# EXAMINATION ANSWER KEY

Salem ILOT 16-01 RO NRC Exam – (**APPROVED**)

**1** **Points: 1.00**

Given:

- Unit 1 is at 25% Reactor Power and rising due to a plant startup

At time 17:00:00

- The 13 RCP shaft shears

At **17:00:30**, which ONE of the following completes the statements below?

The Reactor is ___(1)___.

Normal full PZR spray capability ___(2)___ available.

| | **(1)** | **(2)** |
|---|---|---|
| A. | tripped | is **NOT** |
| B. | tripped | is |
| C. | at power | is **NOT** |
| D. | at power | is |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, a reactor trip on RCS low flow has different coincidences based on reactor power level. Since the reactor is above P-7 (10% power) and there is a reactor trip based on RCS low flow when the reactor is > P-7, the candidate could incorrectly conclude that at 12:00:30, the reactor is tripped. Part 2 is correct.

B. Incorrect but plausible. For Part 1, a reactor trip on RCS low flow has different coincidences based on reactor power level. Since the reactor is above P-7 (10% power) and there is a reactor trip based on RCS low flow when the reactor is > P-7, the candidate could incorrectly conclude that at 12:00:30, the reactor is tripped. For Part 2, since many other systems only require 1 pump to provide 100% flow (e.g. CCW, SW, SI, CS, CVCS and RHR), the candidate could incorrectly

C. **Correct.** For Part 1, when the 13 RCP shaft shears at 17:00:00, the RCS low flow reactor trip setpoint will be met for only 13 Loop. Since the reactor is below P-8 (36% power), the reactor will not trip. For Part 2, PZR spray is produced from the 11 and 13 loop D/Ps (created by the 13 and 11 RCPs). However, 13 RCP actually produces most of the spray flow. Consequently, when 13 RCP trips, full PZR spray flow is not available.

D. Incorrect but plausible. Part 1 is correct. For Part 2, since many other systems only require 1 pump to provide 100% flow (e.g. CCW, SW, SI, CS, CVCS and RHR), the candidate could incorrectly

**Question Number:** 1

**Tier:** 2 Group 1

**K/A:** 003 Reactor Coolant Pump System-K3.01

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

**Importance Rating:** 3.7

**10 CFR Part 55:** 41.7 / 45.6

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must how a trip of the 13 RCP will affect the RCS / PZR pressure control system.

**SRO Justification:** N/A

**Technical References:** 2-EOP-FRCE-3 ( LICENSED OPERATOR FLUENCY LIST)

**Proposed references to be provided:** None

**Learning Objective:** NOS05FLUNCY-09 ( LICENSED OPERATOR FLUENCY LIST)

1 State those items in the Licensed Operator Fluency List

A. Permissives and Control Grade Interlocks

B. Reactor Trips

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**2** **Points: 1.00**

Given:

- Unit 2 is at 95% Reactor Power and stable
- The Rod Bank Selector Switch is in MANUAL
- The 21 **MIXED BED DEMINERALIZER** is in service

At time 20:00:00

- 2CC71 (Letdown Heat Exchanger Component Cooling Water Outlet Control Valve) malfunctions causing the letdown temperature to rise and stabilize at 130 °F

Which ONE of the following completes the statements below?

When in service, the mixed bed demineralizer is used to ___(1)___.

As the 21 **MIXED BED DEMINERALIZER** heats up, RCS TAVG will **INITIALLY** ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | provide Lithium control and help maintain RCS pH | rise |
| B. | provide Lithium control and help maintain RCS pH | lower |
| C. | remove chemical impurities from the RCS | rise |
| D. | remove chemical impurities from the RCS | lower |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the Cation Demineralizer is used to remove Lithium from the RCS and to maintain RCS pH. Consequently, the candidate could incorrectly conclude that mixed bed demineralizer is used to help maintain RCS pH. For Part 2, the candidate could incorrectly conclude that the demineralizer will actually absorb more boron as it heats up which would cause TAVG to rise.

B. Incorrect but plausible. For Part 1, the Cation Demineralizer is used to remove Lithium from the RCS and to maintain RCS pH. Consequently, the candidate could incorrectly conclude that mixed bed demineralizer is used to help maintain RCS pH. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that the demineralizer will actually absorb more boron as it heats up which would cause TAVG to rise.

D. **Correct.** For Part 1, when is service, the mixed bed demineralizer is used to remove chemical impurities from the RCS. For Part 2, boron removal more efficient at lower temperatures. Consequently, the demineralizer will release boron as temperature rises resulting in a unplanned reactivity change. With more boron in the RCS, TAVG will lower to offset the negative reactivity inserted into the core when the demineralizer heated up and released boron.

**Question Number:** 2

**Tier:** 2 Group 1

**K/A:** 004 Chemical and Volume Control System-K6.20

Knowledge of the effect of a loss or malfunction on the following CVCS components: Function of demineralizer, including boron loading and temperature limits

**Importance Rating:** 2.5

**10 CFR Part 55:** 41.7 / 45.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must how a malfunction of the CVCS mixed bed demineralizer (demineralizer heats up) affects performance of the demineralizer to include changes in RCS TAVG.

**SRO Justification:** N/A

**Technical References:** NOS05CVCS00-17 (CHEMICAL AND VOLUME CONTROL SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CVCS00-17 ( CHEMICAL AND VOLUME CONTROL SYSTEM )

4 Describe the function and how their normal and abnormal operations affects the Chemical and Volume Control System:

xii Demineralizers (Mixed Bed, Cation, and Deborating)

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**3** **Points: 1.00**

Which ONE of the following completes the statement below?

The Residual Heat Removal System Pumps take suction from the ___(1)___ Hot Leg and can be aligned to discharge into the ___(2)___ Hot Legs.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 21 | 21 and 22 |
| B. | 21 | 23 and 24 |
| C. | 22 | 21 and 22 |
| D. | 22 | 23 and 24 |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Since the RHR Pumps takes suction from an RCS hot leg and can be aligned to discharge into RCS two hot legs and selection of the 4 RCS loops is plausible.

B. **Correct.** The Residual Heat Removal System Pumps take suction from the 21 Hot Leg and can be aligned to discharge into the 23 and 24 Hot Legs.

C. Incorrect but plausible. Since the RHR Pumps takes suction from an RCS hot leg and can be aligned to discharge into RCS two hot legs and selection of the 4 RCS loops is plausible.

D. Incorrect but plausible. Since the RHR Pumps takes suction from an RCS hot leg and can be aligned to discharge into RCS two hot legs and selection of the 4 RCS loops is plausible.

**Question Number:** 3

**Tier:** 2 Group 1

**K/A:** 005 Residual Heat Removal System (RHRS)-K1.09

Knowledge of the physical connections and/or cause-effect relationships between the RHRS and the following systems: RCS

**Importance Rating:** 3.6

**10 CFR Part 55:** 41.2 to 41.9 / 45.7 to 45.8

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must the physical connections of the RHR System (suction and discharge)

**SRO Justification:** N/A

**Technical References:** NOS05RHR000-16 (RESIDUAL HEAT REMOVAL SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05RHR000-16 (RESIDUAL HEAT REMOVAL SYSTEM)

3 Draw a one-line diagram of the Residual Heat Removal System which indicates the following: Major Components

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**4** **Points: 1.00**

Given:

- A LBLOCA has occurred
- The crew is performing 2-EOP-LOCA-3 (Transfer To Cold Leg Recirculation)
- 21SJ44 (Containment Sump Suction Valve) can **NOT** be opened

Which ONE of the following completes the statements below?

The crew was required to realign ECCS valves for cold leg recirculation as soon as the RWST Level ___(1)___ alarm was **FIRST** validated.

With 21SJ44 closed, ___(2)___ RHR Pump(s) will be able to draw suction from the Containment Sump and discharge ECCS flow into the RCS cold legs and to the suctions of the SI Pumps and Centrifugal Charging Pumps.

| | **(1)** | **(2)** |
|---|---|---|
| A. | LO | **ONLY** 22 |
| B. | LO | **BOTH** |
| C. | LO-LO | **ONLY** 22 |
| D. | LO-LO | **BOTH** |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1, IAW EOP-LOCA-1, the crew is required to realign ECCS valves for cold leg recirculation as soon as the RWST Level LO alarm was FIRST validated. For Part 2, with 21SJ44 closed only 22 RHR pump will be able to draw suction from the Containment Sump and discharge ECCS flow into the RCS cold legs and to the suctions of the SI Pumps and CCPs.

B. Incorrect but plausible. Part 1 is correct. For Part 2, the valve arrangements for the ECCS pumps to take suction from a water source are not standardized. For example, if SJ1 (RWST Suction Valve to CCP) had failed to open, BOTH CCPs could take suction from the RWST. Consequently, the candidate could incorrectly the containment suction valves to the RHR pumps are arranged similarly to the SJ1 and SJ2. This would cause the candidate to further incorrectly deduce that with 21SJ44 closed, BOTH RHR Pump(s) will be able to draw suction from the Containment Sump and discharge ECCS flow into the RCS cold legs and to the suctions of the SI Pumps and CCPs.

C. Incorrect but plausible. For Part 1, there is a RWST Level LO-LO alarm. Consequently, the candidate could incorrectly conclude that RWST Level LO alarm only warns the crew to prepare for transferring ECCS flow to cold leg recirculation and the transfer will actually occur when the RWST Level LO-LO alarm is validated. Part 2 is correct.

D. Incorrect but plausible. For Part 1, there is a RWST Level LO-LO alarm. Consequently, the candidate could incorrectly conclude that RWST Level LO alarm only warns the crew to prepare for transferring ECCS flow to cold leg recirculation and the transfer will actually occur when the RWST Level LO-LO alarm is validated. For Part 2, the valve arrangements for the ECCS pumps to take suction from a water source are not standardized. For example, if SJ1 (RWST Suction Valve to CCP) had failed to open, BOTH CCPs could take suction from the RWST. Consequently, the candidate could incorrectly the containment suction valves to the RHR pumps are arranged similarly to the SJ1 and SJ2. This would cause the candidate to further incorrectly deduce that with 21SJ44 closed, BOTH RHR Pump(s) will be able to draw suction from the Containment Sump and discharge ECCS flow into the RCS cold legs and to the suctions of the SI Pumps and CCPs.

**Question Number:** 4

**Tier:** 2 Group 1

**K/A:** 006 Emergency Core Cooling System (ECCS)-K6.05

Knowledge of the effect of a loss or malfunction on the following will have on the ECCS: HPI/LPI cooling water

**Importance Rating:** 3.0

**10 CFR Part 55:** 41.7 / 45.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how a malfunction of LPI water (containment suction valve fails close) during cold leg recirculation affects ECCS.

**SRO Justification:** N/A

**Technical References:** 2-EOP-LOCA-3 (Transfer To Cold Leg Recirculation)
NOS05ECCS00-09 ( EMERGENCY CORE COOLING SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ECCS00-09 ( EMERGENCY CORE COOLING SYSTEM)

3 Draw a one-line diagram of the Emergency Core Cooling System which indicates the following:

a. Major Emergency Core Cooling System Components

b. Major Emergency Core Cooling System Flowpaths

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**5** **Points: 1.00**

Given:

- Unit 2 is at 80% Reactor Power and stable
- 21 Charging Pump is in service
- PZR Pressure and Level are lowering
- Containment Pressure is rising

At time 11:00

- PZR Pressure is 1864 psig and lowering
- Containment Pressure is 4.1 psig

At time 11:08

- PZR Pressure is 1764 psig and lowering
- Containment Pressure is 5.2 psig

Which ONE of the following completes the statements below?

___(1)___ is the earliest time that an **AUTOMATIC** Safety Injection occurred.

The PZR Heaters will de-energize ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 11:00 | based PZR low level |
| B. | 11:00 | when Safety Injection is actuated |
| C. | 11:08 | based PZR low level |
| D. | 11:08 | when Safety Injection is actuated |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1, an automatic Safety Injection occurs when PZR Pressure is < 1765 psig or Containment Pressure is > 4 psig). Consequently, 11:00:00 is the earliest time that an automatic Safety Injection occurred. For Part 2, the PZR heater will de-energize based on PZR low level (at 17%).

B. Incorrect but plausible. Part 1 is correct. For Part 2, since the SI signal causes several automatic actions, the candidate could incorrectly conclude that the PZR Heaters de-energize when SI is actuated.

C. Incorrect but plausible. For Part 1, the candidate may recognize that at 11:08:00, the automatic Safety Injection setpoint for low RCS pressure has been reached and incorrectly determine that 11:08:00 is the earliest time that an automatic Safety Injection setpoint was reached. Part 2 is correct.

D. Incorrect but plausible. For Part 1, the candidate may recognize that at 11:08:00, the automatic Safety Injection setpoint for low RCS pressure has been reached and incorrectly determine that 11:08:00 is the earliest time that an automatic Safety Injection setpoint was reached. . For Part 2, since the SI signal causes several automatic actions, the candidate could incorrectly conclude that the PZR Heaters de-energize when SI is actuated.

**Question Number:** 5

**Tier:** 2 Group 1

**K/A:** 006 Emergency Core Cooling System (ECCS)-K6.05-EA4.09

Ability to manually operate and/or monitor in the control room: PZR LCS and PZR PCS

**Importance Rating:** 4.1

**10 CFR Part 55:** 41.7 / 45.5 to 45.8

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know what causes the PZR heaters to de-energize as PZR level & pressure lower and Safety Injection actuates.

**SRO Justification:** N/A

**Technical References:** NOS05FLUNCY-09 ( LICENSED OPERATOR FLUENCY LIST)
NOS05ECCS00-09 ( EMERGENCY CORE COOLING SYSTEM)
NOS05PZRP&L-10 (PRESSURIZER PRESSURE AND LEVEL CONTROL)

**Proposed references to be provided:** None

**Learning Objective:** NOS05PZRP&L-10 (PRESSURIZER PRESSURE AND LEVEL CONTROL)

5 Outline the interlocks associated with the following Pressurizer Pressure and Level Control System components:

a. P-7 and the Pressurizer Low-Pressure Reactor Trip
b. P-11 and the Pressurizer Low-Pressure Safety Injection Block
c. P-7 and the High Level Reactor Trip
d. Low-temperature interlock with PORVs
e. Isolation of Letdown Orifices
f. Low-level Pzr Heater Cutout
g. +5% level increase/Backup heaters on

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** x
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**6** **Points: 1.00**

Given:

- Cooling of the PRT is required

Which ONE of the following completes the statements below?

Cooling of the PRT can be initiated MANUALLY ___(1)___.

During PRT Cooling, the PRT is drained directly to the ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | or AUTOMATICALLY | RCDT |
| B. | or AUTOMATICALLY | RCDT pump suction header |
| C. | **ONLY** | RCDT |
| D. | **ONLY** | RCDT pump suction header |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Form Part 1, since there are many other processes that have automatic functions, the candidate could incorrectly conclude that PRT Cooling can be performed manually and automatically. For Part 2, since the draining of the PRT is ultimately pumped from the RCDTs, the candidate could incorrectly conclude that when the PRT is drained via PR14 directly into the RCDT (like so many other water sources).

B. Incorrect but plausible. Form Part 1, since there are many other processes that have automatic functions, the candidate could incorrectly conclude that PRT Cooling can be performed manually and automatically. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, since the draining of the PRT is ultimately pumped from the RCDTs, the candidate could incorrectly conclude that when the PRT is drained via PR14 directly into the RCDT (like so many other water sources).

D. **Correct.** For Part 1, PRT cooling is accomplished by a feed (via 2WR82) and bleed (via 2PR14) of the tank. Operation of WR82 and PR14 can only be performed manually. For Part 2, during PRT Cooling, the PRT is drained directly to the RCDT pump suction header.

**Question Number:** 6

**Tier:** 2 Group 1

**K/A:** 007 Pressurizer Relief Tank/Quench Tank System (PRTS)-K4.01

Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following: Quench tank cooling

**Importance Rating:** 2.6

**10 CFR Part 55:** 41.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know that a design feature of PRT cooling is that cooling can only be initiated manually with no automatic feature

**SRO Justification:** N/A

**Technical References:** NOS05PZRPRT-06 ( PRESSURIZER AND PRESSURIZER RELIEF TANK)

**Proposed references to be provided:** None

**Learning Objective:** NOS05PZRPRT-06 ( PRESSURIZER AND PRESSURIZER RELIEF TANK)

3 Identify and describe the Control Room controls, indications, and alarms associated with the Pressurizer and Pressurizer Relief Tank, including:

a. The Control Room location of Pressurizer and Pressurizer Relief Tank control bezels and indications. (Licensed Operator & STA only)

b. The function of each Pressurizer and Pressurizer Relief Tank Control Room control and indication. (Licensed Operator & STA only)

c. The effect each Pressurizer and Pressurizer Relief Tank control has upon Pressurizer and Pressurizer Relief Tank components and operation. (Licensed Operator & STA only)

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

**Question History:**

**Comments:**

**7** **Points: 1.00**

Given:

- Unit 2 is in MODE 3

At time 15:00:00

- **BOTH** 2R17A/B (Component Cooling Process Monitors) have just come into HI alarm

At time 15:01:00

- The crew has also initiated S2.OP-AB.CC-0001 (Component Cooling Abnormality) and S2.OP-AB.RAD-0001 (Abnormal Radiation)

At time 15:15:00

- Chemistry has verified a rise in Component Cooling activity

Which ONE of the following completes the statements below?

At **15:00:30**, 2CC149 (Surge Tank Vent Valve) is ___(1)___.

If CCW Surge Tank overflows, then the in-service Waste Holdup Tank ___(2)___ will become contaminated.

| | **(1)** | **(2)** |
|---|---|---|
| A. | open | and the 22 ABV Exhaust Filter Unit |
| B. | open | **ONLY** |
| C. | closed | and the 22 ABV Exhaust Filter Unit |
| D. | closed | **ONLY** |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Form Part 1, 2CC149 is normally open and the candidate could not recall that 2CC149 closes when 2R17A/B being in alarm. Consequently at 15:00:30, the candidate could incorrectly conclude that 2CC149 is open. Part 2 is correct.

B. Incorrect but plausible. Form Part 1, 2CC149 is normally open and the candidate could not recall that 2CC149 closes when 2R17A/B being in alarm. Consequently at 15:00:30, the candidate could incorrectly conclude that 2CC149 is open. For Part 2, the candidate could fail to recognize the 22 ABV Exhaust Filter Unit will also become contaminated when the CCW Surge Tank overflows.

C. **Correct.** For Part 1, 2CC149 automatically closes on high radiation alarm on 2R17A/B. For Part 2, IAW S2.OP-AB.CC-0001 Step 3.8 NOTE, "Allowing CCW Surge Tank to overflow will contaminate the in-service Waste Holdup Tank and the 22 ABV Exhaust Filter Unit".

D. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could fail to recognize the 22 ABV Exhaust Filter Unit will also become contaminated when the CCW Surge Tank overflows.

**Question Number:** 7

**Tier:** 2 Group 1

**K/A:** 008 Component Cooling Water System (CCWS)-A2.04

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: PRMS alarm.

**Importance Rating:** 3.3

**10 CFR Part 55:** 41.5 / 43.5 / 45.3 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must be able to predict how the CCWS will respond when 2R17A/B (Component Cooling Process Monitors) come into alarm. Additionally, the candidate must also know what components will be contaminated if the CCWS Surge Tank Overflows.

**SRO Justification:** N/A

**Technical References:** NOS05CCW000-11 (COMPONENT COOLING WATER)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CCW000-11 (COMPONENT COOLING WATER)

3 Describe how the following components impact the Component Cooling Water System during normal and abnormal conditions:

- CC-149, Surge Tank Vent Valve

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**8** **Points: 1.00**

Given:

- The crew is attempting to maintain the PZR water saturated so 13 RCP can be restarted in accordance with 1-EOP-TRIP-5 (Natural Circulation Rapid Cooldown Without RVLIS) Step 4
- PZR Pressure is 2005 psig
- PZR Liquid Temperature is 635 °F

Which ONE of the following completes the statements below?

The PZR is ___(1)___.

In accordance with the 1-EOP-TRIP-5, the reason for establishing and maintaining saturation conditions in the PZR is to limit the PZR pressure ___(2)___ upon RCP restart.

| | **(1)** | **(2)** |
|---|---|---|
| A. | subcooled | rise |
| B. | subcooled | reduction |
| C. | water saturated | rise |
| D. | water saturated | reduction |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, there are concerns for pressure to rise when an RCP is started when the plant is water solid. Consequently, the candidate could incorrectly that the reason for establishing and maintaining saturation conditions in the PZR is to limit the PZR pressure increase upon RCP restart IAW 1-EOP-TRIP-5.

B. **Correct.** For Part 1, with PZR Pressure at 2005 psig (2020 psia), saturation temperature is 637 °F. Consequently, with PZR liquid temperature at 635 °F, the PZR is NOT water saturated. For Part 2, IAW 1-EOP-TRIP-5, "To limit the pressure decrease upon RCP restart, saturated conditions should first be established in the PZR."

C. Incorrect but plausible. For Part 1, since the steam tables are listed in psia (not psig), the candidate could enter the steam tables at 1990 psia and incorrectly interpolate to determine that the PZR is watere saturated. For Part 2, there are concerns for pressure to rise when an RCP is started when the plant is water solid. Consequently, the candidate could incorrectly that the reason for establishing and maintaining saturation conditions in the PZR is to limit the PZR pressure increase upon RCP restart IAW 1-EOP-TRIP-5.

D. Incorrect but plausible. For Part 1, since the steam tables are listed in psia (not psig), the candidate could enter the steam tables at 1990 psia an incorrectly interpolate to determine that the PZR is watered saturated. Part 2 is correct.

**Question Number:** 8

**Tier:** 2 Group 1

**K/A:** 010 Pressurizer Pressure Control System (PZR PCS)-K5.01

Knowledge of the operational implications of the following concepts as they apply to the PZR PCS: Determination of condition of fluid in PZR, using steam tables

**Importance Rating:** 3.5

**10 CFR Part 55:** 41.5 / 45.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must be able to determine if the PZR is water saturated (using steam tables) and the reason (operational implication) the PZR is maintained water saturated when restarting an RCP IAW 1-EOP-TRIP-5 (Natural Circulation Rapid Cooldown Without RVLIS).

**SRO Justification:** N/A

**Technical References:** Steam Tables
1-EOP-TRIP-5 (Natural Circulation Rapid Cooldown Without RVLIS)

**Proposed references to be provided:** None

**Learning Objective:** NOS05TRP004-06 ( EOP-TRIP 4,5,6; NATURAL CIRCULATION COOLDOWN )

4 Determine the basis for each step, caution, note or continuous action step relative to a NATURAL CIRCULATION COOLDOWN.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**9** **Points: 1.00**

Given:

- Unit 2 is at 100% Reactor Power
- A secondary transient is causing PZR pressure to rise

At time 12:00:00

- PZR pressure is 2312 psig

At time 12:00:30

- PZR pressure is 2340 psig

Which ONE of the following completes the statements below?

At **12:00:00**, PZR Spray Valves (2PS1 and 2PS3) are ___(1)___.

At **12:00:30**, PZR PORVs (2PR1 and 2PR2) are ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | throttled | open |
| B. | throttled | closed |
| C. | fully open | open |
| D. | fully open | closed |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, 2315 psig is the PZR Pressure set point at which the PORVs would fully close. Consequently, the candidate could mistake the 2315 psig set point for when the PZR Spray valves go fully open. Consequently, the candidate would incorrectly conclude that at 12:00:00, the PZR Spray valves are throttled (and not fully open). Part 2 is correct.

B. Incorrect but plausible. For Part 1, 2315 psig is the PZR Pressure set point at which the PORVs would fully close. Consequently, the candidate could mistake the 2315 psig set point for when the PZR Spray valves go fully open. Consequently, the candidate would incorrectly conclude that at 12:00:00, the PZR Spray valves are throttled (and not fully open). For Part 2, the PZR master controller setpoint is at 100% when PZR pressure is 2355 psig. The candidate could incorrectly conclude that the PZR PORVs open when the PZR master controller is at 100% (or 2355 psig). This would then cause the candidate to incorrectly conclude that at 12:00:30, the PZR PORVs are closed.

C. **Correct.** For Part 1, with PZR Pressure at 2312, the PZR Spray Valves are fully open. For Part 2, with PZR Pressure at 2340, the PZR PORVS are open.

D. Incorrect but plausible. Part 1 is correct. For Part 2, the PZR master controller setpoint is at 100% when PZR pressure is 2355 psig. The candidate could incorrectly conclude that the PZR PORVs open when the PZR master controller is at 100% (or 2355 psig). This would then cause the candidate to incorrectly conclude that at 12:00:30, the PZR PORVs are closed.

**Question Number:** 9

**Tier:** 2 Group 1

**K/A:** 010 Pressurizer Pressure Control System (PZR PCS)-A3.02

Ability to monitor automatic operation of the PZR PCS, including: PZR pressure

**Importance Rating:** 3.6

**10 CFR Part 55:** 41.7 / 45.5

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must be able to determine the automatic operation of PZR PCS components (PZR Spray Valves and PZR PORVs) as a secondary transient causes PZR Pressure to rise over time.

**SRO Justification:** N/A

**Technical References:** NOS05PZRP&L-10 ( PRESSURIZER PRESSURE AND LEVEL CONTROL)

**Proposed references to be provided:** None

**Learning Objective:** NOS05PZRP&L-10 ( PRESSURIZER PRESSURE AND LEVEL CONTROL)

4 Describe how the following components impact the Pressurizer Pressure and Level Control System during normal and abnormal conditions:

- Pressurizer Pressure Control and Alarm Channels
- Master Pressure Controller
- Spray Valves
- Power-Operated Relief Valves (PORVs)

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**10** **Points: 1.00**

Given

- Unit 2 is at 100% Reactor Power and stable
- The PZR Pressure Transmitters read the following:

| CH I<br>2PT-455 | CH II<br>2PT-456 | CH III<br>12PT-457 | CH IV<br>2PT-474 | <br>2PT-1648 |
|---|---|---|---|---|
| 2235 PSIG | 0 PSIG | 2235 PSIG | 2235 PSIG | 2235 PSIG |

Which ONE of the following completes the statements below concerning the design of the Reactor Protection System (RPS)?

With 2PT-456 failed low, the coincidence for the PZR Pressure **LOW** Reactor Trip (based on the remaining functional PZR Pressure Channels) is now _____.

A. 2 out of 4

B. 1 out of 4

C. 2 out of 3

D. 1 out of 3

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. The candidate could incorrectly conclude that PT-1648 also feeds into the PZR Pressure LOW Reactor Trip coincidence and when 2PT-456 fails, this causes the 2PT-456 bistable to be bypassed from the PZR Pressure LOW Reactor Trip. Consequently, with 2PT-456 failed low, the candidate would then incorrectly determine that the coincidence for the PZR Pressure LOW Reactor Trip (based on the remaining functional PZR Pressure Channels) is now 2 out of 4.

B. Incorrect but plausible. The candidate could incorrectly conclude that PT-1648 also feeds into the PZR Pressure LOW Reactor Trip coincidence. PT01648 is only used for indication at the RSP. Consequently, with 2PT-456 failed low, the candidate would then incorrectly determine that the coincidence for the PZR Pressure LOW Reactor Trip (based on the remaining functional PZR Pressure Channels) is now 1 out of 4.

C. Incorrect but plausible. The candidate could incorrectly conclude that when 2PT-456 fails, this causes the 2PT-456 bistable to be bypassed from the PZR Pressure LOW Reactor Trip. Consequently, coincidence for the PZR Pressure LOW Reactor Trip (based on the remaining functional PZR Pressure Channels) is now 2 out of 3.

D. **Correct.** PT-455/456/457/474 are the pressure transmitters that feed into the PZR Pressure LOW Reactor Trip coincidence (2 out of 4 below low pressure trip setpoint). With 2PT-456 failed low, the coincidence for the PZR Pressure LOW Reactor Trip (based on the remaining functional PZR Pressure Channels) is now 1 out of 3.

**Question Number:** 10

**Tier:** 2 Group 1

**K/A:** 012 Reactor Protection System-K4.05

Knowledge of RPS design feature(s) and/or interlock(s) which provide for the following: Spurious trip protection

**Importance Rating:** 2.7

**10 CFR Part 55:** 41.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how the PZR Pressure LOW Reactor Trip coincidence changes when a PZR Pressure Transmitter Channel fails low (which prevents a spurious Reactor Trip

**SRO Justification:** N/A

**Technical References:** NOS05RXPROT-12 (REACTOR PROTECTION SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05RXPROT-12 (REACTOR PROTECTION SYSTEM)

4 Describe the design bases of the RPS, including: (License Operator and STA only)

- Redundancy
- Independence
- Diversification
- Fail Safe
- Testability

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**11** **Points: 1.00**

Which ONE of the following completes the statement below concerning RCP Undervoltage Reactor Trip Setpoint and Coincidence?

If the associated Permissive Interlock is satisfied, a Reactor Trip Signal will be generated when 4KV Group Busses H and ___(1)___ are less than a maximum of ___(2)___ % of normal bus voltage.

| | **(1)** | **(2)** |
|---|---|---|
| A. | G | 70 |
| B. | G | 90 |
| C. | E | 70 |
| D. | E | 90 |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** If the associated Permissive Interlock is satisfied, a Reactor Trip Signal will be generated when 4KV Group Busses H and G are less than a maximum of 70% of normal bus voltage.

B. Incorrect but plausible. Part 1 is correct. For Part 2, 90% is setpoint for the RCP Low Flow Reactor Trip. Consequently, the candidate could incorrectly conclude that 90% normal bus voltage is the set point for the RCP Undervoltage Reactor Trip.

C. Incorrect but plausible. For Part 1, the RCP Undervoltage Reactor Trip is based on two selected 4KV Group Busses in an undervoltage condition. Consequently, the candidate could incorrectly conclude that 2 of the selected 4KV Group Busses are H and E. Part 2 is correct. Part 2 is correct.

D. Incorrect but plausible. For Part 1, the RCP Undervoltage Reactor Trip is based on two selected 4KV Group Busses in an undervoltage condition. Consequently, the candidate could incorrectly conclude that 2 of the selected 4KV Group Busses are H and E. Part 2 is correct. For Part 2, 90% is setpoint for the RCP Low Flow Reactor Trip. Consequently, the candidate could incorrectly conclude that 90% normal bus voltage is the set point for the RCP Undervoltage Reactor Trip.

**Question Number:** 11

**Tier:** 2 Group 1

**K/A:** 013 Engineered Safety Features Actuation System (ESFAS)-K1.02

Knowledge of the physical connections and/or cause effect relationships between the ESFAS and the following systems: RCP

**Importance Rating:** 3.2

**10 CFR Part 55:** 41.2 to 41.9 / 45.7 to 45.8

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must the physical connection between the RCP and ESFAS. The physical connection is RCP undervoltage causes a Reactor Trip (ESFAS Function).

**SRO Justification:** N/A

**Technical References:** NOS05FLUNCY-09 (LICENSED OPERATOR FLUENCY LIST)

**Proposed references to be provided:** None

**Learning Objective:** NOS05FLUNCY-09 (LICENSED OPERATOR FLUENCY LIST)

4 State those items in the Licensed Operator Fluency List

- Permissives and Control Grade Interlocks
- Reactor Trips

**Cognitive Level:**

**Higher** _____
**Lower** X

**Question Source**

**New** _____
**Modified Bank** _____
**Bank** X

**Question History:**

**Comments:**

**12** **Points: 1.00**

Consider the following Containment Cooling configurations with a DBA occurring inside containment:

1. **ONLY ONE** CS Pump operating
2. **ONLY ONE** CS Pump operating plus **ONLY** 3 CFCUs operating
3. **ONLY ONE** CS Pump operating plus **ONLY** 2 CFCUs operating
4. **ONLY** 5 CFCUs operating

Which ONE of the following completes the statements below?

_____ are the **MINIMUM** Containment Cooling components required to be in operation that will maintain Containment Pressure, Temperature and Humidity with design limits with a DBA occurring inside containment.

A. 1 or 3

B. 1 or 4

C. 2 or 4

D. 2 or 3

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Since all of the given Containment Cooling configurations are possible containment cooling configurations, then all of the distractors are plausible.

B. Incorrect but plausible. Since all of the given Containment Cooling configurations are possible containment cooling configurations, then all of the distractors are plausible.

C. **Correct.** The following Containment Cooling configurations will maintain Containment Pressure, Temperature and Humidity with design limits with a DBA occurring inside containment: 2 CS Pumps (not given in question stem), 1 CS Pump + 3 CFCUs, and 5 CFCUs.

D. Incorrect but plausible. Since all of the given Containment Cooling configurations are possible containment cooling configurations, then all of the distractors are plausible.

**Question Number:** 12

**Tier:** 2 Group 1

**K/A:** 022 Containment Cooling System (CCS)-A1.03

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Containment humidity

**Importance Rating:** 3.2

**10 CFR Part 55:** 41.5 / 45.5

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the operating Containment Cooling configuration (CS Pumps and CFCUs) that will maintain Containment Pressure, Temperature and Humidity with design limits with a DBA occurring inside containment

**SRO Justification:** N/A

**Technical References:** NOS05CONTMT-15 ( CONTAINMENT AND CONTAINMENT SUPPORT SYSTEMS)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CONTMT-15 ( CONTAINMENT AND CONTAINMENT SUPPORT SYSTEMS)

4 Describe how the following components impact the Containment and Containment Support Systems during normal and abnormal conditions

- Containment Fan Cooler System

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**13** **Points: 1.00**

Which ONE of the following completes the statements below?

___(1)___ is added to Containment Spray flow to remove elemental iodine from the containment atmosphere ___(2)___.

.

| | **(1)** | **(2)** |
|---|---|---|
| A. | Sodium Hydroxide | **ONLY** |
| B. | Sodium Hydroxide | and to reduce corrosion of containment components |
| C. | Hydrazine | **ONLY** |
| D. | Hydrazine | and to reduce corrosion of containment components |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate may fail to recall that NaOH is also used to prevent corrosion of containment components.

B. **Correct.** NaOH is added to Containment Spray flow to remove elemental iodine from the containment atmosphere and to prevent corrosion of containment components.

C. Incorrect but plausible. For Part 1, Hydrazine is a familiar chemical added to the RCS to scavenge oxygen. Consequently, the candidate may incorrectly conclude Hydrazine is added to Containment Spray flow. For Part 2, the candidate may fail to recall that NaOH is also used to prevent corrosion of containment components.

D. Incorrect but plausible. For Part 1, Hydrazine is a familiar chemical added to the RCS to scavenge oxygen. Consequently, the candidate may incorrectly conclude Hydrazine is added to Containment Spray flow.

**Question Number:** 13

**Tier:** 2 Group 1

**K/A:** 026 Containment Spray System (CSS)-G2.1.27

Knowledge of system purpose and/or function

**Importance Rating:** 3.9

**10 CFR Part 55:** 41.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know that removing elemental iodine from the containment atmosphere and preventing corrosion of containment components are functions of the Containment Spray System.

**SRO Justification:** N/A

**Technical References:** NOS05CSPRAY-06 ( CONTAINMENT SPRAY SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CSPRAY-06 ( CONTAINMENT SPRAY SYSTEM)

2 Describe the purpose of the Containment Spray System.

3. Describe the design bases of the Containment Spray System

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

**Question History:**

**Comments:**

**14** **Points: 1.00**

Given:

- A LOCA coincident with a Loss Of Offsite Power has occurred at Unit 2
- The 2C 4KV Vital Bus is de-energized due to a fault on the bus

At time 16:30:00

- Containment Pressure is 15.1 psig and slowly rising

At **16:30:30**, which ONE of the following completes the statements below?

_____ Containment Spray Pump(s) is / are running

A. **NO**

B. **BOTH**

C. **ONLY** 21

D. **ONLY** 22

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. The candidate could incorrectly conclude that at 16:30:00, the Containment Spray setpoint has not been reached or that the electrical transient has affected both CS pumps. In either case, the candidate would then incorrectly deduce that at 16:30:00, no CS pumps are running.

B. Incorrect but plausible. The candidate could incorrectly conclude that both CS pumps are not powered from the 2C 4KV Vital Bus. Consequently, with a valid Containment Spray signal present at 16:30:00, the candidate would incorrectly deduce that both CS pumps are running.

C. **Correct.** 21 CS Pump is powered from 2A KV Vital Bus and 22 CS Pump is powered from 2C 4K Vital Bus. Additionally, a Containment Spray actuation occurs at 15 psig Containment pressure. At 16:30:00, a containment spray actuation signal exists and 2C 4K Vital Bus is de-energized. Consequently, ONLY 21 CS Pump is running.

D. Incorrect but plausible. The candidate could incorrectly conclude that only the 21 CS Pump is powered from 2C KV Vital Bus. Consequently, with a valid Containment Spray signal present at 16:30:00, the candidate would incorrectly deduce that only 22 CS pump is running.

**Question Number:** 14

**Tier:** 2 Group 1

**K/A:** 026 Containment Spray System (CSS)-K2.01

Knowledge of bus power supplies to the following: Containment spray pumps

**Importance Rating:** 3.4

**10 CFR Part 55:** 41.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must demonstrate knowledge of the power supplies to both Containment Spray Pumps by determining which pumps will be running after an electrical transient has cause the 2C 4KV Vital bus to de-energize.

**SRO Justification:** N/A

**Technical References:** NOS05FLUNCY-09 (LICENSED OPERATOR FLUENCY LIST)
NOS05CSPRAY-06 ( CONTAINMENT SPRAY SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CSPRAY-06 ( CONTAINMENT SPRAY SYSTEM)

3 State the power supply to the following Containment Spray System components:

a. Containment Spray Pumps.

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

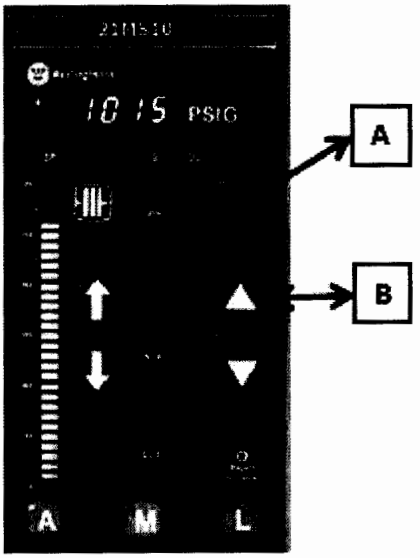
**Question History:**

**Comments:**

**15** **Points: 1.00**

Given:

- 21 SG has a confirmed tube leak
- The crew is preparing to adjust 21MS10 (MS PWR RELIEF Vlv) setpoint in accordance with S2.OP-AB.SG-0001 (Steam Generator Tube Leak)




Which ONE of the following completes the statements below?

