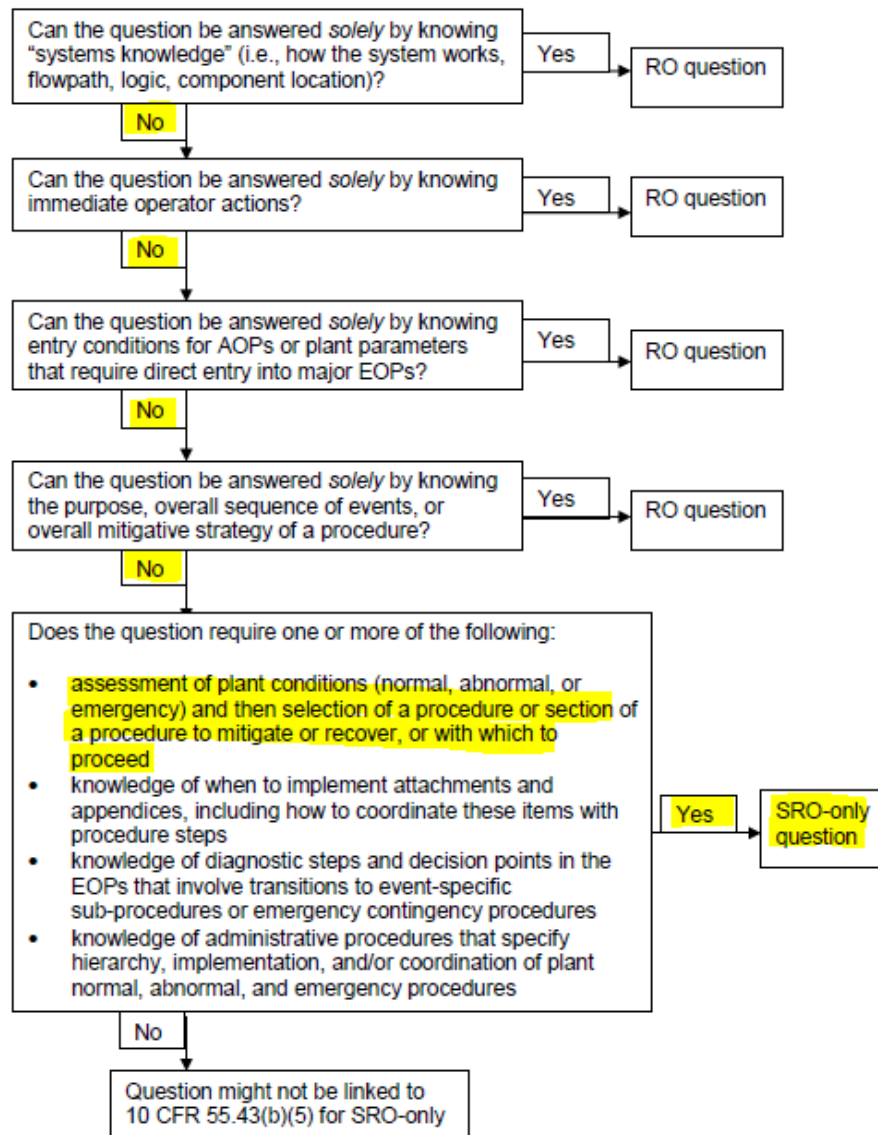
SRO Match Justification:

ES-401

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Attachment 2

**Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)**



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

85

10-118

Points: 1.00

Given:

- Unit 2 experienced a reactor trip and safety injection due to a steam line break downstream of the Main Steam Line Isolation Valves (MSIVs).
- ALL MSIVs failed to close.
- The crew is performing SI Termination steps per 2-EOP-LOSC-2, Uncontrolled Depressurization of All Steam Generators.
- Field operator reports that 23MS167 is now closed.

Subsequently, the STA observes the following;

- AFW flow to each SG is 1E+4 lbm/hr.
- All SG NR Levels are off-scale low.
- 21, 22, and 24 SG Pressures are 100 psig.
- 23 SG Pressure is 200 psig and rising.
- RCS Pressure is 1100 psig.
- ALL RCS T-Colds temperatures are < 230 °F.
- Intermediate Range SUR is +0.1 DPM.

Which ONE of the following describes the NEXT CRS action?

- A. Return to 2-EOP-LOSC-1, Faulted Steam Generator Isolation.
- B. Transition to 2-EOP-FRSM-1, Response to Nuclear Generation.
- C. Transition to 2-EOP-FRHS-5, Response to Steam Generator Low Level.
- D. Transition to 2-EOP-FRTS-1, Response to Thermal Shock.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: D

Explanation / Justification:

- A. Incorrect. Plausible because this is a required transition when a faulted SG is recovered. With 23 SG isolated and pressure rising, the CRS will not return to 2-EOP-LOSC-1 because SI Termination is in progress.
- B. Incorrect. Plausible because the SRO may believe this is the higher RED path. SUR of +0.1 DPM is a PURPLE Path in the Shutdown Margin Status Tree, which is not higher than a RED Path in Thermal Shock Status Tree.
- C. Incorrect. Plausible because the low level in the SG are valid but not the highest priority. Low SG levels is a YELLOW Path in the Heat Sink Status Tree and therefore not a priority.
- D. Correct. A RED Path in the Thermal Shock Status Tree exists due to all RCS T-Cold cooldown rates not less than 100 °F in the last 60 minutes and all RCS pressure/temperature points are not to the right of Limit A in Figure 4A (T-Colds less than 230 °F and RCS pressure at 1100 psig).

Technical References:

2-EOP-CFST-1 (R41)

Proposed References to be provided:

None

Learning Objective:

NOS05FRTS00-03, Objective 1, State the RED paths for the Thermal Shock Status Tree.

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.7 / 43.5 / 45.12

Level:

SRO

Category/System:

10- Pressurized Thermal Shock

K/A #:

W E08 G2.4.21

Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.

Importance:

4.6

Tier/Group

Emergency and Abnormal Plant Evolutions-Tier 1/Group 2

K/A Match: The K/A is matched because the SRO must assess plant conditions and determine which safety system status tree to implement next.

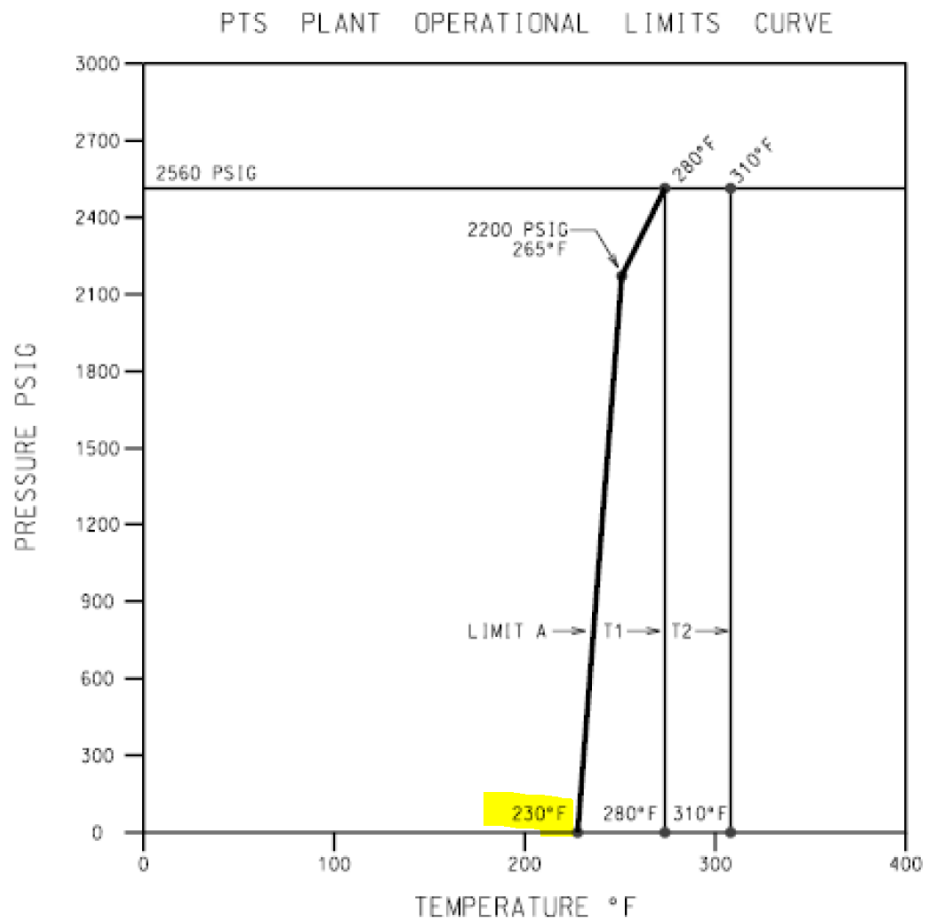
SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

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graph TD
    Start[ALL T-COLD COOLDOWN RATES LESS THAN 100°F IN LAST 60 MINUTES] -- YES --> LeftPath
    Start -- NO --> RightPath
    LeftPath[ALL T-COLDs GREATER THAN 312°F] -- YES --> GreenSAT1[GREEN SAT]
    LeftPath -- NO --> RCSPressure[RCS PRESSURE LESS THAN 375 PSIG]
    RCSPressure -- YES --> GreenSAT2[GREEN SAT]
    RCSPressure -- NO --> TCold312[ALL T-COLDs GREATER THAN 280°F]
    TCold312 -- YES --> YellowFRTS2[YELLOW FRTS-2]
    TCold312 -- NO --> PurpleFRTS1_1[PURPLE FRTS-1]
    RightPath[ALL RCS PRESSURE/TEMP POINTS TO THE RIGHT OF LIMIT A] -- YES --> TCold310[ALL T-COLDs GREATER THAN 310°F]
    RightPath -- NO --> RedFRTS1[RED FRTS-1]
    TCold310 -- YES --> GreenSAT3[GREEN SAT]
    TCold310 -- NO --> YellowFRTS1[YELLOW FRTS-2]
    TCold310 -- NO --> PurpleFRTS1_2[PURPLE FRTS-1]
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SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional References: 2-EOP-CFST-1



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

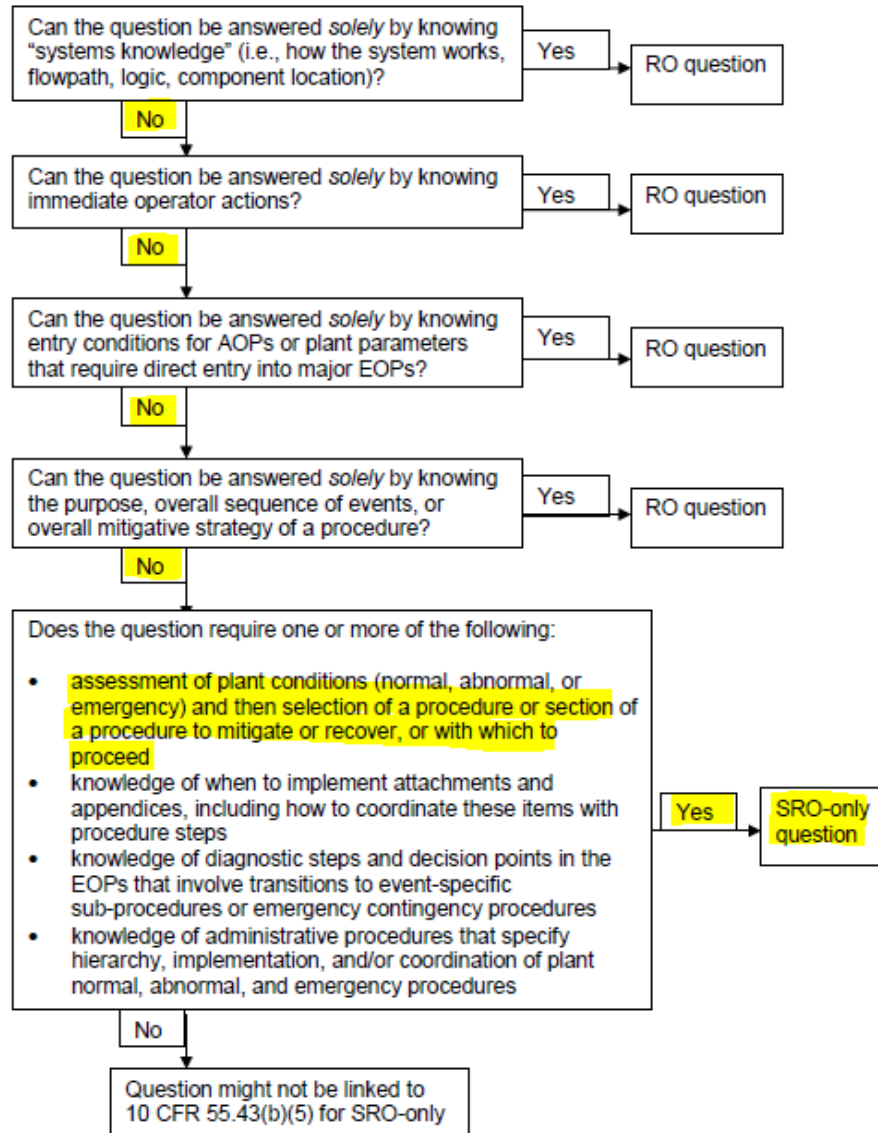
SRO Match Justification:

ES-401

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Attachment 2

Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

86

04-052

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- The RO reports the following for 21 RCP:
 - Console Alarm, SEAL LEAK-OFF FLOW HI-LO, is LIT.
 - Seal Leak-off recorder indicates > 6 gpm.
 - Seal Injection Flow indicates 8.5 gpm.
 - Seal Inlet and Outlet Temperatures are indicating 109 °F and rising.
- The crew enters S2.OP-AB.RCP-0001, Reactor Coolant Pump Abnormality.

Which ONE of the following completes both statements?

