

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

1

ID: CM-1029

Points: 1.00

Tier# 1	Group # 1	Level RO
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A transition out of E-0, Reactor Trip or Safety Injection is to ES-1.1 Safety Injection Termination after verifying subcooling, RCS Pressure and Pressurizer level.

ES-1.1 directs ECCS flow reduction by _____ to _____.

- A. Stopping all but one Charging and all but one Safety Injection pump to minimize RWST depletion.
- B. Stopping all but one Charging and all but one Safety Injection pump to enable pressurizer level control using normal charging.
- C. Isolating BIT flow to minimize RWST depletion.
- D. Isolating BIT flow to enable pressurizer level control using normal charging.

Answer: D

Answer Explanation:

- A. Incorrect –Wrong because Both Safety Injection pumps are stopped and Pressurizer overflow is concern. Plausible since Charging Pump action is correct, and ECCS flow reduction will have an effect of minimizing RWST depletion.
- B. Incorrect – Wrong because both Safety Injection pumps are stopped. Plausible because the purpose statement is correct and the terminology “stop all but one” is used for charging pumps.
- C. Incorrect – Wrong because BIT flow is isolated but not for RWST concerns. Plausible since isolating BIT flow will reduce RWST completion.
- D. CORRECT – Per 12 OHP-4023-ES-1.1, BIT flow is isolated and normal Charging flow is aligned to prevent Pressurizer overflow.

Question ID CM-1029

Comments:

Reference: 1-OHP-4023-ES-1.1 SI Termination Rev 23 (Steps 2, 6, 9), 12 OHP-4023-ES-1.1, Plant Specific Background Document for 1-OHP-4023-ES-1.1 & 2-OHP-4023-ES-1.1 Rev 17 (page 14)

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-EOP09-E36) For each of the E-1 Series procedures, discuss the basis or reason for all Steps, in accordance with the E-1 series background documents.

Associated K&A(s):

EPE.007.EK3.07

Importance Factor: 3.3

K&A Statement: Knowledge of the reasons for the following responses and/or actions as they apply to a Reactor Trip: ECCS flow reduction

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5 / 10

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

2

ID: RO-C-EOP09-E42-1

Points: 1.00

Tier# 1	Group # 1	Level RO
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The operators are performing a Post-LOCA Cooldown using ES-1.2, Post LOCA Cooldown and Depressurization. After isolating the BIT and establishing normal charging flow, they note PZR level has lowered from 35% to 30% in 10 minutes.

With no operator action, how much time will elapse before letdown isolation occurs?

- A. 6.5 minutes
- B. 13 minutes
- C. 16 minutes
- D. 26 minutes

Answer: D

Answer Explanation:

- A. Incorrect - Plausible if candidate does math incorrectly and multiplies by .5 % / min instead of divides $(30-17) = 13\% * .5\% / \text{min} = 6.5$
- B. Incorrect - Plausible if candidate does math incorrectly and candidate uses 1% / min lowering $((30-17) = 13\% @ 1\% / \text{min} = 13 \text{ minutes}$
- C. Incorrect - Plausible if candidate does math based on 22% level which is used in ES-1.2, Post LOCA Cooldown and Depressurization to check pressurizer level trend. $(30-22) = 8\% @ .5\% / \text{min} = 16 \text{ minutes}$
- D. CORRECT – A trip of all pressurizer heaters occurs at 17% level in the Pressurizer. $(30-17)= 13\% @ .5\% / \text{min} = 26 \text{ minutes}$

Question ID RO-C-EOP09-E42-1

Comments:

Reference: 1-OHP-4024-108 Drop 5 - Pressurizer Level Low All Heaters Off Rev 33

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-EOP09-E42) For each of the E-1 Series procedures, discuss any EOP Key Decision Points, in accordance with the E-1 series background documents.

Associated K&A(s):

EPE.009.EA2.05

Importance Factor: 2.8/3.4

K&A Statement: Ability to determine and/or interpret the following as they apply to a Small-Break LOCA: The time available for action before PZR is empty, given the rate of decrease of PZR level

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.43. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

3

ID: 2008NRC-0583

Points: 1.00

Tier# 1	Group # 1	Level RO
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During a Large Break LOCA, an evaluation of plant status is made during Step 11 of 1-OHP-4023-E-1, Loss of Reactor or Secondary Coolant. Part of this evaluation includes a check of ECCS pump compartment sump alarms and auxiliary building vent stack and area radiation monitors.

Which ONE of the following reasons describes the BASIS for checking these alarms and radiation monitors in this procedure?

- A. Determine if local actions can be performed without excessive personnel exposure.
- B. Determine if ECCS leakage exceeds that assumed in the Control Room dose analysis.
- C. Determine if a transition should be made to address a LOCA outside of Containment.
- D. Collect current radiation values to assist in Emergency Event classification.

Answer: C

Answer Explanation:

- A. Incorrect - Wrong because In-Plant operators are dispatched with Radiation Protection techs that assess the plant conditions with hand held instruments. Plausible because sump alarms and radiation monitor alarms could indicate a radiological hazard.
- B. Incorrect - Wrong because ECCS leakage amount is not relevant to EOP implementation. Plausible because ongoing plant leakage from ECCS equipment is tracked to ensure that assumptions are met outside of EOP actions.
- C. CORRECT - Per 12-OHP-4023-E-1, Plant sump alarms and radiation monitors are both checked to identify leakage in the auxiliary building. This check is made to determine if the operator should make a transition to 1-OHP-4023-ECA-1.2, LOCA Outside Containment.
- D. Incorrect - Wrong because this assessment is done outside of the emergency operating procedure set (EOPs). Plausible because parameters monitored in EOPs may impact Emergency Event classification.

Question ID 2008NRC-0583

Comments:

Reference: 12-OHP-4023-E-1 Loss of Reactor or Secondary Plant Specific Background Document, Step 11 Basis pg. 29, Rev. 25

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-EOP09-E36) For each of the E-1 Series procedures, discuss the basis or reason for all Steps, in accordance with the E-1 series background documents.

Associated K&A(s):

EPE.011.EA2.15

Importance Factor: 4.1/4.0

K&A Statement: Ability to determine and/or interpret the following as they apply to a Large-Break LOCA: Sump level

Question Cognitive Level: Comprehension or Analysis H / 2

10 CFR Part 55 Content: 10 CFR 55.43. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

4

ID: RO-C-EOP03-E10-2

Points: 1.00

Tier# 1	Group # 1	Level RO
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Given the following conditions in Unit 2:

- The reactor was tripped and all Reactor Coolant Pumps stopped due to loss of CCW cooling
- A decision has been made to cooldown the plant by natural circulation.

How are S/G levels maintained during natural circulation cooldown to ensure most efficient heat transfer?

Control feed flow as necessary to maintain

- A. narrow range SG between 40 and 48%
- B. total feed flow > 240,000 pph
- C. narrow range SG levels between 48% and 67%
- D. narrow range SG levels between 20% and 40%

Answer: A

Answer Explanation:

- A. CORRECT – Per ES-0.2, S/G level is maintained within the program level band (40-48% to provide a stable heat sink for decay heat removal. Heat sink is required for natural circulation.
- B. Incorrect – Wrong because no level band is specified and this value is only used when SG level is <13%. Plausible because this is the standard value used in EOPs for heat sink verification based on AFW flow when SG levels are <13%.
- C. Incorrect – Wrong because level band is above the program level band. 48% is the high level for the program level band for level. 67% is the maximum limit to avoid a Yellow Path condition for high SG level. Plausible if candidate believes more water is better for natural circulation.
- D. Incorrect – Wrong because level band is below the program level band. Plausible because this is a combination of bands for SG level control in Normal and EOPs.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID RO-C-EOP03-E10-2

Comments:

Reference: 12-OHP-4023-ES-0.2 Plant Specific Background Document for 1-OHP-4023-ES- 0.2 Natural Circ Cooldown Rev 13 (Page 19); 12-OHP-4023-SUP-011 Plant Specific Background Document for 1-OHP-4023-SUP-011 Natural Circulation Verification Rev. 4 (Page 2)

Source: New

Associated objective(s):

(RO-C-EOP03-E19) From memory, for each of the E-0 series EOPs discuss the basis for all Steps, without error.

Associated K&A(s):

APE.015.AK3.07

Importance Factor: 3.7

K&A Statement: Knowledge of the reasons for the following responses and/or actions as they apply to Reactor Coolant Pump Malfunctions: Ensuring that S/G levels are controlled properly for natural circulation enhancement

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5 / 10

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

5

ID: RO-C-AOP0340412-E1-5

Points: 1.00

Tier# 1	Group # 1	Level RO
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Unit 1 is operating at 100% power in normal lineup.

1-NLP-151 (Pressurizer Level channel 1) is the controlling channel and then develops a leak in the D/P cell bellows.

How would 1-QRV-251 respond to the bellows leak to control Pressurizer level and what Operator action would be required to maintain **RCP Seal Injection flow** in the normal band using only 1-QRV-200, CVCS Charging to Regen HX 1-HE-12 Flow Control Valve?

- A. 1-QRV-251 would throttle closed and 1-QRV-200 would need to be throttled closed.
- B. 1-QRV-251 would throttle open and 1-QRV-200 would need to be throttled closed.
- C. 1-QRV-251 would throttle closed and 1-QRV-200 would need to be throttled open.
- D. 1-QRV-251 would throttle open and 1-QRV-200 would need to be throttled open.

Answer: A

Answer Explanation:

- A. CORRECT – For a full reference leg, zero DP indicates high level. A bellows leak would cause zero DP and result in a high level indication. The level control system would respond by lowering charging flow to reduce level. 1-QRV-251 would throttle closed lowering both Charging and Seal Injection flow. 1-QRV-200 would be required to be throttled closed to raise backpressure to force more charging flow to the Seal Injection lines to maintain RCP Seal Injection in allowed band.
- B. Incorrect – Wrong because 1-QRV-251 would throttle closed. 1-QRV-200 would be required to be throttled closed. Plausible if candidate believes indicated level lowers.
- C. Incorrect –Wrong because 1-QRV-200 would need to be throttled closed. 1-QRV-251 would throttle closed. The reduced charging flow would lower seal injection flow and require 1-QRV-200 to be throttled closed to maintain RCP Seal Injection in allowed band. Plausible because 1-QRV-251 will throttle closed and if candidate reverses the operation of 1-QRV-200.
- D. Incorrect – 1-QRV-251 would throttle closed to lower level. 1-QRV-200 would be required to be throttled closed to maintain RCP Seal Injection in allowed band. Plausible if candidate believes indicated level lowers and reverses the operation of 1-QRV-200.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID RO-C-AOP0340412-E1-5

Comments:

Reference: SOD-00202-003 Pressurizer Level Control System Rev 7, SOD-00300-001 Charging and Letdown System Rev 13, Lesson Plan RO-C-IF27A Sensors and Detectors 1 Rev. 002 (Page 179)

Source: New

Associated objective(s):

(RO-C-AOP0340412-E1) Given a set of plant conditions including a Pressurizer Level Instrument Malfunction or Controller failure, predict the plant response with no operator intervention, without error.

Associated K&A(s):

APE.022.AK3.01

Importance Factor: 3.4

K&A Statement: Knowledge of the reasons for the following responses and/or actions as they apply to Loss of Reactor Coolant Makeup: Adjustment of RCP seal backpressure regulator valve to obtain normal flow

Question Cognitive Level: Comprehension or Analysis

H / 4

10 CFR Part 55 Content: 10 CFR 55.41. 5 / 10

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

6

ID: RO-C-01600-E7-1

Points: 1.00

Tier# 1	Group # 1	Level RO
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Due to a lowering CCW Surge Tank level the Unit 2 Control Room team has entered 2-OHP-4022-016-001, CCW Out-Leakage / Malfunction of the CCW System.

The crew has initiated make up to the surge tank and has split the East and West CCW trains but the leak location is still not identified. The next step checks CCW Surge tank < 48”.

What is the Operational significance of 48” in the CCW Surge tank?

When level lowers below 48” _____ .

- A. the CCW pumps may begin to show signs of cavitation.
- B. the divider baffle will provide train separation in the surge tank.
- C. entry conditions for OHP-4022-016-004 Loss of Component Cooling Water are met.
- D. ESW makeup to the CCW Surge tank will begin to supply make up.

Answer: B

Answer Explanation:

- A. Incorrect – Wrong because at 48% there is adequate level in the surge tank to prevent cavitation but plausible as surge tank does provide suction to CCW pumps and OHP-4021-016-001 contains direction to stop CCW pumps if loss of suction occurs.
- B. CORRECT – OHP-4022-016-001 has a step to check for lowering indications on train specific level indicators once level is < 48% which correlates to the height of the divider baffle.
- C. Incorrect – Wrong because transition to OHP-4022-016-004 Loss of Component Cooling Water is only made if no CCW pumps are running. Plausible because the procedure directs stopping CCW pump(s) showing indications of cavitation which may result from loss of CCW suction.
- D. Incorrect - Wrong because this action is only directed by OHP-4021-016-001 after determination of leak location. Plausible because 12-OHP-5030-016-001, Supplying ESW to CCW for Makeup using a Temporary Configuration Change is a new available modification made to the plant but requires manual actions.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID RO-C-01600-E7-1

Comments:

Reference: 2-OHP-4022-016-001, CCW Out-Leakage / Malfunction of the CCW System, Rev 24, NOTES prior to steps 2 & 6

Source: New

Associated objective(s):

(RO-C-01600-E7) From memory, list the parameters and instrumentation used to verify proper operation for the CCW System without error:

- a. CLR-410/411 (Surge Tank Level)
- b. CFI-410/420 (CCW Header Flow)
- c. CTR-410/420 (Hx Inlet Temp)
- d. CPI-410/420 (Pump Disch Press)
- e. CRA-415/425 (CCW loop)
- f. CTR-415/425 (Hx Outlet Temp)
- g. Delete
- h. CFI-419/429 (RHR Hx Flow)
- i. CFA-450/455 (CCW to/from RCPs Flow Mismatch)
- j. CFA-459/460 (CCW to/from Excess Letdown Hx Flow Mismatch)
- k. CFA-456/457 (CCW to/from Reactor Support Coolers Flow Mismatch)
- l. CTR-418 (CCW Temp From Reactor Support Coolers)
- m. CFI-451/452/453/454 (CCW Flow from RCP Motor Brg Oil Coolers)
- n. CTI-451/452/453/454 (CCW Temp from RCP Motor Brg Oil Coolers)
- o. CTA-451/452/453/454 (CCW Temp Alarm RCP Motor Brg Oil Coolers)
- p. CFI-455/456/457/458 (CCW Flow from RCP Thermal Barrier)
- q. CFA-451/452/453/454 (CCW Flow Alarm RCP Motor Brg Oil Coolers)

Associated K&A(s):

APE.026.AA1.05

Importance Factor: 3.5

K&A Statement: Ability to operate and/or monitor the following as they apply to Loss of Component Cooling Water: The CCWS surge tank, including level control, level alarms, and a radiation alarm

Question Cognitive Level: Comprehension or Analysis H / 2

10 CFR Part 55 Content: 10 CFR 55.41. 5 / 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

ID: NRCAUDIT07-0038A

Points: 1.00

7

Tier# 1	Group # 1	Level RO
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Unit 2 is operating at 100% power, with Pressurizer Pressure Control selected to Channel 1-2.

The following conditions exist:

- Pressurizer PORVs 2-NRV-151 and 2-NRV-153 are full OPEN
- Pressurizer Spray Valves 2-NRV-163 and 2-NRV-164 are full CLOSED
- Pressurizer Pressure Channel 2 indicates 2500 psig
- All other Pressurizer Pressure Channels indicate 2200 psig and lowering.
- 2-RU-27, PRZ Pressure Controller indicates 20%

Based on these conditions, which ONE of the following actions must be performed according to 2-OHP-4022-IFR-001, INSTRUMENT FAILURE RESPONSE?

- A. Place 2-RU-27, PRZ Pressure Controller, in MANUAL and control as necessary to restore RCS pressure
- B. Trip the reactor, perform the immediate actions of E-0, REACTOR TRIP OR SAFETY INJECTION, then trip RCP's #22, 23, and 24.
- C. Close PZR PORV Block Valves 2-NMO-151 and 2-NMO-153.
- D. Place the Pressurizer Pressure Control select switch to the Channel 1-4 position and verify PZR PORV closes.

Answer: C

Answer Explanation:

The postulated event is a failure of Pressurizer Pressure Channel 2 (Bistable channel) failed high with an SSPS logic error that actuates bistable PB457. This will actuate both the open and confirmation signals for pressurizer PORVs NRV-151 and NRV-153.

- A. Incorrect – Incorrect because the PZR controller is not sending a signal to open the PORV as indicated by the 20% output. Plausible as this would be the action for a pressure control issue that cannot be immediately linked to a PZR PORV.
- B. Incorrect – Incorrect, but plausible as these are the actions that would be taken for a pressurizer spray valve failed open.
- C. CORRECT – This is an RNO action per IFR-001 for a PZR Pressure not stable or trending to 2235# and RCS Pressure Control problem can be immediately linked to a PZR PORV.

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D. Incorrect – Incorrect because the action is not contained in IFR-001. Plausible as this action is listed in 2-OHP-4022-013-009, Pressurizer Pressure Instrument Malfunction and would result in PORV closure.

Question ID NRCAUDIT07-0038A

Comments:

Reference: 2-OHP-4022-IFR-001 Instrument Failure Response Rev 11, SOD 00202-002, Pressurizer Pressure Control System Rev 7

Source: New

Associated objective(s):

(RO-C-AOP0330412-E3) Given a set of plant conditions including a Pressurizer Pressure Instrument Malfunction or Controller Failure explain the procedural mitigation strategy for the malfunction in accordance with OHP-4022-013-009, Pressurizer Pressure Instrument Malfunction.

Associated K&A(s):

APE.027.AA1.01

Importance Factor: 3.8

K&A Statement: Ability to operate and/or monitor the following as they apply to a Pressurizer Pressure Control System Malfunction: PZR heaters, sprays, and PORVs

Question Cognitive Level: Comprehension or Analysis

H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

8

ID: CM-8693

Points: 1.00

Tier# 1	Group # 1	Level RO
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The plant has experienced an ATWS condition. Boration is in progress in accordance with FR-S.1, Response to Nuclear Power Generation/ATWS.

Which of the following meets the criteria to transition from FR-S.1?

	<u>Wide Range Log Power</u>	<u>Wide Range SUR</u>
A.	1%	+0.1 dpm
B.	6%	-0.3 dpm
C.	3%	0.0 dpm
D.	4%	-0.2 dpm

Answer: D

Answer Explanation:

FR-S.1 transition criteria require reactor power <5% by wide range indication with a negative wide range startup rate. This indicates that power is low enough to be within the capacity of AFW and that the reactor is subcritical.

- A. Incorrect - Incorrect because startup rate is too high. Plausible since power level is <5% and well within AFW flow limits.
- B. Incorrect - Incorrect because power is too high. Plausible because startup rate is correct, indicating the reactor is subcritical.
- C. Incorrect - Incorrect because startup rate is too high. Plausible since power level is <5% and well within AFW flow limits, and if 0 SUR is interpreted as shut down.
- D. CORRECT - Correct because both power level and startup rate are within the procedural limit.

Question ID CM-8693

Comments:

Reference: 1-OHP-4023-FR-S-1 Response to Nuclear Power Generation / ATWS Rev 13 (Step 19; 12-OHP-4023-FR-S.1 PSBD for FR-S. Rev 11 (Step 19 basis)

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-EOP04-E18) For each of the FR-S series procedures identify the Procedure Transitions in accordance with 12-OHP-4023-FR-S.1, Response to Nuclear Power Generation/ATWS and 12-OHP-4023-FR-S.2 Response to Loss of Core Shutdown Background Documents.

Associated K&A(s):

EPE.029.EA2.01

Importance Factor: 4.4/4.1

K&A Statement: Ability to determine and/or interpret the following as they apply to an Anticipated Transient Without Scram: Reactor power

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.43. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

9

ID: RO-C-E3-ECA-T2-Q4

Points: 1.00

Tier# 1	Group # 1	Level RO
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Following a Steam Generator tube rupture in SG #23, the Unit Supervisor has transitioned to ECA-3.3 "SGTR Without Pressurizer Pressure Control" due to a loss of RCS pressure control.

Which ONE of the following conditions would require the crew to exit the procedure loop trying to re-establish pressure control **and** check if ECCS flow should be reduced per ECA-3.3?

- A. Non-ruptured SG pressure lowers in an uncontrolled manner.
- B. Pressurizer level is 25% and rising.
- C. SG 23 narrow range level is 51% and rising.
- D. RCS pressure control using auxiliary spray is established.

Answer: B

Answer Explanation:

2-OHP-4023-ECA-3-3 step 6 directs a check of pressurizer level >20% (24% adverse). If level criteria is satisfied the Crew is directed to check for ECCS termination criteria. If not, the crew is directed back to step 1.

- A. Incorrect – Incorrect because uncontrolled depressurization of a non-ruptured SG indicates a need to transition to E-2, but does not indicate that ECCS should be terminated to do so. Plausible if candidate believes that ECCS should first be terminated before managing a subsequent accident with independent re-initiation criteria.
- B. CORRECT – Correct because value meets the procedural minimum. Pressurizer level returning on scale is an indicator that ECCS flow could recover level after termination and that ECCS flow should now be terminated so as not to lead to SG overfill.
- C. Incorrect – Incorrect because pressure control recovery attempts should continue until the ruptured SG reaches the high-high level of 67% (if PRZ level is not on scale). Plausible if the candidate confuse procedural actions for ruptured and non-ruptured SGs. 51% level in a non-ruptured steam generators exceeds the procedurally directed control band and would require operator action.
- D. Incorrect – Incorrect because this condition would result in a transition back to E-3 where ECCS flow termination criteria would eventually be checked. Therefore, ECCS termination criteria per ECA-3.3 would not apply. Plausible because this condition would result in exiting the procedure loop.

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Question ID RO-C-E3-ECA-T2-Q4

Comments:

Reference: 2-OHP-4023-ECA-3.3 SGTR without Pressure Control Rev 12 (Step 6),
12-OHP-4023-ECA-3.3 Plant Specific Background Document for 2-OHP-4023-ECA-
3.3 Rev 12 (Step 6 basis)

Source: New

Associated objective(s):

(RO-C-EOP08-E18) For the E-3 series procedures and the ECA-3 series procedures discuss the basis or reason for all Steps, In accordance with the applicable Plant Specific Background Documents.

Associated K&A(s):

EPE.038.EK2.10

Importance Factor: 4.1

K&A Statement: Knowledge of the relationship between a Steam Generator Tube Rupture and the following systems or components: ECCS

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.41. 7 / 8

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

10

ID: CM-0587

Points: 1.00

Tier# 1	Group # 1	Level RO
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The 250V DC System station batteries are sized for ____ hours of continuous operation during a _____.

- A. Four;
Station Black Out (SBO)
- B. Four;
Loss of Offsite Power (LOOP)
- C. Eight;
Station Black Out (SBO)
- D. Eight;
Loss of Offsite Power (LOOP)

Answer: A

Answer Explanation:

Explanation: The loads for the LOOP and the SBO events are not identical and therefore both profiles are considered in battery sizing.

- A. CORRECT – For the Station Blackout (SBO) event, the batteries are sized for four hours of continuous operation, predicated upon the continuous operation of all required DC emergency equipment.
- B. Incorrect – Incorrect because, for the LOOP event, the batteries are sized for three hours of continuous operation, predicated upon the continuous operation of all required DC emergency equipment. Plausible because there is a criteria for both SBO and LOOP events.
- C. Incorrect – Incorrect because, for the Station Blackout (SBO) event, the batteries are sized for four hours of continuous operation, predicated upon the continuous operation of all required DC emergency equipment. Plausible as 8 hour time is listed in the lesson for discharge rates and time for cell voltage to drop to minimum.

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D. Incorrect – Incorrect because, for the LOOP event, the batteries are sized for three hours of continuous operation, predicated upon the continuous operation of all required DC emergency equipment. Plausible as 8 hour time is listed in the lesson for discharge rates and time for cell voltage to drop to minimum.

Question ID CM-0587

Comments:

Reference: RO-C-08204 250 Volt DC Distribution System, Rev 9, pages 7-9

Source: Bank

Associated objective(s):

(RO-C-08204-E1) Explain the purpose(s) and/or function(s) of the 250 Volt DC System.

Associated K&A(s):

EPE.055.EK3.01

Importance Factor: 4.1

K&A Statement: Knowledge of the reasons for the following responses and/or actions as they apply to a Station Blackout: Length of time for which battery capacity is designed

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5 / 10

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

11

ID: RO-C-AOP0030412-E3-1

Points: 1.00

Tier# 1	Group # 1	Level RO
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Unit 1 is in Mode 5 with ESW Cross-tie valves both Closed.

A severe lightning storm results in the loss of reserve power to both trains. Both U1 Emergency Diesel Generators experience a start failure.

How does the Operating crew regain temperature control of the CCW system?

Restore power to T11A and or D then:

- A. start East or West CCW pump and throttle ESW cooling valve to the CCW Heat Exchanger.
- B. start East or West ESW pump and throttle ESW cooling valve to the CCW Heat Exchanger.
- C. start East or West CCW and ESW pumps and throttle ESW cooling valve to the CCW Heat Exchanger.
- D. start East or West CCW and ESW pumps and throttle CCW flow control valve to the CCW Heat Exchanger.

Answer: C

Answer Explanation:

- A. Incorrect – Wrong because, with ESW cross-tie valves closed, an ESW pump must also be started for Unit 1 to supply cooling water to the CCW Heat Exchanger. Plausible if the effects of closed cross-tie valves are not accounted for and because action to restore cooling to the CCW system is correct.
- B. Incorrect – Wrong because a CCW pump would also have to be manually started to restore CCW cooling and temperature control. Plausible if candidate believes a CCW pump will auto start on low pressure when power is restored and because action to restore cooling to the CCW system is correct.
- C. CORRECT – both an ESW and CCW pump would be started and ESW flow to the CCW HX is throttled for temperature control.
- D. Incorrect – Wrong because ESW flow is throttled for temperature control, not CCW. Plausible because both an ESW and CCW pump would be started and because throttling CCW flow would have an impact on temperature.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID RO-C-AOP0030412-E3-1

Comments:

Reference: 1-OHP-4022-001-005 Loss of Off-Site Power with the Reactor Shut down Rev 19 (Step 2), 1-OHP-4024-104 Rev 52, Drops 85 East CCW HX Discharge Temp Abnormal & 95 West CCW HX Discharge Temp Abnormal

Source: New

Associated objective(s):

(RO-C-AOP0030412-E3) Given plant conditions explain the procedural mitigation strategy for a Loss of Offsite Power while Shutdown in accordance with AOP 1(2)-OHP-4022-001-005 “Loss Of Offsite Power With Reactor Shutdown”.