The PO will set the 21MS10 setpoint to ___(1)___ psig by depressing button ___(2)___..

| | (1) | (2) |
|---|---|---|
| A. | 1045 | A |
| B. | 1045 | B |
| C. | 1070 | A |
| D. | 1070 | B |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1, IAW S2.OP-AB.SG-0001 Step 3.31, the 21MS10 setpoint will be set to 1045 psig. For Part 2, button 1 will be depressed on the 21MS10 controller to raise the set point.

B. Incorrect but plausible. Part 1 is correct. For Part 2, button 2 on the 21MS10 is used to raise the manual output to the valve so it opens more. Consequently, the candidate could incorrectly conclude that button 2 actually raises the controller's setpoint.

C. Incorrect but plausible. For Part 1, 1070 psig is a familiar pressure (setpoint for MS15 (Main Steam Safety Valve). Consequently, the candidate could incorrectly conclude that the MS10 controller will be adjusted to 1070 psig. Part 2 is correct.

D. Incorrect but plausible. For Part 1, 1070 psig is a familiar pressure (setpoint for MS15 (Main Steam Safety Valve). Consequently, the candidate could incorrectly conclude that the MS10 controller will be adjusted to 1070 psig. For Part 2, button 2 on the 21MS10 is used to raise the manual output to the valve so it opens more. Consequently, the candidate could incorrectly conclude that button 2 actually raises the controller's setpoint.

**Question Number:** 15

**Tier:** 2 Group 1

**K/A:** 039 Main and Reheat Steam System (MRSS)-G2.2.2

Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels

**Importance Rating:** 4.6

**10 CFR Part 55:** 41.6 / 41.7 / 45.2

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how to adjust the 21MS10 (MS PWR RELIEF Vlv) controller due to a confirmed 21 SG Tube Leak

**SRO Justification:** N/A

**Technical References:** NOS05ABSGTL-05 ( STEAM GENERATOR TUBE LEAK)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABSGTL-05 ( STEAM GENERATOR TUBE LEAK)

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

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**16** **Points: 1.00**

Given:

- The crew is performing S2.OP-SO.MS-0001 (Main, Reheat, Turbine Bypass Steam Warmup) and is preparing to open 21-24MS167 (Main Steam Isolation Valves)

In accordance with S2.OP-SO.MS-0001, which ONE of the following completes the statements below?

The reason that 21-24MS7 (Main Steam Loop Drain Valves) are opened before 21-24MS167 is to ___(1)___.

The crew will open 21-24MS167 when there is less than a **MAXIMUM** of ___(2)___ psid across each valve.

A. (1) prevent pressurized steam from forcing residual water in the piping to cause water hammer on downstream components
   (2) 15

B. (1) prevent pressurized steam from forcing residual water in the piping to cause water hammer on downstream components
   (2) 50

C. (1) remove any collected corrosion products or impurities to ensure Main Turbine blading is not impinged
   (2) 15

D. (1) remove any collected corrosion products or impurities to ensure Main Turbine blading is not impinged
   (2) 50

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, there are multiple steps in S2.OP-SO.MS-0001 that require actions to be performed when MS Header pressure is ≥ 15 psig. Consequently, the candidate could incorrectly conclude that 21-24MS167 will be opened when there is less than a maximum of 15 psid across each valve.

B. **Correct.** For Part 1, the reason that 21-24MS7 (Main Steam Loop Drain Valves) are opened before 21-24MS167 is to prevent pressurized steam from forcing residual water in the piping to cause water hammer on downstream components. For Part 2, The crew will open 21-24MS167 when there is less than a maximum of 50 psid across each valve.

C. Incorrect but plausible. For Part 1, preventing damage to the Turbine is a general concern and the candidate could incorrectly conclude that The reason that 21-24MS7 (Main Steam Loop Drain Valves) are opened before 21-24MS167 is to remove any collected corrosion products or impurities to ensure Main Turbine blading is not impinged. For Part 2, there are multiple steps in S2.OP-SO.MS-0001 that require actions to be performed when MS Header pressure is ≥ 15 psig. Consequently, the candidate could incorrectly conclude that 21-24MS167 will be opened when there is less than a maximum of 15 psid across each valve.

D. Incorrect but plausible. For Part 1, preventing damage to the Turbine is a general concern and the candidate could incorrectly conclude that The reason that 21-24MS7 (Main Steam Loop Drain Valves) are opened before 21-24MS167 is to remove any collected corrosion products or impurities to ensure Main Turbine blading is not impinged. Part 2 is correct.

**Question Number:** 16

**Tier:** 2 Group 1

**K/A:** 039 Main and Reheat Steam System (MRSS)- K5.01

Knowledge of the operational implications of the following concepts as the apply to the MRSS: Definition and causes of steam/water hammer

**Importance Rating:** 2.9

**10 CFR Part 55:** 41.5 / 45.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know could cause water hammer when the MSS is warmed.

**SRO Justification:** N/A

**Technical References:** S2.OP-SO.MS-0001

**Proposed references to be provided:** None

**Learning Objective:** NOS05MSTEAM-11 ( MAIN STEAM SYSTEM )

14 Given internal or external industry operating experience, review the OE and outline a course of action, which could prevent recurrence.

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

**Question History:** Modified From a Question that was on the ILOT 0901 NRC RO Exam

**Comments:**

**17** **Points: 1.00**

Given:

- Unit 2 is at 100% Reactor Power and stable

At time 09:00:00

- The suction pressure transmitter for the 22 SGFP **FAILS** to 200 psig

Which ONE of the following completes the statements below?

The 22 SGFP will **TRIP ___(1)___**.

After 22 SGFP has tripped, Reactor Power will stabilize at approximately ___(2)___ %.

| | **(1)** | **(2)** |
|---|---|---|
| A. | IMMEDIATELY (at 09:00:00) | 50 |
| B. | IMMEDIATELY (at 09:00:00) | 66 |
| C. | at 09:00:10 (after a 10 second delay) | 50 |
| D. | at 09:00:10 (after a 10 second delay) | 66 |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, there is an instantaneous SGFP trip on low suction pressure (< 190 psig). The candidate could incorrectly conclude that given the question stem, that the SGFP will trip instantaneously at 09:00:01. For Part 2, there are only two SGFPs. The candidate could incorrectly conclude that each SGFP provides 50% total flow. Consequently when 22 SGFP trips, the candidate could incorrectly conclude that a turbine runback will occur to 50% and reactor power will then stabilize at 50%.

B. Incorrect but plausible. For Part 1, there is an instantaneous SGFP trip on low suction pressure (< 190 psig). The candidate could incorrectly conclude that given the question stem, that the SGFP will trip instantaneously at 09:00:01. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, there are only two SGFPs. The candidate could incorrectly conclude that each SGFP provides 50% total flow. Consequently when 22 SGFP trips, the candidate could incorrectly conclude that a turbine runback will occur to 50% and reactor power will then stabilize at 50%.

D. **Correct.** For Part 1, the SGP will trip when suction pressure is less than 215 psig for 10 seconds. Consequently, given the question stem, 09:00:**11** is the LATEST time that the 22 SGFP TRIPS. For Part 2, once 22 SGFP trips and turbine runback to 66% will be generated. Since Reactor Power follows steam demand, Reactor Power will stabilize at approximately 66%.

**Question Number:** 17

**Tier:** 2 Group 1

**K/A:** 059 Main Feedwater (MFW) System-A1.03

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MFW controls including: Power level restrictions for operation of MFW pumps and valves

**Importance Rating:** 2.7

**10 CFR Part 55:** 41.5 / 45.5

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the maximum allowable reactor power following a SGFP trip with the Reactor Power initially at 100% power.

**SRO Justification:** N/A

**Technical References:** NOS05CN&FDW-15 (CONDENSATE AND FEEDWATER SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CN&FDW-15 (CONDENSATE AND FEEDWATER SYSTEM)

8 Identify and describe the Control Room controls, indications, and alarms associated with the Condensate and Feedwater System, including:

a. The Control Room location of Condensate and Feedwater System control bezels and indications. (Licensed Operator & STA only)

b. The function of each Condensate and Feedwater System Control Room control and indication. (Licensed Operator & STA only)

c. The effect each Condensate and Feedwater System control has upon Condensate and Feedwater System components and operation. (Licensed Operator & STA only)

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** X
**Bank** _____

**Question History:**

**Comments:**

**18** **Points: 1.00**

Given:

- Unit 2 is 100% Reactor Power and stable
- S2.OP-PT.AF-0002 (Auxiliary Feedwater Backleakage) Section 5.1 (Backleakage Monitoring and Determination) has just been completed
- Indications show there is backleakage on the 23 Auxiliary Feedwater line

In accordance with S2.OP-PT.AF-0002, which ONE of the following completes the statements below?

S2.OP-PT.AF-0002 was **REQUIRED** to be performed ___(1)___ after an AFW Pump was initially shutdown in MODES 1-3.

Backleakage of feedwater into the AFW System can **DISABLE** the motor-driven AFW Pumps by causing ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | IMMEDIATELY | the pumps to rotate backward |
| B. | IMMEDIATELY | vapor binding in the pumps |
| C. | between 30 to 60 minutes | the pumps to rotate backward |
| D. | between 30 to 60 minutes | vapor binding in the pumps |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that S2.OP-PT.AF-0002 is required to be performed immediately after an Auxiliary Feedwater Pump is shutdown in Modes 1-3. For Part 2, when a pump rotates backward and the pump is started, the duration of the starting current is extended because it takes longer for the get up to speed. In some cases, this extended starting current can cause the breaker for the motor to open (since starting current is 5-7 times greater than running current). RCPs are specifically design with Anti-Reverse-Rotation Devices. Consequently, the candidate could incorrectly conclude that backleakage of feedwater into the AFW System can DISABLE the motor-driven AFW Pumps by causing to rotate backwards.

B. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that S2.OP-PT.AF-0002 is required to be performed immediately after an Auxiliary Feedwater Pump is shutdown in Modes 1-3. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, when a pump rotates backward and the pump is started, the duration of the starting current is extended because it takes longer for the get up to speed. In some cases, this extended starting current can cause the breaker for the motor to open (since starting current is 5-7 times greater than running current). RCPs are specifically design with Anti-Reverse-Rotation Devices. Consequently, the candidate could incorrectly conclude that backleakage of feedwater into the AFW System can DISABLE the motor-driven AFW Pumps by causing to rotate backwards.

D. **Correct.** For Part 1, IAW S2.OP-PT.AF-0002 P&L 3.1, "This procedure shall be performed 30 to 60 minutes after an Auxiliary Feedwater Pump is shutdown in Modes 1-3". For Part 2, IAW SOER 84-3 (and the AFW Lesson Plan), "backleakage of hot feedwater has disabled auxiliary feedwater (AFW) pumps due to steam binding."

**Question Number:** 18

**Tier:** 2 Group 1

**K/A:** 061 Auxiliary / Emergency Feedwater (AFW) System - A2.06

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

**Importance Rating:** 2.7

**10 CFR Part 55:** 41.5 / 43.5 / 45.3 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know when to test for backleakage from the MFW into the AFW IAW S2.OP-PT.AF-0002 (Auxiliary Feedwater Backleakage) and the consequence of backleakage into AFW.

**SRO Justification:** N/A

**Technical References:** NOS05AFW000-15 (AUXILIARY FEEDWATER SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05AFW000-15 (AUXILIARY FEEDWATER SYSTEM)

14 Given internal or external industry operating experience, review the OE and outline a course of action, which could prevent recurrence

13 Discuss the procedural requirements associated with the Auxiliary Feedwater System, including an explanation of major precaution and limitations in the Auxiliary Feedwater System procedures

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**19** **Points: 1.00**

Given:

- Unit 2 is MODE 3
- 2A 4KV Vital Bus is powered from 23 SPT
- 2B and 2C 4KV Vital Busses are powered from 24 SPT

Subsequently

- The 23 SPT fails to 0 VAC

Which ONE of the following completes the statement below?

The 23 SPT Supply Breaker to 2A 4KV Vital Bus will **FIRST** open when 23 SPT Voltage lowers to less than a **MAXIMUM** of ___(1)___ % of normal voltage.

After the electrical transient is complete, 2A 4KV Vital Bus will be powered by ___(2)___ .

| | **(1)** | **(2)** |
|---|---|---|
| A. | 70 | EDG 2A |
| B. | 35 | EDG 2A |
| C. | 70 | 24 SPT |
| D. | 35 | 24 SPT |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, EDG 2A can power the 2A 4KV Vital bus. Consequently, the candidate could incorrectly conclude that when 23ASD breaker opens, EDG 2A will power the 2A 4KV Bus.

B. Incorrect but plausible. For Part 1, 35% of bus normal voltage is permissive setpoint which allows breaker 24 ASD to close to power the 2A 4KV Vital Bus. Consequently, the candidate could incorrectly conclude that the 23 SPT Supply Breaker to 2A 4KV Vital Bus will FIRST open when 23 SPT Voltage lowers to less than a MAXIMUM of 35 % of normal voltage. For Part 2, EDG 2A can power the 2A 4KV Vital bus. Consequently, the candidate could incorrectly conclude that when 23ASD breaker opens, EDG 2A will power the 2A 4KV Bus.

C. **Correct.** For Part 1, the 23 SPT Supply Breaker to 2A 4KV Vital Bus will FIRST open when 23 SPT Voltage lowers to less than a MAXIMUM of 70 % of normal voltage. For Part 2, after the electrical transient is complete, 2A 4KV Vital Bus will be powered by 24 SPT.

D. Incorrect but plausible. For Part 1, 35% of bus normal voltage is permissive setpoint which allows breaker 24 ASD to close to power the 2A 4KV Vital Bus. Consequently, the candidate could incorrectly conclude that the 23 SPT Supply Breaker to 2A 4KV Vital Bus will FIRST open when 23 SPT Voltage lowers to less than a MAXIMUM of 35 % of normal voltage. Part 2 is correct.

**Question Number:** 19

**Tier:** 2 Group 1

**K/A:** 062 AC Electrical Distribution System-A1.03

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ac distribution system controls including: Effect on instrumentation and controls of switching power supplies

**Importance Rating:** 2.5

**10 CFR Part 55:** 41.5 / 45.5

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the instrumentation / controls that starts the power transfer from the failed 23 SPT to 2A 4KV Vital Bus. The candidate must also predict and monitor the proper power transfer of the 2A 4KV Vital Bus after the 23 SPT supply breaker opens.

**SRO Justification:** N/A

**Technical References:** NOS054KVAC0-08 (4160 ELECTRICAL SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS054KVAC0-08 (4160 ELECTRICAL SYSTEM)

9 State the setpoints, coincidence, blocks and permissives for automatic actuations associated with the 4160 Electrical System

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** _____
**Bank** X

**Question History:**

**Comments:**

**20** **Points: 1.00**

Which ONE of the following completes the statements below concerning the Unit 1 250 VDC system?

The Unit 1 _____ is / are powered from the Unit 1 250 VDC Battery and Charger System.

A. Field Excitation Circuitry for the EDGs

B. Main Turbine Emergency Oil Pump

C. Vital Instrument Bus Inverters

D. Emergency Lighting Inverters

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. All of the distractors are powered from the Unit 1 125 VDC Battery and Charger System. Consequently, the candidate could incorrectly conclude that any of the distractors are powered from the Unit 1 250 VDC Battery and Charger System.

B. **Correct.** The Unit 1 Main Turbine Emergency Oil Pump is powered from the Unit 1 250 VDC Battery and Charger System.

C. Incorrect but plausible. All of the distractors are powered from the Unit 1 125 VDC Battery and Charger System. Consequently, the candidate could incorrectly conclude that any of the distractors are powered from the Unit 1 250 VDC Battery and Charger System.

D. Incorrect but plausible. All of the distractors are powered from the Unit 1 125 VDC Battery and Charger System. Consequently, the candidate could incorrectly conclude that any of the distractors are powered from the Unit 1 250 VDC Battery and Charger System.

**Question Number:** 20

**Tier:** 2 Group 1

**K/A:** 063 D.C. Electrical Distribution-K2.01

Knowledge of bus power supplies to the following: Major DC loads

**Importance Rating:** 2.9

**10 CFR Part 55:** 41.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know that the Unit 1 Main Turbine Emergency Oil Pump is a major DC load that is powered from the Unit 1 250 VDC Battery and Charger System

**SRO Justification:** N/A

**Technical References:** NOS05DCELEC-09 (DC ELECTRICAL SYSTEMS)

**Proposed references to be provided:** None

**Learning Objective:** NOS05DCELEC-09 (DC ELECTRICAL SYSTEMS)

3 Identify and describe the local controls and indications associated with the DC Electrical System, including:

a. The location of DC Electrical System local controls and indications. (Licensed Operator & Non-licensed Operator only)

b. The function of DC Electrical System local controls and indications. (Licensed Operator & Non-licensed Operator only)

c. The plant and conditions or permissives required for DC Electrical System local controls to perform their intended function. (Licensed Operator & Non-licensed Operator only)

d. The setpoints associated with the DC Electrical Systems local alarms.

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

**Question History:**

**Comments:**

**21** **Points: 1.00**

In accordance LCO 3.8.1.2 (ELECTRICAL POWER SYSTEMS – SHUTDOWN), which ONE of the following completes the statements below?

LCO 3.8.1.2 requires a **MINIMUM** of ___(1)___ separate and independent diesel generators to be OPERABLE.

If **ALL REQUIRED** EDGs are inoperable, the crew ___(2)___ required to **IMMEDIATELY** suspend all operations involving positive reactivity changes.

| | **(1)** | **(2)** |
|---|---|---|
| A. | two | is |
| B. | two | is **NOT** |
| C. | three | is |
| D. | three | is **NOT** |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1, LCO 3.8.1.2 requires a minimum of two separate and independent diesel generators to be OPERABLE. For Part 2, If ALL REQUIRED EDGs are inoperable, the crew is required to IMMEDIATELY suspend all operations involving positive reactivity changes

B. Incorrect but plausible. Part 1 is correct. For Part 2, LCO 3.8.1.2 REQUIRED ACTION A has an option to ONLY declare the affected required features inoperable in lieu of suspending all operations involving positive reactivity changes. Consequently, the candidate could incorrectly conclude that LCO 3.8.1.2 REQUIRED ACTION B does not require suspending all operations involving positive reactivity changes.

C. Incorrect but plausible. For Part 1, LCO 3.8.1.2 (ELECTRICAL POWER SYSTEMS – OPERATING) requires a minimum of three separate and independent diesel generators to be OPERABLE. Consequently, the candidate could incorrectly conclude that LCO 3.8.1.2 also requires a minimum of three separate and independent diesel generators to be OPERABLE. Part 2 is correct.

D. Incorrect but plausible. For Part 1, LCO 3.8.1.2 (ELECTRICAL POWER SYSTEMS – OPERATING) requires a minimum of three separate and independent diesel generators to be OPERABLE. Consequently, the candidate could incorrectly conclude that LCO 3.8.1.2 also requires a minimum of three separate and independent diesel generators to be OPERABLE. For Part 2, LCO 3.8.1.2 REQUIRED ACTION A has an option to ONLY declare the affected required features inoperable in lieu of suspending all operations involving positive reactivity changes. Consequently, the candidate could incorrectly conclude that LCO 3.8.1.2 REQUIRED ACTION B does not require suspending all operations involving positive reactivity changes.

**Question Number:** 21

**Tier:** 2 Group 1

**K/A:** 064 Emergency Diesel Generators (ED/G)-G2.2.22

Knowledge of limiting conditions for operations and safety limits

**Importance Rating:** 4.0

**10 CFR Part 55:** 41.5 / 43.2 / 45.2

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must how many separate and independent diesel generators are required to be OPERABLE per LCO 3.8.1.2 (ELECTRICAL POWER SYSTEMS – SHUTDOWN).

**SRO Justification:** N/A

**Technical References:** NOS05EDG000-12 (EMERGENCY DIESEL GENERATORS)

**Proposed references to be provided:** None

**Learning Objective:** NOS05EDG000-12 (EMERGENCY DIESEL GENERATORS)

10 Given a situation dealing with Emergency Diesel Generator operability, examine the situation and apply the appropriate Technical Specification action

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**22** **Points: 1.00**

Given:

At time 10:00:00

- A Reactor Trip and Safety Injection have occurred coincident with a LOOP at Unit 2
- EDG 2B can **NOT** be started

At **10:15:00**, which ONE of the following completes the statement below?

22 RHR Pump is ___(1)___ and 22 SI Pump is ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | stopped | running |
| B. | stopped | stopped |
| C. | running | running |
| D. | running | stopped |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** 22 RHR pump is powered from 2**B** 4KV Vital Bus and 22 SI Pump is powered from 2**C** 4KV Vital Bus. Additionally, 2B EDG can not be started after the LOOP occurs. Consequently, 15 minutes after a reactor trip and safeguards have occurred (coincident with the loop), 2**A** and 2**C** Vital Busses are being powered from EDG 2A and EDG 2C and all of the appropriate ECCS loads have been loaded onto the running EDGs. Therefore, at 10:15:00, 22 RHR Pump is stopped and 22 SI Pump is running.

B. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that 22 SI pump is powered from 2B 4KV Vital Bus. This would result in the candidate incorrectly deducing that at 10:15:00, the 22 SI Pump is stopped.

C. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that 22 RHR pump is powered from 2C 4KV Vital Bus. This would result in the candidate incorrectly deducing that at 10:15:00, the 22 RHR Pump is running. Part 2 is correct.

D. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that 22 RHR pump is powered from 2C 4KV Vital Bus. This would result in the candidate incorrectly deducing that at 10:15:00, the 22 RHR Pump is running. For Part 2, the candidate could incorrectly conclude that 22 SI pump is powered from 2B 4KV Vital Bus. This would result in the candidate incorrectly deducing that at 10:15:00, the 22 SI Pump is stopped.

**Question Number:** 22

**Tier:** 2 Group 1

**K/A:** 064 Emergency Diesel Generators (ED/G)-K3.02

Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following: ESFAS controlled or actuated systems

**Importance Rating:** 4.2

**10 CFR Part 55:** 41.7 / 45.6

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must be determine the status of the 22 RHR Pump and 22 SI Pump (ESFAS actuated components) following a Reactor Trip and Safety Injection actuation coincident with a LOOP and failure of EDG 2B.

**SRO Justification:** N/A

**Technical References:** NOS054KVAC0-08 (4160 ELECTRICAL SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS054KVAC0-08 (4160 ELECTRICAL SYSTEM)

9 State the setpoints, coincidence, blocks and permissives for automatic actuations associated with the 4160 Electrical System

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**23** **Points: 1.00**

Given:

- Unit 1 and Unit 2 are at 100% Reactor Power

At time 17:00

- **1**R19A (Steam Generator Blowdown Liquid Monitor) goes into WARNING

At time 19:45

- **2**R19C (Steam Generator Blowdown Liquid Monitor) goes into WARNING

Which ONE of the following completes the statements below?

At **17:01**, **11**GB185 (Blowdown Discharge to Condenser) is ___(1)___.

At **19:46**, **23**GB185 (Blowdown Discharge to Condenser) is ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | closed | open |
| B. | closed | closed |
| C. | open | open |
| D. | open | closed |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the candidate may incorrectly conclude that for Unit 1, there are automatic functions when a R19 goes in to warning. Consequently, the candidate would then incorrectly deduce that at 19:46:00, 23GB185 (Blowdown Discharge to Condenser) is closed. For Part 2, the candidate may incorrectly conclude that for Unit 2, there are no automatic functions when a R19 goes in to warning. Consequently, the candidate would then incorrectly deduce that at 19:46:00, 23GB185 (Blowdown Discharge to Condenser) is open.

B. Incorrect but plausible. For Part 1, the candidate may incorrectly conclude that for Unit 1, there are automatic functions when a R19 goes in to warning. Consequently, the candidate would then incorrectly deduce that at 19:46:00, 23GB185 (Blowdown Discharge to Condenser) is closed. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate may incorrectly conclude that for Unit 2, there are no automatic functions when a R19 goes in to warning. Consequently, the candidate would then incorrectly deduce that at 19:46:00, 23GB185 (Blowdown Discharge to Condenser) is open.

D. **Correct.** For Part 1, Unit 1 has no automatic functions when a R19 goes in to warning. Automatic functions only occur when the monitor goes into alarm. Consequently, with 1R19A in warning (at 17:01:00), 11GB185 (Blowdown Discharge to Condenser) is open. For Part 2, Unit 2 has automatic functions that occur when a R19 goes in to warning. Consequently, with 2R19C in warning (at 19:46:00), 23GB185 (Blowdown Discharge to Condenser) is closed.

**Question Number:** 23

**Tier:** 2 Group 1

**K/A:** 073 Process Radiation Monitoring (PRM) System-K4.01

Knowledge of PRM system design feature(s) and/or interlock(s) which provide for the following: Release termination when radiation exceeds setpoint

**Importance Rating:** 4.0

**10 CFR Part 55:** 41.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the design features of the R19 process radiation monitors at Unit 1 and Unit 2. In this case, there are unit differences and only Unit 2 will automatically terminate the release when the applicable R19 monitor goes into warning.

**SRO Justification:** N/A

**Technical References:** NOS05RMS000-17 (RADIATION MONITORING SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05RMS000-17 (RADIATION MONITORING SYSTEM)

5 NCT Outline the interlocks associated with the following Radiation Monitoring System components:

- R19A, B, C, & D, Steam Generator Blowdown Liquid Monitors

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

**Question History:**

**Comments:**

**24** **Points: 1.00**

Given:

- The crew is performing S2.OP-AB.SW-0001 (Loss of Service Water Header Pressure)
- The leak is determined to be downstream of 21SW22 (NUCLEAR HEADER)

Which ONE of the following completes the statements below?

In accordance with is S2.OP-AB.SW-0001, the crew will **CLOSE** 21SW22 and **ENSURE** ___(1)___ 21SW23 and 22SW23 (TIE VALVES).

After the valve manipulations have been completed, SW cooling ___(2)___ available to 21CFCU and 22CFCU.

| | **(1)** | **(2)** |
|---|---|---|
| A. | closed | is |
| B. | closed | is **NOT** |
| C. | open | is |
| D. | open | is **NOT** |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could not recall the proper cooling arrangement between 21 and 22 SW headers. Additionally, 23 CFCU is the only CFCU that can be cooled by both SW headers. Either way, the candidate could then incorrectly determine that 21 and 22 CFCUs will have still have SW cooling.

B. **Correct.** For Part 1 and in accordance with S2.OP-AB.SW-0001 Attachment 4 Step 2.0, the crew will CLOSE 21SW22 and ENSURE CLOSE 21SW23 and 22SW23 (TIE VALVES). For Part 2, after the valve manipulations have been completed, SW cooling is NOT available to 21CFCU and 22CFCU.

C. Incorrect but plausible. For Part 1 and in accordance with S2.OP-AB.SW-0001 Attachment 4 Step 3.0, if the 21 SW header was leaking upstream of 21SW22, the crew would CLOSE 21SW22 and ENSURE OPEN 21SW23 and 22SW23 (TIE VALVES). Consequently, given the question stem, the candidate could incorrectly conclude that opening 21SW23 and 22SW23 is required.

D. Incorrect but plausible. For Part 1 and in accordance with S2.OP-AB.SW-0001 Attachment 4 Step 3.0, if the 21 SW header was leaking upstream of 21SW22, the crew would CLOSE 21SW22 and ENSURE OPEN 21SW23 and 22SW23 (TIE VALVES). Consequently, given the question stem, the candidate could incorrectly conclude that opening 21SW23 and 22SW23 is required. Part 2 is correct. For Part 2, the candidate could not recall the proper cooling arrangement between 21 and 22 SW headers. Additionally, 23 CFCU is the only CFCU that can be cooled by both SW headers. Either way, the candidate could then incorrectly determine that 21 and 22 CFCUs will have still have SW cooling.

**Question Number:** 24

**Tier:** 2 Group 1

**K/A:** 076 Service Water System (SWS)-A2.02

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: Service water header pressure

**Importance Rating:** 2.7

**10 CFR Part 55:** 41.5 / 43.5 / 45.3 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the procedural guidance of S2.OP-AB.SW-0001 (Loss of Service Water Header Pressure) for isolating a leak downstream of 21SW22 (NUCLEAR HEADER).

**SRO Justification:** N/A

**Technical References:** NOS05ABSW01-03 ( LOSS OF SERVICE WATER HEADER PRESSURE)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABSW01-03 ( LOSS OF SERVICE WATER HEADER PRESSURE)

1 Describe the operation of the SW system as applied to S1/S2.OP-AB.SW-0001:
- Loads supplied from the nuclear header

4 Given a set of initial plant conditions:
- Determine the appropriate abnormal procedure (AOP)
- Describe the plant response to actions taken in the AOP
- Describe the final plant condition that is established by the AOP

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

**Question History:**

**Comments:**

**25** **Points: 1.00**

Which ONE of the following completes the statement below?

**11**CA330 (CONT SUP INLET VALVE) and **12**CA330 (CONT SUP INLET VALVE) fail **CLOSED** on a Loss of ___(1)___.

With **BOTH 11**CA330 and **12**CA330 closed, **EACH** PZR PORV ___(2)___ be operated if needed.

| | **(1)** | **(2)** |
|---|---|---|
| A. | Control Air | can |
| B. | Control Air | can **NOT** |
| C. | 125 VDC or 28 VDC Power | can |
| D. | 125 VDC or 28 VDC Power | can **NOT** |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1, the CA330s fail closed on a loss of control air. For Part 2, each PORV has 2 accumulators and the accumulators are sized for 100 opening/closing cycles (50/accumulator). Consequently, with BOTH 11CA330 and 12CA330 CLOSED, each PZR PORV can be operated if needed.

B. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could fail to recall that each PORV have accumulators. Consequently, with BOTH 11CA330 and 12CA330 CLOSED, the candidate would then incorrectly conclude that the PORVs can not be operated if needed.

C. Incorrect but plausible. For Part 1, since the CA330s are Containment Isolation Valves, the candidate could incorrectly that the CA330s fail closed on a loss of 125 VDC or 28 VDC Power. Part 2 is correct.

D. Incorrect but plausible. For Part 1, For Part 1, since the CA330s are Containment Isolation Valves, the candidate could incorrectly that the CA330s fail closed on a loss of 125 VDC or 28 VDC Power. For Part 2, the candidate could fail to recall that each PORV have accumulators. Consequently, with BOTH 11CA330 and 12CA330 CLOSED, the candidate would then incorrectly conclude that the PORVs can not be operated if needed.

**Question Number:** 25

**Tier:** 2 Group 1

**K/A:** 078 Instrument Air System (IAS)-K3.01

Knowledge of the effect that a loss or malfunction of the IAS will have on the following: Containment air system

**Importance Rating:** 3.1

**10 CFR Part 55:** 41.7 / 45.6

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know that a loss of Control Air to 11CA330 (CONT SUP INLET VALVE) and 12CA330 (CONT SUP INLET VALVE) will cause both valves to close. Additionally, the candidate must know that PZR PORV operation is possible with 11CA330 and 12CA330 valves closed.

**SRO Justification:** N/A

**Technical References:** NOS05CONAIR-12 (CONTROL AIR SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CONAIR-12 (CONTROL AIR SYSTEM)

1 Describe how each impact the Control Air System during normal and abnormal conditions.

- CA Containment Isolation Valves

**Cognitive Level:**

**Higher** X
**Lower** ____

**Question Source**

**New** X
**Modified Bank** ____
**Bank** ____

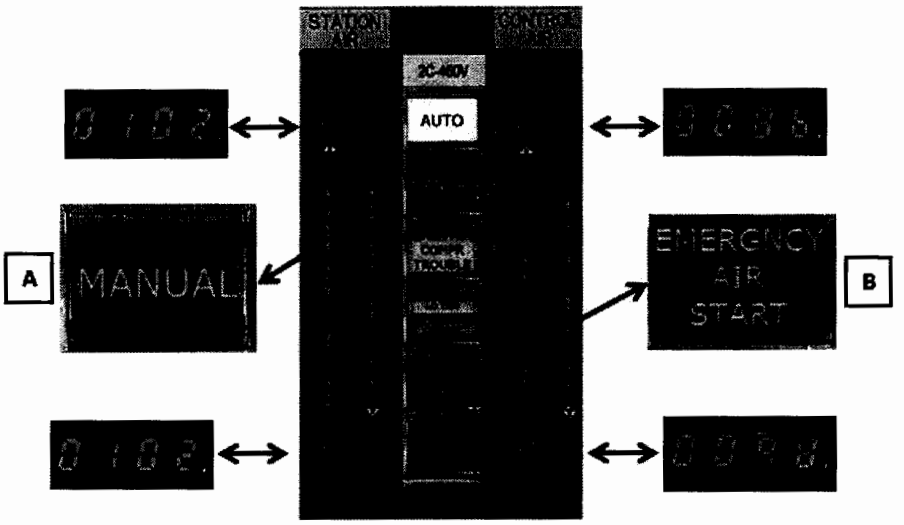
**Question History:**

**Comments:**

**26** **Points: 1.00**

Given:

- The PO observes the following:




Which ONE of the following completes the statements below?

The 2 Emergency Air Compressor ___(1)___ reached its **AUTOMATIC** start setpoint.

If the PO is required to **MANUALLY** start the 2 Emergency Air Compressor, depressing BEZEL button(s) ___(2)___ is / are the **MINIMUM** pushbutton manipulation(s) required to start the emergency air compressor.

| | **(1)** | **(2)** |
|---|---|---|
| A. | has | A then B |
| B. | has | B **ONLY** |
| C. | has **NOT** | A then B |
| D. | has **NOT** | B **ONLY** |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, S2.OP-AB.CA-0001 (Loss of Control Air) requires the crew to manually start ECAC when control air pressure reaches 88 psig. Consequently, the candidate could incorrectly deduce that the automatic start set point for the ECAC is 88 psig. Part 1 is correct.

B. Incorrect but plausible. For Part 1, S2.OP-AB.CA-0001 (Loss of Control Air) requires the crew to manually start ECAC when control air pressure reaches 88 psig. Consequently, the candidate could incorrectly deduce that the automatic start set point for the ECAC is 88 psig. For Part 2, since the crew is attempting to manually start the emergency air compressor (ECAC), the candidate could incorrectly deduce the controller is designed to start the ECAC with only one button.

C. **Correct.** For Part 1, the 2 ECAC will automatically start when control air pressure is less than 85 psig. Consequently, since the lowest control air pressure is 86 psig, The 2 Emergency Air Compressor has NOT reached its AUTOMATIC start setpoint. For Part 2, depressing BEZEL button(s) 1 then 2 are the MINIMUM pushbutton manipulation(s) required to start the emergency air compressor.

D. Incorrect but plausible. Part 1 is correct. For Part 2, since the crew is attempting to manually start the emergency air compressor (ECAC), the candidate could incorrectly deduce the controller is designed to start the ECAC with only one button.

**Question Number:** 26

**Tier:** 2 Group 1

**K/A:** 078 Instrument Air System (IAS)-A4.01

Ability to manually operate and/or monitor in the control room: Pressure gauges

**Importance Rating:** 3.1

**10 CFR Part 55:** 41.7 / 45.5 to 45.8

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must monitor the compressed air gauge (located on the compressed air control room BEZEL) and

determine if the ECAC has reached its automatic start setpoint. Additionally, the candidate must know how to manually start the ECAC from the control room.

**SRO Justification:** N/A

**Technical References:** NOS05CONAIR-12 (CONTROL AIR SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CONAIR-12 (CONTROL AIR SYSTEM)

8 Identify and describe the Control Room controls, indications, and alarms associated with the Control Air System, including:

- The Control Room location of Control Air System control bezels and indications.
- The function of each Control Air System Control Room control and indication.
- The effect each Control Air System control has upon Control Air System components and operation.
- The plant conditions or permissives required for Control Air System Control Room controls to perform their intended function.
- The setpoints associated with the Control Air System control room alarms. (Licensed Operator & STA only)

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**27** **Points: 1.00**

Given:

- Unit 2 is at 100% Reactor Power and stable
- 21-24 CFCUs are running in high speed
- 25 CFCU is stopped

At time 13:50

- A Reactor Trip and Safety Injection have occurred

Ten minutes later at **14:00**, which ONE of the following completes the statement below?

21-24 CFCUs are running in ___(1)___ speed and 25CFCU is ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | high | stopped |
| B. | high | running in high speed |
| C. | low | stopped |
| D. | low | running in low speed |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. The candidate could incorrectly conclude that with the SECs in Mode 1, this will cause on the previously running CFCUs to shift to high speed.

B. Incorrect but plausible. The candidate could incorrectly conclude that with the SECs in Mode 1, this will cause all of the CFCUs to shift to high speed.

C. Incorrect but plausible. The candidate could incorrectly conclude that with the SECs in Mode 1, this will cause only the previously running CFCUs to shift to low speed.

D. **Correct.** At 14:00:00 the SECs will be in MODE 1. This will cause the running CFCUs to stop and then all of the CFCUs will be started in low speed. Consequently, at 14:10:00, 21-24 CFCUs are running in low speed and 25CFCU is running in low speed.

**Question Number:** 27

**Tier:** 2 Group 1

**K/A:** 103 Containment System-K1.01

Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: CCS

**Importance Rating:** 3.6

**10 CFR Part 55:** 41.2 to 41.9 / 45.7 to 45.8

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how the CCS (containment cooling system CFCUs) will physically circulate and cool the containment atmosphere following a reactor trip and safety injection actuation.

**SRO Justification:** N/A

**Technical References:** NOS05ESF000-02 ( INTRODUCTION TO ENGINEERED SAFETY FEATURES AND DESIGN CRITERIA)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ESF000-02 ( INTRODUCTION TO ENGINEERED SAFETY FEATURES AND DESIGN CRITERIA)

4 Describe the function and operating characteristics for the following Engineered Safety Features Standby Power System components:

a) The power sources

b) The Safeguards Equipment Cabinets

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** _____
**Bank** X

**Question History:**

**Comments:**

**28** **Points: 1.00**

Given:

- Unit 1 is at 100% Reactor Power and stable
- 1CV5 (75 GPM ORIFICE) is in service

At time 12:00:00

- A spurious Phase A Containment Isolation occurs

At **12:01:00**, which ONE of the following completes the statements below?

Seal Return flow is being directed to the ___(1)___

___(2)___ are **BOTH** closed.

NOTE:

- 1CV2 (LTDWN LINE ISOL V)
- 1CV277 (LTDWN LINE ISOL V)
- 1CV7 (LTDWN HX INLET V)

| | **(1)** | **(2)** |
|---|---|---|
| A. | PRT | 1CV2 and 1CV277 |
| B. | PRT | 1CV5 and 1CV7 |
| C. | VCT | 1CV2 and 1CV277 |
| D. | VCT | 1CV5 and 1CV7 |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, 1CV2 and 1CV277 will automatically close on low PZR level. Consequently, the candidate could incorrectly conclude that 1CV-2 and 1VC277 also automatically close on a Phase A Containment Isolation.

