QUESTIONS REPORT

for 2023 NRC Full Exam Bank

1. 2023 NRC RO 001

Given the following:

- Unit 2 was tripped approximately 15 minutes ago
- EOP-0.1, Reactor Trip Response, is in progress at:

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11    Check If Source Range Detectors
      Should Be Energized:
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- N-35 IR (Channel I) reads 1.8 x 10^{-10} Amps
- N-36 IR (Channel II) reads 1.8 x 10^{-11} Amps
- Power Above P-6 status light is LIT

Based on the above, N-35 neutron indication is ___(1)___. The status of N-31 SR (Channel I) and N-32 SR (Channel II) are ___(2)___.

	(1)	(2)
A.	Undercompensated	energized
B✓	Undercompensated	de-energized
C.	Overcompensated	energized
D.	Overcompensated	de-energized

RO Tier 1 Group 1

Source:
New

Question History:
NA

K/A:
Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (EPE 7) REACTOR TRIP: Principles of neutron detection

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(7)

Reference:
EOP-0.1 UNIT 2 Rev. 47
883D195 Sheet 11 Rev. 7
883D195 Sh 12 Rev. 10
OR-1

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

A. Incorrect – Plausible if the candidate believes either N-35 or N-36 are required to be below P-6 power level to energize source range NIs.

B. Correct – With the P-6 status light ON, Permissive P-6 ($1x10^{-10}$ Amps) IS met for one channel (N-36); therefore, Source Range HV is not energized to BOTH N-31 and N-32. N-35 condition in the stem as given is undercompensated, in which compensating voltage is set too low and results in the output being higher than actual power level.

C. Incorrect – Plausible if the candidate incorrectly assesses that overcompensation means channel N-35 reads a higher output.

D. Incorrect – P Plausible if the candidate incorrectly assesses that overcompensation means channel N-35 reads a higher output AND also believes BOTH N-35 and N-36 are required to be below P-6 power level to energize source range NIs.

Learning Objective:

2. 2023 NRC RO 002

Initially, the following conditions exist:

- Unit 1 is cooling down in MODE 5
- The Pressurizer is SOLID
- Reactor Coolant System pressure is 310 psig
- Reactor Coolant Pumps are secured

Then the following conditions occur:

- PT-420, Loop A Hot Leg Pressure fails HIGH
- Alarm 1C04 1C 3-5, LOW TEMPERATURE OVER PRESSURE is LIT
- Reactor Coolant System pressure is lowering.

What is the correct operator action in accordance with AOP-24, Respond to Instrument Malfunctions?

A. Take PORV PCV-431C Control Switch to CLOSE

B✓ Take PORV PCV-430 Control Switch to CLOSE

C. Place PT-420 to trip immediately

D. Place 1HC-431K Pressurizer Pressure Controller to Manual

RO Tier 1 Group 1

Source:
N/A

Question History:
None

K/A:
Ability to determine and/or interpret the following as they apply to (APE 8) PRESSURIZER VAPOR Space Accident (CFR: 43.5 / 45.13): PORV logic control under low-pressure conditions

Justification for K/A Match:

Cognitive Level:
HIgh

10 CFR Part 55 Content:
10 CFR 55.43 5

Reference:
AOP-24, Rev 10, Response to Instrument Malfunctions
Drawing 883D195 SH 18 Rev 013
Tech Specs Section 3.4.12, Rev 2

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A
Justification:

PT420, The Loop A Hot Leg Pressure transmitter, provides input into alarms for 1C-3-5, Low Temperature Over Pressure alarm, and 1C-2-5, Low Temperature Over Pressure Protection Required. PT420 also provides input into the LTOP circuitry for PORV PCV-430. IAW AOP-24, Step 3 requires the operator to take manual control of the affected controller or to place any affected equipment controls in manual. In this case, the affected equipment control is the PORV PCV-430 control switch. Step 4 directs the operator to return the affected parameter to desired value, which requires the operator to take the PCV-430 control switch to close.

A. Incorrect – Plausible if the trainee incorrectly assumes that PT420 provides input into PCV-431C instead of PCV-430.

B. Correct - see above

C. Incorrect – PT-420 going to trip would not remove the high pressure signal.

D. Incorrect – 1HC-431K is an input to the PORV when at power vs LTOP conditions, which makes this plausible.

Learning Objective:

3. 2023 NRC RO 003

Unit 2 has experienced a Large Break LOCA combined with a Loss of Offsite Power.

- RCS Pressure is 100 psig

Which of the following is the order that the listed ECCS components will inject to the RCS?

A.✓ SI Accumulators, SI Pumps, RHR Pumps

B. RHR Pumps, SI Accumulators, SI Pumps

C. SI Accumulators, RHR Pumps, SI Pumps

D. RHR Pumps, SI Pumps, SI Accumulators

RO Tier 1 Group 1

Source:

Modified from Braidwood Exam Question ID # RE10011-EK2.02-03-A

Question History:

K/A:
(000011EK2.03) Knowledge of the relationship between LARGE-Break LOCA and the following systems or components:
RCS

Justification for K/A Match:

Cognitive Level: Low

10 CFR Part 55 Content:
55.41 (b)(7)

Reference:
None

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

A. Correct – This is the correct injection sequence for a Large LOCA.

B. Incorrect – Plausible if the candidate misses the Loss of Offsite Power in the stem or believes the RHR pumps will restart prior to accumulator injection or does not remember that the accumulators are passive and do not require power to inject.

C. Incorrect – Plausible if the candidate believes that the RHR pumps are started prior to the SI pumps on the EDG sequencer.

D. Incorrect – Plausible if the candidate mis-applies knowledge that the accumulators will inject at the pressure they should be checked to isolate.

Learning Objective:

4. 2023 NRC RO 004
Given the following conditions:

- 1C03 1D 1-4, 1P-1A RCP COOLING WATER FLOW LOW is LIT.
- The crew is responding to a loss of the Thermal Barrier cooling during normal RCP operation at 100% reactor power in accordance with AOP-1B, RCP Malfunction.

The thermal barrier provides cooling to RCP Seal #1 _(1)_; and
The operator required action _(2)_ to immediately trip 1P-1A RCP.

	(1)	(2)
A.	during normal RCP operation	is
B.	on a loss of seal injection	is
C.✓	on a loss of seal injection	is NOT
D.	during normal RCP operation	is NOT

RO Tier 1 Group 1
Tier 1 match due to testing applicant's knowledge of how to safely operate the plant during emergency and abnormal conditions through progression of an event. The question discusses the ability of the operator to assess progression of AOP-1B through diagnoses of plant conditions.

Source: New

Question History:
New

K/A:
Ability to operate and/or monitor the following as they apply to (APE 15) REACTOR COOLANT Pump Malfunctions (CFR: 41.7 / 45.5 / 45.6): RCP thermal barrier

Justification for K/A Match:

Cognitive Level: Low

10 CFR Part 55 Content:
10 CFR 55.41.7

Reference:

AOP-1B Unit 1_30, Reactor Coolant Pump Malfunction__
AOP-9B Unit 1_027, Component Cooling System Malfunction_

Proposed reference to be provided to the applicants during examination:

None

Original Question:

New

Justification:

The thermal barrier serves as a backup cooling method to protect the RCP seals on a loss of RCP seal injection. On a loss of the thermal barrier cooling during normal operation, AOP-1B directs attempting to restore thermal barrier flow and establish operation of component cooling per AOP-9B, Unit 1 Component Cooling Water Malfunction, AOP-9B. AOP-1B directs continued monitoring of RCP conditions on a loss of CC flow to the RCP but directs tripping the RCP only with indication of loss of seal injection and thermal barrier flow and neither can be immediately restored.

Answer A: Incorrect. (a) is plausible if trainee fails to recall that the thermal barrier is a passive, backup cooling device for RCP seal protection. (b) is plausible if trainee incorrectly assumes that thermal barrier operation is critical for continued RCP normal operation.

Answer B: Incorrect. (a) is correct. (b) is plausible if trainee incorrectly assumes that thermal barrier operation is critical for continued RCP normal operation.

Answer C: Correct

Answer D: Incorrect. (a) is plausible if trainee fails to recall that the thermal barrier is a passive, backup cooling device for RCP seal protection. (b) is correct

Learning Objective:

5. 2023 NRC RO 005

Unit 1 is at 100% power when a transient occurs, the following indications are reported:

- 1C04 1C 1-2, PRESSURIZER PRESSURE HIGH OR LOW is LIT
- 1HC-431K, PRESSURIZER PRESS CONTROLLER output is 0

What initial action is required per ARB 1C04 1C 1-2?

A.✓ Place pressurizer pressure control system in MANUAL.

B. Place 1RC-431A, Pressurizer Spray in the CLOSE position.

C. Place 1RC-431C, Pressurizer PORV in the CLOSE position.

D. Place the A, B, C, D, Pressurizer Heaters in the ON position.

RO Tier 1 Group 1

Source:
New

Question History:
NA

K/A:
(000027AA1.01) Ability to operate and/or monitor the following as they apply to (APE 27) PRESSURIZER PRESSURE Control System Malfunction: PZR heaters, sprays, and PORVs

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(7)

Reference:

883D195 Sheet 18, PZR Pressure Logics, Rev. 13
883D195 Sheet 19, PZR Heaters Logics, Rev. 5
ARB 1C04 1C 1-2, Pressurizer Pressure High or Low, Rev. 8

Proposed reference to be provided to the applicants during examination:

None

Original Question:

N/A

Justification:

A. Correct – The PZR pressure control output at zero feeds a LOW pressure signal to the control circuitry. Step 5.3 of the operator response section of the ARB directs the operator to take manual control of the system and control at 2235 psig.

B. Incorrect – Plausible if the candidate misapplies controller failure (at 0) for a high pressure condition and therefore the spray valve is open. Additionally, if the heaters are on for too long, closing the spray valve will NOT mitigate this transient.

C. Incorrect – Plausible if the candidate believes that the stem is describing an INSTRUMENT failure. The ARB does direct the PORVs to be placed in close, but that is for an instrument failure with intent to defeat the channel.

D. Incorrect – Plausible if the candidate misapplies controller failure (at 0) for an actual LOW pressure condition and therefore turning the

Learning Objective:

6. 2023 NRC RO 006

Unit 1 is responding to an ATWS.

The control room is currently verifying all dilution paths isolated in accordance with Step 8 of CSP-S.1, Response to Nuclear Power Generation/ATWS when the following conditions occur:

- Both Reactor Trip breakers red lights are NOT LIT and green indication lights are LIT
- Both Reactor Trip Bypass breakers red and green indication lights are NOT LIT
- PR NI channels read 4% and slowly lowering
- SUR channels read -0.1 DPM SUR

Which of the following describes the current plant conditions and correct operator response IAW CSP-S.1?

A. The reactor is NOT subcritical; continue in CSP-S.1 until SUR lowers to -.3 DPM.

B. The reactor is NOT subcritical; continue in CSP-S.1 until Trip and Bypass breakers are confirmed open.

C. The reactor status is unknown; continue in CSP-S.1 until Trip and Bypass breakers are confirmed open.

D✓ The reactor is subcritical; verify emergency borate conditions and return to EOP-0, Reactor Trip or Safety Injection.

RO Tier 1 Group 1

Source:
New

Question History:
NA

K/A:
029 EA2.14 Ability to determine and/or interpret the following as they apply to (EPE 29) ANTICIPATED TRANSIENT WITHOUT SCRAM (ATWS) (CFR: 43.5 / 45.13): Occurrence of a reactor trip

Justification for K/A Match:

Cognitive Level: Low

10 CFR Part 55 Content:
55.41 (7)

Reference:

BG CSP-S.1 028, BG Response to Nuclear Power Generation/ATWS
CSP-S.1 Unit 1 043, Response to Nuclear Power Generation/ATWS

Proposed reference to be provided to the applicants during examination:

None

Original Question:

N/A

Justification:

CSP-1 Step 6 is a continuous action step to verify reactor subcritical by verifying PRNIs <5% and IR channels indicate a negative startup rate. The subsequent action is to verify boration is appropriate for the current plant conditions and return to the procedure in effect. Once the reactor conditions are met, the appropriate operator action is to immediately return to the continuous action step and perform the required actions.

Answer A is Incorrect. The answer is plausible if the trainee fails to recall requirements for verifying the reactor subcritical. Continuing on with CSP-S.1 is plausible if the trainee fails to identify the first part of the answer is incorrect. A -.3 DPM SUR is plausible for determining that the reactor is not subcritical based on the fact that a -.3 DPM SUR is expected in post trip conditions; however, CSP-S.1 step 5 and the basis guide state that any negative SUR is sufficient to recognize the reactor is tripped and subcritical.

Answer B is Incorrect. The answer is plausible if the trainee fails to recall requirements for verifying the reactor subcritical. Continuing on with CSP-S.1 is plausible if the candidate fails to identify conditions for a subcritical reactor and determines that positive confirmation of the reactor trip and bypass breakers being open is required for determining reactor status; however, CSP-S.1 step 5 and the basis guide state that any negative SUR and PRNI <5% is sufficient to recognize the reactor is tripped and subcritical.

Answer C is incorrect. Part 1 of the answer is incorrect; reactor status is known by PRNI and SUR indications provided. Plausible if the candidate assumes that confirmation of the reactor trip and bypass breakers is required for determining reactor status. Continuing on with CSP-S.1 is plausible if the candidate determines that positive confirmation of the reactor trip and bypass breakers being open is required for determining reactor status; however, CSP-S.1 step 5 and the basis guide state that any negative SUR and PRNI <5% is sufficient to recognize the reactor is tripped and subcritical.

Answer D is correct.

Learning Objective:

7. 2023 NRC RO 007

Given the following:

- A Steam Generator Tube Rupture has occured on ’B’ SG.
- The crew has performed all actions of EOP-3, Steam Generator Tube Rupture, up to the step to begin RCS depressurization.

(1) Describe the action taken with the ’B’ SG ADV.

-AND-

(2) What is the reason for this action?

A. (1) Closed with controller in MANUAL

(2) Prevents radioactive release to atmosphere

B. (1) Closed with controller in MANUAL

(2) Ensures minimum RCS subcooling will be maintained when RCS depressurization is initiated

C. (1) Set at 1050 psig with controller in AUTO

(2) Prevent challenges to the SG safety valves

D. (1) Set at 1050 psig with controller in AUTO

(2) Ensures minimum RCS subcooling will be maintained when RCS depressurization is initiated

High Cog
2019 EOP Segment Exam RO
New question 6/18/18 JAH
Modeled after 2014 Ginna RO 72

RO Tier 1 Group 1

Source:
031.02.LP0441.002 015

Question History:
NA

K/A:
(000038EK2.13) Knowledge of the relationship between (EPE 38) STEAM GENERATOR Tube Rupture and the following systems or components: Main steam system

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(7)

Reference:
EOP-3 Unit 1 Background Document Rev. 39

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

A. Incorrect – Plausible if the candidate believes that the ruptured SG is to be isolated.

B. Incorrect – Plausible if the candidate believes that the ruptured SG is to be isolated.

C. Correct – From BG EOP-3, "The atmospheric dump valve on the ruptured steam generator should remain available to limit steam generator pressure unless it fails open. This will minimize any challenges to the code safety valve."

D. Incorrect – Plausible if the candidate believes that minimum subcooling must be maintained in order to depressurize the RCS.

Learning Objective:

LIST the major actions accomplished by the following procedures: (031.02.LP0441.002)

a. EOP 2
b. EOP 3
c. EOP 3.1
d. EOP 3.2
e. EOP 3.3

8. 2023 NRC RO 008

Unit 1 was operating at Rated Thermal Power when the Reactor tripped and Safety Injection initiated due to a Faulted ‘A’ Steam Generator.

- The crew took required actions in EOP-2, Faulted S/G Isolation
- The crew transitioned to EOP-1, Loss of Reactor or Secondary Coolant and is on Step 2 to check if S/G are Not Faulted.

The following indications are noted:

• Pressurizer Pressure	1790 psig	Slowly Lowering
• Pressurizer Level	25%	Slowly Lowering
• Loop ‘A’ RCS Cold Leg WR Temp	483ºF	Slowly Lowering
• Loop ‘B’ RCS Cold Leg WR Temp	484ºF	Slowly Lowering
• SG ‘A’ Narrow Range Level	0%	Stable
• SG ‘B’ Narrow Range Level	28%	Slowly Rising
• SG ‘A’ Pressure	0 psig	Stable
• SG ‘B’ Pressure	780 psig	Slowly Lowering
• AFW Flow Header ‘A’	0 gpm	Stable
• AFW Flow Header ‘B’	275 gpm	Stable
• Containment Pressure	7 psig	Slowly Lowering

Which of the following describes the condition of the ‘B’ SG and the expected operator response?

A. NOT Faulted; reduce AFW flow when SG Level is >52%.

B. Faulted; must be isolated.

C. NOT Faulted; reduce AFW flow when SG Level is >33%.

D. Faulted; reduce AFW flow to approximately 50 gpm.

RO Tier 1 Group 1
Meets tier 1 criteria due to analysis of plant conditions that lead to the progression of an event.

Source:
New

Question History:
None

K/A:
EMERGENCY PROCEDURES/PLAN: Knowledge of the specific bases for emergency and abnormal operating procedures (CFR: 41.10 / 43.1 / 45.13) – Steam Line Rupture

Justification for K/A Match:

Cognitive Level:
High

10 CFR Part 55 Content:
10 CFR 55.41.10

Reference:
EOP-0 Unit 1_071 Reactor Trip or Safety Injection
EOP-1 Unit 1_048 Loss of Reactor or Secondary Coolant
EOP-2 Unit 1_026 Faulted SG Isolation
BG EOP-2_020_Fauled Steam Generator Isolation

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

EOP-0 Step 8 verifies RCS Temperature and establishes control of AFW flow to greater than 275 gpm until level in at least one S/G is >33% [52%]. With isolation of the ‘A’ SG in EOP-2, the basis of the required action to check if S/G are Not Faulted in EOP-1, Step 2 is to determine if the affected Steam Generator Pressure is uncontrolled. Per BG EOP-2, ‘Uncontrolled’ mean not under control of the operator, and incapable of being controlled by the operator using available equipment. The intent of this step is not to identify a Faulted Steam Generator based on a lowering pressure due to an RCS cooldown. With containment above the adverse setpoint of 5 psig, the adverse setpoints for SG level are in effect; therefore, a minimum of 52% SGWL is required before reducing AFW feed flow to <275gpm

Answer A: Correct

Answer B: Incorrect. Plausible if the trainee incorrectly assumes lower ‘B’ SG Pressure is indication of a SG Fault and incorrectly determines that isolation of both SGs is acceptable in EOP response.

Answer C: Incorrect. ‘B’ SG is not faulted but reducing AFW flow rate when SG Level is >33% is incorrect. Containment is adverse; therefore, a minimum SG level of 52% is required before lowering AFW flow rate to <275gpm. Plausible if the candidate fails to recall the AFW flow requirements based on adverse containment conditions.

Answer D: Incorrect. Plausible if the trainee incorrectly assumes lower ‘B’ SG Pressure is indication of a SG Fault and recognizes that isolation of both SGs is not recommended in EOP response and with both faulted, AFW is reduced to 50 gpm.

Learning Objective:

9. 2023 NRC RO 009

Unit 1 was operating at rated power when a transient occurs. The following is reported:

- A Loss of Main Feedwater has occurred
- Reactor has tripped
- Containment pressure is 3.5 psig
- Crew entered CSP-H.1, Response to Loss of Secondary Heat Sink
- RCS Bleed and Feed was just conducted using CSP-H.1

Following the RCS Bleed and Feed, the following conditions are reported:

- ’A’ S/G water level is 70” WR with 100 gpm AFW flow
- ’B’ S/G water level is 75” WR with 0 gpm AFW flow
- Core Exit Thermocouple temperatures are RISING

What Steam Generator(s) can have maximum feed flow rate established using CSP-H.1?

A✓ ’A’ Steam Generator

B. ’B’ Steam Generator

C. Neither Steam Generator

D. Both ’A’ AND ’B’ Steam Generators

RO Tier 1 Group 1

Source:
New

Question History:
NA

K/A:
(000054AA2.09) Ability to determine and/or interpret the following as they apply to LOSS OF Main Feedwater:
S/G dryout conditions

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(10)

Reference:
CSP-H.1, Response to Loss of Secondary Heat Sink, Rev. 47

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Learning Objective:

A. Correct – Per the Foldout Page criteria of CSP-H.1, a DRY S/G is that which is less than 80” AND NO feed flow established. By this definition, the “B” S/G is dry. CSP-H.1 FOP criteria directs feeding any NON dry S/G at maximum until CETs are lowering.

B. Incorrect – Plausible if the candidate misreads the conditions and believes the “B” S/G is NOT dry.

C. C. Incorrect – Plausible if the candidate believes BOTH S/Gs are dry AND misapplies the FOP criteria step in CSP-H

D. Incorrect – Plausible if the candidate believes neither S/G is in dryout conditions and therefore both S/Gs can be fed at maximum rate.

Learning Objective:

10. 2023 NRC RO 010

Unit 2 was operating at 100% power when a large break LOCA occurred.
The crew is responding in accordance with applicable EOPs.

Subsequently, a loss of offsite power occurs.

Time	Event
0 sec.	G-02 EDG reenergizes bus 2A05, 4160 VAC Safeguards Bus
+27 sec.	The RO is monitoring ESF equipment sequencing.

Which piece of equipment will start next?

A. 2P-15A, 'A' Safety Injection Pump

B.✓ 2P-53, MDAFW Pump

C. 2W1-A1, Containment Cooling Fan

D. P-32F, Service Water Pump

RO Tier 1 Group 1
Tier 1 due to containing information related to sequence of plant operation and the progression of the event.

Source:
Modified RE10056-K3.01-1

Question History:
RE10056-K3.01-1
BWD 2019 Cert Exam Question: #48

K/A:
056 AK3.01
Knowledge of the reasons for the following responses and/or actions as they apply to (APE 56) Loss of Offsite Power (CFR: 41.5 / 41.10 / 45.6 / 45.13): Order and time to initiation of power for the load sequencer

Justification for K/A Match:

Cognitive Level: Low

10 CFR Part 55 Content:
55.41 (5)

Reference:
UFSAR (2017) Section 8.8-7

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

A INCORRECT: SI pumps ride the bus during a loss of power. Plausible if the candidate fails to recall the load sequencing for the EDG following LOOP with SI conditions.

B CORRECT: On a loss of offsite power, the MDAFW pumps restart on the load sequencer at time +32.5 seconds.

C INCORRECT: Containment Fans would start at time +38 seconds. Plausible if the candidate fails to recall the load sequencing for the EDG following LOOP with SI conditions.

D INCORRECT: P32F SW Pump would start at time +25 seconds. Plausible if the candidate fails to recall the load sequencing for the EDG following LOOP with SI conditions.

Learning Objective:
LP0486.14
Describe the automatic functions associated with the ESFAS and its major components. Description should include ...protection afforded by the system.

11. 2023 NRC RO 011

Both units are operating at Rated Thermal Power when a transient occurs. The following is reported:

- All bistable status lights go dark on 1C04
- LT-471, 'B' S/G Level is de-energized
- RTO has BAD DATA input on PPCS

What action is expected to be taken?

A. Place Rod Control in MANUAL due to loss of all WHITE instrument buses.

B. Place D-305 battery on service for Battery D-06 due to loss of D-02, 125 VDC bus.

C. Place D-305 battery on service for Battery D-105 due to loss of D-03, 125 VDC bus.

D✓ Place Reactor Make-up Control Switch to STOP due to loss of all YELLOW instrument buses.

RO Tier 1 Group 1

Source:
Modified

Question History:
Modified from PB NRC Exam Question RO 11 (Modified procedure portion of question)
2012 NRC RO 11

K/A:
(000057) (APE 57) Loss of Vital AC Electrical Instrument Bus (G2.1.19) CONDUCT OF OPERATIONS:
Ability to use available indications to evaluate system or component status

Justification for K/A Match:

Cognitive Level: Low

10 CFR Part 55 Content:
55.41 (b)(7)

Reference:

AOP-0.2, Loss of Safety Related Instrument Buses
AOP-0.2, Loss of Safety Related Instrument Buses Background, Rev. 7
ARP 2C20 B 2-8, D-02/D-04 125V DC Bus Under/over Voltage, Rev. 5
ARP 2C20 A 2-2, D-10/D-03 125V DC Bus Under/over Voltage, Rev. 6

Proposed reference to be provided to the applicants during examination:

None

Original Question:

Modified from PB NRC Exam Question RO 11 (Modified procedure portion of question)

Justification:

A. Incorrect – Plausible if the candidate believes that the loss of all WHITE instrument buses would cause the 1C04 bistable lights to go out.

B. Incorrect – Plausible if the candidate believes that a loss of the D-02 bus would cause the 1C04 bistable status lights to go out

C. Incorrect – Plausible if the candidate believes that a loss of the D-03 bus would cause the 1C04 bistable status lights to go out.

D. Correct – Upon a loss of all YELLOW instrument buses, the bistable lights lose power.

Learning Objective:

12. 2023 NRC RO 012

The plant is responding to icing conditions at the intake using AOP-13A, Circulating Water System Malfunction.

The following conditions exist:

- Forebay Level is -14 feet, lowering slowly
- 1P-30A, 'A' Circulating Water Pump, has been secured.
- The non-ice melt unit, Unit 1, was tripped in accordance with AOP-13A
- The Unit 1 OS directs the RO to secure 1P-30B, 'B' Circulating Water Pump.

Prior to operating the 1P-30B control switch, the RO observes:

- The Green, White and Red indicating lights above the 1P-30B control switch are NOT LIT.
- Replacing the light bulbs with verified working bulbs did not change the light status.

What is the status of the 1P-30B breaker and what is the required operator response to secure 1P-30B?

A. The breaker is open and no operator action is required.

B.✓ The breaker is closed and the breaker must be tripped locally.

C. The breaker is closed and the control switch must be placed in PULLOUT.

D. The breaker is closed and the operator will trip the breaker from the Control Room.

RO Tier 1 Group 1
Tier 1 –The stem directs actions in AOP-13A to respond to a situation requiring tripping the circulating water pump. The subsequent stem provides indications for current plant operational status and requires the candidate to understand the current operational status of the pump and how the indications effect the actions and progression of the AOP-13A event.

Source:
New

Question History:
New

K/A:
Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to (APE 58) LOSS OF DC Power (CFR: 41.8 / 41.10 / 45.3): Loss of breaker protection

Justification for K/A Match:

Cognitive Level:
High

10 CFR Part 55 Content:
10 CFR 55.41.8
Reference:
OI-35B, Electrical Equipment General Information
Westinghouse 499B466, Shts. 204, 219, 220B, 252B, 255B, 258, 259B, 260B, 262, 964, 970, 973 & 1523A

Proposed reference to be provided to the applicants during examination:
None

Original Question:
None

Justification:

Loss of indicating lights is indication of a loss of control power to the tripping circuit, which results in continued running of the pump without remote tripping capability or automatic protection.

A. Incorrect. The breaker will not change state with a loss of control power. Plausible if the applicant believes the breaker will trip open on loss if DC control power.

B. Correct. See explanation.

C. Incorrect. Plausible if the candidate believes placing the control switch in PULLOUT will trip the breaker.

D. Incorrect. Plausible if the applicant believes the loss of indicating lights is due to a loss of main power to the pump, but the remote trip feature is still available.

Learning Objective:

13. 2023 NRC RO 013

Given the following:

Both units are at 90% when a transient occurs:

- 2A05, 4160 VAC Bus undervoltage causes G02 EDG to start and load

Subsequently:

- C01 A 3-5, NORTH OR SOUTH SERVICE WATER HEADER PRESSURE LOW alarm is LIT
- Crew determines the North Service Water header pressure is low
- Crew enters AOP-9A, Service Water System Malfunction

What actions must take place to allow G02 to continue to run?

A. Open the G02 alternate cooling water MOV on C01.

B. Place all four of the G02 EDG room cooling fans to ON.

C.✓ Supply cooling water to G02 from the south service water header by locally repositioning manual valves.

D. Supply cooling water to G02 from the fire system by locally repositioning manual cross connect valves.

RO Tier 1 Group 1

Source:
Modified

Question History:
PB Exam Bank Question 051.06.LP0086.007 004

K/A:
(000062AK3.03) Knowledge of the reasons for the following responses and/or actions as they apply to (APE 62) LOSS OF SERVICE WATER: Guidance actions contained in AOPs for loss of service water

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(10)

Reference:

AOP-9A, Service Water Malfunction, Rev. 39
AOP-9A (BG), Service Water Malfunction Background, Rev. 23
ARP C01 A 3-5, North or South Service Water Header Pressure Low, Rev. 1

Proposed reference to be provided to the applicants during examination:

None

Original Question:
PB Exam Bank Question 051.06.LP0086.007 004

Justification:

A. Incorrect – Plausible if the candidate believes that the service water alternate cooling isolation valves are on Panel C01.

B. Incorrect – Plausible if the candidate believes that the emergency diesel G02 does NOT have a south service water supply and that air fans must be started.

C. Correct – Per AOP-9A, the G02 emergency diesel generator must be manually aligned to the alternate header (Step A3b)

D. Incorrect – Plausible if the candidate believes the alternate cooling water medium to G02 is the fire header.

Learning Objective:
051.06.LP0086.007
RECOGNIZE and ANALYZE the effects of a loss of Service Water System on:
a. Instrument Air Compressors
b. Diesel Generator Coolers (G01 and G02)
c. Auxiliary Feedwater Pumps
d. Component Cooling Heat Exchangers
e. Battery and Inverter Room Coolers

Modified from LP0086.007.002 for E18.2 2/23/01 - TAV

14. 2023 NRC RO 014

Unit 1 is responding to a plant transient that resulted in a safety injection with a loss of instrument air. The control room is responding in accordance with the applicable EOPs.

In restoration of the instrument air system, Instrument Air Compressor K2A was successfully started following SI reset and restoration of non-safeguards lockouts.

There are no Service Air Compressors running. The SRO directs starting the K3A Service Air Compressor. There are no faults on the K3A Air Compressor.

What action(s) is/are the minimum step(s) required to start the K3A Service Air Compressor?

A. Clear the inner stage pressure interlock, then press START at the control panel.

B.✓ Close the breaker locally and press START at the control panel.

C. Pressing START at the control panel ONLY.

D. Close the breaker locally ONLY.

RO Tier 1 Group 1

Source:
New

Question History:
New

K/A:
CONDUCT OF OPERATIONS: Ability to explain and apply system precautions, limitations, notes, or cautions (CFR: 41.10 / 43.2 / 45.12) – Loss of Instrument Air

Justification for K/A Match:
Tier 1 applicability: Information required to answer the question is contained in the site’s procedure for loss of instrument air, AOP-5B.

Cognitive Level:
Low

10 CFR Part 55 Content:
10 CFR 55.41.8

Reference:
AOP-5B_049, Loss of Instrument Air

Proposed reference to be provided to the applicants during examination:
None

Original Question:
None

Justification:

AOP-5B Step 3 Note states the following: Starting K3A following an SI requires that the breaker be closed at the breaker cubicle prior to pressing START at the control panel.

A: Incorrect: K3B requires clearing the inner stage pressure interlock if the compressor trips. Plausible if candidate applies K3B notes to the K3A compressor.

B. Correct. See explanation.

C: Incorrect: The breaker must be locally closed prior to pressing the START button.

D: Incorrect: Closing the breaker locally is correct, but the START button must also be pressed to start the compressor.

Learning Objective:

- DESCRIBE the procedures which govern operation of the Instrument and Service Air Systems. Description should include significant prerequisites, precautions, and notes associated with each operating procedure requiring consideration by Licensed and Non Licensed Operators. (052.06.LP0338.005)
- RECOGNIZE and ANALYZE the response of the Instrument and Service Air Systems to a Safety Injection. (052.06.LP0338.006)

15. 2023 NRC RO 015

Unit 1 is operating at 100% power when the American Transmission Company informs you that a Solar Magnetic Disturbance magnitude level Kp8 alert is in progress.

AOP-31, Solar Magnetic Disturbance Alert Response, has been entered and Generator Step-Up (GSU) Neutral Ground current monitors have been connected.

Electricians call the Main Control Room and report:

- Sustained GSU DC Neutral Amps have been 122 for the past five (5) minutes.

What action must take taken?

A. Reduce power to 63%.

B. Reduce power to 39%.

C. Reduce power to 35%.

D.✓ Take generator offline.