Associated K&A(s):

APE.056.AA1.28

Importance Factor: 3.1

K&A Statement: Ability to operate and/or monitor the following as they apply to Loss of Offsite Power: SWS flow control valve for the CCW cooler to control CCW outlet temperature

Question Cognitive Level: Comprehension or Analysis

H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

12

ID: 2008NRC-0591A

Points: 1.00

Tier# 1	Group # 1	Level RO
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Unit 2 was in Mode 2 when a power loss to 250 VDC Distribution Panel 2-MCAB occurred. After 5 minutes, the following conditions exist:

- Ann. 219, Drop 29, CRID 3 INVERTER ABNORMAL is alarming
- Ann. 219, Drop 30, CRID 4 INVERTER ABNORMAL is alarming
- Loop 3 Tavg indicates 530 degrees
- Loop 3 Delta-T indicates 0%
- Loops 1, 2, and 4 Tavg indicates 550 degrees
- Loops 1, 2, and 4 Delta-T indicate 3%

Which ONE of the following describes this failure?

- A. CRID 3 & 4 Static Inverter Transfer switches have transferred to the Alternate Power Supply.
- B. CRID 3 Static Inverter Transfer switch has Failed to Transfer.
CRID 4 Static Inverter Transfer switch has transferred to the Alternate Power Supply.
- C. CRID 3 Static Inverter Transfer switch has transferred to the Alternate Power Supply.
CRID 4 Static Inverter Transfer switch has Failed to Transfer.
- D. CRID 3 & 4 Static Inverter Transfer switches have failed to transfer to the Alternate Power Supply.

Answer: B

Answer Explanation:

- A. Incorrect – Wrong because transferring to the alternate supply would maintain power to the CRID. Symptoms indicate loss of power to CRID 3. Plausible because transferring to the alternate source causes the listed alarms.
- B. CORRECT - When the normal DC source is lost, each CRID inverter transfer static switch should automatically transfer to the alternate AC input source. The failure of Loop 3 RCS instrumentation indicates CRID 3 failed to transfer to the alternate AC source and is de-energized. Operable Loop 4 RCS instrumentation indicates CRID 4 is energized from the alternate AC source.
- C. Incorrect – Incorrect because the effects are reversed. Plausible if the candidate does not know applicable power supplies.
- D. Incorrect – Wrong because a loss of power is not indicated for CRID 4 based on instrumentation values given. Plausible because loss of power would generate the listed alarms.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID 2008NRC-0591A

Comments:

Reference: 2-OHP-4024-219 Rev 48 Drop 39 DG2AB Inverter Failure & 40 4KV Bus T21A
Overvoltage, 2-OHP-4021-082-008 Rev 44 Tables 3 (4), Operational Effects –
Loss of Power to CRID 3 (4) Panel

Source: New

Associated objective(s):

(RO-C-0820360101-E1) Given plant conditions including a Loss of CRID Instrument
Inverters and Power Panels, predict the response of the plant, without error.

Associated K&A(s):

APE.057.AK2.06

Importance Factor: 4.0

K&A Statement: Knowledge of the relationship between Loss of Vital AC Electrical
Instrument Bus and the following systems or components: RCS instrumentation

Question Cognitive Level: Comprehension or Analysis

H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

13

ID: NRCAUDIT07-0253

Points: 1.00

Tier# 1	Group # 1	Level RO
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A 250 VDC station battery is supplying DC bus loads without a battery charger online. If the equipment loaded on the DC bus does NOT change, as the battery is expended the current draw (amps) will:

- A. be fairly constant until the design battery capacity (amp-hours) is exhausted and then will rapidly lower.
- B. rise steadily until the design battery capacity (amp-hours) is exhausted.
- C. lower steadily until the design battery capacity (amp-hours) is exhausted.
- D. initially lower until approximately 50% design capacity (amp-hours) had been expended and then rise until the battery has been exhausted.

Answer: B

Answer Explanation:

- A. Incorrect – Wrong because the current draw rises. Plausible because this describes voltage response for some battery types.
- B. CORRECT – Recall that $\text{Power} = \text{Voltage} \times \text{Current}$. As the battery discharges the voltage will drop. To maintain a constant power output the current draw must rise.
- C. Incorrect – Wrong because the current draw rises. Plausible because the listed effect of lowering voltage on current draw has been reversed.
- D. Incorrect – Wrong because the current draw rises throughout the discharge cycle. Plausible because a rapid drop in voltage would cause a corresponding rapid current rise.

Question ID NRCAUDIT07-0253

Comments:

Reference: RO-C-BE01, Basic Electricity Rev 1 Pages 39-43, 108-109, DOE-HDBK-1011 DOE Electrical Science Volume 2

Source: Bank

Previous exam: NRC 2020-12

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-08204-E5) Predict how a loss of 600 Volt AC affects 250 Volt DC system.

Associated K&A(s):

APE.058.AK1.03

Importance Factor: 3.7

K&A Statement: Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to Loss of DC Power: Effect of battery discharge rate on capacity

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 8 / 10

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

14

ID: RO-C-06401-E1-5

Points: 1.00

Tier# 1	Group # 1	Level RO
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The _____ system contains filters and dryers to remove moisture and contaminants to _____ .

- A. Plant Air, protect system piping from damage.
- B. Control Air, protect system piping from damage.
- C. Plant Air, protect components from loss of air due to blockage issues.
- D. Control Air, protect components from loss of air due to blockage issues.

Answer: D

Answer Explanation:

- A. Incorrect – Wrong because Plant Air does not use dryers. Plausible because the Plant Air Compressor does use moisture separators as part of the air compression cycle but this is to cool the air and remove moisture before it is stored in the Plant Air Receiver.
- B. Incorrect –Wrong purpose.. Plausible because system is correct.
- C. Incorrect – Wrong because Plant Air does not use dryers. Plausible because the Plant Air Compressor does use moisture separators as part of the air compression cycle and because purpose is correct.
- D. CORRECT – The Control Air system contains multiple sets of filters and the Control Air Dryer to remove particulates and moisture than could lead to a loss of instrument air to components serviced by the Control Air Headers which are mostly valve positioners.

Question ID RO-C-06401-E1-5

Comments:

Reference: Plant OE - Plant Event Root Cause Evaluation, 2020-6941, U2 Manual Reactor Trip and Auto Safety Injection; SD-ENG-06401, Compressed Air System (Pages 8-9).

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-06401-E1) Explain the purpose and/or function of the following Compressed Air Systems:

- a. Plant Air System
- b. Control Air System
- c. Backup Air Compressor

Associated K&A(s):

APE.065.AK1.02

Importance Factor: 3.1

K&A Statement: Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to Loss of Instrument Air: Effects of water and/or particulate matter in instrument air lines (operating experience)

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 8 / 10

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

15

ID: CM-0989

Points: 1.00

Tier# 1	Group # 1	Level RO
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Plant conditions are as follows:

- Unit 1 is in MODE 3, stable at 547°F and 2235 psig
- Steam Generators are being controlled at 44% using the East and West MDAFPs
- The 4160 VAC distribution system is being supplied by the reserve transformers

Due to a system disturbance, indicated voltage on the safeguard busses drop (initial value) and then stabilize (final value) one minute later as follows:

- T11A Initial Value: 110.5V Final Value: 111.5V
- T11B Initial Value: 112.0V Final Value: 114.0V
- T11C Initial Value: 110.5V Final Value: 111.5V
- T11D Initial Value: 112.0V Final Value: 114.0V

Which ONE of the following describes the electrical distribution response if voltage remains at these values for an additional 5 minutes?

- A. All safeguards busses will be energized by their respective EDG.
- B. T11A and T11D busses will be energized by their respective EDG.
- C. T11A and T11B busses will be energized by its respective EDG.
- D. T11C and T11D busses will be energized by its respective EDG.

Answer: C

Answer Explanation:

Aux Bus Undervoltage <113.12 as measured on T11A or T11D will cause actuation of the degraded voltage relays for the respective train (Train A-Buses T11C and T11D; Train B-Buses T11A and T11B). If the degraded voltage condition persists for 111 seconds, the supply breakers from the normal power source will open for both buses in the associated train, causing a loss of power. This will result in the associated EDG starting and re-energizing the buses.

- A. Incorrect – Wrong because T11C and T11D will remain powered from Reserve Feed as T11D voltage is above 113.12 V. Plausible if the candidate does not account for the time delay, since initial voltage readings are <113.12V for both T11A and T11D.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

- B. Incorrect – Wrong because T11C and T11D will remain powered from Reserve Feed as T11D voltage is above 113.12 V. Plausible if the candidate believes aux bus under voltage only affects the safety buses required to supply ECCS loads (T11A and T11D).
- C. CORRECT - T11A voltage is $<113.12V$ for greater than the 111 second time delay, which will cause loss of normal power to both T11A and T11B. The EDG will start and energize the buses.
- D. Incorrect – Wrong because T11C and T11D will remain powered from Reserve Feed as T11D voltage is above 113.12 V. Plausible if the candidate believes the voltage is sensed on T11C for Train A.

Question ID CM-0989

Comments:

Reference: OHP 4024-121 Drops 68 Train A Aux Bus Undervoltage & 78 Train B Aux Bus Undervoltage Step 3.3 Rev 104

Source: Bank

Associated objective(s):

(RO-C-0821040401-E1) Given a set of plant conditions including the occurrence of Abnormal Electrical Grid Voltage, Frequency, and Transformer Open Phase Conditions predict the response of the plant without error.

Associated K&A(s):

G 2.1.07

Importance Factor: 4.4/4.7

K&A Statement: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation (CFR: 41.5 / 43.5 / 45.12 / 45.13)

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

16

ID: RO-C-EOP09-E34-1

Points: 1.00

Tier# 1	Group # 1	Level RO
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Given the following conditions:

- A LOCA outside containment has resulted in RCS subcooling dropping to 0°F.
- The operating crew has entered OHP-4023-ECA-1.2, LOCA Outside Containment.

Which ONE of the following identifies the expected status of Containment Phase A Isolation, and the parameter used to verify that the LOCA has been isolated in accordance with ECA-1.2?

	<u>Phase A Status</u>	<u>Parameter Monitored for LOCA Isolation</u>
A.	NOT automatically actuated	Pressurizer level rising
B.	NOT automatically actuated	RCS pressure rising
C.	automatically actuated	Pressurizer level rising
D.	automatically actuated	RCS pressure rising

Answer: D

Answer Explanation:

- A. Incorrect- Wrong because neither response is correct. Pressurizer level rising is plausible since the student could reason that it may be rising if the leak was isolated. The procedure directs the use of RCS pressure increasing as the method used to indicate the leak has been isolated. Phase A not being actuated is plausible if applicant misapplies the fact that the LOCA was outside of containment, and therefore containment pressure does NOT rise to 1.0 psig. 1.0 psig is the containment pressure setpoint for Safety Injection. Since Phase A isolates certain components of containment, and since this LOCA is outside containment, it is plausible that the applicant would believe that a Phase A is not needed.
- B. Incorrect- Wrong because CI Phase A actuates automatically. Plausible since the procedure does direct the use of RCS pressure increasing as the method for determining the leak is isolated.
- C. Incorrect- Wrong because rising level is not the procedurally required parameter. Plausible since a Phase A has been actuated, due to the Safety Injection signal. Pressurizer level rising is plausible since the student could reason that it may be rising if the leak was isolated.
- D. CORRECT - The procedure directs the use of RCS pressure increasing as the method used to indicate the leak has been isolated. A Phase A has actuated, since a Safety Injection was automatically initiated due to low RCS pressure resulting from the LOCA.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID RO-C-EOP09-E34-1

Comments:

Reference: 1-OHP-4023-E-0 Reactor Trip or Safety Injection pg 34 Rev 46, 1-OHP-4023-ECA-1.2 LOCA Outside Containment Rev 5, pg 4

Previous exam use: NRC EXAM 2012

Source: Bank

Associated objective(s):

(RO-C-EOP09-E34) For each of the E-1 Series procedures, identify the Major Action Categories and discuss the bases for each in accordance with the E-1 series background documents.

Associated K&A(s):

(WE 04) P2.2.44

Importance Factor: 4.2/4.4

K&A Statement: Ability to interpret control room indications to verify the status and operation of a system and understand how operator actions and directives affect plant and system conditions (CFR: 41.5 / 43.5 / 45.12)

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.41. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

17

ID: RO-C-EOP09-E36-1

Points: 1.00

Tier# 1	Group # 1	Level RO
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While responding to a LOCA, a transition to OHP-4023-ECA-1.1, Loss of Emergency Coolant Recirculation, was performed when meeting conditions in OHP-4023-E-1, Loss of Primary or Secondary Coolant.

The crew is commencing the plant cooldown using Steam Dumps.

While cooling down the Operators will monitor for _____, to block _____ .

- A. P11, Low Steam Line Pressure Safety Injection
- B. P11, Steam Line D/P Safety Injection
- C. P12, Low Steam Line Pressure Safety Injection
- D. P12, Steam Line D/P Safety Injection

Answer: C

Answer Explanation:

- A. Incorrect – Wrong permissive. P-11 is associated with PZR pressure < 1910# at DC Cook. It is the Steam Line Pressure lo signal in the Westinghouse material. Plausible because P-11 is monitored during cooldown and allows the manual block of Pressurizer Pressure lo SI at DC Cook
- B. Incorrect – Wrong permissive and trip signal. P-11 is associated with PZR pressure < 1910# at DC Cook. It is the Steam Line Pressure lo signal in the Westinghouse material. Plausible because P-11 is monitored during cooldown.
- C. CORRECT - P-12 signal is active when 2/4 loop Tave < 541 f and allows the manual block of SI due to low steam line pressure (500#)
- D. Incorrect – Incorrect trip signal. Plausible because P-12 is correct but Steam line D/P SI has no block available.

Question ID RO-C-EOP09-E36-1

Comments:

Reference: 12-OHP-4023-ECA-1.1 Loss of Emergency Recirculation Plant Specific Background Document Rev 16 Step 9

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-EOP09-E36) For each of the E-1 Series procedures, discuss the basis or reason for all Steps, in accordance with the E-1 series background documents.

Associated K&A(s):

W.E11.EK1.05

Importance Factor: 3.4

K&A Statement: Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to Loss of Emergency Coolant

Recirculation: Blocking low steamline pressure SI when PZR pressure lowers less than P-11 setpoint during cooldown

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5 / 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

18

ID: 2008NRC-0289

Points: 1.00

Tier# 1	Group # 1	Level RO
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Given the following plant conditions:

- A Unit 2 Reactor Trip and Safety Injection have occurred.
- Both Charging Pumps are unavailable
- While implementing 2-OHP-4023-E-0, Reactor Trip or Safety Injection Step 10, it is determined that AFW flow can NOT be established.
- All SG NR levels are off-scale low.
- All SG WR levels are 58% and lowering.
- The crew has just entered 2-OHP-4023-FR-H.1, Response to Loss of Secondary Heat Sink.
- RCS Pressure is 175 psig and stable.
- Intact SG pressures are 475 psig and trending down.

Which ONE of the following describes the plant conditions and action required?

Steam Generators are:

- A. required to provide secondary heat sink. Remain in 2-OHP-4023-FR-H.1 to initiate Bleed and Feed per 2-OHP-4023-FR-H.1.
- B. NOT required to provide secondary heat sink. Go to 2-OHP-4023-E-1, Loss of Reactor or Secondary Coolant.
- C. required to provide secondary heat sink. Remain in 2-OHP-4023-FR-H.1 to establish AFW Flow.
- D. NOT required to provide secondary heat sink. Return to 2-OHP-4023-E-0.

Answer: D

Answer Explanation:

Secondary heat sink is not required if SGs are at a higher pressure than the RCS. They act as a heat source.

- A. Incorrect - Secondary heat sink is not required because SGs are at a higher pressure than the RCS. Plausible because the Crew would initiate Bleed and Feed if they remained in FR-H.1 due to both charging pumps unavailable.
- B. Incorrect - SGs are not required for heat sink, but the crew will return to E-0, not E-1. Plausible because the indications are for a LOCA, which will require an eventual transition from E-0 to E-1

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

- C. Incorrect - Secondary heat sink is not required because SGs are at a higher pressure than the RCS. Plausible because FR-H.1 contains actions to restore AFW flow.
- D. CORRECT - SGs are not required for heat sink, and the Crew returns to E-0 per FR-H.1.

Question ID 2008NRC-0289

Comments:

Reference: 2-OHP-4023-E-0 Reactor Trip or Safety Injection Rev 46, 2-OHP-4023-FR-H.1 Response to Loss of Secondary Heat Sink rev 30, 12-4023-FR-H.1 Plant Specific Background Document Rev 26, Step 1

Source: Bank

Associated objective(s):

(RO-C-EOP11-E10) For each of the FR-H series procedures discuss the basis or reason for all Steps, in accordance with 12-OHP-4023-FR-H.1, 12-OHP-4023-FR-H.2, 12-OHP-4023-FR-H.3, 12-OHP-4023-FR-H.4, and 12-OHP-4023-FR-H.5, Background Documents.

Associated K&A(s):

G 2.1.19

Importance Factor: 3.9/3.8

K&A Statement: Ability to use available indications to evaluate system or component status (CFR: 41.10 / 45.12)

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.41. 10

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

19

ID: NRCAUDIT07-0365A

Points: 1.00

Tier# 1	Group # 2	Level RO
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Which ONE of the following describes the proper operation of the boric acid transfer pump QMO-410, Emergency Boration Valve when emergency boration is performed per 4021-005-007, Operation of Emergency Boration Flowpaths?

To commence Emergency Boration:

- A. Open QMO-410 and verify the selected Boric Acid Transfer pump switches to fast.
- B. Open QMO-410 and start the selected Boric Acid Transfer pump in fast.
- C. Start the selected Boric Acid Transfer pump in fast and then open QMO-410.
- D. Start the selected Boric Acid Transfer pump in fast and then verify QMO-410 opens.

Answer: C

Answer Explanation:

When Normal Boration is used, the BA Transfer Pump will shift to fast speed and valves will realign. Emergency Boration flow is manually initiated.

- A. Incorrect – Wrong because the BA Transfer Pump will not auto start in this situation, Plausible if student believes the Boric Acid Transfer pump switches to fast on the opening signal to QMO-410
- B. Incorrect – Wrong because the actions are listed in reverse order. Plausible as these are the required actions but in reverse order.
- C. CORRECT - Per 1-4021-005-007 Attachment #1 Boric acid Storage Tanks Flowpath the operator places the selected Boric Acid Transfer Pump to fast and the opens QMO-410.
- D. Incorrect - Plausible if student believes QMO-410 opens when the Boric Acid Transfer pump switches to fast.

Question ID NRCAUDIT07-0365A

Comments:

Reference: 1-OHP-4021-005-007, Operation of Emergency Boration Flowpaths Rev 8 (Pages 5&6)

Source: Modified

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

- (RO-C-00300-E6)** Describe the flow path for the Boric Acid Makeup System, starting with the BASTs and passing sequentially through the following components:
- BAST's (North, Middle, South)
 - BAT Pumps
 - BA Filter
 - Blender
 - Alternate Boration
 - Emergency Boration
 - CVCS Holdup Tanks

Associated K&A(s):

APE.024.AA2.10

Importance Factor: 2.8/3.4

K&A Statement: Ability to determine and/or interpret the following as they apply to
Emergency Boration: Normal boron flow

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.43. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

20

ID: RO-C-AOP070412-E1-2

Points: 1.00

Tier# 1	Group # 2	Level RO
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Unit 2 was operating at 100% power when the following conditions were observed:

- Lowering RCS Pressure and Pressurizer level.
- HIGH alarm on 2-SRA-2905, Steam Jet Air Ejector.

The US entered 2-OHP-4022-002-021 Steam Generator Tube Leak procedure. The reactor was then tripped based on leak size but SI was not required.

How is AFW flow controlled in 2-OHP-4022-002-021?

Isolate AFW flow:

- A. as soon as the affected SG is identified
- B. after NR level is >13% in affected SG
- C. after NR level is >20% in affected SG
- D. after NR level is > 50% in affected SG

Answer: B

Answer Explanation:

- A. Incorrect – Incorrect because AFW flow is not isolated until >13% in affected SG. Plausible if candidate believes earliest isolation will minimize chance of over fill.
- B. CORRECT – The leaking S/G is procedurally isolated from all feed water flow when NR level reaches 13%
- C. Incorrect – Incorrect level. Plausible because 20% is the procedural minimum SG level for the unaffected SGs.
- D. Incorrect – Incorrect level. Plausible because 50% is the procedural maximum SG level for the unaffected SGs.

Question ID RO-C-AOP070412-E1-2

Comments:

Reference: 2-OHP-4022-002-021 Steam Generator Tube Leak Rev 22 (Page 17)

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-AOP0170412-E2) Given a set of plant conditions including a Steam Generator Tube Leak, explain the required operator actions to stabilize plant conditions in accordance ½-OHP-4022-002-021, Steam Generator Tube Leak.

Associated K&A(s):

APE.037.AK2.24

Importance Factor: 3.7

K&A Statement: Knowledge of the relationship between a Steam Generator Tube Leak and the following systems or components: AFW system

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

21

ID: RO-C-0530190812-E5-1

Points: 1.00

Tier# 1	Group # 2	Level RO
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Unit 2 is at 100% power when Condenser vacuum begins slowly degrading. The crew is looking for the cause of the lowering vacuum.

Which ONE of the following indicates a potential cause of the degrading vacuum?

(Consider each cause separately)

- A. 150# Aux Steam Header is 10 psig above setpoint
- B. Main Condenser Waterbox D/P has lowered by half today
- C. Main Condenser Hotwell level is 3" below controller setpoint
- D. Steam Jet Air Ejector air flows have doubled since yesterday

Answer: D

Answer Explanation:

- A A. Incorrect – Wrong because SJAE's efficiency degrade with low supply steam pressure. Pressure being 10# above setpoint would not degrade vacuum. Plausible because SJAE pressure can impact vacuum.
- B. Incorrect – Wrong because water box D/P lowering indicates less clogging and results in better heat transfer and better vacuum not degraded. Plausible if the candidate infers low D/P indicates less flow.
- C. Incorrect – Wrong because level 3" below 588' 2" is not sufficient to affect vacuum as it is above the low level alarm set point. Plausible because lower Hotwell level means less chance of tube coverage which could degrade vacuum.
- D. CORRECT – SJAE flows doubling indicates an air in-leakage problem which would result in degraded vacuum.

Question ID RO-C-0530190812-E5-1

Comments:

Reference: 2-OHP-4024-DCS-MT Rev 20 Drops 141-143, 2-OHP-4024-215 Rev 43 Drops 1 & 2

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-0530190812-E5) Given a set of plant conditions including a Steam Seal Controller Failure/Loss of Main Condenser Vacuum describe the required operator actions to correct, control, or mitigate the plant response in accordance with the applicable Annunciator Response Procedures.

Associated K&A(s):

G 2.1.45

Importance Factor: 4.3/4.3

K&A Statement: Ability to identify and interpret diverse indications to validate the response of another indication. (CFR: 41.7 / 43.5 / 45.4)

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

22

ID: CM-0290

Points: 1.00

Tier# 1	Group # 2	Level RO
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Which ONE of the following lists the Unit 1 Control Room Ventilation system damper alignment for operation during a fire located in the Control Room Cable Vault?

- 1-HV-ACR-DA-1(1A) - CR Vent Intake Damper
- 1-HV-ACR-DA-2(2A) - CR PRZN Clean Up Intake damper
- 1-HV-ACR-DA-3 – CR PRZN Clean Up Recirc damper

1-HV-ACR-DA-1(1A)	1-HV-ACR-DA-2	1-HV-ACR-DA-2A	1-HV-ACR-DA-3
A. CLOSED	PARTIAL OPEN	CLOSED	CLOSED
B. OPEN	PARTIAL OPEN	CLOSED	OPEN
C. CLOSED	CLOSED	PARTIAL OPEN	OPEN
D. OPEN	CLOSED	PARTIAL OPEN	CLOSED

Answer: A

Answer Explanation:

For a fire: Dampers 1 status is closed: Dampers 2 status is one partially open (normally DA-2 is closed, DA-2A will partially open if DA-2 fails to partially open) , the other closed; Damper 3 status is closed.

- A. CORRECT - Fire positioning closes normal outside air and control room recirculating air while providing some outside air through one partially open Damper 2 to pressurization fan to provide positive pressure in control room.
- B. Incorrect – Wrong because outside air damper and Recirc damper positions incorrect. Plausible if all outside air dampers are believed to remain open for a Control Room fire.
- C. Incorrect – Incorrect because Recirc damper position is incorrect. Plausible if normal outside air is believed to close, partial outside air is provided through one damper 2, but the normal control room recirculation air damper is believed to remain open for a control room fire.
- D. Incorrect – Incorrect because normal vent outside air damper is incorrect. Plausible because other damper positions are correct.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID CM-0290

Comments:

Reference: Lesson Plan Lesson Plan RO-C-02801A Control Room Ventilation Rev 9
page 18, SOD-02801A-001 Control Room Ventilation Rev 4

Source: Bank

Associated objective(s):

(RO-C-02801A-E8) Describe the conditions that cause the following components to start, trip or reposition:

- a. Pressurization fans
- b. Chiller packages
- c. Remotely operated dampers (ACR-DA-1, 1A, 2, 2A, 3)

Associated K&A(s):

APE.067.AA1.05

Importance Factor: 3.5

K&A Statement: Ability to operate and/or monitor the following as they apply to a Plant Fire on Site: Plant and control room ventilation systems

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

23

ID: CM-1854

Points: 1.00

Tier# 1	Group # 2	Level RO
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Which ONE of the following will occur on a high radiation alarm on RRS-1001-A, Radioactive Liquid Effluent Channel 1 Monitor?

- A. RRV-285, Liquid Waste Effluent Discharge Header Shutoff Valve automatically closes.
- B. Alarm at WDS only - no automatic actions.
- C. RRV-286 or RRV-287 Liquid Waste Effluent Header to Circ Water Discharge Header Shutoff Valve automatically closes.
- D. RRV-284, Liquid Release Control Valve automatically closes.

Answer: A

Answer Explanation:

- A. CORRECT - RRV-285 the liquid waste effluent discharge valve is the automatic release termination valve.
- B. Incorrect – Wrong because high radiation in the discharge flowpath does terminate the release. Plausible that manual isolation is required since an AEO is assigned to monitor the release.
- C. Incorrect – Wrong because the routing valves to either U1 or U2 circulating water discharge do not automatically close on high rad in the effluent stream. Plausible if student believes the isolation signal isolates flow at CW release path for each unit.
- D. Incorrect. Wrong because RRV-284 controls flow bypassing the RMS monitor to control the sample flowpath and has no automatic function. Plausible if student believes that the flow adjustment valve also has an isolation function.

Question ID CM-1854

Comments:

Reference: Lesson Plan RO-C-02200, Liquid Waste Disposal System rev 6 page 22;
12-OHP-4024-139 Drop 12-RRS-1000 Rev 29

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

- (RO-C-02200-E3)** Describe the function of the following Liquid Waste Disposal System
Major Components: Chemical Drain Tank and Pump
- a. Laundry and Hot Shower Tanks and Pumps
 - b. Waste Holdup Tanks
 - c. Waste Evaporator Feed Pumps and Filters
 - d. Liquid Waste Demineralizers
 - e. Waste Evaporator Condensate Tanks and Pumps
 - f. #3 and #4 monitor Tanks
 - g. RRV-285, Radioactive Liquid Waste Disposal Effluent Header To CW Discharge Tunnels Shutoff Valve
 - h. RFI-285, Flow Indicator Transmitter
 - i. RRS-1000 (RRS-1001A and RRS-1001B), RRS-1000 Series Radiation Monitors Local Display Unit
 - j. Reactor Coolant Drain Tank (RCDT)

Associated K&A(s):

SYS.068.A3.02

Importance Factor: 3.6

K&A Statement: Ability to monitor automatic features of the Liquid Radwaste System, including: Automatic isolation

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

24

ID: RO26-0005A

Points: 1.00

Tier# 1	Group # 2	Level RO
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Given the following plant conditions:

- Unit 1 is at 100% power.
- All control systems are in normal alignment.
- Letdown flow is aligned with a flow of 75 gpm at 1-QFI-301.