B. **Correct.** For Part 1, 1CV284 & 1CV116 (RCP SW RET HDR STOP VALVES) will close. This causes seal return flow to be redirected from the VCT to the PRT via Relief Valve 1CV15. For Part 2, letdown will be isolated during a Phase A isolation. This is accomplished by closing 1CV5 and 1CV7.

C. Incorrect but plausible. For Part 1, seal injection flow is normally directed to the VCT. The candidate could incorrectly conclude that redirecting seal injection to the PRT is not desirable since this will cause a loss of RCS inventory. Incorrect but plausible. Part 1 is correct. For Part 2, 1CV2 and 1CV277 will automatically close on low PZR level. Consequently, the candidate could incorrectly conclude that 1CV-2 and 1VC277 also automatically close on a Phase A Containment Isolation.

D. Incorrect but plausible. For Part 1, seal injection flow is normally directed to the VCT. The candidate could incorrectly conclude that redirecting seal injection to the PRT is not desirable since this will cause a loss of RCS inventory. Part 2 is correct.

**Question Number:** 28

**Tier:** 2 Group 1

**K/A:** 103 Containment System-A3.01

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

**Importance Rating:** 3.9

**10 CFR Part 55:** 41.7 / 45.5

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must monitor the automatic operation of the CVCS containment isolation valves following a Phase A Containment Isolation.

**SRO Justification:** N/A

**Technical References:** NOS05CVCS00-17 (CHEMICAL AND VOLUME CONTROL SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CVCS00-17 (CHEMICAL AND VOLUME CONTROL SYSTEM)

9 State the setpoints for automatic actuations associated with the Chemical and Volume Control System.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** X
**Bank** _____

**Question History:**

**Comments:**

**29** **Points: 1.00**

Which ONE of the following completes the statements below?

**21** Centrifugal Charging Pump is powered from the ___(1)___ 4KV Vital Bus.

**22** Centrifugal Charging Pump is powered from the ___(2)___ 4KV Vital Bus.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 2A | 2B |
| B. | 2A | 2C |
| C. | 2B | 2A |
| D. | 2B | 2C |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Since there are three 4KV Vital Busses that power two trains of each type of ECCS pumps, selecting any combination of two separate 4K Vital busses is plausible.

B. Incorrect but plausible. Since there are three 4KV Vital Busses that power two trains of each ECCS pumps, selecting any combination of two separate 4K Vital busses is plausible.

C. Incorrect but plausible. Since there are three 4KV Vital Busses that power two trains of each ECCS pumps, selecting any combination of two separate 4K Vital busses is plausible.

D. **Correct.** 21 Centrifugal Charging Pump is powered from the 2B 4KV Vital Bus. 22 Centrifugal Charging Pump is powered from the 2C 4KV Vital Bus.

**Question Number:** 29

**Tier:** 2 Group 2

**K/A:** 011 Pressurizer Level Control System-K2.01

Knowledge of bus power supplies to the following: Charging pumps

**Importance Rating:** 3.1

**10 CFR Part 55:** 41.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the power supplies for the 21 and 22 Charging Pumps.

**SRO Justification:** N/A

**Technical References:** NOS05CVCS00-17 (CHEMICAL AND VOLUME CONTROL SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CVCS00-17 (CHEMICAL AND VOLUME CONTROL SYSTEM)

9 State the power supply to the following Chemical and Volume Control System components:

a. Charging Pumps

b. Boric Acid Transfer Pumps

c. Primary Water Pumps

**Cognitive Level:**

**Higher** _____
**Lower** X

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**30** **Points: 1.00**

Given:

- The crew is recovering a dropped Control Bank A Rod in accordance with S2.OP-AB.ROD-0002 (Dropped Rod)
- The ROD BANK SELECTOR SWITCH has just been placed in CBA

Which ONE of the following completes the statement below?

With the ROD BANK SELECTOR SWITCH in CBA, the dropped rod will be withdrawn at _____ steps per minute in small increments per reactor Engineering guidance.

A. 72

B. 64

C. 48

D. 8

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. 72 steps per minute is maximum speed for withdrawing rods when the ROD BANK SELECTOR SWITCH is in AUTO. Consequently, the candidate could incorrectly conclude that with ROD BANK SELECTOR SWITCH in CBA, the dropped rod will be withdrawn at 72 steps per minute.

B. Incorrect but plausible. 64 steps per minute is the speed for withdrawing rods when the ROD BANK SELECTOR SWITCH is in SBA, SBB, SBC or SBD. Consequently, the candidate could incorrectly conclude that with ROD BANK SELECTOR SWITCH in CBA, the dropped rod will be withdrawn at 64 steps per minute.

C. **Correct.** With the ROD BANK SELECTOR SWITCH in CBA, the dropped rod will be withdrawn at 48 steps per minute.

D. Incorrect but plausible. 8 steps per minute is minimum speed for withdrawing rods when the ROD BANK SELECTOR SWITCH is in AUTO. Consequently, the candidate could incorrectly conclude that with ROD BANK SELECTOR SWITCH in CBA, the dropped rod will be withdrawn at 8 steps per minute.

**Question Number:** 30

**Tier:** 2 Group 2

**K/A:** 014 Rod Position Indication System (RPIS)-A4.02

Ability to manually operate and/or monitor in the control room: Control rod mode-select switch

**Importance Rating:** 3.4

**10 CFR Part 55:** 41.7 / 45.5 to 45.8

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must be able to monitor in the control room the expected rod speed when withdrawing control rods with the ROD BANK SELECTOR SWITCH in the CBA position.

**SRO Justification:** N/A

**Technical References:** NOS05RODS00-12 (ROD CONTROL AND POSITION INDICATION SYSTEMS)

**Proposed references to be provided:** None

**Learning Objective:** NOS05RODS00-12 (ROD CONTROL AND POSITION INDICATION SYSTEMS)

11 Identify and describe the Control Room controls, indications, and alarms associated with the Rod Control and Position Indication Systems, including:

a. The Control Room location of Rod Control and Position Indication Systems control bezels and indications

b. The function of each Rod Control and Position Indication Systems Control Room control and indication

c. The effect each Rod Control and Position Indication Systems control has upon Rod Control and Position Indication Systems components and operation

d. The plant conditions or permissives required for Rod Control and Position Indication Systems Control Room controls to perform their intended function

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**31** **Points: 1.00**

Given:

- Unit 2 is in MODE 3 preparing to do a plant startup

At Time 07:00

- An AUTOMATIC RCS Makeup starts

At Time 07:01

- 125 VDC power to 2CV179 (PRIMARY WATER FLOW) has been lost
- The Primary Water Flow Deviation Alarm actuates

At Time 07:02

- 2CV185 (MAKEUP FLOWPATH) fails to AUTOMATICALLY close

Which ONE of the following completes the statements below?

The Primary Water Flow Deviation Alarm actuates when primary water flow is greater than a **MINIMUM** of ±___(1)___ gpm above the setpoint.

The Source Range NI Audible Count Rate indication is expected to ___(2)___ as the makeup continues with 2CV179 in its failed position.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 5.0 | rise |
| B. | 5.0 | lower |
| C. | 0.8 | rise |
| D. | 0.8 | lower |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that 2CV179 fails open. With 2CV179 open during an automatic RCS makeup, actual RCS Boron Concentration will lower. Lowering actual RCS Concentration will add positive reactivity which will cause the Source Range NI Audible Count Rate indication to rise.

B. **Correct.** For Part 1 and IAW S2.OP-AR-ZZ-0012, the Primary Water Flow Deviation Alarm actuates when primary water flow is greater than a MINIMUM of ± 5.0 gpm above the setpoint. For Part 2, 2CV179 fails closed. Consequently, actual boron flow into the boric acid blender will higher than the predetermined setpoint for the auto makeup (based on current RCS Boron concentration). This will cause actual RCS boron concentration to rise since the boron concentration of auto makeup flow is higher than the setpoint for the existing RCS Boron concentration. An increase in actual RCS Boron concentration will insert negative reactivity which will cause the Source Range NI Audible Count Rate indication to lower.

C. Incorrect but plausible. For Part 1, the Boric Acid Flow Deviation actuates when boric acid flow is greater than a MINIMUM of ± 0.8 gpm above the setpoint. Consequently, the candidate could incorrectly conclude that the Primary Water Flow Deviation Alarm actuates when primary water flow is greater than a MINIMUM of ± 0.8 gpm above the setpoint. For Part 2, the candidate could incorrectly conclude that 2CV179 fails open. With 2CV179 open during an automatic RCS makeup, actual RCS Boron Concentration will lower. Lowering actual RCS Concentration will add positive reactivity which will cause the Source Range NI Audible Count Rate indication to rise.

D. Incorrect but plausible. For Part 1, the Boric Acid Flow Deviation actuates when boric acid flow is greater than a MINIMUM of ± 0.8 gpm above the setpoint. Consequently, the candidate could incorrectly conclude that the Primary Water Flow Deviation Alarm actuates when primary water flow is greater than a MINIMUM of ± 0.8 gpm above the setpoint. Part 2 is correct.

**Question Number:** 31

**Tier:** 2 Group 2

**K/A:** 015 Nuclear Instrumentation System (NIS)-A3.05

Ability to monitor automatic operation of the NIS, including: Recognition of audio output expected for a given plant condition

**Importance Rating:** 2.6

**10 CFR Part 55:** 41.7 / 45.5

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how the Source Range NI Audible Count Rate indication will automatically respond during an automatic RCS makeup with 2CV172 (BORIC ACID FLOW) failed open.

**SRO Justification:** N/A

**Technical References:** NOS05CVCS00-17 (Chemical and Volume Control System)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CVCS00-17 (Chemical and Volume Control System)

11 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

**Cognitive Level:**

**Higher** X
**Lower** ____

**Question Source**

**New** X
**Modified Bank** ____
**Bank** ____

**Question History:**

**Comments:**

**32** **Points: 1.00**

Given:

- Unit 2 is at 25% Reactor Power and stable
- Emergent maintenance activities are ongoing inside containment
- Containment pressure is slowly rising due to the maintenance activities

In accordance with Unit 2 Technical Specifications, which ONE of the following completes the statements below?

LCO 3.6.1.4 (CONTAINMENT INTERNAL PRESSURE) will **NOT** be met when containment pressure is greater than a **MINIMUM** of + ___(1)___ psig.

When LCO 3.6.1.4 is **NOT** met, the crew is required to restore containment internal pressure within limits within a **MAXIMUM** of ___(2)___ minutes or place the Unit in HOT STANDBY within the next 6 hours.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 0.2 | 30 |
| B. | 0.2 | 60 |
| C. | 0.3 | 30 |
| D. | 0.3 | 60 |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the BEZEL Hi CNTMT Pressure Alarm is 0.2 psid. Consequently, the candidate could incorrectly determine that LCO 3.6.1.4 (INTERNAL PRESSURE) will NOT be met when containment pressure is greater than a minimum of + 0.2 psig. For Part 2, there are other LCOs with 30 minutes REQUIRED ACTION (LCOs 3.2.1, 3.2.4, 3.4.10.2 and 3.7.2). Consequently, the candidate could incorrectly conclude that when LCO 3.6.1.4 is NOT met, the crew is required to restore containment internal pressure within limits within a MAXIMUM of 30 minutes or place the Unit in HOT STANDBY within the next 6 hours

B. Incorrect but plausible. For Part 1, the BEZEL Hi CNTMT Pressure Alarm is 0.2 psid. Consequently, the candidate could incorrectly determine that LCO 3.6.1.4 (INTERNAL PRESSURE) will NOT be met when containment pressure is greater than a minimum of + 0.2 psig. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, there are other LCOs with 30 minutes REQUIRED ACTION (LCOs 3.2.1, 3.2.4, 3.4.10.2 and 3.7.2). Consequently, the candidate could incorrectly conclude that when LCO 3.6.1.4 is NOT met, the crew is required to restore containment internal pressure within limits within a MAXIMUM of 30 minutes or place the Unit in HOT STANDBY within the next 6 hours

D. **Correct.** For Part 1, LCO 3.6.1.4 (INTERNAL PRESSURE) will NOT be met when containment pressure is greater than a minimum of + 0.3 psig. For Part 2, When LCO 3.6.1.4 is NOT met, the crew is required to restore containment internal pressure within limits within a MAXIMUM of 60 minutes or place the Unit in HOT STANDBY within the next 6 hours.

**Question Number:** 32

**Tier:** 2 Group 2

**K/A:** 029 Containment Purge System (CPS)-A2.01

Ability to (a) predict the impacts of the following malfunctions or operations on the Containment Purge System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Maintenance or other activity taking place inside containment

**Importance Rating:** 2.9

**10 CFR Part 55:** 41.5 / 43.5 / 45.3 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must use Technical Specifications (a procedure) to mitigate containment internal pressure rising (using CPS) due to emergent maintenance activities taking place inside containment.

**SRO Justification:** N/A

**Technical References:** NOS05CONTMT-15 (CONTAINMENT AND CONTAINMENT SUPPORT SYSTEMS)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CONTMT-15 (CONTAINMENT AND CONTAINMENT SUPPORT SYSTEMS)

9 Given a situation dealing with Containment and Containment Support Systems operability, examine the situation and apply the appropriate Technical Specification action.

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

**Question History:**

**Comments:**

**33** **Points: 1.00**

Given the following Salem Water Sources:

1. Demineralized Water System
2. Primary Water Storage Tank
3. CVCS Holdup Tanks
4. Refueling Water Storage Tank
5. Fresh Water and Fire Protection Water Storage Tank

Which ONE of the following completes the statements below concerning Unit 2 Spent Fuel Pool?

In accordance S2.OP-SO.SF-0001 (Fill And Transfer Of The Spent Fuel Pool), _____ are sources of water that can be used to provide **ROUTINE** makeup to the Spent Fuel Pool.

A. 1, 2, 3, and 4 **ONLY**

B. 2, 3, and 4 **ONLY**

C. 3, 4 and 5 **ONLY**

D. 1, 2, 3, 4, and 5

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** In accordance S2.OP-SO.SF-0001 (Fill And Transfer Of The Spent Fuel Pool), the follow water sources are allowed to be used for ROUTINE makeup to the Spent Fuel Pool:

1. Demineralized Water System
2. Primary Water Storage Tank
3. CVCS Holdup Tanks
4. Refueling Water Storage Tank

B. Incorrect but plausible. All of the listed water sources are actual Salem Water Sources. Consequently, all of the distractors are plausible when determining the allowed ROUTINE makeup sources to the Spent Fuel pool.

C. Incorrect but plausible. All of the listed water sources are actual Salem Water Sources. Consequently, all of the distractors are plausible when determining the allowed ROUTINE makeup sources to the Spent Fuel pool.

D. Incorrect but plausible. All of the listed water sources are actual Salem Water Sources. Consequently, all of the distractors are plausible when determining the allowed ROUTINE makeup sources to the Spent Fuel pool.

**Question Number:** 33

**Tier:** 2 Group 2

**K/A:** 033 Spent Fuel Pool Cooling System (SFPCS)-K4.01

Knowledge of design feature(s) and/or interlock(s) which provide for the following: Maintenance of spent fuel level

**Importance Rating:** 2.9

**10 CFR Part 55:** 41.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know what water sources can be used as a source routine makeup to the SFP. This is a design feature of the SFP Cooling System that provides maintenance of SFP level.

**SRO Justification:** N/A

**Technical References:** NOS05SFP000-10 (SPENT FUEL POOL COOLING SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05SFP000-10 (SPENT FUEL POOL COOLING SYSTEM)

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 .

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**34** **Points: 1.00**

Given:

- A Unit 1 Core reload is in progress
- The Fuel Transfer Cart is in the Fuel Handling Building with the upender in the horizontal position

At 09:00:00

- The limit switch on the Fuel Transfer Tube Gate Valve fails and the valve no longer indicates open
- An NEO has verified that the Fuel Transfer Tube Gate Valve is open

At 09:05:00

- Water level in the refueling canal begins to rapidly lower
- The crew is preparing to close the Fuel Transfer Tube Gate Valve

Which ONE of the following completes the statements below concerning?

At **09:00:00** and if desired, the Fuel Transfer Cart can be moved MANUALLY ___(1)___ to Containment with the failed limit switch on the Fuel Transfer Tube Gate Valve.

At **09:05:00**, the crew ___(2)___ **FULLY** close the Fuel Transfer Tube Gate Valve with the Fuel Transfer Cart locate in the Fuel Handling Building.

| | **(1)** | **(2)** |
|---|---|---|
| A. | **ONLY** | can |
| B. | **ONLY** | can **NOT** |
| C. | or ELECTRICALLY | can |
| D. | or ELECTRICALLY | can **NOT** |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could in correctly conclude that the Fuel Transfer Tube Gate Valve can be closed regardless of its location (inside containment or inside the fuel handling building).

B. **Correct.** For Part 1, the Fuel Transfer Cart has two interlocks that will prevent / allow cart movement: upender must be in the horizontal position and the Fuel Transfer Tube Gate Valve must be open (as indicated with the open limit switch). At 09:00:00, both interlocks are not satisfied and the Fuel Transfer Cart can not be moved to containment. For Part 2, the crew can not close the Fuel Transfer Tube Gate Valve with the Fuel Transfer Cart locate in the Fuel Handling Building

C. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that the fuel cart interlock was only based on position of the upender and the Fuel Transfer Tube Gate Valve was verified open administratively prior to moving the fuel transfer cart. For Part 2, the candidate could in correctly conclude that the Fuel Transfer Tube Gate Valve can be closed regardless of its location (inside containment or inside the fuel handling building).

D. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that the fuel cart interlock was only based on position of the upender and the Fuel Transfer Tube Gate Valve was verified open administratively prior to moving the fuel transfer cart. Part 2 is correct.

**Question Number:** 34

**Tier:** 2 Group 2

**K/A:** 034 Fuel Handling Equipment System (FHES)-A1.02

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the Fuel Handling System controls including: Water level in the refueling canal

**Importance Rating:** 2.9

**10 CFR Part 55:** 41.5 / 45.5

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know that as water level in the refueling canal lowers, what condition must be met to close the Fuel Transfer Tube Gate Valve (fuel transfer cart must be inside containment).

**SRO Justification:** N/A

**Technical References:** S2.OP-AB.FUEL-0002 (Loss Of Refueling Cavity Or Spent Fuel Pool Level)

NOS05REFUEL-11 (REFUELING SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05REFUEL-11 (REFUELING SYSTEM)

5 Outline the interlocks associated with the following Refueling System components:

a. Manipulator Crane Bridge and Trolley
b. Manipulator Crane Hoist and Gripper
c. Fuel Transfer System Conveyor Car
d. Fuel Transfer System Upender
e. Fuel Handling Crane

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** X
**Bank** _____

**Question History:**

**Comments:**

**35** **Points: 1.00**

Given:

- Unit 2 is at 100% Reactor Power and stable

At time 10:00:00

- The 21BF19 Main Feedwater Control Valve controller malfunctions causing 21BF19 to close

At time 10:00:30

- The crew performs a **MANUAL** Reactor Trip
- **ONLY** Reactor Trip Train A Breaker opens

Which ONE of the following completes the statement below?

The Steam Dump System will use the ___(1)___ to stabilize RCS $T_{AVG}$ at ___(2)___ °F.

| | (1) | (2) |
|---|---|---|
| A. | Plant Trip Controller | 552 |
| B. | Plant Trip Controller | 547 |
| C. | Load Rejection Controller | 552 |
| D. | Load Rejection Controller | 547 |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that steam dump plant trip controller is based on Reactor Trip Train A Breaker opening. For Part 2, the candidate could incorrectly recall which steam dump controller has a dead band and incorrectly concludes that the plant trip controller has a dead band. This would then cause the candidate to incorrectly conclude that following the reactor trip, RCS TAVG will stabilize at 552°F.

B. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that steam dump plant trip controller is based on Reactor Trip Train A Breaker opening. For Part 2, the plant trip controller has no dead band and will normally restore RCS TAVG to RCS No-Load TAVG (547°F).

C. **Correct.** For Part 1, with the Plant initially at 100% Power, the Steam Dump System is in the TAVG Mode. Consequently when the plant trips and ONLY Reactor Trip Train A Breaker opens, the Load Rejection Controller will control the steam dumps. If Reactor Trip Train B Breaker had opened then the Plant Trip Controller would have controlled the steam dumps. For Part 2, with the Load Rejection Controller in control of the steam dumps, there is a 5°F dead band associated with the controller. Consequently, the steam dumps will maintain RCS TAVG at 552 °F (547°F (no load TAVG) + 5 °F).

D. Incorrect but plausible. Part 1 is correct. For Part 2, the distractor is plausible for two different reasons. First, following a reactor trip in which both Reactor Trip Train A and B Breakers open, the steam dump system would maintain RCS TAVG at 547°F. Secondly, the candidate could incorrectly recall which steam dump controller has a dead band. Either way, the candidate could incorrectly determine that following the reactor trip, RCS TAVG will stabilize at 547°F.

**Question Number:** 35

**Tier:** 2 Group 2

**K/A:** 041 Steam Dump System (SDS)/Turbine Bypass Control-K6.03

Knowledge of the effect of a loss or malfunction on the following will have on the SDS: Controller and positioners, including ICS, S/G, CRDS

**Importance Rating:** 2.7

**10 CFR Part 55:** 41.7 / 45.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how the SDCS will respond following a malfunction of the 21BF19 controller which requires a manual a reactor trip from 100% power in which ONLY Reactor Trip Train A Breaker opens.

**SRO Justification:** N/A

**Technical References:** NOS05STDUMP-12 (STEAM DUMP SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05STDUMP-12 (STEAM DUMP SYSTEM)

7: Describe the function of the following controllers and how their normal and abnormal operation affects the Steam Dump System:

a. Steam Pressure Controller

b. Load Rejection Controller

c. Plant Trip Controller

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** _____
**Bank** X

**Question History:**

**Comments:**

**36** **Points: 1.00**

Which ONE of the following completes the statement below?

_____ can cause Main Condenser vacuum to degrade.

A. Excessively low TAC supply temperature

B. Excessively high Vacuum Pump Seal Water flow

C. Vacuum Pump Separating Tank releasing through the overflow

D. Excessively high Vacuum Pump Seal Water Temperature

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. All of the other distractors will cause Seal Water Temperature to lower which would actually improve Condenser Vacuum. However, the candidate could incorrectly conclude that any of the distractors would degrade condenser vacuum.

B. Incorrect but plausible. All of the other distractors will cause Seal Water Temperature to lower which would actually improve Condenser Vacuum. However, the candidate could incorrectly conclude that any of the distractors would degrade condenser vacuum.

C. Incorrect but plausible. All of the other distractors will cause Seal Water Temperature to lower which would actually improve Condenser Vacuum. However, the candidate could incorrectly conclude that any of the distractors would degrade condenser vacuum.

D. **Correct.** As Seal Water temperature increases, Vacuum Pump performance decreases, and can result in degrading vacuum.

**Question Number:** 36

**Tier:** 2 Group 2

**K/A:** 055 Condenser Air Removal System (CARS)-K3.01

Knowledge of the effect that a loss or malfunction of the CARS will have on the following: Main condenser

**Importance Rating:** 2.5

**10 CFR Part 55:** 41.7 / 45.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how a malfunction in CARS (seal water temperature rising) will affect Condenser Vacuum.

**SRO Justification:** N/A

**Technical References:** NOS05CAR000-07 (CONDENSER AIR REMOVAL AND PRIMING SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CAR000-07 (CONDENSER AIR REMOVAL AND PRIMING SYSTEM)

13: Given plant conditions, relate the Condenser Air Removal and Priming System with the following:

a. Main Turbine/Generator
b. Main Condenser
c. Condensate System
d. Steam Generator
e. Condensate Polishers
f. Radiation Monitoring
g. Steam Dump System

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** _____
**Bank** X

**Question History:**

**Comments:**

**37** **Points: 1.00**

Given:

- Unit 2 is at 90% Reactor Power

At time 17:00:00

- **21**CN22 (LP Feedwater Heaters 21A/22A Inlet Control Valve) and **23**CN22 (LP Feedwater Heaters 21C / 22C Inlet Control Valve) **SPURIOUSLY** close

Which ONE of the following completes the statements below?

With **21**CN22 and **23**CN22 closed, Reactor Power will ___(1)___.

The crew ___(2)___ open **21**CN22 and **23**CN22 from the Control Room.

| | **(1)** | **(2)** |
|---|---|---|
| A. | remain stable | can |
| B. | remain stable | can **NOT** |
| C. | rise | can |
| D. | rise | can **NOT** |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the candidate could fail to recognize that with the given condensate transient, that Feedwater temperature will lower. Consequently, if the candidate incorrectly concluded Feedwater temperature is stable, then the candidate would also conclude that reactor power is stable. For Part 2, other CN valves associated with Feedwater heaters can be operated in the Control Room (e.g. 2CN45 and 2CN47). Consequently, the candidate could incorrectly conclude that 21CN22 and 23CN22 can also be opened from the control room.

B. Incorrect but plausible. For Part 1, the candidate could fail to recognize that with the given condensate transient, that Feedwater temperature will lower. Consequently, if the candidate incorrectly concluded Feedwater temperature is stable, then the candidate would also conclude that reactor power is stable. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, other CN valves associated with Feedwater heaters can be operated in the Control Room (e.g. 2CN45 and 2CN47). Consequently, the candidate could incorrectly conclude that 21CN22 and 23CN22 can also be opened from the control room.

D. **Correct.** For Part 1, with 21CN22 and 23CN22 closed, 2CN45 will modulate open to maintain <65 psid across 21 and 22 LP Heaters. With 2CN45 modulated, Feedwater temperature will lower. With SG Steam flow constant, Reactor power will rise. For Part 2, the CN22s only have indications in the Control Room (no controls). Consequently, The crew can not open 21CN22 and 23CN22 from the Control Room.

**Question Number:** 37

**Tier:** 2 Group 2

**K/A:** 056 Condensate System-G2.1.30

Ability to locate and operate components, including local controls

**Importance Rating:** 4.4

**10 CFR Part 55:** 41.7 / 45.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know that 21&23CN22 (Condensate Valves) can only be operated locally and not in the control room.

**SRO Justification:** N/A

**Technical References:** NOS05CN&FDW-15 (CONDENSATE AND FEEDWATER SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CN&FDW-15 (CONDENSATE AND FEEDWATER SYSTEM)

7: Identify and describe the local controls, indications, and alarms associated with the Condensate and Feedwater System, including:

a. The location of Condensate and Feedwater System local controls and indications.

b. The function of Condensate and Feedwater System local controls and indications.

c. The plant conditions or permissives required for Condensate and Feedwater System local controls to perform their intended function.

d. The setpoints associated with the Condensate and Feedwater System local alarms.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**38** **Points: 1.00**

Which ONE of the following completes the statements below concerning the Unit 2 Radioactive Liquid Waste System Tanks?

**ONLY** the _____ has a physical connection to the Waste Gas Compressor Header.

A. RCDT

B. 21 WHUT

C. Chemical Drain Tank

D. Auxiliary Building Sump Tank

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** ONLY the RCDT has a physical connection to the Waste Gas Compressor Header.

B. Incorrect but plausible. Since all of the distractors are part of the tanks that comprise the Liquid Waste System, all of the distractors are plausible.

C. Incorrect but plausible. Since all of the distractors are part of the tanks that comprise the Liquid Waste System, all of the distractors are plausible.

D. Incorrect but plausible. Since all of the distractors are part of the tanks that comprise the Liquid Waste System, all of the distractors are plausible.

**Question Number:** 38

**Tier:** 2 Group 2

**K/A:** 068 Liquid Radwaste System (LRS)-K1.02

Knowledge of the physical connections and/or cause effect relationships between the Liquid Radwaste System and the following systems: Waste gas vent header

**Importance Rating:** 2.5

**10 CFR Part 55:** 41.2 to 41.9 / 45.7 to 45.8

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know which Radioactive Liquid Waste System Tank is physically connected to the Waste Gas Compressor Header.

**SRO Justification:** N/A

**Technical References:** NOS05WASLIQ-09 (RADIOACTIVE LIQUID WASTE SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CN&FDW-15 (CONDENSATE AND FEEDWATER SYSTEM)

14: Given plant conditions, relate the Radioactive Liquid Waste System with the following:

a. Reactor Coolant System
b. Chemical Volume Control System
c. Waste gas vent header
d. Pressurizer Relief Tank
e. Reactor Coolant Drain Tank
f. Circulating Water System
g. Service Water System
h. Radiation Monitoring System

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**39** **Points: 1.00**

In accordance with S2.OP-IO.ZZ-0003 (Hot Standby To Minimum Load), which ONE of the following completes the statement below?

The crew will record the time of MODE 2 entry in the Control Room Narrative Log when _____.

A. the reactor is announced to be critical

B. withdrawal of Control Bank "A" is imminent

C. withdrawal of Shutdown Bank "A" is imminent

D. when IR power level has been stabilized at 2E-3%

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. The candidate could incorrectly conclude that the plant enters Mode 2 when the reactor becomes critical.

B. **Correct.** In accordance with S2.OP-IO.ZZ-0003, The crew will record the time of MODE 2 entry in the Control Room Narrative Log when withdrawal of Control Bank "A" is imminent.

C. Incorrect but plausible. The candidate could incorrectly conclude that the plant enters Mode 2 when the first bank of control rods is withdrawn.

D. Incorrect but plausible. The candidate could incorrectly conclude that the plant enters Mode 2 when the IR power has been stabilized at 2E-3% which is when data is collected IAW SC.RE-RA.ZZ-0002 (Inverse Count Rate Ratio During Reactor Startup).

**Question Number:** 39

**Tier:** 3 Group _____

**K/A:** G2.1.18

Ability to make accurate, clear, and concise logs, records, status boards, and reports

**Importance Rating:** 3.6

**10 CFR Part 55:** 41.10 / 45.12 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the requirement of S2.OP-IO.ZZ-0003 (Hot Standby To Minimum Load) to accurately document in the Control Room Narrative Log when the Unit enters MODE 2 during a plant startup.

**SRO Justification:** N/A

**Technical References:** NOS05IOP300-09 (REACTOR STARTUP)

**Proposed references to be provided:** None

**Learning Objective:** NOS05IOP300-09 (REACTOR STARTUP)

1: Summarize the purpose of S1/S2.OP-IO.ZZ-0003(Q), Hot Standby to Minimum Load

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | |
| **Bank** | X |

**Question History:**

**Comments:**

**40** **Points: 1.00**

Given:

- Unit 2 is at 100% Reactor Power and stable

At time 10:00

- 2LT-112 (VCT Level Transmitter) fails to 80%

Which ONE of the following completes the statements below?

At **10:01**, **ACTUAL** VCT Level is ___(1)___.

If **ACTUAL** VCT Level reaches the AUTO MAKE-UP set point with 2LT-112 failed at 80%, an AUTO MAKE-UP___(2)___ start.

| | **(1)** | **(2)** |
|---|---|---|
| A. | lowering | will **NOT** |
| B. | lowering | will |
| C. | stable | will **NOT** |
| D. | stable | will |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the VCT has two level transmitters (LT-112 and LT-114). If LT-114 had failed to 80%, CV-35 would be almost fully diverted to the CVCS Holdup Tanks. Consequently, the candidate could incorrectly conclude that CV-35 would be almost fully diverted to the CVCS Holdup Tanks which would cause ACTUAL VCT level to lower. Part 2 is correct.

B. Incorrect but plausible. For Part 1, the VCT has two level transmitters (LT-112 and LT-114). If LT-114 had failed to 80%, CV-35 would be almost fully diverted to the CVCS Holdup Tanks. Consequently, the candidate could incorrectly conclude that CV-35 would be almost fully diverted to the CVCS Holdup Tanks which would cause ACTUAL VCT level to lower. For Part 2, the VCT has two level transmitters (LT-112 and LT-114). The candidate could incorrectly conclude that LT-114 controls the AUTO MAKE-UP function. Consequently, the candidate would then incorrectly deduce that with LT-112 failed at 85%, an AUTO MAKE-UP would start when ACTUAL VCT level reaches the AUTO MAKE-UP set point.

C. **Correct.** For Part 1, LT-112 will cause CV-35 to ONLY fully divert to the CVCS Holdup Tanks at 87% (no modulation of CV-35). Consequently, when LT-112 fails to 85%, CV-35 will remain fully aligned to the VCT and ACTUAL VCT Level will remain stable. For Part 2, LT-112 is the controlling transmitter for AUTO MAKE-UP. Consequently, with LT-112 failed at 85%, an AUTO MAKE-UP will NOT start when ACTUAL VCT level reaches the AUTO MAKE-UP set point.

D. Incorrect but plausible. Part 1 is correct. For Part 2, the VCT has two level transmitters (LT-112 and LT-114). The candidate could incorrectly conclude that LT-114 controls the AUTO MAKE-UP function. Consequently, the candidate would then incorrectly deduce that with LT-112 failed at 85%, an AUTO MAKE-UP would start when ACTUAL VCT level reaches the AUTO MAKE-UP set point.

**Question Number:** 40

**Tier:** 3 Group _____

**K/A:** G2.1.28

Knowledge of the purpose and function of major system components and controls

**Importance Rating:** 4.1

**10 CFR Part 55:** 41.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how the CVCS Auto Makeup Controller functions when LT-112 (VCT Level Transmitter) fails to 85%

**SRO Justification:** N/A

**Technical References:** NOS05CVCS00-17 (CHEMICAL AND VOLUME CONTROL SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CVCS00-17 (CHEMICAL AND VOLUME CONTROL SYSTEM)

7: Identify and describe the local controls, indications, and alarms associated with the Chemical and Volume Control System, including:

a. The location of Chemical and Volume Control System local controls and indications.

b. The function of Chemical and Volume Control System local controls and indications.

c. The plant conditions or permissives required for Chemical and Volume Control System local controls to perform their intended function.

d. The setpoints associated with the Chemical and Volume Control System local alarms.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** _____
**Bank** X

**Question History:**

**Comments:**

**41** **Points: 1.00**

**REFERENCES PROVIDED**

Given:

- Unit 2 is at 100% Reactor Power and stable
- Core Burnup is 8000 EFPH
- RCS Boron Concentration is 900 ppm
- Control Bank D is at 228 steps

At time 10:00:00

- The crew is planning to reduce Reactor Power to 80% to support unplanned maintenance activities
- As part of the down power, the crew will change core reactivity by (-) 216 pcm by raising RCS Boron Concentration

Which ONE of the following completes the statements below?

Using the given references and disregarding any core reactivity change due to Xenon, Control Bank D will be at approximately _____ steps after the down power and RCS Boron Concentration change are completed.

A. 186

B. 175

C. 166

D. 150

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** IAW S2-RE-RA.ZZ-0016 (Figure 17A or Table 2-1), for the given Core Burnup and RCS Boron Concentration, lowering power from 100% to 80% will add (+) 396 pcm of reactivity to the core. Since the crew will change core reactivity by (-) 216 pcm by raising RCS Boron Concentration, Control Bank D will need to make up for the remaining (-) 180 pcm by inserting from 228 steps. Using the Integral Rod Worth from IAW S2-RE-RA.ZZ-0016 Figure 2C, Control Bank D will be at approximately 186 steps after the down power and RCS Boron Concentration change are completed.

B. Incorrect but plausible. Determining the correct answer requires multiple calculations and reading of multiple curves / tables. Consequently, there are several incorrect steps the candidate could perform to incorrectly determine Control Bank D final position. Since the distractors are all possible positions of Control Bank D, all of the distractors are plausible.

C. Incorrect but plausible. Determining the correct answer requires multiple calculations and reading of multiple curves / tables. Consequently, there are several incorrect steps the candidate could perform to incorrectly determine Control Bank D final position. Since the distractors are all possible positions of Control Bank D, all of the distractors are plausible.

D. Incorrect but plausible. Determining the correct answer requires multiple calculations and reading of multiple curves / tables. Consequently, there are several incorrect steps the candidate could perform to incorrectly determine Control Bank D final position. Since the distractors are all possible positions of Control Bank D, all of the distractors are plausible.

**Question Number:** 41

**Tier:** 3 Group _____

**K/A:** G2.1.43

Ability to use procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, fuel depletion, etc.

**Importance Rating:** 4.1

**10 CFR Part 55:** 41.10 / 43.6 / 45.6

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must use S2-RE-RA.ZZ-0016 (Curve Book – Salem Unit 2 Cycle 23) to determine how much control rods will insert following a power reduction from 100% to 80%.

**SRO Justification:** N/A

**Technical References:** S2-RE-RA.ZZ-0016 (Curve Book – Salem Unit 2 Cycle 23)

**Proposed references to be provided:** S2-RE-RA.ZZ-0016 (Curve Book – Salem Unit 2 Cycle 23) Pages 24, 94 and 100

**Learning Objective:** NOS05RODS00-12 (ROD CONTROL AND POSITION INDICATION SYSTEMS)

18: Given plant conditions, relate the Rod Control and Position Indication System with the following:

a. Chemical Volume Control System
b. Reactor Coolant System
c. Nuclear Instrumentation System
d. Reactor Protection System
e. Containment Ventilation System
f. 480V Vital AC System
g. 115V Vital AC System
h. 125V Vital DC System
i. 28V DC System

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**42** **Points: 1.00**

Given:

- Corrective Maintenance has just been completed on 2A Emergency Diesel Generator (EDG)
- Operations is preparing to perform a Load Test on 2A EDG as part of the Post -Maintenance Operability Retest

In accordance with S2.OP-ST.DG-0001 (2A Diesel Generator Surveillance Test), which ONE of the following completes the statements below?

To prevent tripping the Diesel Generator Breaker on reverse power, generator load must be **IMMEDIATELY** raised to greater than a **MINIMUM** of ___(1)__ KW after the breaker is closed.

During the Load Test, the 2A EDG may **NOT** exceed its ___(2)___ KW Continuous Load Rating.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 500 | 2600 |
| B. | 500 | 2750 |
| C. | 200 | 2600 |
| D. | 200 | 2750 |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1 and IAW S2.OP-ST.DG-0001, to prevent tripping the Diesel Generator Breaker on reverse power, generator load must be IMMEDIATELY raised to greater than a minimum of 500 KW after the breaker is closed. For Part 2 and IAW S2.OP-ST.DG-0001, during the Load Test, the 2A EDG may NOT exceed its 2600 KW Continuous Load Rating.

B. Incorrect but plausible. Part 1 is correct. For Part 2, S2.OP-ST.DG-0001 Precautions And Limitations states that the EDG is rated to 2750 KW for 2000 hours (2681 KW Local). Consequently, the candidate could incorrectly conclude that 2750 KW is the Continuous Loading Rating on the EDG.

C. Incorrect but plausible. For Part 1, S2.OP-ST.DG-0001 states that when unloading the EDG, generator load must be maintained at greater than 200 KW until the breaker is opened (to prevent tripping the Diesel Generator Breaker on reverse power). Consequently, the candidate could incorrectly conclude that to prevent tripping the Diesel Generator Breaker on reverse power, generator load must be IMMEDIATELY raised to greater than a minimum of 200 KW after the breaker is closed. Part 2 is correct.