RO Tier 1 Group 1

Source:
New

Question History:
NA

K/A:
(000077AA1.02) Ability to operate and/or monitor the following as they apply to GENERATOR VOLTAGE AND ELECTRIC Grid Disturbances:
Turbine/generator controls

Justification for K/A Match:

Cognitive Level: Low

10 CFR Part 55 Content:
55.41 (b)(10)

Reference:

CSP-H.1, Response to Loss of Secondary Heat Sink, Rev. 47

Proposed reference to be provided to the applicants during examination:

None

Original Question:

N/A

Learning Objective:

A. Incorrect – Plausible if the candidate incorrectly recalls AOP-31 FOP criteria (63% is for DC Neutral Ground Amps between 71 and 87).

B. Incorrect – Plausible if the candidate incorrectly recalls AOP-31 FOP criteria (39% is for DC Neutral Ground Amps between 87 and 100).

C. Incorrect – Plausible if the candidate incorrectly recalls AOP-31 FOP criteria (<39% is for DC Neutral Ground Amps between 100 and 118).

D. Correct – AOP-31 FOP criteria direct taking the generator offline if DC Neutral Ground Amps are greater than 118.

Learning Objective:

16. 2023 NRC RO 016

A Reactor trip and Safety Injection have occurred on Unit 2. Due to high Aux Building radiation levels, the crew has entered ECA-1.2, LOCA Outside Containment. Actions have been taken in an attempt to isolate the leak.

Given the following plant conditions:

- PZR level is off scale low
- SI flow is 0 GPM
- RCS pressure is 1700 psig and rising
- Aux Building Radiation Monitors are in alarm

According to ECA-1.2, which of the following describes the status of the leak?

A.✔ Isolated based on RCS pressure rising.

B. Isolated based on SI flow of 0 GPM.

C. NOT isolated based on PZR level indication not rising.

D. NOT isolated based on Aux Building radiation monitor indication.

RO Tier 1 Group 1

Source:
ECA-1.2 Unit 2 Rev 26
BG ECA-1.2_015

Question History:
DC Cook 2016 RO

K/A:
Ability to determine and/or interpret the following as they apply to (W E04) LOCA Outside Containment (CFR: 41.10 / 43.5 / 45.13): RCS pressure

Justification for K/A Match:
Tier 1 match due to testing applicant's knowledge of how to safely operate the plant during emergency and abnormal conditions through progression of an event. The question discusses the ability of the operator to assess progression of ECA-1.2 through diagnoses of plant conditions.
Cognitive Level: Low

10 CFR Part 55 Content:
10 CFR 55.41.10

Reference:
ECA-1.2 Unit 2 Rev 26
BG ECA-1.2 015

Proposed reference to be provided to the applicants during examination:
None

Original Question:
The plant was in Mode 1. Reactor trip and Safety Injection have occurred. Due to high Aux Building radiation levels, the crew has entered 2-OHP-4023-ECA-1.2, LOCA Outside Containment. Actions have been taken in an attempt to isolate the break.
Given the following plant conditions:
• PRZ level is off scale low
• SI flow is 0 GPM
• RCS pressure is 1700 psig and rising
• Aux Building Radiation Monitors are in alarm
Which ONE of the following describes the status of the leak based on the requirements of 2-OHP-4023- ECA-1.2?

The leak is:
A. isolated based on RCS pressure rising.
B. isolated based on SI flow of 0 GPM.
C. NOT isolated based on PRZ level indication not rising.
D. NOT isolated based on Aux Building radiation monitor indication.

Answer: A
Answer Explanation
A. Correct RCS pressure is the required parameter for determination of isolation.
B. Incorrect SI flow would be 0 if RCS pressure is above shutoff head of the SI Pump.
C. Incorrect PRZ level is not used, but it will rise after a while when RCS inventory is restored.
D. Incorrect Aux Building radiation is used as an entry condition to the procedure.

Justification:

BG ECA 1.2 rev 15 Step 2 Note 1 basis states that if the leak is isolated, a significant RCS pressure increase will occur due the SI flow filling up the RCS with break flow stopped. Once it is determined that break flow is isolated, valve cycling can stop and continuation can go on.

A. Correct RCS pressure is the required parameter for determination of isolation.

B. Incorrect SI flow would be 0 if RCS pressure is above shutoff head of the SI Pump. Plausible if the candidate assumes that a reduction in SI flow indicates that the leak was on the SI line and is isolated from the break during actions of ECA 1.2

C. Incorrect PZR level is not used, but it will rise after a while when RCS inventory is restored. Plausible if the candidate incorrectly assumes pressurizer level is the primary indication for RCS leak determination status based on the consideration of water inventory in the pressurizer.

D. Incorrect Aux Building radiation is used as an entry condition to the procedure. Plausible if the candidate assumes that an alarming Aux Building Radiation monitor indicates an ongoing leak.

Learning Objective:

17. 2023 NRC RO 017

A LOCA is in progress on Unit 1 and the crew has entered ECA-1.1, Loss of Containment Sump Recirculation.

The following conditions exist:

- RWST level is 18% and lowering
- 1P-14A, 'A' Containment Spray Pump is operating
- 1P-15A/B SI Pumps are operating
- 1P-10A/B RHR Pumps are operating
- RCS Pressure is 340 psig

The crew has initiated an RCS Cooldown to Cold Shutdown at Step 7.

While establishing only One Train of ECCS pumps in service:

- RWST level is reported at 16.5% and lowering.

What action(s) are required?

A. Place ONLY SI and RHR pumps in pullout.

B.✓ Place ONLY the operating Containment Spray Pump in pullout.

C. Place all operating Containment Spray, SI, and RHR pumps in pullout.

D. Place ONLY the 'A' train ECCS pumps (1P-14A, 1P-15A, and 1P-10A) in pullout.

RO Tier 1 Group 1

Source:
Modified

Question History:
Modified from DCC Exam Bank Question RO32NRC-018:

- Aligned to PB setpoints
  Aligned to PB EOPs

K/A:
(WE11EK2.09) Knowledge of the relationship between (W E11) LOSS OF EMERGENCY Coolant Recirculation and the following systems or components:
ECCS

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(7)

Reference:

ECA-1.1, Loss of Emergency Coolant Recirculation UNIT 1, Rev. 45
ECA-1.1, Loss of Emergency Coolant Recirculation Background, Rev. 31

Proposed reference to be provided to the applicants during examination:

None

Original Question:

18	ID: RO32NRC-018	Points: 1.00

A LOCA is in progress and the crew has entered OHP-4023-ECA-1-1, Loss of Emergency Coolant Recirculation from OHP-4023ECA-1.2, LOCA Outside Containment when the leak could not be isolated.

The following conditions exist:

- RWST level is 18% and lowering.
- East and West CCPs, North and South SI & East and West RHR pumps are running.
- RCS Pressure is 340 psig.

The crew has initiated a RCS Cooldown to Cold Shutdown at Step 9. While establishing only One Train of ECCS pumps in service the BOP reports the RWST level is 10.9% and lowering.

What actions are required based on the BOP report?

A. Trip all running ECCS pumps as RWST level is below 11%

B. Trip the running SI and CCP's ONLY as RWST is below 11%.

C. Trip the running RHR pumps as RWST level is below 11% and trip the running SI and CCP's when RWST is below 7%.

D. Trip the running SI and CCP's pumps as RWST level is below 11% and trip the running RHR pumps when RWST is below 7%.

Answer: C

Answer Explanation:

OHP-4023-ECA-1.1 fold out page ECCS / CTS Pump trip Criteria contains the following directions:

- **IF** RWST level lowers to less than 11%, **THEN** trip any running RHR/CTS pump aligned to the RWST.
- IF RWST level lowers to less than 7%, THEN trip CCPs/SI pumps aligned to the RWST.

Learning Objective:

A. Incorrect – Plausible if the candidate believes at 17% RWST level that the SI and RHR pump suctions are threatened.

B. Correct – In accordance with ECA-1.1, at 17%, the FOP criteria is met to place the containment spray pumps in pull out due to suction issues.

C. Incorrect – Plausible if the candidate believes at 17% all ECCS and CS pump suctions are threatened

D. Incorrect – Plausible if the candidate believes no actions are required other than placing one train of ECCS on service.

Learning Objective:

18. 2023 NRC RO 018

The crew is attempting to restore S/G level using CSP-H.1, Loss of Secondary Heat Sink, by depressurization of the secondary.

The crew will depressurize _(1)_ Steam Generator(s) in order to _(2)_.

	(1)	(2)
A.	both	maximize natural circulation
B.✓	only one	minimize chance of reaching feed and bleed criteria
C.	both	maximize RCS subcooling
D.	only one	minimize chance of unblocking SI actuation during SG depressurization

RO Tier 1 Group 1

Source:
New

Question History:
None

K/A:
Knowledge of the reasons for the following responses and/or actions as they apply to (W E05) Loss of Secondary Heat Sink (CFR: 41.5 / 41.10 / 45.6 / 45.13): Depressurizing an S/G and establishing feed flow from the CDS

Justification for K/A Match:
Meets tier 1 criteria due to testing information contained in EOP and their associated bases document.

Cognitive Level:
Low

10 CFR Part 55 Content:
10 CFR 55.41.5

Reference:
CSP-H.1_047, Response to Loss of Secondary Heat Sink
BG CSP-H.1_031, Response to Loss of Secondary Heat Sink

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

CSP-H.1, Step 13 directs trying to establish feed flow from the Condensate System. The Note at the beginning of Step 13 states that depressurizing only one S/G reduces the potential of reaching bleed and feed initiation criteria and causes less reduction in Pzr level and RCS subcooling.

A: Incorrect. Plausible if the candidate considers the primary focus of core cooling as the reason to achieve secondary heat sink and recalls that CSP-H.1 directs stopping both RCPs.

B. Correct.

C: Incorrect. Plausible if the candidate has the concept that maximum cooling is desirable for a loss of heat sink conditions; however, basis guide for CSP-H.1 states that only one S/G is desired because the reduction in less severe, which could require manual SI actuation and challenge plant conditions.

D: incorrect. Plausible if the candidate misapplies the caution above step 13 stating PZR automatic unblock on a pressurizer pressure rise to > 2000# to SG depressurization.

Learning Objective:

19. 2023 NRC RO 019

What are two separate and independent indications of a dropped rod that can be used as entry conditions into AOP-6A, Dropped Rod?

A. QPTR Deviation Alarm and Power Range Rod Drop Alarm.

B. NIS 1% power drop and Power Range Rod Drop Alarm.

C. IRPI at “zero” (0) and Rod Bottom Light.

D.✓ Power Range Rod Drop Alarm and Rod Bottom Light.

12/8/22 Added "Power Range Rod Drop Alarm" due to having two different rod drop alarms with two differenct sources (rod bottom rod drop and power range rod drop). KEM
9-5-13 validate answers, A, B and C appear correct - BVV and DH.
LOI 2012 I&C Quiz 3
PB-ILT-SIM-001ER New Question

RO Tier 1 Group 2

Source:
Bank

Question History:
PB Exam Bank Question 053.01.LP0576.007 004

K/A:
(000005) (APE 5) Inoperable/Stuck Control Rod (G2.4.4) EMERGENCY PROCEDURES/PLAN:
Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures

Justification for K/A Match:

Cognitive Level: Low

10 CFR Part 55 Content:
55.41 (b)(6)

Reference:

ECA-1.1, Loss of Emergency Coolant Recirculation UNIT 1, Rev. 45
ECA-1.1, Loss of Emergency Coolant Recirculation Background, Rev. 31

Proposed reference to be provided to the applicants during examination:

None

Original Question:

PB Exam Bank Question 053.01.LP0576.007 004

Learning Objective:

A. Incorrect – Plausible if the candidate believes a Quadrant Power Tilt deviation alarm is an entry condition into AOP-6A.

B. Incorrect – Plausible if the candidate believes a 1% power drop is indicative of a rod drop. Per AOP-6A, a 2.5% spike in 5 seconds represents a dropped rod.

C. Incorrect – Plausible if the candidate believes these indications are generated separately.

D. Correct – These indications are indications of a rod drop per AOP-6A and are generated separately.

Learning Objective:

DESCRIBE system response to the following:
a. Rod Bottom Bistable Trip
b. Inoperable, Misaligned, or Dropped Rod
c. Rod Position Indication component failures
d. Loss of Control Rod Drive Mechanism cooling

20. 2023 NRC RO 020

Given the following:

- Unit 1 was at normal 100% power operation when a component failure during testing resulted in an automatic trip signal on High Reactor Power
- The reactor failed to trip and the crew has entered CSP-S.1, Response To Nuclear Power Generation/ATWS
- The Main Turbine is tripped and both AFW Pumps are running
- Emergency Boration has been initiated
- T_{avg} is 590°F

Assuming NO automatic or manual control rod motion, the trend of T_{avg} will:

A. lower continuously until Emergency Boration is stopped.

B. remain the same until reactor power is less than AFW heat removal capability and then begin to lower.

C.✓ lower continuously until steam dumps gain control of T_{avg} and then stabilize as steam dumps modulate closed.

D. remain the same until control rods drop, then lower rapidly and stabilize when steam dumps are closed.

RO Tier 1 Group 2

Source:
Bank

Question History:
2017 NRC 20

K/A:
Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to (APE 24) EMERGENCY Boration (CFR: 41.6 / 41.7 / 41.8 / 41.10 / 45.3): Relationship between boron addition and change in TAVE

Justification for K/A Match:
Tier 1 – tests applicant's knowledge of the progression of an event following a plant transient.

Cognitive Level:
High

10 CFR Part 55 Content:
10 CFR 55.41.6

Reference:
NUC GFP RXT 008 Reactor Operational Physics, Rev 0, Section 4.3
WCAP 8330 Anticipated Transients Without Trip Analysis, Appendix B

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

When the Emergency Boration reaches the reactor the effect is similar to but not as rapid as the negative reactivity insertion of control rod motion. With the steam dumps wide open, T_{avg} will lower until they gain control. At that point the steam dumps will modulate closed as T_{avg} is attempting to lower due to boration. With the steam dumps modulating closed to control T_{avg} at no-load temperature, T_{avg} will stabilize with dumps finally open only as needed to remove decay heat and reactor coolant pump heat.

A Incorrect. Plausible because T_{avg} will begin lowering as the Emergency Boration reaches the reactor. However, it has no effect on T_{avg} once the reactor is sub-critical

B. Incorrect. Plausible from a heat balance standpoint, if the student has the conception that only power is changing. However, T_{avg} will be lowering continuously from the negative reactivity insertion

C: Correct. See above.

D. Incorrect. Plausible because this is an instantaneous response on a normal plant trip. However, T_{avg} will be lowering continuously from the negative reactivity insertion

Learning Objective:
Explain the monitoring and control of Tave, Tref and power during power operation. (NUC GFP RXT 008.020)
Explain the effects of control rod motion, boration and dilution on reactor power. (NUC GFP RXT 008.021

21. 2023 NRC RO 021

A Reactor startup is in progress on Unit 1 with the following conditions:

- The reactor is critical and operating at 7% power (indicated by Power Range NIs)
- Condenser Steam Dumps are maintaining RCS T_{avg} at 551°F
- Main Turbine is on the turning gear

N-36, Intermediate Range has failed LOW. The plant is stable, and the Shift Supervisor has directed N-36 to be removed from service.

(1) What procedure provides guidance on how to remove N-36 from service?

(2) What is the sequence that N-36 will be removed from service?

	(1)	(2)
A.	0-SOP-IC-001 RED	Bypass trip then remove fuses
B.	0-SOP-IC-001 RED	Remove fuses then bypass trip
C.✓	0-SOP-IC-001 WHITE	Bypass trip then remove fuses
D.	0-SOP-IC-001 WHITE	Remove fuses then bypass trip

RO Tier 1 Group 2

Source:
Modified

Question History:
PB Exam Bank Question 057.02.LP3341.002 021. Modified to make Tier 1 question.

K/A:
(000033AK2.03) Knowledge of the relationship between (APE 33) LOSS OF INTERMEDIATE RANGE Nuclear Instrumentation and the following systems or components:
RPS

Justification for K/A Match:

Cognitive Level: Low

10 CFR Part 55 Content:
55.41 (b)(7)

Reference:

883D195 Sh. 11 Rev. 7
883D195 Sh. 12, Rev. 10
ARB 1C04 1A 2-2, 1N-35 or 36 Intermediate Range Loss of Detector Voltage, Rev. 5
0-SOP-IC-001 RED, Routine Maintenance Procedure Removal Of Safeguards Or Protection Sensor From Service – Red Channels, Rev. 19
0-SOP-IC-001 WHITE, Routine Maintenance Procedure Removal Of Safeguards Or Protection Sensor From Service – White Channels, Rev. 22

Proposed reference to be provided to the applicants during examination:

None

Original Question:

057.02.LP3341.002 021

Given the following:

- The reactor is critical and operating at 7% power (on all Power Range NI channels)
- RCS Tavg is 551°F and STABLE on the Condenser Steam Dumps
- The Main Turbine is on the turning gear

Based on the conditions listed, determine which of the following LCO 3.3.1, Reactor Protection System (RPS) Instrumentation, trip functions are required to be operable.

A. Pressurizer Pressure - Low.

B. Pressurizer Water Level - High.

C✓ Intermediate Range Neutron Flux.

D. Reactor Coolant Flow Low - Single Loop.

Given specific plant conditions, ASSESS and APPLY Technical Specification requirements as appropriate.

Learning Objective:

A. Incorrect – Plausible if the candidate does not recall that N-36 is a WHITE channel.

B. Incorrect – Plausible if the candidate does not recall that N-36 is a WHITE channel AND that pulling the fuses first WILL cause a reactor trip.

C. Correct – N-36 is a WHITE channel, and the appropriate WHITE channel procedure has the appropriate guidance to remove the channel from service. Additionally, the level trip MUST be bypassed prior to pulling the fuses or a reactor trip signal will be generated. In the conditions provided in the stem (below P-7), a reactor trip will be inserted.

D. Incorrect – Plausible if the candidate does not recall that pulling the fuses first WILL cause a reactor trip.

Learning Objective:

22. 2023 NRC RO 022

Given the following plant conditions on Unit 2:

- The unit is in Mode 6 with refueling activities in progress.
- Containment purge is in service.
- A fuel assembly is dropped in the cavity.
- The Manipulator Crane area radiation monitor has a HIGH radiation alarm.
- Containment Radiation Monitors show a rise but no alarms have actuated.
- Two (2) minutes later, all radiation monitors show a stable trend with no additional alarms actuated.

In accordance with procedure AOP-8B, Irradiated Fuel Handling Accident in Containment, the operator should verify which of the following?

A. Containment evacuation alarm sounds and containment purge stops <u>automatically</u>.

B. Containment evacuation alarm is <u>manually</u> actuated in the control room and containment purge stops <u>automatically</u>.

C. Containment evacuation alarm sounds <u>automatically</u> and containment purge is stopped <u>manually</u> in the control room.

D.✓ Containment evacuation alarm is <u>manually</u> actuated in the control room and containment purge is stopped <u>manually</u> by the control room operator.

RO Tier 1 Group 2

Source:
Bank

Question History:
047 004/RO/OK/MODIFIED/NRC EXAM 2008-66/000036
AK1.01/RO-C-AOP0630412-E3/NRCAUDIT07-1024A
2012-047
DC Cook 2012

K/A:
Ability to determine and/or interpret the following as they apply to (APE 36) FUEL HANDLING INCIDENTS (CFR: 41.7 / 43.5 / 43.7 / 45.13): Magnitude of potential radioactive release

Justification for K/A Match:
Tier 1 match due to required knowledge of system operation leading to the progression of an event. KA match due to testing operator actions designed to limit the magnitude of potential release from fuel handling incident.

Cognitive Level:
High

10 CFR Part 55 Content:
10 CFR 55.41.7

Reference:
AOP-8B U2_013 Irradiated fuel handling accident in containment
UFSAR 5.3.2.3

Proposed reference to be provided to the applicants during examination:
None

Original Question:
Given the following plant conditions on Unit 2:
• The unit is in Mode 6 with refueling activities in progress.
• Containment purge is in service.
• A fuel element is accidentally dropped into the cavity.
• All radiation monitor TRIP/BLOCK switches are in their NORMAL position.
• The Manipulator Crane area radiation monitor has a HIGH radiation alarm.
• Containment Radiation Monitors show a rise but no alarms have actuated.
• Two (2) minutes later, all radiation monitors show a stable trend with no additional
alarms actuated.
(Assume: All equipment responds as designed.)
Which ONE of the following actions would occur, assuming that operators follow the
instructions of 12-OHP-4022-018-004, Irradiated Fuel Handling Accident In Containment Building - Control Room?
A. Verify containment evacuation alarm sounds automatically.
Verify containment purge stops automatically.
B. Containment evacuation alarm is manually actuated by the control room operator.
Verify containment purge stops automatically.
C. Verify containment evacuation alarm sounds automatically.
Containment purge is stopped manually by the control room operator.
D. Containment evacuation alarm is manually actuated by the control room operator.
Containment purge is stopped manually by the control room operator.

Justification:

Containment Purge Ventilation Isolation (CVI) is initiated by high radioactivity in containment, as read by RE-212 or RE-305 from SPING. CVI results in closure of containment purge supply and exhaust valves (CV-3244/CV-3212), which initiates a trip of the purge exhaust fans (W-6A&B) and therefore the purge supply fans (W-2A&B). The stem indicates that a rise in containment radiation occurred, which meets the entry criteria of AOP-8B. however, since a high radiation alarm did not occur, and radiation levels are stable, manual operation of the containment purge system is necessary.

Learning Objective:

23. 2023 NRC RO 023

Given the following:

- Unit 1 was operating at Rated Thermal Power when a Steam Generator faulted inside containment
- Safety injection and Containment Spray automatically actuated
- When the crew has completed the verification of immediate actions of EOP-0, Reactor Trip or Safety Injection, the following plant conditions were observed:
  - Containment pressure is 31 psig and RISING SLOWLY
  - SG ‘A’ Pressure is 680 psig and LOWERING SLOWLY
  - SG ‘B’ Pressure is 150 psig and LOWERING

What would be the expected status of containment depressurization equipment?

A.✓ Containment Spray Pumps – BOTH pumps OPERATING
Containment Accident Fans – FOUR fans OPERATING
Containment Cooling Fans – FOUR fans STOPPED
Containment Vent Cooler Outlet Emergency FCV – BOTH OPEN

B. Containment Spray Pumps – BOTH pumps OPERATING
Containment Accident Fans - FOUR fans STOPPED
Containment Cooling Fans - FOUR fans OPERATING
Containment Vent Cooler Outlet Emergency FCV - BOTH OPEN

C. Containment Spray Pumps – ONE pump OPERATING
Containment Accident Fans - FOUR fans OPERATING
Containment Cooling Fans - FOUR fans STOPPED
Containment Vent Cooler Outlet Emergency FCV - BOTH OPEN

D. Containment Spray Pumps – ONE pump OPERATING
Containment Accident Fans - FOUR fans OPERATING
Containment Cooling Fans - FOUR fans STOPPED
Containment Vent Cooler Outlet Emergency FCV – ONE OPEN

RO Tier 1 Group 2

Source: Bank

Question History:
2017 Audit Exam

K/A:
(WE14EA1.06) Ability to operate and/or monitor the following as they apply to (W E14) HIGH CONTAINMENT PRESSURE:
CSS

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(7)
Reference:
EOP 0, Reactor Trip or Safety Injection
883D195 Sh 7, 8, and 9; SI Actuation and Sequence Logic Diagram

Proposed reference to be provided to the applicants during examination:
None

Justification:

A **CORRECT:** Automatic SI and CS actuations setpoints have been exceeded, this starts both CS pumps, 4 accident fans, stops 4 containment cooling fans, and opens both SW to accident cooler MOVs.

B **INCORRECT:** Plausible if the candidate does not remember that containment cooling fans are tripped and believes they will provide additional containment cooling if running.

C **INCORRECT:** Plausible if the candidate believes that the 2nd CS pumps will be stopped as part of immediate actions. That is only done by actions taken in E-0 and the stem conditions have not reached that step. (Att A will stop one CS pump).

D **INCORRECT:** Plausible if the candidate believes only one SW FCV is open because when this is checked in E-0, Att A, the operator verifies at least one opened.

Learning Objective:

Given appropriate access to the Site Specific Simulator or specific plant conditions, ASSESS response of the safeguards systems to specific accident conditions. Assessment should include conditions requiring actuation and the system response to each actuation signal.
(031.02.LP0405.013)

24. 2023 NRC RO 024

Consider the following Unit 2 conditions:

- A transient has occurred inside containment
- The crew is in EOP-1, Loss of Reactor or Secondary Coolant

The following conditions now exist:

- SI flow is 0 GPM
- RCS pressure is 1800 PSIG and STABLE
- RCS Subcooling is 42ºF and STABLE
- Pressurizer level is 15% and RISING
- Containment pressure is 3 PSIG and LOWERING
- SG levels is 30% NR and rising SLOWLY
- Total AFW flow is 285 gpm
- SG pressures are 675 PSIG and STABLE
- RWST level is 68% and lowering SLOWLY
- RCPs have been stopped

Based on these conditions, which procedure will be transitioned to from EOP-1?

A. EOP-0.2, Natural Circulation Cooldown

B.✓ EOP-1.1, SI Termination

C. EOP-1.2, Small Break LOCA Cooldown and Depressurization

D. EOP-1.3, Transfer to Containment Sump Recirculation - Low Head Injection

RO Tier 1 Group 2

Source:
Bank

Question History:
2007 NRC 91
INPO Bank, Ginna, 4/04, 27340

K/A:

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:

References:
EOP-1, Loss of Reactor or Secondary Coolant
EOP-0.2, Natural Circulation Cooldown

Proposed reference to be provided to the applicants during examination:
None

Original Question:
Consider the following Unit 2 conditions:

- A LOCA has occurred inside containment. All systems responded as required.
- The staff is presently at step 21 of EOP-1 "Loss of Reactor or Secondary Coolant" to "Check if RCS Cooldown and Depressurization is required."
- The following Unit 2 conditions now exist:

  - SI flow - 400 GPM and stable
  - RCS pressure - 1380 PSIG and stable
  - CETs - 500ºF and stable
  - Containment pressure - 3 PSIG and lowering
  - SG levels - both 60% and stable
  - SG pressures - both 675 PSIG and stable
  - Electrical bus alignment normal for unit post-trip conditions.
  - RWST level - 88% and decreasing slowly
  - RCPs have been stopped.

Based on these conditions, which procedure will be transitioned to from EOP-1?

A EOP-0.2, "Natural Circulation Cooldown"
B EOP-1.1, SI Termination
C EOP-1.2, Small Break LOCA Cooldown and Depressurization
D EOP-1.3, Transfer to Containment Sump Recirculation - Low Head Injection

Explanation:
A: Incorrect, EOP-0.2 is used for non-accident situations and enteed from EOP-0.1.

B: Correct, SI termination criteria is met per EOP-1 FOP.

C: Incorrect, with pressure at 1800 PSIG, transition to EOP-1.2 is not appropriate.

D: Incorrect, RWST level is at 68%, which is above EOP-1.3 transition requirement with no RHR flow.

Learning Objective:
Given appropriate conditions/parameters and access to the Site Specific Simulator, Implement the following procedures for the specified conditions:
a. EOP-1 to determine the proper recovery procedure for a loss of Primary or Secondary Coolant.
(LP0435.10)

10CFR55.43 Statement met: (5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

25. 2023 NRC RO 025

Given the following:

- Unit 2 was operating at 100% power
- A Steam Generator tube rupture occurred
- The crew is responding per EOP-3, Steam Generator Tube Rupture

The crew is performing Step 29, Control RCS Pressure and Charging Flow to Minimize RCS Secondary Leakage and the following conditions exist:

- Pressurizer Level 20%
- Ruptured SG NR Level 100%
- Ruptured SG WR Level 400 inches and stable (flat-lining on level recorder)
- Ruptured SG Pressure 1040 psig
- RCS Pressure 1025 psig

PZR LEVEL	RUPTURED S/G(s) LEVEL		
	RISING	LOWERING	OFF SCALE HIGH
Less than or Equal to [38%] 23%	• Raise charging flow • Depressurize RCS using Step 29.b.	Raise charging flow	• Raise charging flow • Maintain RCS and ruptured S/G(s) pressures equal
Between [38%] 23% AND 50%	Depressurize RCS using Step 29.b.	Turn on PZR heaters	Maintain RCS and ruptured S/G(s) pressures equal
Between 50% AND [71%] 72%	• Depressurize RCS using Step 29.b. • Reduce charging flow	Turn on PZR heaters	Maintain RCS and ruptured S/G(s) pressures equal
GREATER THAN OR EQUAL TO [71%] 72%	Reduce charging flow	Turn on PZR heaters	Maintain RCS and ruptured S/G(s) pressures equal

What action should be taken?

A. Raise charging flow and depressurize the RCS.

B. Raise charging flow and depressurize the S/G.

C. Depressurize the S/G only.

D.✓ Raise charging flow only.

RO Tier 1 Group 2

Source: Bank

Question History:
PB Exam Bank #EOP-3, TABLE 001

K/A:
(WE13EA1.05) Ability to operate and/or monitor the following as they apply to (W E13) STEAM Generator Overpressure:
RCS

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(5)

Reference:
EOP-3 Unit 2, SGTR, Rev. 59
EOP-3 SGTR Background, Rev. 39

Proposed reference to be provided to the applicants during examination:
None

Justification:

A **INCORRECT:** Plausible if the candidate believes conditions are met to depressurize the RCS.

B **INCORRECT:** Plausible if the candidate believes conditions are met to begin to depressurize the S/G.

C **INCORRECT:** Plausible if the candidate believes that conditions are met to only depressurize the S/G.

D **CORRECT:** At this point, RCS and S/G pressures are nearly equalized and the priority now becomes refilling the PZR.

Learning Objective:
031.02.LP0441.016

26. 2023 NRC RO 026

Given the following:

A reactor trip and Safety Injection have occurred as a result of a large break LOCA on unit 2.
EOP-1.3, Transfer to Containment Sump Recirculation – Low Head Injection has just been completed.
The RO reports the following information associated with the containment

- Neither train of Containment Spray is running
- Containment pressure 4.0 psig
- Containment radiation 1400 R/hr
- Containment Sump B level 89 inches

Which of the following is an IMMEDIATE containment concern and which procedure should be entered?

A. Containment structural integrity. Go to CSP-Z.1, Response to High Containment Pressure.

B✓ Flooding vital equipment in containment. Go to CSP-Z.2, Response to Containment Flooding.

C. Erroneous instrumentation readings. Go to CSP-Z.3, Response to High Containment Radiation Level

D. Inadequate suction to the RHR pumps. Go to ECA-1.3, Containment Sump Blockage.

RO Tier 1 Group 2

Source:
Bank

Question History:
2017 NRC 125

K/A:
Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to (W E15) Containment Flooding (CFR: 41.5 / 41.7 / 45.7 / 45.8): Design basis flood level in containment

Justification for K/A Match:
Meets tier 1; requires comprehension of current plant conditions to determine procedural progression of the event. Meets KA by requiring the candidate to understand the design basis flood levels in containment and the required operator implications to the condition.

Cognitive Level:
High

10 CFR Part 55 Content:
10 CFR 55.41.5

Reference:
CSP-ST.0, Critical Safety Function Status Trees, Rev 9, Figure 5
BG-CSP-ST.0, Background Critical Safety Function Status Trees, Rev 6, Decision 4
(ERG Step: F-0.5)

Proposed reference to be provided to the applicants during examination:
None

Original Question:
Given the following:

A. A reactor trip and Safety Injection have occurred as a result of a large break LOCA on unit 2
B. EOP-1.3, Transfer to Containment Sump Recirculation – Low Head Injection has just been completed
C. The RO reports the following information associated with the containment
A. Neither train of Containment Spray is running
B. Containment pressure 4.0 psig
C. Containment radiation 1400 R/hr
D. Containment Sump B level 89 inches
The containment indications can be replace with the containment PPCS display 2220
Which of the following is an IMMEDIATE containment concern?

A. Containment structural integrity. Go to FR-Z.1, Response to High Containment Pressure.

B. Flooding vital equipment in containment. Go to FR-Z.2, Response to Containment Flooding.

C. Flooding vital equipment in containment. Go to FR-Z.2, Response to Containment Flooding.

D. Inadequate suction to the RHR pumps. Go to ECA-1.3, Containment Sump Blockage.

Justification:

From the items communicated, the immediate item of concern is the Sump B level. If containment pressure is less than 25 psig, and containment sump B level is greater than 86, indicating containment flooding has occurred, and the concern with containment flooding is as the water level rises, it might threaten the availability of equipment required for long term cooling of the core and or containment.