1. Which RCP seal failed?
 2. In accordance with S2.OP-AB.RCP-0001, what actions will the CRS direct the crew?
-
- A.
 - 1) #1
 - 2) Immediately TRIP the reactor and stop 21 RCP.
 - B.
 - 1) #1
 - 2) Perform an orderly shutdown and stop 21 RCP within 8 hours.
 - C.
 - 1) #2
 - 2) Immediately TRIP the reactor and stop 21 RCP.
 - D.
 - 1) #2
 - 2) Perform an orderly shutdown and stop 21 RCP within 8 hours.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: A

Explanation / Justification:

- A. Correct. IAW S2.OP-AB.RCP-0001 Attachment 1, #1 seal leak-off flow greater or equal to 6 gpm then go to Attachment 2, Stopping RCPs. Attachment 2 will direct a manual reactor trip, stopping 21 RCP, then between 3-5 minutes after stopping RCP close the 21CV104 and go to 2-EOP-TRIP-1.
- B. Incorrect. First part is correct. Second part is incorrect. This action will be performed at step 3.6 if RCP seal leak-off flow is less than 0.8 gpm or is slowly approaching 6 gpm. Credible distractor since this is an action in AB.RCP-1 for a degraded #2 seal.
- C. Incorrect. First part is incorrect. High seal-off flow is indicative of a #1 seal failure. Second part is correct. Plausible because this is an action if it meets the RCP trip criteria per the AB.RCP.
- D. Incorrect. First part is incorrect. High seal-off flow is indicative of a #1 seal failure. Second part is incorrect. Second part is incorrect. This action will be performed at step 3.6 if RCP seal leak-off flow is less than 0.8 gpm or is slowly approaching 6 gpm. Credible distractor since this is an action in AB.RCP-1 for a degraded #2 seal.

Technical References:

S2.OP-AB.RCP-0001 (R28)

Proposed References to be provided:

N/A

Learning Objective:

NOS05SGTR01-06, Objective 6, Determine the indications that are monitored to ensure proper system/component operation for each step in 2-EOP-SGTR-1

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 43.5 / 45.3 / 45.13

Level:

SRO

Category/System:

04-Reactor Coolant Pump

K/A #:

003 A2.02

Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Conditions which exist for an abnormal shutdown of an RCP in comparison to a normal shutdown of an RCP.

Importance:

3.9

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked to predict the impact of a high RCP seal leak-off flow and based on plant conditions to determine whether immediate action is required as opposed to an orderly shutdown.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

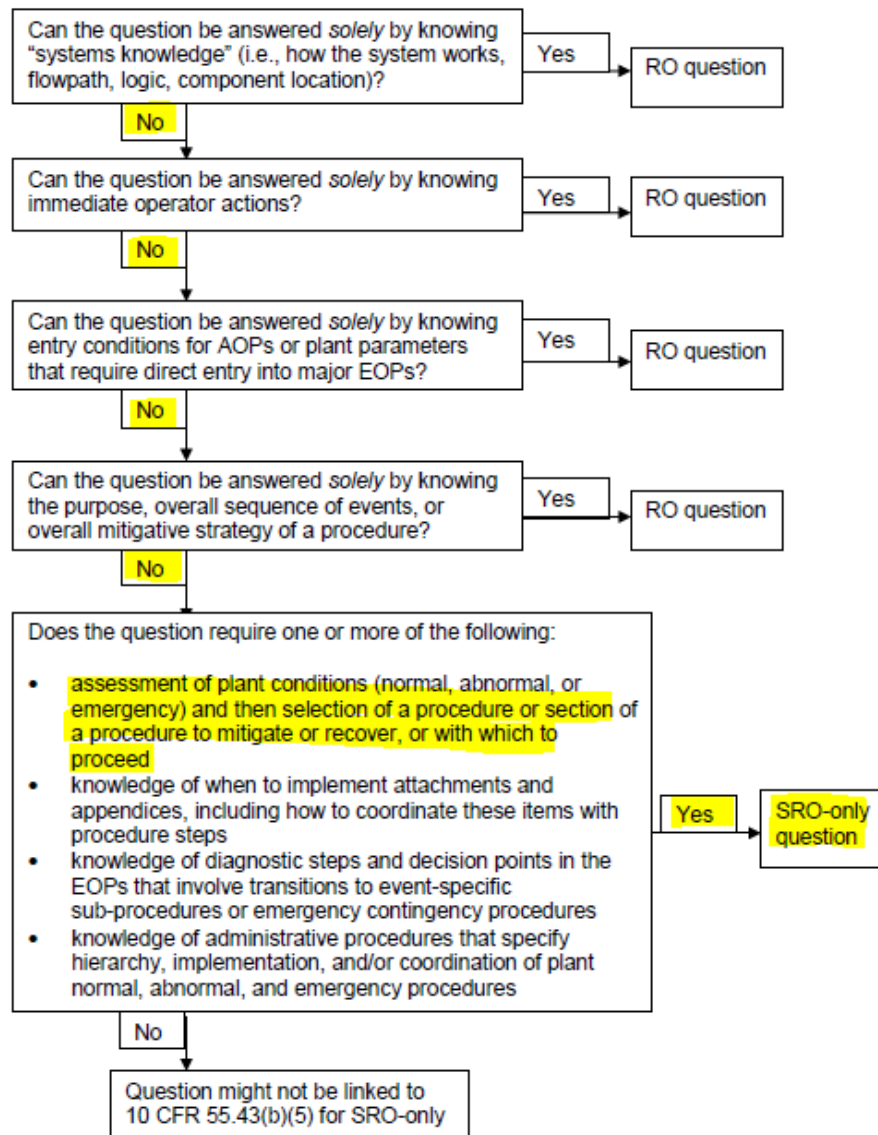
SRO Match Justification:

ES-401

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Attachment 2

**Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)**



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

87

07-018

Points: 1.00

Given

- In accordance with the outage schedule, the Unit 2 reactor was manually tripped at 20% power for the start of a planned refueling outage.
- Following the reactor trip, the crew observes RCS pressure dropping rapidly and manually actuates Safety Injection.
- All other systems responded as designed post trip.

Based on the above events, which ONE of the following correctly identifies the reportability to the NRC?

[REFERENCE PROVIDED]

- A. Nonreportable.
- B. 4 hour report under RAL#s 11.3.1 AND 11.3.2.
- C. 4 hour report under RAL# 11.3.2 ONLY.
- D. 4 hour report under RAL# 11.3.1 ONLY.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: D

Explanation / Justification:

- A. Incorrect. Plausible because the SRO may misinterpret the reportability requirements for a valid actuation such that if the reactor trip and Safety Injection were not due to automatic actuation signals, then, no report is required to the NRC.
- B. Incorrect. Plausible because the SRO may believe that if at anytime the reactor is tripped regardless of preplanned or not, then a 4 hour report is required under RAL# 11.3.2. The SRO may misinterpret the 4 hour report criteria under RAL# 11.3.1 based on the Safety Injection being manually actuated.
- C. Incorrect. Plausible because the SRO may believe that since an SI was manually actuated that this manual action did not meet the criteria of a valid actuation signal under RAL#11.3.1 for a 4 hour report. The SRO may believe that the manual reactor trip is reportable under RAL # 11.3.2 eventhough if it was preplanned.
- D. Correct. IAW SECG RAL# 11.3.2, since the manual reactor trip was part of a preplanned event, then a 4 hour report to the NRC is not required. However, since the crew was required to manually actuate Safety Injection due to degrading RCS conditions, this would be reportable to the NRC as a 4 hour report under SECG RAL# 11.3.1, since this was not part of a series of preplanned events during testing or reactor operation.

Technical References:

Proposed References to be provided:

Learning Objective:

Question Source:

Question Cognitive Level:

10CFR Part 55 Content:

Level:

Category/System:

K/A #:

SECG Section 11.3

SECG RALs Section 11.3 and Bases

NOS05TRP001-09, Objective 20. Given the Salem Event Classification guide, classify the event.

New

Comprehension/Analysis

41.10 / 43.5 / 45.11

SRO

07-Reactor Protection

012 G2.4.30

Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.

Importance:

Tier/Group

4.1

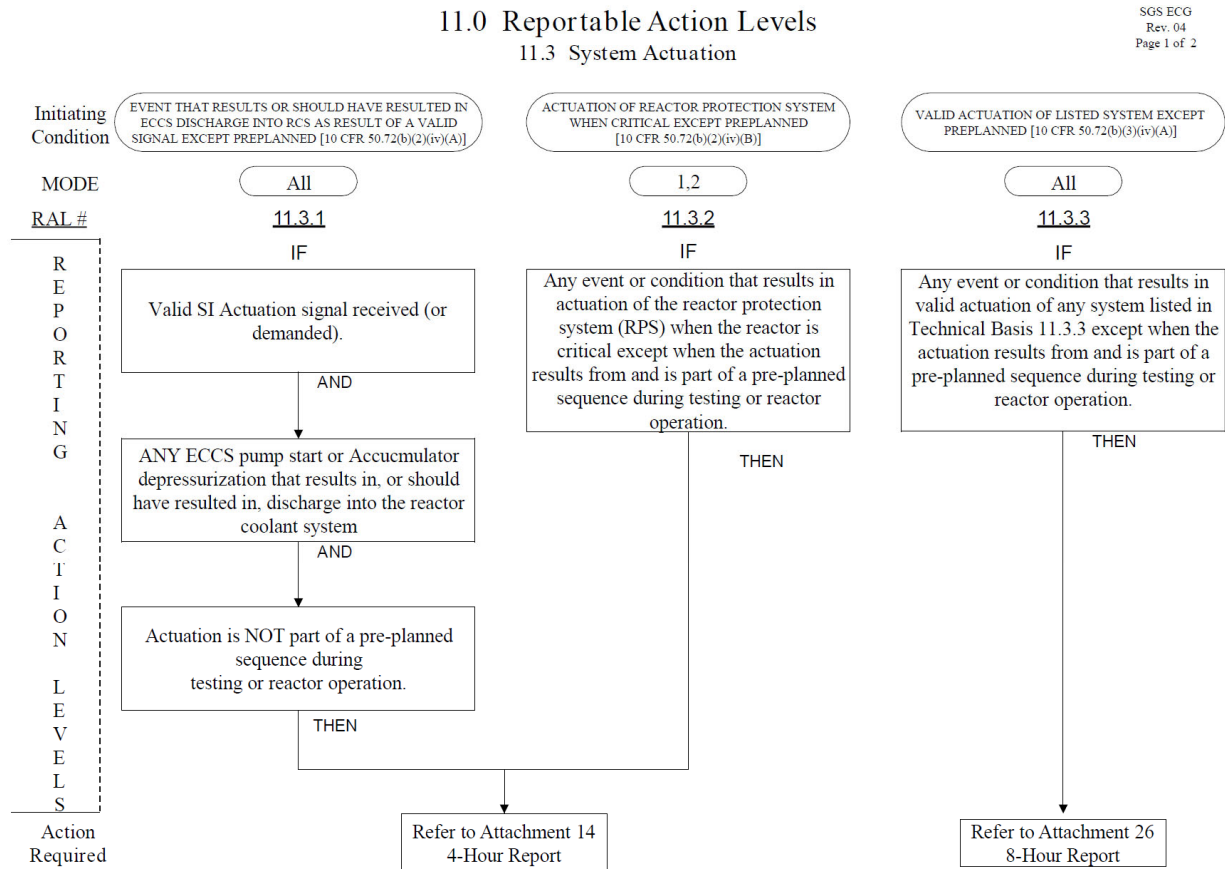
Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is being asked knowledge of reportability requirements of 10 CFR 50.72 to State and Local authorities.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference:



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference:

SGS EAL/RAL Technical Basis

11.0 Reportable Action Levels

11.3 System Actuations

REPORTABLE ACTION LEVEL - 11.3.1

IC ANY EVENT THAT RESULTS OR SHOULD HAVE RESULTED IN ECCS DISCHARGE INTO THE RCS AS THE RESULT OF A VALID SIGNAL EXCEPT WHEN THE ACTUATION RESULTS FROM AND IS PART OF A PRE-PLANNED SEQUENCE DURING TESTING OR REACTOR OPERATION
[10 CFR 50.72(b)(2)(iv)(A)]

RAL

Valid SI Actuation signal received (or demanded)

AND

ANY ECCS Pump start or Accumulator depressurization that results in or should have resulted in, discharge to the RCS

AND

Actuation is NOT part of a pre-planned sequence during testing or reactor operation.

MODE - All

BASIS

A 4-hour report is required for those events that result in either a valid automatic or manual SI actuation or would have resulted in SI actuation if some component had not failed or an operator action had not been taken are reportable. Review RAL 11.3.3 for the list of systems if a valid automatic or manual actuation occurs.

For example, while performing a RCS cooldown following a controlled Reactor Shutdown, a Main Steam Line ΔP SI is inadvertently generated. However, the Charging Pumps fail to start and RCS pressure remains above the SI Pump shutoff head pressure. Although no ECCS discharge to the vessel occurred, the event is reportable.

A system actuation should be apparent at the time of occurrence. Therefore, if all events are reported properly, it is expected that all reports under 10 CFR 50.72 are as a result of an ongoing condition.

A **valid** signal refers to actual plant conditions or parameters satisfying the requirements for SI initiation. Valid actuations also include intentional manual actuations unless the actuation is part of a preplanned test. Excluded from this reporting requirement would be those instances in which instrument drift, spurious signals, human error or other invalid signals caused SI actuation (e.g. jarring a cabinet, an error in the use of jumpers or lifted leads, error in actuation of controls switches, or equipment failures or radio frequency interference).

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference:

SGS EAL/RAL Technical Basis

Preplanned actuations are those which are expected to actually occur due to preplanned activities covered by procedures. Such actuations are those for which a procedural step or other appropriate documentation indicates the specific actuation is actually expected to occur. Control room personnel are aware of the specific signal generation before its occurrence or indication in the control room. Manual actuations as directed by abnormal or emergency operating procedures (i.e., not part of a preplanned test or operational evolution) are reportable.

IF the SI Actuation discharges or should have discharged into the RCS as result of an INVALID signal, THEN a report under this RAL is not required.

REFERENCES

SGS UFSAR
10 CFR 50.72(b)(2)(iv)(A)
10 CFR 50.73
NUREG 1022, Rev. 3, section 3.2.6

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference:

SGS EAL/RAL Technical Basis

11.0 Reportable Action Levels

11.3 System Actuations

REPORTABLE ACTION LEVEL - 11.3.2

IC ACTUATION OF THE REACTOR PROTECTION SYSTEM WHEN CRITICAL EXCEPT PREPLANNED [10 CFR 50.72(b)(2)(iv)(B)]

RAL

Any event or condition that results in actuation of the reactor protection system (RPS) when critical, except when the actuation results from and is part of a preplanned sequence during testing or reactor operation

MODE - 1, 2

BASIS

A 4-hour report is required for an event involving a critical scram is reportable under RAL 11.3.2 unless it resulted from and was part of a pre-planned sequence. Manual RPS actuation in anticipation of receiving an automatic RPS actuation is reportable. Review RAL 11.3.3 for the list of systems if a valid actuation occurs.