D. Incorrect but plausible. For Part 1, S2.OP-ST.DG-0001 states that when unloading the EDG, generator load must be maintained at greater than 200 KW until the breaker is opened (to prevent tripping the Diesel Generator Breaker on reverse power). Consequently, the candidate could incorrectly conclude that to prevent tripping the Diesel Generator Breaker on reverse power, generator load must be IMMEDIATELY raised to greater than a minimum of 200 KW after the breaker is closed. For Part 2, S2.OP-ST.DG-0001 Precautions And Limitations states that the EDG is rated to 2750 KW for 2000 hours (2681 KW Local). Consequently, the candidate could incorrectly conclude that 2750 KW is the Continuous Loading Rating on the EDG.

**Question Number:** 42

**Tier:** 3 Group _____

**K/A:** G2.2.21

Knowledge of pre- and post-maintenance operability requirements

**Importance Rating:** 2.9

**10 CFR Part 55:** 41.10 / 43.2

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the post-maintenance operability requirements for the 2A EDG in accordance with S2.OP-ST.DG-0001 (2A Diesel Generator Surveillance Test).

**SRO Justification:** N/A

**Technical References:** NOS05EDG000-12 (EMERGENCY DIESEL GENERATORS)

**Proposed references to be provided:** None

**Learning Objective:** NOS05EDG000-12 (EMERGENCY DIESEL GENERATORS)

12: Discuss the procedural requirements associated with the Emergency Diesel Generator, including an explanation of major precaution and limitations in the Emergency Diesel Generator procedures

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**43** **Points: 1.00**

In accordance with Unit 2 Technical Specifications, which ONE of the following completes the statements below?

Safety Limit 2.1.2 (Reactor Coolant System Pressure) will **NOT** be met when RCS pressure is greater than a **MINIMUM** of ___(1)___ psig.

If the Unit is in MODE 3 when RCS Pressure has exceeded the Safety Limit 2.1.2 limit, then RCS pressure must be reduced within its limit within a **MAXIMUM** of ___(2)___ minutes.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 2485 | 5 |
| B. | 2485 | 60 |
| C. | 2735 | 5 |
| D. | 2735 | 60 |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, 2485 psig is the setpoint for the PZR safety valves. Consequently, the candidate could incorrectly conclude that SL 2.1.2 (Reactor Coolant System Pressure) will NOT be met when RCS pressure is greater than a MINIMUM of 2485 psig. Part 2 is correct.

B. Incorrect but plausible. For Part 1, 2485 psig is the setpoint for the PZR safety valves. Consequently, the candidate could incorrectly conclude that SL 2.1.2 (Reactor Coolant System Pressure) will NOT be met when RCS pressure is greater than a MINIMUM of 2485 psig. For Part 2, IAW SL 2.1.2, if the Unit was in Mode 1 or 2 when SL 2.1.2 limits were exceeded, then RCS pressure must be reduced within its limit within a MAXIMUM of 60 minutes. Consequently, the candidate could incorrectly conclude that if the Unit was in Mode 3 when SL 2.1.2 limits were exceeded, then RCS pressure must be reduced within its limit within a MAXIMUM of 60 minutes.

C. **Correct.** For Part 1, SL 2.1.2 (Reactor Coolant System Pressure) will NOT be met when RCS pressure is greater than a MINIMUM of 2735 psig. For Part 2, if the Unit is in MODE 3 when RCS Pressure has exceeded the SL 2.1.2 limit, then RCS pressure must be reduced within its limit within a MAXIMUM of 5 minutes.

D. Incorrect but plausible. Part 1 is correct. For Part 2, IAW SL 2.1.2, if the Unit was in Mode 1 or 2 when SL 2.1.2 limits were exceeded, then RCS pressure must be reduced within its limit within a MAXIMUM of 60 minutes. Consequently, the candidate could incorrectly conclude that if the Unit was in Mode 3 when SL 2.1.2 limits were exceeded, then RCS pressure must be reduced within its limit within a MAXIMUM of 60 minutes.

**Question Number:** 43

**Tier:** 3 Group _____

**K/A:** G2.2.38

Knowledge of conditions and limitations in the facility license

**Importance Rating:** 3.6

**10 CFR Part 55:** 41.7 / 41.10 / 43.1 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the RCS Safety Limit Requirement for RCS Pressure IAW Technical Specifications. Technical Specifications are part of the Facility License.

**SRO Justification:** N/A

**Technical References:** NOS05TECHSPEC-12 (TECHNICAL SPECIFICATIONS)

**Proposed references to be provided:** None

**Learning Objective:** NOS05TECHSPEC-12 (TECHNICAL SPECIFICATIONS)

6. Explain the term "Safety Limit" as it applies to the Technical Specifications, and describe the Safety Limits for Salem Nuclear Generating Station.
7. Describe the consequences of exceeding a Safety Limit.

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

**Question History:**

**Comments:**

**44** **Points: 1.00**

Given:

- An NEO has signed onto the appropriate RWP to perform work inside a **HIGH** Radiation Area

In accordance with RP-AA-4000 (Personnel Conduct in Radiologically Controlled Areas), which ONE of the following completes the statements below?

In order to ensure the dose limits of the RWP are not exceeded, RP-AA-4000 states that self-reading dosimeters should be read approximately every ___(1)___ minutes while working in a **HIGH** Radiation Area.

If an unexpected self-reading dosimeter comes into alarm, the NEO is **REQUIRED** to ___(2)___ and notify RP personnel.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 30 | go to a low dose area within the HRA |
| B. | 30 | exit the HRA immediately |
| C. | 15 | go to a low dose area within the HRA |
| D. | 15 | exit the HRA immediately |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, RP-AA-4000 states that self-reading dosimeters should be read approximately every 30 minutes while working in a Radiation Area. Consequently, the candidate could incorrectly conclude that self-reading dosimeters should always be read every 30 minutes. For Part 2, the candidate could incorrectly conclude that exiting the RA is not required until RP has verified the alarm is valid. Consequently, the candidate could incorrectly conclude that going to a low dose area and notifying RP is the required response IAW RP-AA-4000.

B. Incorrect but plausible. For Part 1, RP-AA-4000 states that self-reading dosimeters should be read approximately every 30 minutes while working in a Radiation Area. Consequently, the candidate could incorrectly conclude that self-reading dosimeters should always be read every 30 minutes. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that exiting the RA is not required until RP has verified the alarm is valid. Consequently, the candidate could incorrectly conclude that going to a low dose area and notifying RP is the required response IAW RP-AA-4000.

D. **Correct.** For Part 1, RP-AA-4000 states that self-reading dosimeters should be read approximately every 15 minutes while working in a High Radiation Area. For Part 2, If an unexpected self-reading dosimeter comes into alarm, the NEO is REQUIRED to exit the area and notify RP personnel.

**Question Number:** 44

**Tier:** 3 Group _____

**K/A:** G2.3.7

Ability to comply with radiation work permit requirements during normal or abnormal conditions

**Importance Rating:** 3.6

**10 CFR Part 55:** 41.7 / 41.10 / 43.1 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the requirements of working in a High Radiation Area in order to comply with an RWP IAW RP-AA-4000 (Personnel Conduct in Radiologically Controlled Areas).

**SRO Justification:** N/A

**Technical References:** NOS05RADCON-05 (RADIATION PROTECTION PROGRAM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05RADCON-05 (RADIATION PROTECTION PROGRAM)

6. In accordance with applicable station procedures:
   - b) Describe the following posting requirements, as well as any applicable restrictions:
     - i) Contaminated Area
     - ii) High Contamination Area
     - iii) Airborne Radioactivity Area
     - iv) Radiation Area
     - v) High Radiation Area
     - vi) Locked High Radiation Area
     - vii) Exclusion Area
     - viii) Very High Radiation Area

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**45** **Points: 1.00**

Given:

- A Licensed Operator notices that a Locked High Radiation Area (LHRA) is unlocked and unmanned

In accordance with RP-AA-460 (Controls For High And Very High Radiation Areas), which ONE of the following completes the statements below?

After immediately notifying RP of the unmanned and unlocked LHRA, the Licensed Operator ___(1)__ required to return to the area and maintain positive control until an RP representative arrives.

The dose rate for a LHRA is greater than a **MINIMUM** of ___(2)___ mrem / hr @ 30 cm.

| | **(1)** | **(2)** |
|---|---|---|
| A. | is | 100 |
| B. | is | 1000 |
| C. | is **NOT** | 100 |
| D. | is **NOT** | 1000 |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, greater than 100 mrem @ 30 cm is the definition for a High Radiation Area. Consequently, the candidate could incorrectly determine that the dose rate for a LHRA is greater than a MINIMUM of 100 mrem / hr @ 30 cm.

B. **Correct.** For Part 1 and IAW RP-AA-460 Precautions and Limitations, "Any individual who determines that a HRA, LHRA, or VHRA is not being controlled adequately shall notify RP immediately (while maintaining positive control over the area to the extent possible during this notification period). After notifying RP, the individual shall return to the area and maintain positive control of the area, without personal endangerment, until an RP representative arrives." For Part 2 and IAW RP-AA-460, The dose rate for a LHRA is greater than a MINIMUM of ___(2)___ mrem / hr @ 30 cm.

C. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that the only requirement in RP-AA-460 for finding an unlocked and unmanned LHRA is to immediately notify RP. For Part 2, greater than 100 mrem @ 30 cm is the definition for a High Radiation Area. Consequently, the candidate could incorrectly determine that the dose rate for a LHRA is greater than a MINIMUM of 100 mrem / hr @ 30 cm.

D. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that the only requirement in RP-AA-460 for finding an unlocked and unmanned LHRA is to immediately notify RP. Part 2 is correct.

**Question Number:** 45

**Tier:** 3 Group _____

**K/A:** G2.3.13

Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation | areas, aligning filters, etc.

**Importance Rating:** 3.4

**10 CFR Part 55:** 41.12 / 43.4 / 45.9 / 45.10

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the duties of a licensed operator when finding a LHRA unlocked and unmanned IAW RP-AA-460 (Controls For High And Very High Radiation Areas).

**SRO Justification:** N/A

**Technical References:** NOS05PROCED-08 (USE AND CONTROL OF PROCEDURES)

**Proposed references to be provided:** None

**Learning Objective:** NOS05PROCED-08 (USE AND CONTROL OF PROCEDURES)

4. In accordance with applicable station procedures:
   - Define the following terms:
   - Protected Area
   - Radiologically Controlled Area (RCA)
   - Restricted Area
   - Contaminated Area
   - High Contamination Area
   - Airborne Radioactivity Area
   - Radiation Area
   - High Radiation Area
   - Locked High Radiation Area
   - Exclusion Area
   - Very High Radiation Area
   - ALARA

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

**Question History:**

**Comments:**

**46** **Points: 1.00**

Given:

- Unit 1 and Unit 2 are at 100% Reactor Power

At time 12:00

- 2R1B-2 (Unit 1 Control Room Intake Duct) goes into WARNING

At time 12:10

- 2R1B-2 goes into ALARM

Which ONE of the following completes the statement below?

___(1)___ is the **EARLIEST** time that Control Room Ventilation has shifted to ACCIDENT PRESSURIZED MODE with ___(2)___ EACS Intake dampers **AUTOMATICALLY** opening.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 12:00 | **ONLY** Unit 2 |
| B. | 12:00 | Unit 1 and Unit 2 |
| C. | 12:10 | **ONLY** Unit 2 |
| D. | 12:10 | Unit 1 and Unit 2 |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, other Radiation Monitors (2R19s and 1R19s) have automatic functions when the monitor goes into WARNING. Consequently, the candidate could incorrectly conclude that Control Room Ventilation will shift to ACCIDENT PRESSURIZED MODE when 2R1B-2 goes into WARNING. Part 2 is correct.

B. Incorrect but plausible. For Part 1, other Radiation Monitors (2R19s and 1R19s) have automatic functions when the monitor goes into WARNING. Consequently, the candidate could incorrectly conclude that Control Room Ventilation will shift to ACCIDENT PRESSURIZED MODE when 2R1B-2 goes into WARNING. For Part 2, since Unit 1 and Unit 2 control room share the same Control Room Envelop, the candidate could incorrectly conclude that Unit 1 and Unit 2 EACS Intake dampers will automatically open.

C. **Correct.** For Part 1, the Control Room Ventilation will shift to ACCIDENT PRESSURIZED MODE when 2R1B-2 goes into ALARM. This first occurs at 12:10:00. For Part 2, when 2R1B-2 (Rad monitor is located in Unit 1 Normal Intake Duct) goes into alarm, ONLY the Unit 2 EACS Intake dampers AUTOMATICALLY open.

D. Incorrect but plausible. Part 1 is correct. For Part 2, since Unit 1 and Unit 2 control room share the same Control Room Envelop, the candidate could incorrectly conclude that Unit 1 and Unit 2 EACS Intake dampers will automatically open.

**Question Number:** 46

**Tier:** 3 Group _____

**K/A:** G2.3.14

Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities

**Importance Rating:** 3.4

**10 CFR Part 55:** 41.12 / 43.4 / 45.10

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how the Control Room Ventilation system will respond when a contamination hazard arises during normal operations.

**SRO Justification:** N/A

**Technical References:** NOS05CAVENT-11 (CONTROL AREA VENTILATION SYSTEM)

**Proposed references to be provided:** None

**Learning Objective:** NOS05CAVENT-11 (CONTROL AREA VENTILATION SYSTEM)

9. State the setpoints, coincidence, blocks and permissives for automatic actuations associated with the Control Area Ventilation System.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** X
**Bank** _____

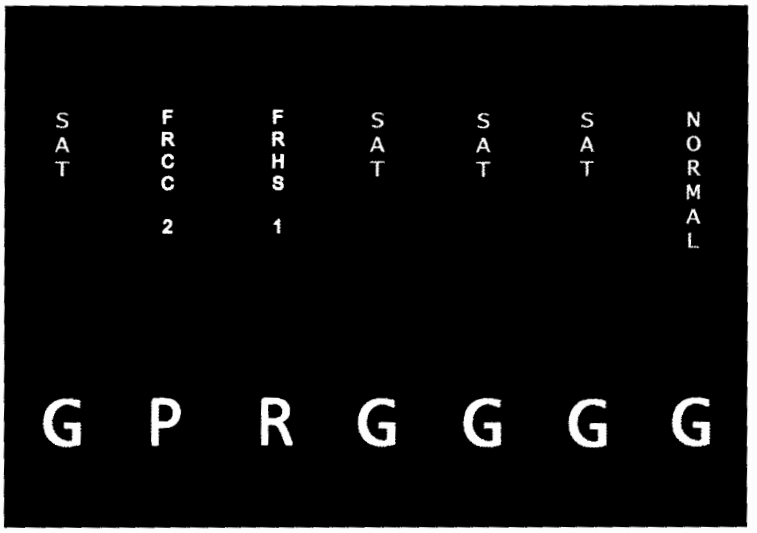
**Question History:**

**Comments:**

**47** **Points: 1.00**

Given:

- The crew is monitoring the Critical Safety Functions
- The STA has verified the following Critical Safety Function Status Trees (CFSTs):




In accordance with OP-AA-101-111-1003 (Use Of Procedures), which ONE of the following completes the statements below?

Based on the Functional Restoration Implementation Priority, the crew is required to **FIRST** address the challenge to ___(1)___.

With verified Red and Purple CFSTs, OP-AA-101-111-1003 states that the CFSTs should be monitored ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | Core Cooling | every 10-20 minutes |
| B. | Core Cooling | continuously |
| C. | Heat Sink | every 10-20 minutes |
| D. | Heat Sink | continuously |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Since Core Cooling is a higher CSF than Heat Sink, the candidate could incorrectly conclude that based on the status of the CSFTs, the crew is required to first address the challenge to Core Cooling. For Part 2, OP-AA-101-111-1003 does have a provision to monitor CSFTs every 10-20 minutes (if no condition more serious than YELLOW is encountered). Consequently, the candidate could incorrectly conclude that with verified Red and Purple CSFTs, OP-AA-101-111-1003 states that the CFSTs should be monitored every 10-20 minutes.

B. Incorrect but plausible. Since Core Cooling is a higher CSF than Heat Sink, the candidate could incorrectly conclude that based on the status of the CSFTs, the crew is required to first address the challenge to Core Cooling. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, OP-AA-101-111-1003 does have a provision to monitor CSFTs every 10-20 minutes (if no condition more serious than YELLOW is encountered). Consequently, the candidate could incorrectly conclude that with verified Red and Purple CSFTs, OP-AA-101-111-1003 states that the CFSTs should be monitored every 10-20 minutes.

D. **Correct.** For Part 1, IAW OP-AA-101-111-1003, CSF Hierarchy (high to low) is SHUTDOWN MARGIN, CORE COOLING, HEAT SINK, THERMAL SHOCK, CONTAINMENT ENVIRONMENT and COOLANT INVENTORY. Additionally, CFST Color Hierarchy (high to low) is red, purple, yellow, and green. Based on the status of the CSFTs, the crew is required to first address the challenge to Heat Sink. For Part 2, with verified Red and Purple CSFTs, OP-AA-101-111-1003 states that the CFSTs should be monitored continuously.

**Question Number:** 47

**Tier:** 3 Group _____

**K/A:** G2.4.23

Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations

**Importance Rating:** 3.6

**10 CFR Part 55:** 41.7 / 41.10 / 43.1 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the bases of how to prioritize implementing Functional Restoration Procedures (part of the EOP network) by actually prioritizing FRP implementation IAW OP-AA-101-111-1003 (Use Of Procedures).

**SRO Justification:** N/A

**Technical References:** NOS05PROCED-08 (USE AND CONTROL OF PROCEDURES)

**Proposed references to be provided:** None

**Learning Objective:** NOS05PROCED-08 (USE AND CONTROL OF PROCEDURES)

5. Implement Rules Of Usage For Emergency Operating Procedures

**Cognitive Level:**

**Higher** X
**Lower** ____

**Question Source**

**New** X
**Modified Bank** ____
**Bank** ____

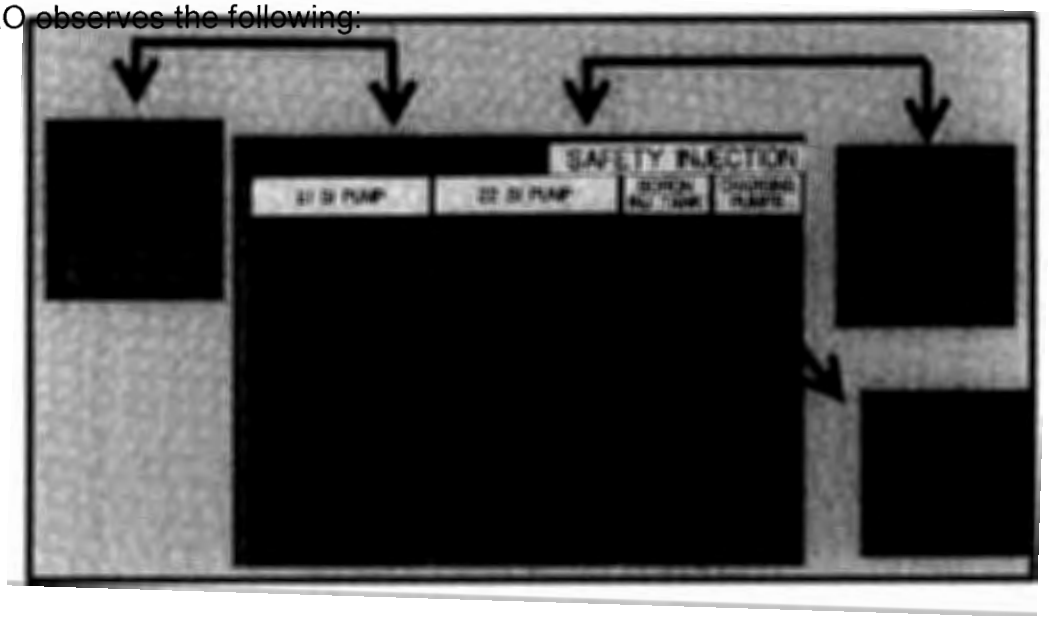
**Question History:**

**Comments:**

**48** **Points: 1.00**

Given:

- The crew is performing the ECCS Flow Evaluation (Step 19) of 2-EOP-TRIP-1 (Reactor Trip or Safety Injection)
- Containment Pressure is 3 psig and slowly rising
- RCS Pressure is 1560 psig and lowering
- The RO observes the following:




In accordance with 2-EOP-TRIP-1, which ONE of the following completes the statements below?

ECCS flow ___(1)___ been properly established.

The crew will stop the RCPs after ECCS flow is established and RCS Pressure is less than a **MAXIMUM** of ___(2)___ psig.

| | **(1)** | **(2)** |
|---|---|---|
| A. | has **NOT** | 1350 |
| B. | has **NOT** | 1500 |
| C. | has | 1350 |
| D. | has | 1500 |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, if RCS Pressure had been less than 1540 psig with no SI Flow, then ECCS would not be properly established. Consequently, the candidate could incorrectly determine ECCS is not properly established given the current plant parameters. Part 2 is correct

B. Incorrect but plausible. For Part 1, if RCS Pressure had been less than 1540 psig with no SI Flow, then ECCS would not be properly established. Consequently, the candidate could incorrectly determine ECCS is not properly established given the current plant parameters. For Part 2, 1-EOP-TRIP-1 CAS also has a required action based on RCS pressure being less than 1500 psig. Consequently, the candidate could incorrectly conclude that the crew will stop the RCPs after ECCS flow is established and RCS Pressure is less than a maximum of 1500 psig.

C. **Correct.** For Part 1 and IAW 1-EOP-TRIP-1 Step 19, since the SI CHG FLOW METER is reading greater than 100 gpm and RCS Pressure is greater than 1540 psig (non-adverse number), ECCS is properly established (even though SI Flow is 0 gpm). For Part 2 and IAW the CAS of 1-EOP-TRIP-1, the crew will stop the RCPs after ECCS flow is established and RCS Pressure is less than a maximum of 1350 psig.

D. Incorrect but plausible. Part 1 is correct. For Part 2, 1-EOP-TRIP-1 CAS also has a required action based on RCS pressure being less than 1500 psig. Consequently, the candidate could incorrectly conclude that the crew will stop the RCPs after ECCS flow is established and RCS Pressure is less than a maximum of 1500 psig.

**Question Number:** 48

**Tier:** 3 Group _____

**K/A:** G2.4.47

Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material

**Importance Rating:** 4.2

**10 CFR Part 55:** 41.10 / 43.5 / 45.12

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must use trends of parameters that are indicated in the control room (containment pressure, RCS pressure, SI flow and Charging flow) and based on those trends, determine the procedural requirements of 2-EOP-TRIP-1.

**SRO Justification:** N/A

**Technical References:** NOS05TRP001-08 ( EOP-TRIP-1, REACTOR TRIP OR SAFETY INJECTION AND INTRODUCTION TO THE USE OF EOPs)

**Proposed references to be provided:** None

**Learning Objective:** NOS05TRP001-08 ( EOP-TRIP-1, REACTOR TRIP OR SAFETY INJECTION AND INTRODUCTION TO THE USE OF EOPs)

15. State the RCP Trip Criteria in EOP-TRIP-1

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | |
| **Bank** | X |

**Question History:**

**Comments:**

**49** **Points: 1.00**

Given:

- Unit 1 is at 100% Reactor Power and stable

At time 10:00:00

- A valid AUTOMATIC reactor trip signal is generated by RPS but the Reactor Trip Breakers do **NOT** open

At time 10:00:05

- The Immediate Actions of 1-EOP-TRIP-1 (Reactor Trip Or Safety Injection) have been initiated
  - **BOTH** Reactor Trip Switches have been actuated
  - **BOTH** Reactor Trip Breaker Bezels have been actuated
  - The Reactor Trip Breakers are still closed

In accordance with1-EOP-TRIP-1, which ONE of the following completes the statement below?

Assuming any actions performed after 10:00:05 will be successful, the crew's **NEXT** actions will be to _____.

A. initiate Rod Insertion and then perform a MAIN STEAM ISOLATION

B. open Breakers 1E6D and then perform a MAIN STEAM ISOLATION

C. initiate Rod Insertion and then actuate the TURBINE TRIP Switch

D. open Breakers 1E6D and then actuate the TURBINE TRIP Switch

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. All of the distractors are part of the immediate actions of Trip-1. Consequently, all of the distractors are plausible.

B. Incorrect but plausible. All of the distractors are part of the immediate actions of Trip-1. Consequently, all of the distractors are plausible.

C. Incorrect but plausible. All of the distractors are part of the immediate actions of Trip-1. Consequently, all of the distractors are plausible.

D. **Correct.** IAW 1-EOP-TRIP-1, after the crew has actuated the Reactor Trip Switches and Reactor Trip Breaker Bezels, the crew's NEXT actions will be to open Breakers 1E6D and 1G6D then actuate the TURBINE TRIP Switch.

**Question Number:** 49

**Tier:** 1 Group 1

**K/A:** EPE: 007 Reactor Trip-EK2.02

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

**Importance Rating:** 2.6

**10 CFR Part 55:** 41.7 / 45.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the procedural guidance of EOP-TRIP-1 (Reactor Trip Or Safety Injection) when the RTBs fail to open.

**SRO Justification:** N/A

**Technical References:** 1-EOP-TRIP-1 (Reactor Trip Or Safety Injection)

**Proposed references to be provided:** None

**Learning Objective:** NOS05TRP001-08 ( REACTOR TRIP OR SAFETY INJECTION)

16 State the Immediate Actions of EOP-TRIP-1

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | |
| **Bank** | X |

**Question History:**

**Comments:**

**50** **Points: 1.00**

Given:

- The crew is performing 1-EOP-LOCA-2 (Post LOCA Cooldown and Depressurization) Step 29, "Monitor For Natural Circulation Flow"
- The RO observes the following:
  - CETs are 600 °F and stable
  - RCS Pressure is 1645 psig and slowly lowering
  - 11 SG pressure is 725 psig and stable
  - 11 T-COLD is 509 °F and stable
  - 11 T-HOT is 530 °F and stable

In accordance with 1-EOP-LOCA-2, which ONE of the following completes the statements below?

Natural Circulation ___(1)___ established.

If Natural Circulation is **NOT** established, the crew will ___(2)___ 11 SG steam dumping rate.

| | **(1)** | **(2)** |
|---|---|---|
| A. | is | raise |
| B. | is | lower |
| C. | is **NOT** | raise |
| D. | is **NOT** | lower |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1 and IAW 1-EOP-LOCA-2 Step 29, to have proper Natural Circulation flow, the following are required:

- RCS Subcooling based on CETs > 0° F
  - RCS Subcooling is 9 °F ($T_{SAT}$ for 1645 psig (1660 psia - RCS Pressure) is 609 °F and CETs are 600 °F)
- SG Pressure stable or lowering (11 SG pressure is 725 psig and stable)
- RCS $T_{HOT}$ stable or lowering (Loop 1 $T_{HOT}$ is 530 °F and stable)
- CETs stable or lowering (CETs are 600 °F and stable)
- 11 SG pressure at saturation pressure for RCS $T_{COLD}$ temperature.
  - 11 $T_{COLD}$ is 509 °F ($P_{SAT}$ is 725 psig or 740 psia) and 11 SG pressure is 725 psig

Consequently, natural circulation flow is indicated. For Part 2, 1-EOP-LOCA-2 Step 29, "Raise steam dumping rate to establish natural circulation flow."

B. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly raising 11 SG pressure (which is caused by lowering steam dumping rate) will establish natural circulation flow.

C. Incorrect but plausible. For Part 1, since there are 5 separate evaluations required to determine if natural circulation has been established, the candidate could incorrectly perform one of the evaluations and determine that natural circulation is not establish. Part 2 is correct.

D. Incorrect but plausible. For Part 1, since there are 5 separate evaluations required to determine if natural circulation has been established, the candidate could incorrectly perform one of the evaluations and determine that natural circulation is not establish. For Part 2, 1-EOP-LOCA-2 Step 29, "Raise steam dumping rate to establish natural circulation flow."

**Question Number:** 50

**Tier:** 1 Group 1

**K/A:** EPE: 011 Large Break LOCA-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 Rating:** 4.1

**10 CFR Part 55:** 41.8 / 41.10 / 45.3

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the procedural guidance of 1-EOP-LOCA-2 to determine if natural circulation has been established and the actions to take if natural circulation has not been established

**SRO Justification:** N/A

**Technical References:** 1-EOP-LOCA-2 (Post LOCA Cooldown and Depressurization)

**Proposed references to be provided:** None

**Learning Objective:** NOS05LOCA02-03 (EOP-LOCA-2, POST-2 POST-LOCA COOLDOWN AND DEPRESSURIZATION)

5 Determine the indications that are monitored to ensure proper system/component operation for each step in the EOP for POST LOCA COOLDOWN AND DEPRESSURIZATION

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**51** **Points: 1.00**

Given:

- Unit 2 is at 75% Reactor Power
- 22 RCP is experiencing abnormal vibrations

At time 07:00:00

- The crew is performing S2.OP-AB-RCP-0001 (Reactor Coolant Pump Abnormality) Attachment 2 (Stopping Reactor Coolant Pumps)
- The Reactor **TRIP** has been **CONFIRMED**
- Reactor Trip Breaker 'A' is closed
- 22 RCP has been stopped

At **07:00:00**, which ONE of the following completes the statements below?

In accordance with S2.OP-AB-RCP-0001, the crew was required to stop 22 RCP when the validated motor flange vibration exceeded a **MINIMUM** of ___(1)___ mils.

LCO 3.4.1.2 (Reactor Coolant Loops And Coolant Circulation Hot Standby) ___(2)___ met.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 5 | is **NOT** |
| B. | 5 | is |
| C. | 20 | is **NOT** |
| D. | 20 | is |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, LCO 3.4.1.2 requires all loops to be OPERABLE if rod control is energized. Consequently, based on the question stem conditions, the candidate could incorrectly conclude that all four of the reactor coolants are required to be OPERABLE. This would then cause the candidate to further incorrectly deduce that LCO 3.4.1.2 is not met.

B. **Correct.** For Part 1, IAW S2.OP-AB-RCP-0001 CAS, when motor flange vibration greater than 5 mils, the crew will perform S2.OP-AB-RCP-0001 Attachment 2 and stop 22 RCP. For Part 2, LCO 3.4.1.2 only requires two of the reactor coolants to be OPERABLE (if the rod control system is de-energized). Consequently, at 07:00:00, RTB B is open and BOTH RTB Bypass Breakers are not racked in, so LCO 3.4.1.2 is met.

C. Incorrect but plausible. For Part 1, S2.OP-AB-RCP-0001 CAS requires the RCP to be secured when shaft vibration is greater than 20 mils or motor flange vibration is greater than 5 mils. Consequently, the candidate could incorrectly conclude that the 22 RCP is stopped when the motor flange vibration exceeded a minimum of 20 mils. For Part 2, LCO 3.4.1.2 requires all loops to be OPERABLE if rod control is energized. Consequently, based on the question stem conditions, the candidate could incorrectly conclude that all four of the reactor coolants are required to be OPERABLE. This would then cause the candidate to further incorrectly deduce that LCO 3.4.1.2 is not met.

D. Incorrect but plausible. For Part 1, S2.OP-AB-RCP-0001 CAS requires the RCP to be secured when shaft vibration is greater than 20 mils or motor flange vibration is greater than 5 mils. Consequently, the candidate could incorrectly conclude that the 22 RCP is stopped when the motor flange vibration exceeded a minimum of 20 mils. Part 2 is correct.

**Question Number:** 51

**Tier:** 1 Group 1

**K/A:** APE : 015/017 Reactor Coolant Pump (RCP) Malfunctions-G2.2.42

Ability to recognize system parameters that are entry-level conditions for Technical Specifications.

**Importance Rating:** 3.9

**10 CFR Part 55:** 41.7 / 41.10 / 43.2 / 43.3 / 45.3

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the status of LCO 3.4.1.2 (Reactor Coolant Loops And Coolant Circulation Hot Standby) when the 22 RCP is secured after the reactor has been tripped from 75% power IAW S2.OP-AB-RCP-0001 (Reactor Coolant Pump Abnormality)

**SRO Justification:** N/A

**Technical References:** S2.OP-AB-RCP-0001
LCO 3.4.1.2

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABRCP0-06 (REACTOR COOLANT PUMP ABNORMALITY)

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

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**52** **Points: 1.00**

Given:

- Unit 2 is at 100% Reactor Power and stable

At time 16:00:00

- 2R41 (Plant Radiation Monitor) reading is trending up
- PZR Level is lowering
- Seal Injection flow is lowering
- Letdown line flashing is occurring

At **16:00:00**, which ONE of the following completes the statements below?

There is a leak on the CVCS ___(1)___ line.

S2.OP-AB.CVC-0001 (Loss Of Charging) entry conditions ___(2)___ met.

| | **(1)** | **(2)** |
|---|---|---|
| A. | letdown | are |
| B. | letdown | are **NOT** |
| C. | charging | are |
| D. | charging | are **NOT** |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, many of the indications given are also indicative of a letdown line leak (PZR level ↓ and Plant Radiation Monitor ↑). Consequently, the candidate could incorrectly conclude that a leak on the CVCS letdown line exists. For Part 2, the candidate could incorrectly that a leak on the letdown would ultimately affect charging flow rate. A reduction in charging flow is an entry condition to S2.OP-AB.CVC-0001.

B. Incorrect but plausible. For Part 1, many of the indications given are also indicative of a letdown line leak (PZR level ↓ and Plant Radiation Monitor ↑). Consequently, the candidate could incorrectly conclude that a leak on the CVCS letdown line exists. For Part 2, a leak on the letdown line is not an entry condition to S2.OP-AB.CVC-0001.

C. **Correct.** For Part 1, based on the question stem conditions, there is a leak on the CVCS charging line (seal injection ↓, PZR level ↓, Plant Radiation Monitor ↑ and flashing in the letdown line). For Part 2, a leak in the charging supply line is an entry condition for S2.OP-AB.CVC-0001.

D. Incorrect but plausible. Part 1 is correct. For Part 2, since RCS inventory is being lost, the candidate could incorrectly conclude that only entry conditions to S2.OP-AB.RC-0001 (Reactor Coolant System Leak) are met. Additionally, since the charging pump is providing flow to seal injection and the regenerative heat exchanger, the candidate could also incorrectly conclude S2.OP-AB.CVC-0001 are not met.

**Question Number:** 52

**Tier:** 1 Group 1

**K/A:** APE: 022 Loss of Reactor Coolant Makeup-AA2.01

Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: Whether charging line leak exists

**Importance Rating:** 3.2

**10 CFR Part 55:** 43.5 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must determine if a charging line leak exists based on plant conditions and if so, are the entry conditions to S2.OP-AB.CVC-0001 (Loss Of Charging) met.

**SRO Justification:** N/A

**Technical References:** S2.OP-AB.CVC-0001 (Loss Of Charging)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABRCP0-06 (REACTOR COOLANT PUMP ABNORMALITY)

3 Given a set of initial plant conditions:

a. Determine the appropriate abnormal procedure.

b. Describe the plant response to actions taken in the abnormal procedure.

c. Describe the final plant condition that is established by the abnormal procedure

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**53** **Points: 1.00**

Given:

- The crew is performing S1.OP-AB.RHR-0002 (Loss Of RHR At Reduced Inventory)

In accordance with S1.OP-AB.RHR-0002 CAS, which ONE of the following completes the statements below?

IF AT ANY TIME, _____ pump cannot be aligned and started to make up to the RCS, THEN the crew will ESTABLISH RWST Gravity Feed.

A. a Charging **OR** SI

B. a Charging **AND** SI

C. **ONLY** a Charging

D. **ONLY** a SI

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** IAW S2.OP-AB.RHR-0002 CAS," IF AT ANY TIME, a Charging OR SI pump cannot be aligned and started to make up to the RCS, THEN the crew will ESTABLISH RWST Gravity Feed to RCS level > 97.5 feet."

B. Incorrect but plausible. All of the distractors use different combinations of the correct response. Consequently, all of the distractors are plausible.

C. Incorrect but plausible. All of the distractors use different combinations of the correct response. Consequently, all of the distractors are plausible.

D. Incorrect but plausible. All of the distractors use different combinations of the correct response. Consequently, all of the distractors are plausible.

**Question Number:** 53

**Tier:** 1 Group 1

**K/A:** 025 Loss of Residual Heat Removal System (RHRS)-AK3.01

Knowledge of the reasons for the following responses as they apply to the Loss of Residual Heat Removal System: Shift to alternate flowpath

**Importance Rating:** 3.1

**10 CFR Part 55:** 41.5,41.10 / 45.6 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know when the alternate RHR flowpath (gravity drain of the RWST) is aligned during performance of S1.OP-AB.RHR-0002 (Loss Of RHR At Reduced Inventory ).

**SRO Justification:** N/A

**Technical References:** S1.OP-AB.RHR-0001 (Loss Of RHR)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABRCP0-06 (REACTOR COOLANT PUMP ABNORMALITY)

1 Describe the operation of the following system as applied to S2.OP-AB.RHR-0001:

A. General arrangement of the RHR system

B. RHR system lineup for Shutdown Cooling.

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**54** **Points: 1.00**

Given:

- Unit 1 is at 100% Reactor Power and stable
- 12 CC Heat Exchanger is in service
- 12 Charging Pump is in service
- CCW Surge Tank level is 61% and rising
- The crew is performing S1.OP-AB.CC-0001 (Component Cooling Abnormality)
- Chemistry has sampled CCW and reports the following parameters have changed based on the previous CCW sample before S1.OP-AB.CC-0001 was entered:
    - Chromate concentration has lowered
    - Chloride concentration has risen

In accordance with S1.OP-AB.CC-0001, which ONE of the following completes the statement below?

The leak is located in the _____.

A. Seal Water Heat Exchanger

B. Letdown Heat Exchanger

C. 12 CC Heat Exchanger

D. 12 Charging Pump

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Since ALL three distractors will cause CCW Surge Tank level to rise and chromate concertation to lower, the candidate could incorrectly conclude any of the distractors are the source of the CCW leak.

B. Incorrect but plausible. Since ALL three distractors will cause CCW Surge Tank level to rise and chromate concertation to lower, the candidate could incorrectly conclude any of the distractors are the source of the CCW leak.

C. **Correct.** IAW S1.OP-AB.CC-0001, "Any inleakage will dilute CC System Chromates and SW inleakage will increase Chloride concentration." Consequently, since Chemistry has reported that Chloride concentration has risen, there is SW inleakage into CCW. 12 CC Heat Exchanger is the source of the CCW Leakage.

D. Incorrect but plausible. Since ALL three distractors will cause CCW Surge Tank level to rise and chromate concertation to lower, the candidate could incorrectly conclude any of the distractors are the source of the CCW leak.