A INCORRECT: Plausible because there is no train of containment cooling running, and the is one of the decision points for entry into Z.1, but it is incorrect due to containment pressure being less than 25 psig.

B CORRECT: See above explanation.

C INCORRECT: Plausible because this is a yellow path, all containment radiation monitors greater than 10 R/h. With this being a yellow the implementation is based on operator judgment when it is determined that adequate time exists to implement it.

D INCORRECT: Plausible as given the indications, there is an issue with sump, but this would be a misconception on the part of the operator.

Learning Objective:
IMPLEMENT the CSPs to respond to plant conditions where the Containment Status Tree is not satisfied.
(043.03.LP2000.007)

27. 2023 NRC RO 027

Unit 2 ‘B’ Reactor Coolant Pump was started after a seal replacement with the following parameters:

- RCS pressure at 411 psig
- Seal injection flow at 6 gpm

After operating ‘B’ Reactor Coolant Pump for approximately 20 minutes the following indications were observed:

- No. 1 seal delta-P >400 psig
- No. 1 seal leakoff has steadily risen

What action should be taken to correct the issue?

A. Vent the RCDT.

B✓ Raise pressure on the VCT.

C. Close the No. 1 seal bypass valve.

D. Trip the RCP due to No. 3 seal failure.

RO Tier 1 Group 2

Source:
Modified

Question History:
Modified from PB Exam Bank # 051.01.LP0125.005 008 to re-dress the question from an action mitigation point of view vice just the abnormal conditions.

K/A:
(003A2.04) Ability to (a) predict the impacts of the following on the (SF4P RCP) REACTOR COOLANT PUMP SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Effects of fluctuation of VCT pressure on RCP seal injection flow

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(5)

Reference:
ARB 2C03 2D 3-10, 2P-1A RCP No. 1 Seal Water Flow High or Low, Rev. 8
AOP-1B UNIT 2, RCP Malfunction, Rev. 27

Proposed reference to be provided to the applicants during examination:
None

Original Question:
Modified from PB Exam Bank # 051.01.LP0125.005 008 to re-dress the question from an action mitigation point of view vice just the abnormal conditions.

Justification:

A. Incorrect – Plausible if the candidate believes that a higher RCDT pressure will cause an increased ΔP on the seal.

B. Correct – Given the conditions, VCT pressure is too low.

C. Incorrect – Plausible if the candidate believes that the indications support a bypassed seal.

D. Incorrect – Plausible if the candidate believes that the downstream flowpath is blocked and the RCP cannot be recovered.

Learning Objective:

28. 2023 NRC RO 028

Unit 2 is operating at 100% power.

- 2CV-142, Charging Flow Control Valve, has failed full open.

Reactor Coolant Pump labyrinth seal DP will _(1)_ and pressurizer level will _(2)__.

	(1)	**(2)**
A.✓	lower	remain constant
B.	rise	steadily rise
C.	rise	remain constant
D.	lower	steadily rise

RO Tier 2 Group 1

Source:
Bank

Question History:
2011 NRC RO 36

K/A:
Ability to predict and/or monitor changes in parameters associated with operation of the (SF1; SF2 CVCS) CHEMICAL AND VOLUME CONTROL SYSTEM, including (CFR: 41.5 to 41.7 / 45.5): Letdown and charging flows

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
10 CFR 55.41.5

Reference:
LP0079

Proposed reference to be provided to the applicants during examination:
None

Original Question:
2011 NRC RO 36

Justification:

A: Correct, 2CV-142 opening would raise charging flow, which would result in less flow being provided to the seal injection flow path, resulting in a lower RCP labyrinth seal delta P. Charging pumps are positive displacement type pumps with speed controlled through a variable frequency drive unit with input from auctioneered high Tave. Since Tave did not change, charging pump speed did not change and therefore charging flow remains the same, keeping pressurizer level constant.

B: Incorrect, The first part is incorrect. Plausible because student may believe the increased charging flow would result in increased flow to the RCP labyrinth seals based on an incorrect knowledge of the relationship between charging flow and seal delta p. The second part is incorrect. Plausible if the candidate incorrectly assumes that opening the charging flow control valve will raise overall charging flow, causing pressurizer level to rise.

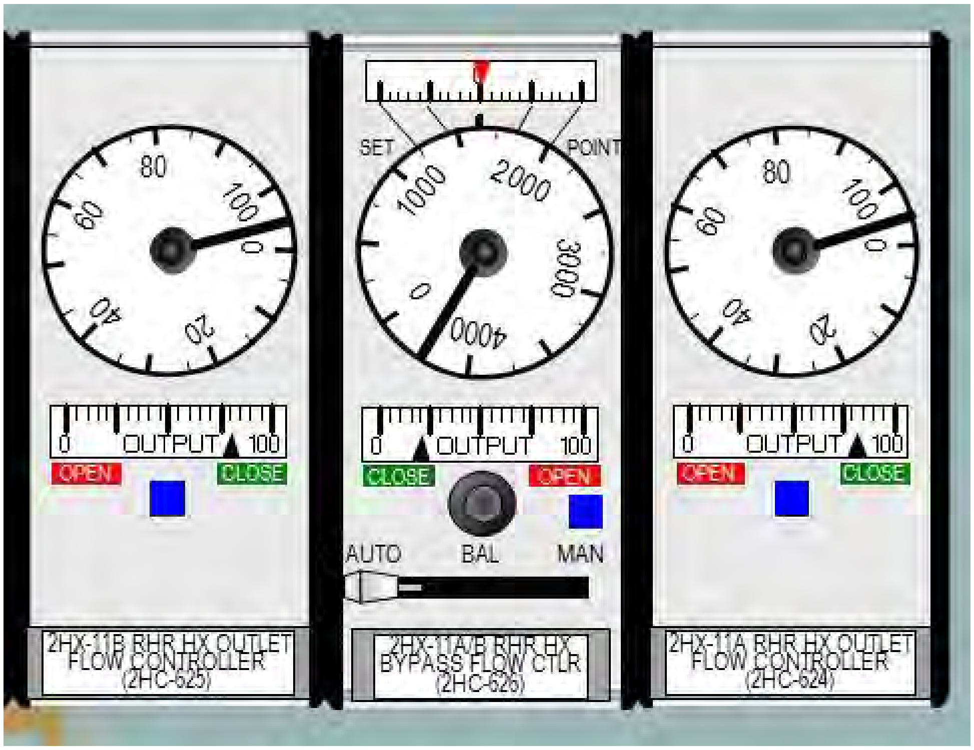
C: Incorrect, The first part is incorrect. Plausible because student may believe the increased charging flow would result in increased flow to the RCP labyrinth seals based on an incorrect knowledge of the relationship between charging flow and seal delta p. However, labyrinth seal delta P would lower due to lower flow. The second part is correct.

D: Incorrect, The first part is correct. The second part is incorrect. Plausible if the candidate incorrectly assumes that opening the charging flow control valve will raise overall charging flow, causing pressurizer level to rise.

Learning Objective:
DESCRIBE the function and/or purpose, design bases, and operating characteristics of the Component Cooling Water system and major components

29. 2023 NRC RO 029

Unit 2 is in MODE 5 with shutdown cooling in service as shown.



- A transient occurs where instrument air is lost to the 2RH-626, HX-11A/B RHR Hx Bypass Control valve.

(1) **Based on the loss of air, 2RH-626 is in the __(2)___ position.**

(2) **The controller responds by attempting to drive 2RH-626 to the __(1)__ position.**

	(1)	(2)
A.	open	closed
B.	closed	closed
C.	open	open
D.✓	closed	open

RO Tier 2 Group 1

Source:
New

Question History:
N/A

K/A:
(005) RESIDUAL HEAT REMOVAL SYSTEM
(191003K1.01) CONTROLLERS AND POSITIONERS:
Function and operation of flow controller in manual and automatic modes

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(3)

Reference:
2-SOP-RH-002, Residual Heat Removal System Operation, Rev. 14
110E029 Sheet 1, Rev. 57

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Learning Objective:

A. Incorrect Plausible if the candidate believes that the 2RH-626 valve fails open on a loss of instrument air AND if the candidate does not recall controller operation in automatic.

B. Incorrect – Plausible if the candidate does not recall controller operation in automatic.

C. Incorrect – Plausible if the candidate believes that the 2RH-626 valve fails open on a loss of instrument air.

D. Correct – The controller will "see" the 2RH-626 valve closed and will attempt to open the valve to maintain proper flow. Based on the loss of instrument air, the 2RH-626 fails closed.

Learning Objective:

30. 2023 NRC RO 030

Unit 1 operators are attempting to place ECCS on Containment Sump recirculation following a LOCA.

Which of the following requirements is a direct interlock regarding operation of 1SI-857A, 'A' RHR Heat Exchanger Outlet to SI Pump Suction Valve?

A. 1SI-896A, 'A' SI Pump Suction from RWST Isolation Valve, must be closed.

B. 1SI-852A, Low Head SI Core Deluge Valve, must be throttled to 43%.

C.✓ 1P-10A RHR Pump discharge pressure must be <210 psig.

D. 1SI-897A or 1SI-897B, Recirc Line Isolation AOV, must be closed.

RO Tier 2 Group 1

Source:
New

Question History:
None

K/A:
Ability to manually operate and/or monitor the (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM in the control room (CFR: 41.7 / 45.5 to 45.8): Overpressure protection system

Justification for K/A Match:
Meets KA: Requires operator knowledge of system interlocks that protect the ECCS system from overpressure conditions.
Meets Tier 2: Requires operator knowledge of system interlocks for operation.

Cognitive Level:
Low

10 CFR Part 55 Content:
10 CFR 55.41.7

Reference:
PBN LP0066 Safety Injection, Rev 27

Proposed reference to be provided to the applicants during examination:
None

Original Question:
None

Justification:

A.Incorrect. 1SI-857A must be fully closed to open 1SI-896A, to prevent RWST contamination. However, 1SI-857A can be opened even if 1SI-896A is open to allow swap over to containment sump recirculation if only 1 train of ECCS equipment is operable. Plausible if the candidate incorrectly applies 1SI-896A interlock requirements to 1SI-857A for the basis of cross contamination prevention.

B.Incorrect. 1SI-852A must be throttled to 43% per procedure to prevent RHR pump runout when RHR pumps are supplying Containment Spray. However, this is not an interlock to 1SI-857A. Plausible if the candidate incorrectly applies 1SI-852A operating requirements to 1SI-857A for establishing runout protection.

C.Correct. The 1P-10A discharge pressure must be <210 psig to open 1SI-857A. This interlock prevents over pressurization of the SI pump suction piping.

D.Incorrect. There is no interlock for operation of 1SI-857A related to 1SI-897A or B. These valves are interlocked with 1SI-851 valve operation. Plausible if the candidate incorrectly applies 1SI-851A or B interlock requirements to 1SI-857A.

Learning Objective:

31. 2023 NRC RO 031

Unit 2 experienced a transient. The crew has entered CSP-P.1, "Response to Imminent Pressurized Thermal Shock Condition" and is currently on Step 6:

```
6     Check If ECCS Flow Should Be
      Terminated:
```

What is the basis for terminating Safety Injection and starting necessary RCPs per CSP-P.1 Step 6?

A. The soak required by CSP-P.1 requires SI to be secured. RCPs are started to provide the ability to use normal spray to depressurize the primary system.

B. The soak required by CSP-P.1 requires SI to be secured. RCPs are started to equalize boron concentration throughout the primary to ensure proper shutdown margin as the RCS cools.

C.✓ SI is a significant contributor to cold leg temperature decrease and may prevent lowering RCS pressure and should be terminated if possible. RCPs are started to provide mixing of cold SI and warm reactor coolant water.

D. SI is a significant contributor to cold leg temperature decrease and may prevent lowering RCS pressure and should be terminated if possible. RCPs are started to minimize temperature gradient across S/G tube sheets.

RO Tier 2 Group 1

Source:
Bank

Question History:
Question is from 2007 NRC RO 027 and Seabrook exam bank

K/A:
Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM:
Brittle fracture, including causes and preventive actions

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(7)

Reference:
CSP-P.1 UNIT 2 Rev. 35

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Learning Objective:

A. Incorrect – Plausible if the candidate believes There is a soak required in CSP-P.1 but SI is preferred to be secured not required and other means besides spray are available to depressurize the RCS. Starting an RCP is for mixing of water to equalize temperature.

B. Incorrect – Plausible if the candidate believes there is a soak required in CSP-P.1 but SI is preferred to be secured not required, RCP start is for mixing water to equalize temperature not boron.

C. Correct – Stopping SI flow stops the addition of cold water into the RCS and starting the RCPs mixes the RCS to warm it up reducing PTS concerns.

D. Incorrect – Plausible if the candidate believes SI is a correct answer but RCPs do not mix the water to reduce the temperature gradient across the S/G tube sheet.

Learning Objective:

32. 2023 NRC RO 032

Given:
- Unit 1 is at 100% power

The following occurs:
- A Pressurizer PORV fails open.
- The associated PZR PORV Block valve was taken to close.
- PRT Pressure is 90 psig.
- PRT Pressure is RISING at 3 psig per minute.
- ARB 1C04 1C 1-1, PRT PRESS HIGH TEMP HI LEVEL HI OR LO, is LIT
- PRT Level is 80% and rising slowly
- Pressurizer Level is 35% and lowering slowly

(1) What is the appropriate operator response to the above event?
AND
(2) AFTER FIVE MINUTES, with the block valve <u>NOT</u> closed, which of the following parameters accurately indicate expected PRT conditions?

A. (1) Drain the PRT using OP 4C, Pressurizer Relief Tank Operation
(2) PORV Relief line temperatures RISING

B. (1) Trip the Reactor and initiate SI using AOP-1A, Reactor Coolant Leak
(2) PORV Relief line temperatures RISING

C. (1) Drain the PRT using OP 4C, Pressurizer Relief Tank Operation
(2) PRT Pressure LOWERING

D.✓ (1) Trip the Reactor and initiate SI using AOP-1A, Reactor Coolant Leak
(2) PRT Pressure LOWERING

RO Tier 2 Group 1
Tier 2- tests candidate's knowledge of PRT system and the impact that exceeding the pressure limit has on the system during abnormal operations.

Source:
Modified Bank

Question History:
2014 Byron #34

K/A:
Ability to (a) predict the impacts of the following on the (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 43.5 / 45.3 / 45.13): Exceeding PRT/quench tank high-pressure limits

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
10 CFR 55.41.5

Reference:

ARB 1C04 1C 1-1_05, PRT PRESS HIGH TEMP HI LEVEL HI OR LO AOP-1A Unit 1_20, Reactor Coolant Leak
OP 4C Unit 1_002, Pressurizer Relieve Tank Operation unit 1_

Proposed reference to be provided to the applicants during examination:

None

Original Question:

32 **Points: 1.00**

Which of the following parameters indicates that the PRT rupture disk has ruptured following a Pressurizer PORV failing OPEN?

A. Pressurizer pressure LOWERING

B. Relief line temperatures RISING

C. PRT temperature LOWERING

D. Pressurizer level LOWERING

Answer: C

Answer Explanation:

A is incorrect: Pzr pressure will not lower, because the PORV is controlled by Pzr pressure. If pressure lowers, PORV will close.

B is incorrect: Relief line temperatures will lower, if there is any change at all, when the PRT ruptures. They rose when the PORV opened.

C is CORRECT: The PRT is a saturated system, so when it ruptures at 100 PSIG, it will go to CNMT pressure and temperature will lower accordingly.

D is incorrect: Any change in Pzr level will be affected very little, if at all, by the PRT rupturing.

Justification:

A. Incorrect – Part (1) is incorrect. PORV Relief line temperatures will lower, if there is any change at all, when the PRT ruptures. They rose when the PORV opened. Plausible if the candidate fails to recall that the PRT rupture disc setpoint is 100 psid, and assumes that rising pressure in the PRT will result in higher tailpipe temperatures. Part (2) is incorrect but plausible since ARB 1C04 1C 1-1 states ‘If Necessary to fill, vent, drain, or pressurize the PRT, then go to OP 4C. In this situation, transitioning to OP 4C is not the priority concern for mitigating plant conditions. Plausible if the candidate incorrectly determines that addressing adverse PRT conditions (rising PRT Level) is the primary concern of the question.

B. Incorrect – Part (1) is incorrect. PORV Relief line temperatures will lower, if there is any change at all, when the PRT ruptures. They rose when the PORV opened. Plausible if the candidate fails to recall that the PRT rupture disc setpoint is 100 psid, and assumes that rising pressure in the PRT will result in higher tailpipe temperatures. Part (2) is correct. ARB 1C04 1C-1-1 refers the operator to AOP-1A, if necessary. The entry criteria are met for AOP-1A, Reactor Coolant Leak. Step 1, a continuous action step, directs a manual reactor trip and safety injection initiation if PZR Level is not within 10% of program level.

C. Incorrect – Part (1) is correct. The PRT rupture disc will relieve PRT pressure to containment at 100 psid. . Part (2) is incorrect but plausible since ARB 1C04 1C 1-1 states ‘If Necessary to fill, vent, drain, or pressurize the PRT, then go to OP 4C. In this situation, transitioning to OP 4C is not the priority concern for mitigating plant conditions. Plausible if the candidate incorrectly determines that addressing adverse PRT conditions (rising PRT Level) is the primary concern of the question.

D. Correct - Part (1) is correct. The PRT rupture disc will relieve PRT pressure to containment at 100 psid.. Part (2) is correct. ARB 1C04 1C-1-1 refers the operator to AOP-1A, if necessary. The entry criteria are met for AOP-1A, Reactor Coolant Leak. Step 1, a continuous action step, directs a manual reactor trip and safety injection initiation if PZR Level is not within 10% of program level.

Learning Objective:

IDENTIFY and DESCRIBE the Control Room controls, alarms, and indications associated with the Pressurizer, Level control, Pressure control, and Relief system, including:

- Location and function of component and/or system operating controls and control stations
- Alarming locations and response to major system and component alarms
- Plant, system, and component conditions or permissives required for Control Room operation
- Set points associated with major system alarms and/or interlocks

33. 2023 NRC RO 033

The following exists on Unit 2

- ARB 1C04 1C 1-1, PRT PRESS HIGH TEMP HI LEVEL HI OR LO is LIT
- The crew is currently filling the Pressurizer Relief Tank (PRT) using OP-4C, Pressurizer Relief Tank Operation

(1) Which system is used in OP-4C to fill the PRT?
(2) Why is it undesirable to have a low level in the PRT?

A. (1) Chemical and Volume Control System

(2) The radioactive gases that leak from the top of the pressurizer would not be adequately scrubbed, causing elevated gaseous activity inside containment.

B. (1) Chemical and Volume Control System

(2) There would be insufficient water volume to absorb and condense a design discharge of pressurizer safeties, resulting in exceeding the PRT design pressure.

C. (1) Reactor Makeup Water System

(2) The radioactive gases that leak from the top of the pressurizer would not be adequately scrubbed, causing elevated gaseous activity inside containment.

D.✓ (1) Reactor Makeup Water System

(2) There would be insufficient water volume to absorb and condense a design discharge of pressurizer safeties, resulting in exceeding the PRT design pressure.

*****NRC LISTED AS HIGH COG. VERIFY COGNITIVE LEVEL*****

RO Tier 2 Group 1

Source:
New

Question History:
N/A

K/A:
(007K6.09) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM:
Makeup/fill water

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(3)

Reference:
OP-4C, PRT Operation, Rev. 2
PB UFSAR Section 4.2

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Learning Objective:

A. Incorrect – Plausible if the candidate believes that CVCS is used to fill the PRT (per OP-4C, only the RMW system is used) AND believes that a radioactive release will occur and that the contents of the PRT are scrubbed for pH concerns.

B. Incorrect – Plausible if the candidate believes that CVCS is used to fill the PRT (per OP-4C, only the RMW system is used).

C. Incorrect – Plausible if the candidate believes that a radioactive release will occur and that the contents of the PRT are scrubbed for pH concerns.

D. Correct – In accordance with OP-4C, only the RMW system is used to fill the PRT. The reason for the low level is per the UFSAR.Incorrect – Plausible if the candidate believes that the 2RH-626 valve fails open on a loss of instrument air.

Learning Objective:

34. 2023 NRC RO 034

Given the following:

- Unit 1 is operating at Rated Thermal Power
- Blockage is developing in the service water line supplying the component cooling heat exchanger aligned to Unit 1

Subsequently the following annunciators are LIT:

- 1C03 1D 1-6, COMPONENT COOLING HX OUTLET TEMP HIGH
- 1C03 1D 2-4, 1P-1A OR B RCP COMPONENT COOLING WATER RETURN TEMP HIGH

The maximum CC supply header temperature to the RCPs shall not exceed __(1)__; and to resolve this issue the crew must enter __(2)__.

	(1)	(2)
A.✓	125°F	AOP 9A, SERVICE WATER SYSTEM MALFUNCTION
B.	135°F	AOP-9B, COMPONENT COOLING SYSTEM MALFUNCTION
C.	135°F	AOP 9A, SERVICE WATER SYSTEM MALFUNCTION
D.	125°F	AOP-9B, COMPONENT COOLING SYSTEM MALFUNCTION

RO Tier 2 Group 1

Source:
Bank

Question History:
963. 2017 NRC 13

K/A:
Ability to (a) predict the impacts of the following on the (SF8 CCW) COMPONENT COOLING WATER SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 43.5 /45.3 / 45.13): SWS malfunction

Justification for K/A Match:
KA – requires operator knowledge of the impact of a SWS malfunction on the operation of the CC system.

Cognitive Level:
Low

10 CFR Part 55 Content:
10 CFR 55.41.5

Reference:
AOP-9A Service Water System Malfunction, Rev. 39
1-SOP-CC-001 Component Cooling System, Rev 33

Proposed reference to be provided to the applicants during examination:
None

Original Question:
963. 2017 NRC 13

Justification:

The Abnormal Operating Procedure for loss of service water directs use of operating instructions to address adverse temperature trends for service water cooled equipment. The component cooling system operating procedure provides a maximum CC supply temperature to the RCPs of 125°F.

A CORRECT: See above explanation.

B INCORRECT: The first half is incorrect but plausible because this value is the alarm setpoint for the RCP CC water return temperature. The second half is incorrect but plausible if the student mistakenly diagnoses CCW system alarms are due to a CCW system malfunction.

C INCORRECT: The first half is incorrect but plausible because this value is the alarm setpoint for the RCP CC water return temperature. The second half is correct.

D INCORRECT: The first half is correct. The second half is incorrect but plausible if the student mistakenly diagnoses CCW system alarms are due to a CCW system malfunction.

Learning Objective:
RECOGNIZE and ANALYZE the response of the Component Cooling Water System to a loss of the Service Water system.
(051.06.LP0084.006)

35. 2023 NRC RO 035

Unit 1 is operating at rated power when a transient occurs:

- Unit 1 has tripped
- Power to 1B-32, 480V Safeguards MCC is lost

Regarding the CCW system:

(1) What valve has lost power due to the transient?

(2) What is the expected position of the valve after the transient?

A. (1) 1CC-769, 1HX-4 ELHX SHELL SIDE OUTLET AOV

(2) Closed

B. (1) 1CC-769, 1HX-4 ELHX SHELL SIDE OUTLET AOV

(2) Open

C. (1) 1CC-754A, 1P-1A RCP CC INLET MOV

(2) Closed

D.✓ (1) 1CC-754A, 1P-1A RCP CC INLET MOV

(2) Open

RO Tier 2 Group 1

Source:
New

Question History:
N/A

K/A:
(008 K2.01) Knowledge of electrical power supplies to the following:
COMPONENT COOLING WATER SYSTEM CCW Valves

Justification for K/A Match:

Cognitive Level: High

10 CFR Part 55 Content:
55.41 (b)(7)

Reference:
110E018, Sheet 1, Auxiliary Coolant System, Rev. 71
110E018, Sheet 2, Auxiliary Coolant System, Rev. 22
110E018, Sheet 3, Auxiliary Coolant System, Rev. 45

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Learning Objective:

A. Incorrect – Plausible if the candidate mis-remembers the power supply for the 1CC-769 since the power supply for the valve is D-16 vice 1B-32. A loss of power for an AOV associated with a containment isolation would fail in the closed direction.

B. Incorrect – Plausible if the candidate mis-remembers the power supply for the 1CC-769. Plausible as the valve is expected to be open with no containment isolation signal.

C. Incorrect – The power supply for the 1CC-754A is 1B-32 with the valve losing indications on the control boards. It is expected to be open as the stem does NOT mention any action where the valve should be closed. Candidate may think valve is closed with loss of indicating lights.

D. Correct – The power supply for the 1CC-754A is 1B-32 with the valve losing indications on the control boards. The valve is expected to be open as nothing closed the MOV prior to the power loss..

Learning Objective:

36. 2023 NRC RO 036

With the Pressurizer Level Defeat Switch in the OPERATE (426 CH1) position, a Pressurizer level instrument failure on Unit 1 caused the following **SEQUENTIAL** plant events:

- Charging flow was reduced.
- Pressurizer level lowered.
- Letdown flow isolated and Pressurizer heaters turned off.
- Pressurizer level increased until a high level trip occurred.

Which of the following instrument failures caused this sequence of events?
(assume NO operator action)

A. Pressurizer level channel 426 (Red) failed low.

B. Pressurizer level channel 426 (Red) failed high.

C. Pressurizer level channel 428 (Blue) failed low.

D.✓ Pressurizer level channel 428 (Blue) failed high.

Bank:

K/A # and IR:

K/A Statement: Knowledge of the interrelations between the Pressurizer Level Control Malfunctions and the following: Sensors and detectors.

References:
Logic Drawing 883D195 Sh. 13, Pressurizer Trip Signals
Logic Drawing 883D195 Sh. 18, PZR Level and Pressure Control
PBN LP00078 PZR & PRT Rev 16
PBN LP0457, PZR Press and level Control Rev 15

Proposed reference to be provided to the applicants during examination:
None

Original Question:
Given:
- Unit 1 is at 75% power, normally aligned.
- All systems are at stable, steady state condition.

Then the following event occurs:
- A charging flow control malfunction causes pressurizer level to rise.
- The crew takes manual control of charging flow and stabilizes pressurizer level at 60%.
- ALL other systems remain in automatic control and the crew maintains pressurizer level at 60% until stable, steady state conditions exist again.

With the above conditions, compare STEADY STATE demand on the on 1PK-455A, MASTER
PZR PRESS CONTROLLER, BEFORE and AFTER the event.

AFTER the event, 1PK-455A DEMAND will be...

A. LOWER because a smaller pressurizer bubble exists.

B. LOWER because spray flow is more effective.

C. HIGHER because of more pressurizer heater input.

D. the SAME because saturation pressure is the same.

Proposed Answer: C

Explanation:

A: Incorrect, channel is not a controlling channel but direction of failure would cause letdown and heaters to isolate.

B: Incorrect, channel failed in the correct direction to cause above indications, but is not normally a controlling channel.

C: Incorrect, channel is a controlling instrument and the direction of failure would cause letdown to isolate and heaters to turn off.

D: Correct, Charging flow lowered due to the false high signal, actual Pressurizer level lowered due to lower charging flow which subsequently isolated letdown and turned off heaters. Due to letdown being secured, eventually the Pressurizer filled up to the high level trip setpoint.

Learning Objective:
LP0078
DESCRIBE the function and/or purpose, design bases, and operating characteristics of the Pressurizer, Level control, Pressure control, and Relief system and its major components.

LP0457
DESCRIBE the automatic functions and interlocks associated with the Pressurizer, Level control, Pressure control, and Relief system and its major components:

Pressurizer Pressure
Pressurizer Level
Low Temperature Over Pressure Protection

37. 2023 NRC RO 037

Given:

- Unit 1 is at 5% Reactor Power
- 52/RTA, Reactor Trip Breaker ’A’ is CLOSED
- 52/BYB, Reactor Trip Bypass Breaker ’B’ is CLOSED

Due to a malfunction, power to D01 is lost.

What represents the automatic function of the Reactor Protection System?

	52/RTA, ’A’ Reactor Trip Breaker	52/BYB, ’B’ Reactor Trip Bypass Breaker
A.	Open	Closed
B.✔	Open	Open
C.	Closed	Closed
D.	Closed	Open

RO Tier 2 Group 1

Source:
Bank

Question History:
PB, 2017 Q#38

RO:
10 CFR Part 55 Content: 55.41 (b)(7)

K/A:
012 K2.01 Knowledge of electrical power supplies to the following
- RPS channels, components, and interconnections

Justification for K/A Match:

Cognitive Level:

Reference:

617F354 Sheet 5A, Reactor Protection System Reactor Trip Breaker Switchgear Train A Unit 1, Schematic Diagram, Rev. 5

Proposed reference to be provided to the applicants during examination:

None

Original Question:

N/A

Justification:

A. Incorrect – Plausible if the candidate believes the ’B’ Reactor Trip Bypass Breaker is powered from ’B’ train 125 V_{DC} power.

B. Correct – The ‘A’ train 125 V_{DC} train supplies power to both the ‘A’ Reactor Trip Breaker and ‘B’ Reactor Trip Bypass Breaker UV coils, so both will be open.

C. Incorrect – Plausible if the candidate believes the ’A’ Reactor Trip Breaker and ’B’ Reactor Trip Bypass Breaker are not powered from the 125 V_{DC} system.

D. Incorrect - Plausible if the candidate believes the ’A’ Reactor Trip Breaker is powered from the ’B’ train 125 V_{DC} power.

Learning Objective:

38. 2023 NRC RO 038

Which of the following Safeguards Signals DIRECTLY causes a Containment Isolation Signal (CI)?

A. Main Steam Line Isolation Signal

B. MANUAL Safety Injection Signal

C.✓ AUTO Safety Injection Signal

D. AUTO Containment Spray Actuation Signal

RO Tier 2 Group 1

Source:
Bank

Question History:
2012 NRC RO 55

RO:
10 CFR 55.41.2

Justification:
Tier 2 – requires candidates to recall from knowledge the actuation signals for containment isolation from the ECCS system.

K/A:
Knowledge of (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM design features and/or interlocks that provide for the following (CFR: 41.2 / 41.6 / 41.7): Containment isolation signal actuation/reset

Justification for K/A Match:

Cognitive Level:
Low

Reference:
Logic Drawing 883D195 Sh. 7_25, Containment Isolation

Proposed reference to be provided to the applicants during examination:
None

Original Question:
2012 NRC RO 55

Justification:

A: Incorrect: Safety injection sends a signal to the MSIV isolation circuit. Plausible if candidate forgets the circuitry tie between isolation signals.

B: Incorrect: When manual safety injection is used, manual containment isolation is required. Plausible if candidate forgets the circuitry for manual Si vs automatic CI signals.

C: Correct: Auto safety injection sends a signal to the containment isolation circuit.

D: Incorrect: Containment spray is at 25 psig so a containment isolation signal should have been sent at 5 psig containment pressure. Plausible if the candidate forgets which Containment pressure setpoint initiates what circuitry.

Learning Objective:

Describe the automatic functions associated with the ESFAS and its major components. Description should include ...actuation logic....
(053.06.LP0486.014) (required, if available)

39. 2023 NRC RO 039

Unit 2 has experienced a large break LOCA with loss of offsite power.

The following conditions were noted:

- Containment pressure is 27 psig
- 2A06 4160 VAC Safeguards Bus is **deenergized**

Which components of the Containment Cooling system will be operating?

	Containment Spray Pump	**Containment Fans**
A.✓	2P-14A	2W-1A1 and 2W-1B1
B.	2P-14A	2W-1C1 and 2W-1D1
C.	2P-14B	2W-1A1 and 2W-1B1
D.	2P-14B	2W-1C1 and 2W-1D1

RO Tier 2 Group 1

Source:
Bank

Question History:
PB 2009 NRC Exam Question RO 038

RO:
10 CFR Part 55 Content: 55.41 (b)(7)

Justification:

K/A:
022 A3.01 Ability to monitor automatic features of the CONTAINMENT COOLING SYSTEM, including:
-Initiation of ESFAS mode of operation

Justification for K/A Match:

Cognitive Level:

Reference:

MDB 3.2.4 2B03, Rev. 14
MDB 3.2.4 2B04, Rev. 14

Proposed reference to be provided to the applicants during examination:

None

Original Question:

N/A

Justification:

A. Correct – Based on the power available in the question, the 2P-14A CS Pump with 2W-1A1 and 2W-1B1 will be running.

B. Incorrect – Plausible if the candidate believes the 2W-1C1 and 1D1 fans will be running.

C. Incorrect – Plausible if the candidate believes the 2P-1B1 CS Pump will be running.

D. Incorrect – Plausible if the candidate believes the 2P-1B1 CS Pump and the 2W-1C1 and 1D1 fans will be running.

Learning Objective:

40. 2023 NRC RO 040

Given the following:

- A Containment Pressure transmitter that feeds both SI and Containment Spray fails LOW
- Action has been taken in accordance with Technical Specifications to place the failed channel in TRIP

Which of the following identifies the correct ESF actuation logic for the remaining Containment pressure channels?