Preplanned actuations are those which are expected to actually occur due to preplanned activities covered by procedures. Such actuations are those for which a procedural step or other appropriate documentation indicates the specific actuation is actually expected to occur. Control room personnel are aware of the specific signal generation before its occurrence or indication in the control room.

REFERENCES

10 CFR 50.72(b)(2)(iv)(B)
10 CFR 50.73
NUREG-1022, Rev. 3, section 3.2.6

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference:

SGS EAL/RAL Technical Basis

11.0 Reportable Action Levels

11.3 System Actuations

REPORTABLE ACTION LEVEL - 11.3.3

IC VALID ACTUATION OF LISTED SYSTEM EXCEPT PREPLANNED
[10 CFR 50.72(b)(3)(iv)(A)]

RAL

Any event or condition that results in valid actuation of any system listed in Technical Basis 11.3.3 except when the actuation results from and is part of a pre-planned sequence during testing or reactor operation

MODE - All

BASIS

An 8-hour report is required for a valid actuation of any of the systems named in 10 CFR 50.72(b)(3)(iv)(B) unless the actuation resulted from and was part of a pre-planned sequence during testing or reactor operation. Except for critical scrams (RAL 11.3.2), invalid actuations are not reportable by telephone under 10 CFR 50.72. If an 8-hour ENS report is needed due to a valid system actuation concurrent with an ECCS or RPS actuation, it can be included with the 4-hour ENS report made under 10 CFR 50.72(b)(2)(iv)(A) or (B).

The system actuation flow chart provides guidance to determine reportability.

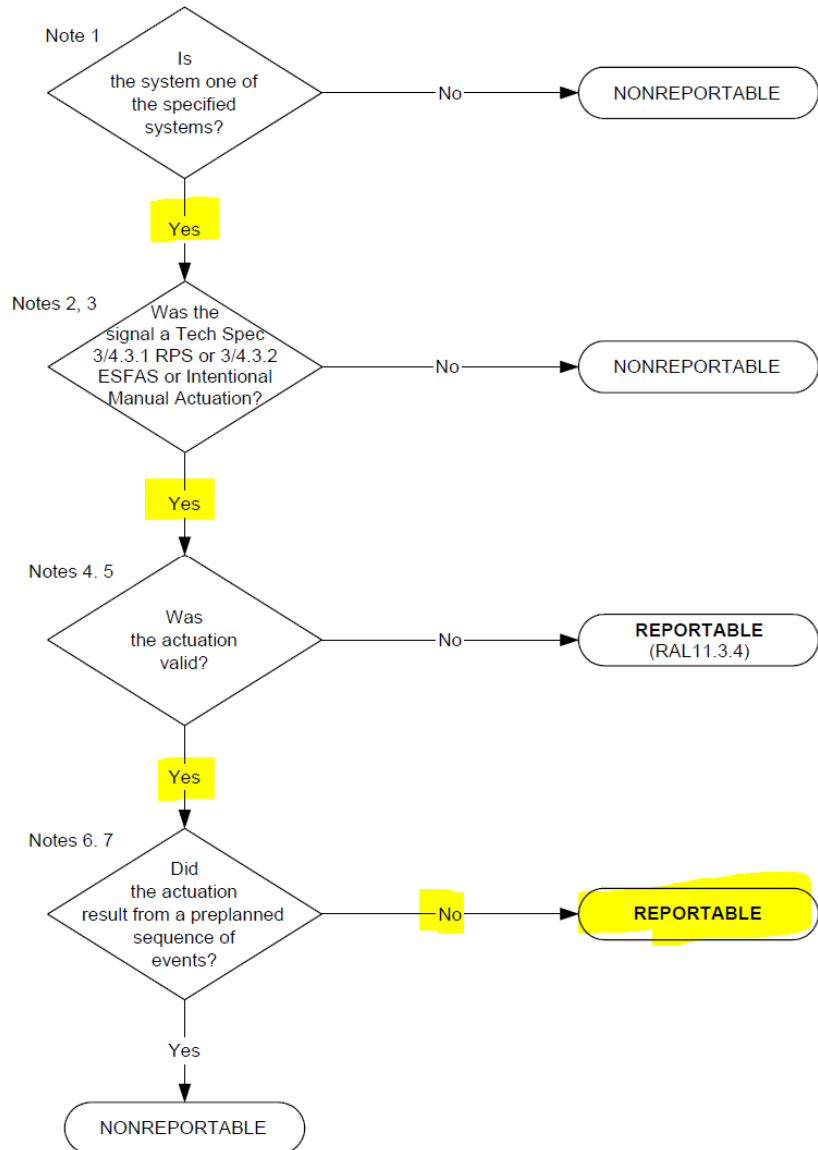
SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference:

SGS EAL/RAL Technical Basis

SYSTEM ACTUATION FLOW CHART



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RAL - 11.3.3
Rev. 07

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference:

SGS EAL/RAL Technical Basis

SYSTEM ACTUATION FLOW CHART

NOTES

1. Systems for which this RAL applies are listed on page 4.
2. See Technical Specifications 3/4 3.1, Reactor Trip System Instrumentation and 3/4.3.2, ESF Actuation System Instrumentation (signals required for initiation of system safety function).
3. An ESF signal actuates equipment to mitigate the consequences of an accident, assure safe shutdown, minimize radioactive releases, etc. Process signals provided to protect equipment or as the result of good engineering judgment for system operating requirements (e.g., low flow starts, low suction pressure pump trips) are not ESF signals. If an actuation signal occurs, but distinction between "ESF" and "Process" cannot be determined immediately, the actuation is considered reportable. Retraction should be considered later, if necessary. Intentional manual actuation is not a "Process" signal.
4. Valid actuations are those actuations that result from VALID SIGNALS or from intentional manual initiation, unless it is part of a preplanned test. Valid signals are those signals that are initiated in response to actual plant conditions or parameters satisfying the requirement for initiation of the safety function of the system.

An "actuation" is considered valid even if the resultant function (e.g., reactor trip) has already been accomplished as a result of a prior actuation or a plant evolution, such as a routine shutdown.
5. Invalid actuations are by definition those that do not meet the criteria for being valid. Invalid actuations can include instrument drift, spurious signals, human error, jarring a cabinet, an error in the use of jumpers or lifted leads, an error in the actuation of switches or controls, equipment failure, or radio frequency interference. Invalid actuations do not include actuations from the sensor by measurement of an actual physical system parameter that was at its setpoint.

An invalid actuation is not reportable as a non-emergency event under 10 CFR 50.72. However, 10 CFR 50.73 requires at least a telephone notification to the NRC Operations Center within 60 days of an invalid actuation. SECG Att 34 provides direction for this report.

No report is required for invalid actuations that occur while the system is properly removed from service or occur after the safety function is already completed.
6. Manual system actuation to mitigate the consequences of an accident, assuring safe shutdown of plant is reportable. Manual actuation as directed by normal operating or test procedures is not reportable. Manual actuations as directed by abnormal or emergency operating procedures (i.e., not part of a preplanned test or operational evolution) are reportable.
7. Preplanned actuations are those which are expected to actually occur due to preplanned activities covered by procedures. Such actuations are those for which a procedural step or other appropriate documentation indicates the specific actuation that is actually expected to occur. Control room personnel are aware of the specific signal generation before its occurrence or indication in the control room.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference:

SGS EAL/RAL Technical Basis

Applicable Systems and Components

NOTE: Numbers in parentheses indicate UFSAR Chapter

Reactor Protection System (unless reported under RAL 11.3.2)

Containment Systems (6.2)

Containment Heat Removal (6.2.2)

Containment Isolation System* (6.2.4)

ECCS (6.3)

Residual Heat Removal

Safety Injection System

Plant Systems

Auxiliary Feedwater

Emergency AC Electrical Power (8.3)

* Containment isolation valves in more than one system or multiple MSIVs

REFERENCES

SGS UFSAR

10 CFR 50.72(b)(3)(iv)(A)

10 CFR 50.73

NUREG 1022, Rev. 3, section 3.2.6

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

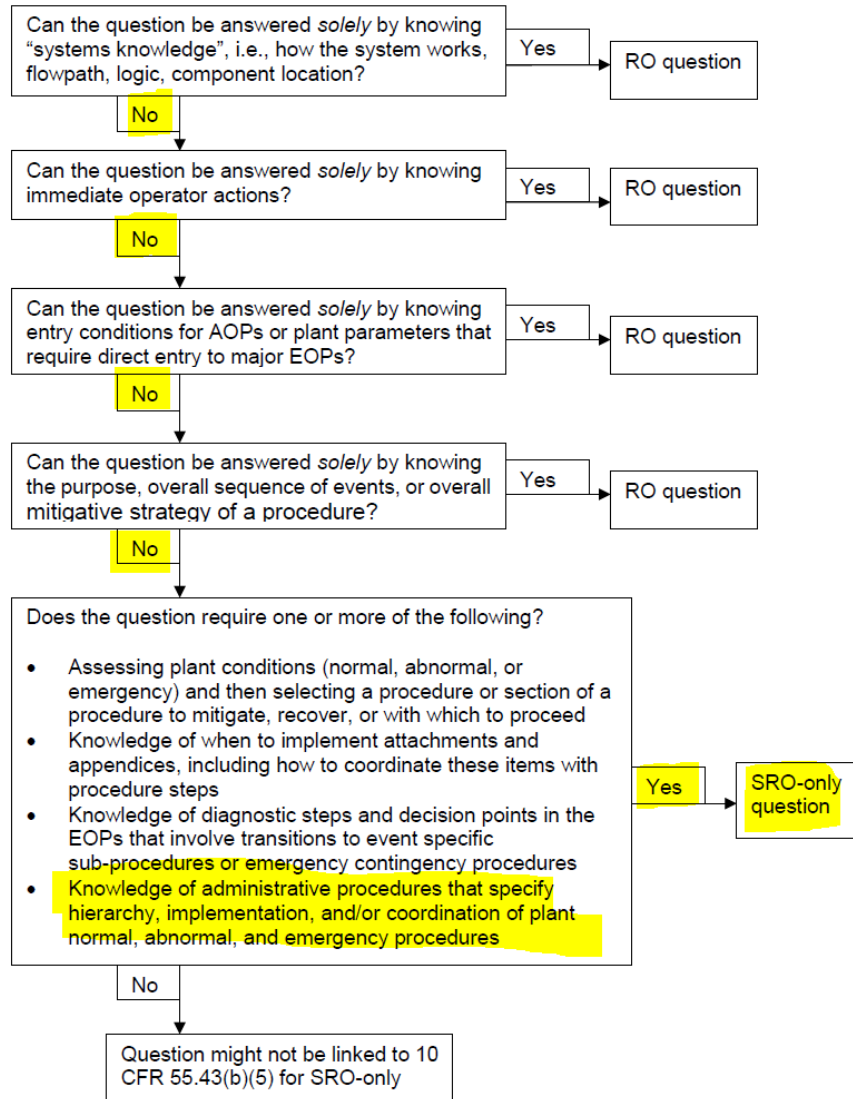
SRO Match Justification:

ES-401

8

Attachment 2

**Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5)
(Assessment and selection of procedures)**



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

88

05-016

Points: 1.00

Given:

- Unit 1 is at 100% Power.
- 11 Charging Pump is in service.
- A Loss of All Control Air has occurred.
- The crew enters S1.OP-AB.CA-0001, Loss of Control Air.
- The CRS directs manually tripping the reactor and entering 1-EOP-TRIP-1, Reactor Trip or Safety Injection.
- Operators are locally controlling AFW valves to maintain post trip SG Narrow Range levels.

Which ONE of the following completes both statements?

1. What will be the subsequent impact on PZR level?
 2. What is the preferred course of action?
-
- A.
 - 1) PZR level will rise
 - 2) Locally control charging flow by adjusting the 1CV54, CENT CHG PUMP FLOW CONT VLV.
 - B.
 - 1) PZR level will rise
 - 2) Transfer to 13 Charging Pump and locally control the speed changer.
 - C.
 - 1) PZR level will lower
 - 2) Transfer to 13 Charging Pump and locally control the speed changer.
 - D.
 - 1) PZR level will lower
 - 2) Locally control charging flow by adjusting the 1CV54, CENT CHG PUMP FLOW CONT VLV.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: **A and B**

Question 88 was determined to have to two correct answers, 'A' and 'B,' based on review of the post-examination comments.

Explanation / Justification:

- A. ~~***Correct. Incorrect. Part 1 is correct. Part 2 is incorrect. Plausible because the centrifugal charging and adjusting the 1CV54 can be used to supply charging flow, however, in this case per S1.OP-AB.CA-0001 Attachment 8, CRS Decisions, recommends operating 13 PDP since its speed controller is failed at the low speed and therefore minimum RCP seal flow.~~ Part 1 is correct. On loss of all control air, with letdown isolated, the 1CV55 failed open, and the 1CV71 failed closed, the operating centrifugal charging pump will result in higher flow and pressure to the RCP seals. This will result in higher flow into the RCS and thus raise PZR level faster. Part 2 is correct. S1.OP-AB.CA-0001, "Loss of Control Air," provides guidance in both the "Selected Continuous Action Summary (CAS) Items" and the "Attachment 1 Continuous Action Summary" sections of the procedure, to maintain Pressurizer level by locally adjusting the 1CV54, CENT CHG PUMP FLOW CONT VLV, to control charging flow.
- B. ***Correct. Per S1.OP-AB.CA-0001, Attachment 8, CRS Decisions, on loss of all control air, with letdown isolated, the 1CV55 failed open, and the 1CV71 failed closed, operating a centrifugal charging pump will result in higher flow and pressure to the RCP seals. This will result in higher flow into the RCS and thus raise PZR level faster. It is recommended to operate 13 PDP since its speed controller is failed at the low speed stop that will minimize RCP seal flow. It is for this reason that 13 PDP should be placed in service to allow reducing the charging flow and extend the time for the PZR level to reach the limit of 90%.
- C. Incorrect. Part 1 is incorrect. Part 2 is correct. Plausible because the SRO may not correctly assess the impact of the components on a loss of air and incorrectly determine that PZR level will lower. The SRO may determine that both the 1CV55 and 1CV71 fails closed, resulting in the centrifugal charging pumps in recirculation back to the VCT and no flow to the RCP seals.
- D. Incorrect. Part 1 and Part 2 are incorrect. Part 1 is plausible because the SRO may not correctly assess the impact of the components on a loss of air and incorrectly determine that PZR level will lower. The SRO may determine that both the 1CV55 and 1CV71 fails closed, resulting in the centrifugal charging pumps in recirculation back to the VCT and no flow to the RCP seals, Part 2 is plausible because the centrifugal charging and adjusting the 1CV54 can be used to supply charging flow.