**Question Number:** 54

**Tier:** 1 Group 1

**K/A:** APE: 026 Loss of Component Cooling Water (CCW)-AA2.01

Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: Location of a leak in the CCWS

**Importance Rating:** 3.1

**10 CFR Part 55:** 41.5,41.10 / 45.6 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know must analyze plant conditions and use the procedural guidance contained in S1.OP-AB.CC-0001 (Component Cooling Abnormality) to determine the location of a leak into the CCW system

**SRO Justification:** N/A

**Technical References:** S1.OP-AB.CC-0001 (Component Cooling Abnormality)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABCC01-09 (COMPONENT COOLING ABNORMALITY)

5 Given a set of initial plant conditions:

A. Determine the appropriate abnormal procedure.

B. Describe the plant response to actions taken in the abnormal procedure.

C. Describe the final plant condition that is established by the abnormal procedure.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** X
**Bank** _____

**Question History:**

**Comments:**

**55** **Points: 1.00**

Given:

- Unit 2 is at 50% Reactor Power and stable
- PT-455 (Channel I PZR Pressure) is the controlling PZR Pressure channel

At time 22:00:00

- PT-455 (Channel I PZR Pressure) fails high

Which ONE of the following completes the statements below?

At **22:00:05**, _____ is / are open.

A. **BOTH** Power Relief Valves (2PR1 and 2PR2)

B. **NO** Power Relief Valves (2PR1 and 2PR2)

C. **ONLY** 2PR1

D. **ONLY** 2PR2

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. The candidate could incorrectly the PORVs open based on the master pressure controller. Consequently, when the controlling pressure channel fails (PT-455), the candidate would then incorrectly conclude that BOTH PORVs are open at 22:05.

B. **Correct.** 2PR1 and 2PR2 requires 2 channels (PT-455 / PT-457 or PT-456 / PT-474)) to read greater than 2335 for the PORV to open. Consequently, at 22:00:05 with ONLY PT-455 reading greater than 2335 psig (due to PT-455 failing high), NO Power Relief Valves (2PR1 and 2PR2) are open.

C. Incorrect but plausible. The candidate could correctly realize that operation of the PORVs is dependent on specific PZR Pressure Transmitters. However, the candidate could then incorrectly understand how the PORV open logic works and / or which pressure transmitters operate each specific PORV. This would cause the candidate to incorrectly conclude that ONLY 2PR1 or ONLY 2PR2 is open at 22:05.

D. Incorrect but plausible. The candidate could correctly realize that operation of the PORVs is dependent on specific PZR Pressure Transmitters. However, the candidate could then incorrectly understand how the PORV open logic works and / or which pressure transmitters operate each specific PORV. This would cause the candidate to incorrectly conclude that ONLY 2PR1 or ONLY 2PR2 is open at 22:05.

**Question Number:** 55

**Tier:** 1 Group 1

**K/A:** 027 Pressurizer Pressure Control System (PZR PCS) Malfunction-AK2.03

Knowledge of the interrelations between the Pressurizer Pressure Control Malfunctions and the following: Controllers and positioners

**Importance Rating:** 2.6

**10 CFR Part 55:** 41.7 / 45.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must knowhow the PORV controllers respond after the controlling channel has failed high (PT-455).

**SRO Justification:** N/A

**Technical References:** NOS05PZRP&L-10 ( PRESSURIZER PRESSURE AND LEVEL CONTROL)

Drawing 231357 (Units 1 & 2 Pressurizer 1PR1,2PR1,1PR2,2PR2 Press. Power)

**Proposed references to be provided:** None

**Learning Objective:** NOS05PZRP&L-10 ( PRESSURIZER PRESSURE AND LEVEL CONTROL)

Describe how the following components impact the Pressurizer Pressure and Level Control System during normal and abnormal conditions:

f. Power-Operated Relief Valves (PORVs)

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**56** **Points: 1.00**

Given:

- Unit 2 is at 100% Reactor Power and stable
- 21 Charging Pump is in service

At time 10:00:00

- A valid reactor trip signal is generated by RPS but the Reactor Trip Breakers do **NOT** open

At time 10:00:10

- The crew has transitioned to 2-EOP-FRSM-1 (Response To Nuclear Power Generation)
- SI has **NOT** actuated

In accordance with 2-EOP-FRSM-1, which ONE of the following completes the statements below?

The crew will ensure ___(1)___ Charging Pumps are running.

After the REQUIRED Charging Pumps have been started, the crew ___(2)___ **REQUIRED** to MANUALLY actuate Safety Injection.

| | **(1)** | **(2)** |
|---|---|---|
| A. | **ALL** three | is |
| B. | **ALL** three | is **NOT** |
| C. | AT LEAST two | is |
| D. | AT LEAST two | is **NOT** |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, having 3 Charging Pumps running will inject Boron faster than only 2 Charging Pumps. Since an ATWS is in progress, the candidate could incorrectly conclude that FRSM-1 requires all 3 Charging Pumps in operation. For Part 2, 2-EOP-FRSM-1 has a provision for aligning the charging pumps to take suction from the RWST. Consequently, the candidate could incorrectly conclude that for the given plant conditions, the crew will align the charging pumps to take suction from the RWST.

B. Incorrect but plausible. For Part 1, having 3 Charging Pumps running will inject Boron faster than only 2 Charging Pumps. Since an ATWS is in progress, the candidate could incorrectly conclude that FRSM-1 requires all 3 Charging Pumps in operation. in Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that actuating Safety Injection is advantageous and required per FRSM-1.

D. **Correct.** For Part 1 and IAW 2-EOP-FRSM-1 Step 3, the crew will ensure at least two charging pumps are running. For Part 2 and IAW 2-EOP-FRSM-1 Step 3.1, the crew is not required to actuate Safety Injection.

**Question Number:** 56

**Tier:** 1 Group 1

**K/A:** EPE : 029 Anticipated Transient Without Scram (ATWS)-EA1.01

Ability to operate and monitor the following as they apply to a ATWS: Charging pumps

**Importance Rating:** 3.4

**10 CFR Part 55:** 41.7 / 45.5 / 45.6

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the procedural guidance per 2-EOP-FRSM-1 (Response To Nuclear Power Generation) for operating and aligning the charging pumps.

**SRO Justification:** N/A

**Technical** 2-EOP-FRSM-1 (Response To Nuclear Power Generation)

**References:**

**Proposed references to be provided:** None

**Learning Objective:** NOS05FRSM00-04 (EOP-FRSM-1 AND 2 RESPONSE TO NUCLEAR POWER GENERATION)

3 Describe the plant response to actions taken in the following EOP step sequence(s):

A. Response To Nuclear Power Generation: 1, 3, 4.1, 10, and 12 thru 15

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**57** **Points: 1.00**

Given:

- The crew has just terminated SI in accordance with 1-EOP-SGTR-1 (Steam Generator Tube Rupture)
- 14 SG is ruptured

Which ONE of the following completes the statements below?

The reason SI was terminated during performance of 1-EOP-SGTR-1 is to prevent overfill of ___(1)___ .

In accordance with 1-EOP-SGTR-1 CAS, the crew will reestablish ECCS flow if ___(2)___ .

| | (1) | (2) |
|---|---|---|
| A. | 14 SG | PZR level can **NOT** be maintained ≥ 11% OR Subcooling is ≤ 0°F |
| B. | 14 SG | **ONLY** PZR level can **NOT** be maintained ≥ 11% |
| C. | the pressurizer | PZR level can **NOT** be maintained ≥ 11% OR Subcooling is ≤ 0°F |
| D. | the pressurizer | **ONLY** PZR level can **NOT** be maintained ≥ 11% |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1, the reason ECCS flow is terminated during performance of 1-EOP-SGTR-1 is to prevent overfill of the ruptured SG (14 SG). For Part 2 and IAW -EOP-SGTR-1 CAS, the crew will reestablish ECCS flow if PZR level can not be maintained ≥ 11% OR Subcooling is ≤ 0°F.

B. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that 1-EOP-SGTR-1 CAS requirements are to reestablish ECCS flow if ONLY PZR level can NOT be maintained ≥ 11%.

C. Incorrect but plausible. For Part 1, 14 SG and the PZR are in hydraulic communication during a SGTR. The candidate may misunderstand the hydraulics between the RCS and the ruptured SG and incorrectly conclude that prolonged full ECCS flow will cause pressurizer level to rise and even possible overfill. Additionally, the steps prior to terminating ECCS flow include depressurization of the RCS. When the RCS is depressurized during EOP-SGTR-1, voiding in the upper head may occur which will cause PZR level to rapidly increase. The candidate could misapply the concern for rapidly rising PZR during RCS depressurization and incorrectly apply this concern to prolonged ECCS full flow during the performance of EOP-SGTR-1. Part 2 is correct.

D. Incorrect but plausible. For Part 1, 14 SG and the PZR are in hydraulic communication during a SGTR. The candidate may misunderstand the hydraulics between the RCS and the ruptured SG and incorrectly conclude that prolonged full ECCS flow will cause pressurizer level to rise and even possible overfill. Additionally, the steps prior to terminating ECCS flow include depressurization of the RCS. When the RCS is depressurized during EOP-SGTR-1, voiding in the upper head may occur which will cause PZR level to rapidly increase. The candidate could misapply the concern for rapidly rising PZR during RCS depressurization and incorrectly apply this concern to prolonged ECCS full flow during the performance of EOP-SGTR-1. For Part 2, the candidate could incorrectly conclude that 1-EOP-SGTR-1 CAS requirements are to reestablish ECCS flow if ONLY PZR level can NOT be maintained ≥ 11%.

**Question Number:** 57

**Tier:** 1 Group 1

**K/A:** EPE: 038 Steam Generator Tube Rupture (SGTR)-EK3.09

Knowledge of the reasons for the following responses as the apply to the SGTR: Criteria for securing/throttling ECCS

**Importance Rating:** 4.1

**10 CFR Part 55:** 41.5 / 41.10 / 45.6 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the reason ECCS flow is terminated during the performance of 1-EOP-SGTR-1 (Steam Generator Tube Rupture).

**SRO Justification:** N/A

**Technical References:** 1-EOP-SGTR-1 (Steam Generator Tube Rupture)

**Proposed references to be provided:** None

**Learning Objective:** NOS05SGTR01-04 ( STEAM GENERATOR TUBE RUPTURE)

3 Describe the EOP mitigation strategy for a steam generator tube rupture

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**58** **Points: 1.00**

Given:

- Unit 2 is at 90% Reactor Power and stable

At time 10:00:00

- 21 SGFP trips

At time 10:00:05 (5 Seconds Later)

- The crew initiates the IMMEDIATE ACTIONS of S2.OP-AB.CN-0001 (Main Feedwater / Condensate System Abnormality)
- Turbine Power is stable at 90%
- Turbine RAMP RATES are **NOT** preset for SGFP runback

In accordance with S2.OP-AB.CN-0001, which ONE of the following completes the statements below?

The crew will initiate a MANUAL Main Turbine load reduction at less than or equal to a **MAXIMUM** rate of _____ % / MIN.

A. 20

B. 15

C. 10

D. 5

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. All of the distractors are Turbine Ramp Rates that are close to the actual procedural limit of S2.OP-AB.CN-0001. Consequently, ALL of the distractors are plausible.

B. **Correct.** IAW S2.OP-AB.CN-0001 IMMEDATE ACTIONS 2.3.1, "IF RAMP RATES are not preset for SGFP runback, THEN: ADJUST RAMP RATES for less than or equal to 15%/MIN."

C. Incorrect but plausible. All of the distractors are Turbine Ramp Rates that are close to the actual procedural limit of S2.OP-AB.CN-0001. Consequently, ALL of the distractors are plausible.

D. Incorrect but plausible. All of the distractors are Turbine Ramp Rates that are close to the actual procedural limit of S2.OP-AB.CN-0001. Consequently, ALL of the distractors are plausible.

**Question Number:** 58

**Tier:** 1 Group 1

**K/A:** 054 Loss of Main Feedwater (MFW)-G2.4.49

Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.

**Importance Rating:** 3.8

**10 CFR Part 55:** 41.10 / 43.5 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how to operate the Main Turbine controls (as part of the immediate actions) IAW S2.OP-AB.CN-0001 (Main Feedwater / Condensate System Abnormality).

**SRO Justification:** N/A

**Technical References:** S2.OP-AB.CN-0001 (Main Feedwater / Condensate System Abnormality)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABCN01-06 ( MAIN FEEDWATER/CONDENSATE SYSTEM ABNORMALITY)

2. State the immediate actions of AB.CN-0001

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**59** **Points: 1.00**

Given:

- The crew is preparing to perform the Vital Power Restoration Steps of 1-EOP-LOPA-1 (Loss Of All AC Power)

In accordance with 1-EOP-LOPA-1, which ONE of the following completes the statements below?

Prior to restoring AC power, the crew will ensure **ALL** SECs are ___(1)___ .

Preventing damage to the RCP seals ___(2)___ a reason that the centrifugal charging pumps are **NOT** allowed to start automatically following power restoration.

| | **(1)** | **(2)** |
|---|---|---|
| A. | de-energized | is **NOT** |
| B. | de-energized | is |
| C. | blocked and reset | is **NOT** |
| D. | blocked and reset | is |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, restoring seal injection is normally desirable and will usually help protect the RCPs seals. Consequently, the candidate could incorrectly conclude that preventing RCS seal damage is NOT a reason for preventing auto start of the centrifugal charging pumps following power restoration.

B. **Correct.** For Part 1, IAW 1-EOP-LOPA-1, prior to restoring AC power, the crew will ensure ALL SECs are de-energized. For Part 2, IAW 1-EOP-LOPA-1, preventing damage to the RCP seals is a reason that the centrifugal charging pumps are not allowed to start automatically following power restoration.

C. Incorrect but plausible. For Part 1, blocking and resetting the SECs is performed throughout the EOP Network (e.g. EOP-TRIP-1). Consequently, the candidate could incorrectly conclude that EOP-LOPA-1 requires ALL SECs to be blocked and reset.

D. Incorrect but plausible. For Part 1, blocking and resetting the SECs is performed throughout the EOP Network (e.g. EOP-TRIP-1). Consequently, the candidate could incorrectly conclude that EOP-LOPA-1 requires ALL SECs to be blocked and reset. Part 2 is correct.

**Question Number:** 59

**Tier:** 1 Group 1

**K/A:** EPE: 055 Loss of Offsite and Onsite Power (Station Blackout)-EK3.02

Knowledge of the reasons for the following responses as the apply to the Station Blackout: Actions contained in EOP for loss of offsite and onsite power

**Importance Rating:** 4.3

**10 CFR Part 55:** 41.5 / 41.10 / 45.6 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the reason the centrifugal charging pumps are not allowed to start automatically following power restoration IAW 1-EOP-LOPA-1 (Loss Of All AC Power)

**SRO Justification:** N/A

**Technical References:** 1-EOP-LOPA-1 (Loss Of All AC Power)

**Proposed references to be provided:** None

**Learning Objective:** NOS05LOPA00-06 (EOP-LOPA-1, 2, 3; LOSS OF ALL AC POWER AND RECOVERY)

3 Describe the consequences of an uncontrolled restoration of seal cooling to the reactor coolant pump seals.

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**60** **Points: 1.00**

Given

- Unit 2 is in MODE 4
- RCS TAVG is 300°F and stable
- 21 RHR Loop is in service for shutdown cooling
- 22 RHR Loop is aligned for ECCS
- 2C EDG is running and paralleled with the Grid in accordance with S2.OP-ST.DG-0003 (2C Diesel Generator Surveillance Test)

At time 12:00

- A Loss of Offsite Power (LOOP) occurs

Which ONE of the following completes the statements below?

During the electrical transient, the 2C EDG Output Breaker will ___(1)___ .

At **12:15**, 21 RHR Pump is ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | remain closed | stopped |
| B. | remain closed | running |
| C. | open then reclose | stopped |
| D. | open then reclose | running |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, since 2C EDG was already running loaded during the LOOP, the candidate could incorrectly conclude that 2C EDG would remain closed as SEC 2C strips the loads off of 2C 4KV Vital Bus and then automatically loads the blackout loads. Part 2 is correct. For Part 2, the RHR pumps are automatically sequenced on their respective Vital Busses when the SECs are in Mode I (SI only) and Mode III (SI & Blackout). Consequently, the candidate could incorrectly conclude that following a LOOP that an RHR pump that had been running in Shutdown Cooling will automatically restart after the SECs complete their sequencing.

B. Incorrect but plausible. For Part 1, since 2C EDG was already running loaded during the LOOP, the candidate could incorrectly conclude that 2C EDG would remain closed as SEC 2C strips the loads off of 2C 4KV Vital Bus and then automatically loads the blackout loads.

C. **Correct.** For Part 1, when the LOOP occurs at 12:00, 2A and 2B 4K Vital Busses will sense an Instantaneous UV condition which will cause ALL three 3 SECs (2A, 2B and 2C) to enter Mode II – Blackout Only (2 / 3 Vital Busses sensing Instantaneous UV condition). Since the 2C SEC has gone into Mode II, this will cause the running 2C EDG Output Breaker to OPEN. At the SEC 2C continues its sequencing, the 2C EDG Output Breaker will reclose. For Part 2, 21 RHR Pump is powered from 2A 4KV Vital Bus. With 2A SEC in Mode II, the 21 RHR will NOT be automatically loaded (during the 2A SEC sequencing). Consequently, at 12:15 (after SEC 2A has completed its sequencing), 21 RHR pump is stopped.

D. Incorrect but plausible. Part 1 is correct. For Part 2, the RHR pumps are automatically sequenced on their respective Vital Busses when the SECs are in Mode I (SI only) and Mode III (SI & Blackout). Consequently, the candidate could incorrectly conclude that following a LOOP that an RHR pump that had been running in Shutdown Cooling will automatically restart after the SECs complete their sequencing.

**Question Number:** 60

**Tier:** 1 Group 1

**K/A:** APE: 056 Loss of Offsite Power-AA2.54

Ability to determine and interpret the following as they apply to the Loss of Offsite Power: Breaker position (remote and local)

**Importance Rating:** 2.9

**10 CFR Part 55:** 43.5 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how the 2C EDG Output Breaker responds following a LOOP and the 2C EDG initially paralleled to the Grid.

**SRO Justification:** N/A

**Technical References:** NOS05EDG000-12 (Emergency Diesel Generators)

**Proposed references to be provided:** None

**Learning Objective:** NOS05EDG000-12 (Emergency Diesel Generators)

14 Given plant conditions, relate the Emergency Diesel Generator with the following:

a. 4160 Electrical System
b. Service Water System
c. DC Distribution System
d. Diesel Starting Air
e. Safeguards Equipment Controller.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**61** **Points: 1.00**

Given:

At time 10:00:00

- Unit 2 is at 100% Reactor Power and stable
- The crew enters S2.OP-AB.CA-0001 (Loss of Control Air)
- NEOs are walking down the Control Air System searching for a large air leak
- Control Air Header Pressure is observed as follows:

| Time | 10:00 | 10:05 | 10:10 | 10:15 |
|---|---|---|---|---|
| 2A Control Air Header | 99 psig | 88 psig | 79 psig | 72 psig |
| 2B Control Air Header | 103 psig | 93 psig | 85 psig | 79 psig |

In accordance with S2.OP-AB.CA-0001, which ONE of the following completes the statements below?

___(1)___ is the **EARLIEST** time the crew is required to attempt to **MANUALLY** start the 2 Emergency Control Air Compressor.

___(2)___ is the **EARLIEST** time the crew is required to **TRIP** the Reactor.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 10:00 | 10:10 |
| B. | 10:00 | 10:15 |
| C. | 10:05 | 10:10 |
| D. | 10:05 | 10:15 |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, IAW S2.OP-AB.CA-001 Step 3.7, if either Station Air Header is indicating less than 100 psig, the crew is required to attempt to start the remaining Station Air Compressor. Consequently, the candidate could incorrectly conclude that the crew is required to attempt to start the 2 Emergency Air Compressor when 2A Control Air Header pressure is less than 100 psig. For Part 2, the candidate may recognize the 80 psig Control Air Header threshold for tripping the reactor. However, the candidate may incorrectly conclude that reactor is required to be tripped when only one of the Control Air Header pressures is less than 80 psig.

B. Incorrect but plausible. For Part 1, IAW S2.OP-AB.CA-001 Step 3.7, if either Station Air Header is indicating less than 100 psig, the crew is required to attempt to start the remaining Station Air Compressor. Consequently, the candidate could incorrectly conclude that the crew is required to attempt to start the 2 Emergency Air Compressor when 2A Control Air Header pressure is less than 100 psig. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate may recognize the 80 psig Control Air Header threshold for tripping the reactor. However, the candidate may incorrectly conclude that reactor is required to be tripped when only one of the Control Air Header pressures is less than 80 psig.

D. **Correct.** For Part 1, IAW S2.OP-AB.CA-001 Step 3.10, the crew is required to attempt to start the 2 Emergency Control Air Compressor when 2A Control Air Header less than or equal to 88 psig. The earliest time this occurs is 10:05:00. For Part 2, IAW S2.OP-AB.CA-0001 (Selected CAS Items), the reactor is first required to be trip when BOTH 2A and 2B Control Air Headers indicate less than 80 psig. The earliest time this occurs is at 1015:00.

**Question Number:** 61

**Tier:** 1 Group 1

**K/A:** APE: 065 Loss of Instrument Air-G2.4.47

Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material

**Importance Rating:** 4.2

**10 CFR Part 55:** 41.10 / 43.5 / 45.12

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must analyze a trend of Control Air Header Pressures over time and determine the required crew response IAW S2.OP-AB.CA-0001 (Loss of Control Air)

**SRO Justification:** N/A

**Technical References:** S2.OP-AB.CA-0001 (Loss of Control Air)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABCA01-07 ( LOSS OF CONTROL AIR)

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.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** X
**Bank** _____

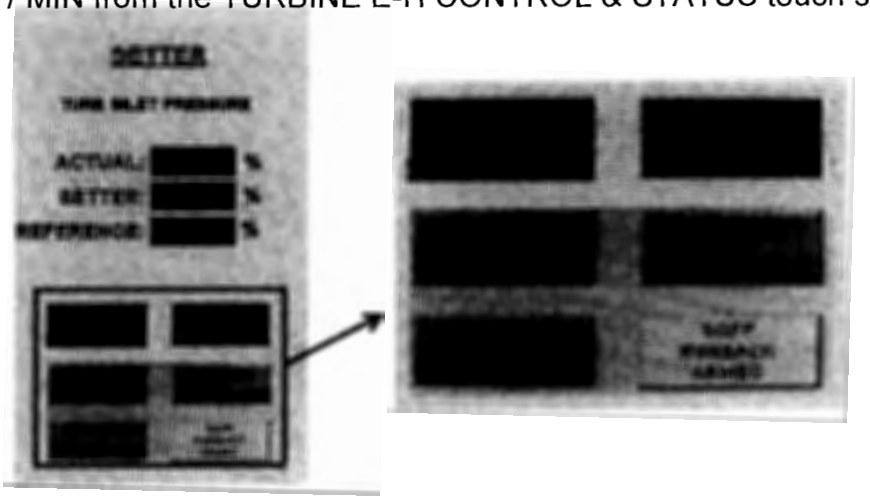
**Question History:**

**Comments:**

**62** **Points: 1.00**

Given:

- Unit 2 is at 100% Reactor Power
- The crew is performing S2.OP-AB.GRID-0001 (Abnormal Grid) Attachment 2 (Solar Magnetic Disturbance)
- The crew is preparing to initiate a generator load reduction to less then to 942 MW (~ 77.6% RTP) at 15% / MIN from the TURBINE E-H CONTROL & STATUS touch screen monitor



In accordance S2.OP-AB.GRID-0001, which ONE of the following completes the statements below?

With the turbine controls in OPERATOR MODE – AUTO, the PO will select _____ to initiate the generator load reduction.

A. SMD#1 RUNBACK **ONLY**

B. SMD#2 RUNBACK **ONLY**

C. SMD#1 RUNBACK then GO

D. SMD#2 RUNBACK then GO

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. The TURBINE E-H CONTROL & STATUS touch screen monitor allows for manual entry of the setter and the reduction ramp rate. During manual entry the turbine won't move until the go button is depressed. Since the SMD#1 RUNBACK is a preset setter position with a preset ramp rate, the candidate could incorrectly that only the SMD#1 RUNBACK button is depressed to start the load reduction.

B. Incorrect but plausible. The TURBINE E-H CONTROL & STATUS touch screen monitor allows for manual entry of the setter and the reduction ramp rate. During manual entry the turbine won't move until the go button is depressed. Additionally, since there is a SMD#2 RUNBACK with a preset setter position with a preset ramp rate, the candidate could incorrectly that only the SMD#2 RUNBACK button is depressed to start the load reduction.

C. **Correct.** For Part 1, IAW S2.OP-AB.GRID-0001 (Abnormal Grid) Attachment 2 (Solar Magnetic Disturbance), the PO will depress SMD#1 RUNBACK and GO to initiate the generator load reduction.

D. Incorrect but plausible. The candidate could incorrectly conclude that using the SMD#2 RUNBACK is required per S2.OP-AB.GRID-0001 Attachment 2. Pressing GO is required to start the turbine load reduction.

**Question Number:** 62

**Tier:** 1 Group 1

**K/A:** APE: 077 Generator Voltage and Electric Grid Disturbances-AA1.02

Ability to operate and/or monitor the following as they apply to Generator Voltage and Electric Grid Disturbances: Turbine / generator controls

**Importance Rating:** 3.8

**10 CFR Part 55:** 41.5 and 41.10 / 45.5, 45.7, and 45.8

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must be able to use the turbine controls to lower turbine load IAW S2.OP-AB.GRID-0001 (Abnormal Grid) Attachment 2 (Solar Magnetic Disturbance)

**SRO Justification:** N/A

**Technical References:** S2.OP-AB.GRID-0001 (Abnormal Grid) Attachment 2

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABGRID-12(ABNORMAL GRID)

2 Describe, in general terms, the actions taken in S2.OP-AB.GRID-0001(Q) and the bases for the actions in accordance with the Technical Bases Document.

**Cognitive Level:**

**Higher** X
**Lower** ____

**Question Source**

**New** X
**Modified Bank** ____
**Bank** ____

**Question History:**

**Comments:**

**63** **Points: 1.00**

Given:

- The crew has just transitioned to 1-EOP-LOCA-6 (LOCA Outside Containment)

In accordance with 1-EOP-LOCA-6, which ONE of the following completes the statements below?

As part of the leak isolation strategy, the crew ___(1)___ separate the 11 and 12 RHR discharge lines by closing 11RH19 (RHR Discharge X-CONN Valve) and 12RH19 (RHR Discharge X-CONN Valve).

The crew will monitor rising ___(2)___ to determine when the leak has been successfully isolated.

| | **(1)** | **(2)** |
|---|---|---|
| A. | will | RCS pressure |
| B. | will | Pressurizer level |
| C. | will **NOT** | RCS pressure |
| D. | will **NOT** | Pressurizer level |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1, IAW 1-EOP-LOCA-6 Step 2, the crew will close 11RH19 and 12RH19 which will separate the 11 and 12 RHR discharge lines. This will enhance the operator's ability to diagnose the success or failure of leak isolation. For Part 2, IAW 1-EOP-LOCA-6, the crew will monitor rising RCS Pressure to determine when the leak has been successfully isolated

B. Incorrect but plausible. Part 1 is correct. For Part 2, since ECCS flow is injecting water into the core during performance of 1-EOP-LOCA-6, RCS inventory will increase once the leak has been isolated. An increase in RCS inventory can be measured by rising PZR level. Consequently, the candidate could incorrectly conclude that 1-EOP-LOCA-6 monitors rising PZR level as a determination that the leak has been successfully isolated.

C. Incorrect but plausible. For Part 1, separating the 11 and 12 RHR discharge lines is not required to isolate the leak when performing 1-EOP-LOCA-6. Consequently, the candidate could fail to recognize the advantage of separating the 11 and 12 RHR discharge lines and incorrectly conclude that closing 11RH19 and 12RH19 is not required per 1-EOP-LOCA-6. Part 2 is correct.

D. Incorrect but plausible. For Part 1, separating the 11 and 12 RHR discharge lines is not required to isolate the leak when performing 1-EOP-LOCA-6. Consequently, the candidate could fail to recognize the advantage of separating the 11 and 12 RHR discharge lines and incorrectly conclude that closing 11RH19 and 12RH19 is not required per 1-EOP-LOCA-6. For Part 2, since ECCS flow is injecting water into the core during performance of 1-EOP-LOCA-6, RCS inventory will increase once the leak has been isolated. An increase in RCS inventory can be measured by rising PZR level. Consequently, the candidate could incorrectly conclude that 1-EOP-LOCA-6 monitors rising PZR level as a determination that the leak has been successfully isolated.

**Question Number:** 63

**Tier:** 1 Group 1

**K/A:** EPE: LOCA Outside Containment-EA1.2

Ability to operate and / or monitor the following as they apply to the (LOCA Outside Containment): Operating behavior characteristics of the facility

**Importance Rating:** 3.6

**10 CFR Part 55:** 41.7 / 45.5 / 45.6

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know what parameter to monitor (rising RCS pressure) which determines when the leak has been isolated IAW EOP-LOCA-6 (LOCA Outside Containment)

**SRO Justification:** N/A

**Technical References:** EOP-LOCA-6 (LOCA Outside Containment)

**Proposed references to be provided:** None

**Learning Objective:** NOS05LOCA06-03 (LOCA OUTSIDE CONTAINMENT)

1 Describe the EOP mitigation strategy during LOCA OUTSIDE CONTAINMENT

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**64** **Points: 1.00**

Given:

- The crew is performing the Bleed and Feed Initiation Steps of 1-EOP-FRHS-1 (Response To Loss Of Secondary Heat Sink)
- 11 Charging Pump and 11 SI Pump are the **ONLY** ECCS pumps running

In accordance with 1-EOP-FRHS-1, which ONE of the following completes the statements below?

The crew ___(1)___ proceed in 1-EOP-FRHS-1 and establish the required RCS Bleed Path.

When establishing a Bleed Path, the crew will open ___(2)___.

| | (1) | (2) |
|---|---|---|
| A. | can **NOT** | **BOTH** PORVs **ONLY** |
| B. | can **NOT** | **BOTH** PORVs and **ALL** Reactor Head Vents |
| C. | can | **BOTH** PORVs **ONLY** |
| D. | can | **BOTH** PORVs and **ALL** Reactor Head Vents |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, The desired feed path in 1-EOP-FRHS-1 is to have BOTH SI Pumps and BOTH Charging Pumps feeding the RCS. Consequently, the candidate could incorrectly conclude that an RCS Bleed Path can not be established until BOTH SI Pumps and BOTH Charging Pumps are running. Part 2 is correct.

B. Incorrect but plausible. For Part 1, The desired feed path in 1-EOP-FRHS-1 is to have BOTH SI Pumps and BOTH Charging Pumps feeding the RCS. Consequently, the candidate could incorrectly conclude that an RCS Bleed Path can not be established until BOTH SI Pumps and BOTH Charging Pumps are running. For Part 2, the Reactor Head Vents and the PORVs will both vent the RCS to the PRT. Consequently, the candidate could incorrectly conclude that 1-EOP-FRHS-1 requires ALL Reactor Head Vents and BOTH PORVs to be opened as part of the RCS Bleed Path.

C. **Correct.** For Part 1, IAW 1-EOP-FRHS-1 Step 23.2, as long as 1 Charging Pump and 1 SI Pump are running, the crew will continue attempts to start the 12 Charging Pump and 12 SI Pump while establishing an RCS Bleed Path. For Part 2, IAW 1-EOP-FRHS-1 Step 24, the crew will establish an RCS Bleed Path by opening BOTH PORVs.

D. Incorrect but plausible. Part 1 is correct. For Part 2, the Reactor Head Vents and the PORVs will both vent the RCS to the PRT. Consequently, the candidate could incorrectly conclude that 1-EOP-FRHS-1 requires ALL Reactor head Vents and BOTH PORVs to be opened as part of the RCS Bleed Path.

**Question Number:** 64

**Tier:** 1 Group 1

**K/A:** W/E05 Loss of Secondary Heat Sink-EK2.2

Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the following: Facility*s heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility

**Importance Rating:** 3.9

**10 CFR Part 55:** 41.8 / 41.10, 45.3

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the feed requirements (ECCS Pump configuration) and bleed requirements (RCS PORVs) which are heat removal systems IAW EOP-FRHS-1 (Response To Loss Of Secondary Heat Sink)

**SRO Justification:** N/A

**Technical References:** EOP-FRHS-1 (Response To Loss Of Secondary Heat Sink)

**Proposed references to be provided:** None

**Learning Objective:** NOS05FRHS00-02 (HEAT SINK FUNCTIONAL RESTORATION)

5 Describe the EOP mitigation strategy for the following:

A. Response to Loss of Secondary Heat Sink

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**65** **Points: 1.00**

Given:

- The crew is preparing to perform the RCS Depressurization To Minimize Subcooling Steps of 1-EOP-LOCA-5 (Loss Of Emergency Recirculation)
- **ALL** RCPs are stopped
- PZR Level is 10%
- RCS Subcooling is 35 °F

At time 16:15:**00**

- The RCS depressurization has started

At time 16:15:**30** (30 seconds later)

- PZR Level is 45% and rising
- RCS Subcooling is 25 °F

In accordance with 1-EOP-LOCA-5, which ONE of the following completes the statements below?

At **16:15:00**, the crew used ___(1)___ to depressurize the RCS.

At **16:15:30**, there ___(2)___ indications that voiding is occurring in the upper head region.

| | **(1)** | **(2)** |
|---|---|---|
| A. | AUX SPRAY | are **NOT** |
| B. | AUX SPRAY | are |
| C. | a PZR PORV | are **NOT** |
| D. | a PZR PORV | are |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, depressurizing the RCS using a PZR PORV will result in a loss of RCS inventory. The candidate may conclude that losing RCS inventory is not desirable and incorrectly conclude that the RCS will be depressurized using AUX SPRAY. For Part 2, the candidate may not understand the expected indications associated with voiding in the upper head region. Consequently, the candidate could incorrectly conclude that at 10:00:30, there are not indications that voiding is occurring in the upper head region.

B. Incorrect but plausible. For Part 1, depressurizing the RCS using a PZR PORV will result in a loss of RCS inventory. The candidate may conclude that losing RCS inventory is not desirable and incorrectly conclude that the RCS will be depressurized using AUX SPRAY. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate may not understand the expected indications associated with voiding in the upper head region. Consequently, the candidate could incorrectly conclude that at 10:00:30, there are not indications that voiding is occurring in the upper head region.

D. **Correct.** For Part 1, IAW 1-EOP-LOCA-5 Step 24, with normal spray not available, the crew will depressurize the RCS using a PZR PORV. For Part 2, IAW 1-EOP-LOCA-5 Step 24, voiding in the upper head region will result in rapidly rising PZR Level. Since RCS Level has risen 35% in 30 seconds, there are indications that voiding is occurring in the upper head region.

**Question Number:** 65

**Tier:** 1 Group 1

**K/A:** W/E11 Loss of Emergency Coolant Recirculation-EK1.1

Knowledge of the operational implications of the following concepts as they apply to the (Loss of Emergency Coolant Recirculation): Components, capacity, and function of emergency systems

**Importance Rating:** 3.7

**10 CFR Part 55:** 41.8 / 41.10, 45.3

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know that the RCS will be depressurized using a PZR PORV (a safety related component) IAW 1-EOP-LOCA-5 (Loss Of Emergency Recirculation).

**SRO Justification:** N/A

**Technical References:** 1-EOP-LOCA-5 (Loss Of Emergency Recirculation)

**Proposed references to be provided:** None

**Learning Objective:** NOS05LOCA05-04 (LOSS OF EMERGENCY RECIRCULATION)

5 Determine the indications that are monitored to ensure proper system/component operation for each step in the EOP for LOSS OF EMERGENCY RECIRCULATION

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**66** **Points: 1.00**

Given:

- A Reactor Trip and Safety Injection Actuation have occurred
- The 1A 4KV VITAL BUS is de-energized due to an electrical fault on the bus
- The 12 AFW Pump will **NOT** start
- The crew has just transitioned to 1-EOP-LOSC-2 (Multiple Steam Generator Depressurization)
- The RCS cooldown rate is 120 °F / HR

In accordance with 1-EOP-LOSC-2, which ONE of the following completes the statements below?

The crew ___(1)___ isolate steam to the 13 AFW Pump.

AFW flow will be controlled / reduced to ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | will **NOT** | maintain SG NR Levels less than 33% |
| B. | will **NOT** | no less than 1.0E04 LB / HR to each SG |
| C. | will | maintain SG NR Levels less than 33% |
| D. | will | no less than 1.0E04 LB / HR to each SG |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, if the RCS cooldown rate was less than 100 °F / HR, the crew will control AFW flow to maintain SG NR Levels less than 33%. Consequently, the candidate could incorrectly conclude that with the given plant conditions, AFW flow will be controlled to maintain SG NR Levels less than 33%.

B. **Correct.** For Part 1, based on the question stem, BOTH MDAFW Pumps are not available (11 AFW Pump due to 1A 4KV bus being de-energized and 12 AFW Pump will NOT start). IAW 1-EOP-LOSC-2 Step 1, since the 13 AFW Pump is the only source of AFW flow, steam must be maintained to the 13 AFW pump. For Part 2, IAW 1-EOP-LOSC-2 Step 5, with RCS cooldown rate greater than 100 °F / HR, AFW flow will be reduced to no less than 1.0E04 LB / HR to each SG.

C. Incorrect but plausible. For Part 1, if a MDAFW Pump is available, then 1-EOP-LOSC-2 requires steam to be isolated the 13 AFW Pump. Based on the plant conditions, the candidate could not recognize that the 11 AFW Pump is also not available. This would cause the candidate to incorrectly deduce that steam will be isolated to the 13 AFW Pump. For Part 2, if the RCS cooldown rate was less than 100 °F / HR, the crew will control AFW flow to maintain SG NR Levels less than 33%. Consequently, the candidate could incorrectly conclude that with the given plant conditions, AFW flow will be controlled to maintain SG NR Levels less than 33%.

D. Incorrect but plausible. For Part 1, if a MDAFW Pump is available, then 1-EOP-LOSC-2 requires steam to be isolated the 13 AFW Pump. Based on the plant conditions, the candidate could not recognize that the 11 AFW Pump is also not available. This would cause the candidate to incorrectly deduce that steam will be isolated to the 13 AFW Pump. Part 2 is correct.