The following parameters are noted on the CVCS system:

- Seal Return Flows are 3 gpm per RCP
- Charging flow is 89 gpm and rising.
- 1-QTA-160, Regen HX Outlet Temp - Letdown, has risen 5°F from its steady state value.
- VCT level is 33% and lowering.
- PZR level is 48% and lowering.
- RCS temperature is 571°F and stable.

The Crew has entered 1-OHP-4022-002-020, Excessive Reactor Coolant Leakage.

Which ONE of the following describes the leakage location?

RCS Leakage is from:

- A. the letdown line between the orifices and the letdown containment isolation valves.
- B. the charging line downstream of the regenerative heat exchanger.
- C. the letdown line upstream of the regenerative heat exchanger.
- D. the charging line upstream of the regenerative heat exchanger.

Answer: D

Answer Explanation:

Any of the distractors are plausible if the student cannot determine the leak location from the information provided.

A. Incorrect – Wrong because this leakage location would cause a lowering in letdown flow. Plausible because some of the leakage indications support this leak location

B. Incorrect – Wrong because this leakage location would have no impact on Regen Hx (letdown) Outlet temperature. Plausible because some of the leakage indications support this leak location

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

C. Incorrect - Wrong because this leakage location would have no impact on Regen Hx (letdown) Outlet temperature. Plausible because some of the leakage indications support this leak location

D. CORRECT - This leakage would cause a rise in letdown temperature as less charging flow would provide cooling in the Regen HX.

Any of the distractors is plausible if the student cannot determine the leak location from the information provided.

Question ID RO26-0005A

Comments:

Reference: SOD-00300-001 Charging and Letdown System Rev 13

Source: Modified

Associated objective(s):

(RO-C-AOP0160412-E1) Given a set of plant conditions which includes Excessive RCS Leakage, predict the response of the plant without operator intervention including final plant configuration, without the use of references and without error.

Associated K&A(s):

APE.078.AA2.01

Importance Factor: 4.0/3.7

K&A Statement: Ability to determine and/or interpret the following as they apply to a Reactor Coolant System Leak: Possible leak paths

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.43. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

25

ID: RO-C-EOP1E9-1

Points: 1.00

Tier# 1	Group # 2	Level RO
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OHP-4023-FR-H.2, Response to Steam Generator Overpressure is entered when Steam Generator pressure exceeds the highest S/G Safety setpoint.

Assuming all SG safety valves fail to lift, which ONE of the following describes the potential cause of the high SG pressure sufficient to meet FR-H.2 entry conditions?

- A. Inadvertent closure of the Steam Generator Stop Valve (SGSV) prior to the reactor trip.
- B. Associated RCP tripping resulting in reduced steaming of SG.
- C. Overfilling a SG after the reactor trip.
- D. Failure of the Steam Dump System to control RCS temperature on the reactor trip.

Answer: C

Answer Explanation:

- A. Incorrect – Incorrect because SG Stop Valve closure would result in a higher pressure and isolation of the affected SG from steam dumps, but the SG would be protected from over pressure by the PORV. Plausible because the listed condition would result in higher SG pressure.
- B. Incorrect – Incorrect because the associated loop RCP tripping does result in less steaming but pressure would not go that high and the SG would be protected from over pressure by the PORV and steam dumps. Plausible because the listed condition would result in higher SG pressure.
- C. CORRECT - Per 12-OHP-4023-FR-H.2 a credible cause of an FR-H.2 over pressure condition is over feeding the SG following a trip.
- D. Incorrect – Incorrect because upon a failure of the Steam Dump system the SG PORVs control SG pressure. Plausible because the listed condition would result in higher SG pressure.

Question ID RO-C-EOP1E9-1

Comments:

Reference: 12-OHP-4023-FR-H.2, Plant Specific Background Document Rev 3, WOG ERG FR-H.2 (Pages 6 & 10)

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-EOP11-E9) For each of the FR-H series procedures identify the Major Action Categories and discuss the bases for each, in accordance with 12-OHP-4023-FR-H.1, 12-OHP-4023-FR-H.2, 12-OHP-4023-FR-H.3, 12-OHP-4023-FR-H.4, and 12-OHP-4023-FR-H.5, Background Documents.

Associated K&A(s):

W.E13.EK1.04

Importance Factor: 3.2

K&A Statement: Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to Steam Generator Overpressure:
Conditions required to cause overpressurization of an S/G

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.41. 5 / 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

26

ID: RO-C-EOP12-E28-Q1

Points: 1.00

Tier# 1	Group # 2	Level RO
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ECCS Termination Criteria in FR-P.1, Response to Imminent Pressurized Thermal Shock Condition, use subcooling as determined by ___(1)___ because this indication ___(2)___.

- A. (1) RCS Cold Leg Temperature
(2) is not as susceptible to single loop effects such as SG isolation or ECCS injection flow
- B. (1) RCS Cold Leg Temperature
(2) provides a better indication of reactor vessel temperature
- C. (1) Core Exit Thermocouple Temperature
(2) is not as susceptible to single loop effects such as SG isolation or ECCS injection flow
- D. (1) Core Exit Thermocouple Temperature
(2) provides a better indication of reactor vessel temperature

Answer: C

Answer Explanation:

- A - Incorrect - FR-P.1 directs using subcooling by core exit thermocouples. Plausible because the reason is the correct reason for using thermocouple temperatures.
- B - Incorrect - FR-P.1 directs using subcooling by core exit thermocouples. Plausible because RCS cold leg temperature is used for entry conditions for FR-P.1 because it is the best indication for reactor vessel temperature.
- C. CORRECT - OHP-4023-FR-P.1 states the requirements to use core exit thermocouple temperatures. The reason is stated in the Westinghouse Owners Group ERG Executive Volume.
- D - Incorrect - RCS Cold Leg Temperatures provide the best indication for reactor vessel temperature. Plausible because thermocouples are used to determine subcooling.

Question ID RO-C-EOP12-E28-Q1

Comments:

Reference: 1-OHP-4023-FR-P-1 Response to Imminent Pressurized Thermal Shock Condition Rev 14, Westinghouse Owners Group ERG Executive Volume Page 588

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-EOP12-E28) Given a plant in post-accident PTS conditions, identify the Major Action Categories and discuss the bases for each, in accordance with the FR-P series procedures and associated background documents..

Associated K&A(s):

W.E08.EK2.05

Importance Factor: 3.7

K&A Statement: Knowledge of the relationship between Pressurized Thermal Shock and the following systems or components: ITM

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.41. 7 / 8

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

27

ID: 2008NRC-0425A

Points: 1.00

Tier# 2	Group # 1	Level RO
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A Reactor Startup is in progress with Reactor Power at $2E^{-8}$ amps and rising.

Given the following conditions on RCP #3:

1. Seal Leak-off flow is 1.2 gpm and stable
2. Lower Bearing water temperature is 240°F and rising.
3. Motor Bearing temperature is 174°F and stable.
4. Seal Leakoff temperature is 179°F and rising.
5. Seal Injection Flow is 8 gpm.
6. Vibrations are at 16 mils and rising.

Which ONE of the following operator actions MUST be taken based upon these conditions?

- A. Manually trip the reactor, enter OHP-4023-E-0, Reactor Trip or Safety Injection, perform immediate actions, then trip the No. 3 RCP.
- B. Initiate reactor shutdown per OHP-4021-001-003, Power Reduction, and trip the No. 3 RCP after the reactor is shutdown.
- C. Manually trip the reactor, enter OHP-4023-E-0, Reactor Trip or Safety Injection, perform immediate actions then continue monitoring RCP parameters for degradation.
- D. Initiate reactor shutdown per OHP-4021-001-003, Power Reduction then continue monitoring RCP parameters for degradation.

Answer: A

Answer Explanation:

Symptoms are indicative of the lower radial bearing failure. Bearing failure would cause increased heat in the bearing, causing an increase in Lower Bearing water temperature. Bearing failure would also cause increased RCP vibration.

- A. CORRECT – Fold out page criteria is met with Lower Bearing Water temperature >225 °F and rising seal leak-off temperature, and directs going to step 15 to trip the reactor.
- B. Incorrect – Wrong because fold out page criteria is met and directs going to step 15 to trip the reactor. Plausible if student does not recognize fold out page criteria and believes a normal shutdown would be satisfactory in Mode 2.
- C. Incorrect - Wrong because the lower bearing is failing and will require a reactor trip to remove the pump from service. Plausible because action to trip the reactor and go to E-0 is correct and if student does not recognize fold out page criteria that RCP trip is required.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

D. Incorrect - Wrong because the lower bearing is failing and will require a reactor trip to remove the pump from service. Plausible if student does not recognize fold out page criteria and believes a normal shutdown would be satisfactory in Mode 2.

Question ID 2008NRC-0425A

Comments:

Reference: 1-OHP-4022-002-001, Malfunction of a Reactor Coolant Pump Rev 27
Fold Out Page 25

Source: Modified

Previous Exam use: NRC 2008

Associated objective(s):

(RO-C-AOP0140412-E3) Given plant conditions explain the procedural mitigation strategy for a Malfunction of a RCP in accordance with plant procedures.

Associated K&A(s):

SYS.003.K6.07

Importance Factor: 3.0

K&A Statement: Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the Reactor Coolant Pump System: Thrust and radial bearing

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

28

ID: RQ-C-NOP4-T1-Q2B

Points: 1.00

Tier# 2	Group # 1	Level RO
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The following plant parameters exist during a constant-rate plant heatup:

- T_{AVG} One Hour Ago: 325°F
- T_{AVG} Currently: 340°F
- Total Seal Leakoff Flow: 8 gpm
- Letdown Flow: 40 gpm

To maintain Pressurizer Level stable, what is the required charging flow on QFI-200 (Charging Pumps discharge flow indicator)?

- A. 30 gpm
- B. 48 gpm
- C. 75 gpm
- D. 105 gpm

Answer: A

Answer Explanation:

Net Charging is the amount of charging flow above that which is required to maintain Pressurizer Level stable.

Net Charging = Charging Flow - (Letdown Flow + Seal Leakoff Flow + Shrink Factor)

Shrink Factor = 1.2 gpm per 1°F/hr cooldown (-1.2 gpm per 1°F/hr heatup)

IAW 4021-001-004 Step 4.2, net Charging is limited to 75 gpm when RCS Temperature is greater than 310°F, providing protection for the Pressurizer Surge Line from rapid temperature changes associated with the influx and outsurge of colder RCS water.

- A. CORRECT - For a heatup rate of 15F per hour, 18gpm would be subtracted from normal stable pressurizer level control. This would result in a stable pressurizer level.
 $0 \text{ net charging} = 30\text{gpm indicated charging} - (40\text{gpm letdown} + 8\text{gpm seal leakoff} - 18\text{gpm})$
- B. Incorrect - Charging flow is too high. Pressurizer level would be rising. Plausible because this is the charging flow without accounting for Shrink Factor.
 $0 = 48\text{gpm} - (40\text{gpm} + 8\text{gpm})$

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

- C. Incorrect - Charging flow is too high. Pressurizer level would be rising. Plausible because this is the maximum allowable net (i.e. NOT indicated) charging IAW OHP-4021-001-004.
- D. Incorrect - Charging flow is too high. Pressurizer level would be rising. Plausible because this is the MAXIMUM PERMISSIBLE indicated charging flow (75 gpm more than zero net charging). $30\text{gpm} + 75\text{gpm} = 105\text{gpm}$ or $75\text{gpm} = 105\text{gpm} - (40\text{gpm} + 8\text{gpm} - 18\text{gpm})$

Question ID RQ-C-NOP4-T1-Q2B

Comments:

Reference: 1-OHP-4021-001-001, Plant Heatup from Cold Shutdown to Hot Standby Attachment 1 Precaution 3.1.22 Rev 90

Source: Bank

Associated objective(s):

(RO-C-NOP5-E1) Given a procedural step, Precaution and Limitation, Note, or Caution associated plant heatup (including referenced procedures), explain the basis of the procedure step, Precaution and Limitation, Note, or Caution.

Associated K&A(s):

SYS.004.A1.04

Importance Factor: 4.2

K&A Statement: Ability to predict and/or monitor changes in parameters associated with operation of the Chemical and Volume Control System, including: PZR pressure and level

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5 / 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

29

ID: RO-C-00300-E9-Q2

Points: 1.00

Tier# 2	Group # 1	Level RO
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The Pressurizer Level Control Selector switch is in the CHANNEL 1&3 position. Which of the following lists the power supplies for the controlling pressurizer level channel and for QRV-251, CVCS Charging Pumps Discharge Flow Control Valve?

- | | | |
|----|-------------------------------|---------|
| | Controlling PZR Level Channel | QRV-251 |
| A. | CRID-1 | CRID-3 |
| B. | CRID-3 | CRID-3 |
| C. | CRID-1 | CRID-1 |
| D. | CRID-3 | CRID-1 |

Answer: A

Answer Explanation:

With the Pressurizer Level Control Selector switch in the CHANNEL 1&3 position, Pressurizer Level Channel NLP-151 is the controlling channel which controls QRV-251 to maintain pressurizer level on program. With the Pressurizer Level Control Selector switch in the CHANNEL 1&3 position, channel NLP-153 is the bi-stable channel that only controls pressurizer heater cutoff and letdown isolation.

- A. CORRECT - These are the listed power supplies per OHP-4021-082-008 Operation of CRID Power Supplies Tables 1&3.
- B. Incorrect - Wrong power supply for controlling pressurizer level. Plausible if candidate believes Channel 3 would be the control channel and because QRV-251 power supply is correct
- C. Incorrect - Wrong power supply for QRV-251. Plausible because controlling pressurizer level channel power supply is correct
- D. Incorrect - Power supplies are reversed. Plausible if candidate believes Channel 3 would be the control channel and because controlling pressurizer level and QRV-251 are powered from different power supplies

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID RO-C-00300-E9-Q2

Comments:

References: OHP-4021-082-008 Operation of CRID Power Supplies Tables 1&3
Rev 45

Source: New

Associated objective(s):

(RO-C-00300-E9) Explain how a loss of each of the support systems will affect the operation of the CVCS.

- a. Control Air
- b. Electrical Power
- c. CCW
- d. PRZ Level Control System

Associated K&A(s):

SYS.004.K2.06

Importance Factor: 3.3

K&A Statement: Knowledge of electrical power supplies to the following: Control instrumentation

Question Cognitive Level: Memory or Fundamental Knowledge F / 4

10 CFR Part 55 Content: 10 CFR 55.41. 6 / 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

30

ID: CM-39719

Points: 1.00

Tier# 2	Group # 1	Level RO
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The following plant conditions exist:

- A Large Break LOCA has occurred
- ICM-306, Recirc Sump to West RHR/CTS Pumps, is OPEN

Which ONE of the following conditions must be established to allow IMO-350, SI Pump Suction from West RHR HX, to be opened?

- A. IMO-361 or IMO-362, SI Pump Suction Cross-Ties to CCP - OPEN
- B. IMO-320, West RHR pump Suction - OPEN
- C. IMO-262 or IMO-263, SI Pumps Recirc to RWST - CLOSED
- D. IMO-261, SI pump Suction From RWST - CLOSED

Answer: C

Answer Explanation:

- A. Incorrect – Incorrect due to wrong interlock. Plausible since IMO-361 or IMO-362 would establish a flowpath to the SI Pumps from ICM-305, the Train-A Recirc Sump Containment Isolation Valve, through the Charging Pumps, but this alignment is completely independent of IMO-350 open interlocks.
- B. Incorrect - Incorrect due to wrong interlock. Plausible since IMO-320 being CLOSED is an interlock for opening ICM-306. This distractor describes the opposite situation, if IMO-320 were taken to OPEN, the ICM-306 would not open, and neither would IMO-350
- C. CORRECT - IMO-350 will not open unless ICM-306, the Train-B Recirc Sump Containment Isolation Valve, is OPEN and at least one of the SI Pump Recirc Valves to the RWST is CLOSED. ICM-306 supplies the West RHR Pump suction from the Recirc Sump, and the West RHR Pump supplies the SI Pumps suction through IMO-350.
- D. Incorrect - Incorrect due to wrong interlock. Plausible since RHR pump discharge pressure would exceed the RWST pressure at the SI pump suction. However, a check valve downstream of IMO-261 will prevent backflow to the RWST.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID CM-39719

Comments:

Reference: SOD-00800-001 Emergency Core Cooling System – Injection Phase
Rev 8

Source: Bank

Associated objective(s):

(RO-C-01700-E7) From memory, explain the control interlocks associated with the operation of the following RHR System components, without error:

- a. IMO-330/331
- b. IMO-340/350
- c. IMO-128/ICM-129
- d. ICM-305/306
- e. IMO-310/320

Associated K&A(s):

SYS.005.K4.08

Importance Factor: 4.0

K&A Statement: Knowledge of Residual Heat Removal System design features and/or interlocks that provide for the following: Lineup for piggyback mode with HPI

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. Z

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

31

ID: RO26-0009

Points: 1.00

Tier# 2	Group # 1	Level RO
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Given the following plant conditions:

- A plant cooldown was in progress in accordance with OHP-4021-001-004, Plant Cooldown from Hot Standby to Cold Shutdown.
- RCS pressure was at 600 psig when a LOCA occurred.
- RCS pressure is currently 450 psig and lowering slowly.

Which ONE of the following describes the status of the ECCS equipment identified below?

- A. Accumulator level is stable; RHR flow is rising
- B. Accumulator level is lowering; RHR flow is zero
- C. Accumulator level is stable; RHR flow is zero
- D. Accumulator level is lowering; RHR flow is rising

Answer: C

Answer Explanation:

- A. Incorrect – Wrong because RHR would not be injecting. Plausible because Accumulator level would be stable and RHR flow would eventually occur when pressure lowers sufficiently.
- B. Incorrect – Wrong because, with RCS pressure at 450 psig, Cold Leg Accumulators would not be injecting because they are procedurally isolate. Plausible because if power were not removed, the SI signal would automatically open the valves and because RHR flow would be zero.
- C. CORRECT - Cold Leg Accumulators would be not be lowering since they would be isolated with power removed in accordance with 01-OHP-4021-001-004. RHR flow will not be indicated until RCS pressure drops to approximately 300 psig.
- D. Incorrect – Wrong because Accumulator level is stable and RHR is not injecting. Plausible as this would be a possible set of accumulator and RHR response for a LOCA initiated from full power.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID RO26-0009

Comments:

Reference: 1-OHP-4021-001-004 Plant Cooldown to Hot Standby rev 90 Page 68, 1-OHP-4023-E-1 Loss of Reactor or Secondary Coolant Rev 29 Page 10

Source: Bank

Associated objective(s):

(RO-C-NOP2-E15) Discuss removal of the ECCS accumulators from service when RCS pressure is less than 1000 psig and after entry into MODE 4, but prior to automatic injection into the RCS IAW OHP-4021-001-004.

Associated K&A(s):

SYS.006.K5.06

Importance Factor: 3.9

K&A Statement: Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the Emergency Core Cooling System: Relationship between ECCS flow and RCS pressure

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

32

ID: NRCAUDIT07-0925

Points: 1.00

Tier# 2	Group # 1	Level RO
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Operators suspect a vapor space leak through either a Pressurizer Safety or PORV.

What indication combinations are available to help the operator determine which valve is faulted?

	<u>ACOUSTIC MONITOR</u>	<u>TAILPIPE TEMPERATURE</u>
A.	each Safety each PORV	each Safety common PORV line
B.	common Safety line each PORV	common Safety line each PORV
C.	each Safety common PORV line	each Safety common PORV line
D.	common Safety common PORV line	each Safety line each PORV

Answer: C

Answer Explanation:

- A. Incorrect – Wrong because PORVs share Acoustic monitor. Plausible because other indications are correct.
- B. Incorrect – Wrong because PORVs share indicators and safeties have separate indicators. Plausible because other indications are correct.
- C. CORRECT - The Pressurizer PORVs all discharge into a common line which is monitored with a single Acoustic Monitor and Temperature indicator. The Pressurizer Safety Valves have individual Acoustic monitors and temperature indicators.
- D. Incorrect – Wrong because PORVs share indicators and safeties have separate indicators. Plausible because other indications are correct.

Question ID NRCAUDIT07-0925

Comments:

Reference: RO-C-00202 Pressurizer and Pressure relief Rev 12 pg. 50-51

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-00202-E4) From memory describe the flowpath for the Pressurizer and Pressure Relief System starting with the RCS Loops and passing through the following components without error :

- a. Spray Valves and Spray Bypass Valves
- b. Surge Line
- c. Pressurizer Heaters
- d. Pressurizer Power Operated Relief Valves (PORVs)
- e. Pressurizer Safety Valves
- f. Pressure Relief Tank (PRT)

Associated K&A(s):

SYS.007.A1.04

Importance Factor: 3.9

K&A Statement: Ability to predict and/or monitor changes in parameters associated with operation of the Pressurizer Relief Tank/Quench Tank System, including: PZR tail pipe temperatures

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

33

ID: NRCAUDIT07-0805

Points: 1.00

Tier# 2	Group # 1	Level RO
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Which ONE of the following describes the adverse effects of NO operator action with a leaking pressurizer PORV?

- A. There are NO adverse effects. The PRT is designed to handle continuous in-leakage.
- B. The cyclic temperature stresses in combination with inner wall erosion on the PORV tailpipe may lead to premature piping failure.
- C. The PRT rupture disc may break with subsequent elevated radiation, temperature and pressure indications in containment.
- D. Mechanical breakdown of the PORV seating surface may cause the PORV to fail when needed for overpressure protection.

Answer: C

Answer Explanation:

A. Incorrect – Wrong because the PRT is not designed for continuous input without any actions to cool and drain. Plausible since the PRT can handle in-leakage with operator action.

B. Incorrect – Wrong because with a constant leak the temperatures will not be cycling, PORV seat cutting/erosion may be a concern but not inner wall erosion. Plausible since cyclic temperatures could lead to excessive stresses.

C. CORRECT – The tank design is based on the requirement to condense and cool a discharge of pressurizer steam equal to 110 percent of the volume above the 100%-power pressurizer water level set-point. If the temperature in the tank rises above 126°F during plant operation, the tank is cooled by spraying in cool water and draining out the warm mixture to the Waste Disposal System. The tank is not designed to accept a continuous discharge from the pressurizer.

D. Incorrect – Wrong because the PORV would be available for overpressure protection even with seat leakage. Plausible since damage may occur (PORV seating may erode).

Question ID NRCAUDIT07-0805

Comments:

Reference: Lesson Plan RO-C-00202 Pressurizer and Pressure relief Rev 12 Page 35, 37

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Previous exam use: NRC 2020-34

Associated objective(s):

(RO-C-0020920412-E1) Given a set of plant conditions which includes a Leaking Pressurizer Power Operated Relief Valve, predict the response of the plant without operator intervention including final plant configuration, without the use of references and without error.

Associated K&A(s):

SYS.007.K3.01

Importance Factor: 3.4

K&A Statement: Knowledge of the effect that a loss or malfunction of the Pressurizer Relief Tank/Quench Tank System will have on the following systems or system parameters: Containment

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7 / 9

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

34

ID: RO-C-01600-E5-1

Points: 1.00

Tier# 2	Group # 1	Level RO
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Unit 1 is in Mode 5 prior to a refueling outage with the West RHR and CCW Trains of cooling in service when all Off-site power is lost due a grid event.

Operators identify the CD EDG is running with both output breakers open. The AB EDG has an Incomplete Start annunciator standing. The crew is performing actions in 1-OHP-4022-001-005, Loss of Off-Site power with the Reactor Shutdown.

When the Operator closes the EDG output breaker to T11D:

- A. East CCW pump starts and the Heat Exchanger Outlet valve opens.
- B. West CCW pump starts and the Heat Exchanger Outlet valve opens.
- C. East CCW pump starts and the Discharge Header Cross-Tie valves open.
- D. West CCW pump starts and the Discharge Header Cross-Tie valves open.

Answer: A

Answer Explanation:

- A. CORRECT – East CCW pump is powered by the D bus and will start when power is restored. The HX outlet valve is also powered from the D bus and will open on the pump start.
- B. Incorrect – Incorrect because West CCW pump is powered by the A bus not D bus. The HX outlet valve is also powered from the A bus and it was already open. Plausible if wrong power supply is assumed.
- C. Incorrect – Wrong because one set of Header Cross-tie valves are powered from the D bus but does not open on the pump start. Plausible because East CCW pump is powered by the D bus and will start when power is restored.
- D Incorrect – Wrong because West CCW pump is powered by the A bus and will not start when power is restored. One set of Header Cross-tie valves are powered from the D bus but does not open on the pump start. Plausible if wrong power supply is assumed.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID RO-C-01600-E5-1

Comments:

Reference: 11-OHP-4021-082-024 Removal and restoration of power to 600V Bus 11D and Associated motor Control Centers Rev 53, Figure 1; 1-OHP-4021-082-020 Removal and restoration of power to 600V Bus 11D and Associated motor Control Centers Rev 49 Figure 1; Lesson Plan RO-C-01600, Component Cooling Water System rev 11 Page 22

Source: Bank

Associated objective(s):

(RO-C-01600-E5) From memory, describe the conditions that will cause the following components to trip, automatically/manually start, and/or automatically/manually reposition without error:

- a. CCW Pumps
- b. Remotely Operated Valves
 - 1) CRV-412 (Surge Tank Vent)
 - 2) CMO-419/429 (Return from RHR Hx)
 - 3) CMO-410/420 (Heat Exchanger Outlets)
 - 4) CRV-445 (CCW from SFP Heat Exchanger)
 - 5) CRV-485 (CCW Supply to 'N' BAE Evap/'S' Rad Waste Evap)
 - 6) CRV-470 (CCW from letdown Heat Exchanger)
 - 7) CCR-440/441 (CCW from Main Steam Penetration Coolers)
 - 8) CCM-430/431/432/433 (CCW To/From CEQ Fans)
 - 9) CCR-455 (CCW to Reactor Support Coolers)
 - 10) CCR-456/457 (CCW from Reactor Support Coolers)
 - 11) CCR-460/462 (CCW to/from Excess Letdown Heat Exchanger)
 - 12) CCM-458/459 (CCW to RCP Thermal Barrier/Motor Oil Coolers)
 - 13) CCM-453/454 (CCW Return from Thermal Barrier)
 - 14) CCM-451/452 (CCW Return from Motor Bearing Oil Coolers)

Associated K&A(s):

SYS.008.K2.01

Importance Factor: 3.0

K&A Statement: Knowledge of electrical power supplies to the following: CCW valves

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

35

ID: RO-C-IF27A-E2.3-Q1

Points: 1.00

Tier# 2	Group # 1	Level RO
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Atmospheric pressure lowered 2" Hg due to a storm moving into the area of the plant.

How does this affect indicated containment pressure and indicated pressurizer pressure?