***S1.OP-AB.CA-0001, "Loss of Control Air," contains three sections that provide guidance for controlling Pressurizer level; 1) Selected Continuous Action Summary (CAS) Items, 2) Attachment 1 Continuous Action Summary, and 3) Attachment 8, "CRS Decisions." The first section to be implemented by the CRS when entering the procedure would be either of the CAS sections identified in Items 1 and 2 above, both of which state:

"SEND Operators to maintain Pressurizer level between 24 and 90% while maintaining RCP seal Injection flow 6-12 gpm/pump, NOT to exceed 40 gpm total, by local operation of appropriate components:

- *1CV73, CHG HDR PCV BYP VALVE*
- *Speed Changer on 13 Charging Pump*
- *1CV54, CENT CHG PUMP FLOW CONT VALVE INLET"*

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answers 'A' and 'B' are both correct on the basis that:

- 1) the actions to control Pressurizer level would be taken in accordance with either of the aforementioned CAS sections upon initial entry into S1.OP-AB.CA-0001,
- 2) the CAS actions to control Pressurizer level are bulleted items, indicating that local operation of either 1CV54 or the PDP Speed Changer would be appropriate and acceptable given the conditions specified in the stem,
- 3) local operation of 1CV54 as the preferred course of action is a viable option considering that CCP 11 was already in service, and
- 4) local operation of the PDP Speed Changer as the preferred course of action using Attachment 8, "CRS Decisions," is a viable option because a) the associated guidance contained therein recommends operation of the PDP, and b) the Selected CAS Items section of S1.OP-AB.CA-0001 provides direction to reference the Exhibit 1 Briefing Sheet, which in turn provides direction to reference Attachment 8.

Technical References:	S1.OP-AB.CA-0001 (R25)
Proposed References to be provided:	None
Learning Objective:	NOS05ABCA01-08, Objective 3, Given a set of initial plant conditions, Describe the final plant condition that is established by the abnormal procedure
Question Source:	New
Question Cognitive Level:	Comprehension/Analysis
10CFR Part 55 Content:	41.5 / 43.5 / 45.12
Level:	SRO
Category/System:	08-Instrument Air
K/A #:	078 G2.2.44 Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.
Importance:	4.4
Tier/Group	Plant Systems-Tier 2 / Group 1

K/A Match: The K/A is matched because the SRO must assess or interpret plant conditions to determine how the control air system is impacting PZR level control system operation and then direct actions and procedure selection to control PZR level.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

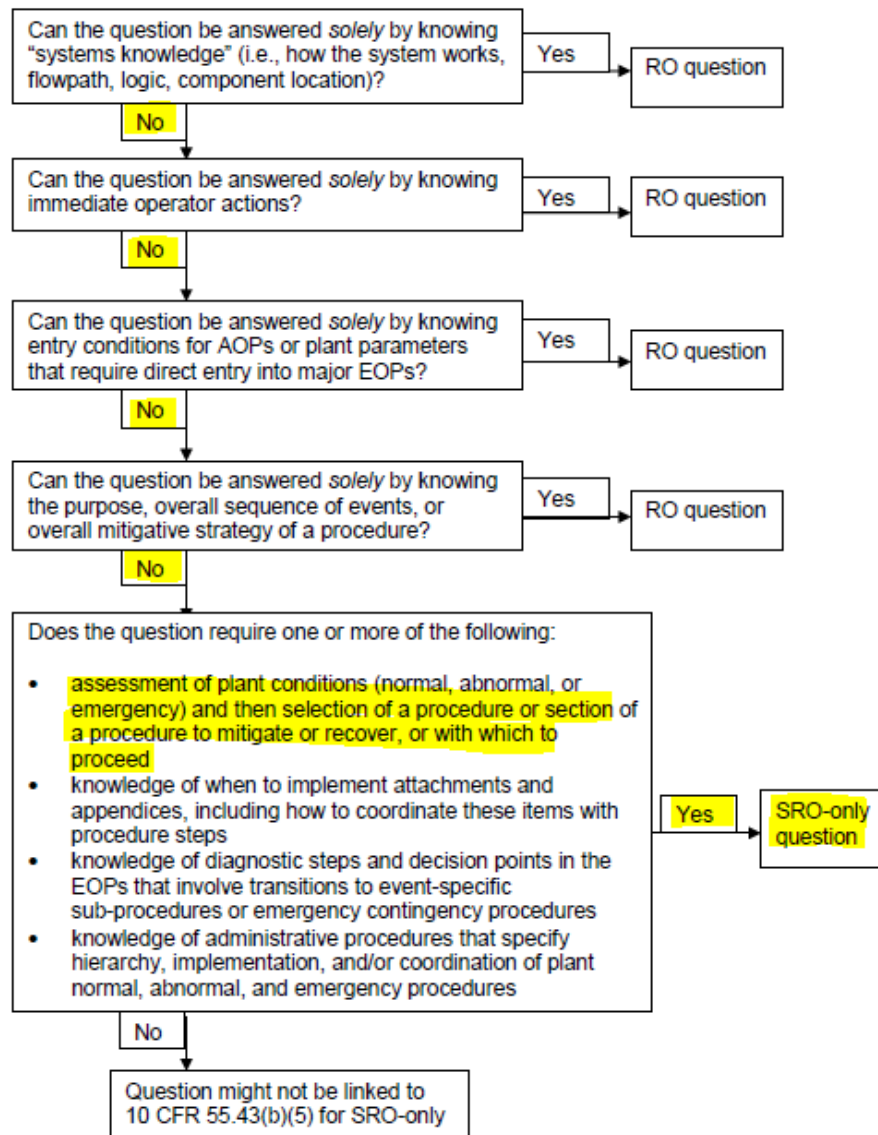
SRO Match Justification:

ES-401

8

Attachment 2

**Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)**



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

89

06-024

Points: 1.00

Given:

- Unit 1 is at 100% power.
- During the performance of the 1A Emergency Diesel Generator (EDG) surveillance run, the 1A EDG failed to start.
- The 1A EDG was declared INOPERABLE today (Monday) at 0600.
- Troubleshooting determined that the K1C relay in the diesel start circuit failed to actuate.
- The 1B and 1C EDGs have these same relay models installed.

In accordance with Technical Specification, which ONE of the following is the required action(s)?

[REFERENCE PROVIDED]

- A. Restore the 1A EDG to OPERABLE status by 0600 Thursday ONLY.
- B. Perform an operability run on the 1B and 1C EDGs by 0600 Tuesday AND restore 1A EDG by 0600 Thursday.
- C. The unit must be in at least HOT STANDBY by 1300 today.
- D. Restore two of the inoperable EDGs to OPERABLE status by 0800 today AND restore the remaining inoperable EDG by 0600 Thursday.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: B

Explanation / Justification:

- A. Incorrect. Plausible because the SRO may believe that a common mode failure does not exist from the information in the stem and that only TS 3.8.1.1 action “b.4” only applies to require restoring the 1A EDG to operable status by 0600 Thursday.
- B. Correct. Based on 1A EDG being declared inoperable due to the K1C relay failure and the Part 21 on the same relay models installed on the 1B and 1C EDGs, the SRO should conclude that a common mode failure exists or can’t be ruled out. As a result the SRO should apply TS 3.8.1.1 action “b.3” and “b.4”, which requires performing a surveillance run within 24 hours on the two operable EDGs. In any case, restore the inoperable EDG to operable status within 72 hours or be in Hot Standby in the next 6 hours. So in this case the 1B and 1C EDGs require operability runs by 0600 Tuesday and the 1A EDG needs to be restored to operability status by 0600 Thursday.
- C. Incorrect. Plausible because the SRO may believe that the common mode failure makes all EDGs inoperable and that TS 3.0.3 now applies requiring the unit to be in Hot Standby by 1300 today (Monday). TS 3.0.3 would not apply here because action “e” exists for two or more diesels inoperable.
- D. Incorrect. Plausible because the SRO may misinterprets implementing TS 3.8.1.1 action “b.3” and “b.4” and believes that since all EDGs are inoperable, that action “e” is required to restore two inoperable diesels to operable status within 2 hours and then implement action “b.4” to restore the remaining EDG within 72 hours or 0600 Thursday.

Technical References:

TS LCOs 3.8.1.1 and 3.0.3

Proposed References to be provided:

TS LCO 3.8.1.1

Learning Objective:

NOS05TECHSPEC-14, Objective 14. Describe the general component and parameter categories that are addressed by Technical Specification Sections 3/4.1 through 3/4.12

Question Source:

Modified Bank – DC Cook 2018 SRO89

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.10 / 43.2 / 45.13

Level:

SRO

Category/System:

06-Emergency Diesel Generator

K/A #:

064 G2.2.36

Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions of operations.

Importance:

4.2

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the SRO must analyze plant conditions and determine what TS action required based on determining if a common mode failure exists based on the failed relay and conditions provided in the stem.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Modified Question – The question stem condition was modified for the SRO to assess the conditions that caused the EDG to fail to start and then determine what Tech Spec action is required based on a common mode failure with the K1C relays. The original question provided the SRO indications that a common mode failure most likely existed without requiring much mental activity.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Parent Question: DC Cook 2018 NRC SRO89

EXAMINATION ANSWER KEY

RO31 NRC EXAM 2018

89

ID: NRCAUDIT07-0960

Points: 1.00

SRO Only

Unit 1 is at 100% power. The following plant conditions exist:

- Both Supplemental DGs are out of service due to an electrical control problem
- The 1CD Emergency Diesel Generator (EDG) was declared INOPERABLE today (Monday) at 0600.
- Engineering can NOT rule out EDG common mode failure
- It is estimated that 1 CD DG will not be returned to Operable status for 7 days.

What action is required?

- A. Perform an operability run on the 1AB EDG by 0600 tomorrow AND restore one Supplemental DG by 0600 Thursday.
- B. The unit must be in at least HOT STANDBY by 1200 today.
- C. Perform an operability run on the 1AB EDG by 0600 tomorrow AND restore both Supplemental DGs by 0600 Thursday.
- D. Restore both Supplemental DGs by 1800 today OR perform an operability run on the 1AB EDG by 0600 tomorrow.

Answer: C

Answer Explanation:

- A. INCORRECT - Both SDGs are required. Plausible if student believes that one SDG can support a safeguards train.
- B. INCORRECT - This is the action for Condition B.4.1 not being met. Plausible if student does not understand that either B.4.1 (Common mode) or B.4.2 (Run the other EDG within 24 hours) can be met to comply with this condition.
- C. CORRECT - Tech Spec requires action B to be entered. Action B1 requires both Supplemental DGs to be operable (Action C requires them to be restored within 72 hours if EDG is not restored). Since common mode failure cannot be ruled out, the AB EDG must be run within 24 hours.
- D. INCORRECT - The SDGs must be restored within 72 hours AND the AB EDG must be run. Plausible if student does not completely read 3.8.1 B conditions to determine that SDGs and other EDG must both be addressed.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

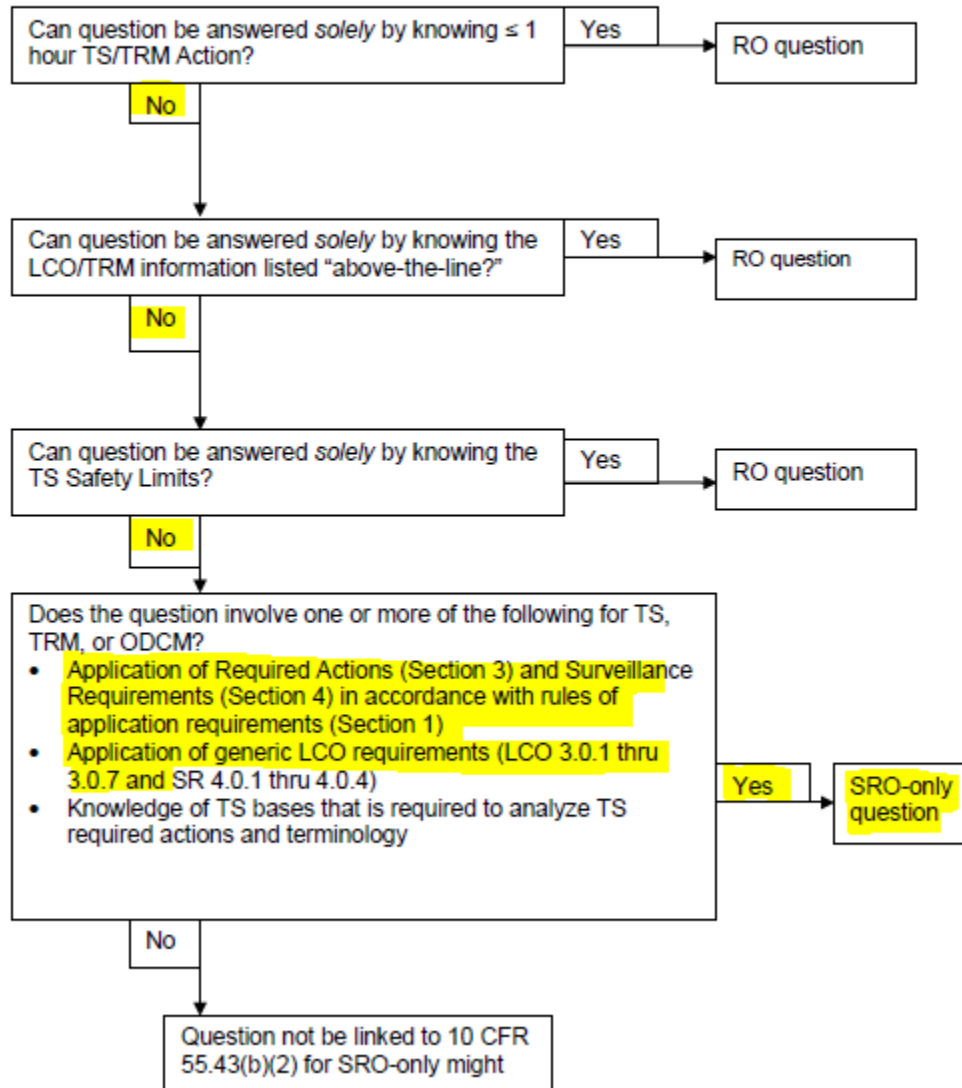
SRO Match Justification:

ES-401

5

Attachment 2

Figure 1: Screening for SRO-only linked to 10 CFR 55.43(b)(2) (Tech Specs)



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

90

04-053

Points: 1.00

Given:

- Unit 2 is at 40% Power.
- #4 SW Bay was isolated due to a leak.
- 2A EDG is paralleled to the 4KV bus for surveillance testing.
- 22 Charging Pump is in service.
- 21 and 23 SW Pumps are in service.
- 22 SW Pump is in AUTO and standby.