**Question Number:** 66

**Tier:** 1 Group 1

**K/A:** W/E12 Uncontrolled Depressurization of all Steam Generators-EK1.1

Knowledge of the operational implications of the following concepts as they apply to the (Uncontrolled Depressurization of all Steam Generators): Components:, capacity, and function of emergency systems

**Importance Rating:** 3.4

**10 CFR Part 55:** 41.8 / 41.10, 45.3

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how much AFW Pump flow (a safety related component) must be reduce IAW 1-EOP-LOSC-2 (Multiple Steam Generator Depressurization).

**SRO Justification:** N/A

**Technical References:** 1-EOP-LOSC-2 (Multiple Steam Generator Depressurization)

**Proposed references to be provided:** None

**Learning Objective:** NOS05LOCS02-03 ( MULTIPLE SG DEPRESSURIZATION )

5 Given EOP-LOSC-2 and a set of plant conditions:

A. Determine a discrete path through the EOP

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**67** **Points: 1.00**

Given:

- The Unit 2 Control Room has been evacuated in accordance with S2.OP-AB.CR-0001 (Control Room Evacuation)
- The Reactor Trip has been confirmed but 2 Control Rods did not fully insert into the core

At time 08:00:00

- The RO and PO are preparing to perform an Emergency Boration in accordance with S2.OP-AB.CR-0001 Attachment 5 (Reactor Operator) and Attachment 6 (Plant Operator)

Which ONE of the following completes the statements below?

In accordance with S2.OP-AB.CR-0001 Attachment 6, the crew will perform the Emergency Boration for a duration of ___(1)___ minutes.

During the Emergency Boration, the RO will throttle 2CV55 (Cent Chg Pmp Flow Cont Valve) by adjusting the 2CV55 Manual HAND/AIR Regulator Controller located at Panel ___(2)___.

NOTE:

- Panel 213-2 = Unit 2 Hot Shutdown Panel
- Panel 216-2 = Unit 2 CVC Chg Pmps FL & PR Inst Panel

| | **(1)** | **(2)** |
|---|---|---|
| A. | 70 | 213-2 |
| B. | 70 | 216-2 |
| C. | 240 | 213-2 |
| D. | 240 | 216-2 |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that Panel 216-2 only contains instrumentation readings and the 2CV55 Manual HAND/AIR Regulator Controller is actually located the Hot Shutdown Panel.

B. **Correct.** For Part 1, IAW S2.OP-AB.CR-0001 Attachment 6, the crew is required to perform an Emergency Boration for a duration of 35 minutes per each stuck rod. Consequently, with 2 Control Rods stuck, the crew is required to perform an Emergency Boration for a duration of 70 minutes. For Part 2, the RO throttle 2CV55 (Cent Chg Pmp Flow Cont Valve) by adjusting the 2CV55 Manual HAND/AIR Regulator Controller located at Panel 216-2.

C. Incorrect but plausible. For Part 1, EOP-TRIP-2 also contains Emergency Boration guidelines. In EOP-TRIP-2, if the RWST is used as the source of the Emergency Boration, then the emergency boration duration will be 120 minutes for each stuck rod. Consequently, the candidate could incorrectly conclude that S2.OP-AB.CR-0001 Attachment 6 requires the emergency boration duration to be 120 minutes for each stuck rod (240 minutes total). For Part 2, the candidate could incorrectly conclude that Panel 216-2 only contains instrumentation readings and the 2CV55 Manual HAND/AIR Regulator Controller is actually located the Hot Shutdown Panel.

D. Incorrect but plausible. For Part 1, EOP-TRIP-2 also contains Emergency Boration guidelines. In EOP-TRIP-2, if the RWST is used as the source of the Emergency Boration, then the emergency boration duration will be 120 minutes for each stuck rod. Consequently, the candidate could incorrectly conclude that S2.OP-AB.CR-0001 Attachment 6 requires the emergency boration duration to be 120 minutes for each stuck rod (240 minutes total). Part 2 is correct.

**Question Number:** 67

**Tier:** 1 Group 2

**K/A:** APE: 024 Emergency Boration-G2.4.34

Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects

**Importance Rating:** 4.2

**10 CFR Part 55:** 41.10 / 43.5 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the ROs and POs actions performed outside of the control room for an Emergency Boration IAW S2.OP-AB.CR-0001 (Control Room Evacuation).

**SRO Justification:** N/A

**Technical References:** S2.OP-AB.CR-0001 (Control Room Evacuation)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABCR01-05 ( CONTROL ROOM EVACUATION)

2 Describe, in general terms, the actions taken in S1/S2.OP-AB.CR-0002(Q) and the bases for the actions.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**68** **Points: 1.00**

Given:

At time 11:00

- The crew is attempting to control PZR level in accordance with S2.OP-AB.SG-0001 (Steam Generator Tube Leak)

At time 11:02

- PZR level can **NOT** be maintained
- The crew has **TRIPPED** the Reactor and the Reactor Trip has been confirmed

In accordance with S2.OP-AB.SG-0001, which ONE of the following completes the statements below?

At **11:00**, the crew will ___(1)___ letdown.

At **11:02**, the crew ___(2)___ initiate a Safety Injection prior to transitioning to 2-EOP-TRIP-1 (Reactor Trip or Safety Injection).

| | **(1)** | **(2)** |
|---|---|---|
| A. | isolate | will |
| B. | isolate | will **NOT** |
| C. | reduce | will |
| D. | reduce | will **NOT** |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the candidate could conclude that avoiding a safety injection and doing a controlled plant shutdown is preferable. Consequently, isolating letdown will give the crew the most margin to maintain PZR level and to prevent a safety injection. Consequently, the candidate could incorrectly conclude that S2.OP-AB.SG-0001 directs the crew to isolate letdown. Part 2 is correct.

B. Incorrect but plausible. For Part 1, the candidate could conclude that avoiding a safety injection and doing a controlled plant shutdown is preferable. Consequently, isolating letdown will give the crew the most margin to maintain PZR level and to prevent a safety injection. Consequently, the candidate could incorrectly conclude that S2.OP-AB.SG-0001 directs the crew to isolate letdown. For Part 2, the candidate could incorrectly conclude that a manual safety injection is not required until the crew reaches 2-EOP-TRIP-1 Step 5 (is SI actuated or required).

C. **Correct.** For Part 1, IAW S2.OP-AB.SG-0001 Step 3.7, the crew will reduce letdown to minimum by ONLY placing 2CV3 (45 gpm ORIFICE) in service. For Part 2, IAW S2.OP-AB.SG-0001 Step 3.11, the crew will initiate a safety injection prior to going to 2-EOP-TRIP-1.

D. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that a manual safety injection is not required until the crew reaches 2-EOP-TRIP-1 Step 5 (is SI actuated or required).

**Question Number:** 68

**Tier:** 1 Group 2

**K/A:** APE: 037 Steam Generator (S/G) Tube Leak-AA1.07

Ability to operate and / or monitor the following as they apply to the Steam Generator Tube Leak: CVCS letdown flow indicator

**Importance Rating:** 3.1

**10 CFR Part 55:** 41.7 / 45.5 / 45.6

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know how CVCS letdown flow will be adjusted to maintain PZR level IAW S2.OP-AB.SG-0001 (Steam Generator Tube Leak). There is no specific procedural guidance concerning the CVCS letdown flow indicator.

**SRO Justification:** N/A

**Technical References:** S2.OP-AB.SG-0001 (Steam Generator Tube Leak)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABSGTL-05 (STEAM GENERATOR TUBE LEAK)

4 Given a set of initial plant conditions:

A. Determine the appropriate abnormal procedure

B. Describe the plant response to actions taken in the abnormal procedure

C. Describe the final plant condition that is established by the abnormal procedure

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**69** **Points: 1.00**

Given:

- Unit 1 is at 100% Reactor Power and stable
- The crew is performing S1.OP-AB.RC-0002 (High Activity In Reactor Coolant System)
- 13 Charging Pump is in service
- 1CV4 (75 GPM ORIFICE) is in service
- Chemistry has just reported that the confirmatory sample has confirmed increasing activity in the RCS but below LCO 3.4.9 (Specific Activity) limits

In accordance with S1.OP-AB.RC-0002, which ONE of the following completes the statements below?

The crew ___(1)___ required to place either 11 Charging Pump or 12 Charging Pump in service and secure the 13 Charging Pump.

In addition to 1CV4, the crew ___(2)___ required to also place 1CV3 (45 GPM ORIFICE) in service.

| | **(1)** | **(2)** |
|---|---|---|
| A. | is | is |
| B. | is | is **NOT** |
| C. | is **NOT** | is |
| D. | is **NOT** | is **NOT** |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1, IAW S1.OP-AB.RC-0002 Step 3.15, the crew is required to transfer to a Centrifugal Charging Pump (CCP). Consequently, the crew is required to secure the 13 Charging Pump (PDP) and place either 11 Charging Pump or 12 Charging Pump (CCPs) is service. For Part 2, IAW S1.OP-AB.RC-0002 Step 3.16, the crew is required to maximize letdown flow. Consequently, in addition to 1CV4, the crew is required to also place 1CV3 (45 GPM ORIFICE) in service.

B. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could know that letdown should be maximized. However, the candidate could misinterpret this requirement to be having only the highest rated orifice (75 GPM) in service.

C. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that either the 13 Charging pump is a CCP or that the PDP Charging pump may remain in service when performing S1.OP-AB.RC-0002. Part 2 is correct.

D. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that either the 13 Charging pump is a CCP or that the PDP Charging pump may remain in service when performing S1.OP-AB.RC-0002. For Part 2, the candidate could know that letdown should be maximized. However, the candidate could misinterpret this requirement to be having only the highest rated orifice (75 GPM) in service.

**Question Number:** 69

**Tier:** 1 Group 2

**K/A:** APE: 076 High Reactor Coolant Activity-AA2.02

Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: Corrective actions required for high fission product activity in RCS

**Importance Rating:** 2.8

**10 CFR Part 55:** 43.5 / 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate know how letdown and charging will be maximized (corrective actions for high fission product activity in RCS) IAW S1.OP-AB.RC-0002 (High Activity In Reactor Coolant System).

**SRO Justification:** N/A

**Technical References:** S1.OP-AB.RC-0002 (High Activity In Reactor Coolant System)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABRC02-05 (HIGH ACTIVITY IN REACTOR COOLANT SYSTEM)

3 Describe, in general terms, the actions taken in S2.OP-AB.RC-0002 and the bases for the actions in accordance with the Technical Bases Document.

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

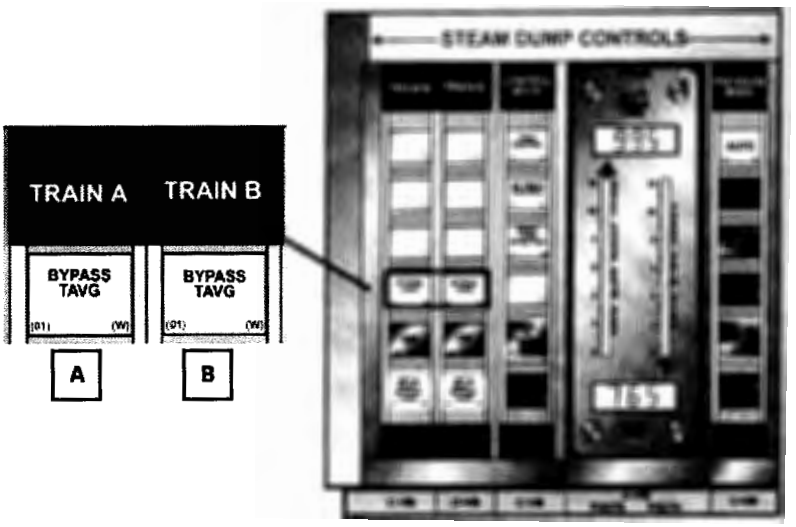
**Question History:**

**Comments:**

**70** **Points: 1.00**

Given:

- The crew is performing the RCS Cooldown To Cold Shutdown Steps of 2-EOP-LOCA-2 (Post LOCA Cooldown and Depressurization)
- Condenser Steam Dumps are available




Which ONE of the following completes the statements below?

In accordance with 2-EOP-LOCA-2, the crew will maintain T-COLD Cooldown Rate less than a **MAXIMUM** of ___(1)___ °F / HR.

Depressing BEZEL Pushbutton(s) ___(2)___ is / are the **MINIMUM** pushbutton manipulation(s) required to have the Condenser Steam Dumps function when TAVG is less than 543 °F.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 50 | A **OR** B |
| B. | 50 | A **AND** B |
| C. | 100 | A **OR** B |
| D. | 100 | A **AND** B |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, other procedures (S2.OP-IO.ZZ-0006 (HOT STANDBY TO COLD SHUTDOWN)) have an RCS Cooldown limit of 50 °F / HR. Consequently, the candidate could incorrectly conclude that 2-EOP-LOCA-2 also has an RCS Cooldown Rate limit of 100 °F / HR. For Part 2, if the Steam Dump Train A and Train B Blocking solenoids were in parallel, depressing BEZEL Pushbutton(s) 1 OR 2 would be the minimum pushbutton manipulation(s) to have the Condenser Steam Dumps function when TAVG is less than 543 °F. Additionally, for many safety systems, only 1 train is required to be OPERABLE for the safety system to perform its safety function. Consequently, the candidate could apply this logic to the steam dumps and incorrectly conclude that ONLY one Train of Steam Dumps need to be taken to "BYPASS TAVG" for Steam Dumps to function when TAVG is less than 543 °F.

B. Incorrect but plausible. For Part 1, other procedures (S2.OP-IO.ZZ-0006 (HOT STANDBY TO COLD SHUTDOWN)) have an RCS Cooldown limit of 50 °F / HR. Consequently, the candidate could incorrectly conclude that 2-EOP-LOCA-2 also has an RCS Cooldown Rate limit of 100 °F / HR. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, if the Steam Dump Train A and Train B Blocking solenoids were in parallel, depressing BEZEL Pushbutton(s) 1 OR 2 would be the minimum pushbutton manipulation(s) to have the Condenser Steam Dumps function when TAVG is less than 543 °F. Additionally, for many safety systems, only 1 train is required to be OPERABLE for the safety system to perform its safety function. Consequently, the candidate could apply this logic to the steam dumps and incorrectly conclude that ONLY one Train of Steam Dumps need to be taken to "BYPASS TAVG" for Steam Dumps to function when TAVG is less than 543 °F.

D. **Correct.** For Part 1, IAW 2-EOP-LOCA-2 Step 11, The crew will maintain T-COLD Cooldown Rate less than a maximum of 100 °F / HR. For Part 2, IAW 2-EOP-LOCA-2 Step 11, depressing BOTH "BYPASS TAVG" BEZEL Pushbuttons are the is the MINIMUM pushbutton manipulation(s) required to have the Condenser Steam Dumps function when TAVG is less than 543 °F.

**Question Number:** 70

**Tier:** 1 Group 2

**K/A:** W/E03 LOCA Cooldown and Depressurization-EK2.1

Knowledge of the interrelations between the (LOCA Cooldown and Depressurization) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features

**Importance Rating:** 3.6

**10 CFR Part 55:** 41.7 / 45.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the 2-EOP-LOCA-2 (Post LOCA Cooldown and Depressurization) procedural guidance concerning RCS Cooldown Rate and manual bypass of Condenser Steam Dump Automatic LO TAVG block feature.

**SRO Justification:** N/A

**Technical References:** 2-EOP-LOCA-2 (Post LOCA Cooldown and Depressurization)

**Proposed references to be provided:** None

**Learning Objective:** NOS05LOCA02-03 ( POST-LOCA COOLDOWN AND DEPRESSURIZATION)

5 Determine the indications that are monitored to ensure proper system/component operation for each step in the EOP for POST LOCA COOLDOWN AND DEPRESSURIZATION

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

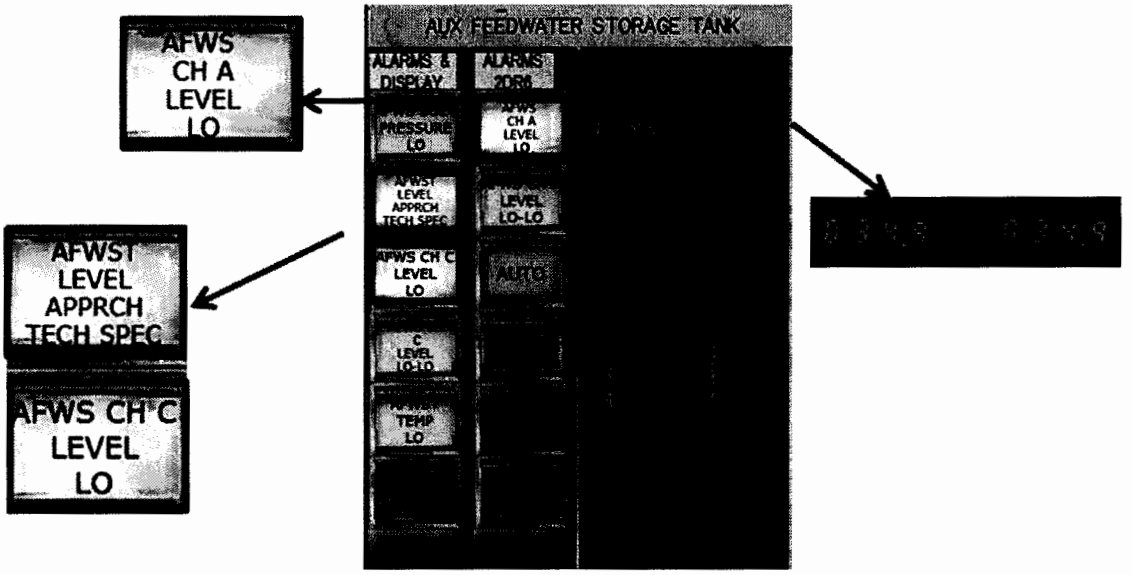
**Question History:**

**Comments:**

**71** **Points: 1.00**

Given:

- The crew is performing the SG Level Control Steps of 2-EOP-FRCC-2 (Response To Degraded Core Cooling)
- The PO observes the following on the AUX FEEDWATER STORAGE TANK BEZEL (Red Box = VALID ALARM):




In accordance with 2-EOP-FRCC-2, which ONE of the following completes the statements below?

The crew ___(1)___ required to shift AFW suction to an alternate source.

If **NO INTACT** SG is available, the crew can feed a RUPTURED SG ___(2)___ .

| | **(1)** | **(2)** |
|---|---|---|
| A. | is | **ONLY** |
| B. | is | or a FAULTED SG |
| C. | is **NOT** | **ONLY** |
| D. | is **NOT** | or a FAULTED SG |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, since the AFWST Lo Level alarm is valid, the candidate could incorrectly conclude that the crew is required to shift AFW suction to an alternate source. For Part 2, 2-EOP-FRHS-1 (RESPONSE TO LOSS OF SECONDARY HEAT SINK) specifically forbids feeding a FAULTED SG if an INTACT or RUPTURED SG is available. Consequently, the candidate could incorrectly conclude that 2-EOP-FRCC-2 also forbids feeding a FAULTED SG if an INTACT or RUPTURED SG is available.

B. Incorrect but plausible. For Part 1, since the AFWST Lo Level alarm is valid, the candidate could incorrectly conclude that the crew is required to shift AFW suction to an alternate source. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, 2-EOP-FRHS-1 (RESPONSE TO LOSS OF SECONDARY HEAT SINK) specifically forbids feeding a FAULTED SG if an INTACT or RUPTURED SG is available. Consequently, the candidate could incorrectly conclude that 2-EOP-FRCC-2 also forbids feeding a FAULTED SG if an INTACT or RUPTURED SG is available.

D. **Correct.** For Part 1, IAW 2-EOP-FRCC-2 Step 12, since only the AFWST LO LEVEL is illuminated, the crew is NOT required to shift AFW suction to an alternate source (need the AFWST LO-LO Level Alarm to switch to the alternate suction source). For Part 2, IAW 2-EOP-FRCC-2 Step 12, If NO INTACT SG is available, the crew can feed a FAULTED SG or RUPTURED SG.

**Question Number:** 71

**Tier:** 1 Group 2

**K/A:** E06 Degraded Core Cooling-EK1.3

Knowledge of the operational implications of the following concepts as they apply to the (Degraded Core Cooling): Annunciators and conditions indicating signals, and remedial actions associated with the (Degraded Core Cooling).

**Importance Rating:** 3.7

**10 CFR Part 55:** 41.8 / 41.10, 45.3

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the operational implications (the need to shift AFW flow to an alternate source) after analyzing annunciators associated with AFWST level IAW EOP-FRCC-2 (Response To Degraded Core Cooling)

**SRO Justification:** N/A

**Technical References:** EOP-FRCC-2 (Response To Degraded Core Cooling)

**Proposed references to be provided:** None

**Learning Objective:** NOS05LOCA02-03 ( POST-LOCA COOLDOWN AND DEPRESSURIZATION)

5 Describe the EOP mitigation strategy for the following:

a. Response to Inadequate Core Cooling.

b. Response to Degraded Core Cooling.

c. Response to Saturated Core Cooling Conditions.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**72** **Points: 1.00**

Given:

- The crew is performing 1-EOP-FRHS-2 (Response To Steam Generator Overpressure)
- 11 SG is 1150 psig

At time 12:00

- The crew is attempting to release steam from 11 SG
- 11MS18 (MS Warmup) and 11MS10 (Atmospheric Relief Valves) can **NOT** be opened
- RCS T-HOTs are 550 °F

In accordance with 1-EOP-FRHS-2, which ONE of the following completes the statements below?

At **12:00**, the crew ___(1)___ start the 13 AFW Pump in an effort to release steam from 11 SG.

If the crew is unable to release steam from 11 SG, then crew will ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | will | cool down the RCS to < 540 °F using UNAFFECTED SGs |
| B. | will | establish AFW flow to 11 SG |
| C. | will **NOT** | cool down the RCS to < 540 °F using UNAFFECTED SGs |
| D. | will **NOT** | establish AFW flow to 11 SG |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1, IAW 1-EOP-FRHS-2 Step 5, lists the 13 AFW Pump as a permitted release path for the affected SG. Since the other permitted release paths are not available and 11 SG is a source of steam for the 13 AFW, the crew will start the 13 AFW Pump in an effort to release steam from 11 SG. For Part 2, IAW 1-EOP-FRHS-2 Step 9, if the crew is unable to release steam from 11 SG, then RCS T-HOTs will be maintained less than a maximum of 540 °F by using the unaffected SGs.

B. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that establish cool AFW flow to 11 SG will help reduce 11 SG pressure.

C. Incorrect but plausible. For Part 1, the candidate may incorrectly determine that the 11 SG is not a source of steam to the 13 AFW Pump. Consequently, the candidate would then incorrectly determine that the crew will not start the 13 AFW Pump in an effort to release steam from 11 SG. Part 2 is correct.

D. Incorrect but plausible. For Part 1, the candidate may incorrectly determine that the 11 SG is not a source of steam to the 13 AFW Pump. Consequently, the candidate would then incorrectly determine that the crew will not start the 13 AFW Pump in an effort to release steam from 11 SG. For Part 2, the candidate could incorrectly conclude that establish cool AFW flow to 11 SG will help reduce 11 SG pressure.

**Question Number:** 72

**Tier:** 1 Group 2

**K/A:** W/E13 Steam Generator Overpressure-EK2.2

Knowledge of the interrelations between the (Steam Generator Overpressure) and the following: Facility*s heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

**Importance Rating:** 3.0

**10 CFR Part 55:** 41.7 / 45.7

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the RCS heat removal (via unaffected SGs) requirements IAW 1-EOP-FRHS-2 (Response To Steam Generator Overpressure).

**SRO Justification:** N/A

**Technical References:** EOP-FRHS-2 (Response To Steam Generator Overpressure)

**Proposed references to be provided:** None

**Learning Objective:** NOS05FRHS00-02 (HEAT SINK FUNCTIONAL RESTORATION)

6 Describe the plant response to actions taken in the following EOP step sequence(s).

A. EOP-FRHS-1: 7, 9, 13, 18.5, 22, 24, 29,35, 38, 39,40 and 41

B. EOP-FRHS-2: 3, 6, 9, and 10

C. 2-EOP-FRHS-3: 4, 8, 9, and 11

D. EOP-FRHS-5: 4, 7.1, and 7.2.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**73** **Points: 1.00**

Given:

- The crew has just transitioned to 1-EOP-FRCE-1 (Response To Excessive Containment Pressure) from 1-EOP-LOCA-5 (Loss Of Emergency Recirculation)
- **BOTH** Containment Spray Pumps have stopped in accordance with 1-EOP-LOCA-5
- Containment Pressure is 25 psig and slowly rising
- The crew is performing 1-EOP-FRCE-1 Step 3, "Has Containment Pressure Remained Less Than 15 psig"

Which ONE of the following completes the statements below?

In accordance with 1-EOP-FRCE-1 Step 3, the crew ___(1)___ start **BOTH** Containment Spray Pumps.

With 1-EOP-LOCA-5 in effect, conserving RWST water ___(2)___ a reason for how Containment Spray Pumps are operated in 1-EOP-FRCE-1 Step 3.

| | **(1)** | **(2)** |
|---|---|---|
| A. | will **NOT** | is **NOT** |
| B. | will **NOT** | is |
| C. | will | is **NOT** |
| D. | will | is |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate may incorrectly conclude that high containment pressure (last fission product barrier) is the highest priority and conserving RWST water is not a reason for how the CS pumps are operated in EOP-FRCE-1.

B. **Correct.** For Part 1, IAW 1-EOP-FRCE-1 Step 2, the CS pumps will be operated in as directed by 1-EOP-LOCA-5. Since LOCA-5 directed both CS Pumps to be started, the crew will NOT start both CS Pumps. For Part 2, with 1-EOP-LOCA-5 in effect, conserving RWST water is a reason for how Containment Spray Pumps are operated in 1-EOP-FRCE-1 Step 3. For Part 2, the candidate may incorrectly conclude that high containment pressure (last fission product barrier) is the highest priority and conserving RWST water is not a reason for how the CS pumps are operated in EOP-FRCE-1.

C. Incorrect but plausible. For Part 1, both CS Pumps will be normally be started in EOP-FRCE-1. The candidate could not recall the provision to operate the CS pumps as directed by EOP-LOCA-5 and incorrectly conclude that bot CS Pumps will be started. For Part 2, the candidate may incorrectly conclude that high containment pressure (last fission product barrier) is the highest priority and conserving RWST water is not a reason for how the CS pumps are operated in EOP-FRCE-1.

D. Incorrect but plausible. For Part 1, both CS Pumps will be normally be started in EOP-FRCE-1. The candidate could not recall the provision to operate the CS pumps as directed by EOP-LOCA-5 and incorrectly conclude that bot CS Pumps will be started. Part 2 is correct.

**Question Number:** 73

**Tier:** 1 Group 2

**K/A:** W/E14 High Containment Pressure-EK3.2

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

**Importance Rating:** 3.1

**10 CFR Part 55:** 41.5 / 41.10, 45.6, 45.13

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the reason for how the Containment Spray Pumps are operated when performing EOP-FRCE (Response To Excessive Containment Pressure) with EOP-LOCA-5 (Loss Of Emergency Recirculation) also in effect.

**SRO Justification:** N/A

**Technical References:** EOP-FRCE-1 (Response To Excessive Containment Pressure)

**Proposed references to be provided:** None

**Learning Objective:** NOS05FRCE00-06 ( EOP-FRCE-1, 2, AND 3 CONTAINMENT ENVIRONMENT )

2 Describe the plant response to actions taken in the following EOP step sequence(s).

2.1. 2-EOP-FRCE-1: 1, 2, 3, 3.4, 4, 7, and 9

2.2. 2-EOP-FRCE-2: 1

2.3. 2-EOP-FRCE-3: 1 and 2

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**74** **Points: 1.00**

Given:

- The crew is performing 2-EOP-FRCE-2 (Response To High Containment Sump Level)
- SW flow to 25 CFCU is abnormally high
- 25 CFCU has just been stopped

Which ONE of the following completes the statements below?

In accordance with 2-EOP-CFST-1 (Critical Safety Function Status Trees), the crew entered 2-EOP-FRCE-2 when Containment Sump Level reached a minimum of ___(1)___ %.

In accordance with 2-EOP-FRCE-2, the crew will close 25SW58 (Inlet Water Valve) ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 75 | and 25SW72 (Outlet Water Valve) |
| B. | 75 | **ONLY** |
| C. | 78 | and 25SW72 (Outlet Water Valve) |
| D. | 78 | **ONLY** |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, Containment Sump Level of 75% is the adverse level in which EOP-CFST-1 requires performance of EOP-FRCE-2. Consequently, the candidate could incorrectly conclude for the given plant conditions that 2-EOP-FRCE-2 is entered when Containment Sump Level reached a minimum of 75%. Part 2 is correct.

B. Incorrect but plausible. For Part 1, Containment Sump Level of 75% is the adverse level in which EOP-CFST-1 requires performance of EOP-FRCE-2. Consequently, the candidate could incorrectly conclude for the given plant conditions that 2-EOP-FRCE-2 is entered when Containment Sump Level reached a minimum of 75%. For Part 2, when 25 CFCU was stopped, 25SW223 automatically closed. 25SWS223 is directly downstream on 25SW72. Consequently, the candidate could incorrectly conclude that 2-EOP-FRCE-2 only requires the affected CFCU's SW Inlet valve (SW58) to be closed.

C. **Correct.** For Part 1, IAW 2-EOP-CFST-1, the crew entered 2-EOP-FRCE-2 when Containment Sump Level reached a minimum of 78 % (75% adverse). Since the question stem indicates containment pressure is normal, the crew entered 2-EOP-FRCE-2 when Containment Sump Level reached a minimum of 78 %. For Part 2, in accordance with 2-EOP-FRCE-2 Step 1, the crew will close 25SW58 (Inlet Water Valve) and 25SW72 (Outlet Water Valve).

D. Incorrect but plausible. Part 1 is correct. For Part 2, when 25 CFCU was stopped, 25SW223 automatically closed. 25SWS223 is directly downstream on 25SW72. Consequently, the candidate could incorrectly conclude that 2-EOP-FRCE-2 only requires the affected CFCU's SW Inlet valve (SW58) to be closed.

**Question Number:** 74

**Tier:** 1 Group 2

**K/A:** W/E15 Containment Flooding-EA1.2

Ability to operate and / or monitor the following as they apply to the (Containment Flooding): Operating behavior characteristics of the facility

**Importance Rating:** 2.7

**10 CFR Part 55:** 41.7 / 45.5 / 45.6

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the procedural guidance of 2-EOP-FRCE-2 (Response To High Containment Sump Level) to properly isolate SW to a leaking CFCU (which is the cause of the containment flooding).

**SRO Justification:** N/A

**Technical References:** 2-EOP-FRCE-2 (Response To High Containment Sump Level)

**Proposed references to be provided:** None

**Learning Objective:** NOS05FRCE00-06 ( EOP-FRCE-1, 2, AND 3 CONTAINMENT ENVIRONMENT )

1 Describe the EOP mitigation strategy for the following:

1.1. 2-EOP-FRCE-1

1.2. 2-EOP-FRCE-2

1.3. 2-EOP-FRCE-3

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**75** **Points: 1.00**

Given:

- 2R44A and 2R44B (High Range Containment Accident Monitors) are in alarm
- Containment Radiation is 7E2 R/HR
- The crew has just entered 2-EOP-FRCE-3 (Response To High Containment Radiation)

Which ONE of the following completes the statements below?

In accordance with 2-EOP-CFST-1 and based on the Containment Radiation levels, Containment is considered ___(1)___.

In accordance with 2-EOP-FRCE-3, the crew is required to operate the 21 THRU 25 CFCUs in ___(2)___ speed.

| | (1) | (2) |
|---|---|---|
| A. | NORMAL | low |
| B. | NORMAL | high |
| C. | ADVERSE | low |
| D. | ADVERSE | high |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1, IAW 2-EOP-CFST-1, since containment radiation is less than 1E05 R/HR, contain is considered NORMAL. For Part 2, IAW 2-EOP-FRCE-3 Step 2, the crew is required to operate the 21 THRU 25 CFCUs in low speed.

B. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that running the CFCUs in high speed would better circulate the containment atmosphere which would better mitigate the high radiation condition.

C. Incorrect but plausible. For Part 1, since 2R44A and 2R44B (High Range Containment Accident Monitors) are in alarm, the candidate could incorrectly conclude that containment is ADVERSE. Part 2 is correct.

D. Incorrect but plausible. For Part 1, since 2R44A and 2R44B (High Range Containment Accident Monitors) are in alarm, the candidate could incorrectly conclude that containment is ADVERSE. For Part 2, the candidate could incorrectly conclude that running the CFCUs in high speed would better circulate the containment atmosphere which would better mitigate the high radiation condition.

**Question Number:** 75

**Tier:** 1 Group 2

**K/A:** W/E16 High Containment Radiation-EK1.2

Knowledge of the operational implications of the following concepts as they apply to the (High Containment Radiation): Normal, abnormal and emergency operating procedures associated with (High Containment Radiation).

**Importance Rating:** 2.7

**10 CFR Part 55:** 41.8 / 41.10, 45.3

**10 CFR 55.43.b** N/A

**K/A Match:** K/A is matched because the candidate must know the procedural guidance of 2-EOP-FRCE-3 (Response To High Containment Radiation) concerning operation of the CFCUs.

**SRO Justification:** N/A

**Technical References:** 2-EOP-FRCE-3 (Response To High Containment Radiation)

**Proposed references to be provided:** None

**Learning Objective:** NOS05FRCE00-06 (EOP-FRCE-1, 2, AND 3 CONTAINMENT ENVIRONMENT)

1 Describe the EOP mitigation strategy for the following:

1.1. 2-EOP-FRCE-1

1.2. 2-EOP-FRCE-2

1.3. 2-EOP-FRCE-3

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

# EXAMINATION ANSWER KEY

Salem ILOT 16-01 SRO NRC Exam – (**APPROVED**)

**1** **Points: 1.00**

Given:

- A Reactor Trip and Safety Injection have occurred due to a PZR Vapor Space LOCA
- There are indications that a bubble has formed in the Reactor Vessel
- The crew has just transitioned to 1-EOP-FRCI-3 (Response To Void In Reactor Vessel) from 1-EOP-LOCA-1 (Loss Of Reactor Coolant)

Which ONE of the following completes the statements below?

During a PZR Vapor Space LOCA, PZR level ___(1)___ a valid indication of RCS inventory.

In accordance with 1-EOP-FRCI-3, the crew will ___(2)___ .

| | **(1)** | **(2)** |
|---|---|---|
| A. | is | ensure normal Charging Flow has been established |
| B. | is | Return To 1-EOP-LOCA-1 |
| C. | is **NOT** | ensure normal Charging Flow has been established |
| D. | is **NOT** | Return To 1-EOP-LOCA-1 |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the WOG Transient and Accident Analysis documentation states that during all other LOCAs, PZR level is a valid indication of RCS inventory. Consequently, the candidate could incorrectly conclude that during a PZR Vapor Space LOCA, PZR level is also a valid indication of RCS inventory. For Part 2, establishing normal flow is the first step of 1-EOP-FRCI-3 in which components are realigned (Step 3). Consequently, if the candidate fails to recognize the transition out of 1-EOP-FRCI-3 at Step 2, the candidate would incorrectly conclude that establishing normal charging is the proper action given the plant conditions.

B. Incorrect but plausible. For Part 1, the WOG Transient and Accident Analysis documentation states that during all other LOCAs, PZR level is a valid indication of RCS inventory. Consequently, the candidate could incorrectly conclude that during a PZR Vapor Space LOCA, PZR level is also a valid indication of RCS inventory. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, establishing normal flow is the first step of 1-EOP-FRCI-3 in which components are realigned (Step 3). Consequently, if the candidate fails to recognize the transition out of 1-EOP-FRCI-3 at Step 2, the candidate would incorrectly conclude that establishing normal charging is the proper action given the plant conditions.

D. **Correct.** For Part 1 and per the WOG Transient and Accident Analysis documentation, during a PZR Vapor Space LOCA, PZR level is NOT a valid indication of RCS inventory. For Part 2 and IAW 1-EOP-FRCI-3 Step 2, since BOTH SI Pumps are running (Safety Injection has occurred), then the crew will immediately return to procedure in effect (1-EOP-LOCA-1).

**Question Number:** 1

**Tier:** 1 Group 1

**K/A:** APE : 008 Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)-AA2.29

Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: The effects of bubble in reactor vessel

**Importance Rating:** 4.2

**10 CFR Part 55:** 43.5 / 45.13

| | |
|---|---|
| **10 CFR 55.43.b** | 5 |
| **K/A Match:** | K/A is matched because the candidate must know the procedural guidance contained in 1-EOP-FRCI-3 (Response To Void In Reactor Vessel) when a bubble forms in the reactor vessel during a PZR Vapor Space LOCA. |
| **SRO Justification:** | The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate perform a procedure selection by determining if the crew should remain in 1-EOP-FRCI-3 or transition to 1-EOP-LOCA-1 during a PZR Vapor Space LOCA. |
| **Technical References:** | NOS05TAA007-00 (LOSS OF COOLANT ACCIDENTS)<br><br>1-EOP-LOCA-1<br><br>1-EOP-FRCI-3 |
| **Proposed references to be provided:** | None |
| **Learning Objective:** | NOS05TAA007-00 (LOSS OF COOLANT ACCIDENTS)<br><br>3 Compare the sequences of core cooling mechanisms for various size LOCAs, including the following specific cases:<br><br>e. Pressurizer vapor-space LOCA<br><br>NOS05FRCI00-04 (EOP-FRCI-1 THRU 3, COOLANT INVENTORY FUNCTIONAL RESTORATION PROCEDURES )<br><br>2. Describe the plant response to actions taken in the following EOP step sequence(s):<br><br>A. 2-EOP-FRCI-1: 3, 4, 5, 7.1, 8, 9, and 10<br><br>B. 2-EOP-FRCI-2: 4, 5, and 6<br><br>C. 2-EOP-FRCI-3: 2, 5, 7, 8, 11.4, 14, 15, 17, 19, 20, and 22 |

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**2** **Points: 1.00**

Given:

At time 07:00

- A Reactor Trip and Safety Injection have occurred due to a LBLOCA

At time 07:20

- The crew has transitioned to 1-EOP-LOCA-1 (Loss Of Reactor Coolant)

In accordance with 1-EOP-LOCA-1 (Loss Of Reactor Coolant), which ONE of the following completes the statements below?

The crew will start ___(1)___ Hydrogen Recombiner(s) when Containment Hydrogen Concentration is greater than a 0.5%.

___(2)___ is the **EARLIEST** time that the crew is required to perform 1-EOP-LOCA-4 (Transfer To Hot Leg Recirculation).

| | **(1)** | **(2)** |
|---|---|---|
| A. | **ONLY** one | 19:00 |
| B. | **ONLY** one | 21:00 |
| C. | **BOTH** | 19:00 |
| D. | **BOTH** | 21:00 |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, EOP-LOCA-1 has a requirement to start preparations for Hot Leg Recirculation 12 hours after the SI Actuation. Consequently, the candidate could incorrectly conclude that that the crew is required to perform 1-EOP-LOCA-4 at 19:00.