	<u>Indicated Containment Pressure</u>	<u>Indicated Pressurizer Pressure</u>
A.	Rises	Lowers
B.	Rises	Remains the Same
C.	Lowers	Remains the Same
D.	Lowers	Lowers

Answer: B

Answer Explanation:

- A. Incorrect – Wrong because indicated pressurizer remains the same since actual containment pressure did not change. Plausible because this would be the response to an actual rise in containment pressure
- B. CORRECT - Indicated containment pressure would rise due to a lower pressure on the reference leg for the containment pressure detector (atmosphere). Indicated pressurizer pressure would not be affected, since actual containment pressure did not change.
- C. Incorrect – Wrong because Containment pressure indication would rise. Plausible because pressurizer pressure would remain the same
- D Incorrect – Wrong because Containment pressure indication would rise and because pressurizer pressure would remain the same. Plausible if the candidate confuses the detector response with that of a level detector, which has an inverse proportionality to reference leg pressure.

Question ID RO-C-IF27A-E2.3-Q1

Comments:

Reference: Lesson Plan RO-C-IF27A, Sensors and Detectors 1 Rev 2, Pages 36-40

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-IF27A-E2.3) Describe the factors that affect accuracy and instrumentation of differential pressure detectors, including their failure modes.

Associated K&A(s):

191002.K1.11

Importance Factor: 3.0

K&A Statement: Effects of operating environment (pressure, temperature, and/or radiation)

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

36

ID: RQ-C-FUND-10-T1-Q3A

Points: 1.00

Tier# 2	Group # 1	Level RO
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As stated in UFSAR Chapter 14 analysis, which ONE of the following provides reactor DNB protection following a SLOW uncontrolled rod withdrawal while the reactor is at power?

- A. Over Temperature Delta-T
- B. High Neutron Flux Reactor Trip
- C. Over Power Delta-T
- D. Power Range Positive Rate Trip

Answer: A

Answer Explanation:

- A. CORRECT - Per the UFSAR, Over Temperature Delta-T RPS provides reactor protection for uncontrolled rod withdrawal.
- B. Incorrect – Wrong because this is not the credited trip. Plausible because this trip does provide protection from positive reactivity insertion but not from the SLOW rod withdrawal.
- C. Incorrect – Wrong because this is not the credited trip. Plausible because this trip does provide protection from localized over power conditions in fuel cells. Slow uncontrolled withdrawal of rod banks would not result in localized fuel exceeding power limits.
- D. Incorrect - Wrong because this is not the credited trip. Plausible because this trip does provide protection from a rapid positive reactivity insertion.

Question ID RQ-C-FUND-10-T1-Q3A

Comments:

Reference: UFSAR Section 14.1 Revision 30 Page 21

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RQ-C-FUND-10-T1) discuss the transient including initial conditions and assumptions, plant response, final plant conditions, and overall assessment of the operation of the plant, for the following;

- a. Uncontrolled RCCA Withdrawal from a Subcritical Reactor
- b. Uncontrolled RCCA Withdrawal at Power
- c. Chemical and Volume Control System Malfunction (Uncontrolled Boron Dilution)

Associated K&A(s):

SYS.012.K4.02

Importance Factor: 4.5

K&A Statement: Knowledge of Reactor Protection System design features and/or interlocks that provide for the following: Automatic reactor trip when RPS setpoints are exceeded for each RPS function; functional basis for each

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

37

ID: RO-C-01100-E3-Q1

Points: 1.00

Tier# 2	Group # 1	Level RO
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1-PPP-303, Containment Pressure Channel 1, failed high. Prior to any Crew action, 1-PPP-301, Containment Pressure Channel 3, also failed high.

Based on the above indications the operator should observe:

Safety Injection Actuation (1),
Containment Spray Actuation (2).

(1) Safety Injection
Actuation

(2) Containment Spray
Actuation

- | | |
|-----------------|--------------|
| A. Not Actuated | Not Actuated |
| B. Actuated | Not Actuated |
| C. Not Actuated | Actuated |
| D. Actuated | Actuated |

Answer: C

Answer Explanation:

SI actuates on high containment pressure with a 2/3 coincidence on channels PPP-300, PPP-301, and PPP-302. Therefore with only one of these channels indicating high, the coincidence for SI actuation is not satisfied. Containment Spray actuates on high-high containment pressure with a 2/4 coincidence on channel PPP-300, PPP-301, PPP-302, and PPP-303. Therefore, the 2 of 4 coincidence is satisfied for Containment Spray actuation is satisfied.

- A. Incorrect – Wrong because Containment Spray is actuated. Plausible if wrong assumption about instrumentation and coincidence is made.
- B. Incorrect – Wrong because SI is not actuated, Containment Spray is actuated. Plausible if candidate reverses effects.
- C. CORRECT - Conditions satisfied as described above
- D. Incorrect – Wrong because SI is not actuated. Plausible because SI is actuated on a 2/3 coincidence.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID RO-C-01100-E3-Q1

Comments:

Reference: SOD-01100-002 RPS / ESFAS Signals Rev 1

Source: New

Associated objective(s):

(RO-C-01100-E3)

Explain the purposes/functions/bases of the following ESFAS actuation circuits:

- a. Safety Injection: Manual, Low Pressurizer Pressure, Low Steamline Pressure, Steamline □ Pressure, Lower Containment Pressure High
- b. Phase A Containment Isolation: Manual, Safety Injection Actuation
- c. Phase B Containment Isolation: Manual, High-High Containment Pressure
- d. Containment Ventilation Isolation: Manual, High Containment Radiation
- e. Containment Spray: Manual, High-High Containment Pressure
- f. Main Steam Line Isolation: Manual, High Steam Flow, Low Steam Line Pressure, High-High Containment Pressure
- g. FW Isolation: High-High SG Level, Reactor Trip with Low Temperature, Safety Injection Actuation
- h. MDAFP Automatic Starts: Low-Low SG Level, Safety Injection, Load Shed, Trip of Both Main Feedwater Pumps, AMSAC
- i. TDAFP Automatic Starts: Low-Low SG Level, RCP Bus Undervoltage, AMSAC
- j. Blackout Sequence: Load Shed, Load Conservation
- k. CEQ Fans

Associated K&A(s):

SYS.013.A3.09

Importance Factor: 4.1

K&A Statement: Ability to monitor automatic operation of the Engineered Safety Features Actuation System, including: Containment spray actuation/signal

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.41. 6 / 7 / 8

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

38

ID: NRCAUDIT07-0309A

Points: 1.00

Tier# 2	Group # 1	Level RO
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Given the following plant conditions:

- Unit 2 was at 100% power, all systems in normal alignment.
- All Containment Upper and Lower Vent Units were operating
- During SSPS surveillance testing, a test error caused an inadvertent Safety Injection (SI) signal on both trains.
- An SI and Reactor Trip occurred.
- All systems operated as designed during the event.

Which ONE of the following describes the expected effect on the Containment Vent Units and the procedural action that will restore the Units to service?

- A. All the Upper Containment Vent Units will be stopped.
Fans will be restarted by resetting Containment Isolation Phase A per ES-1.1, SI Termination.
- B. All the Upper Containment Vent Units will be stopped.
Fans will be restarted by resetting Containment Vent Isolation per ES-1.1, SI Termination.
- C. All the Lower Containment Vent Units will be stopped.
Fans will be restarted by resetting Containment Isolation Phase A per ES-1.1, SI Termination.
- D. All the Lower Containment Vent Units will be stopped.
Fans will be restarted by resetting Containment Vent Isolation per ES-1.1, SI Termination.

Answer: A

Answer Explanation:

- A. CORRECT - When SI actuates, this causes actuation of both the Containment Isolation Phase A signal and the Containment Vent Isolation signal. Upper Containment Vent Units are stopped as part of the Containment Isolation Phase A signal. The Containment Vent Isolation signal has no impact on either Upper Containment Vent Units or Lower Containment Vent Units. Lower Containment Vent Units are tripped off when a Containment Isolation Phase B signal is generated based on high containment pressure. In ES-1.1 SI Termination, Containment Isolation Phase A is reset, which will cause the Upper Containment Vent Units to restart because their switches are not repositioned during E-0.
- B. Incorrect - Fans will not be restarted by resetting Containment Vent Isolation. Plausible if the candidate believes Containment Vent Units are affected by the Containment Vent Isolation actuation

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

39

ID: RO-C-01000-E1-1

Points: 1.00

Tier# 2	Group # 1	Level RO
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During a Steam line break inside containment a malfunction of the Containment Spray System and the _____ system could result in containment pressure exceeding the design pressure of _____ psig.

- A. Ice Condenser, 12
- B. Distributed Ignition, 12
- C. Ice Condenser, 10
- D. Distributed Ignition, 10

Answer: A

Answer Explanation:

- A. CORRECT – The Ice Condenser system is identified in the UFSAR as assisting in maintaining containment pressure below the design pressure of 12 psig.
- B. Incorrect – Incorrect because the Distributed Ignition System (DIS) is not effective during a Steam Line Break. It is designed to limit containment overpressure as a result of a hydrogen explosion after a LOCA. Plausible because DIS helps to minimize the chance of a hydrogen explosion after a LOCA and because design pressure is correct.
- C. Incorrect – Incorrect because 10 psig is the max pressure reached following ice bed melt per the UFSAR, not containment design pressure. Plausible because Ice Condenser is correct system.
- D. Incorrect – Incorrect because DIS is not is not effective during a Steam Line Break and 10 psig is the max pressure reached following ice bed melt per the UFSAR, not containment design pressure. Plausible because DIS helps to minimize the chance of a hydrogen explosion after a LOCA and because design pressure is correct.

Question ID RO-C-01000-E1-1

Comments:

Reference: UFSAR Section 5.3.3.1 rev 30, DB-12-CNTS, DB-12-CNTT

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-01000-E1) Explain the purpose(s) and/or function(s) of the Ice Condenser System.

In Accordance with UFSAR Chapter 5 Containment, DB-12-CNTS Containment Systems, SD-12-REFR-100 Ice Condenser Refrigeration System

Associated K&A(s):

SYS.025.K3.01

Importance Factor: 4.3

K&A Statement: Knowledge of the effect that a loss or malfunction of the Ice Condenser System will have on the following systems or system parameters:
Containment

Question Cognitive Level: Memory or Fundamental Knowledge F / 2

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

40

ID: RO-C-EOP09-E36-Q1

Points: 1.00

Tier# 2	Group # 1	Level RO
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A Large Break LOCA occurred. The Crew responded per E-0, Rector Trip or Safety Injection and transitioned to ES-1.3, Transfer to Cold Leg Recirculation. When attempting to stop the East Containment Spray (CTS) pump, the pump failed to stop.

What impact will this have on the design capability of the Containment Spray system (1) and what procedural action should be taken to compensate for the failure (2)?

- A. (1) There will be no impact on the design capability of the Containment Spray System; one train of CTS is sufficient to maintain containment pressure through all phases of the LOCA.
(2) Direct local action to stop the East CTS pump.
- B. (1) There will be no impact on the design capability of the Containment Spray System; one train of CTS is sufficient to maintain containment pressure through all phases of the LOCA.
(2) Reset CTS actuation and close East CTS pump discharge valves.
- C. (1) The Containment Spray system will not be able to fulfill its design requirements during subsequent phases of the event.
(2) After 50 minutes, establish RHR spray using the East RHR pump.
- D. (1) The Containment Spray system will not be able to fulfill its design requirements during subsequent phases of the event.
(2) After 50 minutes, establish RHR spray using the West RHR pump.

Answer: D

Answer Explanation:

- A. Incorrect – Wrong because one train of CTS is not sufficient to maintain containment pressure after ice bed melt occurs. Plausible if candidate believes one train is sufficient and because local action to stop the pump would allow transfer to recirculation to be physically completed, but ES-1.3 does not direct this action.
- B. Incorrect – Wrong because one train of CTS is not sufficient to maintain containment pressure after ice bed melt occurs. Plausible if candidate believes one train is sufficient and because the action to reset CTS and close pump discharge valves is directed in ES-1.3.
- C. Incorrect – Wrong because use of the East RHR pump will not be possible because recirculation lineup will not be procedurally completed. Plausible because other elements of the answer are correct.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

D. CORRECT - Per 12-OHP-4023-ES-1.3 Step 17 background, one train of CTS will not be sufficient to maintain design pressure following ice bed melt and one train of RHR should be aligned to RHR spray. Since the East CTS pump did not stop, the East RHR pump will not be aligned for recirculation in OHP-4023-ES-1.3 Step 6. Therefore, RHR spray must be established using the West RHR pump.

Question ID RO-C-EOP09-E36-Q1

Comments:

Reference: 12-OHP-4023-ES-1.3 Transfer to Cold Leg Recirculation Plant Specific Background Document Rev. 21, page 41; 1-OHP-4023-ES-1.3 Rev 20 steps 6 and 17

Source: New

Associated objective(s):

(RO-C-EOP09-E36) For each of the E-1 Series procedures, discuss the basis or reason for all Steps, in accordance with the E-1 series background documents.

Associated K&A(s):

SYS.026.A2.04

Importance Factor: 3.9/4.0

K&A Statement: Ability to (a) predict the impacts of the following on the Containment Spray System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Failure of spray pump

Question Cognitive Level: Comprehension or Analysis

H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

41

ID: 2008NRC-0573

Points: 1.00

Tier# 2	Group # 1	Level RO
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Given the following plant conditions on Unit 1:

- The unit was operating at 100% power.
- A Loss of Control Air has occurred.
- Control Air Header is reading 0 psig.

Which ONE of the following describes the effect of the loss of control air on the Steam Generator Stop Valves (SGSVs)?

The SGSVs:

- A. will remain open and can be closed using the hydraulic unit.
- B. will remain open and can be closed by locally aligning nitrogen to one SGSV dump valve.
- C. close due to SGSV dump valves failing open on loss of air.
- D. close due to loss of control air to the hydraulic unit.

Answer: C

Answer Explanation:

- A. Incorrect - Incorrect because SGSVs close due to loss of air to the dump valves. Plausible if thought dump valves fail closed or as-is and only way to operate SGSV is via hydraulics.
- B. Incorrect - Incorrect as SGSVs close due to loss of air to the dump valves and there is no backup nitrogen supply to the dump valves. Plausible since SG PORVs have nitrogen backup.
- C. CORRECT - SGSV dump dumps fail open on loss of air causing the SGSV to close due to steam delta-p on the steam actuating piston.
- D. Incorrect - Incorrect as the hydraulic unit is comprised of spring and motor operated components (not air) and loss of air has no effect on the hydraulic unit. Plausible if thought the hydraulic unit was air operated.

Question ID 2008NRC-0573

Comments:

Reference: SOD-05103-003 Steam Generator Stop Valve Rev 6, Lesson Plan RO-C-05103 Main Steam System Rev 13 Page 15

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Source: Bank

Associated objective(s):

- (RO-C-05103-E8)** Describe the condition(s) that will cause the following Main Steam System components to trip or automatically/manually start or reposition
- Main Steam Isolation Valves (MRV-210,220,230,240)
 - Steam Generator PORVs (MRV-213,223,233,243)
 - Main Steam Drains

Associated K&A(s):

SYS.039.A4.01

Importance Factor: 3.9

K&A Statement: Ability to manually operate and/or monitor in the control room: MSIVs and bypass valves

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

42

ID: RO-C-05501-E5-1

Points: 1.00

Tier# 2	Group # 1	Level RO
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With Unit 1 operating at 100% power, FPC-250A, Channel A Feed Pump Discharge Header Pressure, begins to drift LOW in comparison with FPC-250B, Channel B Feed Pump Discharge Header Pressure.

Which ONE of the following describes the response of **indicated** Main Feed Pump DP?

- A. No change in Feed Pump DP since the program uses the higher of the two channels to control Feed Pump DP.
- B. No change in Feed Pump DP since FPC-250A is automatically disabled upon a deviation.
- C. Indicated Feed Pump DP lowers slowly since the AVERAGE of FPC-250A and FPC-250B is used for indicated Feed Pump DP.
- D. Indicated Feed Pump DP lowers slowly since the LOWER of FPC-250A and FPC-250B is used for indicated Feed Pump DP.

Answer: D

Answer Explanation:

- A. Incorrect - Incorrect because lowest reading of FPC is used. This would lower indicated delta-p. Plausible if channel selection preference is reversed.
- B. Incorrect - Incorrect because, on a slow failure, neither channel is disabled until one exceeds high or low limit, not simply a deviation. Plausible because channel failure would automatically remove the channel.
- C. Incorrect - Incorrect because lowest reading of FPC is used not the average. Plausible if channel selection algorithm is incorrectly assumed.
- D. CORRECT - Lowest reading of FPC is used to be conservative on delta-p input when compared to highest UPC-101 reading. This would lower indicated delta-p.

Question ID RO-C-05501-E5-1

Comments:

Reference: 4024-MFP-DCS Drop C-11 &14, Lesson Plan RO-C-05501 MFP Turbine Controls Rev 7 Pages 22-24

Previous Exam use - NRC EXAM 2012

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-05501-E5) Describe the principles of Main Feed Pump Turbine control including system response to changes in input parameters.

Associated K&A(s):

SYS.039.A4.03

Importance Factor: 3.4

K&A Statement: Ability to manually operate and/or monitor in the control room: MFW pump turbines

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

43

ID: RO-C-05500-E7-1

Points: 1.00

Tier# 2	Group # 1	Level RO
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Unit 2 is raising power from 40% to 50% with the East Main Feedwater Pump (MFP) supplying main feedwater to the Steam Generators (SG) in Speed Control.

To maintain target MFP DP as power rises, the BOP must _____ East MFP speed which will _____ discharge pressure and MFP flow will _____ .

- A. raise, lower, rise
- B. lower, lower, rise
- C. raise, raise, rise
- D. lower, lower, lower

Answer: C

Answer Explanation:

- A. Incorrect – Incorrect because MFP discharge pressure will rise. Plausible if the relationship between MFP pressure and SG pressure is misunderstood, as SG pressure will lower as power rises.
- B. Incorrect – Incorrect because MFP speed and discharge pressure will rise. Plausible if the relationship between MFP pressure and SG pressure is misunderstood, as SG pressure will lower as power rises.
- C. CORRECT – MFP speed, discharge pressure and pump flow will rise.
- D. Incorrect – Incorrect because MFP speed, discharge pressure and pump flow will rise. Plausible because this distractor is correct for reducing power.

Question ID RO-C-05500-E7-1

Comments:

Reference: TDB-1-FIG-2-5, Feedwater Differential Pressure Program, Lesson Plan RO-C-05501 MFP Turbine Controls Rev 7 Pages 21-22

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-05500-E7) From memory describe how the Main Feedwater Turbine controls adjust Main Feedpump speed, including all inputs, to assist in established the required feedwater flow rates without error.

Associated K&A(s):

SYS.059.K5.01

Importance Factor: 3.4

K&A Statement: Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the Main Feedwater System: Relationship between variable speed, flow, and discharge pressure of the MFW pumps

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.41. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

44

ID: RQ-C-05101-T4-4A

Points: 1.00

Tier# 2	Group # 1	Level RO
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Given the following plant conditions:

- Unit 1 is at 100% power and stable
- Steam Generator Level Controls are in AUTOMATIC
- Main Feed Pumps are in Automatic D/P control
- Steam Generator #12 Steam Flow Channel 1, 1-MFC-121, is selected to the Steam Generator Level Control System.

When requested by MTI, operators switch the controlling Steam Flow channel to 1-MFC-120. Due to channel deviations the #12 Feed Reg Valve (FRV) throttles in the closed direction to match Feed Flow to the new Steam Flow signal.

Based only on the change in #12 FRV position the MFP's will see a _____ D/P and will _____ MFP speed in response to the new D/P.

- A. higher, reduce
- B. higher, raise
- C. lower, reduce
- D. lower, raise

Answer: A

Answer Explanation:

- A. CORRECT – A FRV closing will provide backpressure raising feed Header Pressure. MFP D/P is Feed header – Bypass header pressure. This would raise D/P seen by the MFP Control system. A D/P above auto setpoint, which is based on total Steam Flow, would result in MFP speed lowering to lower Feed header pressure.
- B. Incorrect – Wrong because a FRV closing will provide backpressure raising feed Header Pressure. MFP D/P is Feed header – Bypass header pressure. This would raise D/P seen by the MFP Control system. The second part is plausible if candidate confuses MFP speeds effect on Feed header pressure.
- C. Incorrect – Wrong because DP will be higher. Plausible if candidate confuses how MFP D/P is calculated.
- D. Incorrect – Wrong because effects are reversed. Plausible if candidate confuses how MFP D/P is calculated. The second part is plausible if candidate confuses MFP speeds effect on Feed header pressure.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID RQ-C-05101-T4-4A

Comments:

Reference: TDB-1-FIG-2-5, Feedwater Differential Pressure Program, Lesson Plan RO-C-05100 Steam Generating System Rev 11 Slides 83-88, Lesson Plan RO-C-05501 MFP Turbine Controls Rev 7 Pages 22-24

Source: Modified

Associated objective(s):

(RO-C-05100-E6) Describe the flowpath through the following FRV Flow Control components:

- a. SG NR Level Transmitter
- b. Level Controller
- c. Steam Generator Steam Flow Transmitter
- d. Steam Generator Steam Pressure Transmitter
- e. Flow Controller
- f. FW Flow Transmitter

Associated K&A(s):

SYS.059.K5.07

Importance Factor: 3.4

K&A Statement: Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the Main Feedwater System:
Relationship between MFW pump speed and feedwater regulating valve position

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

45

ID: CM-2807

Points: 1.00

Tier# 2	Group # 1	Level RO
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A FLOW RETENTION signal associated with the EAST MDAFP will cause the AFW valves to steam generators:

- A. #2 and #3 to throttle to a preset position.
- B. #2 and #3 to receive a signal to fully open.
- C. #1 and #4 to receive a signal to fully open.
- D. #1 and #4 to throttle to a preset position.

Answer: A

Answer Explanation:

- A. CORRECT – The East Motor Driven auxiliary Feed water pump feeds #2 & 3 S/G's. The flow retention signal throttles the Flow Control valves to a preset position to protect the AFW pump from runout conditions.
- B. Incorrect – Wrong because the valves throttle closed to limit flow. Plausible if candidate confuses flow conservation with flow retention because a Flow Conservation signal would open the valves.
- C. Incorrect – Wrong S/G's and the valves throttle closed to limit flow. Plausible if wrong train valves are associated with the pump and because a Flow Conservation signal would open the valves.
- D. Incorrect – Wrong S/G's but correct valve action. Plausible if wrong train valves are associated with the pump.

Question ID CM-2807

Comments:

Reference: Lesson Plan RO-C-05600 Auxiliary Feed Water System Rev 15 Pages 34-35;
SOD-05600-01 Auxiliary Feed Water System Rev 8

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-05600-E13) Discuss the following Technical Specifications for the AFW system including the basis:

- a. 3.7.5 Aux Feedwater System.
- b. 3.7.6 Condensate Storage Tank.
- c. 3.8.4 DC distribution "N" train battery system.

RO33 NRC Exam 2022

(RO-C-05600-E12) Discuss the purpose and operation of the following AFW operating conditions.

- a. Flow retention.
- b. Flow conservation.

Associated K&A(s):

G 2.1.28

Importance Factor: 4.1/4.1

K&A Statement: Knowledge of the purpose and function of major system components and controls (CFR: 41.7)

Question Cognitive Level: Memory or Fundamental Knowledge F / 2

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

46

ID: NRCAUDIT07-0308

Points: 1.00

Tier# 2	Group # 1	Level RO
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Given the following conditions:

- Unit 1 is preparing to synchronize and load the main generator onto the grid with the breaker O1 (preferred method).
- The exciter field breaker contactors are closed.
- The auto voltage regulator is in service.
- The Generator CB O1 Synch. Selector switch has been placed in the MANUAL position.
- The operators have been directed to manually synchronize the generator to the grid.

Which ONE of the following conditions is verified prior to synchronization to the grid?

- A. Synch. Scope is moving SLOWLY in the SLOW direction.
Bus voltage is 2-3 volts greater than Generator voltage.
- B. Synch. Scope is moving SLOWLY in the SLOW direction.
Generator voltage is 2-3 volts greater than Bus voltage.
- C. Synch. Scope is moving SLOWLY in the FAST direction.
Bus voltage is 2-3 volts greater than Generator voltage.
- D. Synch. Scope is moving SLOWLY in the FAST direction.
Generator voltage is 2-3 volts greater than Bus voltage.

Answer: D

Answer Explanation:

- A. Incorrect – Wrong direction but plausible because voltage criteria is correct and if requirements for paralleling are not understood.
- B. Incorrect - Wrong direction and voltage criteria is incorrect. Plausible if requirements for paralleling are reversed.
- C. Incorrect –Wrong voltage criteria. Plausible because direction is correct and if requirements for paralleling are not understood.
- D. CORRECT – Generator voltage is adjusted 2-3 volts greater than Bus voltage to prevent the generator from coming on as a reactive load. Synch. Scope moving in Fast direction prevents a Reverse Power condition.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID NRCAUDIT07-0308

Comments:

Reference: 1-OHP-4021-050-001 turbine Generator Normal startup and operation rev 86
Section 4.17; Lesson Plan RO-C-IF05 motors and Generators Rev 1 Slides
117-119

Source: Bank

Associated objective(s):

(RO-C-NOP7-E1) Given a procedural step, Precaution and Limitation, Note, or Caution associated with power escalation (including referenced procedures), explain the basis of the procedure step, Precaution and Limitation, Note, or Caution, without error.

Associated K&A(s):

SYS.062.A4.07

Importance Factor: 3.7

K&A Statement: Ability to manually operate and/or monitor in the control room:
Synchronizing and paralleling of different AC supplies

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

47

ID: RO-C-08204-E7-Q1

Points: 1.00

Tier# 2	Group # 1	Level RO
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250 VDC Plant DC ground indication is provided in the Control Room using (1). These indications (2).

- A. (1) positive and negative ground detection lights
(2) provide continuous indication of a ground on the 250VDC system
- B. (1) positive and negative ground detection lights
(2) will only indicate a ground on the 250VDC system when the Battery Ground Relay Test pushbutton is pressed
- C. (1) positive and negative to ground voltmeters
(2) provide continuous indication of a ground on the 250VDC system
- D. (1) positive and negative to ground voltmeters
(2) will only indicate a ground on the 250VDC system when the voltmeter selector switch is placed in the Positive or Negative position.

Answer: A

Answer Explanation:

- A. CORRECT -The positive and negative ground lights are continuously connected to the DC system and will indicate a ground on the bus by changing the intensity of the light (dimmer on the grounded side.)
- B - Incorrect – Wrong because, although positive and negative ground lights provide the indication, no switch manipulation is required. Plausible because operating the Test pushbutton will dim one light and generate a ground alarm.
- C - Incorrect – Wrong because ground detection indication is continuous in the Control Room, but the positive and negative to ground voltmeters are located on the Battery Control panels in the plant 4KV switchgear room. Plausible because the voltmeters can be used for ground detection.
- D - Incorrect – Wrong location for controls. Plausible because it accurately describes the use of the positive and negative to ground voltmeters located on the Battery Control panels in the plant 4KV switchgear room.

Question ID RO-C-08204-E7-Q1

Comments:

Reference: Lesson Plan RO-C-08204 250Volt DC Distribution Rev 9 Pages 12, 14, & 15

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-08204-E7) Identify the conditions that would cause Control Room alarms for the 250 VDC Distribution system.