A.✓ Safety Injection - 1 of 2; Containment Spray - 1 of 2 plus 2 of 3

B. Safety Injection - 1 of 2; Containment Spray - 2 of 3 plus 2 of 3

C. Safety Injection - 1 of 3; Containment Spray - 1 of 2 plus 1 of 3

D. Safety Injection - 1 of 3; Containment Spray - 2 of 3 plus 1 of 3

RO Tier 2 Group 1

Source: Bank

Question History:

2011 Ginna Retake Question 11

K/A:

013K6.01 Engineered Safety Features Actuation System (ESFAS)
Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: **Sensors and detectors**
(Imp 2.7*/3.1*)

Justification for K/A Match:

Matches the K/A by requiring the operator to understand how a failure of a detector will effect on the functioning of ESFAS.

Cognitive Level:

Comprehensive 2-DR: The operator must understand the initial conditions, and the ramifications of the event. Then the operator must determine what effect this event will have on the remaining ESF actuation logic

10 CFR Part 55 Content:

55.41 7
55.43

Reference:

883D195 SH 7, Safeguards Actuation Signals Logic Diagram Rev 25

Proposed reference to be provided to the applicants during examination:

None

Original Question:

Given the following:

A Containment Pressure transmitter that feeds both SI and Containment Spray fails LOW.

Action has been taken in accordance with Technical Specifications to place the failed channel in TRIP.

Which ONE of the following identifies the correct ESF actuation logic for the remaining Containment pressure channels?

A. Safety Injection -1/2; Containment Spray -1/2 plus 2/3

B. Safety Injection -1/2; Containment Spray -213 plus 2/3

C. Safety Injection -1/3; Containment Spray -1/2 plus 1/3

D. Safety Injection -1/3; Containment Spray -2/3 plus 1/3

Proposed answer: A

Justification:

Safety Injection is normally 2 of 3 logic for Containment Pressure and Containment Spray is 2 of 3 taken twice. When a protection channel that feeds both actuations is removed from service, bistables are tripped in all cases. AUTO SI will occur if either of the two remaining bistables trip, and an AUTO CS normally needs 2 of 3 for 2 sets of inputs, since one is already in a tripped condition, only 1 additional is needed to meet the 2 of 3 requirement for the first set of inputs, and for the other, it will need and additional 2 of 3 channels to trip.

A **CORRECT:**See above.

B **INCORRECT:**The first part is correct. The second part is incorrect, plausible as it would be correct if Containment Spray was placed in BYPASS rather than trip.

C **INCORRECT:**The first part is incorrect, SI is 1 of 2, plausible because PZR Pressure SI actuation is 2 of 3 logic, and the operator can confuse the logic with the 2 of 4 logic provided by other RPS actuations. The second half is correct.

D **INCORRECT:**The first part is incorrect, SI is 1 of 2, plausible because PZR Pressure SI actuation is 2 of 3 logic, and the operator can confuse the logic with the 2 of 4 logic provided by other RPS actuations. The second part is incorrect, plausible as it would be correct if Containment Spray was placed in BYPASS rather than trip.

Learning Objective:

Describe the automatic functions associated with the Engineered Safety Features Actuation System (ESFAS) and its major components. Description should include actuation setpoints, actuation logic, logic acceptability, requirements to enable actuation, and protection afforded by the system. (053.06.LP0486.017)

41. 2023 NRC RO 041

The mechanical seal on a containment spray pump is cooled by the __________ system?

A. ✓ Component Cooling Water

B. Reactor Makeup Water

C. Service Water

D. Firewater

RO Tier 2 Group 1

Source:
Bank

Question History:
PB NRC Exam Bank Question 051.03.LP0064.010 002

RO:
10 CFR Part 55 Content: 55.41 (b)(9)

Justification:

K/A:
026 K1.02 Knowledge of the physical connections and/or cause and effect relationships between the CONTAINMENT SPRAY SYSTEM and the following systems:
-Cooling water

Justification for K/A Match:

Cognitive Level:

Reference:
110E017 Sh. 3, Rev. 48

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

A. Correct – The Component Cooling Water System cools the CS Pump mechanical seal.

B. Incorrect – Plausible if the candidate believes the Reactor Makeup System cools the CS mechanical seal.

C. Incorrect – Plausible if the candidate believes the Service Water System cools the CS mechanical seal.

D. Incorrect – Plausible if the candidate believes the firewater system cools the CS mechanical seal.

Learning Objective:
051.03.LP0064.010

42. 2023 NRC RO 042

Unit 1 is at 100% power with a lowering Main Steam header pressure.

What is the effect on the Auxiliary Steam System?

1MS-2074, Air Ejector Steam Supply Valve, will throttle __(1)__ to maintain Aux Steam Pressure at __(2)__ PSIG.

	(1)	(2)
A.✓	Open	180
B.	Open	150
C.	Closed	180
D.	Closed	150

RO Tier 2 Group 1

Source:
New

Question History:
None

RO:
10 CFR 55.41.7

Justification:
Meets Tier 2 requirements based on required operator knowledge to understand the aux steam system response related to main steam header pressure changes.

K/A:
Knowledge of the effect that a loss or malfunction of the (SF4S MSS) MAIN AND REHEAT STEAM SYSTEM will have on the following systems or system parameters (CFR: 41.7 / 45.6): Auxiliary steam system

Justification for K/A Match:

Cognitive Level:
Low

Reference:
OP13A Unit 1_016
M-201 SH 2_033
PBN LP0135 Rev 13 Condenser Air Removal

Proposed reference to be provided to the applicants during examination:
None

Original Question:
None

Justification:

Aux Steam Supply Valve monitors downstream pressure as indicated on PI-2075 to maintain aux steam pressure at the desired pressure. In the question stem, a lowering main steam header pressure would reduce supply pressure to the aux steam system and result in lowering aux steam pressure. This would result in the valve opening to allow more steam pressure through the valve to maintain aux steam header pressure.

OP-13A Step 5.12.3.h, states “Ensure 1MS-2074 is maintaining pressure at approximately 180psig”.

A Correct.

B incorrect. Part (1) is correct that the valve will open; Part (2) is incorrect in that the valve setpoint maintains 180#. The answer is plausible based on the common value of auxiliary steam pressure of 150#.

C Incorrect. Part (1) is incorrect; closing of the valve will reduce downstream pressure and further lower aux steam pressure out of the desired band. Plausible if the trainee misapplies knowledge regarding system operation and believes that closure of the valve is required to maintain pressure to the air ejectors. Part (2) is correct.

D Incorrect. Part (1) is incorrect; closing of the valve will reduce downstream pressure and further lower aux steam pressure out of the desired band. Plausible if the trainee misapplies knowledge regarding system operation and believes that closure of the valve is required to maintain pressure to the air ejectors. Part (2) is incorrect in that the valve setpoint maintains 180#. The answer is plausible based on the common value of auxiliary steam pressure of 150#.

Learning Objective:

LP0135
DESCRIBE the Control Room controls, alarms, and indications associated with the Condenser Air Removal System, including:

- Location and function of component and/or system operating controls and control stations

43. 2023 NRC RO 043

Given the following:

- Both units at RTP
- An electrical transient resulted in the loss of 2A-02 4.16 KV Bus

What component is directly affected?

A. 1P-27C, Heater Drain Pump

B. 2P-1A, Reactor Coolant Pump

C. 1P-30B, Circulating Water Pump

D.✓ 2P-28B, Steam Generator Feed Pump

RO Tier 2 **Group** 1

Source:

New

Question History:

N/A

RO:

10 CFR Part 55 Content: 55.41 (b)(4)

Justification:

K/A:

(059 K2.01) Knowledge of electrical power supplies to the following:
MAIN FEEDWATER SYSTEM MFW system pumps

Justification for K/A Match:

Cognitive Level:

Reference:

MDB 3.2.2 2A01, Rev. 8

Proposed reference to be provided to the applicants during examination:

None

Original Question:

N/A

Justification:

A. Incorrect – Plausible if the candidate believes the Heater Drain Pump 1P-27C is powered by this bus instead of 2A-01.

B. Incorrect – Plausible if the candidate does not recognize that RCP 2P-1A is powered from 2A-01.

C. Incorrect – Plausible if the candidate does not recognize that this pump is powered by Unit 1 (1A-02).

D. Correct – Steam Generator Feed Pump, 2P-28B is powered from this bus.

Learning Objective:

44. 2023 NRC RO 044

EOP-1, Loss of Reactor or Secondary Coolant, step 3 states:

****

3	**Check Intact S/G Level:**	
	a. S/G level - GREATER THAN [52%] 33%	a. Maintain total feed flow greater than or equal to 275 gpm until level is greater than [52%] 33% in at least one S/G.
	b. Control feed flow to maintain S/G level between [52%] 33% and 63%	b. **IF** level in any S/G continues to rise in an uncontrolled manner, **THEN** go to EOP-3, UNIT 1, STEAM GENERATOR TUBE RUPTURE.

****

The reason for minimum total feed flow of 275 gpm is to . . .

A. maintain SG level in the narrow range during a large break LOCA.

B. recover from the initial shrink in SG water level during the reactor trip.

C.✓ ensure a secondary heat sink for small and intermediate size LOCAs and secondary breaks.

D. ensure a sufficient steam generator inventory to establish natural circulation on a loss of off site power.

RO Tier 2 Group 1

Source:
Bank

Question History:
2017 NRC 46

RO:
10 CFR 55.41.5

K/A:
Knowledge of the effect that a loss or malfunction of the (SF4S AFW) AUXILIARY/EMERGENCY FEEDWATER SYSTEM will have on the following systems or system parameters (CFR: 41.5 / 41.7 / 45.6): RCS

Justification for K/A Match:

Cognitive Level:
Low

Reference:
BG EOP-1_37 Loss of Reactor or Secondary Coolant Basis Document
CSP-H.1 Unit 1__047, Response to Loss of Secondary Heat Sink

Proposed reference to be provided to the applicants during examination:
None

Original Question:

EOP-1, Loss of Reactor or Secondary Coolant, has the following as step 3:

3	**Check Intact S/G Level:**		
	a. S/G level - GREATER THAN [51%] 32%	a.	Maintain total feed flow greater than or equal to 230 gpm until level is greater than [51%] 32% in at least one S/G.
	b. Control feed flow to maintain S/G level between [51%] 32% and 63%	b.	**IF** level in any S/G continues to rise in an uncontrolled manner, **THEN** go to EOP-3, UNIT 1, STEAM GENERATOR TUBE RUPTURE.

The reason for the minimum AFW flow of 230 gpm is to . . .

A. maintain SG level in the narrow range during a large break LOCA.
B. recover from the initial shrink in SG water level during the reactor trip.
C. ensure a sufficient generator inventory to establish natural circulation on a loss of off site power.
D. ensure a secondary heat sink for small and intermediate size LOCAs and secondary breaks.

Justification:

The purpose of the step is to ensure adequate feed flow or steam generator inventory to ensure a secondary heat sink for small and intermediate size LOCAs and secondary break accidents exists. To provide a positive static head of water to prevent primary to secondary leakage of a large LOCA.

A INCORRECT:Plausible as it is beneficial to maintain SG narrow range levels on span to ensure a positive static head, level will not be maintained in the narrow range during the beginning of the event as the SG will most likely shrink out of the narrow range, and a minimum flow of 275 gpm does not maintain that level, it maintains the heat sink requirement..

B INCORRECT:Plausible as this will happen on most reactor trips.

C CORRECT:See above explanation.

D INCORRECT:Plausible as this is what the EOP generically does by performing this step and one of the assumptions for most accidents is a loss of off-site power.

Learning Objective:

DESCRIBE the function and/or purpose, design bases, and operating characteristics of the Auxiliary Feedwater System and major components. (052.05.LP0169.001)

45. 2023 NRC RO 045

At 1000, an electrical fault results in a loss of 1B01 480 VAC bus.

At 1040, Operator action ___(1)___ required to restore power to the TSC.

Once Bus 1B01 is available, operator action ___(2)___ required to restore Bus 1B01 power to the TSC.

	(1)	(2)
A.✓	IS NOT	IS NOT
B.	IS NOT	IS
C.	IS	IS NOT
D.	IS	IS

RO Tier 2 Group 1

Source:
New

Question History:
N/A

RO:
10 CFR Part 55 Content: 55.41 (b)(7)

K/A:
(062A3.07) Ability to monitor automatic operation of the AC ELECTRICAL DISTRIBUTION SYSTEM:
Automatic bus transfer

Justification for K/A Match:

Cognitive Level:
Low

Reference:

PBE-7033, Electrical One Line Diagram, Rev. 14
PBE-011, PP34 Panel, OI-35B

Proposed reference to be provided to the applicants during examination:

None

Original Question:

N/A

Justification:

A. Correct – The TSC power supply has an alternate source, and the automatic transfer switch is normal seeking.

B. Incorrect – Plausible if the candidate believes the TSC power supply automatic transfer switch is power seeking.

C. Incorrect – Plausible if the candidate believes that alternate power to the TSC ABT must be manually aligned to be available and once normal power is available, the ATS automatically transfers to the normal source.

D. Incorrect – Plausible if the candidate believes the TSC power supply is protected by a manual transfer switch.

Learning Objective:

46. 2023 NRC RO 046

Which of the following Vital DC Distribution parameters are indicated in the Control Room?

1. Bus Voltage
2. Bus Feed Breaker position
3. Battery Charger output current
4. Battery current (Charge/Discharge)

A. 1, 2, and 3

B.✓ 1, 2, and 4

C. 1, 3, and 4

D. 2, 3, and 4

RO Tier 2 Group 1

Source:
Bank

Question History:
2011 NRC RO 47

RO:
10 CFR 55.41.5

K/A:
Ability to predict and/or monitor changes in parameters associated with operation of the (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM, including (CFR: 41.5 / 45.5): Battery charger voltage and/or current

Justification for K/A Match:

Cognitive Level:
Low

Reference:
PBNP LP0121, DC Distribution

Proposed reference to be provided to the applicants during examination:
None

Original Question:
Which of the following Vital DC Distribution parameters are indicated in the Main Control Room?

1. Bus Voltage
2. Battery current (Charge/Discharge)
3. Bus Feed Breaker position
4. Battery Charger output current

A. 1, 2, and 3
B. 1, 2, and 4
C. 1, 3, and 4
D. 2, 3, and 4
Justification:

A: Incorrect, Charger output current not indicated in MCR. Plausible if the candidate fails to recall appropriate indications available in the control room for battery charger current.

B: Correct

C: Incorrect, Charger output current not indicated in MCR. Plausible if the candidate fails to recall appropriate indications available in the control room for battery charger current.

D: incorrect, Charger output current not indicated in MCR. Plausible if the candidate fails to recall appropriate indications available in the control room for battery charger current.

Learning Objective:

47. 2023 NRC RO 047

Given the following:

- Unit 1 has lost all AC power
- G01 EDG is being started locally
- G01 voltage is out of the normal band due to the field **NOT** flashing

What action is required to flash the field on G01 EDG?

A. Shift DC control power fuse disconnects from D-28 to D-40.

B.✔ Depress the FFC relay inside the C-34 cabinet for 3 seconds.

C. Take the EDG Mode Selector Switch in the C-64 cabinet to HYD.

D. Depress the VOLTAGE SHUTDOWN reset pushbutton in the C-81 cabinet.

RO Tier 2 Group 1

Source: New

Question History:
None

K/A:
(064) EMERGENCY DIESEL GENERATOR SYSTEM (G2.1.30) CONDUCT OF OPERATIONS:
Ability to locate and operate components, including local controls

Cognitive Level:
Knowledge 1-P: The operator must recall the necessary steps to manually flash the field for G-01

Reference:
1-SOP-4KV-001, 4KV System Operations Unit 1, Rev. 10
ECA-0.0, Loss of All AC Power, Rev. 76

Proposed reference to be provided to the applicants during examination:
None

Justification:

A **INCORRECT:** Plausible if the candidate incorrectly recalls that this action is NOT used for G01 EDG.

B **CORRECT:** The candidate will go to the C-34 cabinet in accordance with ECA-0.0 Attachment A for a local manual start.

C **INCORRECT:** Plausible if the candidate mis-reads changing frequency. This action is taken for frequency issues or after you manually flash the field.

D **INCORRECT:** Incorrect – Plausible if the candidate incorrectly recalls that this action is NOT used for G01 EDG.

Learning Objective:

Given access to the site specific simulator, IMPLEMENT appropriate actions if the EDG does not start satisfactorily.
(031.02.LP0462.007)

IDENTIFY and DESCRIBE the local controls, alarms, and indications associated with the Diesel Generator System, including:
a. Location and function of component and/or system operating controls and control stations
b. Alarming locations and response to major system and component alarms
c. Plant, system, and component conditions or permissives required for local operation
d. Setpoints associated with major system alarms and/or interlocks
(**054.02.LP0133.007**)

48. 2023 NRC RO 048
Given the following:

- G02, Emergency Diesel Generator is Out of Service
- G01, Emergency Diesel Generator is aligned to BOTH 4160v Safeguards Buses
- An accident has occurred on Unit 1 coincident with a Loss of Offsite Power
- Current G01 load is: 2600 Kw

Which of the following additional loads can be started without exceeding the 2000 hour load limit for G01, Emergency Diesel Generator?

REFERENCE PROVIDED

A. P-32A, Service Water Pump
AND
1W-1B1, Containment Accident Fan

B. 1P-2B, Charging Pump
AND
P-35A, Fire Pump

C. ✓ K-2A, Instrument Air Compressor
AND
1W-1B1, Containment Accident Fan

D. 1P-2B, Charging Pump
AND
P-32A, Service Water Pump

RO Tier 2 Group 1

Source: Bank

Question History:
Imported from LOC Biennial Bank

K/A:

Cognitive Level:

Reference:

AOP-22, EDG Load Management, Unit 1

Proposed reference to be provided to the applicants during examination:

AOP-22, EDG Load Management, Unit 1 Attachment A with electrical lineup blocked out/removed

Justification:

A) Incorrect: 2600kw + 256 + 125 = 2981kw (> 2850 kw)

B) Incorrect: 2600kw + 88 + 171 = 2859kw (> 2850 kw)

C) Correct: 2600kw + 88 + 125 = 2813kw (< 2850 kw)

D) Incorrect: 2600kw + 88 + 256 = 2944kw (> 2850 kw)

Learning Objective:

49. 2023 NRC RO 049

Unit 2 ‘A’ Steam Generator has a tube rupture with the following RMS alarms:

- 2RE-222, SGBD Tank Area Monitor in **ALERT**
- 2RE-219, SGBD Sample Line Monitor in **HIGH**

The following valve positions are observed:

- 2MS-5958, ’A’ SG BD Isolation valve – **CLOSED**
- 2MS-5959, ’B’ SG BD Isolation valve – **CLOSED**
- 2MS-2040, SGBD Tank Outlet Isolation valve – **CLOSED**
- 2MS-2083, ’A’ SGBD Sample Isolation valve – **CLOSED**
- 2MS-2084, ’B’ SGBD Sample Isolation valve - **OPEN**

What actions, if any, will the RO take in response to these conditions?

A. No actions are required as all valves are in the correct positions.

B.✓ Close 2MS-2084 because BOTH sample lines are to be isolated.

C. Open 2MS-2083 because BOTH sample lines are required to ascertain conditions.

D. Open 2MS-5959 because ONLY the ‘A’ Steam Generator is affected, ‘B’ Steam Generator is intact.

RO Tier 2 Group 1

Source: Modified Bank

Question History:

Modified from PB 2012 NRC RO Question 051

K/A:

(073) PROCESS RADIATION MONITORING SYSTEM RADIATION CONTROL:
(G2.3.12) Knowledge of radiological safety principles and 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, or alignment of filters.

Cognitive Level:

High

Reference:
RMSASRB CI 2RE-219 SGBD Liquid Sample Line Monitor Unit 2, Rev. 8
RMSASRB CI 2RE-222 SGBD Tank Area Monitor Unit 2, Rev. 8

Proposed reference to be provided to the applicants during examination:
None

Original Question:
Modified from PB 2012 NRC RO Question 051

Justification:
A **INCORRECT:** Plausible if the candidate believes that only the intact SG should maintain a sample flow path.

B **CORRECT:** With 2RE-219 in HIGH ALARM, all of the valves listed should be closed; the RO will need to close 2MS-2084.

C **INCORRECT:** Plausible if the candidate believes that sample valves do not reposition with RMS and the 2MS-2083 is required to be open.

D **INCORRECT:** Plausible if the candidate believes that high radiation on one steam generator does NOT isolate BD on both steam generators.

Learning Objective:

50. 2023 NRC RO 050

Given the following:

- Unit 2 is at Rated Thermal Power
- Excess Letdown is in service
- 2RE-217, Component Cooling Water Liquid Monitor, goes into HIGH ALARM

Which of the following will automatically shut?

A. CCW-LW-63 and CCW-LW-64, Radwaste System CC Supply and Return

B. 2CC-769, Excess Letdown Heat Exchanger Shell Side Outlet Valve

C. 2CC-761A and 2CC-761B, RCP Thermal Barrier Outlets

D.✓ 2CC-17, Surge Tank Vent Isolation

RO Tier 2 Group 1

Source:
Bank

Question History:
759 - 2015 NRC RO 50

RO:
10 CFR 55.41.7

Justification:
Tier 2 – requires knowledge of the system response related to high PRM actuation signals.

K/A:
Knowledge of (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM design features and/or interlocks that provide for the following (CFR: 41.7): System actuations based on PRM signals

Justification for K/A Match:

Cognitive Level:
Low

Reference:
RMSASRB CI 2RE-217, Radiation Monitoring System Setpoint & Response Book Channel
Information Sheets, CC Water Liquid Monitor, Unit 2, Rev 2

Proposed reference to be provided to the applicants during examination:
None

Original Question:

Given the following:

Unit 2 is at Rated Thermal Power
Excess Letdown is in service
2RE-217, Component Cooling Water Liquid Monitor, goes in to HIGH ALARM

Which of the following will automatically shut?

A. 2CC-17, Surge Tank Vent Isolation
B. CCW-LW-63 and CCW-LW-64, Radwaste System CC Supply and Return
C. 2CC-769, Excess Letdown Heat Exchanger Shell Side Outlet Valve
D. 2CC-761A and 2CC-761B, RCP Thermal Barrier Outlets

Justification:

A INCORRECT: Plausible because these valves are automatically closed by a high flow rate from the associated thermal barrier and is one of the items monitored when 2RE-217 goes into Alert or high alarm.

B INCORRECT: Plausible because these valves will be automatically closed by Unit 2 containment isolation activation, and these valves are only located on Unit 2.

C INCORRECT: Plausible because this valve will be automatically closed by a Unit 2 containment isolation activation and excess letdown is in service and could be a cause of the indications.

D CORRECT: This valve receives a shut signal when the radiation monitor 2RE-217 reaches High Alarm due to an RCS to CCW system leak.

Learning Objective:

DESCRIBE the interlocks associated with the Component Cooling Water System and its major components:

- Vent valve to atmosphere (CC-17)
- CC-769
- RCP Pump CCW valves
- RADWASTE CCW supply and return valves
- Standby CCW Pump start

(051.06.LP0084.004)

51. 2023 NRC RO 051
Given the following:

- Both Units are operating at RTP with a normal electric plant alignment
- P-32A, B, and D Service Water Pumps are running

The following sequence of events occurs:
- 2X-04, Low Voltage Station Transformer LOCKS OUT
- All Emergency Diesel Generators FAIL to automatically restore power to safeguards buses
- Operators manually energize Unit 2 'B' train safeguards buses using the associated standby emergency power source

Which of the following describes the expected Service Water Pumps running just <u>before</u> and 1 minute <u>after</u> the operators close the diesel output breaker?

	Before	After
A.	A	A, B, D & E
B.	A & B	A, B, E & F
C.✓	A & B	A, B, C, D & E
D.	A, B & D	A, B, C, D & E

RO Tier 2 Group 1

Source: Bank

Question History:
PB 2017 AUDIT RO Question 053

RO:
10 CFR Part 55 Content: 55.41 (b)(7)

K/A:
(076A4.01) Ability to manually operate and/or monitor the SERVICE WATER SYSTEM in the control room:
SWS pumps

Cognitive Level:
Comprehension 3-SPK: The student must understand the initial conditions and electrical lineup, determine which pumps will be running due to the event, and then determine which pumps will be running after operator actions are taken.

Reference:

MDB 3.2.3 PANEL 1B04, Rev. 15
MDB 3.2.4 PANEL 2B04, Rev. 14
885D195 Sh. 8, Rev. 19

Proposed reference to be provided to the applicants during examination:

None

Original Question:
Given the following:

- *Both Units are operating in MODE 1 with a normal electric plant alignment*
- *P-32A, B, and D, Service Water Pumps are running*
- *The following sequence of events occurs:*
    - *2X-04, LOCKS OUT*
    - *Diesel generators FAIL to automatically restore power to safeguards buses*
    - *Operators manually energize Unit 2 'B' train safeguards buses using the associated standby emergency power source*

Which of the following describes the expected Service Water Pumps running before and after the operators close the diesel output breaker?

	Before	After
A.	*A & B*	*A, B, C, D & E*
B.	*A & B*	*A, B, E & F*
C.	*A, B & D*	*A, B, C, D & E*
D.	*A*	*A, B, D & E*

Proposed Answer: A

Justification:

A **INCORRECT:** Plausible if the candidate believes B does NOT stay on-line before AND C does not get powered after the DG is running (maintains power from 1B-04).

B **INCORRECT:** Plausible if the candidate believes the F has power before AND C & D have no power after (C & D autostart when G04 output breaker is shut. C never lost power (1B04) and D has power restored (2B04)).

C **CORRECT:** D will trip off on loss of power (Before), and C, D & E will get auto start signals when G04 output breaker is closed to 2A06 (after).

D **INCORRECT:** Plausible if the candidate believes D will not trip before (D lost power due to 2B-04 losing power).

Learning Objective:

DESCRIBE the interlocks associated with the Service Water System and its major components:

a. Service Water Pumps
b. Service Water Screens
c. Service Water Zurn Strainers

(051.06.LP0086.005)

52. 2023 NRC RO 052

Given the following conditions:

- K-2A Instrument Air Compressor is in **CONSTANT**
- K-2B Instrument Air Compressor is **OOS**
- Z-31, Instrument Air Dryer relief valve is failing open

Which of the following correctly states the next expected response of the Instrument Air System as the leak worsens?
(Assume no operator actions)

A. Instrument Air header pressures will eventually return to normal after Z-31 Instrument Air Dryer automatically isolates the leak on high DP.

B✓ Instrument Air header pressures will continue to lower due to the leak. PCV-3079, Service Air/Instrument Air Cross-connect valve will eventually open to try and restore Instrument Air header pressure.

C. Instrument Air header pressures will lower and IA-3000-S, Z-39 IA Dryer Bypass valve, will open cross-connecting the north and south Instrument Air Headers.

D. Instrument Air header pressures will lower and IA-3094-S, Z-31 IA Dryer Bypass valve, will open to isolate the leak.

Bank 2012 NRC RO 64

K/A Statement:

References:
STPT 14.7 Instrument and Service Air

Proposed references to be provided to applicants during examination:
N/A

Explanation:

A: **Incorrect**: There are no automatic isolations for high deltaP on the IA dryers.

B: **Correct**: As IA header pressure lowers there are various automatic compressor starts (including SA) and as pressure lowers the SA system is automatically cross-connected to the IA system to help maintain operating pressure.

C: **Incorrect**: This valve will open automatically at 80 psig in the IA header but the north and south headers are already cross-connected.

D: **Incorrect**: This valve will open automatically at 80 psig in the IA header but the leak will remain aligned.

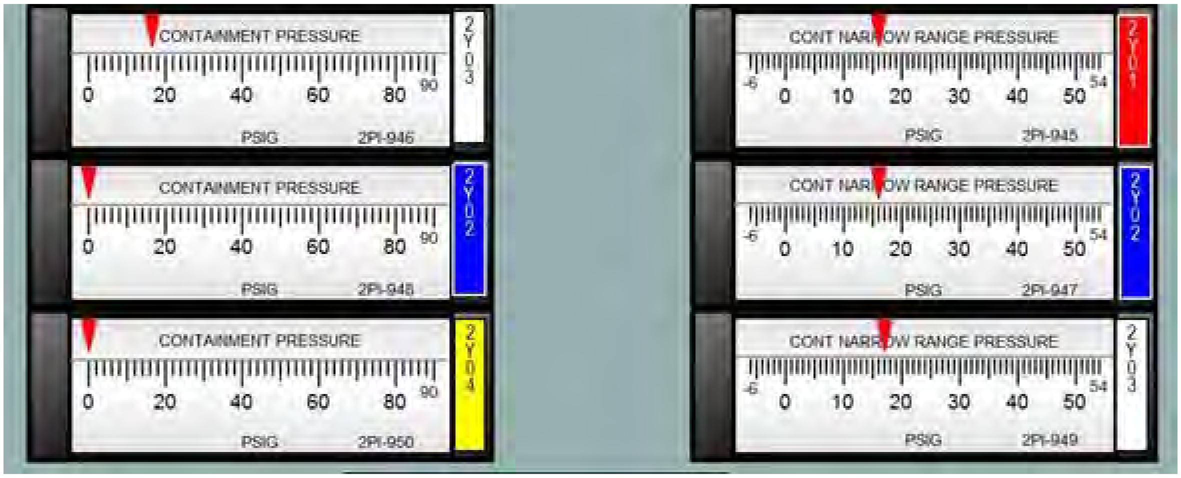
Learning Objective:
DESCRIBE the interlocks and automatic actuation setpoints associated with the Instrument and Service Air Systems, and major system components.
(052.06.LP0338.004)

53. 2023 NRC RO 053

Unit 2 is operating at 100% power.

I&C was conducting a surveillance on 2PI-948, Containment Pressure BLUE channel when a short occurs (now reading 0 psig).

Two minutes later, a transient occurs and you observe the following indications:



Based on the above indications **ONLY**:

Main Steam Isolation __(1)__ occurred based on input from the __(2)__ range containment pressure channels.

	(1)	(2)
A.	has	narrow
B.	has	intermediate
C.	has NOT	narrow
D.✓	has NOT	intermediate

RO Tier 2 Group 1

Source:
New

Question History:
N/A

RO:
10 CFR Part 55 Content: 55.41 (b)(5)

K/A:
(103K1.14) Knowledge of the physical connections and/or cause and effect relationships between the CONTAINMENT SYSTEM and the following systems:
Main & Reheat Steam System

Cognitive Level:

Reference:
885D195 Sh. 7, Rev. 25
M-224, Rev. 227

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

A **INCORRECT:** Plausible if the candidate believes the Main Steam Isolation signal comes from the low range containment pressure channels.

B **INCORRECT:** Plausible if the candidate believes that only one channel of intermediate range containment pressure is needed to actuate Main Steam Isolation.

C **INCORRECT:** Plausible if the candidate believes that the Main Steam Isolation comes from the low range containment pressure channels and that all three instrument channels are required to generate a Main Steam Isolation signal.

D **CORRECT:** The main steam isolation input based on containment pressure (Hi-Hi signal) comes from the intermediate containment pressure channels and requires two out of three coincidence to actuate the signal. In this case, based on the transient conditions in the stem, the logic is NOT satisfied, even when the conditions in the containment support the isolation signal.

Learning Objective:

54. 2023 NRC RO 054

Given the following:

- Unit 1 was operating at Rated Thermal Power
- A Large Break Loss of Coolant Accident (LOCA) occurred
- Flow blockage from foreign material has prevented normal NaOH flow
- The crew has lined up for containment spray recirculation
- Spray Add Tank Level has remained at 65% and is STABLE

The flow blockage may have prevented the containment sump from reaching a minimum pH of ___(1)___ which is required to ___(2)___?