B. **Correct.** For Part 1 and IAW 1-EOP-LOCA-1, the crew will start ONLY one Hydrogen Recombiner when Containment Hydrogen Concentration is greater than a 0.5%. For Part 2 and IAW 1-EOP-LOCA-1, the crew is required to perform 1-EOP-LOCA-4 14 hours after the SI Actuation. Since the SI Actuation occurred at 07:00, the crew is required to perform 1-EOP-LOCA-4 at 21:00.

C. Incorrect but plausible. For Part 1, there are two hydrogen recombiners. Consequently, the candidate could incorrectly conclude that both hydrogen recombiners will be started during the performance of EOP-LOCA-1. For Part 2, EOP-LOCA-1 has a requirement to start preparations for Hot Leg Recirculation 12 hours after the SI Actuation. Consequently, the candidate could incorrectly conclude that that the crew is required to perform 1-EOP-LOCA-4 at 19:00.

D. Incorrect but plausible. For Part 1, there are two hydrogen recombiners. Consequently, the candidate could incorrectly conclude that both hydrogen recombiners will be started during the performance of EOP-LOCA-1. Part 2 is correct.

**Question Number:** 2

**Tier:** 1 Group 1

**K/A:** EPE: 011 Large Break LOCA-G2.1.2

Knowledge of operator responsibilities during all modes of plant operation.

**Importance Rating:** 4.4

**10 CFR Part 55:** 41.10 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must know the operators responsibility to perform 1-EOP-LOCA-4 (Transfer To Hot Leg Recirculation) following a LBLOCA IAW 1-EOP-LOCA-1 (Loss Of Reactor Coolant).

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate perform a procedure selection by determining how long following an SI Actuation is the crew required to perform 1-EOP-LOCA-4 (Transfer To Hot Leg Recirculation).

**Technical References:** 1-EOP-LOCA-1

**Proposed references to be provided:** None

**Learning Objective:** NOS05LOCA01-05 (EOP-LOCA-01, LOSS OF REACTOR COOLANT)

5. Describe the EOP mitigation strategy for a Loss of Coolant Accident.

6. Describe the plant response to actions taken in the following EOP step sequence(s): 1, 2, 5, 6, 8, 13, 20, 22, 23, 24

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**3** **Points: 1.00**

Given:

- Unit 2 is at 95% Reactor Power and stable
- Condensate Polishing is in service
- The crew is implementing S2.OP-AB.CN-0001 (Main Feedwater / Condensate System Abnormality) IMMEDIATE ACTIONS

At time 12:00

- 21 Header Drain Pump has tripped
- SGFP suction pressure is 310 psig and lowering

Which ONE of the following completes the statements below?

During performance of S2.OP-AB.CN-0001 IMMEDIATE ACTIONS, HU-AA-101 (Human Performance Tools And Verification Practices) states that Peer Checks are ___(1)___ (during transients).

With SGFP suction pressure at 310 psig and lowering, S2.OP-AB.CN-0001 directs the crew to **FIRST** open___(2)___ in an effort to restore SGFP suction pressure.

| | **(1)** | **(2)** |
|---|---|---|
| A. | required | 2CN47 (23/24/25 Heater Strings Bypass) |
| B. | required | 21/22/23CN108 (Bypass Polisher Valves) |
| C. | desired but **NOT** required | 2CN47 (23/24/25 Heater Strings Bypass) |
| D. | desired but **NOT** required | 21/22/23CN108 (Bypass Polisher Valves) |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that Peer Checks are required for all IMMEDIATE ACTIONS. For Part 2, opening 2CN47 will be opened after 21/22/23CN108s are opened to restore SGFP suction pressure. Consequently, the candidate could incorrectly conclude that S2.OP-AB.CN-0001 requires 2CN47 to be opened first.

B. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that Peer Checks are required for all IMMEDIATE ACTIONS. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, opening 2CN47 will be opened after 21/22/23CN108s are opened to restore SGFP suction pressure. Consequently, the candidate could incorrectly conclude that S2.OP-AB.CN-0001 requires 2CN47 to be opened first.

D. **Correct.** For Part 1 and IAW HU-AA-10 Step 4.8.6, "Peer checks for actions necessary to mitigate a transient are desired but not required". For Part 2 and IAW S2.OP-AB.CN-0001 Steps 3.20 through 3.22, the crew will FIRST open 21/22/23CN108 (Bypass Polisher Valves)in an effort to restore SGFP suction pressure.

**Question Number:** 3

**Tier:** 1 Group 1

**K/A:** APE: 054 Loss of Main Feedwater (MFW)-G2.1.6

Ability to manage the control room crew during plant transients

**Importance Rating:** 4.8

**10 CFR Part 55:** 41.10 / 43.5 / 45.12 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must know how the SRO manages a MFW Transient as it applies to performing Peer Checks during the performance of the IMMEDIATE ACTIONS of an AOP.

**SRO Justification:** The question meets the SRO requirements because it requires the candidate to know the requirements of HU-AA-101 (Human Performance Tools And Verification Practices) when directing the crew to respond to a loss of feedwater casualty.

| | |
|---|---|
| **Technical References:** | S2.OP-AB.CN-0001<br>HU-AA-101 (Human Performance Tools And Verification Practices) |
| **Proposed references to be provided:** | None |
| **Learning Objective:** | NOS05ABCN01-06 ( MAIN FEEDWATER/CONDENSATE SYSTEM ABNORMALITY)<br>3. Describe, in general terms, the actions taken in AB.CN-0001 and the bases for the actions in accordance with the technical bases document. |

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**4** **Points: 1.00**

Given:

- Unit 2 is in MODE 3 with **ALL** Reactor Trip Breakers CLOSED
- 21 CV Pump is running

At time 18:00:00

- 2CC131 (RCP THERM BAR CC CONT VALVE) goes closed
- 21 CV Pump trips and 22 and 23 CV Pumps can **NOT** be started
- The crew enters S2.OP-AB.RCP-0001(Reactor Coolant Pump Abnormality)

At time 18:20:00

- While performing S2.OP-AB.RCP-0001 Attachment 2 (Stopping Reactor Coolant Pumps) the crew observes the following temperatures:

| | 21 RCP | 22 RCP | 23 RCP | 24 RCP |
|---|---|---|---|---|
| RCP Seal Inlet Temperatures | 222 °F | 227 °F | 220 °F | 223 °F |

In accordance with S2.OP-AB.RCP-0001 Attachment 2, which ONE of the following completes the statements below?

The crew ___(1)___ **REQUIRED** to close 21-24CV104s (SEAL LEAKOFF) within 3-5 minutes after stopping 21-24 RCPs.

At **18:20:00**, the crew will cool the RCP seals by performing ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | is **NOT** | S2.OP-AB.RC-0004 (Natural Circulation) |
| B. | is **NOT** | S2.OP-AB.RCP-0001 Attachment 4 (Re-establishing RCP Seal Cooling) |
| C. | is | S2.OP-AB.RCP-0001 Attachment 4 (Re-establishing RCP Seal Cooling) |
| D. | is | S2.OP-AB.RC-0004 (Natural Circulation) |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1 and based on the question stem, RCP Seal Injection Flow AND RCP Thermal Barrier Component Cooling flows are lost concurrently. Since Seal Leakoff is < 6 gpm, then IAW S2.OP-AB.RCP-0001 Attachment 2, the crew is not REQUIRED to close 21-24CV104s (SEAL LEAKOFF) within 3-5 minutes after stopping 21-24 RCPs (Step 1.4). For Part 2, IAW S2.OP-AB.RCP-0001 Attachment 2 Step 5.0, since ALL RCP Seal Inlet Temperatures are NOT less than 225 °F, the crew will cool the RCP seals by performing S2.OP-AB.RC-0004 (Natural Circulation).

B. Incorrect but plausible. Part 1 is correct. For Part 2, if ALL RCP Seal Inlet Temperatures were less than 225 °F, the crew will cool the RCP seals by performing S2.OP-AB.RCP-0001 Attachment 4. Consequently, the candidate could incorrectly conclude that at 18:20:00, performing S2.OP-AB.RCP-0001 Attachment 4 is required.

C. Incorrect but plausible. For Part 1, Since RCP Seal Injection Flow AND RCP Thermal Barrier Component Cooling flows are lost concurrently, the candidate could incorrectly conclude that the crew is REQUIRED to close 21-24CV104s (SEAL LEAKOFF) within 3-5 minutes after stopping 21-24 RCPs For Part 2, if ALL RCP Seal Inlet Temperatures were less than 225 °F, the crew will cool the RCP seals by performing S2.OP-AB.RCP-0001 Attachment 4. Consequently, the candidate could incorrectly conclude that at 18:25:00, performing S2.OP-AB.RCP-0001 Attachment 4 is required.

D. Incorrect but plausible. For Part 1, IAW S2.OP-AB.RCP-0001 CAS states that RCPs are required to be stopped 5 minutes after not restoring CCW flow to the affected RCPs. Consequently, the candidate could incorrectly conclude that given the current plant conditions, 18:05:00 is the latest time that ALL of the RCPs can be stopped without causing damage to the RCPs. Part 2 is correct.

**Question Number:** 4

**Tier:** 1 Group 1

**K/A:** 015/017 Reactor Coolant Pump (RCP) Malfunctions-AA2.10

Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow):When to secure RCPs on loss of cooling or seal injection

**Importance Rating:** 3.7

**10 CFR Part 55:** 43.5 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must know the S2.OP-AB.RCP-0001(Reactor Coolant Pump Abnormality) guidance for stopping the RCPs when RCP Seal Injection Flow AND RCP Thermal Barrier Component Cooling flows are lost concurrently and a procedure selection on how to cool the RCP seals.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to analyze plant parameters and perform an assessment of plant conditions (normal, abnormal, or emergency) and then selection of a procedure or section of a procedure to mitigate or recover, or with which to proceed.

**Technical References:** S2.OP-AB.RCP-0001(Reactor Coolant Pump Abnormality)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABRCP0-06 (REACTOR COOLANT PUMP ABNORMALITY)

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.

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

**Question History:**

**Comments:**

**5** **Points: 1.00**

Given:

- The crew is trying to established flow from the Condensate System to feed 12 SG in accordance with 1-EOP-FRHS-1 (Response To Loss Of Secondary Heat Sink)
- **ALL** SGs **NR** levels are off scale low
- 12 SG Pressure is 550 psig and slowly lowering
- Containment Pressure is 6 psig and slowly rising
- Bleed and Feed has **NOT** been initiated

Which ONE of the following completes the statements below?

1-EOP-FRHS-1 was **REQUIRED** to be performed because **ALL** SG **NR** Levels are less than 15% ___(1)___.

In accordance with 1-EOP-FRHS-1, the crew can Return To Procedure in Effect ___(2)___.

A. (1) and Total Feedwater Flow to SGs are less than 22E04 LB/HR
   (2) when 12 SG **WR** level starts to rise

B. (1) and Total Feedwater Flow to SGs are less than 22E04 LB/HR
   (2) **ONLY** after 12 SG NR is > than a **MINIMUM** of 15%

C. (1) **ONLY**
   (2) when 12 SG **WR** level starts to rise

D. (1) **ONLY**
   (2) **ONLY** after 12 SG NR is > than a **MINIMUM** of 15%

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1 and IAW EOP-CFST-1, 1-EOP-FRHS-1 was REQUIRED to be performed because ALL SG NR Levels are less than 15% and Total Feedwater Flow to SGs are less than 22E04 LB/HR. For Part 2 and IAW 1-EOP-FRHS-1 Step 19, since Bleed and Feed has NOT been initiated and the condensate line has just been aligned to feed 12 SG, the crew will return to procedure when 12 SG WR level starts to rise.

B. Incorrect but plausible. Part 1 is correct. For Part 2, 1-EOP-FRHS-1 Step 19 also uses ANY SG NR is > than a MINIMUM of 15% (adverse) as a criteria to return to procedure and step in effect. Consequently, the candidate could incorrectly conclude that the crew will Return To Procedure in Effect ONLY after 12 SG NR is > than a MINIMUM of 15%.

C. Incorrect but plausible. For Part 1, the distractor is partially correct. Consequently, the candidate could incorrectly conclude that -EOP-FRHS-1 was REQUIRED to be performed because ALL SG NR Levels are less than 15% ONLY. Part 2 is correct.

D. Incorrect but plausible. For Part 1, the distractor is partially correct. Consequently, the candidate could incorrectly conclude that -EOP-FRHS-1 was REQUIRED to be performed because ALL SG NR Levels are less than 15% ONLY. For Part 2, 1-EOP-FRHS-1 Step 19 also uses ANY SG NR is > than a MINIMUM of 15% (adverse) as a criteria to return to procedure and step in effect. Consequently, the candidate could incorrectly conclude that the crew will Return To Procedure in Effect ONLY after 12 SG NR is > than a MINIMUM of 15%.

**Question Number:** 5

**Tier:** 1 Group 1

**K/A:** W/E05-EA2.1

Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink): Facility conditions and selection of appropriate procedures during abnormal and emergency operations

**Importance Rating:** 4.4

**10 CFR Part 55:** 43.5 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must analyze plant conditions while performing 1-EOP-FRHS-1 (Response To Loss Of Secondary Heat Sink), and select an appropriate procedure in which to proceed.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to analyze plant parameters and determine what procedure(s) to perform ( when to return to procedure in effect )

**Technical References:** NOS05FRHS00-02 (HEAT SINK FUNCTIONAL RESTORATION)

**Proposed references to be provided:** None

**Learning Objective:** NOS05TRP001-08 ( REACTOR TRIP OR SAFETY INJECTION)

12 Given 2-EOP-FRHS-1 Thru 5 and a set of plant conditions:

A. Determine a discrete path through the EOP.

B. Determine an appropriate transition out of the EOP

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**6** **Points: 1.00**

Given:

- The crew is performing 2-EOP-LOCA-5 (Loss Of Emergency Recirculation)
- Containment Pressure is 12.0 psig and slowly rising

In accordance with 2-EOP-LOCA-5, which ONE of the following completes the statements below?

The crew will add makeup to the RWST per ___(1)___.

After the crew has initiated an RWST makeup, the crew will maintain TOTAL feed flow greater than 22E04 LB/HR until at least one SG NR Level is greater than ___(2)___ %.

NOTE:

- S2.OP-SO.CVC-0006 (Boron Concentration Control) Section 5.8, "Makeup to RWST Using CVCS Makeup System"
- S2.OP-SO.SF-0001 (Fill And Transfer Of Spent Fuel Pool) Section 5.6, "Transferring Spent Fuel Pool Water to RWST"

| | **(1)** | **(2)** |
|---|---|---|
| A. | S2.OP-SO.CVC-0006 Section 5.8 | 15% |
| B. | S2.OP-SO.CVC-0006 Section 5.8 | 9% |
| C. | S2.OP-SO.SF-0001 Section 5.6 | 15% |
| D. | S2.OP-SO.SF-0001 Section 5.6 | 9% |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1 and IAW 2-EOP-LOCA-5, the crew will add makeup to the RWST per S2.OP-SO.CVC-0006 Section 5.8. For Part 2, Since Containment Pressure is 12 psig, containment is ADVERSE. Therefore IAW 2-EOP-LOCA-5, after the crew has initiated an RWST makeup, the crew will maintain TOTAL feed flow greater than 22E04 LB/HR until at least one SG NR Level is greater than 15 %.

B. Incorrect but plausible. Part 1 is correct. For Part 2, if containment was normal, IAW 2-EOP-LOCA-5, after the crew has initiated an RWST makeup, then the crew will maintain TOTAL feed flow greater than 22E04 LB/HR until at least one SG NR Level is greater than 9 %. Consequently, given the plant conditions, the candidate could incorrectly conclude that the crew will maintain TOTAL feed flow greater than 22E04 LB/HR until at least one SG NR Level is greater than 15 %.

C. Incorrect but plausible. For Part 1, S2.OP-SO.SF-0001 Section 5.6 is an approved operations procedure to provide makeup to the RWST. Consequently, the candidate could incorrectly conclude that 2-EOP-LOCA-5 directs the crew to initiate an RWST makeup per S2.OP-SO.SF-0001 Section 5.6. Part 2 is correct.

D. Incorrect but plausible. For Part 1, S2.OP-SO.SF-0001 Section 5.6 is an approved operations procedure to provide makeup to the RWST. Consequently, the candidate could incorrectly conclude that 2-EOP-LOCA-5 directs the crew to initiate an RWST makeup per S2.OP-SO.SF-0001 Section 5.6. For Part 2, if containment was normal, IAW 2-EOP-LOCA-5, after the crew has initiated an RWST makeup, then the crew will maintain TOTAL feed flow greater than 22E04 LB/HR until at least one SG NR Level is greater than 9 %. Consequently, given the plant conditions, the candidate could incorrectly conclude that the crew will maintain TOTAL feed flow greater than 22E04 LB/HR until at least one SG NR Level is greater than 15 %.

**Question Number:** 6

**Tier:** 1 Group 1

**K/A:** W/E11 Loss of Emergency Coolant Recirculation-G2.1.9

Ability to direct personnel activities inside the control room

**Importance Rating:** 4.5

**10 CFR Part 55:** 41.10 / 45.5 / 45.12 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must know how the CRS will direct the crew to perform an RWST makeup in accordance with 2-EOP-LOCA-5 (Loss Of Emergency Recirculation).

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to determine what procedure to perform to mitigate a Loss Of Emergency Recirculation event.

**Technical References:** 2-EOP-LOCA-5

**Proposed references to be provided:** None

**Learning Objective:** NOS05LOCA05-04 ( EOP-LOCA-05, LOSS OF EMERGENCY RECIRCULATION)

1 Describe the EOP mitigation strategy during LOSS OF EMERGENCY RECIRCULATION

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**7** **Points: 1.00**

Given:

- Unit 2 is at 100% Reactor Power
- PZR pressure is 2235 and stable
- **21** Backup Heaters are in MANUAL and ON
- 2LT-459 (Channel I PZR Level) is the controlling PZR Level channel

At time 15:00:00

- 2LT-459 Fails high

Which ONE of the following completes the statements below?

At **15:00:30**, **22** Backup Heaters are ___(1)___.

In accordance LCO 3.3.1.1 (REACTOR TRIP SYSTEM INSTRUMENTATION), 2LT-459 must be placed in the tripped condition within a **MAXIMUM** of ___(2)___ hour(s).

| | **(1)** | **(2)** |
|---|---|---|
| A. | energized | 1 |
| B. | energized | 6 |
| C. | de-energized | 1 |
| D. | de-energized | 6 |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that LCO 3.3.1.1 (REACTOR TRIP SYSTEM INSTRUMENTATION) requires 2LT-459 must be placed in the tripped condition within a MAXIMUM of 1 hour.

B. **Correct.** For Part 1 since the controlling LT has failed high, 22 Backup heaters will automatically energize since there is a +5% PZR level deviation ($L_{ACTUAL}$ - $L_{REF}$). For Part 2 and in accordance LCO 3.3.1.1 (REACTOR TRIP SYSTEM INSTRUMENTATION), 2LT-459 must be placed in the tripped condition within a MAXIMUM of 6 hours.

C. Incorrect but plausible. For Part 1, PZR B/U Heaters have an automatic function to energize when PZR pressure is less than 2210 psig. Since PZR pressure is > 2210 psig when LT-459 fails high, the candidate could incorrectly conclude that the 22 Backup heaters are OFF. For Part 2, the candidate could incorrectly conclude that LCO 3.3.1.1 (REACTOR TRIP SYSTEM INSTRUMENTATION) requires 2LT-459 must be placed in the tripped condition within a MAXIMUM of 1 hour.

D. Incorrect but plausible. For Part 1, PZR B/U Heaters have an automatic function to energize when PZR pressure is less than 2210 psig. Since PZR pressure is > 2210 psig when LT-459 fails high, the candidate could incorrectly conclude that the 22 Backup heaters are OFF. Part 2 is correct.

**Question Number:** 7

**Tier:** 1 Group 2

**K/A:** 028 Pressurizer (PZR) Level Control Malfunction-AA2.12

Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: Cause for PZR level deviation alarm: controller malfunction or other instrumentation malfunction

**Importance Rating:** 3.5

**10 CFR Part 55:** 43.5 / 45.13

**10 CFR 55.43.b** 2

**K/A Match:** K/A is matched because the candidate must know the TS required action when 2LT-459 fails high when the Unit is at 100% Reactor Power.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to analyze plant parameters apply TS Required Actions greater than 1 hour.

**Technical References:** LCO 3.3.1.1

NOS05PZRP&L-10 (PRESSURIZER PRESSURE AND LEVEL CONTROL)

**Proposed references to be provided:** None

**Learning Objective:** NOS05PZRP&L-10 (PRESSURIZER PRESSURE AND LEVEL CONTROL)

10. Given a situation dealing with Pressurizer Pressure and Level Control System operability, examine the situation and apply the appropriate Technical Specification action.

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**8** **Points: 1.00**

Given:

- An unplanned gaseous radioactive release from the 11 Gas Decay Tank is in progress

Which ONE of the following completes the statements below?

An alarm on ___(1)___ will alert the crew to the unplanned gaseous radioactive release.

The crew will perform S1.OP-AB.RAD-0001 (Abnormal Radiation) ___(2)___ to ensure the unplanned gaseous radioactive release is stopped.

NOTE:

- S1.OP-AB.RAD-0001 Attachment 1 (Process Radiation Monitors)
- S1.OP-AB.RAD-0001 Attachment 2 (Process Filter Radiation Monitors)

| | **(1)** | **(2)** |
|---|---|---|
| A. | 1R12A-B (Cont or Vent Gas Effluent/Iodine) | Attachment 1 |
| B. | 1R41D (Plant Vent Noble Gas Release Rate) | Attachment 1 |
| C. | 1R12A-B (Cont or Vent Gas Effluent/Iodine) | Attachment 2 |
| D. | 1R41D (Plant Vent Noble Gas Release Rate) | Attachment 2 |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, 1R12A-B is a gaseous process radiation monitor. Consequently, the candidate could incorrectly conclude that an alarm on 1R12A-B (Cont or Vent Gas Effluent/Iodine) will alert the crew to the unplanned gaseous radioactive release. Part 2 is correct.

B. **Correct.** For Part 1, the 11 GDT discharges to the plant vent. Consequently, an alarm on R41D will alert the crew to the unplanned gaseous radioactive release. For Part 2, the crew will perform S1.OP-AB.RAD-0001 (Abnormal Radiation) Attachment 1 to ensure the unplanned gaseous radioactive release is stopped.

C. Incorrect but plausible. For Part 1, 1R12A-B is a gaseous process radiation monitor. Consequently, the candidate could incorrectly conclude that an alarm on 1R12A-B (Cont or Vent Gas Effluent/Iodine) will alert the crew to the unplanned gaseous radioactive release. For Part 2, most gaseous systems have some type of filter arrangement. Consequently, the candidate could incorrectly conclude that 1R41D monitors a filter and S1.OP-AB.RAD-0001 (Abnormal Radiation) Attachment 2 will be used to ensure the unplanned gaseous radioactive release is stopped.

D. Incorrect but plausible. Part 1 is correct. For Part 2, most gaseous systems have some type of filter arrangement. Consequently, the candidate could incorrectly conclude that 1R41D monitors a filter and S1.OP-AB.RAD-0001 (Abnormal Radiation) Attachment 2 will be used to ensure the unplanned gaseous radioactive release is stopped.

**Question Number:** 8

**Tier:** 1 Group 2

**K/A:** 060 Accidental Gaseous-Waste Release-AA2.04

Ability to determine and interpret the following as they apply to the Accidental Gaseous Radwaste: The effects on the power plant of isolating a given radioactive-gas leak

**Importance Rating:** 3.4

**10 CFR Part 55:** 43.5 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must know what Attachment of S1.OP-AB.RAD-0001 (Abnormal Radiation) must be performed to isolate an unplanned gaseous radioactive release.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to know when to implement an Attachment of S1.OP-AB.RAD-0001 (Abnormal Radiation).

**Technical References:** S1.OP-AB.RAD-0001

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABRAD1-06 (ABNORMAL RADIATION)

2 Describe, in general terms, the actions taken in S2.OP-AB.RAD-0001(Q) and the bases for the actions in accordance with the Technical Bases Document

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**9** **Points: 1.00**

Given:

- A Core offload has just begun
- A loss of RHR has occurred
- The crew is performing S2.OP-AB.RHR-0001 (Loss Of RHR) and S2.OP-AB.CONT-0001 (Containment Closure)
- The Outage Equipment Hatch is currently open

In accordance with S2.OP-AB.CONT-0001, which ONE of the following completes the statements below?

S2.OP-AB.CONT-0001 states that Containment Closure should be established ___(1)___.

S2.OP-AB.CONT-0001 states that the crew may close the Outage Equipment Hatch using a **MINIMUM** of ___(2)___.

NOTE:

- SC.MD-FR.CAN-0001 (Outage Equipment Hatch Installation, Removal, Seal Replacement And Door Manipulation For Containment Closure)

| | **(1)** | **(2)** |
|---|---|---|
| A. | prior to Core Boiling | 10 bolts per SC.MD-FR.CAN-0001 |
| B. | prior to Core Boiling | 4 corner bolts per S2.OP-AB.CONT-0001 |
| C. | within a **MAXIMUM** of four hours | 10 bolts per SC.MD-FR.CAN-0001 |
| D. | within a **MAXIMUM** of four hours | 4 corner bolts per S2.OP-AB.CONT-0001 |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, if the reason for entering S2.OP-AB.CONT-0001 was due to something other than Loss of RHR, then the crew would install the Outage Equipment Hatch (using the ALL 10 bolts) by using the guidance contained in SC.MD-FR.CAN-0001. Consequently, the candidate could incorrectly conclude that with a loss of RHR in progress, the crew will install the Outage Equipment Hatch for Containment Closure by using the guidance contained in S2.OP-AB.CONT-0001.

B. **Correct.** For Part 1, S2.OP-AB.CONT-0001 states that for a loss of RHR, Containment Closure should be established prior to Core Boiling. For Part 2, S2.OP-AB.CONT-0001 states that for a loss of RHR, the Outage Equipment Hatch may be closed using 4 corner bolts.

C. Incorrect but plausible. For Part 1, S2.OP-AB.CONT-0001 states that when the initiating event is other than a Fuel handling Incident or Loss Of RHR, Containment Closure should be established within four hours. Additionally, with the cavity flooded, time to boil on a Loss of RHR can be several hours. Consequently, the candidate could incorrectly conclude that with a Loss of RHR in progress and the cavity flooded, S2.OP-AB.CONT-0001 states that Containment Closure should be established within a MAXIMUM of four hours. For Part 2, if the reason for entering S2.OP-AB.CONT-0001 was due to something other than Loss of RHR, then the crew would install the Outage Equipment Hatch (using the ALL 10 bolts) by using the guidance contained in SC.MD-FR.CAN-0001. Consequently, the candidate could incorrectly conclude that with a loss of RHR in progress, the crew will install the Outage Equipment Hatch for Containment Closure by using the guidance contained in S2.OP-AB.CONT-0001.

D. Incorrect but plausible. Incorrect but plausible. For Part 1, S2.OP-AB.CONT-0001 states that when the initiating event is other than a Fuel handling Incident or Loss Of RHR, Containment Closure should be established within four hours. Additionally, with the cavity flooded, time to boil on a Loss of RHR can be several hours. Consequently, the candidate could incorrectly conclude that with a Loss of RHR in progress and the cavity flooded, S2.OP-AB.CONT-0001 states that Containment Closure should be established within a MAXIMUM of four hours. Part 2 is correct.

**Question Number:** 9

**Tier:** 1 Group 2

**K/A:** APE: 069 Loss of Containment Integrity-G2.4.6

Knowledge of EOP mitigation strategies

**Importance Rating:** 4.7

**10 CFR Part 55:** 41.10 / 43.5 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must know the procedural guidance (mitigation strategy) of S2.OP-AB.CONT-0001 (Containment Closure) for reestablishing containment integrity following a Loss of RHR.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to perform a procedure selection to perform containment closure following a Loss of RHR.

**Technical References:** S2.OP-AB.CONT-0001

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABCONT-07 (CONTAINMENT CLOSURE)

2. Describe, in general terms, the actions taken in S1/S2.OP-AB.CONT-0001(Q) and the bases for the actions in accordance with the Technical Bases Document

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**10** **Points: 1.00**

Given:

- A LOCA is in progress at Unit 2

At time 14:00

- 2R44A and 2R44B (High Range Containment Accident Monitors) are reading 2 R/HR

At time 15:00

- 2R44A and 2R44B (High Range Containment Accident Monitors) are reading 100 R/HR

Which ONE of the following completes the statements below?

In accordance with 2-EOP-CFST-1 (Critical Safety Function Status Trees), ___(1)___ is the **EARLIEST** time that 2-EOP-FRCE-3 (Response To High Containment Radiation) entry conditions are met.

In accordance with OP-AA-101-111-1003 (Use Of Procedures), the crew ___(2)___ **REQUIRED** to perform 2-EOP-FRCE-3 (when entry conditions are met).

| | **(1)** | **(2)** |
|---|---|---|
| A. | 15:00 | is |
| B. | 15:00 | is **NOT** |
| C. | 14:00 | is |
| D. | 14:00 | is **NOT** |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, 100 R / HR is the warning setpoint for R44A/B. The candidate could incorrectly FRCE-3 entry conditions are first met when R44A/B go into warning. For Part 2, since most procedures are required to be performed when entry conditions are met, the candidate could incorrectly conclude that FRCE-3 is required to be performed when the entry conditions are met.

B. Incorrect but plausible. For Part 1, 100 R / HR is the warning setpoint for R44A/B. The candidate could incorrectly FRCE-3 entry conditions are first met when R44A/B go into warning. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, since most procedures are required to be performed when entry conditions are met, the candidate could incorrectly conclude that FRCE-3 is required to be performed when the entry conditions are met.

D. **Correct.** For Part 1 and in accordance with 2-EOP-CFST-1 (Critical Safety Function Status Trees), 2-EOP-FRCE-3 entry conditions are met when R44 radiation is ≥ 2 R/HR. The earliest time that this occurs is at 14:00. For Part 2, FRCE-3 is a yellow path procedure. In accordance with OP-AA-101-111-1003 (Use Of Procedures), yellow path function restoration procedures are not required to be performed.

**Question Number:** 10

**Tier:** 1 Group 2

**K/A:** W/E16 High Containment Radiation-G2.4.1

Knowledge of EOP entry conditions and immediate action steps

**Importance Rating:** 4.7

**10 CFR Part 55:** 41.10 / 43.5 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must know the entry conditions for FRCE-3 ( High Range Containment Accident Monitors).

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to perform a procedure selection of a yellow path functional restoration procedure which will mitigate the given plant conditions.

**Technical References:** 2-EOP- CFST-1
OP-AA-101-111-1003

**Proposed references to be provided:** None

**Learning Objective:** NOS05PROCED-08 (USE AND CONTROL OF PROCEDURES)

5. Implement Rules Of Usage For Emergency Operating Procedures

NOS05FRCE00-06 ( EOP-FRCE-1, 2 AND 3 CONTAINMENT ENVIRONMENT FUNCTIONAL RESTORATION)

1. Describe the EOP mitigation strategy for the following:

- 2-EOP-FRCE-1
- 2-EOP-FRCE-2
- 2-EOP-FRCE-3

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**11** **Points: 1.00**

**REFERENCE PROVIDED**

Given:

- Unit 2 is at 100% Power and stable

At time 13:00:00

- The Accumulators have been sampled per S2.OP-ST.SJ-0008 (Emergency Core Cooling – Accumulators) with the following results:

| Accumulator | 21 | 22 | 23 | 24 |
|---|---|---|---|---|
| Boron Concentration (ppm) | 2175 | 2550 | 2400 | 2350 |

In accordance with LCO 3.5.1 (ACCUMULATORS), which ONE of the following completes the statements below?

Based on the sample results, ___(1)___ Accumulator(s) is / are inoperable.

If the inoperable Accumulator(s) can **NOT** be restored to OPERABLE status, then the Unit is required to be in HOT STANDBY within a **MAXIMUM** of ___(2)___ hours.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 1 | 7 |
| B. | 1 | 78 |
| C. | 2 | 7 |
| D. | 2 | 78 |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the candidate could incorrectly recall the boron concentration limits of LCO 3.5.1 and conclude that only 1 Accumulator is inoperable. For Part 2, the candidate could fail to recognize that LCO 3.0.3 is in effect. Consequently, the candidate would then incorrectly conclude that the Unit is required to be in HOT STANDBY within a MAXIMUM of 7 hours.

B. Incorrect but plausible. For Part 1, the candidate could incorrectly recall the boron concentration limits of LCO 3.5.1 and conclude that only 1 Accumulator is inoperable. Part 2 is correct.

C. **Correct.** For Part 1 and IAW LCO 3.5.1, the boron concentration limit is between 2200 – 2500 ppm. Consequently, there are 2 Accumulators that are inoperable. For Part 2, since BOTH accumulators are inoperable, LCO 3.0.3 is applicable and the Unit is required to be in HOT STANDBY within a MAXIMUM of 7 hours.

D. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could fail to recognize that LCO 3.0.3 is in effect. Consequently, the candidate would then incorrectly conclude that the Unit is required to be in HOT STANDBY within a MAXIMUM of 7 hours.

**Question Number:** 11

**Tier:** 2 Group 1

**K/A:** 006 Emergency Core Cooling System (ECCS)-AA2.10

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

**Importance Rating:** 3.9

**10 CFR Part 55:** 41.5 / 45.5

**10 CFR 55.43.b** 2

**K/A Match:** K/A is matched because the candidate must use procedure (technical Specifications) to mitigate low boron concentration in the Safety Injection System (SIS). The accumulators are a source of water to the SIS.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to use application of LCO 3.0.3.

**Technical References:** LCO 3.5.5

**Proposed references to be provided:** Redacted LCO 3.5.5

**Learning Objective:** NOS05ECCS00-09 (EMERGENCY CORE COOLING SYSTEM)

10. Given a situation dealing with Emergency Core Cooling System operability, examine the situation and apply the appropriate Technical Specification action. (License Operator and STA only)

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**12** **Points: 1.00**

Given:

- Unit 2 is in MODE 5
- 21 RHR Loop is in service
- PZR Level is 10% and stable

At time 17:00

- The crew enters S2.OP-AB.RHR-0001 (Loss Of RHR) due to a malfunction of 21RH18 (RHR HX FLOW CONT VALVE)

At time 17:05 (5 minutes later)

- PZR level is 9% and lowering
- 2R11A (Containment Particulate Monitor) reading is rising

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

At **17:05**, the crew will ___(1)___.

A. **IMMEDIATELY** GO TO S2.OP-AB.LOCA-0001 (Shutdown LOCA)

B. perform S2.OP-AB.RHR-0001 Attachment 9 (Steam Generator Reflux Cooling)

C. **IMMEDIATELY** GO TO S2.OP-AB.RHR-0002 (Loss of RHR at Reduced Inventory)

D. **START** Safety Injection and Charging Pumps as required and CONTROL Pressurizer level between 5% and 50% while maintaining RHR System in service

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Going to S2.OP-AB.LOCA-0001 (Shutdown LOCA) would have been correct if the unit was in MODE 4 when the RCS Inventory was lost (IAW S2.OP-AB.RHR-0001 CAS).

B. Incorrect but plausible. Performing S2.OP-AB.RHR-0001 Attachment 9 (Steam Generator Reflux Cooling) would have been correct if at any time a complete loss of all vital buses occurs, NOT as a result of a Beyond- Design-Basis-External-Event (IAW S2.OP-AB.RHR-0001 CAS).

C. Incorrect but plausible. Going to S2.OP-AB.RHR-0002 (Loss of RHR at Reduced Inventory) would have been correct if RCS had been aligned for operation <101 ft. elevation (S2.OP-AB.RHR-0001 Steps 3.3 and 3.4

D. **Correct.** In accordance with S2.OP-AB.RHR-0001 CAS, "IF AT ANY TIME a loss of RCS inventory occurs, THEN PERFORM one of the following:
   - IF in Mode 5 OR 6,
     THEN START Safety Injection and Charging Pumps as required:
     AND:
     - CONTROL Pressurizer level between 5% and 50% while maintaining RHR System in service"

**Question Number:** 12

**Tier:** 2 Group 1

**K/A:** APE: 025 Loss of Residual Heat Removal System (RHRS)-AA2.02

Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: Leakage of reactor coolant from RHR into closed cooling water system or into reactor building atmosphere

**Importance Rating:** 3.8

**10 CFR Part 55:** 43.5 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must know how to mitigate a loss of RCS inventory into containment atmosphere during performance of S2.OP-AB.RHR-0001 (Loss Of RHR).

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to assessment of plant conditions (normal, abnormal, or emergency) and then selection of a procedure or section of a procedure to mitigate or recover, or with which to proceed.

**Technical References:** S2.OP-AB.RHR-0001 (Loss Of RHR)

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABRHR1-05 (LOSS OF RHR)

4. Given a set of initial plant conditions:
   - A. Determine the appropriate abnormal procedure
   - B. Describe the plant response to actions taken in the abnormal procedure.
   - C. Describe the final plant condition that is established by the abnormal procedure..

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**13** **Points: 1.00**

**REFERENCE PROVIDED**

Given:

- Unit 2 is at 100% Reactor Power and stable

At 08:00 on June 12th

- **BOTH** Trains of Containment Spray are declared INOPERABLE

At 10:00 on June 12th

- **ONE** Train of Containment Spray is declared OPERABLE

In accordance with Technical Specifications, which ONE of the following completes the statement below?

___(1)___ is the **LATEST** time / date that Unit 2 is **REQUIRED** to be in HOT STANDBY.

A. 14:00 on June 12th

B. 15:00 on June 12th

C. 08:00 on June 15th

D. 14:00 on June 15th

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. 14:00 on June 12th is the date / time if the candidate incorrectly concludes that the required actions of LCO 3.0.3 must be performed. Additionally, the candidate must also incorrectly apply LCO 3.0.3 to require being in HOT STANDBY within 6 hours.

B. Incorrect but plausible. 15:00 on June 12th is the date / time if the candidate incorrectly concludes that the required actions of LCO 3.0.3 must be performed (1 hour to initiate actions to place the Unit in a Mode in which the specification does not apply + 6 more hours to be in HOT STANDBY).

C. Incorrect but plausible. 08:00 on June 15th is the date / time if the candidate incorrectly interprets the required action of LCO 3.6.2.1 as only allowing 72 hours from 08:00 on June 12th to place Unit 2 in HOT STANDBY.