Associated K&A(s):

SYS.063.K1.01

Importance Factor: 2.6

K&A Statement: Knowledge of the physical connections and/or cause and effect relationships between the DC Electrical Distribution System and the following systems: Ground detection system

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 3 - 8

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

48

ID: RO-C-BE01-E4.6-1

Points: 1.00

Tier# 2	Group # 1	Level RO
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When performing an equalizing charge on the plant batteries, battery charger voltage is limited to a maximum of 280 VDC.

A maximum voltage limit is required:

- A. to prevent the release of hydrogen during the charge.
- B. to ensure specific gravity of the electrolyte decreases sufficiently during the charge.
- C. to limit excessive hydrogen production at the end of the charge.
- D. to separate the electrolyte into hydrogen and sulfuric acid.

Answer: C

Answer Explanation:

- A. Incorrect – Incorrect because Hydrogen release cannot be completely eliminated during charging. Plausible because limiting hydrogen production is the reason.
- B. Incorrect – Incorrect because the goal of the battery charge is to raise specific gravity of the electrolyte by driving lead sulfate off of the battery plates and into the electrolyte solution. Plausible if battery chemistry is not understood.
- C. CORRECT – Although gassing cannot be prevented entirely, charging voltage is limited to reduce the amount of gassing.
- D. Incorrect – Incorrect as this describes the discharge process. Plausible if battery chemistry is not understood.

Question ID RO-C-BE01-E4.6-1

Comments:

Reference: 1-OHP-4021-082-006 Operation of 1AB & 1CD Battery Chargers Rev 12
Attachment 7; Lesson Plan RO-C-BE01 Basic Electricity Part 1 Rev 1 pages
116-120 & 131

Source: New

Associated objective(s):

(RO-C-BE01-E4.6) Describe common battery hazards and how they are managed.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated K&A(s):

SYS.063.K5.02

Importance Factor: 2.8

K&A Statement: Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the DC Electrical Distribution System: Hydrogen generation during battery charging

Question Cognitive Level: Memory or Fundamental Knowledge F / 4

10 CFR Part 55 Content: 10 CFR 55.41. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

49

ID: NRCAUDIT07-0418A

Points: 1.00

Tier# 2	Group # 1	Level RO
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Given the following plant conditions on Unit 1:

- Bus T11A normal supply breaker has opened
- DG 1AB Emergency Diesel Generator has started and is tied to the bus

Which ONE of the following conditions will automatically trip the diesel generator?

- A. CO2 actuating in the EDG Room
- B. Engine Speed
- C. Main Bearing Temperature high
- D. Low Lube Oil Pressure low

Answer: B

Answer Explanation:

All diesel trips except for Phase Differential, Manual, and Overspeed are disabled under emergency conditions.

A. Incorrect – Wrong because trip is blocked under emergency conditions. Plausible because CO2 actuation in room is a normal trip but not in emergency mode.

B. CORRECT - EDG is in Emergency Mode, so Phase Differential, Manual and Overspeed Trips are the only available trips.

C. Incorrect - Wrong because trip is blocked under emergency conditions. Plausible because high Main bearing temperature is a normal trip but not in emergency mode

D. Incorrect - Wrong because trip is blocked under emergency conditions. Plausible because extreme low Lube oil pressure is a normal trip but not in emergency mode.

Question ID NRCAUDIT07-0418A

Comments:

Reference: 1-OHP-4024-119 Drop 51 DG1AB Differential Operated Rev 57

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

- (RO-C-03200-E10)** For the Diesel Engine, describe the conditions for the following:
- Conditions that will cause the Diesel Engine to automatically/manually trip.
 - Conditions that will prevent the Diesel Engine from an automatic/manual trip.
 - Conditions that will cause the Diesel Engine to automatically/manually start.
 - Conditions that will prevent the Diesel Engine from an automatic/manual start.
 - Conditions that will cause an Incomplete Start signal.
 - Diesel Engine Governor response to changing speed/load.

Associated K&A(s):

SYS.064.A3.06

Importance Factor: 3.6

K&A Statement: Ability to monitor automatic features of the Emergency Diesel Generators, including: Stop

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

50

ID: RO-C-01350-E7-Q1

Points: 1.00

Tier# 2	Group # 1	Level RO
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A Waste Gas Decay Tank is being released through the Unit 1 Auxiliary Building Vent Exhaust. Radiation increased as monitored by 1-VRS-1500 Vent Effluent Radiation Monitor which resulted in automatic termination of the release. After the release was isolated, radiation returned to normal levels.

At the time the release stopped, the Unit 1 Composite Radiation Monitor display would indicate a (1) status. After radiation levels return to normal, the HIGH ALARM light above the UNIT VENT EFFLUENT RAD MONIT VRS-1500 TRIP RESET button would be (2).

- A. (1) Yellow (2) Off
- B. (1) Red (2) Off
- C. (1) Yellow (2) On
- D. (1) Red (2) On

Answer: D

Answer Explanation:

- A. Incorrect – Incorrect because Yellow indicates an Alert level. Automatic termination does not occur until a High level is reached. Manual action to terminate the release would be required for a Yellow condition. Plausible because, in this condition, the High alarm light would be Off, and if the candidate confuses conditions for manual release termination and automatic release termination.
- B. Incorrect - Incorrect because the High Alarm light remains on until manually reset. Plausible because Red indicates a High level, which would automatically terminate the release.
- C. Incorrect - Incorrect because Yellow (alert) level does not automatically terminate the release. Plausible if the candidate confuses conditions for manual release termination and automatic release termination and because the High alarm light would remain On if radiation levels returned to normal after an automatic release termination.
- D. CORRECT - Red indicates a High level, which would automatically terminate the release. The High alarm light remains lit until it is manually reset.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

51

ID: RO-C-AOP0590412-E1-Q1

Points: 1.00

Tier# 2	Group # 1	Level RO
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Units 1 and 2 are at 100% power.

The East Essential Service Water (ESW) Pumps are running on both Units with ESW unit cross-tie valves open.

The following annunciators are in alarm:

- Panel 204 Drop 55 East ESW Pump Strainer DP High
- Panel 204 Drop 53 East ESW Pump Discharge Pressure Low

ESW Flow indications are as follows:

Unit 1 Flow (GPM)		Unit 2 Flow (GPM)	
WFA-701 East Flow	4000	WFA-702 East Flow	3000
WFA-703 East Return Flow	4000	WFA-704 East Return Flow	3000
WFA-705 West Flow	6000	WFA-702 West Flow	1000
WFA-707 West Return Flow	1000	WFA-708 West Return Flow	1000

Which ONE of the following indicates the cause of these conditions?

- A. The Unit 2 East ESW Pump Strainer is clogged.
- B. 1-WMO-737, ESW from Unit 1 West CCW HX Valve fails open
- C. There is a leak in the Unit 2 East Service Water Header.
- D. There is a leak in the Unit 1 West Service Water Header.

Answer: D

Answer Explanation:

The high flow differential between the Unit 1 West and Unit 1 West Return indicates a leak on the Unit 1 West Header, which is being supplied by the Unit 2 East ESW pump. This results in low discharge pressure for the east pump, and high strainer DP due to high flow through the strainer. Header flow detectors are located downstream of unit cross-tie and therefore indicate the rupture is on the Unit 1 West header.

- A. Incorrect – Incorrect because a clogged strainer would not provide the given indications for ESW flow. Plausible because high flow is listed as a cause for the standing high strainer DP alarm.
- B. Incorrect - Incorrect because for this failure, ESW Flow and ESW Return Flow would be the same. Plausible because this condition could cause the Unit 2 alarms listed and a high flow on the Unit 1 West header.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

52

ID: RO-C-06000-E4-1

Points: 1.00

Tier# 2	Group # 1	Level RO
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Unit 1 is operating at full power with the Heater Drain System in a normal lineup, the automatic system response to a loss of control air is the Heater Drain Pump Discharge valve fails _____ and the pump Emergency Leak Off valve fails _____.

- A. open, open
- B. open, closed
- C. closed, closed
- D. closed, open

Answer: D

Answer Explanation:

- A. Incorrect – Incorrect because the Heater Drain Pump Discharge valve fails closed to maintain level in the Heater on Alternate Level Control system. Plausible because the ELO valve fails open.
- B. Incorrect – Incorrect because the Heater Drain Pump Discharge valve fails closed to maintain level in the Heater on Alternate Level Control system. Heater Drain Pump and Emergency Leak off Valves are fail Open for pump protection. Plausible if failure modes are reversed for these two valves.
- C. Incorrect – Incorrect because Heater Drain Pump Emergency Leak off Valves are fail Open for pump protection. Plausible because Heater Drain Pump Discharge valve response is correct
- D. CORRECT – Heater Drain Pump Discharge Valves are Fail closed by design where Heater Drain Pump Emergency Leak off Valves are fail Open for pump protection.

Question ID RO-C-06000-E4-1

Comments:

Reference: SD-ENG-06000 Bleed Steam Rev 5 Pages 25-26

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-06000-E4) Explain how a loss of each of the following support systems will affect the operation of the U-1 and U-2 Bleed Steam and Feedwater Heater Drains Systems:

- a. Main Steam
- b. Feedwater
- c. Condensate
- d. Control Air

Associated K&A(s):

SYS.078.K1.18

Importance Factor: 2.5

K&A Statement: Knowledge of the physical connections and/or cause and effect relationships between the Instrument Air System and the following systems: Heater drain system

Question Cognitive Level: Memory or Fundamental Knowledge F / 4

10 CFR Part 55 Content: 10 CFR 55.41. 3 - 8

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

53

ID: NRCAUDIT07-0437

Points: 1.00

Tier# 2	Group # 1	Level RO
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Which ONE of the following **AUTOMATIC** actions will occur as a result of a Containment Isolation Phase B actuation?

- A. Hot Sleeve supply fan will start
- B. Air recirculation/hydrogen skimmer fans will trip after two minutes
- C. Reactor cavity supply fans will start
- D. Pressurizer enclosure fans will trip

Answer: D

Answer Explanation:

- A. Incorrect – Incorrect because Hot Sleeve supply fans do not trip on CI Phase B. Plausible because fans trip on a load conservation.
- B. Incorrect – Incorrect because Air recirculation/hydrogen skimmer fans have a delayed auto start not trip. Plausible if design effects are reversed
- C. Incorrect – Incorrect because Reactor Cavity supply fans have no Auto starts. Plausible because the fans have an Auto trip on CI Phase B.
- D. CORRECT – Pressurizer enclosure fans trip on Phase B actuation signal.

Question ID NRCAUDIT07-0437

Comments:

Reference: Lesson Plan RO-C-02800, Containment Ventilation Rev 9

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-02800-E9) Describe the conditions that will cause the following Containment Ventilation component(s) to trip, automatically and/or manually start, and automatically and/or manually reposition.

- a. All Fans
- b. All Containment Isolation Valves (Dampers)
- c. Air Recirculation/Hydrogen Skimmer Dampers VMO-101/102
- d. Containment Ventilation Isolation Signal

Associated K&A(s):

SYS.103.A3.01

Importance Factor: 4.2

K&A Statement: Ability to monitor automatic features of the Containment System, including: Containment isolation

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

54

ID: UO-C-03401-E2-2

Points: 1.00

Tier# 2	Group # 1	Level RO
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Which ONE of the following describes a function of the containment system low leakage divider barrier?

- A. Ensure steam flow path is through the ice condenser during a LOCA.
- B. Provide biological shielding during normal and abnormal conditions.
- C. Limit containment leakage to the environment following a LOCA.
- D. Prevent contamination of the upper containment during emergency conditions.

Answer: A

Answer Explanation:

- A. CORRECT – Divider Barrier by design directs steam flow thru ice condenser by limiting bypass flow.
- B. Incorrect – Incorrect design feature. Plausible because biological shielding is provided by the inner and outer shield walls of containment by design.
- C. Incorrect – Incorrect design feature. Plausible because the containment structure by design limits leakage to the environment following a LOCA.
- D. Incorrect – Incorrect design feature. Upper containment will become contaminated as steam flows thru the ice condenser into upper containment. Plausible if Ice Condenser doors malfunctioned.

Question ID UO-C-03401-E2-2

Comments:

Reference: UFSAR Section 5 Rev 30

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-03400-E2) Describe the function(s) associated with the following Containment System Major Components.

- a. Containment Structure
- b. Divider Barrier
- c. Refueling Canal Drains
- d. Electrical/Mechanical Penetrations
- e. Personnel and Equipment Hatches
- f. Fuel Transfer Canal

Associated K&A(s):

SYS.103.K4.05

Importance Factor: 2.8

K&A Statement: Knowledge of Containment System design features and/or interlocks that provide for the following: Containment construction

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

55

ID: RO26-0003

Points: 1.00

Tier# 2	Group # 2	Level RO
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Which ONE of the following is the normal source of power to the Rod Control Logic Cabinets?

- A. 250 VDC from BOP station battery
- B. 260 VAC from Rod Drive MG set output
- C. 120 VAC from instrument power bus CRP-3
- D. 120 VAC stepped down from Rod Drive MG set output.

Answer: D

Answer Explanation:

- A. Incorrect – Wrong because Logic Cabinet power is from an AC source. Plausible since 250 VDC is used as control power to the MG set motor breakers.
- B. Incorrect – Wrong because Logic is from an 120 VAC source. Plausible since Logic Cabinet power is supplied by Rod Drive MG output.
- C. Incorrect – Wrong because this is the backup supply source. Plausible since this source is also 120 VAC.
- D. CORRECT - Primary source is stepped down from 260 VAC (Rod Drive MG set output) through the Soltron Transformer to 120 VAC prior to use in the Logic and Power Cabinets.

Question ID RO26-0003

Comments:

Reference: SOD-01200-001 Rod Control Overview Rev 3

Source: Bank

Associated objective(s):

(RO-C-01200-E2) DESCRIBE the electrical power distribution arrangement for the system from the 600 VAC source to the Control Rod Drive Mechanisms through major system components.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated K&A(s):

SYS.001.K2.03

Importance Factor: 3.5

K&A Statement: Knowledge of electrical power supplies to the following Control Rod Drive System components: Logic circuits

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 6

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

56

ID: RO-C-02800-E3-1

Points: 1.00

Tier# 2	Group # 2	Level RO
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Which ONE of the following ventilation systems does **NOT** contain a charcoal filter bed to reduce radiation levels discharged to the Unit 1 Plant Vent Stack?

- A. Containment Pressure Relief.
- B. Containment Purge Exhaust.
- C. Instrument Room Purge Exhaust.
- D. Spent Fuel Pit Exhaust.

Answer: B

Answer Explanation:

- A. Incorrect – Wrong because Containment Pressure Relief suction contains a charcoal filter. Plausible because a charcoal filter would not be required to perform a pressure relief function.
- B. CORRECT - When the Containment Purge system is operating in the Ventilation Mode, the automatic isolation signals are blocked. The procedure requires the Purge to be stopped and radiation protection notified.
- C. Incorrect – Wrong because Instrument Room Purge Fan suction contains a charcoal filter. Plausible because the Instrument Room is in Containment and if candidate believes there is not a direct discharge from the Instrument Room to the plant vent.
- D. Incorrect – Wrong because the SFP exhaust contains a charcoal filter. Plausible because the SFP Exhaust only discharges to one of the Unit vent stacks.

Question ID RO-C-02800-E3-1

Comments:

Reference: Lesson Plan RO-C-02800, SOD-02800-002, SOD-02801B-001

Source: New

Associated objective(s):

(RO-C-02800-E3) Describe the system flowpath for each major Containment Ventilation air handling unit as air passes through each of the following sub-components.

- a. Fans
- b. Filters (Roughing/Medium/Absolute/Charcoal)
- c. Heaters/Coolers

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

d. Dampers

Associated K&A(s):

SYS.029.A1.02

Importance Factor: 3.2

K&A Statement: Ability to predict and/or monitor changes in parameters associated with operation of the Containment Purge System, including: Radiation levels

Question Cognitive Level: Memory or Fundamental Knowledge H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

57

ID: NRCAUDIT07-0866

Points: 1.00

Tier# 2	Group # 2	Level RO
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Given the following:

- A spent fuel assembly is in the containment side upender transfer cart. It has been lowered and is ready to be moved to the SFP side.
- The manipulator crane operator observes the refueling cavity level lowering rapidly.
- The SRO-CA and SFP Area Supervisor begin implementing 12-OHP-4022-018-002, Loss of Refueling Water Level during Refueling Operations-Local Actions.

Which of the following describes the correct sequence of actions to be taken?

- A. Verify the Transfer Cart is in Containment
Close the Transfer Tube Gate Valve
Close the Transfer Canal to SFP Weir Gate
- B. Move the Transfer Cart to the SFP side
Place the fuel assembly from the Transfer Cart in a SFP storage location
Close the Transfer Tube Gate Valve
- C. Raise Fuel Assembly in the upender
Move Fuel assembly in Transfer Cart to reactor vessel
Close the Transfer Tube Gate Valve
- D. Move Transfer Cart to the SFP side
Close the Transfer Tube Gate Valve
Close the Transfer Canal to SFP Weir Gate

Answer: D

Answer Explanation:

- A. Incorrect – Incorrect because Transfer Tube Gate Valve cannot be closed with cart on containment side. Plausible since Weir Gate and Transfer Tube Gate Valve should be closed.
- B. Incorrect – Incorrect because Fuel on the Transfer Cart is left on the cart in the horizontal position. Plausible since Transfer Tube Gate Valve is closed after the Transfer Cart is moved to the SFP.
- C. Incorrect – Incorrect because Transfer Tube Gate Valve cannot be closed with cart on containment side. Plausible since fuel is placed in the vessel if it is on the Manipulator Crane and the Transfer Tube Gate valve should be closed.
- D. CORRECT - The three actions listed are included in the procedure in the given order.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

58

ID: NRCAUDIT07-0142

Points: 1.00

Tier# 2	Group # 2	Level RO
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Given the following:

- Unit 2 is operating at 100% power
- A HIGH alarm is received on 2-DRA-300, Steam Generator (SG) Blowdown Sample Radiation monitor

Which ONE of the following describes automatic response of the SG Blowdown System to this alarm?

- Blowdown Discharge Isolation valve (2-DRV-350) trips closed, Blowdown Sample Isolation valves (2-DCR-301 - 304) trip closed, and Blowdown Containment Isolation valves (2-DCR-310 - 340) trip closed.
- Blowdown Discharge Isolation valve (2-DRV-350) trips closed, Blowdown Sample Isolation valves (2-DCR-301 - 304) remain open, and Blowdown Containment Isolation valves (2-DCR-310 - 340) trip closed.
- Blowdown treatment pump trips, Blowdown Containment Isolation valves (2-DCR-310 - 340) trip closed.
- Blowdown treatment pump trips, Blowdown Sample Isolation valves (2-DCR-301 - 304) remain open.

Answer: A

Answer Explanation:

Note: DRA-353 (Located downstream at the demineralizers) SG Blowdown Treatment high alarm will close the same valves and also trip the treatment pump.

- CORRECT** - High alarm on DRA-300 closes DRV-350, DCR-310, 320, 330, & 340 as well as Sample valves DCR-301, 302, 303, & 304
- Incorrect** – Wrong because DCR 301-304 do NOT remain open. Plausible because the student may believe sampling capability remains intact.
- Incorrect** – Wrong because Blowdown Treatment pump not tripped by DRA-300. Plausible because blowdown treatment pump is tripped by DRA-353 (Blowdown Treatment), but not by DRA-300.
- Incorrect** – Wrong because Plausible because blowdown treatment pump is tripped by DRA-353 (Blowdown Treatment), not DRA-300 and because DCR 301-304 do NOT remain open and the candidate may believe sampling capability remains intact.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

59

ID: NRCAUDIT07-0950

Points: 1.00

Tier# 2	Group # 2	Level RO
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Which ONE of the following describes the Control Room Ventilation System pressurization fan alignment following receipt of a RED alarm on ERS-8401 U2 Control Room Radiation Monitor?

- A. Both Unit 1 Control Room Pressurization Fans are RUNNING
Both Unit 2 Control Room Pressurization Fans are RUNNING
- B. Both Unit 1 Control Room Pressurization Fans are STOPPED
Both Unit 2 Control Room Pressurization Fans are RUNNING
- C. Both Units West Control Room Pressurization Fans are RUNNING
Both Units East Control Room Pressurization Fans are STOPPED
- D. Both Units West Control Room Pressurization Fans are STOPPED
Both Units East Control Room Pressurization Fans are RUNNING

Answer: B

Answer Explanation:

- A. Incorrect – Wrong because only the Unit 2 Fans operate off of ERS-8401. Plausible because both unit systems actuate from an SI in either unit.
- B. CORRECT - Each Control Room has a Separate Control Room Ventilation System. Each Control Room Has a Separate Radiation Monitor which controls its associated fans. ERS-7401 for Unit 1 and ERS-8401 for Unit 2.
- C. Incorrect – Wrong because both Unit 2 Fans Operate off of ERS-8401. Plausible if candidate believes radiation monitors are train specific. Distractor describes response to a single unit Train B Si actuation.
- D. Incorrect – Wrong because both Unit 2 Fans Operate off of ERS-8401. Plausible if candidate believes radiation monitors are train specific. Distractor describes response to a single unit Train A Si actuation.

Question ID NRCAUDIT07-0950

Comments:

Reference: 12-OHP-4024-139 Drop 12-ERS-8400 Rev 29, SOD-01350-001 Radiation Monitor System Details Rev 2, SOD-02801A-001 Control Room Ventilation Rev 4

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

- (RO-C-02801A-E8)** Describe the conditions that cause the following components to start, trip or reposition:
- a. Pressurization fans
 - b. Chiller packages
 - c. Remotely operated dampers (ACR-DA-1, 1A, 2, 2A, 3)

Associated K&A(s):

SYS.050.A4.01

Importance Factor: 3.8

K&A Statement: Ability to manually operate and/or monitor in the control room:
Initiate/reset system

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41. 7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

60

ID: RO-C-05400-E3-1

Points: 1.00

Tier# 2	Group # 2	Level RO
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The following plant conditions existed:

- Unit 1 at 30% power
- The South and Middle Hotwell Pumps in service with the North Hotwell Pump OOS
- Due to excessive air leakage, the Startup Air Ejectors were placed in service
- Condenser vacuum 25" and stable

A trip of the South Hotwell Pump resulted in an alarm on Annunciator Panel 116 related to Steam Jet Air Ejector Cooling Water D/P being abnormal.

As a result of the Hotwell pump tripping:

Air removal efficiency has been reduced on _____ and will be restored by throttling 1-CMO-101, SJAE Bypass valve in the _____ direction per the Annunciator response procedure.

- A. both Normal and Startup air ejectors, open
- B. Normal Air Ejectors only, open
- C. both Normal and Startup air ejectors, close
- D. Normal Air Ejectors only, close

Answer: D

Answer Explanation:

- A. Incorrect – Incorrect because Startup air ejectors are not affected by reduced condensate flow through SJAE condensers. Condensate flow will lower when the Hotwell pump trips. Less Condensate flow thru the SJAE Condenser will lower D/P. Plausible because per Annunciator 116 Drop 51, 1-CMO-101, SJAE Bypass valve is throttled in the open direction to lower SJAE Cooling Water D/P.
- B. Incorrect – Incorrect because D/P will lower but 1-CMO-101, SJAE Bypass valve is throttled in the closed direction to raise SJAE Cooling Water D/P. Plausible because 1-CMO-61, Hotwell Pump and SJAE Recirc valve, is addressed in the ARP as well and is operated in the open direction to raise SJAE D/P.
- C. Incorrect – Incorrect because Startup air ejectors are not affected by reduced condensate flow through SJAE condensers. Condensate flow will lower when the Hotwell pump trips. Less Condensate flow thru the SJAE Condenser will lower D/P. Plausible because 1-CMO-101, SJAE Bypass valve should be throttled in the closed direction for the given conditions.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

D. CORRECT - Condensate flow will lower when the Hotwell pump trips. Less Condensate flow thru the SJAE Condenser will lower D/P. 1-CMO-101 is one of two valves used to adjust SJAE Cooling Water D/P and per Annunciator 116 Drop 52 1-CMO-101, SJAE Bypass valve is throttled in the closed direction to raise SJAE Cooling Water D/P.

Question ID RO-C-05400-E3-1

Comments:

Reference: 1-OHP-4024-116 Drops 51 and 52 Rev 46; SOD-05400-001 Condensate System Rev 10

Source: New

Associated objective(s):

(RO-C-05400-E3) Describe the flowpath for the Condensate system as it passes sequentially from the Main Turbine Exhaust to the suction of the Main Feedwater Pumps, including functions of the following major components:

- a. Main Condensers
- b. Condenser Hotwells
- c. Hotwell Pumps
- d. TACW System
- e. MFW pump seal water
- f. Condensate Makeup/Excess Letdown Line
- g. Condensate Storage Tank
- h. Condensate Dump to Circulating Water System
- i. Steam Jet Air Ejector Condensers
- j. Turbine Exhaust Hood Spray Line
- k. Hotwell Pump and SJAE Recirc Line
- l. Condensate Booster Pumps
- m. Condensate Booster Pump Recirc Lines
- n. Drain Coolers
- o. Low Pressure Heaters (1A, 1B and 1C)
- p. Low Pressure Heater Strings (2A, 2B, 3A, 3B, 4A and 4B)

Associated K&A(s):

SYS.055.A2.03

Importance Factor: 3.2/2.9

K&A Statement: Ability to (a) predict the impacts of the following on the Condenser Air Removal System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Loss of air ejector cooling water

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

61

ID: RO-C-00300-E3-1

Points: 1.00

Tier# 2	Group # 2	Level RO
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U1 is at 15% and raising power following a refueling outage. A hydrogen atmosphere was established in the VCT 2 days ago. You have relieved the night shift ATC Reactor Operator and notice the VCT pressure is slowly lowering. Pressurizer level is stable on setpoint in automatic control. With VCT level stable what is a potential cause of the lowering VCT pressure trend?

- A. The off going RO raised RCP Seal Injection flow prior to turnover.
- B. 1-RSO-300, VCT Vent to the Waste Gas Header is leaking
- C. 1-QRV-303, Letdown Divert valve is leaking to the CVCS HUT's.
- D. 1-QRV-302, CVCS Demineralizer Divert valve has repositioned to the RC Filter position.

Answer: B

Answer Explanation:

- A. Incorrect – Wrong because an increase in Seal Injection flow (more charging flow) would result in VCT level lowering with the observed VCT Pressure drop. Plausible because the distractor would result in pressure lowering.
- B. CORRECT – With VCT level stable and PZR level stable the only cause of VCT pressure lowering is a loss of gas space volume. RSO-300 leaking creates a path to the Waste Gas Vent Header.
- C. Incorrect – Wrong because QRV-303 leaking to CVCS Hut's would lower the letdown flow going in to the VCT. With no change in Charging flow this would cause both VCT level and pressure to lower. Plausible because the distractor would result in pressure lowering.
- D. Incorrect – Wrong because QRV-302 repositioning would not change Letdown flow rate into the VCT and this would not change VCT level or pressure. Plausible if letdown divert flow path is not understood.