Subsequently, the following occurs;

- 23 SW Pump trips.
- OHA J-1, 2A 4KV VTL BUS DIFF PROT, is LIT

Based on the above conditions, which ONE of the following completes both statements?

1. What is the effect on the SW system?
2. How will the CRS proceed?

Note: S2.OP-AB.SW-0001 – Loss of Service Water Header Pressure
S2.OP-AB.SW-0005 – Loss of All Service Water

- A. 1) 22 SW Pump will auto start on low SW header pressure.
2) Enter S2.OP-AB.SW-0001, reduces loads on the SW system listed on Attachment 2, Loads Affected by a Loss of Service Water.
- B. 1) 22 SW Pump will auto start on low SW header pressure.
2) Enter S2.OP-AB.SW-0001, place 23 Charging Pump in service and remove 22 Charging Pump from service.
- C. 1) All SW flow capability is lost.
2) Enters S2.OP-AB.SW-0005, then trips the reactor and stops the RCPs to limit the heat input to the CCW system.
- D. 1) All SW flow capability is lost.
2) Enters S2.OP-AB.SW-0005, then trips the Main Turbine and reduces reactor power to < 5% to lower heat input into the RCS.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: C

Explanation / Justification:

- A. Incorrect. Part 1 is incorrect. Plausible because the SRO may believe that the Unit 2 SW pumps power supplies are the same as Unit 1. This is a unit difference. Part 2 is incorrect. A loss of all SW flow would require entry into AB.SW-5. See Ans. C for further explanation.
- B. Incorrect. Part 1 is incorrect. Plausible because the SRO may believe that the Unit 2 SW pumps power supplies are the same as Unit 1. This is a unit difference. Part 2 is incorrect. A loss of all SW flow would require entry into AB.SW-5. See Ans. C for further explanation.
- C. Correct. 2A EDG supplies power to 21 and 22 SW Pumps (Unit 1 is 15 and 16 SW Pumps). Therefore, when 23 SW Pump tripped and the 2A 4KV bus locked out on bus differential protection, a loss of all SW flow capability occurred. Based on the loss of all SW, the CRS should enter S2.OP-AB.SW-0005 to trip the reactor and stop all RCPs.
- D. Incorrect. Part 1 is correct. Part 2 is incorrect. Plausible because the SRO may believe that based on the current power level of 40% that a turbine trip is the correct action versus tripping the reactor. This is not an action in AB.SW-5. See Ans. C for further explanation.

Technical References:

S2.OP-AB.SW-0005

Proposed References to be provided:

N/A

Learning Objective:

NOS05ABSW4-04, Objectives 4: Describe, in general terms, the actions taken in AB.SW-0004 and AB.SW-0005 and the bases for the actions in accordance with the Technical Bases Document.

Question Source:

Bank – Salem 2016 NRC SRO92

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 / 43.5 / 45.3 / 45.13

Level:

SRO

Category/System:

04-Loss of Service Water

K/A #:

076 A2.01

Ability to (a) predict the impacts of the following malfunctions or operations on the SWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of SWS

Importance:

3.7

Tier/Group

Plant Systems-Tier 2/Group 1

K/A Match: The K/A is matched because the candidate is asked to assess the plant conditions and based on the plant conditions select the appropriate procedure and select actions to mitigate the event. In this case, the SRO must determine that there is a loss of all SW pumps and enter into AB.SW-005 to trip the reactor and stop RCPs.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

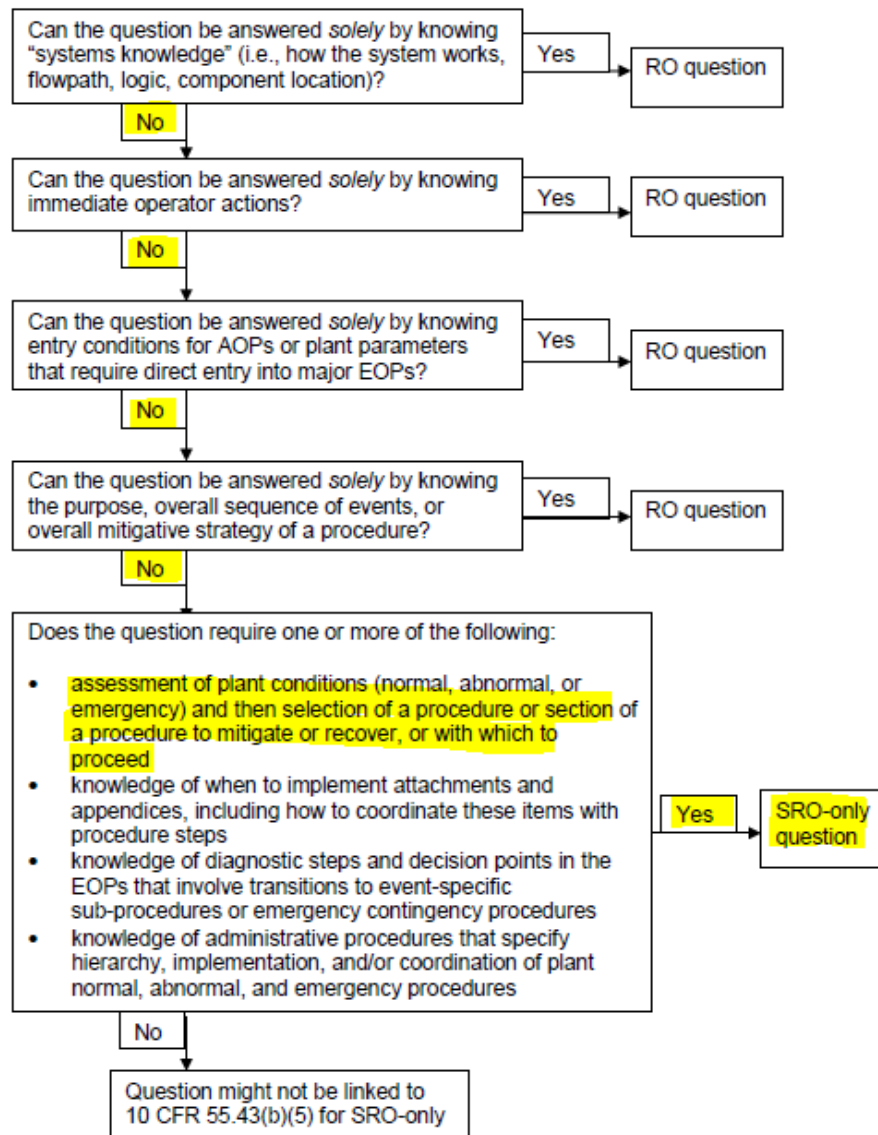
SRO Match Justification:

ES-401

8

Attachment 2

**Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)**



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

91

02-026

Points: 1.00

Given:

- Salem Unit 2 is in MODE 5 with a unit startup in progress.
- A review of surveillance paperwork found that the setpoint for POPS Channel I is out of tolerance.
- Channel I POPS has been declared INOPERABLE.

In accordance with Technical Specification 3.4.10.3, Overpressure Protection Systems, which ONE of the following statements is correct regarding MODE 4 entry?

[REFERENCE PROVIDED]

- A. Mode change can be made. The channel must be restored to OPERABLE status within 7 days following the mode change.
- B. Mode change can be made after a risk assessment is performed.
- C. Mode change can be made. The channel must be restored to OPERABLE status within 24 hours following the mode change.
- D. Mode change can NOT be made until the channel is OPERABLE.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: D

Explanation / Justification:

- A. Incorrect. Plausible because the SRO may incorrectly apply TS 3.4.10.3 action “a” and believe that you can make the mode change so long as you restore the channel within 7 days following entering Mode 4. Mode change cannot be performed until the channel is restored to operable status.
- B. Incorrect. Plausible because TS 3.0.4.b does allow the use of a risk assessment to make a mode change. However, this is prohibited by TS 3.4.10.3 action “e”.
- C. Incorrect. Plausible because the SRO may incorrectly apply TS 3.4.10.3 action “b” and believe that you can make the mode change so long as you restore the channel within 24 hours following entering Mode 4. Mode change cannot be performed until the channel is restored to operable status.
- D. Correct. MODE 4 entry may NOT be performed. TS 3.4.10.3 action “e” states that LCO 3.0.4.b is not applicable when entering MODE 4. TS Reactor Coolant System bases also states that there is an increased risk associated with entering MODE 4 from MODE 5 with an inoperable LTOP system. It further states that performance of a risk assessment should not be applied in this circumstance. In order to make the mode change, the LTOP channel needs to be restored to operable status.

Technical References:

TS 3.4.10.3 and bases

Proposed References to be provided:

TS 3.4.10.3 only

Learning Objective:

NOS05TECHSPEC-14, Objective 14. Describe the general component and parameter categories that are addressed by Technical Specification Sections 3/4.1 through 3/4.12

Question Source:

New

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.10 / 43.2 / 43.5 / 45.3

Level:

SRO

Category/System:

02-Reactor Coolant

K/A #:

002 G2.2.40

Ability to apply Technical Specifications for a system.

Importance:

4.7

Tier/Group

Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the SRO is being asked knowledge on applying LCO 3.0.4 and the applicable TS LCO 3.4.10.3 actions. In this case, the SRO must know that TS 3.0.4.b is for allowing risk assessment, however, TS 3.4.10.3 action “e” prohibits this use.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional References: Salem TS 3.4.10.3

REACTOR COOLANT SYSTEM

OVERPRESSURE PROTECTION SYSTEMS

LIMITING CONDITION FOR OPERATION

3.4.10.3 At least one of the following overpressure protection systems shall be OPERABLE:

- a. Two Pressurizer Overpressure Protection System relief valves (POPS) with a lift setting of less than or equal to 375 psig, or
- b. The Reactor Coolant System (RCS) depressurized with an RCS vent of greater than or equal to 3.14 square inches.

APPLICABILITY: When the temperature of one or more of the RCS cold legs is less than or equal to 312°F, except when the reactor vessel head is removed.

ACTION:

- a. With one POPS inoperable in MODE 4 and the temperature of one or more of the RCS cold legs is less than or equal to 312°F, restore the inoperable POPS to OPERABLE status within 7 days or depressurize and vent the RCS through a 3.14 square inch vent(s) within the next 8 hours; maintain the RCS in a vented condition until both POPSs have been restored to OPERABLE status.
- b. With one POPS inoperable in MODES 5 or 6 with the Reactor Vessel Head installed, restore the inoperable POPS to OPERABLE status within 24 hours, or complete depressurization and venting of the RCS through at least a 3.14 square inch vent(s) within the next 8 hours; maintain the RCS in a vented condition until both POPSs have been restored to OPERABLE status.
- c. With both POPSs inoperable, depressurize and vent the RCS through a 3.14 square inch vent(s) within 8 hours; maintain the RCS in a vented condition until both POPSs have been restored to OPERABLE status.
- d. In the event either the POPS or the RCS vent(s) are used to mitigate a RCS pressure transient, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 30 days. The report shall describe the circumstances initiating the transient, the effect of the POPS or vent(s) on the transient and any corrective action necessary to prevent recurrence.
- e. LCO 3.0.4.b is not applicable when entering MODE 4.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