D. **Correct.** At 08:00 on June 12th, LCO 3.6.2.1 is NOT met (BOTH Trains of Containment Spray are INOPERABLE). LCO 3.6.2.1 does not have any required actions for BOTH Trains of Containment Spray being INOPERABLE. Consequently, the crew must comply with the required actions of LCO 3.0.3. Since ONE Train of Containment Spray is declared OPERABLE at 10:00 on June 12th, the crew no longer has to complete the required actions of LCO 3.0.3. This results in the crew having to comply with the required action of LCO 3.6.2.1 ("With one containment spray system inoperable, restore the inoperable spray system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours). Consequently, the crew has 72+6 hours from 08:00 on June 12th to place Unit 2 in HOT STANDBY (14:00 on June 15th)

**Question Number:** 13

**Tier:** 2 Group 1

**K/A:** 025 Containment Spray-G2.2.40

Ability to apply Technical Specifications for a system

**Importance Rating:** 4.7

**10 CFR Part 55:** 41.10 / 43.2 / 43.5 / 45.3

**10 CFR 55.43.b** 2

**K/A Match:** K/A is matched because the candidate must lower apply LCO 3.0.3 and LCO 3.6.2.1 as it pertains to the Containment Spray System to determine the latest time the Unit 2 is required to be in HOT STANDBY.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate apply required actions (TS Section 3) and generic LCO requirements to determine the required time / date for placing Unit 2 in HOT STANDBY.

**Technical References:** Technical Specifications

**Proposed references to be provided:** LCO 3.6.2.1

**Learning Objective:** NOS05CSPRAY-06 (CONTAINMENT SPRAY SYSTEM)

10. Given a situation dealing with Containment Spray System operability, examine the situation and apply the appropriate Technical Specification action

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**14** **Points: 1.00**

**REFERENCE PROVIDED**

Given:

- Unit 2 is at 100% Reactor Power and stable
- The crew is performing S2.OP-SO.CBV-0002 (Containment Pressure – Vacuum Relief System Operation) Section 5.3, "Performing a Containment Vacuum Relief"
- 2R12A (CNTMT NOBLE GAS) has failed

In accordance with Technical Specifications, which ONE of the following completes the statement below?

LCO 3.3.3.1 (RADIATION MONITORING INSTRUMENTATION) is _____.

A. **NOT** met and the crew must perform Actions 24 and 26

B. **NOT** met and the crew must perform Action 26 **ONLY**

C. **NOT** met and the crew must perform Action 24 **ONLY**

D. met

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. The candidate could correctly conclude that R12A only meets the Table 3.3-6 requirements of 2.a.1.a (Containment- Gaseous Activity- Purge & Pressure Vacuum Relief Isolation) and 2.a.1.b (Containment- Gaseous Activity- RCS Leak Detection). However, the candidate could then incorrectly conclude that R41 is not allowed to be an alternate monitor to meet Table 3.3-6 requirements of 2.a.1.a (Containment- Gaseous Activity- Purge & Pressure Vacuum Relief Isolation). Consequently, the crew would only be required to perform Action2 24 and 26.

B. Incorrect but plausible. The candidate could incorrectly conclude that R12A only meets the Table 3.3-6 requirements of 2.a.1.a (Containment- Gaseous Activity- Purge & Pressure Vacuum Relief Isolation). Consequently, the crew would only be required to perform Action 26.

C. **Correct.** When analyzing LCO 3.3.3.1 against the given plant conditions, the candidate will need to analyze Table 3.3-6. To properly analyze, Table 3.3-6, the candidate must also know information contained in the Bases of LCO 3.3.3.1. R12A is the credited monitor to meet the Table 3.3-6 requirements of 2.a.1.a (Containment- Gaseous Activity- Purge & Pressure Vacuum Relief Isolation) and 2.a.1.b (Containment- Gaseous Activity- RCS Leak Detection). Since S2.OP-SO.CBV-0002 (Containment Pressure – Vacuum Relief System Operation) Section 5.3, "Performing a Containment Vacuum Relief" is in progress, 2R41 (2R41A, B and D) can also be used to meet the requirements of Table 3.3-6 requirements of 2.a.1.a (Containment- Gaseous Activity- Purge & Pressure Vacuum Relief Isolation). Consequently, with 2R12A failed, LCO 3.3.3.1 (RADIATION MONITORING INSTRUMENTATION) is NOT met and the crew must perform Action 24 ONLY.

D. Incorrect but plausible. Since there are multiple R12s (R12A, R12B, R12C) and multiple R41s (A-D), the candidate could incorrectly conclude that LCO 3.3.3.1 is met with ONLY a failure of R12A.

**Question Number:** 14

**Tier:** 2 Group 1

**K/A:** 073 Process Radiation Monitoring (PRM) System

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 Rating:** 3.2

**10 CFR Part 55:** 41.5 / 43.5 / 45.3 / 45.13

**10 CFR 55.43.b** 2

**K/A Match:** K/A is matched because the candidate must use a Procedure (Technical Specifications) to determine the required actions to mitigate failure of a process radiation monitor (R12A) .

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to have knowledge of TS bases that is required to analyze TS-required actions

**Technical References:** Technical Specifications

**Proposed references to be provided:** LCO 3.3.3.1

**Learning Objective:** NOS05CONTMT-15 (CONTAINMENT AND CONTAINMENT SUPPORT SYSTEMS)

9. Given a situation dealing with Containment and Containment Support Systems operability, examine the situation and apply the appropriate Technical Specification action

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**15** **Points: 1.00**

**REFERENCE PROVIDED**

Given:

- Unit 2 is at 100% Power and stable

At time 13:00:00

- The crew enters S2.OP-AB.CA-0001 (Loss Of Control Air)

In accordance with S2.OP-AB.CA-0001, which ONE of the following completes the statements below?

If Control Air pressure can **NOT** be restored, SG levels are expected to ___(1)___ until local control of the 21-24BF19 (SG FW CONT V) can be established.

If the crew MANUALLY trips the reactor because SG Levels can **NOT** be maintained, the crew will perform 2-EOP-TRIP-1 (Reactor Trip Or Safety Injection) ___(2)___.

| | **(1)** | **(2)** |
|---|---|---|
| A. | rise | and S2.OP-AB.CA-0001 concurrently |
| B. | rise | **ONLY** |
| C. | lower | and S2.OP-AB.CA-0001 concurrently |
| D. | lower | **ONLY** |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that the BF19s (FW CONT VALVE) will fail open as Control Air pressure lowers. Consequently, the candidate would then incorrectly deduce that the SG levels are expected to rise. Part 2 is correct.

B. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that the BF19s (FW CONT VALVES) will fail open as Control Air pressure lowers. Consequently, the candidate would then incorrectly deduce that the SG levels are expected to rise. For Part 2, other Abnormal Procedures (e.g. OP-AB-COND-001) require the crew to only perform EOP-TRIP-1 when reactor trip criteria have been met. Consequently, the candidate could incorrectly conclude that when reactor trip criteria have been met in S2.OP-AB.CA-001, the crew will only perform 2-EOP-TRIP-1.

C. **Correct.** For Part 1, IAW S2.OP-AB.CA-001, the BF19s (FW CONT VALVE) will fail closed as Control Air pressure lowers. Consequently, SG levels are expected to lower. For Part 2, IAW S2.OP-AB.CA-001 (Selected CAS Items), once the reactor is tripped, the crew will perform 2-EOP-TRIP-1 and S2.OP-AB.CA-001Q concurrently.

D. Incorrect but plausible. Part 1 is correct. For Part 2, other Abnormal Procedures (e.g. OP-AB-COND-001) require the crew to only perform EOP-TRIP-1 when reactor trip criteria have been met. Consequently, the candidate could incorrectly conclude that when reactor trip criteria have been met in S2.OP-AB.CA-001, the crew will only perform 2-EOP-TRIP-1.

**Question Number:** 15

**Tier:** 2 Group 1

**K/A:** 078 Instrument Air System (IAS)-G2.2.15

Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc.

**Importance Rating:** 4.3

**10 CFR Part 55:** 41.10 / 43.3 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must use S2.OP-AB.CA-0001 (Loss Of Control Air) to determine the expected plant configuration (BF19s (FW CONT VALVES) will close) of the FW system.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to analyze plant parameters and determine what procedure(s) to perform (whether to remain in the Loss of Control Air AOP after the reactor is tripped)

**Technical References:** S2.OP-AB.CA-0001

**Proposed references to be provided:** Portion of Drawing 205302 – SH 3

**Learning Objective:** NOS05ABCA01-07 (LOSS OF CONTROL AIR)

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

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** X
**Bank** _____

**Question History:**

**Comments:**

**16** **Points: 1.00**

Given:

- A Unit 2 Turbine Runback from 100% Reactor Power has occurred
- Valid ROD INSERT LIMIT LO and ROD INSERT LIMIT LO-LO alarms are present

Which ONE of the following completes the statements below?

LCO 3.1.1.1 (SHUTDOWN MARGIN – TAVG ≥ 200 °F) ___(1)___ met.

In accordance with the ROD INSERT LIMIT LO-LO Alarm Response Procedure, the crew will ___(2)___ to restore Control Rods above the Rod Insertion Limit.

NOTE:
- LCO **NOT** met = REQUIRED ACTIONS must be performed
- LCO met = **NO** REQUIRED ACTIONS must be performed

| | (1) | (2) |
|---|---|---|
| A. | is **NOT** | raise turbine power to counter the effects of the runback |
| B. | is **NOT** | perform an Emergency Boration |
| C. | is | raise turbine power to counter the effects of the runback |
| D. | is | perform an Emergency Boration |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, raising turbine power will cause RCS TAVG to lower which would cause Control Rods to automatically withdraw. Consequently, the candidate could incorrectly conclude that the ROD INSERT LIMIT LO-LO Alarm Response Procedure allows the crew to raise turbine power to restore Control Rods above the Rod Insertion Limit

B. **Correct.** For Part 1, with the ROD INSERT LIMIT LO-LO alarm present, the control rods are actually below the RIL. Consequently, SR 4.1.1.1 b (When in MODE 1 or MODE 2 with Keff greater than or equal to 1.0, in accordance with the Surveillance Frequency Control Program by verifying that control banks are within the limits in the COLR per Specification 3.1.3.5) is not met. With SR 4.1.1.1 not being met, LCO 3.1.1.1 is also NOT met. For Part 2 and in accordance with the ROD INSERT LIMIT LO-LO Alarm Response Procedure, the crew can perform S2.OP-SO.CVC-0008 (Rapid Boration) ONLY to restore Control Rods above the Rod Insertion Limit.

C. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that SR 4.1.1.1 only requires a calculation of Shutdown Margin (SDM) and LCO 3.1.1.1 is met until the SDM calculation confirms that SDM is not adequate. For Part 2, raising turbine power will cause RCS TAVG to lower which would cause Control Rods to automatically withdraw. Consequently, the candidate could incorrectly conclude that the ROD INSERT LIMIT LO-LO Alarm Response Procedure allows the crew to raise turbine power to restore Control Rods above the Rod Insertion Limit

D. Incorrect but plausible. For Part 1, the candidate could incorrectly conclude that SR 4.1.1.1 only requires a calculation of Shutdown Margin (SDM) and LCO 3.1.1.1 is met until the SDM calculation confirms that SDM is not adequate. Part 2 is correct.

**Question Number:** 16

**Tier:** 2 Group 2

**K/A:** 045 Main Turbine Generator (MT/G) System-A2.12

Ability to (a) predict the impacts of the following malfunctions or operation on the MT/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Control rod insertion limits exceeded (stabilize secondary)

**Importance Rating:** 2.8

**10 CFR Part 55:** 41.5 / 43.5 / 45.3 / 45.5

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must know how to mitigate control rods being below the RIL after a Turbine Runback has been performed.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to analyze plant parameters and determine what procedure can be implemented after rods go below the RIL during a turbine runback.

**Technical References:** ROD INSERT LIMIT LO-LO Alarm Response Procedure

LCO 3.1.1.1

**Proposed references to be provided:** None

**Learning Objective:** NOS05RODS00-12 (ROD CONTROL AND POSITION INDICATION SYSTEMS)

13. Given a situation dealing with Rod Control and Position Indication Systems operability, examine the situation and apply the appropriate Technical Specification action

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** X
**Bank** _____

**Question History:**

**Comments:**

**17** **Points: 1.00**

Given:

- The crew is performing S2.OP-AB.SF-0001 (Loss Of Spent Fuel Pool Cooling)
- Spent Fuel Pool temperature is 212 °F
- Spent Fuel Pool level is 128 feet, 0 inches

In accordance with S2.OP-AB.SF-0001, which ONE of the following completes the statements below?

The crew will makeup to the Spent Fuel Pool until the Spent Fuel Pool ___(1)___.

The crew can perform S2.OP-SO.SF-0006 (Spent Fuel Pool Emergency Fill) ___(2)___ to raise Spent Fuel Pool Level.

NOTE:

- S2.OP-SO.SF-0001(Fill and Transfer of the Spent Fuel Pool)

| | **(1)** | **(2)** |
|---|---|---|
| A. | HI LEVEL ALARM actuates | or S2.OP-SO.SF-0001 |
| B. | HI LEVEL ALARM actuates | **ONLY** |
| C. | LOW LEVEL ALARM clears | or S2.OP-SO.SF-0001 |
| D. | LOW LEVEL ALARM clears | **ONLY** |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1 and IAW S2.OP-AB.SF-0001, since SFP water is at the boiling point and SFP level at the Low Level alarm setpoint (128 feet, 0 inches), the crew is required to initiate makeup to the Spent Fuel Pool until the HI LEVEL ALARM actuates. For Part 2 and IAW S2.OP-AB.SF-0001, the crew can perform S2.OP-SO.SF-0006 (Spent Fuel Pool Emergency Fill) or S2.OP-SO.SF-0001 to raise Spent Fuel Pool Level.

B. Incorrect but plausible. Part 1 is correct. For Part 2, since the SFP is boiling, the candidate could conclude that any makeup must be done as fast as possible. Consequently, the candidate could incorrectly conclude that S2.OP-AB.SF-0001 only allows a SFP makeup using S2.OP-SO.SF-0006 (Spent Fuel Pool Emergency Fill).

C. Incorrect but plausible. For Part 1, since SFP Level is above the low level alarm setpoint (128 feet, 2inches), the candidate could incorrectly conclude that S2.OP-AB.SF-0001 does not require a SFP makeup. Part 2 is correct.

D. Incorrect but plausible. For Part 1, since SFP Level is above the low level alarm setpoint (128 feet, 2inches), the candidate could incorrectly conclude that S2.OP-AB.SF-0001 does not require a SFP makeup. For Part 2, since the SFP is boiling, the candidate could conclude that any makeup must be done as fast as possible. Consequently, the candidate could incorrectly conclude that S2.OP-AB.SF-0001 only allows a SFP makeup using S2.OP-SO.SF-0006 (Spent Fuel Pool Emergency Fill).

**Question Number:** 17

**Tier:** 2 Group 2

**K/A:** 033 Spent Fuel Pool Cooling-G.2.1.20

Ability to interpret and execute procedure steps

**Importance Rating:** 4.6

**10 CFR Part 55:** 41.10 / 43.5 / 45.12

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must know how interpret and execute CAS Step 5.0 of S2.OP-AB.SF-0001 (Loss Of Spent Fuel Pool Cooling)

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to analyze SFP parameters and select a procedure to mitigate during a Loss of SFP Cooling.

**Technical References:** S2.OP-AB.SF-0001

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABSFP1-06 ( LOSS OF SPENT FUEL POOL COOLING)

2. Discuss the response to loss of SFP cooling

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** X
**Modified Bank** _____
**Bank** _____

**Question History:**

**Comments:**

**18** **Points: 1.00**

Given:

- Unit 1 is at 25% Power and stable
- The crew is performing S1.OP-AB.CA-0001 (Loss Of Control Air) due to a large non-isolable leak on the cross connect line between Station Air and the Unit 1 Control Air
- Number 1 ECAC is running

Which ONE of the following completes the statements below?

The Number 1 ECAC will provide air to 1B and 2B Control Air Headers ___(1)___.

The CRS will direct performance of S2.OP-AB.CA-0001 Attachment 12, "Local Control Of SG Pressure and Level", when ___(2)___ Control Air Header(s) indicate(s) less than 80 psig.

| | (1) | (2) |
|---|---|---|
| A. | and to Station Air | **EITHER** 1A or 1B |
| B. | and to Station Air | **BOTH** 1A and 1B |
| C. | **ONLY** | **EITHER** 1A or 1B |
| D. | **ONLY** | **BOTH** 1A and 1B |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, the candidate could not recall the existence of the check valves between Unit 1 Control Air and Station Air. Consequently, the candidate could then incorrectly conclude that the Number 1 ECAC will provide air to Unit 1 Control Air and Station Air. For Part 2, as Control Air pressure lowers below 80 psig, AOV operation will start to be compromised. Consequently, the candidate could incorrectly conclude that the CRS will direct performance of S2.OP-AB.CA-0001 Attachment 12, "Local Control Of SG Pressure and Level", when EITHER 1A or 1B Control Air Headers indicates less than 80 psig.

B. Incorrect but plausible. For Part 1, the candidate could not recall the existence of the check valves between Unit 1 Control Air and Station Air. Consequently, the candidate could then incorrectly conclude that the Number 1 ECAC will provide air to Unit 1 Control Air and Station Air. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, as Control Air pressure lowers below 80 psig, AOV operation will start to be compromised. Consequently, the candidate could incorrectly conclude that the CRS will direct performance of S2.OP-AB.CA-0001 Attachment 12, "Local Control Of SG Pressure and Level", when EITHER 1A or 1B Control Air Headers indicates less than 80 psig.

D. **Correct.** For Part 1, based on location in which the Number 1 ECA is physically connected into the Unit 1 Control Air System, the Number 1 ECAC will only provide air to the Unit 1 Control Air System (due to the presence of check valves between Unit 1 Control Air System an Station Air System. For Part 2 and IAW S1.OP-AB.CA-0001, the CRS will direct performance of S2.OP-AB.CA-0001 Attachment 12, "Local Control Of SG Pressure and Level", when BOTH 1A and 1B Control Air Headers indicate less than 80 psig.

**Question Number:** 18

**Tier:** 2 Group 2

**K/A:** 079 Station Air System (SAS)-A2.01

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

**Importance Rating:** 3.2

**10 CFR Part 55:** 41.5 / 43.5 / 45.3 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** At Salem Generating Station, Station Air provides the air for the Control Air System (Instrument Air System). Consequently, a malfunction in Service Air affects Control Air. Therefore, the K/A is matched because the candidate must know when S2.OP-AB.CA-0001 Attachment 12, "Local Control Of SG Pressure and Level" is required to be performed which mitigates a malfunction between the connection between Service Air and Control Air.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to analyze plant parameters and determine what when to implement an attachment of a procedure

**Technical References:** S2.OP-AB.CA-0001

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABCA01-07 (LOSS OF CONTROL AIR)

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

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**19** **Points: 1.00**

In accordance with OP-AA-105-102 (NRC Active License Maintenance), which ONE of the following completes the statements below?

The quarterly shift requirement to maintain an SRO License is a **MINIMUM** of ___(1)___ hours to be completed with a combination of complete 8- and 12-hour shifts.

During a credited shift to meet the quarterly shift requirement, the SRO ___(2)___ permitted to perform non-position related administrative tasks outside the control room (e.g. NRC physical).

| | **(1)** | **(2)** |
|---|---|---|
| A. | 40 | is |
| B. | 40 | is **NOT** |
| C. | 56 | is |
| D. | 56 | is **NOT** |

Answer: D

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, OP-AA-105-102 has a 40 hour OJT requirement to reactivate a license. Consequently, the candidate could incorrectly conclude that the quarterly shift requirement to maintain an SRO License is a MINIMUM of 40 hours to be completed with a combination of complete 8- and 12-hour shifts. For Part 2, since an activity such as receiving periodic NRC physicals is required to maintain an active license, the candidate could incorrectly conclude that an SRO is permitted to perform non-position related administrative tasks outside the control room for a credited shift.

B. Incorrect but plausible. For Part 1, OP-AA-105-102 has a 40 hour OJT requirement to reactivate a license. Consequently, the candidate could incorrectly conclude that the quarterly shift requirement to maintain an SRO License is a MINIMUM of 40 hours to be completed with a combination of complete 8- and 12-hour shifts. Part 2 is correct.

C. Incorrect but plausible. Part 1 is correct. For Part 2, since an activity such as receiving periodic NRC physicals is required to maintain an active license, the candidate could incorrectly conclude that an SRO is permitted to perform non-position related administrative tasks outside the control room for a credited shift.

D. **Correct.** For Part 1, IAW OP-AA-105-102, the quarterly shift requirement to maintain an SRO License is a MINIMUM of 56 hours to be completed with a combination of complete 8- and 12-hour shifts. For Part 2, IAW OP-AA-105-102, During a credited shift to meet the quarterly shift requirement, the SRO is NOT permitted to perform non-position related administrative tasks outside the control room

**Question Number:** 19

**Tier:** 3 Group _____

**K/A:** G2.1.4

Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.

**Importance Rating:** 3.8

**10 CFR Part 55:** 41.10 / 43.2

**10 CFR 55.43.b** 1

**K/A Match:** K/A is matched because the candidate must know the requirements to maintain an active license IAW OP-AA-105-102 (NRC Active License Maintenance).

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to know Conditions and Limitations in the Facility License.

**Technical References:** OP-AA-105-102

**Proposed references to be provided:** None

**Learning Objective:**

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | X |
| **Bank** | |

**Question History:**

**Comments:**

**20** **Points: 1.00**

Given:

- Unit 2 is in MODE 3
- Reactor Trip Breakers are CLOSED
- **ALL** control rods are fully inserted into the core
- The crew is performing S2.OP-AB.CC-0001 (Component Cooling Abnormality)

At time 10:00

- 21 RCP BRG CLG WTR FLO LO alarm actuates

In accordance with S2.OP-AB.CC-0001, which ONE of the following completes the statements below?

If the 21 RCP BRG CLG WTR FLO LO alarm is still valid, ___(1)___ is the **EARLIEST** time that the crew is required to perform S2.OP-AB.CC-0001 Attachment 2 (Stopping Reactor Coolant Pumps).

While performing S2.OP-AB.CC-0001 Attachment 2, the crew ___(2)___ required to manually **TRIP** the Reactor.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 10:02 | is |
| B. | 10:02 | is **NOT** |
| C. | 10:05 | is |
| D. | 10:05 | is **NOT** |

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. For Part 1, S2.OP-AB.CC-0001 (Selected CAS Items) has an action which requires RCPs to be secured within 2 minutes to prevent RCP damage (RCP Seal Injection Flow AND RCP Thermal Barrier Component Cooling flow are lost concurrently). Consequently, the candidate could incorrectly conclude that if the 21 RCP BRG CLG WTR FLO LO alarm is still active, 10:02:00 is the earliest time that the crew is required to perform S2.OP-AB.CC-0001 Attachment 2 (Stopping Reactor Coolant Pumps).

B. Incorrect but plausible. For Part 1, S2.OP-AB.CC-0001 (Selected CAS Items) has an action which requires RCPs to be secured within 2 minutes to prevent RCP damage (RCP Seal Injection Flow AND RCP Thermal Barrier Component Cooling flow are lost concurrently). Consequently, the candidate could incorrectly conclude that if the 21 RCP BRG CLG WTR FLO LO alarm is still active, 10:02:00 is the earliest time that the crew is required to perform S2.OP-AB.CC-0001 Attachment 2 (Stopping Reactor Coolant Pumps).

C. **Correct.** For Part 1, IAW S2.OP-AB.CC-0001 (Selected CAS Items), if five minutes have elapsed since RCP BRG CLR WTR FLO LO alarm actuated, the crew will perform Attachment 2, Stopping Reactor Coolant Pumps. Since the 21 RCP BRG CLG WTR FLO LO alarm actuated at 10:00:00, 10:05:00 is the earliest time that the crew is required to perform S2.OP-AB.CC-0001 Attachment 2. For Part 2, IAW S2.OP-AB.CC-0001 Attachment 2, if the Reactor Trip Breakers are CLOSED, the crew will perform a manual Reactor TRIP prior to stopping the affected RCPs.

D. Incorrect but plausible. Part 1 is correct. For Part 2, since the plant is in MODE 3 with ALL of the control rods already inserted fully into the core, the candidate could incorrectly conclude that a manual reactor trip is not required which allows the crew to secure the affected RCP faster.

**Question Number:** 20

**Tier:** 3 Group _____

**K/A:** G2.1.7

Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation

**Importance Rating:** 4.7

**10 CFR Part 55:** 41.5 / 43.5 / 45.12 / 45.13

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must analyze Component Cooling System performance and determine if the RCPs must be secured and if a manual Reactor Trip is required.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to analyze plant parameters and determine when to implement attachments and appendices, including how to coordinate these items with procedure steps (performing Attachment 2 of the Component Cooling Abnormality Procedure).

**Technical References:** S2.OP-AB.CC-0001

**Proposed references to be provided:** None

**Learning Objective:** NOS05ABCC01-09 (COMPONENT COOLING ABNORMALITY)

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

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** _____
**Bank** X

**Question History:**

**Comments:**

**21** **Points: 1.00**

Given:

- Unit 2 is at 100% power and stable

At time 13:00:00 on November 21st

- It was discovered that SR 4.5.2.b.2 (Verify that ECCS Piping Is Full Of Water) was last performed on October 11th at 13:00:00
- SR 4.5.2.b.2 has a MONTHLY Surveillance Frequency

In accordance with Technical Specifications, which ONE of the following completes the statement below?

Assuming **ALL** other administrative requirements have been met, _____ at 13:00:00 is the **LATEST** time / date that SR 4.5.2.b.2 can be performed without having to perform the applicable REQUIRED ACTION(s) of LCO 3.5.2 (ECCS SUBSYSTEMS – TAVG ≥ 350 °F).

A. November 22nd

B. December 21st

C. December 22nd

D. December 29th

Answer: C

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. November 21st is the date if the candidate incorrectly deduces that SR 4.0.2 allows a delay time of 24 hours OR up to the limit of the specified frequency, whichever is LEAST. November 21st + 24 hours = November 21st).

B. Incorrect but plausible. December 21st is the date if the candidate incorrectly assumes a MONTH frequency = 30 days (November 21st + 30 days = December 21st).

C. **Correct.** SR 4.0.3 allows a delay time of 24 hours OR up to the limit of the specified frequency, whichever is greatest. Since the specified frequency is MONTHLY (every 31 days), then November 21st + 31 days = December 22nd. A risk assessment also needs to be performed for delay periods greater than 24 hours. Consequently, assuming ALL other administrative requirements have been met, December 22nd at 13:00:00 is the LATEST time / date that SR 4.5.2.b.2 can be performed without having to perform the applicable REQUIRED ACTION(S) of LCO 3.5.2 (ECCS SUBSYSTEMS – TAVG ≥ 350 °F

D. Incorrect but plausible. December 29th is the date if the candidate incorrectly deduces that SR 4.0.3 also allows a 25% extension to the specified frequency (as defined in SR 4.0.2). November 21st + 31 days + 7 days (25% of 31 days) = December 29th.

**Question Number:** 21

**Tier:** 3 Group _____

**K/A:** G2.2.25

Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits

**Importance Rating:** 4.2

**10 CFR Part 55:** 41.5 / 41.7 / 43.2

**10 CFR 55.43.b** 2

**K/A Match:** K/A is matched because the candidate must know the bases of SR 4.0.3 to apply surveillance delay times for SR 4.5.2.b.2 before having to perform the REQUIRED ACTION(S) of LCO 3.5.2.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to application of application of generic LCO requirements (LCO 3.0.1 through 3.0.7 and SR 4.0.1 through 4.0.4) and knowledge of TS bases that is required to analyze TS-required actions and terminology

**Technical References:** SR 4.0.2
LCO 3.5.2

**Proposed references to be provided:** None

**Learning Objective:** NOS05TECHSPEC-12 (TECHNICAL SPECIFICATIONS)

13. Describe the general requirements associated with Specifications 4.0.1 through 4.0.4 relating to implementation of the Technical Specification Surveillance Requirements

**Cognitive Level:**

**Higher** X
**Lower** _____

**Question Source**

**New** _____
**Modified Bank** _____
**Bank** X

**Question History:**

**Comments:**

**22** **Points: 1.00**

Given:

- Unit 2 is at 95% Power

At time 15:30

- The CRS has declared LCO 3.2.1 (AXIAL FLUX DIFFERENCE (AFD)) **NOT** met

In accordance with LCO 3.2.1, which ONE of the following completes the statements below?

The crew is **REQUIRED** to reduce THERMAL POWER to less than ___(1)___ % of RATED THERMAL POWER by 15:45 (15 minutes after LCO 3.2.1 was **NOT** met).

The LCO 3.2.1 **REQUIRED** power reduction will ensure ___(2)___ limit as specified in the COLR is **NOT** exceeded.

| | **(1)** | **(2)** |
|---|---|---|
| A. | 90 | $F_Q(Z)$ (Heat Flux Hot Channel Factor) |
| B. | 90 | $F_{XY}(Z)$ (Radial Peaking Factor) |
| C. | 50 | $F_Q(Z)$ (Heat Flux Hot Channel Factor) |
| D. | 50 | $F_{XY}(Z)$ (Radial Peaking Factor) |

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** For Part 1 and IAW LCO 3.2.1, with Reactor Power at 95% power and LCO 3.2.1 NOT met at 15:30, the crew is required to reduce THERMAL POWER to less than 90% of RATED THERMAL POWER by 15:45 (within 15 minutes). For PART 2 and IAW LCO Bases, The LCO 3.2.1 REQUIRED power reduction will ensure $F_Q(Z)$ (Heat Flux Hot Channel Factor) limit as specified in the COLR is NOT exceeded.

B. Incorrect but plausible. Part 1 is correct. For Part 2, the LCO Bases for the Power Distribution LCOs (LCO 3.2.x) are designed to protect three different hot channel factors (Heat Flux Hot Channel, Nuclear Enthalpy Rise Hot Channel Factor and Radial Peaking Factor). Consequently, the candidate could incorrectly conclude that LCO 3.2.1 is designed to prevent exceeding the Radial Peaking Factor.

C. Incorrect but plausible. For Part 1 and IAW LCO 3.2.1, once reactor power is between 90%-50%, the crew must then reduce power to less than 50% in the next 30 minutes. Consequently, the candidate could incorrectly conclude that when LCO 3.2.1 was first not met (with RX Power at 95%), the crew is required to reduce THERMAL POWER to less than 50% of RATED THERMAL POWER by 15:45 (within 15 minutes). PART 2 is correct.

D. Incorrect but plausible. For Part 1 and IAW LCO 3.2.1, once reactor power is between 90%-50%, the crew must then reduce power to less than 50% in the next 30 minutes. Consequently, the candidate could incorrectly conclude that when LCO 3.2.1 was first not met (with RX Power at 95%), the crew is required to reduce THERMAL POWER to less than 50% of RATED THERMAL POWER by 15:45 (within 15 minutes). For Part 2, the LCO Bases for the Power Distribution LCOs (LCO 3.2.x) are designed to protect three different hot channel factors (Heat Flux Hot Channel, Nuclear Enthalpy Rise Hot Channel Factor and Radial Peaking Factor). Consequently, the candidate could incorrectly conclude that LCO 3.2.1 is designed to prevent exceeding the Radial Peaking Factor.

**Question Number:** 22

**Tier:** 3 Group _____

**K/A:** G2.2.39

Knowledge of less than or equal to one hour Technical Specification action statements for systems

**Importance Rating:** 4.5

**10 CFR Part 55:** 41.7 / 41.10 / 43.2 / 45.13

**10 CFR 55.43.b** 2

**K/A Match:** K/A is matched because the candidate must have bases knowledge of a 1 hour or less Technical Specification action for LCO 3.2.1 (AXIAL FLUX DIFFERENCE (AFD)) .

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to have knowledge of TS bases.

**Technical References:** LCO 3.2.1

**Proposed references to be provided:** None

**Learning Objective:** NOS05TECHSPEC-12 ( TECHNICAL SPECIFICATIONS)

14. Describe the general component and parameter categories that are addressed by Technical Specification Sections 3/4.1 through 3/4.12. (Licensed Operator & STA only).

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | X |
| **Modified Bank** | |
| **Bank** | |

**Question History:**

**Comments:**

**23** **Points: 1.00**

Given:

- Unit 2 is at **4% Reactor Power** and stable

At time 10:00:00

- A valid Reactor Trip signal on 21 SG LO-LO Level is generated but the Reactor does **NOT** trip
- The crew enters 2-EOP-TRIP-1 (Reactor Trip or Safety Injection)
- **ALL** attempts to trip the Reactor from the Control Room fail

In accordance with 2-EOP-TRIP-1, which ONE of the following completes the statements below?

The crew will ___(1)___ and ___(2)___.

NOTE:

- 2-EOP-FRSM-1 (Response to Nuclear Power Generation)

| | **(1)** | **(2)** |
|---|---|---|
| A. | MANUALLY insert control rods | continue in 2-EOP-TRIP-1 |
| B. | MANUALLY insert control rods | go to 2-EOP-FRSM-1 |
| C. | allow control rods to insert AUTOMATICALLY | continue in 2-EOP-TRIP-1 |
| D. | allow control rods to insert AUTOMATICALLY | go to 2-EOP-FRSM-1 |

Answer: B

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. Incorrect but plausible. Part 1 is correct. For Part 2, the candidate could incorrectly conclude that entry into 2-EOP-FRSM-1 is NOT required since reactor power is less than 5%.

B. **Correct.** For Part 1, 2-EOP-TRIP-1 and 2-EOP-TRIP-1 Basis Document require rods to be inserted. The basis document allows rods to insert in AUTOMATIC if the RCS Temperature error is such that rods step in > 48 steps / minute. Since the plant is at 4% (turbine is not online), rods will not insert automatically greater than 48 steps / minute. Consequently, the rods will be inserted manually. For Part 2, IAW 2-EOP-TRIP-1, since the reactor is not tripped, the crew will go to 2-EOP-FRSM-1

> Reactor Trip is confirmed by all of the following, at the time EOP-TRIP-1 step 2 is read by the NSS:
>
> - Power range NI indication less than 5%, AND
> - Intermediate range NI indication dropping, AND
> - Intermediate range NI startup rate indication negative

C. Incorrect but plausible. For Part 1, 2-EOP-TRIP-1 Basis Document allows rods to be left in automatic if certain conditions are met. Consequently, the candidate could incorrectly conclude that allowing the rods to insert automatically is preferred. For Part 2, the candidate could incorrectly conclude that entry into 2-EOP-FRSM-1 is NOT required since reactor power is less than 5%.

D. Incorrect but plausible. For Part 1, 2-EOP-TRIP-1 Basis Document allows rods to be left in automatic if certain conditions are met. Consequently, the candidate could incorrectly conclude that allowing the rods to insert automatically is preferred. Part 2 is correct.

**Question Number:** 23

**Tier:** 3 Group _____

**K/A:** 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 Rating:** 4.6

**10 CFR Part 55:** 41.7 / 43.5 / 45.12

**10 CFR 55.43.b** 5

**K/A Match:** K/A is matched because the candidate must assess plant conditions and determine if the Shutdown Margin (Subcriticality) safety function is met.

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to analyze plant parameters and perform an assessment of plant conditions (normal, abnormal, or emergency) and then selection of a procedure or section of a procedure to mitigate or recover, or with which to proceed).

**Technical References:** 2-EOP-TRIP-1

**Proposed references to be provided:**

**Learning Objective:**

**Cognitive Level:**

| | |
|---|---|
| **Higher** | X |
| **Lower** | |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | |
| **Bank** | X |

**Question History:** Bank Question modified from January 2017 ILOT Exam SRO Q3

**Comments:**

**24** **Points: 1.00**

Given:

- The CRS is reviewing a release permit for a released from 21 CVCS Monitor Tank
- 2R18 (Waste Disposal Liquid Rad Monitor) has failed its source check

In accordance with S2.OP-SO.WL-0001 (Release Of Radioactive Liquid Waste From 21 CVCS Monitor Tank), which ONE of the following completes the statement below?

The CRS ___(1)___ approve the release permit ___(2)___.

A. (1) can
   (2) provided a second sample was drawn, analyzed, and calculations were second verified prior to the release

B. (1) can
   (2) provided continuous effluent sampling is conducted throughout the liquid waste discharge

C. (1) can **NOT**
   (2) until **ONLY** the 2R18 is repaired and returned to service

D. (1) can **NOT**
   (2) until 2R18 is repaired and returned to service and after a second sample was drawn, analyzed, and calculations were second verified prior to the release

Answer: A

**Answer Explanation**

***DISTRACTOR ANALYSIS:***

A. **Correct.** IAW S2.OP-SO.WL-0001, if 2R18 is inoperable, then the CRS can approve the release permit provided a second sample was drawn, analyzed, and calculations were second verified prior to the release.

B. Incorrect but plausible. Part 1 is correct. For Part 2, since 2R18 provides continuous monitoring during the release, the candidate could incorrectly conclude that the effluent must be continuously sampled during the discharge.

C. Incorrect but plausible. The candidate could incorrectly conclude that the release permit can not be approved until ONLY the 2R18 is repaired and returned to service.

D. Incorrect but plausible. Since the 21 CVCS Monitor Tank can be discharged into the Unit 1 CW system, the candidate could incorrectly conclude that the Unit 1 R18 can be aligned to monitor the 21 CVCS Monitor Tank. Consequently, the candidate could then incorrectly determine that the release permit can not be approved until 2R18 is repaired and returned to service or until the Unit 1 R18 can be source checked and aligned to monitor the release.

**Question Number:** 24

**Tier:** 3 Group _____

**K/A:** G2.3.6

Ability to approve release permits

**Importance Rating:** 3.8

**10 CFR Part 55:** 41.13 / 43.4 / 45.10

**10 CFR 55.43.b** 4

**K/A Match:** K/A is matched because the candidate must the requirements for approving a Liquid Waste Removal permit with 2R18 inoperable IAW S2.OP-SO.WL-0001 (Release Of Radioactive Liquid Waste From 21 CVCS Monitor Tank).

**SRO Justification:** The question meets the SRO requirements as described in NUREG 1021 ES-401 Attachment 2. The question is SRO Only because it requires the candidate to have knowledge of Radiation Hazards that may arise during Normal and Abnormal Situations, including Maintenance Activities and Various Contamination Conditions.

**Technical References:** S2.OP-SO.WL-0001

**Proposed references to be provided:** None

**Learning Objective:** NOS05CAVENT-11 (CONTROL AREA VENTILATION SYSTEM)

10. Given a situation dealing with Control Area Ventilation System operability, examine the situation and apply the appropriate Technical Specification action.

**Cognitive Level:**

| | |
|---|---|
| **Higher** | |
| **Lower** | X |

**Question Source**

| | |
|---|---|
| **New** | |
| **Modified Bank** | |
| **Bank** | X |

**Question History:**

**Comments:**

SRO Question #25 not for public release.