Question ID RO-C-00300-E3-1

Comments:

Reference: SOD-00300-001Charging and Letdown System Rev 13

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

62

ID: NRCAUDIT07-0450

Points: 1.00

Tier# 2	Group # 2	Level RO
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Both Unit 1 and Unit 2 are at Full Power. The Fuel handling Area Ventilation System is in service and aligned for normal operation.

Which ONE of the following statements describes the response of the Fuel Handling Area Ventilation System to a high radiation condition on Spent Fuel Pit Area Radiation Monitor, 12-RRC-330, in this configuration?

- A. The Supply and Exhaust Fans will trip; the normally closed Charcoal Filter Outlet Dampers will go OPEN, the normally open Charcoal Filter Bypass Dampers will go CLOSED.
- B. The Supply and Exhaust Fans will trip; the normally closed Charcoal Filter Outlet Dampers will go OPEN, the normally closed Charcoal Filter Bypass Dampers will stay CLOSED.
- C. The Supply Fans will trip; the Exhaust Fans will continue in operation; the normally closed Charcoal Filter Face Dampers will go OPEN, the normally open Charcoal Filter Bypass Dampers will go CLOSED.
- D. The Supply Fans will trip; the Exhaust Fans will continue in operation; the normally closed Charcoal Filter Face Dampers will go OPEN, the normally closed Charcoal Filter Bypass Dampers will stay CLOSED.

Answer: C

Answer Explanation:

- A. Incorrect – Incorrect because the supply fans do trip but the Exhaust fans stay running. Plausible because the dampers are correct.
- B. Incorrect – Incorrect because the supply fans do trip but the Exhaust fans stay running. Plausible because the Charcoal Filter Bypass Damper is normally open and will close.
- C. CORRECT – The supply fans trip and the exhaust fan remains running with the charcoal filter aligned and its bypass isolated.
- D. Incorrect – Incorrect because the supply fans trip and the exhaust fan remains running. Plausible because the Charcoal Filter Bypass Damper is normally open and will close.

Question ID NRCAUDIT07-0450

Comments:

Reference: SD-02801B, 12-OHP-4024-139 Drop 12-RRC-330 Rev 29

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Source: Bank

Associated objective(s):

(RO-C-02801B-E8) Describe the conditions that will cause the following components to trip, automatically start and/or automatically reposition.

- a. Fans
- b. Face and Bypass Dampers

Associated K&A(s):

SYS.072.A3.01

Importance Factor: 3.3

K&A Statement: Ability to monitor automatic features of the Area Radiation Monitoring System, including: Changes in system alignment

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41 .7

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

63

ID: RO-C-05700-E9-1

Points: 1.00

Tier# 2	Group # 2	Level RO
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Annunciator 123 Drop 6, Priming System Vacuum Low was received and the Turbine Tour reports that none of the vacuum Priming Pumps are able to be placed in service due to a loss of Miscellaneous Seal Cooling Water.

If the Vacuum Priming System remains out of service, which component will NOT be affected?

- A. MFP Condenser
- B. TACW Heat Exchanger
- C. CRAC Chillers
- D. Main Condenser

Answer: C

Answer Explanation:

- A. Incorrect – Incorrect because MFP Condensers are cooled by Circulating Water and the Condenser Water box is serviced by Vacuum Priming. Plausible if system design is not understood.
- B. Incorrect – Incorrect because TACW Heat Exchanger is cooled by Circulating Water and the Heat Exchanger is serviced by Vacuum Priming. Plausible if system design is not understood.
- C. CORRECT – The CRAC Chillers are cooled by ESW and have no connection to Vacuum Priming.
- D. Incorrect – Incorrect because Main Condensers are cooled by Circulating Water and the Condenser Water box is serviced by Vacuum Priming. Plausible if system design is not understood.

Question ID RO-C-05700-E9-1

Comments:

Reference: Drawing OP-12-5119 Circulating water, Priming System and Screen Wash Rev 88 1-OHP-4021-057-004 Operation of Vacuum Priming System Rev 18

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

- (RO-C-05700-E9)** Describe how a loss of the following support systems will affect the Circulating Water System.
- a. Vacuum Priming System
 - b. Screen Wash System
 - c. Liquid Sodium Hypochlorite Injection System
 - d. Miscellaneous Sealing and Cooling Water System

Associated K&A(s):

SYS.075.K1.09

Importance Factor: 2.5

K&A Statement: Knowledge of the physical connections and/or cause and effect relationships between the Circulating Water System and the following systems:
Vacuum priming

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 4 / 5

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

64

ID: RO-C-ADM05-E1-1

Points: 1.00

Tier# 3	Group #	Level RO
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Which of the following degraded equipment condition(s) is/are NOT a potential ODMI per PMP-4010-ODMI-001 Operational Decision Making?

- A. Conditions with the potential to result in a power reduction.
- B. Conditions with the potential to enter a Limiting Condition of Operation.
- C. Any slowly degrading condition that could adversely affect normal, abnormal or emergency plant operation.
- D. Any condition that is identified while completing a scheduled surveillance.

Answer: D

Answer Explanation:

3.3.4 Degraded equipment conditions should be identified as potential ODMIs if they fall in any of the following categories:

- a. Degraded equipment conditions with the potential to result in a power reduction.
- b. Degraded equipment conditions with the potential to enter a Limiting Condition of Operation.
- c. Any slowly degrading condition that adversely effects or could affect normal, abnormal or emergency plant operations, or causes an operator to take compensatory actions.

A. Incorrect – Incorrect because condition is listed. Plausible if requirements are not understood.

B. Incorrect - Incorrect because condition is listed. Plausible if requirements are not understood.

C. Incorrect - Incorrect because condition is listed. Plausible if requirements are not understood.

D. CORRECT – Correct because it does not directly meet any of the listed conditions.

Question ID RO-C-ADM05-E1-1

Comments:

Reference: PMP-4010-ODM-001 Operational Decision Making Rev 14

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-ADM05-E1) Given Plant Procedures, explain the following terms as they apply to operability determinations:

Design Basis,
The Safety Evaluation Report (SER),
Licensing Basis,
Limiting Condition for Operation (LCO),
Surveillance,
Operable,
Functional,
Degraded Condition,
Nonconforming Condition,
Safety Function,
Single-Failure Criteria,
Compensatory Measure,
Full Qualification,
Notice of Enforcement Discretion (NOED),
Immediate Operability Determination (IOD),
Operability Determination Evaluation (ODE),
Prompt Operability Determination,
Past Operability Determination,
Functionality Assessment

Associated K&A(s):

G 2.1.15

Importance Factor: 2.7/3.4

K&A Statement: Knowledge of administrative requirements for temporary management direction, such as standing orders, night orders, or operations memoranda (CFR: 41.10 / 45.12)

Question Cognitive Level: Memory or Fundamental Knowledge F / 4

10 CFR Part 55 Content: 10 CFR 55.41. 10

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

65

ID: CM-6471

Points: 1.00

Tier#	3	Group #	Level	RO
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Which ONE of the following activities require IPTE Management briefing to emphasize the Nuclear Safety aspects of the activity?

- A. Installing the Reactor Vessel Head upon completion of Refueling activities.
- B. Performing the monthly Reactor Trip and Bypass Breaker Operability Test.
- C. Performing 2AB Diesel Generator Operability Test following fuel injector repairs.
- D. Closing switchyard disconnects for the Main Generator output breakers during startup.

Answer: A

Answer Explanation:

- A. CORRECT - Installing the Reactor Vessel Head upon completion of Refueling activities is listed in section 4.1.5 of the PMI as requiring an IPTE brief.
- B. Incorrect – Incorrect because a normally scheduled surveillance is listed in section 4.1.6 as NOT requiring a brief. Plausible because the surveillance has potential to result in a unit trip.
- C. Incorrect – Incorrect because post maintenance tests that use normal plant procedures is listed in section 4.1.6 as NOT requiring a brief. Plausible because the component to be worked has the potential to limit plant operation due to Tech Spec conditions.
- D. Incorrect – Incorrect because normal switchyard activities associated with normal plant start up or shut down is listed in section 4.1.6 as NOT requiring a brief. Plausible because plant startup activities have the potential for a unit trip.

Question ID CM-6471

Comments:

Reference: PMI-4090, Criteria For Conducting Infrequently Performed Tests Or Evolutions sections 4.1.5 and 4.1.6. Rev 26

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-ADM04-E4) Given PMI-4090, Criteria For Conducting Infrequently Performed Tests Or Evolutions describe the conditions for use and provisions for Conducting Infrequently Performed Tests procedure.

Associated K&A(s):

G 2.1.38

Importance Factor: 3.7/3.8

K&A Statement: Knowledge of the station's requirements for verbal communications when implementing procedures (CFR: 41.10 / 45.13)

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 10

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

66

ID: NRCAUDIT07-0063A

Points: 1.00

Tier#	3	Group #	Level	RO
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An AEO performing rounds identifies that the TDAFW pump discharge valves for both units are fully open. The AEO remembers they are supposed to be different and requests you to reposition valves.

Which ONE of the following describes the required action(s)?

- A. Do NOT change Unit 1 valve positions. The Unit 2 valves should be placed in the THROTTLED position.
- B. Do NOT change Unit 2 valve positions. The Unit 1 valves should be placed in the THROTTLED position.
- C. Change both Units valves to the THROTTLED position as the AEO is confusing the TDAFW valves and MDAFW valve differences in each unit.
- D. Do NOT change valve positions on either unit. The valves are correct as positioned.

Answer: B

Answer Explanation:

- A. Incorrect – Plausible if candidate confuses proper unit alignment for the TDAFW pump discharge valves.
- B. CORRECT - The Unit 1 valves should be THROTTLED due to SG overfill concerns. The Unit 2 valves should be FULL OPEN.
- C. Incorrect - Plausible if candidate confuses proper unit alignment for the TDAFW pump discharge valves.
- D. Incorrect - Plausible if candidate confuses proper unit alignment for the TDAFW pump discharge valves.

Question ID NRCAUDIT07-0063A

Comments:

Reference: 1-OHP-4021-056-002 Auxiliary Feed Pump Operation Rev 43 Page 65, 2-OHP-4021-056-002 Auxiliary Feed Pump Operation Rev 39 Page 65

Previous Exam use; NRC-2020-69 Modified

Source: Modified

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

- (RO-C-05600-E5)** Describe the flow path for the AFW System to include the following components and connections in accordance with OP-1(2)-5106A, Flow Print:
- Motor and Air operated valves.
 - Motor and Turbine driven pumps.
 - Connections to other systems and units.

Associated K&A(s):

G 2.2.03

Importance Factor: 3.8/3.9

K&A Statement: (Multi-unit license) Knowledge of the design, procedural, and/or operational differences between units (CFR: 41.5 / 41.6 / 41.7 / 41.10 / 45.12)

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41. 5 / 6 / 7 / 10

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

67

ID: RO-C-ADM04-E5-1

Points: 1.00

Tier#	3	Group #	Level	RO
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Per PMI-4030, Technical Specification Surveillance Test Program, Frequently Performed Surveillance Tests are those surveillances scheduled:

- A. weekly or ≤ 7 days
- B. bi-weekly or twice \leq every 7 days
- C. daily or ≤ 24 hours
- D. shiftly or ≤ 12 hours

Answer: A

Answer Explanation:

- A. CORRECT - PMI-4030 defines a frequently performed Surveillance as scheduled every 7 days or less.
- B. Incorrect – Incorrect because it does not meet the definition in PMI-4030. Plausible because this period is less than every 7 days.
- C. Incorrect - Incorrect because it does not meet the definition in PMI-4030. Plausible because this period is less than every 7 days.
- D. Incorrect - Incorrect because it does not meet the definition in PMI-4030. Plausible because this period is less than every 7 days.

Question ID RO-C-ADM04-E5-1

Comments:

Reference: PMI-4030 Technical Specification Surveillance Test Program, definitions Rev 41

Source: New

Associated objective(s):

(RO-C-ADM04-E5) Given plant procedures describe the theory and practice of valve testing.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated K&A(s):

G 2.2.12

Importance Factor: 3.7/4.1

K&A Statement: Knowledge of surveillance procedures (CFR: 41.10 / 43.2 / 45.13)

Question Cognitive Level: Memory or Fundamental Knowledge F / 4

10 CFR Part 55 Content: 10 CFR 55.41 10

10 CFR 55.43 2

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

68

ID: 2008NRC-0632

Points: 1.00

Tier# 3	Group #	Level RO
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A LOCA that resulted in significant core damage occurred at 1600 hours. Containment Pressure and Radiation levels were recorded every 30 Minutes as follows:

Time	Radiation (R/Hr)	Pressure (psig)
1600	120,000	6.2
1630	118,000	6.2
1700	110,000	5.6
1730	105,000	5.2
1800	103,000	5.1
1830	92,000	4.3

At 1835 hours, while performing Emergency Operating Procedures, a step is encountered which states "Check PRZ level - GREATER THAN 16% [28% ADVERSE]".

Which ONE of the following describes the required Pressurizer level and why?

- A. 16% because adverse values are no longer required because of the dose rate and pressure reduction.
- B. 28% because adverse values must be used as containment radiation dose rate is too high for the previous one hour time frame.
- C. 28% because adverse containment exists due to the current containment radiation dose rate.
- D. 28% because adverse containment exists due to the current containment pressure.

Answer: A

Answer Explanation:

- A. CORRECT - Adverse containment values are required to be used when containment pressure is >5 psig or radiation dose rates are $>10^5$ R/Hr. When pressure lowers to <5 psig and radiation dose rates are $<10^5$ R/Hr. normal values may be used as long as the integrated radiation dose is $<10^6$ R. The pressure, dose rate, and integrated dose are low enough to allow normal values to be used.
- B. Incorrect – Incorrect because the containment radiation dose rate and pressure limits have no time length associated with them. Plausible because total dose is a consideration and if total dose is miscalculated.
- C. Incorrect – Wrong because the current dose rate is $<10^5$ R/Hr. Plausible if candidate believes $<10^4$ R/Hr. is required.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

69

ID: RO-C-ADM02-E25-1

Points: 1.00

Tier# 3	Group #	Level RO
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Which ONE of the following describes the significance of the "GREEN" annunciators in the control room based on the OHI-4000 (Conduct of Operations, Alarm Response) Annunciator Priority System?

The Green Lens alarms:

- A. mean that compensatory actions may be required.
- B. signify those alarms which are generated by local panels.
- C. signify those alarms which are expected on a shiftly basis and do not need to be announced.
- D. indicate alarms which seal-in and require the Reset button to clear once the condition has cleared.

Answer: B

Answer Explanation:

- A. Incorrect – Incorrect because a Red "C" on the lens denotes compensatory actions required. Plausible because the annunciator window can indicate this condition.
- B. CORRECT - Green lens indicates local panel alarms and do not require ARP response in the Control Room.
- C. Incorrect – Incorrect because expected alarms do need to be announced but may not require ARP usage. Plausible, as candidate may confuse green with expected.
- D. Incorrect – Plausible because the annunciator window can indicate this condition.

Question ID RO-C-ADM02-E25-1

Comments:

Reference: OHI-4000 Conduct of Operations: standards rev 144 Attachment 1, Alarm Response Section 3.2

Previous exam use: NRC Exam 2012

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-ADM02-E25) Given a plant condition including an alarm, describe how to properly respond to Control Room alarms in accordance with OHI-4000, "Conduct of Operations: Standards," including proper communications and required log keeping.

Associated K&A(s):

G 2.4.31

Importance Factor: 4.2/4.1

K&A Statement: Knowledge of annunciator alarms, indications, or response procedures (CFR: 41.10 / 45.3)

Question Cognitive Level: Memory or Fundamental Knowledge F / 2

10 CFR Part 55 Content: 10 CFR 55.41 10

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

70

ID: RO-C-IF07-E1.5-1

Points: 1.00

Tier#	4	Group #	Level	RO
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Unit 1 is operating at 100% power immediately following a one-hour power ascension from steady-state 70% power. To keep reactor coolant system temperature stable over the next two hours, the operator must _____ control rods in order to counter the effects of _____.

- A. insert; Xe neutron absorption
- B. insert; Iodine radioactive decay
- C. withdraw; Xe neutron absorption
- D. withdraw; Iodine radioactive decay

Answer: A

Answer Explanation:

- A. CORRECT - It is necessary to supplement the boron dissolved in the coolant with solid boron integrated with the fuel. This reduces the initial soluble boron concentration that prevents MTC from being too positive. The burnable poison provides a partial control of the excess reactivity available during the fuel cycle.
- B. Incorrect – Wrong because boron precipitation, although related to the boron concentration present, is minimized by limiting the amount of boiling in the core. Plausible because reducing boron would reduce precipitation.
- C. Incorrect – Wrong because the flux profile of the reactor is NOT distorted by the addition of soluble poisons. Plausible because burnable poisons can be used to minimize flux distortion
- D. Incorrect – Incorrect because the stem states burnable poisons are installed “instead of using a larger reactor coolant boron concentration”. This is opposite of the truth. Plausible because Cook Nuclear Plant has gone to longer fuel cycles, usually 18 months, and use a higher enrichment fuel to operate longer. Burnable poisons are used to offset the reactivity from increased fuel enrichment.

Question ID RO-C-IF07-E1.5-1

Comments:

Reference: Lesson Plan RO-C-IF07 Fission Product Poisons Rev 1 Pages 202-203

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-IF07-E1.5) explain how xenon-135 concentration reacts during the following nuclear reactor operations:

- a. Xenon free initial reactor startup
- b. Reactor shutdown
- c. Decrease in reactor power
- d. Increase in reactor power
- e. Reactor startup with xenon present in the core

Associated K&A(s):

192006.K1.14

Importance Factor: 3.3

K&A Statement: Explain the methods and reasons for the reactor operator to compensate for the time-dependent behavior of xenon-135 concentration in the reactor

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41 1

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

71

ID: RO-C-IF09-E1.3-1

Points: 1.00

Tier# 4	Group #	Level RO
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Burnable poisons in the form of Integrated Fuel Burnable Absorbers were installed in recent Unit 1 refueling outages instead of using a larger soluble boron concentration to:

- A. establish a more negative moderator temperature coefficient.
- B. prevent boron precipitation during normal operation.
- C. minimize the distortion of the neutron flux distribution caused by soluble boron.
- D. allow the loading of excessive reactivity in the form of higher fuel enrichment.

Answer: A

Answer Explanation:

- A. CORRECT - It is necessary to supplement the boron dissolved in the coolant with solid boron integrated with the fuel. This reduces the initial soluble boron concentration that prevents MTC from being too positive. The burnable poison provides a partial control of the excess reactivity available during the fuel cycle.
- B. Incorrect - boron precipitation although related to the boron concentration present, precipitation is prevented by limiting the amount of boiling in the core.
- C. Incorrect – the flux profile of the reactor is NOT distorted by the addition of soluble poisons.
- D. Incorrect – This distracter has an element of truth, in that Cook Nuclear Plant has gone to longer fuel cycles, usually 18 months, and use a higher enrichment fuel to operate longer. Burnable poisons are used to offset the reactivity from increased fuel enrichment. However, as the stem states, burnable poisons are installed “instead of using a larger reactor coolant boron concentration” to establish a more negative (or less positive) moderator coefficient.

Question ID RO-C-IF09-E1.3-1

Comments:

Reference: RO-C-IF09 Fuel Depletion and Burnable poisons Rev 1 Pages 137-143, UFSAR Chapter 3, Section 3.5.1.3 Rev 30, Page 89

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-IF09-E1.3) From memory, describe the design and use of burnable poisons in a reactor core, without error.

Associated K&A(s):

192007.K1.01

Importance Factor: 2.5

K&A Statement: Define burnable poison and state its use in the reactor

Question Cognitive Level: Memory or Fundamental Knowledge F / 4

10 CFR Part 55 Content: 10 CFR 55.41 1

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

72

ID: RO-C-IF10-E2.4-1

Points: 1.00

Tier#	Group #	Level	RO
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Unit 1 reactor is stable at the point of adding heat (POAH) with the average reactor coolant temperature at 550°F during a plant startup. Control rods are then withdrawn 5 steps.

When the plant stabilizes, reactor power will be _____ and average reactor coolant temperature will be _____ 550°F.

- A. above the POAH; equal to
- B. above the POAH; greater than
- C. at the POAH; equal to
- D. at the POAH; greater than

Answer: B

Answer Explanation:

- A. Incorrect – Wrong because the positive reactivity added by rod withdrawal raises power and results in a fuel temperature increase and a moderator temperature increase. Plausible if student believes that steam dump maintains a constant temperature. Incorrect as power will be higher AND RCS temperature will be higher also.
- B. CORRECT - The rod withdrawal adds positive reactivity, raising power resulting in a fuel temperature increase and a moderator temperature increase.
- C. Incorrect - Incorrect as power will be higher and temperature will be higher. Plausible if student believes that moving control rods out does not raise power and hence that temperature is not raised.
- D. Incorrect - Incorrect as power will be above the POAH. Plausible if student believes that withdrawing control rods does not raise power, but believes that temperature is raised, adding negative reactivity to offset the positive reactivity from the rod withdrawal.

Question ID RO-C-IF10-E2.4-1

Comments:

Reference: Lesson Plan RO-C-IF10 Reactor Operational Physics Rev 1, pages 128-131

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-IF10-E2.4) Describe reactor response and operator responsibilities when operating a reactor in the intermediate range, both above and below the POAH.

Associated K&A(s):

192008.K1.16

Importance Factor: 3.3

K&A Statement: Describe the monitoring and control of reactor power and primary temperature between 0 percent to 15 percent power

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41 .1

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

73

ID: RO-C-IF13-E2.1-1

Points: 1.00

Tier# 4	Group #	Level RO
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Unit 2 is shut down with the pressurizer conditions as follows:

Pressurizer liquid temperature	= 588°F
Pressurizer vapor temperature	= 588°F
Pressurizer pressure	= 1395 psig

If the pressurizer is depressurized using a pressurizer PORV until pressure equals 1185 psig, pressurizer liquid temperature will:

- A. increase due to condensation of vapor.
- B. increase due to evaporation of liquid.
- C. decrease due to evaporation of liquid.
- D. decrease due to condensation of vapor.

Answer: C

Answer Explanation:

The initial liquid temperature is equal to the saturation temperature at 1395 psig, 588°F. Therefore, as pressure is lowered some of the internal energy of the liquid will be used to supply the latent heat of vaporization as the water flashes to steam. This has the net effect of lowering the average kinetic energy of the remaining water mass, which is by definition seen as its temperature. The liquid temperature will decrease due to the liquid evaporation.

A. Incorrect – Incorrect because water at T_{sat} will evaporate as pressure decreases. Plausible if process improperly applied.

B. Incorrect – Wrong because incorrect direction of temperature change as a result. Plausible because cause is correct.

C. CORRECT – see above

D. Incorrect – Incorrect because process is not condensation. Plausible because of correct temperature change but for opposite of correct reason.

Question ID RO-C-IF13-E2.1-1

Comments:

Reference: Lesson Plan RO-C-IF13 Thermodynamic Properties of Steam Rev 1 pages 41-52

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Source: Bank

Associated objective(s):

(RO-C-IF13-E2.2) Predict the effect phase changes will have on plant response.

Associated K&A(s):

193003.K1.08

Importance Factor: 2.8

K&A Statement: Define the following terms: saturated liquid

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41 14

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

74

ID: RO-C-IF14-E2.2-1

Points: 1.00

Tier#	Group #	Level	RO
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Unit 1 is operating at 50% power with three Circulating Water Pumps (CWP) in service. 13 CWP is stopped, resulting in a 3°F condenser hotwell temperature rise. Condenser Water Box Outlet valve position is unchanged. Assuming condenser vacuum remains **constant**, plant efficiency will _____ and the probability of Hotwell Pump cavitation will _____.

- A. increase; increase
- B. increase; decrease
- C. decrease; increase
- D. decrease; decrease

Answer: A

Answer Explanation:

Condensate depression is reduced by 3°F.

Reducing condensate depression means that less of the energy produced by the reactor needs to go to rewarming the cooled liquid. This makes the plant more efficient and the plant efficiency will INCREASE.

However by reducing the condensate depression, the water collecting in the hotwell will be less dense and have a higher specific enthalpy. This will increase the enthalpy of the water entering the eye of the pump impeller and INCREASE the chance the pump will cavitate.

- A. CORRECT - See above explanation
- B. Incorrect - See above explanation. Plausible because efficiency will increase.
- C. Incorrect - See above explanation. Plausible because reduction in circulating water flow could impact vacuum and increased probability of cavitation is correct.
- D. Incorrect - See above explanation. Plausible if cause/effect relationship is reversed.

Question ID RO-C-IF14-E2.2-1

Comments:

Reference: Lesson Plan RO-C-IF15 Thermodynamic Cycles Rev 1 Page 53; Lesson Plan RO-C-IF21 Heat Exchangers and Condensers Rev 1 Pages 53-57

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-IF14-E2.2) Describe the condensing process to include vacuum formation and condensate depression.

Associated K&A(s):

193004.K1.11

Importance Factor: 2.5

K&A Statement: Describe the process of condensate depression (subcooling) and its effect on plant operation

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41 14

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

75

ID: CM-937

Points: 1.00

Tier#	4	Group #	Level	RO
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Unit 2 was operating at 100%. A Main Turbine Control Valve failed closed. Control Rod Bank D inserted in automatic to 190 steps until Tavg and Tref were matched. Final reactor power was 89%. The STA identified Delta-I (Axial Flux) was outside the Acceptable Operating Limit.

Which ONE of the following describes a potential adverse impact on Unit Two reactor of continuing to operate with Delta-I (Delta Flux) outside the acceptable operating limit following this transient?

- A. A xenon oscillation may be produced resulting in exceeding allowable hot channel factors.
- B. Hot channel factors may be exceeded due to a shift in the radial flux profile.
- C. Large Delta-I will lower the Overpower Delta-T reactor trip setpoint.
- D. Any subsequent inward rod motion may result in a reduction in SHUTDOWN MARGIN.

Answer: A

Answer Explanation:

- A. CORRECT - Control rod motion which moves Delta I out of the AFD band may result in a xenon oscillation which can cause power peaks resulting in exceeding HCFs.
- B. Incorrect: Incorrect because Radial flux profile is not impacted by driving axial flux outside the AFD band. Plausible if the concept of radial flux profile is confused with axial flux profile.
- C. Incorrect – Incorrect because Overpower Delta T is not adjusted with a flux penalty. Plausible if the student does not know that the flux penalty is zeroed out of the overpower delta T calculation.
- D. Incorrect – Incorrect because Rods must be positioned below the rod insertion limit to impact shutdown margin. Plausible if rod insertion limit is not understood to be a separate issue from the AFD target band.

Question ID CM-937

Comments:

Reference: Unit 2 Technical Specification Bases Rev 88 B 3.2.3 Axial Flux Difference

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(TRANS5A.8) Given the plant has sustained a transient that has resulted in Delta-I being driven outside its allowable operating band, determine the potential impact on the following:

- a. Flux distribution (top and bottom)
- b. Xenon concentration (top and bottom)
- c. Core hot channel factors

Associated K&A(s):

193009.K1.08

Importance Factor: 3.3

K&A Statement: Describe axial flux imbalance, including long-range effects

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41 14

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

76

ID: RO-C-AOP0340412A-SRO

Points: 1.00

Tier# 1	Group # 1	Level SRO
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SRO ONLY

Given the following plant conditions:

- Unit 1 is at 60% power
- Pressurizer Level channel 1, which is the controlling channel, indicates 100%
- Pressurizer Pressure Channel 1 indicates 2015 psig and lowering
- The other hot calibrated Pressurizer Level channels indicate 37% and lowering
- The other Pressurizer Pressure channels indicate 2225 psig and are lowering

The cause of the event in progress is (1). The SRO will direct actions per (2) to initially control Pressurizer level.