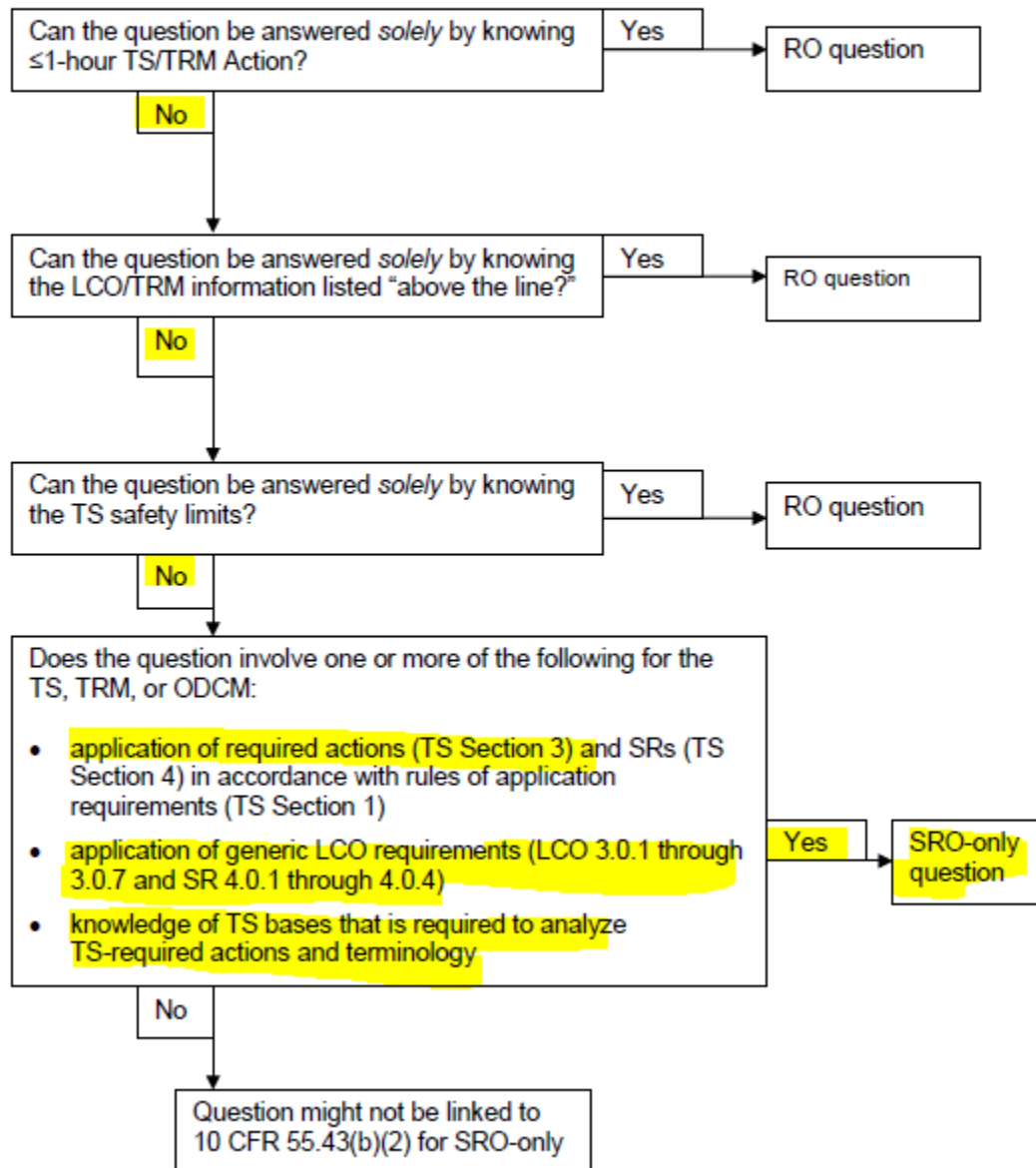
SRO Match Justification:

ES-401

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Attachment 2

Figure 2-1 Screening for SRO-Only Linked to 10 CFR 55.43(b)(2)
(Technical Specifications)



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

92

01-015

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- Rod Control Exercise Testing is in progress per S2.OP-ST.RCS-0001, Reactivity Control System Rod Control Assemblies.
- After withdrawing Control Bank C rods to the ARO position, the RO reports the following;
 - Group Demand Counter for Control Bank C indicates 230 steps.
 - ARPI indication on P-250 indicates one Control Bank C rod at 215 steps.
- The crew enters S2.OP-AB.ROD-0001, Immoveable/Misaligned Control Rods.
- Reactor Engineering confirms the misaligned rod.

Which ONE of the following describes the required action per S2.OP-AB.ROD-0001?

- A. Insert Control Bank C to 215 steps to realign the bank to the misaligned control rod.
- B. Reduce power to less than 75% Rated Thermal Power.
- C. Place the unit in HOT STANDBY within 6 hours.
- D. Power operation at 100% may continue, provided shutdown margin is satisfied.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: B

Explanation / Justification:

- A. Incorrect. This is not allowed per S2.OP-AB.ROD-0001. If the rod is to be recovered, then the rods are aligned to the current bank position. Credible distractor if the SRO believes that moving the bank to the misaligned rods is allowed by procedure, which actually the procedure aligns the misaligned rod to the bank.
- B. Correct. IAW S2.OP-AB.ROD-0001 step 3.37, ONLY one rod indicates misalignment 12 or more steps if greater than 85% RTP, then step 3.41 refers to evaluate TS (including TS 3.1.3.1 movable control assemblies) and step 3.42 directs initiating power reduction to < 75% RTP to comply with TS 3.1.3.1 action c.3.d.
- C. Incorrect. This action is for two misaligned rods. Credible distractor because it is a step in the procedure but for two or more misaligned control rods.
- D. Incorrect. This action is required by TS 3.1.3.1 action c.3, but it is not the only action required. The unit must be reduced to less than 75% RTP as well to comply with TS 3.1.3.1 action c.3.d

Technical References:

S2.OP-AB.ROD-0001 (R11), TS 3.1.3.1

Proposed References to be provided:

None

Learning Objective:

NOS05ABROD01-05, Objective 3, Given a set of initial plant conditions: Describe the final plant condition that is established by the abnormal procedure.

Question Source:

Bank - Salem

Question Cognitive Level:

Comprehension/Analysis

10CFR Part 55 Content:

41.5 /43.5 / 45.3 / 45.13

Level:

SRO

Category/System:

01-Rod Position Indication

K/A #:

014 A2.04

Ability to (a) predict the impacts of the following malfunctions or operations on the RPIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Misaligned rod

Importance:

3.9

Tier/Group

Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the SRO is required to know details of steps in procedure. In this case, the SRO must determine what action is directed per the abnormal procedure for one misaligned control rod.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

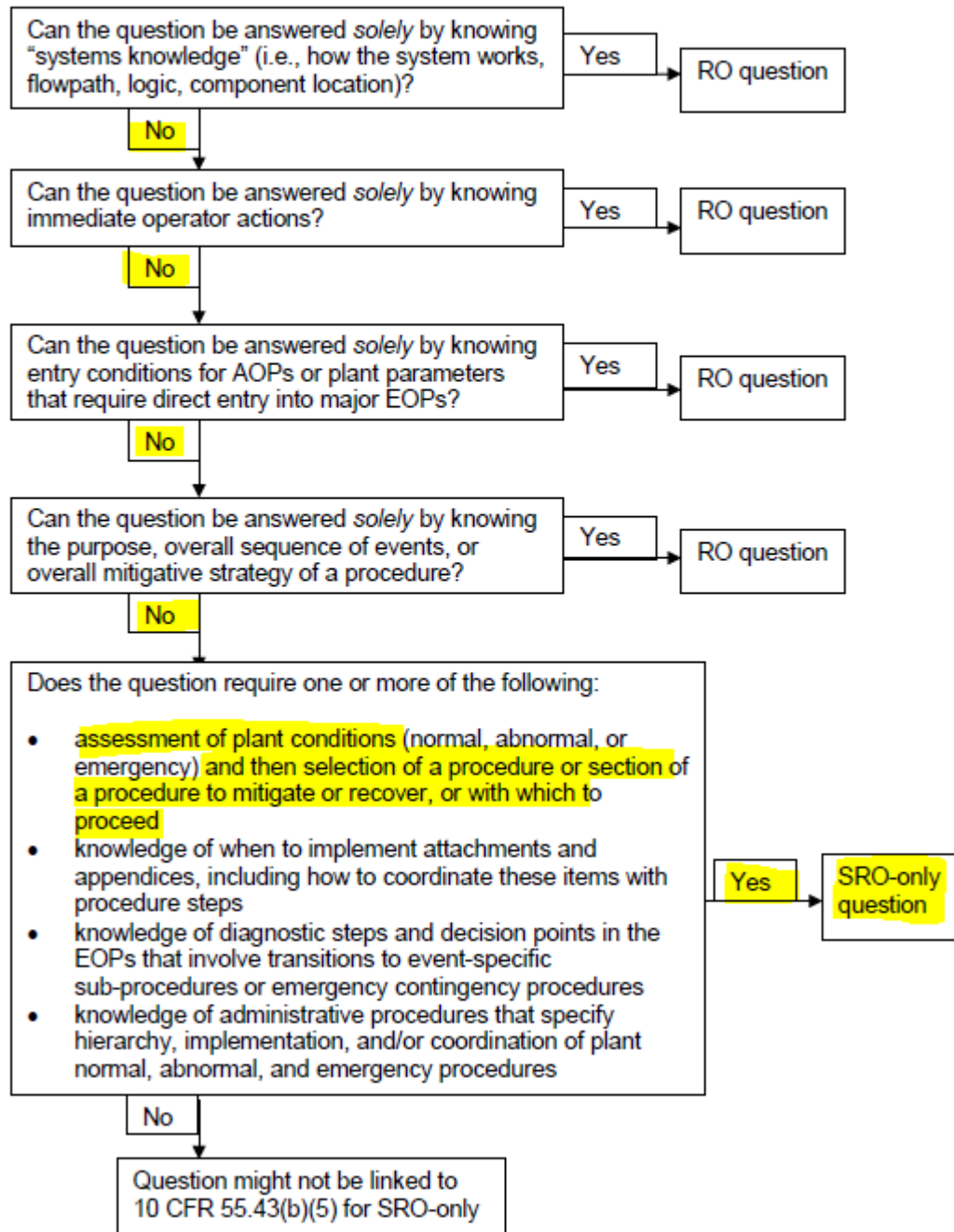
SRO Match Justification:

ES-401

8

Attachment 2

**Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)**



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

93

08-015

Points: 1.00

Given:

- Both Salem Units are operating at 100% Power.
- Hope Creek is operating at 100% Power.
- Fire Brigade current manning consists of 6 qualified personnel.
- During a training exercise on-site, two members of the Fire Brigade are injured and require off-site transportation to Salem Memorial Hospital.

In accordance with the Salem FSAR, which ONE of the following completes both statements?

1. The MINIMUM staffing requirements of the fire brigade __ (1) __ MET.
 2. The fire brigade staffing may be less than the minimum required for a period of time not to exceed __ (2) __ hour(s) provided immediate action is taken to restore the fire brigade to minimum requirements.
-
- A. 1) are
2) 1
 - B. 1) are NOT
2) 1
 - C. 1) are
2) 2
 - D. 1) are NOT
2) 2

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: D

Explanation / Justification:

- A. Incorrect. Part 1 is incorrect. Part 2 is incorrect. Plausible because the SRO may incorrectly determine the minimum staffing requirements for the fire brigade. See Ans. D for further explanation.
- B. Incorrect. Part 1 is correct. Part 2 is incorrect. Plausible because the SRO may believe that the 1 hour action, which is used a lot in Tech Specs, is the correct requirement. See Ans. D for further explanation.
- C. Incorrect. Part 1 is incorrect. Part 2 is correct. Plausible because the SRO may incorrectly determine the minimum staffing requirements for the fire brigade. See Ans. D for further explanation.
- D. Correct. The fire brigade composition may be less than the minimum 5 qualified members (IAW the Salem and Hope Creek UFSAR requirements) for a period of time not to exceed two hours in order to accommodate the unexpected absence of the fire brigade members PROVIDED immediate action is taken to restore the fire brigade to the minimum requirements.

Technical References:	Salem FSAR 9.5.1.1.6 and FP-AA-012 (R6)
Proposed References to be provided:	None
Learning Objective:	None
Question Source:	Bank – Salem 2008 NRC SRO24
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.7 / 41.10 / 43.1 / 45.13
Level:	SRO
Category/System:	08-Fire Protection
K/A #:	086 G2.2.38
	Knowledge of conditions and limitations in the facility license.
Importance:	4.5
Tier/Group	Plant Systems-Tier 2/Group 2

K/A Match: The K/A is matched because the candidate is being asked knowledge of the minimum requirements for the Fire Brigade and what action is required if the minimum staffing requirements is not met. This is a SRO responsibility.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

SRO Match Justification:

ES-401	3	Attachment 2
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II. Examples of Additional Knowledge and Abilities as They Pertain to an SRO License and the 10 CFR 55.43(b) Topics [ES-401, Section D.1.c]

A. Conditions and Limitations in the Facility License [10 CFR 55.43(b)(1)]

Examples of SRO exam items for this topic include the following:

- reporting requirements when the maximum licensed thermal power output is exceeded
- administration of fire protection program requirements, such as compensatory actions associated with inoperable sprinkler systems and fire doors
- required actions necessary when a facility does not meet the administrative controls listed in Technical Specifications (TS), Section 5 or 6, depending on the facility (e.g., shift staffing requirements)
- National Pollutant Discharge Elimination System requirements, if applicable
- processes for TS and final safety analysis report changes

Note: The analysis and selection of required actions for TS Sections 3 and 4 may be more appropriately listed in the following 10 CFR 55.43 topic.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

94

14-044

Points: 1.00

In accordance with S2.OP-IO.ZZ-0007, Cold Shutdown to Refueling, which ONE of the following defueling activities is the **FIRST** evolution performed requiring the direct supervision of the Refueling SRO in Containment because it is a CORE ALTERATION?

- A. Unlatching RCCAs
- B. Lifting the upper internals
- C. Moving the first fuel assembly
- D. Disconnecting CRDMs

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: A

Explanation / Justification:

- A. Correct. IAW S1(2).OP-IO.ZZ-0007, CORE ALTERATION shall be the movement of any fuel, sources, OR reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATION shall NOT preclude completion of movement of a component to a safe conservative location. Unlatching RCCAs and moving fuel assemblies are Core Alterations requiring a refueling SRO present. Unlatching RCCAs is performed prior to the first fuel move.
- B. Incorrect. Moving upper internals is not a Core Alteration. Plausible because this is an evolution performed as part of reactor disassembly.
- C. Incorrect. Moving fuel assembly is a Core Alteration, but it's not the first Core Alteration. Plausible because this is an evolution performed as part of reactor disassembly.
- D. Incorrect. Disconnecting CRDMs is not a Core Alteration. Plausible because this is an evolution performed as part of reactor disassembly and does involve reactivity components, but does not involve the movement of reactivity control components inside the reactor vessel.