A. (1) 7.0
(2) minimize the effects of boron precipitation

B. (1) 10.0
(2) maximize the retention of iodine

C.✓ (1) 7.0
(2) maximize the retention of iodine

D. (1) 10.0
(2) minimize the effects of boron precipitation

RO Tier 2 **Group** 1

Source:
Bank

Question History:
993 2017 NRC 43

RO:
10 CFR 55.41.7

Justification:
Meets Tier 2 requirements by testing the applicant’s knowledge of Containment spray system requirements and the impact a malfunction in the CSS has on the containment structure.

K/A:
Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF5 CNT) CONTAINMENT SYSTEM (CFR: 41.7 / 45.7): CSS

Justification for K/A Match:

Cognitive Level:
Low

Reference:
BG-EOP-1.3, Background Transfer to Containment Sump Recirculation – Low Head Injection, Rev 39 EOP Step 5

Proposed reference to be provided to the applicants during examination:
None

Original Question:
Given the following:

- Unit 1 was operating at Rated Thermal Power
- A Large Break Loss of Coolant Accident (LOCA) occurred
- Flow blockage from foreign material has prevented normal NaOH flow
- The crew has lined up for containment spray recirculation
- Spray Add Tank Level has remained at 65% and is STABLE

The flow blockage may have prevented the containment sump from reaching a minimum pH of ___(1)___ which is required to ___(2)___?

A. (1) 7.0
(2) maximize the retention of iodine

B. (1) 7.0
(2) minimize the effects of boron precipitation

C. (1) 10.0
(2) maximize the retention of iodine

D. (1) 10.0
(2) minimize the effects of boron precipitation

Justification:

The flow blockage has prevented adequate NaOH addition to the sump, as EOP-1.3 wants a minimum of 17% of the spray additive tank added, and the tank level has remained stable. Spray additive is added to maintain the sump pH between 7-9.5. A pH of greater than 7.0 assures the iodine removed by the spray is retained in the sump.

A INCORRECT:The minimum value is correct, the reason is wrong. Plausible if the student has a misconception on the purpose of NaOH addition to the sump.

B INCORRECT:The minimum value is wrong, but reason is correct. Plausible if the student has a misconception on what the minimum value pH for the sump is (pH above 9.5 causes excessive corrosion).

C. CORRECT:See above explanation

D INCORRECT:Both the minimum value and reason are wrong. Plausible if the student has a misconception on what the minimum value pH is for the sump and the purpose of NaOH addition to the sump.

Learning Objective:
DESCRIBE the procedures which govern operation of the Containment Spray System. Description should include significant prerequisites, precautions, and notes associated with each operating procedure requiring consideration by Licensed and Non Licensed Operators.
(051.03.LP0064.009)

55. 2023 NRC RO 055

Given the following:

- Both units are at Rated Thermal Power

Which of the following exceeds the limits of Tech Spec 3.4.13, RCS Operational LEAKAGE?

A. 6 gpm identified leakage

B. 0.5 gpm unidentified leakage

C.✓ 90 GPD tube leakage 1HX-1B, Steam Generator

D. 120 GPD tube leakage 2HX-1A, Steam Generator

RO Tier 2 Group 2

Source:
Bank

Question History:
PB 2019 NRC RO# 070

RO:
10 CFR Part 55 Content: 55.41 (b)(4)

K/A:
(002) LIQUID RADWASTE SYSTEM
(G2.2.3) EQUIPMENT CONTROL:
(Multi-unit license) Knowledge of the design, procedural, and/or operational differences between units

This Technical Specification question asks about information that is “above the line” so it applies to RO and SRO candidates.

Cognitive Level:
Low

Reference:
883D195 Sh 21, Containment Isolation/Containment Ventilation Isolation Logic, Rev. 15
DBD-02, CCW System Section 3.4, Rev. 16
FSAR Section 9.1, Rev. 2017
Tech Spec 3.4.13, RCS Operational LEAKAGE

Proposed reference to be provided to the applicants during examination:
None

Original Question:
None
Justification:

A **INCORRECT:** Plausible if the candidate confuses identified leakage limits with either unidentified or pressure boundary leakage because this exceeds the allowable limit for pressure boundary leakage and unidentified leakage.

B **INCORRECT:** Plausible if the candidate confuses unidentified leakage limits with pressure boundary leakage because this exceeds the allowable limit for pressure boundary leakage.

C **CORRECT:** Operational Leakage limits are NO pressure boundary leakage, 1 gpm unidentified leakage, 10 gpm identified leakage, 72 gpd (Unit 1), and 150 gpd (Unit 2). This is the only choice that exceeds the limit.

D **INCORRECT:** Plausible if the candidate confuses the differences between the units SGTL limit.

Learning Objective:

56. 2023 NRC RO 056

With the Pressurizer Level Defeat Switch in the DEFEAT 3 position (428 CH III), Pressurizer level channel 426 (Red) failed high.

Assuming no operator action, what will the sequential plant transient be?

A. (1) Charging flow raises
(2) Letdown does not isolate
(3) Pressurizer level goes up

B. (1) Charging flow remains the same
(2) Letdown does not isolate
(3) Pressurizer level remains the same

C. (1) Charging flow remains the same
(2) Letdown isolates
(3) Pressurizer level rises until a high level trip occurs

D.✓ (1) Charging flow lowers
(2) Letdown isolates
(3) Pressurizer level rises until a high level trip occurs

RO Tier 2 Group 2

Source:
New

Question History:
N/A

RO:
10 CFR 55.41.7

Justification:
Tier 2 requirements met due to requiring the candidate to understand the pressurizer level system response to input failures.

K/A:
Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF2 PZR LCS) PRESSURIZER LEVEL CONTROL SYSTEM (CFR: 41.7 / 45.7): Level channels

Justification for K/A Match:

Cognitive Level:
High

Reference:
Dwg 883D195, sht 18_013, Logic Diagram, Pressurizer Pressure and Level Control

Proposed reference to be provided to the applicants during examination:
None

Original Question:
None

Justification:

In the DEFEAT 3 Position, PZR level Chanel 426 is a controlling channel with input into the charging flow speed controller. Failure of the controlling channel high results in a false high pressurizer level signal to the charging pump controllers, lowering charging pump speed and resulting flow. Lowered charging flow results in a lowering pressurizer level until letdown isolates at 12% from LM-427 transmitter. This results in a rising pressurizer level until a high PZR level trip is received.

A: Incorrect. The sequence of events is for a controlling PZR level channel failing low. Plausible if the candidate fails to recall the impact of a channel failing high on the control logic circuitry.

B. Incorrect. The sequence of events is for a non-controlling PZR level channel failing high. Plausible if the candidate fails to recall which channel is controlling in DEFEAT 3 position.

C. Incorrect. The sequence of events is for a non-controlling PZR level channel failing low. Plausible if the candidate fails to recall the impact of the failing channel on the control logic circuitry and fails to recall which channel is controlling in DEFEAT 3 position.

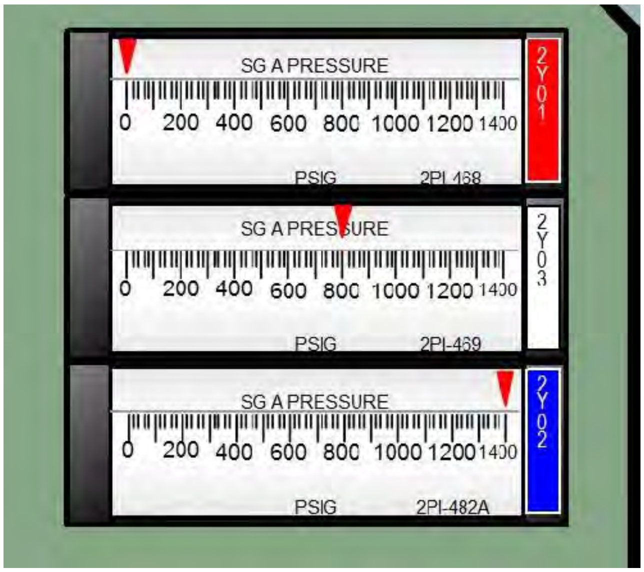
D. Correct.

Learning Objective:
LP0457
- PREDICT the response to the following failures on the Pressurizer pressure level control system:
- Pressurizer level failing low
- Pressurizer level failing high
- Pressurizer pressure failing low
- Pressurizer pressure failing high
- Auctioneered high TAVG failing high
- Auctioneered high TAVG failing low

57. 2023 NRC RO 057

You are a RO on Unit 2 at Rated Thermal Power with PT-482, SG A Pressure (Blue) removed from service per 0-SOP-IC-001 Blue, Routine Maintenance Procedure Removal of Safeguards or Protection Sensor from Service – Blue.

I&C is troubleshooting when an inadvertent short causes the following:



What is the plant response?

A. The plant remains stable.

B✓ A safety injection will initiate.

C. A reactor trip will occur ONLY.

D. A turbine runback will occur ONLY.

RO Tier 2 Group 2

Source:
Modified Bank

Question History:
2019 NRC 059
Modified form PB 2019 NRC 059

- Altered stem to give reading indications
- Modified distractors to plant response vice procedures entered

RO:
10 CFR Part 55 Content: 55.41 (b)(7)

K/A:
(016K5.02) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the NONNUCLEAR INSTRUMENTATION SYSTEM:
Relationship between meter readings and actual parameter values

Cognitive Level:
High

Reference:
M-201 Sheet 1, Rev. 62
883D195 Sheet 7, Rev. 25
0-SOP-IC-001 Blue, Routine Maintenance Procedure Removal of Safeguards or Protection Sensor from Service – Blue

Proposed reference to be provided to the applicants during examination:
None

Original Question:
1190. 2019 NRC 059

Given the following:

- The unit is at Rated Thermal Power
- PT-482, SG A Pressure (Blue) has failed high for an unknown reason and has been removed from service IAW 0-SOP-IC-001 Blue, Routine Maintenance Procedure Removal of Safeguards or Protection Sensor from Service - Blue
- While I&C was collecting comparison data from PT-468, SG A Pressure (Red) an inadvertent short caused PT-468 output to fail low

Which of the following describes the expected crew response to this failure?

A. Place FIC-466, SG A MFRV Controller, HC-480, SG A Feed Reg Bypass controller and HC-468, SG A Atmos Steam Dump controller, in MANUAL per AOP-24, Response to Instrument Malfunctions. Remove PT-468 from service IAW 0-SOP-IC-001 Red.

B. Reduce load per AOP-17A, Rapid Power Reduction, to prevent overpower from excessive steam and feed flow, place HC-468, SG A Atmos Steam Dump controller, in MANUAL.

C. Enter EOP-0, Reactor Trip or Safety Injection, and subsequently transition to EOP-0.1, Reactor Trip Response.

D✓ Enter EOP-0, Reactor Trip or Safety Injection, and subsequently transition to EOP-1.1, SI Termination.

Justification:

A **INCORRECT:** Plausible if the candidate does not recognize that a trip signal will have been inserted due to the maintenance and that ACTUAL S/G pressure is stable, so believes no protective action occurs based on the instrument failures.

B **CORRECT:** Based on the maintenance of the BLUE channel S/G Water Level, a trip will have been inserted as the testing is in progress. If RED channel outputs a low S/G pressure signal, using 883D195 Sheet 7, the logics and protective actions will be made up (2 signals out of 3 for 1 S/G) and with the auto SI not blocked, a safety injection signal will be actuated.

C **INCORRECT:** Plausible if the candidate does not recall the Safety Injection signals related to S/G pressure and believes the result of the meter reading is a reactor trip only (no safety injection).

D **INCORRECT:** Plausible if the candidate believes the result of the meter reading is an overpower condition resulting in a turbine runback because these actions would be correct if PT-482 was still in service and the operator mistakes which instrument has failed high.

Learning Objective:

58. 2023 NRC RO 058

What are the inputs to 1TSS-970, RC Loop A Subcooling Monitor Selector, when the system is selected to Position RTD?

Temperature input is from: __(1)_____; Pressure input is from: ____(2)___.

A. (1) The average of four In-core thermocouples radially spaced across the core
(2) 1PT-420A, RCS Wide Range Pressure

B. (1) The average of four In-core thermocouples radially spaced across the core
(2) 1PT-420C, Loop A Hot Leg Pressure

C. (1) 1TE-450D, Wide Range RCS Hot Leg Temperature
(2) 1PT-420C, Loop A Hot Leg Pressure

D.✓ (1) 1TE-450D, Wide Range RCS Hot Leg Temperature
(2) 1PT-420A, RCS Wide Range Pressure

RO Tier 2 Group 2

Source:
New

Question History:
N/A

RO:
10 CFR 55.41.7

Justification:
Meets Tier 2: Requires system understanding of the inputs to the SCM.

K/A:
Knowledge of (SF7 ITM) IN CORE TEMPERATURE MONITOR SYSTEM design features and/or interlocks that provide for the following (CFR: 41.7): Sensing and determination of location core hot spots

Justification for K/A Match:

Cognitive Level:
Low

Reference:
LP0583, RVLIS/SCM/CET Systems, Rev 8

Proposed reference to be provided to the applicants during examination:
None

Original Question:
None

Justification:

With 1TSS-970 to the ‘RTD’ position, the inputs to the ‘A’ Subcooling Monitoring system come from 1TE-450D, Wide Range RCS Hot Leg Temperature and 1PT-420A, RCS Wide Range Pressure. RCS Hot Leg Temperature is the highest RCS temperature available outside of the in-core thermocouple detectors, which are used when the 1TSS-970 switch is in the ‘TC’ position. RCS Wide Range Pressure detector is located on the intermediate leg of the RCS loop, which is the lowest RCS loop pressure and therefore the most conservative RCS pressure to provide into the subcooling monitoring system.

Answer A: Incorrect. Part (1) is incorrect. Thermocouples do not provide input into the Subcooling Monitoring system while in the RTD position. Plausible if the candidate forgets the inputs of the subcooling system based on switch position. Part (2) is correct.

Answer B: Incorrect. Part (1) is incorrect. Thermocouples do not provide input into the Subcooling Monitoring system while in the RTD position. Plausible if the candidate forgets the inputs of the subcooling system based on switch position. Part (2) is incorrect. Plausible if the candidate fails to recall the inputs into the subcooling system and incorrectly assumes that RCS Hot Leg Pressure would be advantageous based on the higher temperature of the system at that point in the RCS loop.

Answer C: Incorrect. Part (1) is correct. Part (2) is incorrect. Plausible if the candidate fails to recall the inputs into the subcooling system and incorrectly assumes that RCS Hot Leg Pressure would be advantageous based on the higher temperature of the system at that point in the RCS loop.

Answer D: Correct.

Learning Objective:
DESCRIBE the measurement principles and operation of the detectors/instruments associated with the Reactor Vessel Level Indication, Subcooling Monitoring, and Core Exit Thermocouple Systems. (053.07.LP0583.004)

IIX DESCRIBE how the Core Exit Thermocouples are used as inputs into the Reactor Vessel Level and Subcooling Monitoring Systems. (053.07.LP0583.005)

59. 2023 NRC RO 059

You are the RO on Unit 1 when a high radiation signal alarm is received on 1RE-229, Service Water Outlet Monitor.

You contact the Auxiliary Operator and direct them to __(1)__ to investigate the local indications on 1RE-229.

The Spent Fuel Pool Heat Exchangers ___(2)___ be isolated.

	(1)	(2)
A.	8' Fan Room PAB	will
B.✓	8' Fan Room PAB	will NOT
C.	Turbine Hall 8' AFW Pump Room	will
D.	Turbine Hall 8' AFW Pump Room	will NOT

RO Tier 2 Group 2

Source:
New

Question History:
N/A

RO:
10 CFR Part 55 Content: 10 CFR 55.41.(b)(11)

K/A:
(033K1.09) Knowledge of the physical connections and/or cause and effect relationships between the SPENT FUEL POOL COOLING SYSTEM and the following systems:
RMS

Cognitive Level:
Low

Reference:
M-207 Sheet 1, Rev. 91
110E018 Sheet 4, Rev. 53

Proposed reference to be provided to the applicants during examination:
None

Original Question:
None

Justification:

A **INCORRECT:** Plausible if the candidate believes a high radiation signal generated by the radiation monitor will isolate the cause of the leak. Location is correct

B **CORRECT:** No isolation signal is generated from this radiation detector (an alarm will annunciate in the MCR). The location of the 1RE-229 radiation monitor is U-1 8' Fan Room PAB.

C **INCORRECT:** Plausible if the candidate believes a high radiation signal generated by the radiation monitor will isolate the cause of the leak. Also, if the candidate gets the Unit 1 and Unit 2 radiation detectors switched around (Unit 2 location is U-2 Turbine Hall 8' AFW Pump Room).

D **INCORRECT:** Plausible if the candidate gets the Unit 1 and Unit 2 radiation detectors switched around (Unit 2 location is U-2 Turbine Hall 8' AFW Pump Room). The radiation monitor will not generate any isolation signals.

Learning Objective:

60. 2023 NRC RO 060

Given the following:

- Unit 1 is operating at Rated Thermal Power
- 1PT-486, HP First Stage Turbine Pressure Transmitter fails as is

If the turbine were to trip, the transmitter failure will __________.
(Assume no operator action)

A. have no effect, the condenser steam dumps will operate as designed causing RCS T_{avg} to lower to a value of 547°F

B. cause all of the steam dumps to "blow open"; the operator must place the mode selector switch to MANUAL to prevent an excessive RCS cooldown

C. prevent the condenser steam dump valves from modulating; RCS T_{avg} will be maintained at the lowest "blow open" temperature value of 547°F

D.✓ prevent the condenser steam dump valves from "arming", the deviation signal caused by the rising RCS temperature will have no effect

RO Tier 2 Group 2

Source:
Bank

Question History:
2015 NRC RO 61

RO:
10 CFR 55.41.5

Justification:
Meets Tier 2 requirements – requires operator knowledge of steam pressure inputs into the Steam Dump system and know the system response.

K/A:
Ability to predict and/or monitor changes in parameters associated with operation of the (SF4S SDS) STEAM DUMP/TURBINE BYPASS CONTROL SYSTEM, including (CFR: 41.5 / 45.5): Steam pressure

Justification for K/A Match:

Cognitive Level:
High

Reference:
LP0035 Lesson Plan, Condenser Steam Dumps Rev 17

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

The loss of the signal from the turbine impulse chamber pressure will cause the steam dump system to not be supplied with air. Without this air being supplied the steam dump valves will not operate in either modulate or trip open mode.

A INCORRECT: The steam Dumps are not capable of operating without the arming signal. Plausible if the student has a common misconception on the operation of the steam dumps, and how the air is supplied to the dumps.

B INCORRECT: The steam Dumps are not capable of operating without the arming signal. Plausible as the steam dumps will receive one half of the blow open or trip open signal with the trip of the turbine and buildup of decay heat. The other half of the signal is the air signal from the turbine impulse chamber pressure. Also, if the reference temperature were to be effected in a similar manner as the pressure transmitter was effected, then the dumps blowing open and an excessive cooldown would be plausible.

C INCORRECT: The steam Dumps are not capable of operating without the arming signal. Plausible if the student has a misconception on the logics of the steam dump. During normal operations the dumps would blow open and then modulate at the 547°F value.

D CORRECT: See explanation.

Learning Objective:
STATE actuation setpoints and EXPLAIN effects of automatic actuations and interlocks associated with the Steam Dump System. Explanation should include the three modes of Steam Dump operation, Condenser Availability signal, Arming signals, and operating of the five Dump Valve Solenoid Valves

61. 2023 NRC RO 061

A HIGH alarm condition exists on RE-101, Control Room Area Radiation Monitor RE-101.

The temperature of the control room would ___(1)___ based on the response of the ___(2)___-powered heaters.

	(1)	(2)
A.✔	remain the same	steam
B.	lower	steam
C.	remain the same	electric
D.	lower	electric

RO Tier 2 Group 2

Source:
New

Question History:
None

RO:
10 CFR Part 55 Content: 55.41 (b)(5)

K/A:
(050A4.05) Ability to manually operate and/or monitor the CONTROL ROOM VENTILATION in the control room:
Heaters

Cognitive Level:
Low

Reference:
0-SOP-VNCR-002, Control and Computer Room Ventilation System normal operation, Rev. 19
M-214, Sheet 2, Rev. 25
M-214, Sheet 4, Rev. 38

Proposed reference to be provided to the applicants during examination:
None

Original Question:
None

Justification:

A **CORRECT:** The control room ventilation system heaters utilize steam from the house heating steam system, which is sent to the heating coils. The high radiation condition does NOT isolate the heaters or the CW system, so the temperature will remain the same in the control room.

B **INCORRECT:** Plausible if the candidate believes that the high radiation signal isolates the control room heaters and only chill water is available for temperature control of the system.

C **INCORRECT:** Plausible if the candidate believes that the heating portion of the system are electric heaters.

D **INCORRECT:** Plausible if the candidate believes that the heating portion of the system are electric heaters AND believes that the high radiation signal isolates the control room heaters and only chill water is available for temperature control of the system.

Learning Objective:

62. 2023 NRC RO 062

Given the following:

- Unit 1 is at Rated Thermal Power
- A single set of Main Air Ejectors is in service
- 1MS-2074, Air Ejector Main Steam Supply control valve, fails CLOSED

Which of the following will result?
(Assume no operator action)

A. Rising megawatt output and rising condenser hotwell level

B.✓ Lowering megawatt output and rising hotwell temperature

C. Rising megawatt output and rising gland seal header pressure

D. Lowering megawatt output and lowering hotwell temperature

RO Tier 2 Group 2

Source:
Bank

Question History:
2017 NRC 62

RO:
10 CFR 55.41.7

Justification:
Meets Tier 2/KA requirements by testing candidate’s knowledge of air ejector system parameters and response to malfunctions that impact the operation of the Main Condenser system.

K/A:
Knowledge of the effect that a loss or malfunction of the (SF4S CARS) CONDENSER AIR REMOVAL SYSTEM will have on the following systems or system parameters (CFR: 41.7 / 45.6): Main condenser

Justification for K/A Match:

Cognitive Level:
High

Reference:
NUC-GFP-CMP-003, Heat Exchangers and Condensers,
M-201 Sh 2, P&ID Main and Reheat Steam
M-212 Sh 1, P&ID Circulating Water System Condenser Air Removal & Priming

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

Given the initial conditions, a degraded vacuum condition exists. This degraded vacuum will cause the megawatt output of the main generator to lower due to a reduced ΔH and the condenser is a saturated system. Being a saturated system, this changed will result in a high PSAT which will cause a higher TSAT, and therefore a higher hotwell temperature.

A INCORRECT: Megawatts will lower, not rise. Plausible if the student reasons that hotwell level will rise as a result of the steam system transient - rising megawatt output.

B CORRECT: See above explanation.

C INCORRECT: Megawatts will lower not rise, gland seal header pressure may rise for more than one reason, first with the loss of the supply steam for the air ejectors, and secondly due to the degrading vacuum. Plausible if the student reverses the concept of air and non-condensable gasses and with the loss of the supply steam there is more steam for the generator.

D INCORRECT: Degraded vacuum will cause megawatt output to lower, but hotwell temperature will rise, not lower. Plausible if the student reverses the change in absolute pressure, based on the system being a vacuum instead of a pressure.

Learning Objective:

Given access to the Site Specific Simulator or specific plant conditions, EVALUATE plant indications associated with the following events:

- Secondary Coolant System leak
- b. Feedwater system malfunction
- c. Loss of Condenser Vacuum
- d. Loss of Instrument Air Trip

(055.03.LP2439.004)

63. 2023 NRC RO 063

Given the following:

- Unit 1 is at 30% reactor power
- Secondary systems are aligned for single feed train in operation

Subsequently, a small break in the condensate header occurs and the following conditions are noted:

- 1P-25A, Condensate Pump is running
- 1P-25B, Condensate Pump is in standby with its control switch in AUTO
- Feed pump suction pressure is 175 psig and LOWERING
- Condenser Hotwell level is 41" and STABLE
- Containment pressure is 0.8 psig and STABLE
- 1CS-2273, FWH bypass is SLIGHTLY OPEN

What is an expected automatic plant response based on the above conditions?

A. Standby condensate pump starts due to high hotwell level.

B. Running condensate pump trips due to high containment pressure.

C. 1CS-2273, FWH Bypass, closes due to low feed pump suction pressure.

D.✓ Standby condensate pump starts due to low feed pump suction pressure.

RO Tier 2 Group 2

Source:
Bank

Question History:
Taken from PB Exam Bank Q# 3151 (052.05.LP0102.004 007)

RO:
10 CFR Part 55 Content: 55.41 (b)(4)

K/A:
Ability to monitor automatic features of the Condensate System, including Automatic protection of MFW pump low suction pressure

Cognitive Level:
High

Reference:
M-202 Sheet 1, Rev. 62
M-202 Sheet 2, Rev. 33
AOP-2B, Rev. 23

Proposed reference to be provided to the applicants during examination:
None

Original Question:
Taken from PB Exam Bank Q# 3151 (052.05.LP0102.004 007)

Justification:

A **INCORRECT:** Plausible if candidate believes current hotwell level is too high requiring additional secondary coolant to the system. Makeup water to the hotwell comes from the CST, not recirculation from its own system

B **INCORRECT:** Plausible if candidate believes that a high containment pressure trips the condensate pumps. A high containment pressure signal provides a MFIS which does not affect the condensate pumps.

C **INCORRECT:** Plausible if candidate believes closing this valve will provide more flow to the Main Feed Water Pumps.

D **CORRECT:** Stem of the question presents a low Feed pump suction pressure. This pressure would be seen on 1PS-2141 (standby condensate pump start bistable). The standby Condensate pump starts to protect the Main Feed Pump from damage that could be incurred due to low suction pressure.

Learning Objective:

64. 2023 NRC RO 064

Prior to taking the shift you as the oncoming At-the-Controls Operator review the Operations Notebook.

In accordance with OM 3.13, Operations Notebook, Night Orders provide direction and administrative instructions for, AT MOST, the next _________.

A. 1 shift

B. 24 hours

C.✓ 4 days

D. 31 days

RO Tier 3 Group

Source:
New

Question History:
N/A

RO:
10 CFR 55.41.10

Justification:
Meets Tier 3 requirements – focuses on plant -wide generic K/As and not system-specific knowledge.

K/A:
CONDUCT OF OPERATIONS: Knowledge of administrative requirements for temporary management direction, such as standing orders, night orders, or operations memoranda (CFR: 41.10 / 45.12)

Justification for K/A Match:

Cognitive Level:
Low

Reference:

Proposed reference to be provided to the applicants during examination:

Original Question:

Justification:

Answer A: Incorrect. Plausible as the operator is reviewing information for which they will need on the next 1 shift.

Answer B: Incorrect. Plausible as OM 3.13 indicates that Night Orders normally stay in the Operations Notebook for 24 hours but can stay in for AT MOST 4 days.

Answer C: Correct. According to OM 3.13, Operations Notebook, STEP 2.1.1 Night orders should be used to provide direction and administrative instructions for, at most, the next 4 days.

Answer D: Incorrect. Plausible as Significant Event, Industrial Safety information, and Operational Information are to remain in the Operations Notebook for 31 days according to OM 3.13.

Learning Objective:

65. 2023 NRC RO 065

You are on watch in the Control Room when I&C comes into the Control Room to get authorization for a scheduled monthly surveillance. This surveillance requires access to the At-The-Controls area.

Who authorizes the I&C Technicians access to the At-The-Controls Area?

A. Shift Manager

B.✓ Reactor Operator

C. Shift Technical Advisor

D. Control Room Supervisor

RO Tier 3 Group

Source:
New

Question History:
N/A

RO:
10 CFR Part 55 Content: 55.41 (b)(10)

K/A:
(G2.1.47) CONDUCT OF OPERATIONS:
Ability to direct non-licensed personnel activities inside the control room

Cognitive Level:
Low

Reference:
OP-AA-100-1000, Conduct of Operations, Rev. 34

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

A **INCORRECT:** Plausible if the candidate believes the Shift Manager (as the Senior License Holder on shift) approves access to the ATC area.

B **CORRECT:** IAW OP-AA-100-1000, Conduct of Operations, Section 3.4.4, the reactor operator controls access to the ATC area.

C **INCORRECT:** Plausible if the candidate believes that an Operations Senior Reactor Operator can give access to the ATC area.

D **INCORRECT:** Plausible if the candidate believes the SRO that has command and control gives access to the ATC area.

Learning Objective:

66. 2023 NRC RO 066

In accordance with OP-AA-1000, Conduct of Infrequently Performed Test or Evolutions (IPTE), which of the following correctly states the briefing requirements for an (IPTE)?

A. The IPTE Briefing is to take the place of the pre-job brief.

B. The IPTE Briefing is meant to repeat and reinforce the content of the pre-job brief.

C. The IPTE Briefing must be repeated for the oncoming shift personnel by the same designated IPTE Manager.

D.✓ For multiple shift evolutions, individuals who have not received the IPTE Brief must review the briefing package and sign the briefing checklist.

RO Tier 3 Group 2

Source:
New

Question History:
N/A

RO:
10 CFR Part 55 Content: 10 CFR 55.41.10

Justification:
Meets Tier 3 requirements – focuses on plant -wide generic K/As and not system-specific knowledge.

K/A:
EQUIPMENT CONTROL: Knowledge of the process for conducting infrequently performed tests or evolutions (CFR: 41.10 / 43.3 / 45.13)

Justification for K/A Match:

Cognitive Level:
Low

Reference:
OP-AA-1000, Conduct of Infrequently Performed Tests or Evolutions, Rev 17

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

IAW OP-AA-1000, Step 5.C, if an evolution extends over multiple shifts, individuals who have NOT received the IPTE briefing shall review the IPTE briefing package and sign the briefing checklist.

Answer A: Incorrect. IAW OP-AA-1000, Step 5.A, The pre IPTE Briefing is NOT to …take the place of the pre-job brief. Plausible if the candidate fails to recall the purpose of the brief and incorrectly assumes that the IPTE brief can be substituted for the pre-job brief on the basis that the briefing is more extensive by name.

Answer B: incorrect. IAW OP-AA-1000, Step 5.A, The pre IPTE Briefing is NOT to repeat content … of the pre-job brief. Plausible if the candidate fails to recall the purpose of the brief and incorrectly assumes that the IPTE brief is meant to cover all aspects of the job scope, including those portions covered by the pre-job brief.

Answer C: Incorrect. IAW OP-AA-1000, Step 5.B, If the IPTE is extended beyond the shift, then the briefing shall be repeated for the oncoming shift. However, the briefing may be performed by another Manager, as long as that manager meets the requirements of the IPTE Manager as defined by the procedure. Plausible if the candidate fails to recall the purpose of the brief and incorrectly assumes that the IPTE brief must be repeated by the designated Manager for consistency.

Answer D. Correct. See above

Learning Objective:

67. 2023 NRC RO 067

An Auxiliary Operator will be opening the breaker for W-181A3, G-03 EDG Radiator Fan on MCC 1B40 as part of troubleshooting activities, with the breaker panel door removed.

Using procedure FP-MA-ES-01, Electrical Safety, at what distance must the Flash Protection boundary and Restricted Approach Boundary be established?

	Flash Protection	Restricted Approach
A.	7 feet	avoid contact
B.	7 feet	1 foot, 0 inches
C.	17 feet	avoid contact
D.✓	17 feet	1 foot, 0 inches

RO Tier 3 Group

Source:
Bank

Question History:
PB Exam Bank #02.01.26.01 006.

RO:
10 CFR Part 55 Content: 55.41 (b)(10)

K/A:
(G2.2.20) EQUIPMENT CONTROL:
Knowledge of the process for managing troubleshooting activities

Cognitive Level:
High

Reference:
FP-MA-ES-01, Electrical Safety, Rev. 25

Proposed reference to be provided to the applicants during examination:
FP-MA-ES-01, Electrical Safety, Rev. 25 Attachments A and F

Original Question:
PB Exam Bank #02.01.26.01 006.

Justification:

A **INCORRECT:** Plausible if the candidate mis-reads Attachment F for 1B40 at 7 feet AND if the incorrect page of Attachment A is utilized (phase-to-ground vice phase-to-phase).

B **INCORRECT:** Plausible if the candidate mis-reads Attachment F for 1B40 at 7 feet.

C **INCORRECT:** Plausible if the candidate utilizes the incorrect page of Attachment A (phase-to-ground vice phase-to-phase).

D **CORRECT:** FP-MA-ES-01 Attachment F Page 38 for Flash Protection and Attachment A Page 1 for 480V (MCC) for Restricted Approach.

Learning Objective:
02.01.26.01

68. 2023 NRC RO 068

Given the following:

- T-104A, Waste Distillate Tank has been recirced and sampled IAW OI-140B, Standard Radioactive Batch Liquid Release-Waste Distillate Tanks.
- Prior to release, an additional 1000 gallons of water was sent to T-104A.