(1)

(2)

- | | |
|---|---|
| A. Pressurizer Level Instrument failure | 1-OHP-4022-IFR-001 Instrument Failure Response |
| B. Pressurizer Level Instrument failure | 1-OHP-4022-013-010 Pressurizer Level Instrument Malfunction |
| C. Reference leg leak | 1-OHP-4022-013-010 Pressurizer Level Instrument Malfunction |
| D. Reference leg leak | 1-OHP-4022-IFR-001 Instrument Failure Response |

Answer: D

Answer Explanation:

- A. Incorrect – Incorrect because Indicated level is in response to a vapor space leak as verified by pressure changing on that same channel. Plausible because 1-OHP-4022-IFR-001 is correct procedure to place Level Control in manual to stabilize PZR level.
- B. Incorrect – Incorrect because indicated level is in response to a vapor space leak as verified by pressure changing on that same channel. Plausible as Pressurizer Level Instrument Malfunction does have steps to place Level Control in manual to stabilize PZR level.
- C. Incorrect – Incorrect because 1-OHP-4022-013-010 is not a direct entry. 1-OHP-4022-IFR-001 is entered first. Plausible because the event is correct, and Pressurizer Level Instrument Malfunction does have steps to place Level Control in manual to stabilize PZR level.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

77

ID: RO-C0AOP0430412-E3-1-SRO

Points: 1.00

Tier# 1	Group # 1	Level SRO
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SRO ONLY

Given the following plant conditions on Unit 1:

- East RHR train is in service.
- West RHR train is out of service.
- RCS level is one foot below the Reactor Vessel Flange.
- RHR flow is 3800 gpm.

The primary team has just commenced draining the RCS to mid loop when the RO reports fluctuating amps, discharge pressure, and flow on the running RHR pump. IPI-315, East RHR Pump Suction Half Loop Operation pressure Indicator, indicates 2 psig and is fluctuating.

The event in progress is (1). The SRO will direct actions per (2).

- A. (1) cavitation of the East RHR pump.
(2) 1-OHP-4022-017-001, Loss of RHR Cooling, to stop the East RHR pump.
- B. (1) continuous lifting and reseating of the RHR to Loop 2 safety valve.
(2) 1-OHP-4022-017-001, Loss of RHR Cooling, to stop the East RHR pump.
- C. (1) cavitation of the East RHR pump.
(2) 1-OHP-4021-017-001, Operation Of The Residual Heat Removal System, to lower total RHR flow.
- D. (1) continuous lifting and reseating of the RHR to Loop 2 safety valve.
(2) 1-OHP-4022-002-020, Excessive RCS Leakage, isolate RHR discharge header to Loop 2.

Answer: A

Answer Explanation:

- A. CORRECT - The fluctuating parameters indicate cavitation and are entry conditions for 1-OHP-4022-017-001, Loss of RHR Cooling. With given RHR flow and RCS elevation, the East RHR pump would be stopped.
- B. Incorrect – Incorrect because the suction pressure would not be affected by the relief valve lifting. Plausible as a lifting and reseating safety valve will cause amps and flows to fluctuate and the action to stop the RHR pump would reduce the pressure in the RHR to Loop 2 header.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

78

ID: RO-C-EOP09-E36-Q2

Points: 1.00

Tier# 1	Group # 1	Level SRO
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SRO ONLY

An automatic SI and CTS actuation occurred based on high containment pressure. Automatic and manual isolation of 21 and 24 SG stop valves failed. The Crew performed actions of E-0, Reactor Trip or Safety Injection, and E-2, Faulted SG Isolation for 21 and 24 steam generators. The Crew then transitioned to E-1, Loss of Reactor or Secondary Coolant. After stopping CTS pumps and determining if RHR pumps could be stopped, the Crew is performing step 9 as follows:

Check RCS and SG Pressures

- Pressures in all SGs - STABLE OR RISING
- RCS Pressure - STABLE OR LOWERING

. The RO reports the following parameters:

- RCS pressure is 1500 psig and rising
- 21 SG and 24 SG pressures are 150 psig and lowering
- 22 and 23 SG pressures are 800 psig and lowering

Based on these indications, the Unit Supervisor should direct:

- A. transition back to E-2, Faulted SG Isolation, based on fold out page criteria
- B. transition to ECA-2.1, Uncontrolled Depressurization of All Steam Generators
- C. perform Response Not Obtained step to transition back to E-1, Loss of Reactor or Secondary Coolant, step 1
- D. continuation with step 10 in E-1, Loss of Reactor or Secondary Coolant

Answer: C

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

79

ID: RO-C-AOP0540412-E3-1-SRO

Points: 1.00

Tier# 1	Group # 1	Level SRO
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SRO ONLY

Unit 1 was at 100% power when a trip of the East Main Feed Pump occurred. Automatic system response occurred as expected. The RO and BOP have reported completion of immediate actions from memory of 1-OHP-4022-055-001, Loss of One Main Feed Pump.

The following plant conditions exist:

1. Reactor power is 59%.
2. Turbine Power is 620 Mwe.
3. Main Feed Flows are ~0.5E6 PPH greater than Steam Flow on all four Steam Generators.
4. All Feed Water Regulating Valves are full open.
5. All Steam Generator Narrow Range levels are 50% and rising.
6. The STA reports AFD is outside the acceptable operating region.
7. ROD BANK D LOW-LOW alarm is lit.

The Unit Supervisor's priority will be to direct:

- A. the BOP to verify completion of actions of 1-OHP-4022-055-001, Loss of One Main Feed Pump, to lower running MFP speed and remove integration from FRV controllers.
- B. the BOP to perform actions of 1-OHP-4022-IFR-001, Instrument Failure Response, to respond to a Steam Generator Level Control issue.
- C. Crew entry into 1-OHP-4022-001-006, Rapid Power Reduction Response, to lower power <50%.
- D. the Reactor Operator to commence Normal or Emergency Boration to allow rod withdrawal to clear ROD BANK D LOW-LOW alarm.

Answer: A

Answer Explanation:

- A. CORRECT – Maintaining Steam Flow/Feed Flow mismatch to maintain SG level is an immediate action of 1-OHP-4022-055-001. The indications provided indicate that the BOP has not properly performed these actions. After completion of immediate actions from memory, the SRO is responsible to verify proper completion of immediate actions.
- B. Incorrect – Wrong because the Feed Water Regulating Valve (FRV) response is expected for a loss of one Main Feed Pump and does not indicate an instrument or control system failure requiring entry into IFR-001. Plausible because all FRVs open with SG level above normal level of 44% may be misinterpreted as an instrument/control system failure.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

80

ID: RO-C-08200-E1-1-SRO

Points: 1.00

Tier# 1	Group # 1	Level SRO
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SRO ONLY

Unit 1 Control Room Instrumentation Distribution (CRID) Bus 1 is lost due to a fault condition.

As a result of the loss of CRID 1 bus _____ (1) and _____ (2) is entered to place the plant in a stable condition.

- A. (1) 2 Pressurizer PORV's open
(2) 1-OHP-4022-IFR-001, Instrument failure Response
- B. (1) All 4 Feed Regulating Valves close
(2) 1-OHP-4023-E-0, Reactor Trip or Safety Injection
- C. (1) One group of Steam Dump Valves Open
(2) 1-OHP-4022-IFR-001, Instrument failure Response
- D. (1) Train A safety Injection actuates
(2) OHP-4023-E-0, Reactor Trip or Safety Injection

Answer: B

Answer Explanation:

- A. Incorrect – Wrong because, per 1-OHP-4021-082-008 Table 1, all 3 PORV's will lose the ability to open in Auto but will not automatically reposition on loss of CRID 1. Plausible because closing PORVs is directed in IFR-001.
- B. CORRECT – Per 1-OHP-4021-082-008 Table 1 all 4 Feed Regulating Valves close on a Feed Water Isolation signal. Immediate actions of OHP-4023-E-0, Reactor Trip or Safety Injection will be required as all Main Feed flow has been lost to the Steam Generators.
- C. Incorrect – Wrong because, per 1-OHP-4021-082-008 Table 1, two of the Steam Dump valves will fail closed, not open. Plausible because disabling steam dumps is directed in IFR-001.
- D. Incorrect – Wrong because, per 1-OHP-4021-082-008 Table 1, no Train A Safeguard Actuation will be available. Plausible because E-0 will be entered for the CRID 1 failure.

Question ID (Status) RO-C-08200-E1-1-SRO

Comments:

Reference: 1-OHP-4021-082-008 Table 1, 1-OHP-4022-IFR-001

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

81

ID: RO-C-AOP0590412-E3-Q1

Points: 1.00

SRO ONLY

The following plant conditions existed;

- Both units operating at 100%
- The Unit 2 West ESW Pump is OOS for motor repair
- All ESW unit cross-tie valves are open

A seismic event occurs which results in serious damage in the plant screen house which results in the following:

- The Unit 1 East ESW pump trips on instantaneous overcurrent
- The Unit 1 West ESW main supply header ruptures

No other equipment was affected by the seismic event.

After applicable Unit 1 AOP actions have been taken, **Unit 1** will be in (1) and the status of **Unit 2** ESW operability in accordance with Technical Specifications will be (2)

- A. (1) Mode 1
(2) only one ESW train operable
- B. (1) Mode 1
(2) neither ESW train operable
- C. (1) Mode 3
(2) only one ESW train operable
- D. (1) Mode 3
(2) neither ESW train operable

Answer: C

Answer Explanation:

For this event, abnormal operating procedure, major action categories include attempts to start ESW pumps if none are running, identification and isolation of ESW header ruptures, and follow-up actions for isolation of specific components. For the given conditions, action will be taken to close ESW unit crosstie valves on the ruptured ESW header. This will result in no flow on both Unit 1 ESW headers. This will require the crew to perform actions for Loss of CCW to perform a reactor trip and stop all running RCPs. According to Tech Spec 3.7.8 Bases, when an ESW train is cross-tied with the associated opposite unit train, operability of the train relies on the opposite unit ESW pump. Until the cross-tie valves are closed, the Unit 2 East ESW train is inoperable.

- A. Incorrect - Wrong because Unit 1 will be in Mode 3 due to loss of CCW. Plausible because Unit 2 ESW operability is correct and if candidate does not identify the effect on CCW of loss

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

of ESW and required actions.

- B. Incorrect - Wrong because Unit 1 will be in Mode 3 due to loss of CCW and one train Unit 2 ESW will be operable. Plausible if candidate does not identify the effect on CCW of loss of ESW and required actions and does not identify the required actions to close unit cross-tie valves for a rupture.
- C. CORRECT - Unit 1 is in mode 3 due to loss of CCW and Unit 2 has one operable ESW train.
- D. Incorrect - Wrong because Unit 2 has one operable ESW train. Plausible if candidate does not identify the required actions to close unit cross-tie valves for a rupture

Question ID RO-C-AOP0590412-E3-Q1

Comments:

Reference: 1/2-OHP-4022-019-001 Rev 12, Tech Spec 3.7.8 Bases, 1/2-OHP-4022-016-004 Rev 26/29

Source: New

Associated objective(s):

(RO-C-AOP0590412-E3): Given conditions explain the procedural mitigation strategy for ESW System Loss or Rupture in accordance with OHP-4022-019-001, ESW Loss or System Rupture.

Associated K&A(s):

(APE 62) G2.4.6

Importance Factor: 4.7

K&A Statement: Knowledge of emergency and abnormal operating procedures major action categories

Question Cognitive Level: Comprehension or Analysis H / 5

10 CFR Part 55 Content: 10 CFR 55.41 .7

10 CFR 55.43 .5

SRO Justification - Requires assessment of conditions and knowledge of Technical Specification bases for the different specifications.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

82

ID: CM-8700-SRO

Points: 1.00

Tier# 1	Group # 2	Level SRO
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SRO ONLY - OPEN REFERENCE

Unit 2 is at 90% power. The unit has just stabilized following a main turbine stop valve closure from 100%. Control Bank D inserted from 218 steps to 204 steps as indicated on the Control Bank Step Demand Counter. The associated Control Bank D Group 1 individual rod positions indicate as follows:

- Control Rod D4: 191 steps.
- Control Rod D12: 198 steps.
- Control Rod M12: 202 steps.
- Control Rod M4: 218 steps.

MTI has determined that Control Rod M4 is mechanically bound.

Which ONE of the following describes actions that are required by Technical Specifications?

- A. Immediately place Rod Control in MANUAL and monitor and record RCS Tavg once per hour.
- B. Verify shutdown margin is within limits within 1 hour and reduce thermal power to less than 75% within 2 hours.
- C. Verify shutdown margin is within the limits within 1 hour AND be in Hot Standby within 6 hours.
- D. Immediately trip the reactor AND emergency borate the RCS.

Answer: C

Answer Explanation:

Tech Spec 3.1.4 states rod positions shall be within 12 steps of their group step counter or as determined by Figure 3.1.4-1. The derived value of ARM is calculated by Reactor Engineering and the resultant ARM limit are provided on TDB-2-FIG-13-1. Allowable Rod Misalignment (ARM) is ± 18 steps per TDB-2-FIG-13-1, Target Band and ARM, Revision 426.

- A. Incorrect - Wrong because this is the action required for more than one RPI per group inoperable per Tech Spec 3.1.7. Plausible if the candidate believes Rod Position Indications are not within limits because D4 and M4 are >12 steps from the step counter indication.
- B. Incorrect - Wrong because this is the action required for one rod not within alignment limits per Tech Spec 3.1.4. Plausible if the candidate determines rod M4 is misaligned based on IRPI indication and confirmation that the rod did not move during the transient.
- C. CORRECT - This is the action for one or more inoperable rods per Tech Spec 3.1.4. M4 is

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

83

ID: RO-C-EOP01-E27-Q2

Points: 1.00

Tier# 1	Group # 2	Level SRO
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SRO ONLY

2-NLP-151, Pressurizer Level Channel 1, failed low. The Crew is performing actions of 2-OHP-4022-013-010, Pressurizer Level Instrument Malfunction. When the RO attempted to move the Pressurizer Level Control Selector Switch from the CHANNELS 1&2 position to the CHANNELS 2&3 position, the switch was mechanically bound and could not be moved.

Which of the following describes one impact on subsequent recovery actions (1) and one compensatory action that should be taken by the Unit Supervisor (2)?

- A. (1) Automatic control of 2-RU-23 Pressurizer Level Master Controller will not be possible.
(2) Approve a procedure deviation for the step to restore Letdown.
- B. (1) Automatic control of 2-RU-23 Pressurizer Level Master Controller will not be possible.
(2) Direct the RO to place Excess Letdown in service per 1-OHP-4021-003-001, Letdown, Charging and Seal Water Operation.
- C. (1) Automatic control of 2-RU-29 Charging Discharge Flow Control Valve 2-QRV-251 Controller will not be possible.
(2) Approve a procedure deviation for the step to restore Letdown.
- D. (1) Automatic control of 2-RU-29 Charging Discharge Flow Control Valve 2-QRV-251 Controller will not be possible.
(2) Direct the RO to place Excess Letdown in service per 1-OHP-4021-003-001, Letdown, Charging and Seal Water Operation.

Answer: B

Answer Explanation:

Failure to deselect the failed channel will prevent automatic operation of the pressurizer level master controller since this controller receives the input from the controlling pressurizer level channel. Subsequent steps of 2-OHP-4022-013-010 will determine letdown is not in service and direct restoration of normal letdown. This will not be possible since 2-NLP-151 will prevent re-opening 2-QRV-112, RC Letdown to Regen HX. Normal guidance for procedure use and adherence contained in PMP-2010-PRC-003 would require action to document deviation from a procedure by not performing a step as written. OHI-4023, Abnormal/Emergency Procedure User's Guide, provides the guidance to use for procedure deviation in AOP/EOP implementation. The Note prior to step 4.7.6.b states that "Omission or addition of an action to start a component or align a system due to equipment UNAVAILABILITY should NOT be considered a procedure deviation provided the intent of the step is met." Therefore, failure to perform restoration of normal letdown due to failure of the Pressurizer Level Control Selector Switch is not a procedure deviation. 2-OHP-4022-013-010 will subsequently direct verifying the pressurizer level master controller in Manual and placing 2-QRV-251 in Automatic. Since the input to the Master Controller will not affect its output when it is in Manual, automatic control of 2-QRV-251 will be possible.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

84

ID: NRCAUDIT07-1024-SRO

Points: 1.00

Tier# 1	Group # 2	Level SRO
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SRO ONLY

Given the following events and conditions:

Unit 2 is in Mode 6 with core reload in progress.

Containment purge is in service

A fuel assembly accidentally dropped into the cavity.

ERS-2305 and ERS-2405, Lower Containment Noble Gas Low Range Radiation Monitors, have a HIGH alarm.

Both LOWER CONTAINMENT RAD MONITOR TRIP BLOCK switches are in the NORMAL position.

Which ONE of the following lists the procedure that the Unit Supervisor should direct and the effect on the Containment Purge system, assuming that operators follow the required procedure steps and systems operate as designed?

- A. 12-OHP-4022-018-004, Irradiated Fuel Handling Accident in Containment Building - Control Room Actions.
Containment Purge stops and isolates automatically.
- B. 12-OHP-4022-018-009, Dropped or Damaged New Fuel Assembly - Control Room Actions.
Containment Purge stops and isolates automatically.
- C. 12-OHP-4022-018-004, Irradiated Fuel Handling Accident in Containment Building - Control Room Actions.
Containment Purge is manually stopped and isolated by the Control Room operator.
- D. 12-OHP-4022-018-009, Dropped or Damaged New Fuel Assembly - Control Room Actions.
Containment Purge is manually stopped and isolated by the control room operator.

Answer: A

Answer Explanation:

Two procedures govern dropped or damaged fuel incidents in containment. 12-OHP-4022-018-004 is for irradiated fuel and 12-OHP-4022-018-009 for new fuel. During a core reload, either procedure could apply based on the specific fuel assembly that is dropped/damaged. Since the event has resulted in high radiation conditions as indicated by the radiation monitors, the fuel assembly can be determined to be irradiated.

- A. CORRECT - Procedure is correct. High Radiation conditions on ERS-2305 and ERS-2405 automatically stop Containment Purge fans and isolate associated dampers.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

85

ID: RO-C-EC02-E3-1-SRO

Points: 1.00

Tier# 1	Group # 2	Level SRO
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SRO ONLY

Given the following plant conditions:

- Unit 2 is at 100% power
- A boat in Lake Michigan near the plant has inadvertently released a large quantity of chlorine gas which drifted over the plant.
- Due to a failure of Unit 2 Control Room ventilation, chlorine gas has entered the Unit 2 Control Room.
- Unit 1 Control Room is unaffected.
- Due to the hazardous environment in the Unit 2 Control Room, it is decided by the Shift Manager that the Unit 2 Control Room must be evacuated **IMMEDIATELY**.

You are the Unit 2 Unit Supervisor.

What procedure would you enter and what actions would you direct to be completed prior to evacuating the Control room?

2-OHP-4022-CRE-001 – Control Room Evacuation
2-OHP-4025-001-001 – Emergency Remote Shutdown

- A. Enter 2-OHP-4022-CRE-001 and direct a reactor trip and to check the turbine is tripped.
- B. Enter 2-OHP-4025-001-001 and direct a reactor trip and to check the turbine is tripped.
- C. Enter 2-OHP-4022-CRE-001 make a plant announcement and direct a reactor trip only.
- D. Enter 2-OHP-4025-001-001 make a plant announcement and direct a reactor trip only.

Answer: A

Answer Explanation:

- A. CORRECT –2-OHP-4022-CRE-001 is used when a fire is NOT the reason for evacuating the Control Room. A note prior to step 1 states steps 3-7 are to completed prior to evacuation only as conditions allow. If CR evacuation is being performed for toxic as intrusion, only the first two steps should be performed.
- B. Incorrect - Wrong because 2-OHP-4025-001-001 is not the correct procedure. Plausible because 2-OHP-4025-001-001 does contain guidance to trip the reactor and to check the turbine trip, but turbine is not checked for an immediate evacuation due to a fire.
- C. Incorrect - Wrong because these are the actions for 2-OHP-4025-001-001. Plausible because the procedure choice is correct, the direction to trip the reactor is correct, and an announcement would be made later in the procedure.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

86

ID: CM-1052B-SRO

Points: 1.00

Tier# 2	Group # 1	Level SRO
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SRO ONLY - OPEN REFERENCE

Given the following conditions in Unit 2:

- Large break LOCA occurred
- A loss of all offsite AC power occurred
- Both Emergency Diesel Generators started and re-energized all AC emergency buses
- The Crew responded per E-0 and ES-1.3 to establish cold leg recirculation
- The West RHR pump suction line from the containment sump is leaking downstream of 2-ICM-306
- The suction line isolation valve 2-ICM-306 cannot be closed.
- Radiation Monitors indicate as follows:
 - VRS-2500, Unit 2 Vent Noble Gas: 3.3E+01 micro curies/cc
 - VRA-2310, Unit 2 Upper Containment High Range: 320 R/hour
 - VRA-2410, Unit 2 Lower Containment High Range: 250 R/hour

What is the highest applicable emergency classification level for this event?

- A. Unusual Event
- B. Alert
- C. Site Area Emergency
- D. General Emergency.

Answer: D

Answer Explanation:

- A. Incorrect - Wrong classification, this is not the highest applicable classification level. Plausible because conditions for an Unusual Event are met due to the loss of all offsite AC power.
- B. Incorrect - Wrong classification, this is not the highest applicable classification level. Plausible because conditions for an Alert are met due to loss of RCS barrier.
- C. Incorrect - Wrong classification, this is not the highest applicable classification level. Plausible because conditions for a Site Area Emergency are met due to loss of RCS and Containment barriers.
- D CORRECT - Conditions are met for General Emergency based on IC RG1.1 due to radiation monitor VRS-1500 indication greater than 3.3E0 microcuries/cc.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

87

ID: ID RO-C-EOP01-E27-Q1

Points: 1.00

Tier# 2	Group # 1	Level SRO
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SRO ONLY

Unit 2 is operating at 100% power with the pressurizer level control switch in the CHANNELS 1&2 position. Pressurizer Level Channel 1 fails, resulting in a loss of pressurizer heaters. The following annunciators actuate:

- 208 Drop 4, PRESSURIZER LEVEL LOW DEVIATION
- 208 Drop 5, PRESSURIZER LEVEL LOW ALL HTRS OFF
- 208 Drop 50, SCR FAN FAILURE

Which of the following describes (1) how the pressurizer heaters are de-energized for this failure and (2) what procedure(s)/actions will the US direct that will restore pressurizer heaters to service?

- A. (1) Individual Group Backup heater breakers are tripped
(2) 2-OHP-4022-IFR-001, Instrument Failure Response, to place the Pressurizer Level Controller in Manual then ARP 208-50 to reset tripped pressurizer individual Group Backup heater breakers
- B. (1) Individual Group Backup heater breakers are tripped
(2) 2-OHP-4022-013-010, Pressurizer Level Instrument Malfunction, to defeat the failed level channel and reset tripped pressurizer individual Group Backup heater breakers
- C. (1) TR21PHC and TR21PHA 4 KV Supply Breakers trip open
(2) 2-OHP-4022-IFR-001, Instrument Failure Response, to place the Pressurizer Level Controller in Manual then ARP 208-50 to reset and close tripped 4KVbreakers
- D. (1) TR21PHC and TR21PHA 4 KV Supply Breakers trip open
(2) 2-OHP-4022-013-010, Pressurizer Level Instrument Malfunction, to defeat the failed level channel and reset and close tripped 4KV supply breakers

Answer: B

Answer Explanation:

- A. Incorrect - Wrong because placing the Pressurizer Level controller in manual will not allow heater reset. Plausible because IFR-001 actions would energize heaters for a pressure instrument failure and because use of the ARP for 208-50 provides direction for resetting the cycling heaters when Pressurizer level is >17%.
- B. CORRECT- Pressurizer heaters are tripped off by a failure of the controlling pressurizer level channel by sending a trip signal to each individual backup heater group breaker. Heater breakers cannot be closed until the trip signal is defeated by placing the Pressurizer Level Control switch to an operable channel position. This action is performed in 2-OHP-4022-013-010.
- C. Incorrect - Wrong because TR21PHC and TR21PHA 4 KV Supply Breakers are not affected

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

88

ID: RO-C-00900-E13-1-SRO

Points: 1.00

Tier# 2	Group # 1	Level SRO
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SRO ONLY

Unit One was in Mode 3 when informed by engineering that the Automatic **actuation** of Train A Containment Spray System (CTS) is inoperable. Manual actuation is still available. Tech Spec 3.6.6 Condition A has been entered. A cool down is in progress as Engineering reported repairs will take greater than 72 hours to complete.

The earliest Condition A may be exited is _____ because _____ .

- A. Mode 4, manual actuation is credited for Operability in this mode.
- B. Mode 4, there is insufficient energy to result in containment overpressure in this mode.
- C. Mode 5, manual actuation is credited for Operability in this mode.
- D. Mode 5, there is insufficient energy to result in containment overpressure in this mode.

Answer: A

Answer Explanation:

- A. CORRECT – TS 3.6.6 Bases for SR 3.6.6.4 explains a note in the Tech Spec that in Mode 4, only the manual portion of the actuation signal is required. It explains that in TS 3.3.2 Engineered safety Features Actuation (ESFAS) Instrumentation.
- B. Incorrect – Wrong because the listed reason is for why CTS is not required in Modes 5&6. Plausible because exit Mode is correct and reason is related to basis for Mode 5 requirements.
- C. Incorrect – Wrong because this is not the earliest the condition would be exited. Plausible because reason is correct.
- D. Incorrect – Wrong because this is not the earliest the condition would be exited. Plausible as CTS is not required in Mode 5.

Question ID RO-C-00900-E13-1-SRO

Comments:

Reference: Technical Specification 3.6.6, Technical Specification Bases 3.6.6, Technical Specifications 3.3.2

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-00900-E13) Explain the basis for the following Technical Specification/TRM LCOs, Action Statements:

3.3.2, ESFAS (CTS Actuation Signal)

3.6.6, Containment Spray System

3.6.7, Spray Additive System

3.6.9, Distributed Ignition System

3.6.10, Containment Air Recirculation/Hydrogen Skimmer (CEQ) System

TRM 8.3.7 Post Accident Monitoring (PAM) Instrumentation

Associated K&A(s):

G 2.2.25

Importance Factor: 4.2

K&A Statement: Knowledge of the bases in TS for limiting conditions for operation and safety limits (SRO Only)

Question Cognitive Level: Comprehension or Analysis

H / 5

10 CFR Part 55 Content: 10 CFR 55.41 _____

10 CFR 55.43 .2_____

SRO Justification - Question requires knowledge to Technical Specification bases for the different specifications.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

89

ID: RQ-C-05600-T2-Q2

Points: 1.00

Tier# 2	Group # 1	Level SRO
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SRO ONLY

The Auxiliary Building AEO reports that the cable for the Unit 2 Train N Battery positive terminal shows signs of severe overheating and is disconnected. There are no other abnormal conditions reported by the AEO. The BOP reports there are no annunciators actuated in the Control Room.