Technical References:	S2.OP-IO.ZZ-0007 (R21)
Proposed References to be provided:	None
Learning Objective:	NOS05IOP007, Objective 4, State/Identify the following parameters IAW S2.OP-IO.ZZ-0007(Q), Cold Shutdown to Refueling, and Technical Specifications): Define Core Alterations
Question Source:	Bank - Salem
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.10 / 43.7
Level:	SRO
Category/System:	15-Conduct of Operations
K/A #:	G2.1.35
	Knowledge of fuel handling responsibilities of SROs.
Importance:	3.9
Tier/Group	Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the candidate requires knowledge of administrative procedures regarding defueling activities that require a refueling SRO.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

SRO Match Justification:

ES-401	9	Attachment 2
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F. Procedures and Limitations Involved in Initial Core Loading, Alterations in Core Configuration, Control Rod Programming, and Determination of Various Internal and External Effects on Core Reactivity [10 CFR 55.43(b)(6)]

Some examples of SRO exam items for this topic include the following:

- evaluation of core conditions and emergency classifications based on core conditions
- administrative requirements associated with low-power physics testing processes
- administrative requirements associated with refueling activities, such as approvals required to amend core loading sheets or administrative controls of potential dilution paths and/or activities
- administrative controls associated with the installation of neutron sources
- knowledge of TS bases for reactivity controls

G. Fuel-Handling Facilities and Procedures [10 CFR 55.43(b)(7)]

Some examples of SRO exam items for this topic include the following:

- refuel floor SRO responsibilities
- assessment of fuel-handling equipment SR acceptance criteria
- prerequisites for vessel disassembly and reassembly
- decay heat assessment
- assessment of SRs for the refueling mode
- reporting requirements
- emergency classifications

This list does not include items that the RO may be responsible for at some sites, such as fuel-handling equipment and refueling-related control room instrumentation operability requirements, and AOP immediate actions. For example, an RO is required to stop the refueling process when communication is lost between the control room and the refueling floor; therefore, this task is both an RO and SRO responsibility, not an SRO-only responsibility.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

95

14-055

Points: 1.00

In accordance with OP-AA-300, Reactivity Management, which ONE of the following completes both statements?

1. During significant reactivity changes, the role of the Reactivity Management SRO may be filled by ____ (1) ____.
 2. The Reactivity Management SRO ____ (2) ____ allowed to perform peer checks during reactivity manipulations.
-
- A. 1) EITHER an active OR inactive SRO license holder
 2) is NOT
 - B. 1) EITHER an active OR inactive SRO license holder
 2) is
 - C. 1) ONLY an active SRO license holder
 2) is NOT
 - D. 1) ONLY an active SRO license holder
 2) is

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: C

Explanation / Justification:

- A. Incorrect. First part is incorrect. An individual with an Inactive SRO License is not allowed to perform the function as a Reactivity SRO. Second part is correct. Plausible because the SRO may believe that an Inactive SRO License can still perform the action as a Reactivity Manager SRO.
- B. Incorrect. First part is incorrect. An individual with an Inactive SRO License is not allowed to perform the function as a Reactivity SRO. Second part is incorrect. Reactivity SRO is not allowed to perform peer checks. Plausible because the SRO may believe that an Inactive SRO License can still perform the action as a Reactivity Manager SRO as well as performing peer checks.
- C. Correct. IAW OP-AA-300 Step 4.5 Note, it is acceptable to utilize another SRO to perform the Unit Supervisor Reactivity Management function for significant reactivity changes such as start-up, shutdown, etc. In addition, per Step 4.5.11, during load changes, RCS boron concentration changes, or any other activities that affect reactivity, a second licensed individual should be positioned as such to perform peer checks. Therefore, only an active licensed SRO may fill the position as Reactivity SRO and is NOT allowed to perform peer checks.
- D. Incorrect. First part correct. Second part is incorrect. Reactivity SRO is not allowed to perform peer checks. Plausible because the SRO may believe performing peer checks while acting as the Reactivity Manager SRO is permitted.

Technical References:

OP-AA-300 (R8)

Proposed References to be provided:

None

Learning Objective:

NOS05CONDOP-15, Objective5. Describe requirements for the following Control Room or Field Activities in accordance with applicable Conduct of Operations Manual Administrative Procedures.

Question Source:

Bank – Palo Verde 2018 SRO95

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.1 / 43.6 / 45.6

Level:

SRO

Category/System:

14-Conduct of Operations

K/A #:

G2.1.37

Knowledge of procedures, guidelines, or limitations associated with reactivity management.

Importance:

4.6

Tier/Group

Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the SRO is being asked knowledge or SRO responsibilities for reactivity management. In this case, the SRO is being asked who can fill the position as reactivity SRO and whether this position can perform peer checks IAW operations reactivity management procedure.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional Reference: OP-AA-300

OP-AA-300
Revision 8
Page 7 of 17

4.5 Unit Supervisor (Control Room Supervisor) / Senior Reactor Operator

NOTE: It is acceptable to utilize another SRO to perform the Unit Supervisor Reactivity Management function described below for significant reactivity changes such as start-up, shutdown, etc.

- 4.5.1. **NOTIFIES** the Shift Manager of planned reactivity changes prior to the action.
- 4.5.2. **NOTIFIES** the Reactor Engineer of all planned reactivity changes greater than 1% thermal power.
- 4.5.3. **REVIEWS AND APPROVES** all planned reactivity changes in accordance with approved procedures or instructions developed by Reactor Engineering and communicated on the ReMA Form.
- 4.5.4. **ENSURES** the pre-job brief for the work or activity addresses the potential reactivity effects.
- 4.5.5. **ENSURES** core parameters are maintained within prescribed bands.
- 4.5.6. **ENSURES** trainees manipulating reactivity controls are enrolled in an approved training program and directly supervised by a licensed individual.
- 4.5.7. **ENSURES** positive reactivity additions are performed using only one manual method at a time.
- 4.5.8. **ENSURES** the level of control room activities does not detract from the Reactor Operators' ability to properly monitor the reactor. **[SOER 96-1]**
- 4.5.9. **ENSURES** operators who are in the process of reactivity manipulations are focused on the task and not involved with concurrent activities that would cause a distraction. **[SOER 96-1]**
- 4.5.10. **DIRECTS** reactivity changes **AND ENSURES** reactivity manipulations are made in a deliberate, carefully controlled manner while the reactor is monitored to ensure the desired response is attained. **[SOER 96-1]**
 - During manual control rod movement, the Unit Supervisor (Control Room Supervisor) should be positioned in proximity to the Reactor Operator, typically at the controls.
- 4.5.11. During load changes, RCS boron concentration changes, or any other activities that affect reactivity, a second licensed individual should be positioned as such to perform peer checks.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

SRO Match Justification:

ES-401	9	Attachment 2
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F. Procedures and Limitations Involved in Initial Core Loading, Alterations in Core Configuration, Control Rod Programming, and Determination of Various Internal and External Effects on Core Reactivity [10 CFR 55.43(b)(6)]

Some examples of SRO exam items for this topic include the following:

- evaluation of core conditions and emergency classifications based on core conditions
- administrative requirements associated with low-power physics testing processes
- administrative requirements associated with refueling activities, such as approvals required to amend core loading sheets or administrative controls of potential dilution paths and/or activities
- administrative controls associated with the installation of neutron sources
- knowledge of TS bases for reactivity controls

G. Fuel-Handling Facilities and Procedures [10 CFR 55.43(b)(7)]

Some examples of SRO exam items for this topic include the following:

- refuel floor SRO responsibilities
- assessment of fuel-handling equipment SR acceptance criteria
- prerequisites for vessel disassembly and reassembly
- decay heat assessment
- assessment of SRs for the refueling mode
- reporting requirements
- emergency classifications

This list does not include items that the RO may be responsible for at some sites, such as fuel-handling equipment and refueling-related control room instrumentation operability requirements, and AOP immediate actions. For example, an RO is required to stop the refueling process when communication is lost between the control room and the refueling floor; therefore, this task is both an RO and SRO responsibility, not an SRO-only responsibility.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

96

14-056

Points: 1.00

In accordance with CC-AA-112, Temporary Configuration Changes, which ONE of the following completes both statements?

1. The __ (1) __ is responsible for approving installation of Temporary Configuration Changes (TCCs).
 2. For TCCs in direct support of a maintenance activity, a 50.59 review is required if the TCC is installed for more than __ (2) __ days.
-
- A. 1) Control Room Supervisor
 2) 90
 - B. 1) Design Engineering Manager
 2) 90
 - C. 1) Control Room Supervisor
 2) 30
 - D. 1) Design Engineering Manager
 2) 30

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: A

Explanation / Justification:

- A. Correct. Per CC-AA-112, CRS is responsible for approving installation of TCCs. Per step 2.11.1 temporary configuration changes that are established during the maintenance activity (MR90s), are not subject to a 50.59 review provided that (a) the MR90 is in direct support of maintenance and (b) the MR90 will be installed for no more than 90 days at power.
- B. Incorrect. Part 1 is incorrect. Design Engineering Manager does not approve installation of TCCs. Part 2 is correct. Plausible because the SRO may believe that the Engineering Manager is the correct position to authorize installation of the TCCP since the Engineering Manager is also an approver in the development of the TCCP.
- C. Incorrect. Part 1 is correct. Part 2 is incorrect. TCCs installed greater than 90 days requires a 50.59 review. Plausible because the SRO may believe that 30 days is reasonable amount of time.
- D. Incorrect. Part 1 is incorrect. Design Engineering Manager does not approve installation of TCCs. Part 2 is incorrect. TCCs installed greater than 90 days requires a 50.59 review. Plausible because the SRO may believe that the Engineering Manager is the correct position to authorize installation of the TCCP since the Engineering Manager is also an approver in the development of the TCCP

Technical References:

CC-AA-112 (R18)

Proposed References to be provided:

None

Learning Objective:

NOS05ENGDCP-04, Objective 4, Describe the roles and responsibilities of Operations Personnel with respect to the Engineering Configuration Change Control (Design Change) Process

Question Source:

New

Question Cognitive Level:

Fundamental/Memory

10CFR Part 55 Content:

41.10 / 43.3 / 45.13

Level:

SRO

Category/System:

14-Equipment Control

K/A #:

G2.2.11

Knowledge of the process for controlling temporary design changes

Importance:

3.3

Tier/Group

Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the candidate is being asked knowledge of the TCCP process and who authorizes the installation of TCCs which is a SRO responsibility.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

SRO Match Justification:

ES-401	6	Attachment 2
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C. Facility Licensee Procedures Required To Obtain Authority for Design and Operating Changes in the Facility [10 CFR 55.43(b)(3)]

Some examples of SRO exam items for this topic include the following:

- screening and evaluation processes under 10 CFR 50.59, "Changes, Tests and Experiments"
- administrative processes for temporary modifications
- administrative processes for disabling annunciators
- administrative processes for the installation of temporary instrumentation
- processes for changing the plant or plant procedures

Section IV provides an example of a satisfactory SRO-only question related to this topic.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

97

14-057

Points: 1.00

Given:

- Unit 2 is at 100% Power.
- OHA H-27, GEN VREG TRBL, is LIT
- PO reports that the main generator Automatic Voltage Regulator (AVR) swapped to Manual.

In accordance with OP-AA-108-107-1002, Salem and Hope Creek 500 KV Switchyard Operations Interface Procedure, which one of the following completes both statements?

1. The Shift Manager is required to notify __ (1) __ that the AVR is not in AUTO.
2. Per S2.OP-AR.ZZ-0008, Overhead Annunciator Window H, the operating shift is required to make the notification within __ (2) __ minutes of receiving OHA H-27.

Note: ESOC - Electric System Operation Center

- A. 1) ESOC
2) 15
- B. 1) ESOC
2) 30
- C. 1) Hope Creek
2) 15
- D. 1) Hope Creek
2) 30

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: A

Explanation / Justification:

- A. Correct. IAW OP-AA-108-107-1002 step 3.1.17, the operations shift notifies ESOC when the generator Automatic Voltage Regulator (AVR) is NOT in Automatic mode. Log the times when the station voltage regulation equipment is not in Automatic mode. Also, notifies the ER&T Generation Desk who will make appropriate notifications to PJM. IAW OHA H-27 ARP, 15 minute notification to ESOC is required.
- B. Incorrect. Part 1 is correct. Part 2 is incorrect. Plausible for 30 minutes since it's reasonable to believe that prompt notification of 15 minutes is not warranted for this condition.
- C. Incorrect. Part 1 is incorrect. Part 2 is correct. Plausible because the SRO does make notifications to the Hope Creek control room on conditions that may impact plant operations.
- D. Incorrect. Part 1 is incorrect. Part 2 is incorrect. Plausible because the SRO does make notifications to the Hope Creek control room on conditions that may impact plant operations. Plausible for 30 minutes since it's reasonable to believe that prompt notification of 15 minutes is not warranted for this condition.

Technical References:	OP-AA-108-107-1002 (R2)
Proposed References to be provided:	None
Learning Objective:	None
Question Source:	New
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.10 / 43.5 / 45.13
Level:	SRO
Category/System:	14-Equipment Control
K/A #:	G2.2.17
	Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator.
Importance:	3.8
Tier/Group	Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the candidate requires knowledge of the notification requirements to ESOC (load dispatcher) when the automatic voltage regulator is in Manual and the time requirements to complete the notifications. This is a SRO responsibility to ensure this notification is completed.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