Which of the following criteria accurately reflects the status of the T-104A release IAW IO-140B?

T-104A, A WDT release is:

A. Not allowed until the tank has been recirced an additional 50 minutes to accommodate the new water.

B.✓ Not allowed until the tank has been completely recirced and sampled in its entirety.

C. Allowed so long as the sample starts within 24 hours of the initial sample.

D. Allowed, provided release point monitor RE-229 does not receive an ALERT or HI alarm on discharge

RO Tier 3 Group 2

Source:
New

Question History:
N/A

RO:
10 CFR 55.41.11

Justification:
Meets Tier 3 requirements – focuses on plant -wide generic K/As and the administrative requirements to perform radiological release.

K/A:
RADIATION CONTROL: Ability to control radiation releases (CFR: 41.11 / 43.4 / 45.10)

Justification for K/A Match:

Cognitive Level:
Low

Reference:
OI-140B, Standard Radioactive Batch Liquid Release Waste Distillate Tanks

Proposed reference to be provided to the applicants during examination:
None

Original Question:
None

Justification:

OI-140B, Standard Radioactive Batch Liquid Release-Waste Distillate Tanks, Step 3.10 states:

> A tank may NOT be used as a supply of water after the proper recirculation time and a discharge permit has been created. Any water input considers the tank contents to be a new body of water which requires a completely new recirculation and a new discharge permit.

A: Incorrect. Any new water requires completely new recirculation and sampling. 50 minutes is the procedurally required time a WDT must be on recirc per 1000 gallons of level in the tank. Plausible if the candidate fails to recall the requirements of OI-140B and inaccurately assumes the recirc requirements pertain only to the added water volume.

B: Correct. See bove

C: Incorrect. Per OI 140B, Step 3.9, Liquid discharges interrupted for reasons other than a HI, HI Fail, or ALERT RMS alarm may be restarted within 24 hours of the interruption on the initially issued discharge permit. Plausible if the candidate fails to recall the requirements of OI-140B and inaccurately assumes the 24 hours applies to releasing the WDT following sample.

D: Incorrect. Per OI 140B, Step 3.8, Liquid discharges interrupted due to a "release point monitor" HI, HI FAIL, or ALERT alarm (RE-229), shall be evaluated in accordance with RAM 3.1.1, Restarting a Liquid Batch Release, prior to restarting the release. Plausible if the candidate fails to recall the requirements of OI 140B and incorrectly assumes that discharge of the WDT is allowed with the current sample provided the release point monitor does not go into alarm during the discharge.

Learning Objective:

PBN LP0063:
IDENTIFY and DESCRIBE the controls, alarms, and indications associated with the Liquid Waste Disposal System (WL), Borated Water Processing System, and the Advanced Liquid Waste Processing System (ALPS), including: (051.04.LP0063.005)

a. Location and function of component and/or system operating controls and control stations
b. Alarming locations and response to major system and component alarms
c. Plant, system, and component conditions or permissives required for operation
d. Setpoints associated with major system alarms and/or interlocks

69. 2023 NRC RO 069

Regarding alarm response per OP-AA-100-1000, Conduct of Operations:

After a Reactor Trip, with the crew currently in EOP-0, Reactor Trip or Safety Injection:

(1) Announcement of alarms __(1)___expected to occur.

(2) Use of Alarm Response Procedures __(2)__ required.

	(1)	(2)
A.	is	is
B.	is	is NOT
C.	is NOT	is
D.✓	is NOT	is NOT

RO Tier 3 Group

Source:
New

Question History:
N/A

RO:
10 CFR Part 55 Content: 55.41 (b)(10)

K/A:
(G2.4.12) EMERGENCY PROCEDURES/PLAN:
Knowledge of operating crew responsibilities during emergency and abnormal operations

Cognitive Level:
Low

Reference:
OP-AA-100-1000, Conduct of Operations, Rev. 34

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

A **INCORRECT:** Plausible if the candidate does not recall the requirement after a plant trip regarding alarm reporting AND ARP usage in accordance with OP-AA-100-1000.

B **INCORRECT:** Plausible if the candidate does not recall the requirement after a plant trip regarding alarm reporting in accordance with OP-AA-100-1000.

C **INCORRECT:** Plausible if the candidate does not recall the requirement after a plant trip regarding ARP usage in accordance with OP-AA-100-1000.

D **CORRECT:** In accordance with Section 4.2 of OP-AA-100-1000, Immediately following a plant trip, the operators are NOT expected to announce alarms. However, after completing their immediate actions or when directed by the CRS, the operators will acknowledge all alarms. The operators will then review the high priority alarms and inform the CRS of any unexpected or significant high priority alarms (e.g. loss of subcooling margin, adverse containment, etc.). Use of alarm response procedures is NOT required during emergency operating conditions unless directed by the CRS. Alarm response procedures should be used when possible, but usage must NOT take precedence over stabilizing the plant or other mitigating actions of the EOP network.

Learning Objective:

70. 2023 NRC RO 070

Which of the following:

(1) Lists a common fission product in the reactor;

and

(2) Best describes Fission Product Poisons?

A. (1) Boron
(2) nuclei that have small microscopic cross sections for thermal neutron capture

B. (1) Boron
(2) nuclei that have large microscopic cross sections for thermal neutron capture

C. (1) Xenon
(2) nuclei that have small microscopic cross sections for thermal neutron capture

D✓ (1) Xenon
(2) nuclei that have large microscopic cross sections for thermal neutron capture

RO Tier 4 Group

Source:
New

Question History:
N/A

RO:
10 CFR 55.41.1

Justification:
Meets Tier 4 requirements by testing reactor theory knowledge components.
Meets KA by testing candidate's knowledge of the Fission Product Poison definition.

K/A:
FISSION PRODUCT POISONS (CFR: 41.1): Define fission product poison

Justification for K/A Match:

Cognitive Level:
Low

Reference:

Proposed reference to be provided to the applicants during examination:
None

Original Question:
New

Justification:

A: Incorrect. Part (1) is incorrect. Boron is not a fission product, but is used in PWRs for reactivity control. Plausible if the candidate recognizes the absorption capabilities of boron but failed to recall the source of boron related to the definition of fission product poisons. Part (2) is incorrect. Plausible if the candidate fails to recall what the microscopic cross section for thermal neutron capture means and how it applies to fission product poisons.

B: Incorrect. Part (1) is incorrect. Boron is not a fission product, but is used in PWRs for reactivity control. Plausible if the candidate recognizes the absorption capabilities of boron but failed to recall the source of boron related to the definition of fission product poisons. Part (2) is correct.

C: Incorrect. Part (1) is correct. Xenon is a natural fission product during normal plant operation. Part (2) is incorrect. Plausible if the candidate fails to recall what the microscopic cross section for thermal neutron capture means and how it applies to fission product poisons.

D. Correct. Part (1) is correct. Xenon is a natural fission product during normal plant operation. Part (2) is correct. Fission Product Poisons have a large microscopic cross section for thermal neutron capture.

Learning Objective:

71. 2023 NRC RO 071

Given the following:

- A transient occurred requiring a Reactor Trip
- NO Safety Injection Systems are required
- Three (3) Control Rod Bottom Lights are NOT lit
- Currently borating using EOP-0.1, Reactor Trip Response

Five minutes later, a transient results in the loss of BOTH RCPs.

- The crew transitions to EOP-0.2, Natural Circulation Cooldown, and initiates boration to Cold Shutdown concentration
- Natural circulation has been established

Compared to borating in forced circulation, borating in natural circulation requires ____(1)____ time to achieve complete mixing in the RCS.

In natural circulation, after complete mixing, a 1 ppm increase in RCS boron concentration will cause a/an ____(2)_____ change in reactivity for a given reactor coolant temperature as compared to forced circulation.

	(1)	(2)
A.	more	smaller
B.✓	more	equal
C.	less	smaller
D.	less	equal

RO Tier 4 Group

Source:
Modified Bank

Question History:
Modified from GFE, June 2014 Question P3364

RO:
10 CFR Part 55 Content:

K/A:
(192007K1.05) Fuel Depletion and Burnable Poisons:
Describe the effects of boration/dilution on reactivity during forced-flow and natural circulation conditions

Cognitive Level:
Low

Reference:

Proposed reference to be provided to the applicants during examination:
None

Original Question:

USNRC GENERIC FUNDAMENTALS EXAMINATION
JUNE 2014 PWR --FORM A

QUESTION: 32

Compared to adding boric acid to the reactor coolant system (RCS) during forced circulation, adding boric acid during natural circulation requires __________ time to achieve complete mixing in the RCS; and after complete mixing occurs, a 1 ppm increase in RCS boron concentration during natural circulation will cause a/an __________ change in reactivity for a given reactor coolant temperature.

A. less; equal

B. less; smaller

C. more; equal

D. more; smaller

Justification:

A **INCORRECT:** Plausible if the candidate believes that the boron change is related to the RCP running. Regardless of RCPs running, a 1 ppm change applies to the entire system with the characteristics of the reactivity effect the same as long as RCS temperature is the same; therefore, the reactivity change is EQUAL for a given temperature.

B **CORRECT:** Since RCPs are not running in natural circulation, loop transport time is longer; therefore, it takes MORE time to achieve mixing in the RCS. Regardless of RCPs running, a 1 ppm change applies to the entire system with the characteristics of the reactivity effect the same as long as RCS temperature is the same; therefore, the reactivity change is EQUAL for a given temperature

C **INCORRECT:** Plausible if the candidate believes that boron mixes in the RCS faster if there is lower flow rate. Since RCPs are not running in natural circulation, loop transport time is longer; therefore, it takes MORE time to achieve mixing in the RCS. Additionally, plausible if the candidate believes that the boron change is related to the RCP running. Regardless of RCPs running, a 1 ppm change applies to the entire system with the characteristics of the reactivity effect the same if RCS temperature is the same; therefore, the reactivity change is EQUAL for a given temperature

D **INCORRECT:** Plausible if the candidate believes that boron mixes in the RCS faster if there is lower flow rate. Since RCPs are not running in natural circulation, loop transport time is longer; therefore, it takes MORE time to achieve mixing in the RCS.

Learning Objective:

72. 2023 NRC RO 072

Which of the four plant conditions would have the HIGHEST decay heat generation:

The plant started up from a refueling outage _(1)_ days ago and has been operating steady state for_(2)_ days at _(3)_ % power, then trips _(4)_ minute(s) ago.

	(1)	**(2)**	**(3)**	**(4)**
A.	15	five	100	10
B.✓	20	five	100	1
C.	20	seven	40	10
D.	15	seven	40	1

RO Tier 4 Group

Source:
New

Question History:
N/A

RO:
10 CFR 55.41.1

Justification:

K/A:
REACTOR OPERATIONAL PHYSICS (CFR: 41.1): Explain the relationship between decay heat generation and (1) power level history, (2) power production, and (3) time since reactor shutdown

Justification for K/A Match:

Cognitive Level:
Low

Reference:

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

Part (1) and (2) provide a power history for the plants by establishing that plants are BOL and operating steady state sufficient to establish steady state power operations. Based on the scope of the timeframe, neither of these factors are predominate in the decay heat calculation process. Therefore, part (3) and (4) are the major factors for the question. Part (3) identifies power level at time of shutdown, which in this case 100% power level operations will produce higher decay heat than 50% plant operations. Part (4) identifies the time after shutdown; 1 minute is correlates to ~3% decay heat and 10 minutes correlates to ~2% decay heat generation.

A: Incorrect. While sustained 100% power operation will produce high decay heat, at 10 minutes there will be less decay heat in the core than at time 1 minute. Plausible if the candidate fails to recall the correlation of decay heat to time after shutdown.

B: Correct. Sustained 100% power operations with time at 1 minute after shutdown will result in the highest decay heat.

C: Incorrect. 40% sustained power will result in lower decay heat generation. Plausible if the candidate errors on prioritizing power history (7 days) over power history or time after shutdown.

D: Incorrect. 40% sustained power will result in lower decay heat generation. Plausible if the candidate errors on prioritizing power history (7 days) over power history or time after shutdown.

Learning Objective:

73. 2023 NRC RO 073

A transient occurred on Unit 2 and the crew is currently in EOP-1.2, Post-LOCA Cooldown and Depressurization on Step 14:

```
14    Depressurize RCS To Minimize RCS
      Subcooling:
```

Current conditions are as follows:

- Pressurizer liquid temperature = 568°F
- Pressurizer vapor temperature = 596°F
- Pressurizer pressure = 1,395psig
- Pressurizer level = 60%

Given these conditions, the pressurizer liquid is __(1)__; and the pressurizer vapor is ___(2)___.

	(1)	(2)
A.	saturated	saturated
B.	saturated	superheated
C.	subcooled	saturated
D.✓	subcooled	superheated

RO Tier 4 Group

Source:
Bank

Question History:
GFE, Sept 2016

RO:
10 CFR Part 55 Content: 55.41 (b)(14)

K/A:
(193003K1.14) STEAM (CFR: 41.14): Define the following term: -- superheated vapor

Cognitive Level:
High

Reference:

EOP-1.2 Unit 2, Post-LOCA Cooldown and Depressurization, Rev. 37
EOP-1.2, Post-LOCA Cooldown and Depressurization Background, Rev. 28

Proposed reference to be provided to the applicants during examination:
Steam Tables / Mollier Diagram

Original Question:
GFE, Sept 2016
Justification:

A **INCORRECT:** Plausible if the candidate mis-reads the steam tables or Mollier diagram for both the liquid and vapor temperatures to determine the PZR is at saturation conditions.

B **INCORRECT:** Plausible if the candidate mis-reads the steam tables or Mollier diagram for the liquid temperature to determine the PZR liquid is at saturation conditions.

C **INCORRECT:** Plausible if the candidate mis-reads the steam tables or Mollier diagram for the vapor temperature to determine the PZR vapor is at saturation conditions.

D **CORRECT:** Using the steam tables, given the conditions in the pressurizer, the liquid volume is subcooled and the steam space is superheated.

Learning Objective:

74. 2023 NRC RO 074

An operating centrifugal water pump has a 26-inch diameter suction nozzle and a 24-inch diameter discharge nozzle.

For this pump, the discharge water velocity is __________ the suction water velocity; and the discharge water volumetric flow rate is __________ the suction water volumetric flow rate.
(Assume water is incompressible and the suction and discharge water temperatures are the same.)

A. greater than; greater than

B.✓ greater than; equal to

C. less than; greater than

D. less than; equal to

RO Tier 4 Group

Source:
Bank

Question History:
March 2017 GFE Exam PWR

RO:
10 CFR 55.41.14

K/A:
THERMODYNAMIC PROCESS (CFR: 41.14): (THROTTLING AND THE THROTTLING PROCESS) Determine the exit conditions for a throttling process based on the use of steam and/or water

Justification for K/A Match:

Cognitive Level:
Low

Reference:

Proposed reference to be provided to the applicants during examination:
None

Original Question:
March 2017 GFE Exam PWR P7760 (B7760)

Justification:

A: Incorrect. Part 1 is correct. Part 2 is incorrect; the volumetric flow rate of the fluid remains constant through the system. Plausible if the candidate fails to recognize the fluid dynamics and properties as system parameters change.

B. Correct. Part 1 is correct. The smaller diameter discharge nozzle requires a faster fluid velocity in order to maintain the system flow rate. Part 2 is correct. The volumetric flow rate of the system does not change with the change in pipe diameter; system parameters (velocity, pressure) will adjust for the change instead.

C: Incorrect. Part 1 is incorrect. Plausible if the candidate fails to understand the relationship between volumetric flow rate, area and velocity. Velocity is inversely proportional to the cross-sectional area of the pipe. Therefore, the smaller discharge pipe results in a greater velocity. Part 2 is incorrect. The volumetric flow rate of the system does not change with the change in pipe diameter; system parameters (velocity, pressure) will adjust for the change instead. Plausible if the candidate fails to recognize the fluid dynamics and properties as system parameters change.

D: Incorrect. Part 1 is incorrect. Plausible if the candidate fails to understand the relationship between volumetric flow rate, area, and velocity. Velocity is inversely proportional to the cross-sectional area of the pipe. Therefore, the smaller discharge pipe results in a greater velocity. Plausible if the candidate fails to recognize the fluid dynamics and properties as system parameters change. Part 2 is correct.

Learning Objective:

75. 2023 NRC RO 075

Radial peaking factor is defined as the ___(1)___ power density of the fuel across the horizontal plane.

Maintaining this factor within limits ensures the maximum fuel clad temperature of ___(2)___ is not exceeded during a Loss of Coolant Accident.

	(1)	(2)
A.	peak to average	1800°F
B.	median average	1800°F
C.✓	peak to average	2200°F
D.	median average	2200°F

RO Tier 4 Group

Source:
New

Question History:
N/A

RO:
10 CFR Part 55 Content: 55.41 (b)(14)

K/A:
(193009K1.01) CORE THERMAL LIMITS (CFR: 41.14): Explain radial peaking factor

Cognitive Level:
Low

Reference:

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

A **INCORRECT:** Plausible if the candidate mis-applies the correct Peak Cladding Temperature limit (steady state vs. transient limit).

B **INCORRECT:** Plausible if the candidate mis-applies peak to average as a median average which will provide a different numerical limit. Additionally, if the candidate mis-applies the correct PCT temperature limit (steady state vs. transient limit).

C **CORRECT:** The peak to average power density is the definition of radial peaking factor. The numerical limit for this thermal peaking factor based on analysis is 2200°F, which is listed in the licensees Technical Specifications for maximum PCT value.

D **INCORRECT:** Plausible if the candidate mis-applies peak to average as a median average which will provide a different numerical limit.

Learning Objective:

76. 2023 NRC SRO 076

Given the following:

- Unit 1 crew is responding to an RCS leak inside Containment
- 1P-2B Charging Pump is tagged out of service for maintenance
- 1P-2A Charging Pump tripped on overcurrent
- RCS Leakage was calculated at 45 gpm

Several minutes later, the following conditions are noted:

- Unit 1 has been manually tripped
- The crew is performing EOP-0, Reactor Trip or Safety Injection
- The following indications are noted:
    - Containment pressure is 6 psig and RISING SLOWLY
    - RCS pressure is 1735 psig and LOWERING SLOWLY
    - Pressurizer level is 13% and LOWERING
    - RCS subcooling is 45°F and LOWERING
    - 1P-15A and B SI Pumps are both running indicating
        - 40 amps
        - 0 gpm flow
        - 1570 psig discharge pressure

Which of the choices completes the following statement?

The highest required emergency classification is ___(1)___ and the NRC is required to be notified within ___(2)___.

REFERENCE PROVIDED

	(1)	(2)
A.	Unusual Event	15 Minutes
B.	Unusual Event	1 Hour
C.	Alert	15 Minutes
D.✓	Alert	1 Hour

SRO Tier 1 Group 1
Meets Tier 1 requirements- requires operator knowledge of Emergency procedure for proper time notifications during plant transient conditions.

Source: New

Question History: N/A

SRO:

10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Justification for SRO-ONLY Question:
SRO Justification: Offsite reporting is strictly an SRO function at PBNP

K/A:

Small Break LOCA (G2.4.30) EMERGENCY PROCEDURES/PLAN: Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator (CFR: 41.10 / 43.5 / 45.11)

Justification for K/A Match:

Matches the K/A by requiring the examinee to use knowledge of the control room indications and annunciators to determine plant status, and then determine what operator actions are necessary based on those conditions.

Cognitive Level:

Comprehension 3-SPK: The examinee must analyze the initial conditions, to determine the status, then apply that to determine which procedure/appendix is needed to mitigate the event.

10 CFR Part 55 Content:

55.41 50
55.43 5
55.45.12

Reference:

EPIP 1.2.1 Rev 28, EAL and Technical Bases
EPIP 2.1 Rev 63, Notifications - ERO, State and Counties and NRC

Proposed reference to be provided to the applicants during examination:

EPIP 1.2.1_028, first 2 pages (EAL Charts)

Original Question:

Justification:
The correct answer is declaration of an Alert based on FA1, Any Loss or Any potential loss of either fuel clad or RCS barrier. There are no conditions in the stem that challenge Fuel Clad Barrier. The RCS barrier is lost due to manual ECCS (SI) actuation required due to unisolable RCS leakage. The notification will be made per EPIP 2.1, which contains the Precaution and Limitation of "The NRC shall be notified immediately following the state and county notifications, not to exceed on hour from declaration of a classified emergency."

A: Incorrect: Part 1 is incorrect. Plausible if the candidate incorrectly assesses EAL conditions and incorrectly assumes SU5.2, RCS Leakage greater than 25gpm for 15 minutes or longer, as the highest emergency classification. Part (2) is incorrect. Plausible due to the fact that State and Local notifications are made within 15 minutes of declaration.

B: Part 1 is incorrect. Plausible if the candidate incorrectly assesses EAL conditions and incorrectly assumes SU5.2, RCS Leakage greater than 25gpm for 15 minutes or longer, as the highest emergency classification. Part (2) is correct.

C: Incorrect. Part 1 is correct. Part (2) is incorrect. Plausible due to the fact that State and Local notifications are made within 15 minutes of declaration.

D: Correct.

Learning Objective:

77. 2023 NRC SRO 077

You are the Unit 1 Control Room Supervisor when the controlling channel of pressurizer level fails high.

(1) Which procedure would be directed to be entered?

(2) What action is required to be taken by the crew?

A. (1) AOP-24, Response to Instrument Malfunction.

(2) Take charging to minimum.

B. (1) AOP-1D, CVCS Malfunction.

(2) Start an additional charging pump.

C.✓ (1) AOP-24, Response to Instrument Malfunction.

(2) Take manual control of charging.

D. (1) AOP-1D, CVCS Malfunction.

(2) Take 1PC-431K, Pressurizer Pressure Master Controller, to manual.

SRO Tier 1 Group 1

Source: Modified RO Bank to make SRO

Question History:
2005 NRC RO 020

K/A:
(000022) (APE 22) Loss of Reactor Coolant Makeup
(G2.1.2) CONDUCT OF OPERATIONS: Knowledge of operator responsibilities during any mode of plant operation

Justification for K/A Match:

Cognitive Level:

10 CFR Part 55 Content: 55.43 (b)(5)

Reference:

AOP-1D, CVCS Malfunction, Rev. 17
AOP-24, Instrument Malfunction, Rev. 10

Proposed reference to be provided to the applicants during examination:

None

Original Question:
Modified to make SRO-Only from PB Exam Bank question 2005 NRC RO 020
Justification:

A **INCORRECT:** Plausible as Part (1) is correct and with actual pressurizer level high, the crew would minimize charging. In this instance actual level is not high, indicated level is high.

B **INCORRECT:** Plausible if the candidate believes that steps in AOP-1D give the actions to restore this malfunction by starting an additional charging pump to restore PZR level. No entry conditions exist for entry into this procedure.

C **CORRECT:** AOP-24 contains the actions required to take manual control of charging since Controlling Channel of Pressurizer Level has failed high, this causes auto charging pump to ramp to minimum.

D **INCORRECT:** Plausible if the candidate believes that steps in AOP-24 are appropriate to take the pressurizer pressure controller to manual to mitigate the PZR level control issue. Although the PZR parameters will be affected by the level controller failure, taking the pressure controller to manual will not correct the issue.

Learning Objective:

78. 2023 NRC SRO 078

Given the following:

- Unit 1 is in EOP-1.3, Transfer to Containment Sump Recirculation – Low Head Injection
- Bus 1B04 480 VAC Safeguards Bus is de-energized
- The crew has commenced ‘A’ Train of RHR for containment sump recirculation

Subsequently:

- 1P-11A ‘A’ CCW Pump has tripped
- RHR HX Outlet temperature is slowly rising

(1) What is the appropriate initial response to the event,
and
(2) What describes the appropriate procedure prioritization?

A.✓ (1) Maintain sump recirculation per EOP-1.3, monitoring parameters

(2) Enter AOP-9B, Unit 1 Component Cooling System Malfunction, to restore CCW cooling

B. (1) Secure 1P-10A, A RHR Pump, due to loss of CCW Cooling

(2) Enter ECA 1.1, Loss of Containment Sump Recirculation, to restore containment sump recirculation capability

C. (1) Secure 1P-10A, A RHR Pump, due to loss of CCW Cooling

(2) AOP-9B, Unit 1 Component Cooling System Malfunction, to restore CCW cooling

D. (1) Maintain sump recirculation per EOP-1.3, monitoring parameters

(2) Enter ECA 1.1, Loss of Containment Sump Recirculation, to restore containment sump recirculation capability

SRO Tier 1 Group 1

Meets Tier 1; requires operator knowledge of information contained in the site's procedures, including emergency operating procedures (EOPs), and the progression of an event.

Source:New

Meets SRO only - knowledge of diagnostic steps and decision points in the EOPs that involve transitions to event-specific subprocedures or emergency contingency procedures

Question History:

None

K/A:

Ability to determine and/or interpret the following as they apply to (APE 25) LOSS OF RESIDUAL Heat Removal System (CFR: 43.5 / 45.13): RHR heat exchange inlet and outlet temperatures

Justification for K/A Match:

Cognitive Level:

High

10 CFR Part 55 Content:

10 CFR 55.43.5

Reference:
EOP-1.3 Unit 1_059, Transfer to Containment Sump Recirculation – Low Head Injection

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

Unit 1 EOP-1.3_59, includes the following:
• Step 8 Caution states: Core cooling flow must be maintained at all times or core damage will result.
• EOP-1.3 Step 25 caution states “RHR pump(s) should not be run longer than 3 hrs. without component cooling water to the associated RHR heat exchanger(s).

A. Correct.

B. Incorrect. Part 1 is incorrect; plausible if the candidate fails to recognize that loss of CCW flow to the RHR heat exchanger does not compromise the immediate RHR pump operation and applies EOP-1.3 Step 25 caution without the 3 hour delay. Part 2 is correct.

C.Incorrect. Part 1 is correct. Part 2 is incorrect; plausible if the candidate fails to recognize that EOP-1.3 actions are the priority for given plant conditions and inaccurately assumes that a loss of cooling flow to RHR will render the RHR system incapable of operation and therefore prioritizes AOP-9B.

D.Incorrect. Part 1 is incorrect; plausible if the candidate fails to recognize that loss of CCW flow to the RHR heat exchanger does not compromise the immediate RHR pump operation and applies EOP-1.3 Step 25 caution without the 3-hour delay. Part 2 is incorrect; plausible if the candidate fails to recognize that EOP-1.3 actions are the priority for given plant conditions and inaccurately assumes that a loss of cooling flow to RHR will render the RHR system incapable of operation and therefore prioritizes AOP-9B.

Learning Objective:

051.03.LP0069.009
DESCRIBE the procedures which govern operation of the Residual Heat Removal System. Description should include significant precautions and limitation and notes associated with startup and operation of the Residual Heat Removal system.

79. 2023 NRC SRO 079

Given the following:

- Unit 1 at 100% Power
- Pressurizer and VCT levels begin to SLOWLY LOWER
- Crew enters AOP-1A, Reactor Coolant Leak
- 1C03 1D 1-1, 1P-1A or B RCP LABYR SEAL WATER INLET or BEARING TEMP HIGH **LIT and CLEARED**
- 1C03 1D 2-1, 1P-1A or B RCP LABYR SEAL ∆P LOW **LIT and CLEARED**

Subsequently, the following is reported:

- 1P-1B RCP COOLING WATER FLOW LOW annunciator is **LIT**
- CCW Surge Tank Level had risen by 4% and is STABLE
- Pressurizer AND VCT levels are STABLE

Note:
AOP-1B, Reactor Coolant Pump Malfunction
AOP-9B, Component Cooling System Malfunction
EOP-0, Reactor Trip and Safety Injection

What actions should be directed by the SRO?

A. Continue in AOP-1A; monitor RCP seal parameters for degradation.

B. Transition to AOP-1B; trip the Reactor, stabilize per EOP-0, and trip 1P-1B RCP per AOP-1B foldout page.

C. Transition to AOP-9B; bypass and isolate the Seal Water Heat Exchanger per AOP-9B, Attachment A, LEAK ISOLATION FOR LOWERING SURGE TANK LEVEL.

D.✓ Transition to AOP-9B; ensure both RCPs have seal injection supply flow, then verify isolation of 'B' RCP thermal barrier cooling return, per AOP-9B, Attachment B, LEAK ISOLATION FOR RISING SURGE TANK LEVEL.

SRO Tier 1 Group 1

Source: Bank

Question History:
PBNP 2012 SRO 76

K/A:
Ability to determine and/or interpret the following as they apply to Loss of Component Cooling Water:
Location of a leak in the CCWS

Justification for K/A Match:

Cognitive Level:

10 CFR Part 55 Content:
55.43 (b)(5)

Reference:
AOP-1A, Reactor Coolant Leak, Rev. 20
AOP-1B, Reactor Coolant Pump Malfunction, Rev. 30
AOP-9B, Component Cooling Water System Malfunction, Rev. 27
EOP-0, Reactor Trip and Safety Injection, Rev. 45

Proposed reference to be provided to the applicants during examination:
None

Original Question:
PB, 2012 Q76

Justification:

A **INCORRECT:** AOP-1A will not address isolating the RCP Thermal Barrier Cooling return. Plausible if examinee does not recognize that a transition is made to AOP-9B for the risen level in the CCW surge tank. Could determine that the RNO is not needed since the level is stabilized.

B **INCORRECT:** Tripping the Reactor or RCP is not procedurally necessary currently. Plausible if examinee believes that a trip is warranted due to the loss of labyrinth seal cooling to the RCP.

C **INCORRECT:** VCT level rose a finite amount then stopped. A Seal Water HX leak would make the VCT level rise until isolated. Plausible if examinee does not realize that this leak would cause VCT level to continually rise.

D **CORRECT:** Based on the above indications, the unit is experiencing a RCS to CCW leak via the RCP thermal barrier. The thermal barrier will automatically isolate on high flow which make CCW surge tank level stabilize. AOP-9B, Att. B will verify the isolation of the leak.

Learning Objective:

Respond to indications of a CCW leak into or out of the system in accordance with AOP-9B (055.03.LP2444.002)

80. 2023 NRC SRO 080

Unit 1 was at 100% power, normally aligned.

- A malfunction of the pressurizer pressure control system caused 1RC-430, PZR PORV, to fail OPEN in auto.
- 15 seconds after failing open, the RO places the 1RC-430 to CLOSE and the PORV closes.
- PZR pressure dropped to 2050 psig while the PORV was open, and now is STABLE.

When compared to the same event occurring at 50% power, with the lowest transient pressure being equal for both events, the margin to nucleate boiling at 100% power is _(1)_ than the margin to nucleate boiling at 50% power.

- After evaluating the PZR pressure trend, the SRO determines that there is excessive leak by from 1RC-430 and directs the RO to CLOSE 1RC-516, 1RC-430 PZR PORV ISOLATION MOV.
- When 1RC-516 is closed, PZR pressure slowly RISES back to NOP and PORV outlet temperature is slowly dropping.

CURRENTLY, 1RC-430 is INOPERABLE due to _(2)_.

	(1)	(2)
A.	less	1RC-516 being CLOSED
B.✓	less	1RC-430 seat leakage
C.	greater	1RC-516 being CLOSED
D.	greater	1RC-430 seat leakage

SRO Tier 1 Group 1
SRO- requires knowledge of TS Basis.
Tier 1 – Requires operator knowledge regarding the progression of an event.

Source:
    Modified Bank

Question History:
    None

K/A:
Ability to determine and/or interpret the following as they apply to (APE 27) PRESSURIZER PRESSURE Control System Malfunction (CFR: 43.5 / 45.13): Reactor power

Justification for K/A Match:

Cognitive Level:
    High

10 CFR Part 55 Content:

    10 CFR 55.43.5

Reference:
    TS 3.4.11_002, and TS B .4.11 004
    PBN LP0457-PZR Press and Level control LP

Proposed reference to be provided to the applicants during examination:
None

Original Question:

Question 78 ID: 2124970 Points: 1.00

Unit 1 was at 100% power, normally aligned.

• A malfunction of the pressurizer pressure control system caused 1RY455A, PZR PORV, to fail OPEN in auto.

• 15 seconds after failing open, the RO places the 1RY455A C/S to CLOSE and the PORV closes.

• PZR pressure dropped to 2050 psig while the PORV was open, and now is STABLE.

While 1RY455A was OPEN and PZR pressure was dropping, actual charging flow 1 .

• After evaluating the PZR pressure trend, the SRO determines excessive leak by from 1RY455A and directs the RO to CLOSE 1RY8000A, PORV ISOL VLV.

• When 1RY8000A is closed, PZR pressure slowly RISES back to NOP and

PORV temperature is slowly dropping.

CURRENTLY, 1RY455A is INOPERABLE due to 2 .

A. 1. dropped
2. 1RY8000A being CLOSED
B. 1. dropped
2. 1RY455A seat leakage
C. 1. rose
2. 1RY8000A being CLOSED
D. 1. rose
2. 1RY455A seat leakage

Answer D

Answer Explanation

2020 Braidwood NRC Exam Question: # 78

A – Plausible: In a pressurized (non-saturated system), the lower system pressure would reduce back pressure and level would initially rise, then drop as the level control system responded to program level being high. See explanation in correct answer for part 2 answer.

B – Plausible: In a pressurized (non-saturated system), the lower system pressure would reduce back pressure and level would initially rise, then drop as the level control system responded to program level being high.

C – Plausible: See explanation in correct answer for part 2 answer.

D – Correct: Initially when a PZR PORV fails open during steady state conditions, the drop in PZR pressure causes an actual PZR level drop (below program level) by liquid flashing to steam inside the pressurizer (saturated system). This causes 1CV121 to open and charging flow to rise. Tech Spec bases 3.4.11 states: Although typically open to allow PORV operation, the block valves may be OPERABLE when closed to isolate the flow path of an inoperable PORV that is capable of being manually cycled (e.g. as in the case of excessive PORV leakage). Similarly, isolation of an OPERABLE PORV does not render that PORV or block valve inoperable provided the relief function remains available with manual action. An OPERABLE PORV is required to be capable of manually opening and closing, and not experiencing excessive seat leakage. Therefore, the PORV is inoperable due to the seat leakage.

Justification:

Part (1): With Pressurizer pressure at design pressure during 50% and 100% power operation, saturated conditions in the core are dependent upon RCS temperature conditions in the core when compared to pressurizer pressure. RCS temperature conditions are based upon heat generation and heat flux in the core; therefore, higher reactor power conditions will result in a higher heat flux and therefore a higher saturation temperature and subsequently lower margin to boiling. Given a specified drop in pressurizer pressure at 50% and 100% power, the margin to saturated conditions is still greater in a reactor at 50% than at 100% power.

Part (2): Tech Spec 3.4.11 bases states the following: Although typically open to allow PORV operation, the block valves may be OPERABLE when closed to isolate the flow path of an inoperable PORV that is capable of being manually cycled (e.g.as in the case of excessive PORV leakage). Similarly, isolation of an OPERABLE PORV does not render that PORV or block valve inoperable provided the relief function remains available with manual action. An OPERABLE PORV is required to be capable of manually opening and closing, and not experiencing excessive seat leakage. Therefore, the PORV is inoperable due to the seat leakage.

A: Incorrect. Part (1) is correct. Part (2) is incorrect. Plausible if the candidate fails to recall the basis for technical specification inoperability for the plant conditions described.

B. Correct. See explanation above.

C. Incorrect. Part (1) is incorrect. Plausible if the candidate fails to recall the relationship between reactor power, heat flux and saturated conditions in the PZR. Part (2) is incorrect. Plausible if the candidate fails to recall the basis for technical specification inoperability for the plant conditions described.

D. Incorrect. Part (1) is incorrect. Plausible if the candidate fails to recall the relationship between reactor power, heat flux and saturated conditions in the PZR. Part (2) is correct.

Learning Objective:

PREDICT the response to the following failures on the Pressurizer pressure level control system:

- Pressurizer level failing low
- Pressurizer level failing high
- Pressurizer pressure failing low
- Pressurizer pressure failing high
- Auctioneered high TAVG failing high
- Auctioneered high TAVG failing low

IDENTIFY and DISCUSS the Technical Specifications associated with the Pressurizer Pressure and Level Control System components, parameters, and operation to include:

a. Limiting Condition for Operation (LCO)

b. LCO Applicability

81. 2023 NRC SRO 081

Given the following conditions:

- 1X-04 LV Station Auxiliary Transformer lockout occurred
- G-01 EDG did not auto load on to 1A05, 4160 Safeguards Bus
- G-03 EDG tripped on overspeed
- Immediate actions have been completed
- The crew is responding to the loss of AC power
- G-01 EDG was subsequently aligned supplying 1A05
- 1A05 voltage and frequency are 4155 VAC and 59.9 Hz
- G-01 loading is 700 KW

The Third License informs you G-01 is **NOT** responding to adjustments

What actions, if any, are required based on the plant conditions?

A. Start G-02 EDG to supply 1A05 bus; then secure G-01 EDG IAW AOP-18A, Train 'A' Equipment Operation-Unit 1.

B. Secure G-01 EDG and enter ECA-0.0, Loss of All AC Power.

C.✓ Continue operating G01 maintaining EDG loading less than the 2000 hour load limit IAW OI-168, Emergency Diesel Generator Operability.

D. Adjust G-01 EDG loading by starting/securing equipment until voltage/frequency is within limits IAW AOP-18, Electrical System Malfunction.

SRO Tier 1 Group 1

Source: Modified Bank

Question History:

2012 NRC SRO 80 modified to make new distractor correct

K/A:

(000055) (EPE 55) Station Blackout

(G2.1.23) CONDUCT OF OPERATIONS: Ability to perform general and/or normal operating procedures during any plant condition

Justification for K/A Match:

Cognitive Level:

High

10 CFR Part 55 Content:

55.43 (b)(5)

Reference:

ECA-0.0, Loss of All AC Power Background, Rev. 41
ECA-0.0, Loss of All AC Power, Rev. 76

Proposed reference to be provided to the applicants during examination:

None

Original Question:

Modified from PB Exam Bank question 2012 NRC SRO 080.

- Changed stem to make different distractor (OI) the correct answer.

Justification:

A **INCORRECT:** Not procedurally written to load another EDG on to the bus, then secure.

B **INCORRECT:** Plausible if the candidate believes required frequency or voltages are not within band.

C **CORRECT:** EDG must meet the 2000 hour load limit by using the correct OI.

D **INCORRECT:** Plausible if the candidate believes starting and securing loads is procedurally driven as acceptable method to adjust frequency or voltage. AOP-22 is a commonly used procedure to adjust loading on an EDG and could be used at this time to adjust the loading, but not AOP-18.

Learning Objective:

82. 2023 NRC SRO 082

Given the following conditions:

- Unit 1 was at 100% power normal alignments

An event occurs and the following indications are noted:

- Multiple 1C04 window annunciators are in alarm.
- Auctioneered high Tave is 4°F BELOW Tref and stable.
- ONE IRPI Rod Bottom light is LIT.
- Control rods bank D automatically stepped OUT 3 steps and then STOPPED stepping.
- Power Range NIs are stable at:
  N41- 101%
  N42- 101%
  N43- 77%
  N44- 105%

With the above conditions the OS will direct the crew to enter...

A.✓ AOP-6A, Dropped Rod, due to the IRPI indications.

B. AOP-6B, Stuck or Misaligned control Rod, due to the Tave/Tref mismatch.

C. AOP-6C, Uncontrolled Motion of RCCA(S), due to the outward rod motion.

D. EOP-0, Reactor Trip or Safety Injection, due to the NI channel indications.

SRO Tier 1 Group 2
The question is SRO level because it requires assessment of conditions and selection of appropriate procedure.

Source:
Bank

Question History:
Braidwood: 90 ID: SE10003-N01
2009

K/A:
Ability to determine and/or interpret the following as they apply to (APE 3) DROPPED Control Rod (CFR: 43.5 / 45.13): Ex-core NIS

Justification for K/A Match:
The question meets the K/A, requires examinee ability to interpret a dropped rod using ex-core instruments.

Cognitive Level:
High

10 CFR Part 55 Content:
55.43.5

Reference:
PBN LP1547 Rod Control Rev 12

Proposed reference to be provided to the applicants during examination: None
None

Original Question:
Given:
- Unit 1 was at 100% power normal alignment.
An event occurs and the following indications are noted at 1PM05J.
- Multiple block 10 annunciators are in alarm.
- Auctioneered high Tave is 4°F BELOW Tref and stable.
- ONE DRPI Rod Bottom light is LIT.
- Control rods bank D automatically stepped OUT 3 steps and then STOPPED stepping.
- Power Range NIs are stable at:
N41- 101%
N42- 101%
N43- 77%
N44- 105%

With the above conditions the US will direct the crew to...

A. enter 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION, due to the NI channel indications.
B. enter 1BwOA ROD-1, UNCONTROLLED ROD MOTION, due to the outward rod motion.
C. enter 1BwOA ROD-2, FAILURE OF RODS TO MOVE, due to the Tave/Tref mismatch.
D. enter 1BwOA ROD-3, DROPPED OR MISALIGNED ROD, due to the DRPI indications.

Justification:

The given indications are all consistent with a dropped control rod.

Answer A: Correct, All indications are consistent with a single dropped rod.

Answer B:Incorrect, rods are failing to move because of overpower rod stop of 104%. Plausible if the candidate fails to identify that the overpower rod stop is exceeded and focuses on the Tave/Tref deviation.

Answer C: Incorrect, outward rod motion would be expected due to the Tave/Tref mismatch created from the dropped rod. Plausible if the candidate fails to identify that the overpower rod stop is exceeded and focuses on the Tave/Tref deviation

Answer D: Incorrect, No power range NI channels have exceeded the reactor trip setpoint of 106%. Plausible if the candidate mistakenly applies the rod stop limit of 104% to the RPS system actuation.

Learning Objective:

DESCRIBE the control, alarms, and indications associated with the rod control system, including:

° Location and function of component and/or system operating controls and control stations

° Alarming locations and response to major system and component alarms

° Plant, system, and component conditions or permissives required for operation

° Setpoints associated with major system alarms and/or interlocks

83. 2023 NRC SRO 083

After commencing a discharge of T-10A, ‘A’ Monitor Tank, RE-218, Waste Disposal System Liquid Monitor, goes into ALARM due to high radiation.

(1) What automatic actions, if any, will occur?

(2) What actions will the OS direct?

A.✓ (1) WL-18, Waste Liquid Overboard valve will automatically close.

(2) The OS will direct the PAB AO to secure the discharge lineup; the chemistry department will sample the ‘A’ Monitor Tank and issue a new discharge permit if tank levels allow for release.

B. (1) WL-18, Waste Liquid Overboard valve will automatically close.

(2) The OS will direct the PAB AO to isolate RE-218 and purge Rad Monitor for 5 minutes. If the alarm clears during the purge, direct the AO to continue the discharge. Otherwise, direct chemistry to resample the tank and continue the discharge after RE-218 ALERT setpoint is adjusted.

C. (1) No automatic actions will occur.

(2) The OS will direct the PAB AO to secure the discharge lineup and place the tank on recirc; the chemistry department will sample the ‘A’ Monitor Tank and issue a new discharge permit if tank levels allow for release.

D. (1) No automatic actions will occur.

(2) The OS will direct the PAB AO to shut WL-18, Waste Liquid Overboard; direct chemistry to resample the tank and continue the discharge after adjusting RE-218 ALERT setpoint.

SRO Tier 1 Group 2

Source: Bank

Question History:
2007 NRC SRO 83
PB Exam Bank question 2007 NRC SRO 083.

K/A:
(000059AA2.05) Ability to determine and/or interpret the following as they apply to (APE 59) ACCIDENTAL LIQUID Radwaste Release:
The occurrence of automatic safety actions as a result of a high-radiation signal

Justification for K/A Match:

Cognitive Level:

10 CFR Part 55 Content:
55.43 (b)(4)

Reference:
OI-140C, Standard Batch Release – Monitor Tanks, Rev. 10
RAM 3.1.1, Restarting a Liquid Batch Release
RMSARB RE-218, Alarm Response for Waste Disposal System Liquid Monitor

Proposed reference to be provided to the applicants during examination: None

Original Question:
PB 2007 NRC SRO 083

Justification:

A **CORRECT:** valve automatically closes and the lineup is secured IAW OI-140. Then the tank is placed on recirc and resampled. If the results of the sample indicate the tank is satisfactory, then a new discharge permit is issued by chemistry and a new discharge of the tank may commence.

B **INCORRECT:** Plausible if the candidate believes WL-18 will close, but there is no allowance for purging the radiation monitor to clear a high alarm. Purging the radiation monitor is a plausible activity, since flushing and purging are common activities associated with lowering radiation levels. If the examinee assumes that a purge is the proper action, then it follows that the discharge could continue. Carrying this postulated series of events to its logical conclusion; chemistry could then resample the tank and recommend a higher alarm setpoint.

C **INCORRECT:** Plausible if the candidate believes WL-18 will not automatically shut, remaining actions are correct.

D **INCORRECT:** Plausible if the candidate believes WL-18 will not automatically shut, remaining actions plausible since performance of these actions would allow for the continued release of the tank.

Learning Objective:

84. 2023 NRC SRO 084

The Control Room is responding to a lowering level in the Spent Fuel Pool per AOP-8F, Loss of Spent Fuel Pool Cooling.

- Spent Fuel Pool level is 40' and lowering slowly
- RE-105, Spent Fuel Pool Low Range Area Monitor is in **ALARM**

AOP-8F, Attachment B, SFP Makeup Using Unit 1 RWST is currently being aligned.

The Control Room directs operating the following valves in the field:

- Open the Demin Bypass valve
- Close the Demin outlet valve
- Open the Filter bypass valve
- Close the Filter inlet and outlet valves

(1) What is the correct valve position once the manipulations are complete in accordance with AOP-8F, Attachment B?

(2) Per AOP-8F, as SFP level continues to lower, what direction will the SRO give to monitor rising rad levels?

REFERENCE PROVIDED

A.✓ (1) SF-804A is Open

(2) Dispatch RP to locally survey SFP area rad levels

B. (1) SF-804A is Open

(2) Increase monitoring of RE-214, Auxiliary Building Vent Exhaust Gas Monitor.

C. (1) SF-805 is Closed

(2) Dispatch RP to locally survey SFP area rad levels

D. (1) SF-805 is Closed

(2) Increase monitoring of RE-214, Auxiliary Building Vent Exhaust Gas Monitor.

SRO Tier 1 Group 2

Source:
New

Question History:
None

K/A:
Area Radiation Monitoring System Alarms (G2.2.15) EQUIPMENT CONTROL: Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, lineups, or tagouts (reference potential) (CFR: 41.10 / 43.3 / 45.13)

Justification for K/A Match:

Cognitive Level:

10 CFR Part 55 Content:
10 CFR 55.41.10
10 CFR 55.43.3

Reference:
110E018 SH 4_053, P&ID Aux Cooling
AOP-8F_025, Loss of Spent Fuel Pool Cooling
RMSASRB CI RE-105_004

Proposed reference to be provided to the applicants during examination:
110E018 Sh 4_053

Original Question:
N/A

Justification:

(1) Using 110E018, Sh4_053, Section F10 and G10 identify the valves surrounding the Spent Fuel Pool Demineralizer and Spent Fuel Pool Filter. The correct valves are specified in AOP-8F, Attachment B:
a) Open demin bypass.
• SF-804A
b) Shut demin outlet.
• SF-801
c) Open filter bypass.
• SF-805
d) Shut filter [inlet] and outlet valves.
• SF-806A
• SF-806B
(2) AOP-8F, step 6, checks Spent Fuel pool level for greater than 62'-8 and stable or rising. With a lowering trend, Step 6 RNO initiates makeup actions and step c directs monitoring Spent Fuel Pool Area Radiation through the following:
• RE-105, Spent Fuel Pool Low Rang Area Monitor
• RE-135, Spent Fuel Pool Hi Range Area Monitor
• Dispatch RP to locally survey SFP area radiation levels.

A: Correct, see above.

B: Incorrect. Part (1) is correct. Part (2) is incorrect. Increase monitoring of RE-214, Auxiliary Building Vent Exhaust Gas Monitor is not part of AOP-8F, Step 6, and would not be necessary unless there were indications of failed fuel. Plausible because this rad monitor would alarm if contents of the SFP went airborne. (failed fuel or loose surface contamination).

C: Incorrect. Part (1) is incorrect. SF-805, the Filter Bypass Valve, is opened in AOP-8F Attachment B. Plausible if the candidate fails to identify and interpret the plant conditions based on the procedure operated valves compared to the print. Part (2) is correct.

D: Incorrect. Part (1) is incorrect. SF-805, the Filter Bypass Valve, is opened in AOP-8F Attachment B. Plausible if the candidate fails to identify and interpret the plant conditions based on the procedure operated valves compared to the print. Part (2) is incorrect. Increase monitoring of RE-214, Auxiliary Building Vent Exhaust Gas Monitor is not part of AOP-8F, Step 6, and would not be necessary unless there were indications of failed fuel. Plausible because this rad monitor would alarm if contents of the SFP went airborne. (failed fuel or loose surface contamination).

Learning Objective:

85. 2023 NRC SRO 085

You are the Control Room Supervisor of Unit 1 with both Units at normal full power operation when a fire develops in the control boards. The fire causes the following conditions:

- The RO has reported he cannot see the control boards due to smoky environment
- The crew has determined, per AOP-40, that the control room MUST be evacuated

What actions are you required to direct?

A. Trip the reactor and enter EOP-0, Reactor Trip or Safety Injection. Perform AOP-40A, Control Room Abandonment Due to Fire in parallel until the Control Room is accessible.

B.✓ Enter AOP-40A, Control Room Abandonment Due to Fire; Entering EOP-0, Reactor Trip or Safety Injection is **NOT** required.

C. Trip the reactor and perform the immediate actions of EOP-0, Reactor Trip or Safety Injection then transition to AOP-40A, Control Room Abandonment Due to Fire.

D. AOP-40A, Control Room Abandonment Due to Fire; Entering EOP-0, Reactor Trip or Safety Injection is required after the Control Room is accessible.

SRO Tier 1 Group 2

Source: Bank

Question History:
2011 NRC SRO 84

K/A:
(000067) (APE 67) Plant Fire On Site (G2.4.5) EMERGENCY PROCEDURES / PLAN:
Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions

Justification for K/A Match:

Cognitive Level:

10 CFR Part 55 Content: 55.43 (b)(5)

Reference:
AOP-40A, 'Control Room Abandonment Due to Fire'
AOP-40, Response to Fire
AOP-40A, 'Control Room Abandonment Due to Fire' background

Proposed reference to be provided to the applicants during examination:
None

Original Question:
PB Exam Bank question 2011 NRC SRO 084.

Justification:

A **INCORRECT:** Plausible if the candidate believes the use of the AOP is in parallel with EOP-0.

B **CORRECT:** This AOP is of higher priority in this case.

C **INCORRECT:** Plausible if the candidate believes that the AOP is higher priority than EOP-0 but student may reason immediate actions need to be done. EOP-0 entry is not required for this Appendix R fire condition

D **INCORRECT:** Plausible if the candidate believes that the AOP has higher priority and student may think the EOP is done sequentially. EOP-0 entry is not required for this NFPA805 fire condition.

Learning Objective:

86. 2023 NRC SRO 086

Consider the following Unit 1 conditions:

- A Large Break LOCA has occurred
- 1B-04, 480V Safeguards bus normal supply breaker tripped open concurrent with the reactor trip
- RWST level is 5%
- ‘A’ RHR train is in service
- ‘A’ Containment Spray train is in service, receiving water from ‘A’ RHR Train
- Containment pressure is 23 PSIG and lowering slowly
- Containment Sump ’B’ level is 62" and stable
- Containment sump recirculation performance is being monitored per EOP-1, Loss of Reactor or Secondary Coolant, and flow has been stable for 80 minutes

Subsequently, the following conditions change, with all other reamining stable:

- 1P-14A, ‘A’ Containment Spray Pump, flowrate lowers significantly
- 1P-14A, ‘A’ Containment Spray Pump, Red light is **LIT**
- Containment pressure is 25 PSIG and rising slowly

What is the correct plant diagnosis <u>AND</u> the procedure transition?

A.✓ ‘A’ Containment Spray pump shaft sheared, transition to CSP-Z.1, Response to High Containment Pressure.

B. Containment Recirculation capability has been lost, transition to ECA-1.1, Unit 1, Loss of Containment Sump Recirculation.

C. ‘A’ Containment Spray pump shaft sheared, transition to EOP-1.3, Unit 1, Transfer to Containment Sump Recirculation – Low Head Injection.

D. Containment Recirculation capability has been lost, transition to ECA-1.3, Unit 1, Containment Sump Blockage.

SRO Tier 2 Group 1

Source: Bank

Question History:
2007 NRC SRO 87

K/A:
Ability to (a) predict the impacts of the following on the (SF5 CSS) CONTAINMENT SPRAY SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 43.5 / 45.3 / 45.13): Failure of spray pump

Justification for K/A Match:
KA Match – requires operator assessment of containment spray pump failure and determining the appropriate procedure transition based on the plant conditions.

Meets Tier 2 – requires operator system knowledge of plant equipment and operation.

Meets SRO only – requires assessment of plant conditions and determining the mitigating strategy.

Cognitive Level:

10 CFR Part 55 Content:
10 CFR 55.41.5
10 CFR 55.43.5

Reference:

BG EOP-1_037, Background Document, Loss of Reactor or secondary coolant.
CSP-Z.1 Unit 1_029, Response to High Containment Pressure
CSP-ST.0 Unit 1_012, Critical Safety Function Status Trees

Proposed reference to be provided to the applicants during examination: None

Original Question:

Consider the following Unit 1 conditions:

- A Large Break LOCA has occurred.
- 1B-04, 480V Safeguards bus normal supply breaker tripped open concurrent with the reactor trip
- RWST level is 5%.
- ‘A’ RHR train is in service.
- ‘A’ Containment Spray train is in service, receiving water from ‘A’ RHR Train.
- Containment pressure is 23 PSIG and lowering slowly.
- Containment Sump ’B’ level is 62".
- Recirc Sump performance is being monitored IAW EOP-1, "Loss of Reactor or Secondary Coolant", Step 29 and flow has been stable for 20 minutes.
Then the following conditions are noted:
- ‘A’ Containment Spray amps lower to 50 amps, discharge pressures lowers.
- Containment pressure is 25 PSIG and rising slowly

What is the correct transition, and why?
Transition to _(1)____, because CSP-14A __(2)___.

A. Lowering Containment pressure is causing flashing in ’A’ Containment Spray and RHR pump suction lines, secure ‘A’ Containment Spray pump and monitor ‘A’ RHR pump for continued oscillation.

B. Sump ‘B’ strainers are beginning to clog, transition to ECA-1.3, "Containment Sump Blockage" to secure pumps and/or reduce recirculation flow as needed.

C. Pumps are cavitating due insufficient sump water level, transition to ECA-1.2, "LOCA Outside Containment" to provide makeup water for recirc.

D. Boiling is occurring in the RHR heat exchangers, transition to ECA-1.1, "Loss of Containment Sump Recirculation" to align more CCW flow to ‘A’ RHR HX.

Justification:

The operator must diagnose the following from indications of the PPCS show that there is no flow from either containment spray pump. 1P-14B was lost with the lockout of bus 1B-04 during the start of the event. 1P-14A has experienced a shaft shear, as indicated by lowering flow and red light lit. This meets the entry conditions for CSP-Z.1 due to containment pressure being greater than 25 psig and less than one train of containment cooling in effect.

A: Correct.

B: Incorrect. RHR pumps have not had any adverse operation in the stem notes; therefore, the diagnoses and transition is incorrect. Containment Sump Recirculation capability is checked in EOP-1 Step 16, and it is not a continuous action step. The basis for this step is to verify that the equipment is available to establish recirc conditions based on the plant status at that time. The stem states that EOP-1 step 24 has been in effect for 80 minutes, meaning that containment sump recirculation has been established. Plausible if the candidate realizes that a loss of both containment spray pumps occurred but inaccurately assesses the appropriate transition in the EOP procedure network.

C: Incorrect: EOP-1.3 requires securing a Containment Spray pump and aligning SI injection after 2 hours of containment spray operation. This is to prevent boron precipitation. The time required to transition to EOP-1.3 has not been met, and the shaft shear of a containment spray pump would not initiate a transition to EOP-1.3 for this criteria. Plausible if the candidate failed to recall the required transition time and inaccurately diagnosed the stem conditions.

D: Incorrect. Containment sump blockage entry is from EOP-1 Step 24 RNO through determining containment sump performance is not providing normal RHR and SI pump operation. Plausible if the candidate inaccurately assumes the loss of the containment spray pumps could be the result of containment sump performance and incorrectly makes the transition IAW EOP-1 step 24

Learning Objective:

Implement the CSPs to respond to plant conditions where the Containment Status Tree is not satisfied. (043.03.LP2000.007)

87. 2023 NRC SRO 087

You are the Unit 1 Control Room Supervisor conducting a plant startup using OP-1C, Startup to Power Operation Unit 1.

- Reactor Power has been holding at 55% power for three(3) hours to perform Post Maintenance Testing.

A transient occurs:
- BOTH feedwater monitors are now out of service.

One hour after the transient, a Chemistry Technician reports to the Control Room and informs you that the Feedwater sample obtained at the time of the transient contains seven (7) ppb Dissolved Oxygen.

(1) What is the PRIMARY reason to control dissolved oxygen?

(2) What Action Level, if any, applies?

REFERENCE PROVIDED

	(1)	(2)
A.	Minimize S/G tube corrosion	Action Level 1
B.	Maintain PH control	Action Level 1
C.✓	Minimize S/G tube corrosion	No Action Level
D.	Maintain PH control	No Action Level

SRO Tier 2 Group 1

Source: New

Question History:
None

K/A:
(059) (SF4S MFW) MAIN FEEDWATER SYSTEM (G2.1.34) CONDUCT OF OPERATIONS: Knowledge of RCS or balance-of-plant chemistry controls, including parameters measured and reasons for the control

Justification for K/A Match:

Cognitive Level:
High

10 CFR Part 55 Content: 55.43 (b)(5)

Reference:
OP-1C, Startup to Power Operation Unit 1 Rev. 47
NP 3.2.3, Secondary Water Chemistry Monitoring Program, Rev. 31
TRM Section 4.9, Rev. 4

Proposed reference to be provided to the applicants during examination:
NP 3.2.3, Secondary Water Chemistry Monitoring Program Pages 26 thru 28 (section 4.14.2)

Original Question:
N/A

Justification:

A **INCORRECT:** First part is correct. Second part is plausible if the candidate misreads (or does NOT read) NOTE 28 stating that for a period of 24 hours after escalation above 50% the action level 1 threshold for oxygen is 10ppb.

B **INCORRECT:** Plausible if the candidate does not recall or understand that the Hydrazine parameter is used for pH control. Also, plausible if the candidate misreads (or does NOT read) NOTE 28 stating that for a period of 24 hours after escalation above 50% the action level 1 threshold for oxygen is 10ppb.

C **CORRECT:** Per NP 3.2.3, the secondary cycle chemistry must be maintained to minimize corrosion of steam generator tube and shell and balance of plant materials of construction. Additionally, Note 28 (page 26) specifies for a period of 24 hours after escalation above 50% the action level 1 threshold for oxygen is 10ppb before reverting to action level 1 value of 5ppb. .

D **INCORRECT:** Plausible if the candidate does not recall or understand that the Hydrazine parameter is primarily used for pH control. Second part is correct, note 28 (page 26) specifies for a period of 24 hours after escalation above 50% the action level 1 threshold for oxygen is 10ppb before reverting to action level 1 value of 5ppb.

Learning Objective:

88. 2023 NRC SRO 088

Given the following:

- A LOCA is in progress on Unit 1

Twenty minutes later, the following conditions occur:

- Reactor Coolant System Cold Leg Temperature is 300°F and LOWERING
- Reactor Coolant System pressure is 460 psig and LOWERING
- Highest Core Exit Thermocouple is 410°F and LOWERING
- Containment pressure is 55 psig and slowly RISING
- 'A' Steam Generator narrow range level is 45% and STABLE
- 'B' Steam Generator narrow range level is 50% and STABLE
- Total Auxiliary Feedwater flow is 220 gpm and STABLE
- Pressurizer level is 0"
- NR RVLIS indicates 20 ft

The Unit Supervisor will direct:

(1) Entry into which of the following Critical Safety Function Recovery Procedures?
and
(2) In accordance with the selected CSF procedure entry, which action should the SRO direct to mitigate the event?

A. (1) CSP-H.1, Response to Loss of Secondary Heat Sink

(2) Raise total AFW flow to 250 gpm

B. (1) CSP-P.1, Response to Imminent Pressurized Thermal Shock Conditions

(2) Control cooldown by securing the running RHR pumps

C.✓ (1) CSP-H.1, Response to Loss of Secondary Heat Sink

(2) Raise total AFW flow to 285 gpm

D. (1) CSP-P.1, Response to Imminent Pressurized Thermal Shock Conditions

(2) Control cooldown by reducing AFW flow to 50 gpm

SRO Tier 2 Group 1
Meets Tier 2– requires operator knowledge of system requirements for AFW flow during various plant conditions.

Source:
Modified Bank

Question History:
2009 Comanche Peak NRC SRO 86
2015 Audit Exam
2017 Audit Exam
2019 Audit Exam

K/A:
AUXILIARY / EMERGENCY FEEDWATER SYSTEM (G2.1.6) CONDUCT OF OPERATIONS: Ability to manage the control room crew during plant transients (SRO Only) (CFR: 43.5 / 45.12 / 45.13)

Justification for K/A Match:
Meets KA – Requires SRO knowledge of current plant conditions related to AFW system status and the ability to direct crew actions to mitigate plant conditions during a major transient.

Cognitive Level:
High

10 CFR Part 55 Content:
10 CFR 55.43.5

Reference:
CSP-ST.0 Unit 1_012, Critical Safety Function Status Trees
CSP-H.1 Unit 1_047, Response to Loss of Secondary Heat Sink
CSP-P.1 Unit 1_036, Response to Imminent pressurized Thermal Shock Condition

Proposed reference to be provided to the applicants during examination:
None

Original Question:
Given the following:

- *A Large Break Loss of Coolant Accident in progress on Unit 1*
- *Reactor Coolant System Cold Leg Temperature is 405(300)°F and Lowering*
- *Reactor Coolant System pressure is 260 psig and Lowering*
- *Highest Core Exit Thermocouple is 410°F and Lowering*
- *Containment pressure is 61 psig and Slowly Rising*
- *'A' Steam Generator narrow range level is 45% and Stable*
- *'B' Steam Generator narrow range level is 55(51)% and Stable*
- *Total Auxiliary Feedwater flow is 200(220) gpm and Stable*
- *Pressurizer level is 0*
- *NR RVLIS indicates 20 ft*

Which of the following identifies
(1) the greatest Critical Safety Function challenge
AND
(2) what action should be taken to mitigate the situation?

(1) INVENTORY Critical Safety Function is challenged due to the voiding indicated in the Reactor Vessel.
(2) Enter CSP-I.3, Response to Voids in the Reactor Vessel and perform Reactor Head venting.

(1) HEAT REMOVAL Critical Safety Function is challenged due to less than 230 gpm total feedwater flow.
(2) Enter CSP-H.1, Response to Loss of Secondary Heat Sink and raise AFW flow to greater than 230 gpm.

(1) CONTAINMENT Critical Safety Function is challenged by high Containment pressure.
(2) Enter CSP-Z.1, Response to High Containment Pressure, and ensure proper Containment Isolation and Containment Spray alignment.

(1) INTEGRITY Critical Safety Function is challenged by the rapid cooldown.
(2) Enter CSP-P.2, Response to Anticipated Pressurized Thermal Shock Condition, and place Low Temperature Overpressure Protection in service.

Justification:

Current plant conditions result in a red path for CSP-H.1 and an orange path for CSP-P.1. The red path for CSP-H.1 is met with adverse containment conditions, both S/G levels less than 52% AND total AFW flow less than 275 gpm. Orange path conditions are met for CSP-P.1 due to a temperature decrease in both cold legs of greater than 100°F in the last 60 minutes AND RCS cold leg temperatures greater than 280°F but less than 310°F. The foldout page for CSP-ST.0, Unit 1 directs that if a red path condition criteria is met, it has priority over any orange path condition. CSP-H.1 provides direction to restore total feed flow to greater than 275 gpm.

Answer A: Incorrect. Part (1) is correct. Part (2) is incorrect; plausible if the candidate fails to recall that 230 gpm flow rate is acceptable per CSP-H.1 Step 1 Caution only if a S/G tube rupture or faulted S/G. Since neither of those conditions are indicated in the stem, this is an inaccurate assumption.