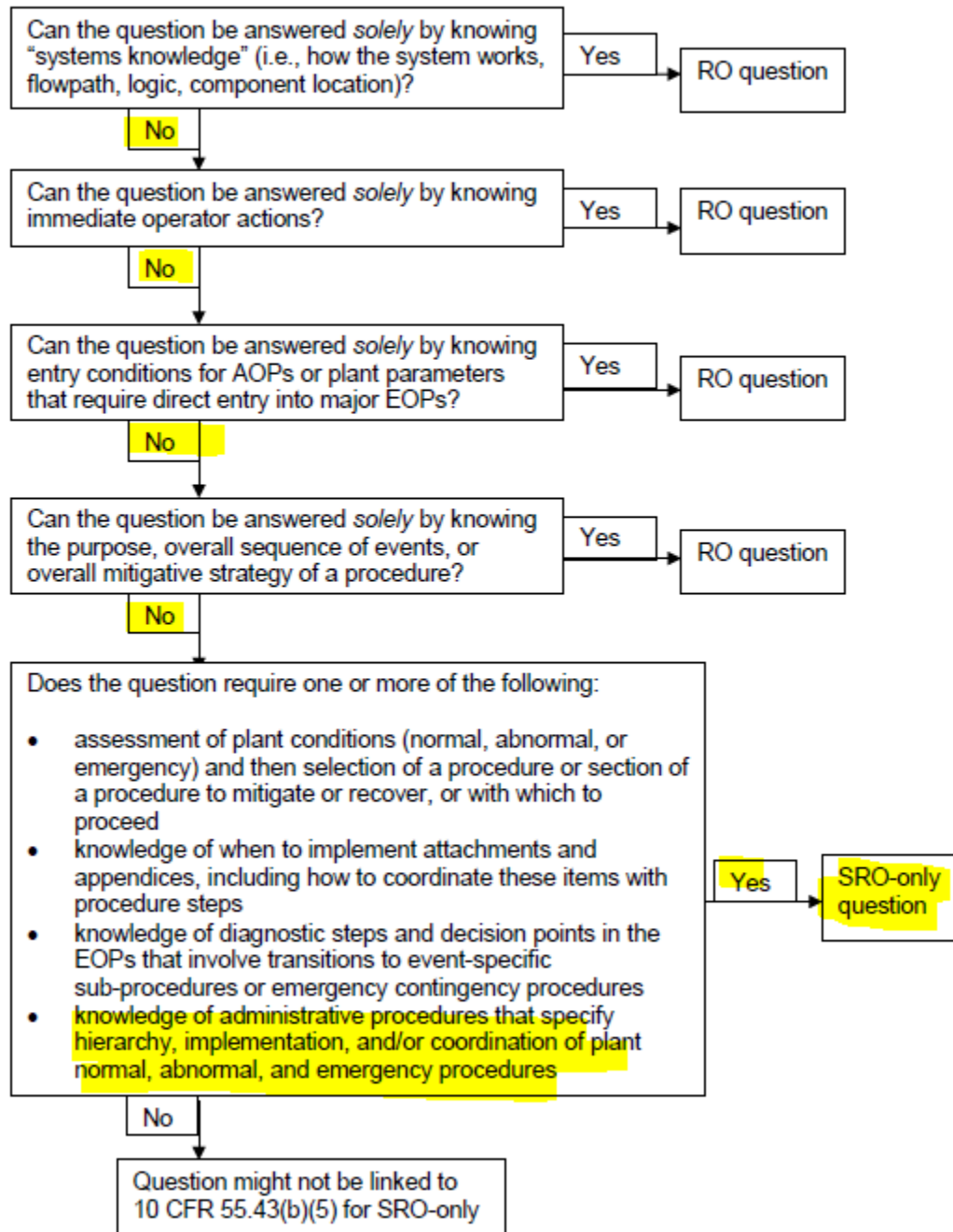
SRO Match Justification:

ES-401

8

Attachment 2

**Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)**



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

98

14-058

Points: 1.00

Given:

- Unit 2 is in MODE 5.
- A Containment Purge is in progress in accordance with S2.OP-SO.WG-0006, Containment Purge to Plant Vent.

Which ONE of the following completes both statements concerning Containment Purge administrative requirements?

1. A temporary termination of Containment Purge of short duration __(1)__ permitted without the need for a new effluent permit.
 2. Reinstatement of Containment Purge must be authorized by the __(2)__.
-
- A. 1) is
2) RP Supervisor
 - B. 1) is
2) Control Room Supervisor
 - C. 1) is NOT
2) RP Supervisor
 - D. 1) is NOT
2) Control Room Supervisor

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: B

Explanation / Justification:

- A. Incorrect. Part 1 is correct. Part 2 is incorrect. See Ans. B for further explanation. Plausible because Rad Pro Supervision authorizations are required for other activities involving radiation release or exposure.
- B. Correct. IAW S2.OP-SO.WG-0006, P&L step 3.2, a temporary termination of Containment Purge, without the need for a new effluent permit, is acceptable provided that the temporary termination is of short duration; for example ≈ 4 hours, AND there is operational assurance that no radiological changes to the containment environment has occurred. Per Attachment 2, reinstatement of purge requires SM or CRS approval.
- C. Incorrect. Part 1 is incorrect. Part 2 is incorrect. See Ans. B for further explanation. Plausible because Rad Pro Supervision authorizations are required for other activities involving radiation release or exposure.
- D. Incorrect. Part 1 is incorrect. Plausible because the SRO may believe that a new effluent permit will be required anytime the purge is terminated. Part 2 is correct. See Ans. B for further explanation.

Technical References:	S2.OP-SO.WG-0006 (R30)
Proposed References to be provided:	None
Learning Objective:	None
Question Source:	New
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.13 / 43.4 / 45.10
Level:	SRO
Category/System:	14-Radiation Control
K/A #:	G2.3.6
	Ability to approve release permits.
Importance:	3.8
Tier/Group	Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the candidate requires knowledge of procedural requirements to temporarily terminate Containment Purge and then who authorizes the reinstatement of purge.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

SRO Match Justification:

D. Radiation Hazards That May Arise during Normal and Abnormal Situations, including Maintenance Activities and Various Contamination Conditions [10 CFR 55.43(b)(4)]

Some examples of SRO exam items for this topic include the following:

- process for gaseous/liquid release approvals (i.e., release permits)
- analysis and interpretation of radiation and activity readings as they pertain to the selection of administrative, normal, abnormal, and emergency procedures
- analysis and interpretation of coolant activity, including comparison to emergency plan criteria and/or regulatory limits

SRO-only knowledge should not be claimed for questions that can be answered *solely* based on RO knowledge of radiological safety principles (e.g., radiation work permit requirements, stay time, and DAC hours).

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

99

14-059

Points: 1.00

Given:

- Units 1 and 2 are at 100% Power.
- A fire is reported in the 2A EDG engine room.
- The Fire Brigade Leader requests off-site assistance to combat the fire.

Which ONE of the following authorizations, by position, is required prior to requesting off-site fire fighting assistance?

- A. Security Shift Manager
- B. Control Room Supervisor
- C. Operations Shift Manager
- D. Fire Department Superintendent

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: C

Explanation / Justification:

(A) Incorrect. Plausible because Security does have to authorize vehicles on-site, however, the procedure specifically states that the Shift Manager (SM) position is required to request for off-site assistance.

(B) Incorrect. Plausible because the CRS would be performing the procedure and you would believe the CRS would authorize this action, however, the procedure specifically states that the SM position is required to request for off-site assistance.

(C) Correct. Per S2.OP-AB.FIRE-0001 Attachment 1, Step 3 Caution, if the Fire Department requests the control room to obtain off-site firefighting assistance, permission should be obtained from EDO/SM prior to calling for off-site assistance.

(D) Incorrect. Plausible because the SRO may believe that the Fire Department Superintendent position is required to request for off-site assistance.

Technical References:	S2.OP-AB.FIRE-0001 (R12)
Proposed References to be provided:	None
Learning Objective:	NOS05ABFIRE-05, Objective 3, Describe, in general terms, the actions taken in S1(2).OP-AB.FIRE-0001(Q) and S1(2).OP-AB.FIRE-0002(Q) and the bases for those actions
Question Source:	New
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.10 to 43.5 / 45.12
Level:	SRO
Category/System:	14-Emergency Procedures/Plan
K/A #:	G2.4.26 Knowledge of facility protection requirements, including fire brigade and portable firefighting equipment usage.
Importance:	3.6
Tier/Group	Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the question requires knowledge of the facility fire protection requirements and who can authorize off-site firefighting assistance per S2.OP-AB.FIRE-0001.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Additional References: S2.OP-AB.FIRE-0001

S2.OP-AB.FIRE-0001(Q)

ATTACHMENT 1

CONTINUOUS ACTION SUMMARY - FIRE DEPARTMENT SUPPORT

- ___ 1.0 IF AT ANY TIME a report of personnel injury is receive,
THEN NOTIFY the SM/CRS AND IMPLEMENT SC.FP-EO.ZZ-0003(Z),
Salem Station Control Room Medical Emergency Response.

NOTE

- ___ In the event of a radiological emergency, the Nuclear Fire Protection Supervisor should obtain permission from EDO/SM prior to calling for offsite assistance.

- ___ 2.0 IF AT ANY TIME notification is received that off-site fire fighting assistance is responding to the site,
THEN NOTIFY Security of the off-site assistance notification and to be prepared to facilitate access of off-site emergency vehicles to the Protected Area.

CAUTION

- ___ If the Fire Department Requests the Control Room to obtain off-site fire fighting assistance, permission should be obtained from EDO/SM prior to calling for offsite assistance.

- ___ 3.0 IF AT ANY TIME the Fire Department requests off-site fire fighting assistance,
THEN:
- ___ 3.1 **NOTIFY** Salem County Emergency Services Dispatchers (9-911 or NETS Phone X-5402) AND REQUEST fire fighting support as specified by Fire Department.
- ___ 3.2 **NOTIFY** Fire Department that fire fighting assistance calls are completed.
- ___ 4.0 IF AT ANY TIME the Fire Department requests a "Recall",
THEN NOTIFY Security's Secondary Alarm Station (X-2255) to implement FP-AA-0002, Fire Department Emergency Call-Out Process.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

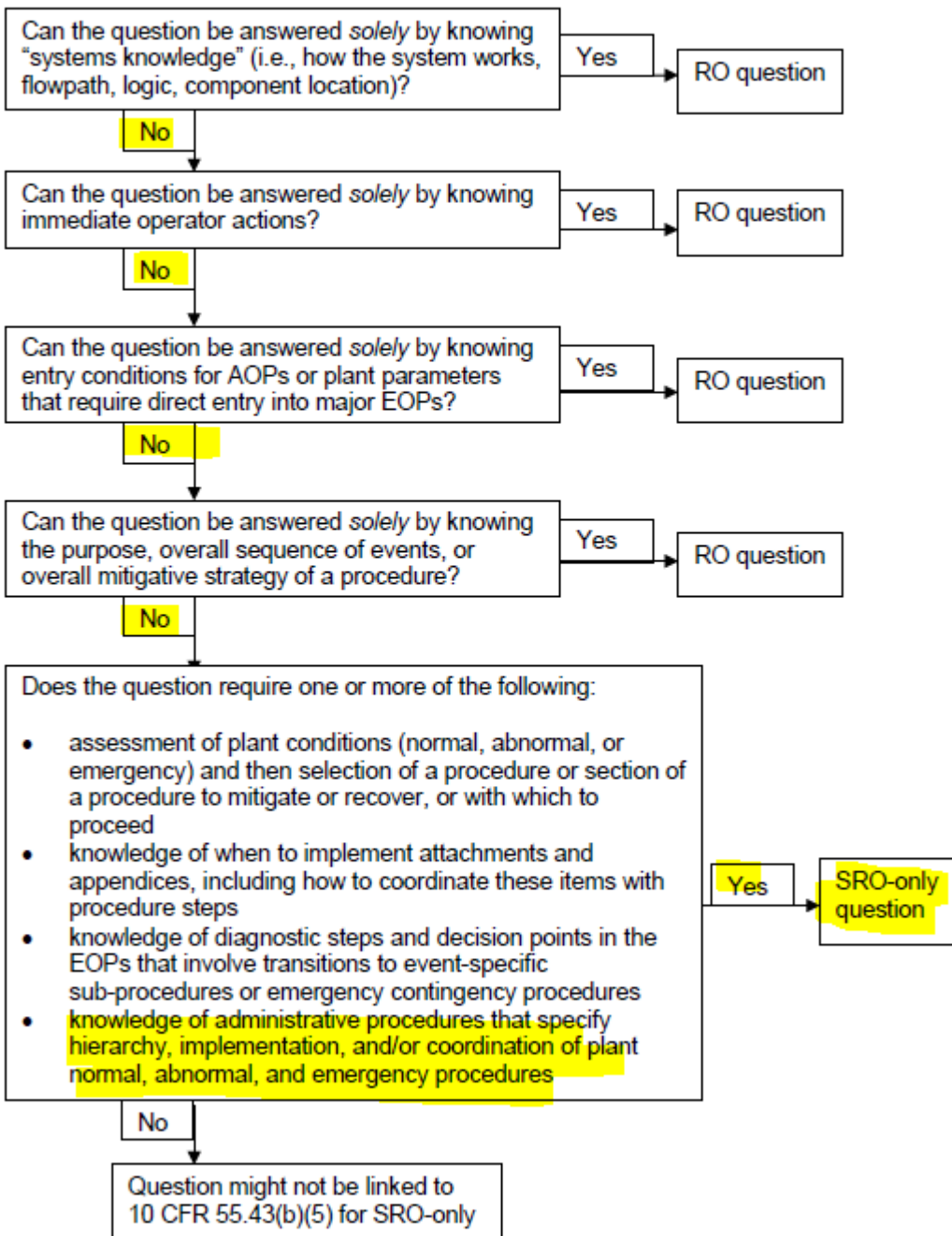
SRO Match Justification:

ES-401

8

Attachment 2

**Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)**



SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

100

15-016

Points: 1.00

In accordance with NC.EP-EP.ZZ-0102, Emergency Coordinator Response, complete the following statement regarding accountability.

The Emergency Response Organization (ERO) accountability process must be completed within a MAXIMUM of __(1)__ minutes from the time a(an) __(2)__ is declared.

- A. 1) 30
 2) Alert
- B. 1) 45
 2) Alert
- C. 1) 45
 2) Site Area Emergency
- D. 1) 30
 2) Site Area Emergency

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

Answer: D

Explanation / Justification:

- A. Incorrect. Part 1 is correct. Part 2 is incorrect. Plausible because Assembly is performed when an Alert is declared.
- B. Incorrect. Part 1 is incorrect. Part 2 is incorrect. Plausible because Assembly is performed when an Alert is declared.
- C. Incorrect. Part 1 is incorrect. Accountability is required to be performed within 30 minutes. Part 2 is correct.
- D. Correct. IAW NC.EP-EP.ZZ-0102, Accountability must be performed when a Site Area Emergency (SAE) has been declared and must be completed within 30 minutes from the time of declaration.

Technical References:	NC.EP-EP.ZZ-0102 (R27)
Proposed References to be provided:	None
Learning Objective:	None
Question Source:	Bank - Salem
Question Cognitive Level:	Fundamental/Memory
10CFR Part 55 Content:	41.10 / 43.5 / 45.11
Level:	SRO
Category/System:	15-Emergency Procedures/Plan
K/A #:	G2.4.38 Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required.
Importance:	4.4
Tier/Group	Generic Knowledge and Abilities-Tier 3

K/A Match: The K/A is matched because the SRO is being asked the responsibilities that the Emergency Coordinator (EC) may have to implement during an emergency. Specifically, in this case the SRO needs to know when to implement accountability and the time requirements to complete when acting as the EC.

SRO EXAMINATION ANSWER KEY

SALEM 2022 NRC Exam (20-01 ILOT) – (Rev 1)

SRO Match Justification

ES-401

8

Attachment 2

**Figure 2-2 Screening for SRO-Only Linked to 10 CFR 55.43(b)(5)
(Assessment and Selection of Procedures)**