Answer B: Incorrect. Part (1) is incorrect. CSP-P.1 is a correct and applicable procedure for the current conditions but as an Orange path only. Plausible if the candidate fails to recall the applicable requirements for red vs orange path conditions. Part (2) is incorrect. Plausible if the candidate recalls the actions of CSP-P.1 to stabilize RCS cooldown and prioritizes RCS cooldown mitigation strategies.

Answer C: Correct.

Answer D: Incorrect. Part (1) is incorrect. CSP-P.1 is a correct and applicable procedure for the current conditions but as an Orange path only. Plausible if the candidate fails to recall the applicable requirements for red vs orange path conditions. Part (2) is incorrect. Plausible if the candidate recalls the actions of CSP-P.1 to stabilize RCS cooldown and prioritizes RCS cooldown mitigation strategies.

Learning Objective:

Recall/list the following concerning the critical safety procedures:
a. Entry conditions for each RED and ORANGE path CSP
b. Purpose of each CSP
c. major actions of each CSP
(043.03.LP1995.012)

89. 2023 NRC SRO 089

You are the Control Room Supervisor on Unit 2 operating at 100% power when a transient occurs. The following is reported:

- C02 F 4-1, Unit 2 Common Critical Control Power Failure in ALARM
- C02 F 1-2, G-02 Emergency Diesel DC Power Failure in ALARM
- Indication is lost for 2P-15A, SI Pump
- Indication is lost for 2P-53, MDAFW Pump

(1) Which bus is affected?

(2) What procedure would you direct to mitigate the event?

A. (1) 2A-05, 4160V AC SWGR Unit 2

(2) AOP-19A, Train A Safeguard Bus Restoration Unit 2

B.✓ (1) 2A-05, 4160V AC SWGR Unit 2

(2) AOP-0.0, Vital DC Malfunction

C. (1) 2A-06, 4160V AC SWGR Unit 2

(2) AOP-19B, Train B Safeguards Bus Restoration Unit 2

D. (1) 2A-06, 4160V AC SWGR Unit 2

(2) AOP-0.0, Vital DC Malfunction

SRO Tier 2 Group 1

Source: New

Question History:
None

K/A:
(062A2.19) Ability to (a) predict the impacts of the following on the AC ELECTRICAL DISTRIBUTION SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations:
Loss of Class 1E DC distribution system

Justification for K/A Match: SRO has to determine what the system impact (a) is and select a correct procedure (b) to correct the event.

Meets SRO only – requires assessment of plant conditions and determining the mitigating strategy.

Cognitive Level:
High

10 CFR Part 55 Content:
55.43 (b)(2)

Reference:
MDB 3.2.2 2A05, Rev. 11
PBE-7033, Rev. 14
AOP-0.0, Vital DC Malfunction, Rev. 37

Proposed reference to be provided to the applicants during examination: None

Original Question:
N/A

Justification:

A **INCORRECT:** Plausible as correct bus. Additionally, if the candidate believes there is a loss of AC power AOP-19A is the correct procedure

B **CORRECT:** The indications given describes a loss of control power to Bus 2A-05 (SI Pump A, G02 DC Power fail, MDAFW Pump). The correct procedure to restore a partial or complete loss of DC power is AOP-0.0.

C **INCORRECT:** Plausible if the candidate believes the indications are for a loss of Bus 2A-06 control power (may confuse the buses with the trains). Additionally, if the candidate believes there is a loss of AC power AOP-19B is the correct procedure.

D **INCORRECT:** Plausible if the candidate believes the indications are for a loss of Bus 2A-06 control power (may confuse the buses with the trains). The correct procedure is listed.

Learning Objective:

90. 2023 NRC SRO 090

Given the following:

Both units are operating at 100% power.

- • D-305 Battery is aligned with D08 Battery Charger to support emergent maintenance on Battery D06.

The following conditions are noted:

- D-108 Battery Charger Trouble alarm received.
- D-02/D-04 125V DC Bus Under/Over Voltage alarm.
- D-106 AM, Battery Ammeter, indicates 123 amps discharging.
- D-04 VM, Bus Voltmeter, indicates 122 VDC.

The crew is responding in accordance with site procedures.

Bus D04 Subsystem is INOPERABLE ___(1)___
and
To restore OPERABILITY, Charger D109 must be lined up with _(2)__ Battery to bus D04.

A✓ (1) ONLY because the D109 charger is not aligned.

(2) D106

B. (1) because the D109 charger is not aligned AND D106 battery is discharged

(2) D106

C. (1) because the D109 charger is not aligned AND D106 battery is discharged

(2) D305

D. (1) ONLY because the D109 charger is not aligned

(2) D305

SRO Tier 2 Group 1
Tier 2– Requires operator knowledge of the battery system parameters required to maintain operability.
SRO Only – Requires operator assessment of basis level conditions required to apply technical specifications and procedural direction.

Source: New

Question History:
None

K/A:
Ability to (a) predict the impacts of the following on the (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 43.5 / 45.3 / 45.13): Malfunction of battery chargers

Justification for K/A Match:
KA Match – requires operator knowledge of DC System response to a loss of battery charger and the procedural actions required to mitigate the situation.

Cognitive Level:
High

10 CFR Part 55 Content:
10 CFR 55.41.5
10 CFR 55.43.5

Reference:
TS 3.8.4 DC Sources - Operating, Rev 5
TS B 3.8.4, DC Sources - Operating, Rev 2
0-SOP-DC-003, 125 VDC System Bus D03 & Components, Rev 22
AOP-0.0, Vital DC Malfunctions, Rev 37

Proposed reference to be provided to the applicants during examination:
None

Original Question:
N/A

Justification:

Tech Spec Basis 3.8.4, rev 5, LCO criteria contains the following statement: An OPERABLE DC electrical power subsystem requires all required batteries and respective chargers to be operating and connected to the associated DC bus(es). 0-SOP-DC-003 Rev 22, 125 VDC System, Bus D-03 & Components, step 3.6 contains the following Battery Bus limits (non-emergency): 132 – 135VDC. The D106 battery is at 122Vdc; therefore, operability of the D106 battery is challenged until the float voltage requirements of T.S. 3.8.6 can be verified.

AOP-0.0 Step 22 RNO states that the following lineups can be used to restore power to Bus D04: D106 with D108/D109, or D305 with D109. Since D305 is currently in use on the D02 bus, an interlock exists to prevent cross-tying DC Busses D301 and D302. Therefore, the only available option is D106 with D109 charger.

Answer A: Correct. Part (1) is correct; the operability of the DC subsystem requires both an operable battery and respective charger connected to the DC Bus. The discharge of the battery does not meet the requirements of T.S. 3.8.6 or the voltage limits of 0-SOP-DC-003. Plausible if the candidate fails to recall the basis for operability in accordance with the tech spec basis. Part (2) is correct.

Answer B: Incorrect. Battery is not discharged.

Answer C: Incorrect. Part (1) is correct. Part (2) is incorrect: Since D305 is currently in use on the D02 bus, an interlock exists to prevent cross-tying DC Busses D301 and D302. Therefore, the only available option is D106 with D109 charger. Plausible if the candidate fails to recognize the interlock limitations of the DC system.

Answer D: Incorrect. Part (1) is incorrect; the operability of the DC bus requires both an operable battery and respective charger connected to the DC Bus. The discharge of the battery does not meet the requirements of T.S. 3.8.6 or the voltage limits of 0-SOP-DC-003. Plausible if the candidate fails to recall the basis for operability in accordance with the tech spec basis. Part (2) is incorrect: Since D305 is currently in use on the D02 bus, an interlock exists to prevent cross-tying DC Busses D301 and D302. Therefore, the only available option is D106 with D109 charger.

Learning Objective:

Given specific plant conditions, ASSESS and APPLY Technical Specification requirements as appropriate.
(057.02.LP3344.002)

91. 2023 NRC SRO 091

You are the Spent Fuel Pool Supervisor during fuel motion.

While preparing to grapple a Fuel Assembly (F/A) to load into position D-6, you are informed that a change is required to the core refueling sequence.

The required changes are made to the PBF-5101, Fuel/Insert Component Movement Authorization.

Whose signature is required on the PBF-5101 form indicating concurrence with the change?

A. Shift Manager

B.✓ Reactor Engineer

C. Operations Director

D. Corporate Functional Area Manager

SRO Tier 2 Group 2

Source: New

Question History:
None

K/A:
(034) FUEL HANDLING EQUIPMENT SYSTEM:
(G2.2.6) EQUIPMENT CONTROL:
Knowledge of the process for making changes to procedures

Justification for K/A Match:

Cognitive Level:
Low

10 CFR Part 55 Content:
55.43 (b)(7)

Reference:
AD-AA-100-1004, Procedure Preparation, Revision, Review and Approval Process, Rev. 36
RP-1C, Refueling, Rev. 85

Proposed reference to be provided to the applicants during examination: None

Original Question:
N/A

Justification:

A **INCORRECT:** Plausible if the candidate believes Shift Manager concurrence is required. Per RP-1C, the Shift Manager is required to be notified; however, the SM does not sign the PBF-5101 form.

B **CORRECT:** Using RP-1C, Refueling Section 3.2.3., any changes to the loading sequence **SHALL** be detailed in PBF-5101, Fuel/Insert Component Movement Authorization. Concurrence of these changes **SHALL** be documented by obtaining the signatures of the Core Loading Supervisor and the Reactor Engineer.

C **INCORRECT:** Plausible if the candidate believes the Operations Director concurrence is required. The OD is the head of the Operations department and their approval is required for Operations Dept procedures; however, the OD is not required for this form.

D **INCORRECT:** Plausible since the CFAM is the approval authority for procedures IAW AD-AA-100-1004, Procedure Preparation, Revision, Review and Approval process; however, the CFAM is not required to sign the PBF-5101 form.

Learning Objective:

92. 2023 NRC SRO 092

Given the following:

- Unit 1 is in MODE 3
- Actions are being taken to transition the unit to MODE 2
- Initial conditions of OP 1B, Reactor Startup, were performed during the previous shift
- Due to unforeseen delays, PBF-2034, Control Room Logs Unit 1, is being performed again
- Source Range N-31, N-32 Channel Check failed due to channel deviation
- Both Source Range NI audio circuits are functioning
- The balance of the PBF-2034 has been completed satisfactory

Which of the following states if Unit 1 can enter MODE 2 and the reason?
(Assume a risk assessment will NOT be performed at this time)

REFERENCES PROVIDED

A✓ No, because the required number of Source Range NI channels are NOT met.

B. Yes, because Source Range Nis will no longer be applicable in MODE 2 above P-6.

C. Yes, provided that the channel check with either N-31 or N-32 and N-40, WR Count Rate, is still met.

D. No, because the MODE change cannot be made until one (1) Source Range NI channel is placed in TRIP per the SOP.

SRO Tier 2 Group 2

Source: Bank

Question History:
From PB Exam Bank 2017 NRC 082

SRO
10CFR55.43(b)(2) Facility operating limitations in the technical specifications and their bases.

K/A:
032AA2.07 Loss of Source Range Nuclear Instrumentation
Ability to determine and interpret the following as they apply to the Loss of Source Range Nuclear Instrumentation: Maximum allowable channel disagreement. (Imp 2.8/3.4)

Cognitive Level:
(015)(SF7) NUCLEAR INSTRMUMENTATION SYSTEM (G2.2.35) EQUIPMENT CONTROL: Ability to determine TS for mode of operation (CFR: 41.7 / 41.10 / 43.2 / 45.13)

Reference:
TS 3.3.1, Reactor Protection System (RPS) Instrumentation, Rev 4
TS B 3.3.1, Bases for Reactor Protection System (RPS) Instrumentation, Rev 8, Applicable Safety Analyses, LCO and Applicability Section
0-SOP-IC-002, Technical Specifications LCO-Instrument Cross Reference, Rev 24, Attachment A, Page 15 of 40, Attachment B pages 130 and 131

Proposed reference to be provided to the applicants during examination:
Tech Spec 3.3.1, Reactor Protection System (RPS) Instrumentation (Entire TS, NO Bases)

Justification:

A **CORRECT:** With the SR NI Channel Check being unsat, one of the two instruments is no longer operable, given that, MODE 2 cannot be entered for the following reasons, The SR NI are applicable in the next mode, there is no allowance for indefinite operation in the next mode, nor is there an allowance or specification stated which will allow operation in MODE 2 with only 1 SR NI.

B **INCORRECT:** Plausible if the candidate misinterprets the requirements of LCO applicability, as the SR NIs are not required in MODE 2 above P-6, but there is a time when the plant will be in MODE 2 below P-6; therefore, the 2 SR NI channels are required.

C **INCORRECT:** Plausible if the candidate incorrectly determines that N-40 is an allowable substitute for the SR NIs in MODE 2. When in MODE 6, 2 of the 3 SR NIs can be utilized to meet the LCOs which use SR NIs.

D **INCORRECT:** Plausible if the candidate incorrectly applies the MODE 2 instrument requirements of placing the affected channel in trip within one hour.

Learning Objective:

Given a copy of Technical Specifications and a set of plant conditions, APPLY the Limiting Condition for Operation (LCO) Applicability requirements of TS Section 3.0.
(057.01.LP3336.011)

93. 2023 NRC SRO 093

Given the following:

- Both units are at Rated Thermal Power
- A Waste Gas decay tank begins to leak
- RE-214, Aux Building Vent Exhaust monitor, goes into HIGH ALARM
- RE-315, Aux Building Exhaust Low-Range monitor, goes into HIGH ALARM

The Shift Manager declares UNUSUAL EVENT, RU1.1 - Reading on ANY Table R-1 effluent radiation monitor greater than column "UE" for 60 minutes or longer

(1) What correctly describes the FINAL PAB Ventilation FIlter alignment (assume no operator action)?

(2) What is the reason for the declaration and implementation of the Emergency Plan?

F-23, PAB Charcoal Filter
F-29, PAB HEPA Filter

A. (1) F-23 is aligned and F-29 is secured

(2) Full Site assembly, accountability, and evacuation of unnecessary personnel is required to protect plant personnel.

B. (1) F-23 is secured and F-29 is aligned

(2) Full Site assembly, accountability, and evacuation of unnecessary personnel is required to protect plant personnel.

C.✓ (1) F-23 is aligned and F-29 is secured

(2) The release indicates a degradation in plant control and a potential degradation in the level of safety

D. (1) F-23 is secured and F-29 is aligned

(2)The release indicates a degradation in plant control and a potential degradation in the level of safety

SRO Tier 2 Group 2

Source: Bank

Question History:
2017 PBNP NRC 83

SRO
10CFR55.43(b)(4) Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions.

10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

K/A:
Ability to (a) predict the impacts of the following on the (SF9 WGS) WASTE GAS DISPOSAL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: WGS component malfunctions

Cognitive Level:
Knowledge 1-F: The operator must understand the initial conditions, recall the automatic actions, and the reason for the EAL classification

Reference:
RMSASRB CI RE-214, Radiation Monitoring System Alarm Setpoint & Response Book Channel Information Sheet, Auxiliary Building Vent Exhaust Gas Monitor, Rev 9
EPIP- 1.2.1, Emergency Action Level Technical Basis, Rev 28
EPIP 6.1,Assembly, Accountability, & Evacuation of PErsonnel, Rev 48

Proposed reference to be provided to the applicants during examination:
None

Original Question:
Modified from PB Exam Bank 2017 NRC 083 (NOT considered a “modified Bank” question):

- Modified RU-1.1 to align with current EPIP 1.2.1

Justification:

A Incorrect – Plausible since the candidate may think that since an EAL threshold has been met due to an abnormal radiation event, that accountability is required. This is only required at an EAL of ALERT or higher.

B Incorrect – Plausible if the candidate believes the filters do not re-align based on the High alarm on the RMS monitors. Also, plausible since the candidate may think that since an EAL threshold has been met due to an abnormal radiation event, that accountability is required. This is only required at an EAL of ALERT or higher.

C Correct – Based on the conditions given in the stem with both RMS monitors in HIGH alarm, F-23, PAB Charcoal filter, will automatically align and F-29, PAB HEPA filter, will automatically secure.

D Incorrect – Plausible if the candidate believes the filters do not re-align based on the High alarm on the RMS monitors.

Learning Objective:

Knowledge of the purpose and function of major system components and controls
(SD86.1 2.1.28)

94. 2023 NRC SRO 094

Given the following:

Both units are operating at 100% power.

- Unit 1 is responding to an ‘A’ Steam Generator Tube Rupture
- 1MS-2010 and 1MS-2011 ‘A’ S/G Safety Valves are stuck OPEN
- FG1 General Emergency has been declared due to Loss of ANY two barriers AND Loss or Potential Loss of third barrier
- Containment High Radiation Monitors read 20,000R/hr and RISING
- Initial wind direction was from 87°
- EPA Protective Action Guidelines (PAGs) downwind dose assessments have been reported as 1.2 REM TEDE at a location 5 miles from the site boundary
- Wind Direction has since changed and is CURRENTLY from 105° without any additional change in PAG dose assessments

What is the MINIMUM Protective Action Recommendation recommendation in accordance with EPIP-1.3, Dose Assessment and Protective Action?

REFERENCE PROVIDED

A. Evacuate 5-Mile Radius.

B. Evacuate 5 Mile Radius AND 10 Mile downwind sectors N,P, AND Q.

C.✓ Evacuate 5-Mile Radius AND 10-Mile downwind sectors M,N,P, AND Q.

D. Evacuate previously affected areas and beyond 10 miles for sectors M,N,P, AND Q.

SRO Tier 3 Group 1
Tier 3– Question matches KA as candidate must use a table from a station procedure to base actions to be taken during an emergency classification

SRO Only – Assessment of facility conditions for determination of the correct PAR is an SRO level function.

Source: New

Question History:
New

K/A:
CONDUCT OF OPERATIONS: Ability to interpret reference materials, such as graphs, curves, and tables (reference potential) (CFR: 41.10 / 43.5 / 45.12)

Justification for K/A Match:
KA Match – Question matches KA as candidate must use a flowchart and table from EPIP-1.3 to determine PAR recommendations.

Cognitive Level:
High

10 CFR Part 55 Content:
10 CFR 55.41.10
10 CFR 55.43.5

Reference:
EPIP-1.3_055, Dose Assessment and Protective Action Recommendations
EPIP-1.2.1_028, Emergency Action Level Technical Basis

Proposed reference to be provided to the applicants during examination:
EPIP 1.3, Attachment A Page 2 and Attachment B

Original Question:
N/A

Justification:

A.Incorrect. This is the PAR for a Non-Loss of Containment Fission Product Barrier with no Hostile Action in progress. Plausible if the candidate fails to identify a Loss of Containment Fission Product Barrier due to the stuck open MS valves.

B.Incorrect. This is the PAR for a Loss of Containment Fission Product Barrier for the present wind conditions (from 105) but fails to identify EPA PAG dose impacts on the PAR. Plausible if the candidate fails to apply dose estimates to the PAR flowchart.

C.Correct. EPA PAG dose impacts are > 1.0 REM TEDE at 7 miles, resulting in evacuation of 5 Mile Radius and 10 Mile downwind sectors. Additionally, the shift in wind results in evacuation of additional 10-Mile downwind sectors when PAG dose estimates are still exceeded at 5 miles.

D.Incorrect. This is the PAR for a Loss of Containment Fission Product Barrier with EPA PAG dose assessments >1.0 REM at 10 mile range. Plausible if the candidate fails to reevaluate the PAG dose assessments for greater than 5 miles from site boundary.

Learning Objective:

95. 2023 NRC SRO 095

What would be considered a conservative decision in accordance with OP-AA-100-100, Conduct of Operations?

A. Directing a 10% normal turbine load reduction in AOP-2A, Secondary Coolant Leak with reactor power at 101%.

B. Authorizing emergent work on the G-01, Emergency Diesel Generator at the end of shift without a brief to avoid a TS 3.0.3 entry.

C. The Control Room redirects the AO to the PAB to monitor a RHR pump start when a Feed Rupture event is in progress.

D✓ Stopping a 24-hour surveillance run on the G-02, Emergency Diesel Generator at the 12-hour point due to a severe thunderstorm warning.

SRO Tier 3

Source:

Question History:
None

K/A:
CONDUCT OF OPERATIONS: Knowledge of conservative decision-making practices

Justification for K/A Match:

Cognitive Level:
Low

10 CFR Part 55 Content:
55.43 (b)(5)

Reference:
OP-AA-100-1000, Rev. 34
AOP-2A, Rev. 18

Proposed reference to be provided to the applicants during examination: None

Original Question:

Justification:

A **INCORRECT:** AOP-2A, Step 2 first bullet would NOT be met; therefore, RNO Step a directs a rapid power reduction, not a normal turbine load reduction. This is contrary to OP-AA-100-1000, Attachment 3, Steps 2.3 (maintaining safety margins) AND 3.5 (addressing degraded conditions).

B **INCORRECT:** Although maintaining the minimum equipment to ensure safe operation is vital to Operations, the example does NOT demonstrate safety over production IAW OP-AA-100-1000, Attachment 3, Step 2.2 of the Conduct of Operations.

C **INCORRECT:** To introduce potential industrial safety risk to an individual is not in placing industrial safety as the number one priority in accordance with OP-AA-100-1000, Attachment 3, Step 2.4 of the Conduct of Operations.

D **CORRECT:** IAW OP-AA-100-1000, Attachment 3, Step 3.5, this is responding to degraded (environmental) conditions with a conservative action.

Learning Objective:

96. 2023 NRC SRO 096

On 2/1/23, at 1200, a pilot cell in the D305 battery was identified to be below Category A or B limits of Table 3.8.6-1 in Technical Specification 3.8.6, causing Required Action Condition A to be entered.

Per the action statement, the following was performed:

- A.1: Electrolyte level and float voltage were satisfactorily verified within one hour.

- A.2: The following was completed satisfactorily:
    - o Cell parameters were verified to meet Table 3.8.6-1 Category C limits within the next 24 hours,
    - o A recurring action to verify Category C limits once per 7 days thereafter was initiated.
- A.3: Repairs were scheduled to be completed by 2/20/23, within the 31 Day completion time.

On 2/8/23, at 1200, cell parameters verified to meet Table 3.8.6-1 Category C limits.

On 2/15/23, at 1100, severe weather limited station personnel access to the site, making the personnel unavailable to perform the recurring verification of Table 3.8.6-1 Category C limits.

Which of the following is the LATEST date that the cell parameters can be verified per technical specifications?

A. 1200 on 2/15/23

B. 1200 on 2/1623

C.✓ 0600 on 2/17/23

D. 0600 on 2/18/23

SRO Tier 3
Tier 3– Requires SRO knowledge of control of equipment status
SRO Only –.Requires knowledge of Tech Spec basis for applicability of to current conditions and how to coordinate TS actions required.

Source: New

Question History:
New

K/A:
EQUIPMENT CONTROL: Knowledge of surveillance procedures (CFR: 41.10 / 43.2 / 45.13)

Justification for K/A Match:
KA Match –.Requires SRO knowledge of surveillance procedures

Cognitive Level:
High

10 CFR Part 55 Content:
10 CFR 55.41.10
10 CFR 55.43.2

Reference:
TS 3.8.6_01, Battery Cell Parameters
TS 3.0__03, LCO Applicability

Proposed reference to be provided to the applicants during examination: None

Original Question:
N/A

Justification:

Explanation:
The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met.
S.R. 3.02 further states the following: If a Completion Time requires periodic performance on a “once per…” basis, the above Frequency extension applies to each performance after the initial performance.
Applying the 1.25 times the interval allows a 7 day periodicity to extend to 9 days, or 2/17/23.

A: Incorrect. This is the actual time the surveillance is due without any allowance.

B. Incorrect. This is a misapplication of the 24 hour time for a missed surveillance (SR 3.03).

C. Correct. 1.25 times 7 days (168 hours) is 210 hours which is 42 hours beyond the completion time requirement or 0600 on 2/17/23.

D. Incorrect. This is a misapplication of adding the 25% grace period to the timeline and the addition of the 24 hour time period for a missed surveillance.

Learning Objective:

97. 2023 NRC SRO 097

Unit 1 is at 4% power, conducting a reactor startup.

Given the following:

- Residual Heat Removal Pump, 1P-10A, has been declared inoperable due to an oil leak
- TSAC 3.5.2 (ECCS-Operating) Condition A has been entered (72-hour completion time)

In accordance with WM-AA-201, Work Order Identification and Validation Process, which of the following Priority Levels would be assigned to the work order generated to repair the pump?

REFERENCE PROVIDED

A.✔ A

B. B

C. C

D. D

SRO Tier 3

Source:
Bank

Question History:
Taken from PB Exam Bank Q#192 (02.02.36.01 004)

K/A:
EQUIPMENT CONTROL: Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operation

Justification for K/A Match:

Cognitive Level:
Low

10 CFR Part 55 Content:
55.43 (b)(5)

Reference:
Technical Specifications (TSAC 3.5.2.A), Rev. 4
WM-AA-201, Rev. 38

Proposed reference to be provided to the applicants during examination:
WM-AA-201 and Attachment 1 **PRINT IN COLOR**

Original Question:
Taken from PB Exam Bank Q#192 (02.02.36.01 004)

Justification:

A **CORRECT:** IAW WM-AA-201, Attachment 1, this inoperability would require entry into a Shutdown LCO as defined in Tech Spec 3.5.2, which would classify this as a Priority A request.

B **INCORRECT:** Plausible if the candidate does not recognize the shutdown LCO entry at the 72-hour mark.

C **INCORRECT:** Plausible if the candidate incorrectly determines that since RHR is not required for at-power operations, that it does not require a high priority to repair.

D **INCORRECT:** Plausible if the candidate incorrectly determines that RHR is a low priority system.

Learning Objective:

98. 2023 NRC SRO 098

Unit 1 is responding to a major plant event.

The following radiation readings were recorded:

- 1RE-126 Containment High Range Monitor 150 R/Hr
- RE-105 SFP Area Low Range Monitor 11 R/Hr
- RE-135 SFP Area High Range Monitor 11 R/Hr
- Meteorology dose assessments beyond the site boundary is 200 mrem TEDE

What is the required Emergency Classification Declaration?

REFERENCE PROVIDED

A. General Emergency

B✓ Site Area Emergency

C. Alert

D. Unusual Event

SRO Tier 3 Group 3
SRO Only –Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
Tier 3– meets Tier 3 by requiring knowledge on generic K/A regarding use of radiation equipment readings as it pertains to site emergency evolution and not a specific emergency evolution.

Source:New

Question History:
None

K/A: RADIATION CONTROL: Ability to use RMSs, such as fixed radiation monitors and alarms or personnel monitoring equipment (CFR: 41.11 / 41.12 / 43.4 / 45.9)

Justification for K/A Match:
KA Match –Question matches KA as it requires candidate to demonstrate ability to use rad monitor readings to determine the condition of containment for EAL application.

Cognitive Level:

10 CFR Part 55 Content:
10 CFR 55.41.11
10 CFR 55.43.4

Reference:
EPIP 1.2.1 EAL's and Technical Bases
3
Proposed reference to be provided to the applicants during examination:
EAL chart with RMS

Original Question:

Justification:

A: Incorrect. There are no GE setpoints met. Plausible if the candidate inaccurately reads the plant conditions and attempts to error with the most conservative reading.

B: Correct. SAE RS1.2 is met by the field survey of >100 mR/hr beyond the site boundary.

C: Incorrect. Plausible if the candidate identifies that RE-105 and RE-126 meet the requirements for RA2.2 and FA1 and fails to identify other applicable EALs.

D: Incorrect. Plausible if the candidate identifies that a rising radiation level for RE-135 is RU2.1.b and fails to identify other applicable EALs.

Learning Objective:

99. 2023 NRC SRO 099

You are the Operating Supervisor on Unit 1.

What event would be a Suspected Tampering event?

A. Mechanical Maintenance reports they received a damaged gasket from the warehouse for planned work on 1P-15A, Safety Injection pump.

B. I&C technicians report some laboratory equipment used for surveillance testing of 1P-2A, Charging pump was not calibrated as required prior to the test.

C. An Auxiliary Operator reports they stopped a scheduled surveillance in progress on P-35B, Diesel Fire Pump due to inadequate personnel protective equipment being used at the job site.

D.✓ An Auxiliary Operator discovers 1P-29, Aux Feedwater pump inboard pump oil level indicator, has been broken off with a visible oil puddle on the floor which was checked two hours ago during rounds.

SRO Tier 3

Source:
Modified Bank

Question History:
None

K/A:
EMERGENCY PROCEDURES/PLAN: Knowledge of procedures relating to a security event (ensure that the test item includes no safeguards information)

Justification for K/A Match:

Cognitive Level:
Low

10 CFR Part 55 Content:
55.43 (b)(5)

Reference:
SY-AA-102-1011
AOP-29, Rev. 29
BG EOP-0, Rev. 45

Proposed reference to be provided to the applicants during examination: None

Original Question:
Modified from PB Exam Bank Q#278 (02.04.28.01 001)

- Changed one distractor to add detailed information.

Justification:

A **INCORRECT:** A damaged item from the warehouse does NOT meet the Suspected Tampering definition of SY-AA-102-1011.

B **INCORRECT:** An out of calibration item does NOT meet the Suspected Tampering definition of SY-AA-102-1011.

C **INCORRECT:** An operator finding a safety concern does NOT meet the Suspected Tampering definition of SY-AA-102-1011

D **CORRECT:** This event does meet the Suspected Tampering definition of SY-AA-102-1011.

Learning Objective:

100. 2023 NRC SRO 100

Given the following:

- Unit 1 is responding to a plant transient that resulted in declaration of a Site Area Emergency.
- The TSC has been activated and has formally assumed responsibility for duties
- The OSC has NOT been activated.
- Emergency Operating Procedures require local equipment operation to secure off-site radioactive release.
- Only one auxiliary operator team is currently available and not assigned to other tasks.
- OP-AA-100-1005-F01, Deviation From Normal Processes, is not in effect.
- The Shift Manager is operating in accordance with EPIP-10.1, Emergency Reentry Requirements.

(1) Who will authorize local auxiliary operator dispatch;
and
(2) What is the briefing requirement for the reentry team?

A. (1) the Shift Manager

(2) A formal in-person brief is required before dispatch

B. (1) the TSC

(2) A formal in-person brief is required before dispatch

C.✓ (1) the Shift Manager

(2) Dispatch the team immediately

D. (1) the TSC

(2) Dispatch the team immediately

SRO Tier 3 Group 4
Tier 3– Requires general knowledge of emergency plant evolutions.
SRO Only –Requires knowledge of emergency implementation procedures that specify coordination of emergency actions.

Source: New

Question History:
N/A

SRO:
10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Justification for SRO-ONLY Question:
SRO Only –Requires knowledge of emergency implementation procedures that specify coordination of emergency actions.

K/A:
EMERGENCY PROCEDURES/PLAN: Knowledge of non-licensed operator responsibilities during an emergency (CFR: 41.10 / 43.1 / 43.5 / 45.13)

Justification for K/A Match:
KA Match – Matches the K/A by requiring the operator to identify the requirements for implementing local operator actions during a declared emergency.

Cognitive Level:
Low
10 CFR Part 55 Content:
55.41 10
55.43 1

Reference:
EPIP-10.1_40, Emergency Reentry

Proposed reference to be provided to the applicants during examination: None

Original Question:
N/A

Justification:

EPIP-10.1, Step 5.1.1, states the following:
The SM shall dispatch all necessary reentry teams and maintain accountability of all on-shift personnel prior to the activation of the OSC.

Step 5.2, Reentry Team Deployment, contains the following Note:Note 2:
Reentry teams for life saving, fire fighting, release termination, and search and rescue shall have the highest priority and be dispatched immediately, completing Attachment B, Reentry Team Dispatch, after dispatch.

A INCORRECT:Part (1) is correct. Part (2) is incorrect; plausible if the candidate fails to recall that reentry team deployment for release termination shall be dispatched immediately.

B INCORRECT:Part (1) is incorrect. Authorization for crew dispatch remains with the Shift Manager until the OSC is activated and assumes responsibility for duties. Plausible if the candidate fails to recall that the OSC dispatches personnel and inaccurately assumes the TSC performs this function. Part (2) is incorrect; plausible if the candidate fails to recall that reentry team deployment for release termination shall be dispatched immediately.

C CORRECT:See above explanation.

D INCORRECT:Part (1) is incorrect. Authorization for crew dispatch remains with the Shift Manager until the OSC is activated and assumes responsibility for duties. Plausible if the candidate fails to recall that the OSC dispatches personnel and inaccurately assumes the TSC performs this function. Part (2) is correct.

Learning Objective:

Diagnose and respond to indication of a CCW leak into or out of the system in accordance with AOP-9B.
(055.03.LP2444.002)