Which of the following describes the effects on the capability of the Auxiliary Feedwater System and operability of the AFW and Train N DC electrical power systems?

- A. The TDAFP will NOT automatically start if an auto start signal subsequently actuates.
The Train N DC electrical power subsystem is inoperable.
The turbine driven auxiliary feedwater train is inoperable.
- B. FMO-211, -221, -231, & -241, TDAFP to SG Isolation Valve(s), are failed in the open position.
The Train N DC electrical power subsystem is operable.
The turbine driven auxiliary feedwater train is inoperable.
- C. The TDAFP will automatically start if an auto start signal subsequently actuates.
The Train N DC electrical power subsystem is inoperable.
The turbine driven auxiliary feedwater train is inoperable.
- D. FMO-211, -221, -231, & -241, TDAFP to SG Isolation Valve(s), are energized and in the open position.
The Train N DC electrical power subsystem is operable.
The turbine driven auxiliary feedwater train is operable.

Answer: C

Answer Explanation:

The Train N Distribution consists of a battery and charger. The charger normally supplies the DC distribution system loads a float current for the battery. For the indications given, the Battery Charger is still supplying DC power to the turbine driven auxiliary feed pump control circuitry and TDAFP discharge valves.

- A. Incorrect - Wrong because the TDAFP will still automatically start. Plausible because both systems are inoperable per Tech Specs.
- B. Incorrect - Wrong because the TDAFP to SG Isolation valves remain powered. Plausible if the candidate believes that the Train N DC system is operable simply by being energized and because the turbine driven auxiliary feedwater train is inoperable.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

- C. CORRECT - The AFW system will still function normally because it is still supplied with DC power from the battery charger. The Train N DC electrical power subsystem is inoperable based on Tech Spec bases which states a battery and charger are required for operability. The turbine driven auxiliary feedwater train is inoperable as directed by T.S 3.8.4 Condition D Required Action D.1.
- D. Incorrect - Wrong because neither system is operable. Plausible because AFW system will still function normally because it is still supplied with DC power from the battery charger, and therefore both systems are functional.

Question ID RQ-C-05600-T2-Q2

Comments:

Reference: Technical Specification 3.8.4, Technical Specification 3.8.4 Bases, Electrical Print OP-2-98210 Rev 19, 2-OHP-4021-056-002 Attachment 11 Rev 39 Section 4.18

Source: New

Associated objective(s):

(RO-C-05600-E4): List the components in the AFW system that are powered from the "N" train DC power distribution system.

(RO-C-05600-E13): Given a description of plant conditions, determine applicable TRM, TS, System Operability, and most limiting LCO in accordance with ITSA-U1 (U2), ITSA-U1(U2)-Bases, and TRM-U1(U2).

Associated K&A(s):

SYS.061.A2.03

Importance Factor: 3.8

K&A Statement: Ability to (a) predict the impacts of the following on the Auxiliary/Emergency Feedwater System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Loss of DC power

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41 .5
10 CFR 55.43 _____

SRO Justification - Question requires assessment of conditions and knowledge of Technical Specification bases for the different specifications.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

90

ID: NRCAUDIT07-0165-SRO

Points: 1.00

Tier# 2	Group # 1	Level SRO
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SRO ONLY

During performance of 1-OHP-4022-064-002, Loss Of Control Air Recovery, you are preparing to initiate a cooldown and depressurization. The procedure contains a caution pertaining to Safety Injection (SI) actuation.

The SI actuation referred to in this caution may be caused by (1). If SI is actuated during the subsequent cooldown, the Unit Supervisor should (2).

- A. (1) steamline differential pressure due to uneven cooling of the Steam Generators.
(2) direct a transition to 1-OHP-4023-E-0, Reactor Trip or Safety Injection.
- B. (1) steamline differential pressure due to uneven cooling of the Steam Generators.
(2) direct a transition 1-OHP-4023-ES-1-1, SI Termination.
- C. (1) low pressurizer pressure due to loss of Pressurizer pressure control
(2) direct a transition to 1-OHP-4023-E-0, Reactor Trip or Safety Injection.
- D. (1) low pressurizer pressure due to loss of Pressurizer pressure control.
(2) direct a transition to 1-OHP-4023-ES-1-1, SI Termination.

Answer: A

Answer Explanation:

Text of the caution: **Caution:** If pressure in one SG becomes 100 psig LESS THAN pressure in any two other SGs during RCS cool down, a SI signal will be generated.”

- A. CORRECT - If Steam line pressure in any SG becomes >100 psig less than the two others a SI signal will be generated. This signal cannot be blocked. Procedure rules of usage in OHI-4023 require transition to E-0 if a safety injection occurs in Modes 1-3 due to exceeding setpoint.
- B. Incorrect - Wrong because transition directly to ES-1.1 not allowed. Plausible because cause of the SI is correct and because the foldout page for 1-OHP-4022-064-002 only directs SI actuation for low pressurizer level or loss of subcooling and the beyond design basis nature of the event would allow for immediate transition to ES-1.1 for a non-accident actuation of SI.
- C. Incorrect - Wrong because RCS pressure can be controlled through use of backup heaters and PORVs and the low pressurizer pressure SI signal will be blocked. Plausible because pressurizer pressure will be lowered below the SI setpoint during the cooldown and the transition is correct.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

91

ID: RO-C-05400-E8-1-SRO

Points: 1.00

Tier# 2	Group # 2	Level SRO
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SRO ONLY

Unit 1 was operating at 75% power when the following alarms were received:

- 118 Drop 75, CONDENSER PIT FLOODED LEVEL HIGH
- 118 Drop 74, CONDENSER PIT FLOODED LEVEL HI-HI

The AEO sent to investigate reported a large rupture on the Condensate Booster Pump discharge header that resulted in water spray which tripped both running Condensate Booster Pumps. At the same time, the BOP reported a trip of the East Main Feed Pump.

(1) What is the response of the Condensate system to the loss of the Condensate Booster Pumps?

(2) What action should be directed by the Unit Supervisor?

- A. (1) 1-CRV-224 LP Heater Bypass, will modulate open. If system pressure continues to lower, the standby Condensate Booster Pump will automatically start.
(2) Direct the Crew to trip the reactor, perform immediate actions of 1-OHP-4023-E-0, Reactor Trip or Safety injection, and close all SG Stop Valves.
- B. (1) 1-CRV-224 LP Heater Bypass, will modulate open. If system pressure continues to lower, the standby Condensate Booster Pump will automatically start.
(2) Direct the Crew to perform immediate actions of 1-OHP-4022-055-001, Loss of One Main Feed Pump.
- C. (1) The standby Condensate Booster Pump will automatically start. If system pressure continues to lower, 1-CRV-224 LP Heater Bypass, will modulate open.
(2) Direct the Crew to trip the reactor, perform immediate actions of 1-OHP-4023-E-0, Reactor Trip or Safety injection, and close all SG Stop Valves.
- D. (1) The standby Condensate Booster Pump will automatically start. If system pressure continues to lower, 1-CRV-224 LP Heater Bypass, will modulate open.
(2) Direct the Crew to perform immediate actions of 1-OHP-4022-055-001, Loss of One Main Feed Pump.

Answer: C

Answer Explanation:

With no running Condensate Booster Pumps, the standby Condensate Booster Pump will start on 325 psig pressure at the Booster Pump discharge. 1-CRV-224 will not start to modulate open until 240 psig Feed Pump Suction Pressure. The ARP for 118-74 directs a reactor trip, transition to E-0, and closure of SG Stop Valves for an unisolable condensate system rupture. Entry conditions for 1-OHP-4022-055-001 are satisfied, but the ARP actions represent a higher priority due to the potential for condenser pit flooding and possible adverse impact to safety related equipment.

- A. Incorrect - Wrong because the Condensate Booster Pump will start prior to CRV-224

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

opening. Plausible because both auto actions occur but in reverse order and because highest priority procedure actions are directed.

- B. Incorrect - Wrong because the highest priority procedure actions are not directed. Plausible because both auto actions occur but in reverse order and because entry conditions are met for 1-OHP-4022-055-001
- C. CORRECT - Order of automatic actions is correct and highest priority procedure actions are directed.
- D. Incorrect - Wrong because the highest priority procedure actions are not directed. Plausible because order of automatic actions is correct and because entry conditions are met for 1-OHP-4022-055-001

Question ID RO-C-05400-E8-1-SRO

Comments:

Reference: 1-OHP-4024-115 Rev 26 Drop 41, 1-OHP-4024-116 Rev 46 Drop 73, 1-OHP-4024-118 Rev 39 Drop 74, 1-OHP-4022-055-001 Rev 12

Source: New

Associated objective(s):

(RO-C-05400-E8): Evaluate the conditions that will cause the following components to trip, automatically/manually start and/or automatically/manually reposition:

- a. Hotwell Pumps
- b. Hotwell Pump and SJAE Recirc Valve
- c. Condensate Booster Pumps
- d. Condensate Booster Pump Recirc Valves
- e. Steam Jet Air Ejectors
- f. Condensate Booster Pumps Recirc Valves

Associated K&A(s):

SYS.056.A2.04

Importance Factor: 3.7

K&A Statement: Ability to (a) predict the impacts of the following on the (SF4S CDS) CONDENSATE SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Loss of condensate pumps

Question Cognitive Level: Comprehension or Analysis H / 4

10 CFR Part 55 Content: 10 CFR 55.41 _____
10 CFR 55.43 5

SRO Justification: The SRO applicant is required to analyze the effect of the combination of pieces of information, determine the effect on the plant, and select the correct procedure transition.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

92

ID: RO-C-02200-E4-1

Points: 1.00

Tier# 2	Group # 2	Level SRO
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SRO ONLY - OPEN REFERENCE

You are the Work Control SRO. The following conditions exist:

- The WDS Operator is working on a liquid release of #4 Monitor Tank via Unit Two.
- RRS-1000, Waste Disposal System Effluent Monitor, is available.
- The AEO informs you that the release was approved by Chemistry and Environmental for four Circulating Water Pumps (CWP) in service with a maximum release flow rate of 40 GPM and a minimum dilution flow rate of 690,000 GPM.
- The WDS Operator asks you to approve the release.

While performing your review for approval, 24 CWP trips.

Based on the trip of 24 CWP, you should:

- A. Approve the original release as three Circulating Water Pumps provide sufficient dilution flow.
- B. Direct the WDS Operator to route new release paperwork for three Circulating Water Pumps in service.
- C. Direct the WDS Operator to perform the release at the next lower maximum release rate of 25 GPM.
- D. Approve the release through Unit One as they have three Circulating Water Pumps in service and a lower allowed minimum flow dilution rate.

Answer: B

Answer Explanation:

Loss of a Circulating Water Pump impacts the allowable release rate for the Liquid Release system when tritium is above the limit.

- A. Incorrect – Wrong because, according to the Table at step 4.8.1, three CWPs provide 586,500 GPM flow, which is less than the limit of 690,000 GPM. Plausible because the listed administrative Minimum Dilution Flow rate is 586,500 GPM.
- B. CORRECT – Since the release was approved by both Chemistry and Environmental with a minimum dilution flow of 690,000 GPM (>586,500 GPM listed for tritium between 0.1 and 2.0 $\mu\text{Ci/ml}$) this indicates that tritium is >2.0 $\mu\text{Ci/ml}$ and that Environmental will need to recalculate the administrative release flow rate and minimum dilution flow rate based on current plant conditions.
- C. Incorrect – Wrong because maximum release rates are set by Chemistry and Environmental and cannot be changed by Operations after their approval has been given. Plausible because 25 GPM is the next lowest release rate listed below 40 GPM on Data Sheet 1 Section 2

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

93

ID: CM-0634

Points: 1.00

Tier# 2	Group # 2	Level SRO
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SRO ONLY

Which ONE of the following meets a TRM requirement for an operable Fire Suppression Water System (8.7.5)?

- A. Two Storage Tanks with 565,000 gal of water in each tank.
- B. One Motor Driven Fire Pump with an operable flow path to the Header.
- C. One Backup Diesel Fire Pump with an operable flow path from the intake structure.
- D. One Diesel Driven Fire Pump with a minimum of 160 gallons of Fuel Oil.

Answer: A

Answer Explanation:

- A. CORRECT - TRM 8.7.5 requires 3 Fire Suppression Water pumps (1 Motor Driven and 2 Diesel Driven pumps, 2 Storage tanks with 565,000 gallons each, and an Operable flow path from the storage tanks through the pumps transferring the water to the distribution header.
- B. Incorrect - 3 pumps are required but plausible as the Motor Driven is the first to Auto start on lowering header pressure and supplies 2500 gpm for firefighting.
- C. Incorrect - 3 pumps are required but plausible as the Screen House Fire pumps were part of the original Fire water suppression system are still installed at DC Cook although not used.
- D. Incorrect - 3 pumps are required but plausible as the 160 gallon volume is the correct SR volume for one diesel driven water pump storage tank. One diesel pump will supply 2500 gpm when running.

Question ID (Status) CM-0634

Comments:

Reference: Technical Requirements Manual 8.7.5 and 8.7.4

Source: Bank

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Associated objective(s):

(RO-C-AS17-E10) Explain the basis for the Fire Water Protection System TRM's, Action Statements, and Surveillance Requirements:

8.7.5 Fire suppression water system.

8.7.6 Spray and/or sprinkler system.

Associated K&A(s):

(086)(SF8 FPS) G 2.2.38

Importance Factor: 4.5

K&A Statement: Knowledge of conditions and limitations in the facility license

Question Cognitive Level: Memory or Fundamental Knowledge F / 3

10 CFR Part 55 Content: 10 CFR 55.41 .7/10

10 CFR 55.43 .1

SRO Justification - Question requires knowledge to Technical Requirement Manual bases for the different specifications.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

94

ID: NRCAUDIT07-0651A

Points: 1.00

Tier# 3	Group #	Level SRO
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SRO ONLY - OPEN REFERENCE

Given the following plant conditions:

- Unit 1 is shutdown with the RCS at 2235 psig and 547°F.
- Unit 2 is shutdown with the RCS at 325 psig and 170°F.
- The Shift Manager, Unit Supervisors, STA, and WCC-SRO are manned as required
- The shift began at minimum staffing levels

(1) Minimum shift staffing for the station based on OHI-4000 requires which minimum number of Reactor Operators under the conditions shown above?

- One RO becomes seriously ill while on watch and must be taken to the hospital. There are four hours left until shift change.

(2) Which ONE of the following describes the required actions?

	<u>Minimum required Reactor Operators</u>	<u>Required Action</u>
A.	3	Action must be taken within one hour to identify a relief operator who will arrive within the following three hours.
B.	4	The affected operator must not be allowed to leave site until a relief operator arrives.
C.	3	No action is required since turnover will occur within four hours.
D.	4	Action must be taken to ensure a relief operator arrives within two hours

Answer: D

Answer Explanation:

- A. Incorrect -Wrong because number of ROs is incorrect. Plausible because if candidate does not account for the Shared RO requirement. The operator must be replaced within 2 hours. Plausible since typical TS required actions are required within 1 hour to start and/or 4 hours total.
- B. Incorrect – The number of ROs is correct. Plausible if candidates does not know TS Allows for unexpected absences. The Operator must leave (FFD requirements apply).
- C. Incorrect -Wrong because number of ROs is incorrect. Plausible as the typical TS 4 hour allowance is contained in many actions.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

95

ID: CM-1064-1

Points: 1.00

Tier# 3	Group #	Level SRO
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SRO ONLY

Select the ONE instance described below when the Shift Manager would direct an Operator to make a plant announcement directing personnel to “report to an Assembly Area located in the Office Buildings or Service Building for accountability at this time. Use an accountability card reader and then remain in the area for further announcements.”

- A. Initial declaration of an Unusual Event
- B. Escalation to an Alert from an Unusual Event
- C. Escalation to a Site Area Emergency from an Alert.
- D. Escalation to General Emergency from a Site Area Emergency.

Answer: C

Answer Explanation:

The announcement is made at the direction of the Shift Manager during performance of PMP-2080-EPP-100 Attachment 4 Accountability. Accountability is required for a Site Area Emergency or for a General Emergency where accountability has not been performed. It is only performed once per event.

- A. Incorrect - Wrong because accountability is not required for UE. Plausible because all classifications require a plant announcement and if the candidate believes any emergency requires accountability.
- B. Incorrect - Wrong because accountability is not required for Alert. Plausible because this is the first emergency classification level which requires activation of the Emergency Centers.
- C. CORRECT - Accountability is required for a Site Area Emergency.
- D. Incorrect - Wrong because since accountability is required for a Site Area Emergency, it would not be performed a second time on the upgrade to General Emergency from Site Area Emergency. Plausible because accountability would be performed for a General Emergency if there had not been a previous Site Area Emergency.

Question ID: CM-1064-1

Comments:

Reference: PMP-2080-EPP-100 Attachment 4 Rev. 43

Source: New

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

96

ID: RQ-C-CPS-T1-Q2

Points: 1.00

Tier# 3	Group #	Level SRO
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SRO ONLY - OPEN REFERENCE

Unit 1 is operating at 100%. You are the Work Control SRO. You have been tasked with performing the SRO Clearance Review for an inspection of the actuator motor for 1-CMO-419, CCW from East RHR Heat Exchanger. The Clearance Writer determined that the 600V breaker for 1-CMO-419 should be Red tagged OPEN and that a tag should be hung on the Control Room switch.

For this clearance, a _____ is required on the Control Room switch for 1-CMO-419.

- A. No tag
- B. Caution tag
- C. Striped Red tag
- D. Red tag

Answer: B

Answer Explanation:

Per 12-OHP-2110-CPS-001, Clearance Permit System (Page 41 of 63), if the component that the switch serves is undergoing maintenance, then the switch should be Caution tagged. If the component that the switch serves is providing an isolation boundary, then the switch should be Red tagged. Since the control switch is for the component being worked, a Caution tag should be used.

- A. Incorrect - Plausible if candidate believes the 600v breaker Red Tag provides sufficient protection.
- B. CORRECT - See explanation above.
- C. Incorrect - Plausible because a Striped Red tag would be used if the control switch was for a component that was providing protection.
- D. Incorrect - Wrong because type of tag is incorrect. Plausible because red tag would be used if the control switch was for a component that was providing protection.

Question ID (Status) RQ-C-CPS-T1-Q2

Comments:

Reference: 12-OHP-2110-CPS-001 Rev 63 Pages 10 and 41

Provided Reference: 12-OHP-2110-CPS-001 Attachment 1, Tagging Methods and Special Considerations

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

97

ID: CM-40376-SRO

Points: 1.00

Tier# 3	Group #	Level SRO
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SRO ONLY - OPEN REFERENCE

Reactor power was raised to 90% about 3 hours ago. The rod control system was in automatic when a ROD CONTROL URGENT FAILURE alarm was received.

A troubleshooting plan has been developed which involves Engineering and Maintenance taking readings inside the power cabinets.

Which ONE of the following identifies the risk level and the approval authority required for this plan? (Assuming no Alternates)

- A. Medium Risk - Operations Director approval
- B. Medium Risk - Plant Manager approval
- C. High Risk - Site Vice President approval
- D. High Risk - Operations Director approval

Answer: C

Answer Explanation:

Since the Equipment will not be removed from service and the activities have a potential for a reactor trip and or transient the Risk category would be High requiring the Site VP or Plant Manager Approval.

- A. Incorrect - Wrong because Risk is HIGH (Ops Director is correct authority for Medium risk)
- B. Incorrect - Wrong because Risk is HIGH (PM Approval is acceptable)
- C. CORRECT - Risk is High and Site VP is an allowable approver.
- D. Incorrect - Wrong because Site VP or PM approval required for High Risk activities.

Any INCORRECT choice is plausible if either the risk assessment is improperly assigned or the approver is not at the correct level as determined by PMP-2291-TRS-001.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

Question ID (Status) CM-40376-SRO

Comments:

The K/A for this question is unique to the SRO position in that is linked to an SRO only task (Determine if additional contingencies or compensatory actions are required for a troubleshooting plan.) The task is not repeated in the RO program.

Reference: PMP-2291-TRS-001 Rev 15, Troubleshooting

Provided Reference: PMP-2291-TRS-001, Troubleshooting - Pages 17-19

Associated objective(s):

Source: Bank

Associated objective(s):

(RO-C-ADM03-E7) Given PMP-2291-TRS-001, Troubleshooting and a set of conditions, determine the adequacy of contingencies in a troubleshooting plan.

Associated K&A(s):

G 2.2.20

Importance Factor: 3.8

K&A Statement: Knowledge of the process for managing troubleshooting activities

Question Cognitive Level: Comprehension or Analysis H / 3

10 CFR Part 55 Content: 10 CFR 55.41 .10
 10 CFR 55.43 .5

Comments: The K/A for this question is unique to the SRO position in that is linked to an SRO only task (Determine if additional contingencies or compensatory actions are required for a troubleshooting plan.) The task is not repeated in the RO program.

SRO Justification - Question requires knowledge required of the SRO position as explained above.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

98

ID: NRCAUDIT07-0905-SRO

Points: 1.00

Tier# 3	Group #	Level SRO
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SRO ONLY - OPEN REFERENCE

You are the Unit Supervisor and are briefing two operators on a system startup lineup. The system requires dual verification. The operators note that a drain valve on the lineup is located in a Locked High Radiation Area (LHRA). No maintenance has been performed on this portion of the system. The dose rate in the area of the valve is 1.5 Rem/hr. The task is expected to take 10 minutes.

Which ONE of the following methods will result in the LOWEST exposure AND still meet procedural requirements?

- A. Direct one operator to perform the initial valve position check, waive the independent verification and note the exemption on the lineup sheet.
- B. Waive both the initial check and independent verification and note the exemption on the lineup sheet.
- C. Submit a request to the ALARA committee to grant a waiver to both the initial check and independent verification.
- D. Submit a request to Radiation Protection to have shielding installed to reduce the dose rate prior to conducting the verification.

Answer: B

Answer Explanation:

- A. Incorrect - Wrong because this would NOT meet the lowest exposure criteria. Plausible because the action would reduce overall exposure
- B. CORRECT - Components located in a high radiation area may be waived at the discretion of the supervisor with operational control. The exemption will be noted on the lineup sheet.
- C. Incorrect - Wrong because the ALARA committee does NOT make this determination. Plausible because the actions listed on the waiver are the correct actions.
- D. Incorrect - Wrong because this would result in exposure to both the operators and those installing shielding. Plausible because shielding is sometimes used to reduce overall dose.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

99

ID: RO-C-EOP01-E27-Q3

Points: 1.00

Tier# 3	Group #	Level SRO
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SRO ONLY

The Crew is responding to a SG Tube Rupture. The Crew has completed actions of OHP-4023-E-3, Steam Generator Tube Rupture, through the step to control RCS pressure and charging flow to minimize RCS-to-Secondary Leakage. The controlling pressurizer pressure channel fails low.

In this situation, the Unit Supervisor should (1) because (2).

- A. (1) direct RO to independently implement OHP-4022-IFR-001 Instrument Failure Response while the Unit Supervisor continues to direct steps of E-3
(2) automatic pressure control is required to accomplish E-3 actions.
- B. (1) discontinue actions of E-3 and implement OHP-4022-IFR-001 to restore automatic pressure control, then continue with E-3 actions
(2) automatic pressure control is required to accomplish E-3 actions
- C. (1) continue to direct steps of E-3 using the RO
(2) Abnormal Operating Procedures should never be performed during EOP implementation
- D. (1) continue to direct steps of E-3 using the RO
(2) automatic pressure control is not required to accomplish E-3 actions

Answer: D

Answer Explanation:

OHI-4023 Attachment 2, Rules of Usage for EOP network, states that ARPs and AOPs may be performed during performance of accident EOPs only if they do not interfere with the actions called for in the EOPs AND their implementation is necessary to help mitigate the consequences of the event. During the given step in E-3, automatic control of pressurizer spray and heaters is not required, as both would already be in manual control, so the controlling pressure channel failure would have no impact. Since AOP actions are not required for E-3 strategies, IFR-001 should not be implemented

- A. Incorrect - Wrong because AOP actions are unnecessary because automatic pressure control is not required for E-3. Plausible because the AOP and EOP actions would be performed in parallel if automatic pressure control was required.
- B. Incorrect - Wrong because AOP actions are unnecessary because automatic pressure control is not required for E-3. Plausible if candidate believes automatic pressure control is required and that the Unit Supervisor must always direct AOP actions.
- C. Incorrect - Wrong because AOPs can be performed during EOPs if the conditions in OHI-4023 are satisfied. Plausible because the AOP would not be implemented in this case.
- D. CORRECT - Performance of the AOP actions is not required to mitigate the event so E-3

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

100

ID: RO27AUDIT-79

Points: 1.00

Tier# 3	Group #	Level SRO
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SRO ONLY

Given the following conditions on Unit 2:

- A Loss of Off-Site Power has occurred.
- The crew is performing the actions of 2-OHP-4023-ES-0.2, Natural Circulation Cooldown.
- Numerous alarms are in, including:
 - ANN 216 Drop 43 CONDENSATE STORAGE TANK LEVEL LOW-LOW
 - ANN 205 Drop 27 SPENT FUEL PIT LEVEL LOW LOW
- Unit 2 CST level indicates 14%, and slowly lowering.
- SFP level indicates 644 (23' on SFP level indication ruler) and slowly lowering.

Which ONE of the above alarm conditions will the SRO address first, and what procedure provides the needed guidance to address the condition?

- A. ANN 216 Drop 43 CONDENSATE STORAGE TANK LEVEL LOW-LOW
OHP-4022-055-003, Loss Of Condensate To Auxiliary Feedwater Pumps
- B. ANN 216 Drop 43 CONDENSATE STORAGE TANK LEVEL LOW-LOW
OHP-4022-001-005, Loss Of Offsite Power With Reactor Shutdown
- C. ANN 205 Drop 27 SPENT FUEL PIT LEVEL LOW LOW
OHP-4021-018-002, Placing in Service and Operation of the SFP Cooling and Cleanup System
- D. ANN 205 Drop 27 SPENT FUEL PIT LEVEL LOW LOW
OHP-4022-018-001, Loss of Spent Fuel Pit Cooling

Answer: A

Answer Explanation:

- A. CORRECT - The alarm setpoint for low-low level in the Condensate Storage Tank corresponds to 15% in the tank. At this level the SRO must recognize that loss of suction to the turbine driven AFW pump (the only one available) is imminent. ES-0.2 foldout page directs addressing the loss of AFW suction per OHP-4022-055-003.

EXAMINATION ANSWER KEY

RO33 NRC SRO EXAM 2022

- B. Incorrect - Wrong because OHP-4022-001-005 is the wrong procedure. The alarm setpoint for low-low level in the Condensate Storage Tank corresponds to 15% in the tank. At this level the SRO must recognize that loss of suction to the turbine driven AFW pump (the only one available) is imminent. ES-0.2 foldout page directs addressing the loss of AFW suction per OHP-4022-055-003. The procedure (OHP-4022-001-005) is plausible, since that procedure does address the loss of power.
- C. Incorrect - Wrong because priority is wrong and OHP-4021-018-002 is the wrong procedure. It is plausible to believe that low level in the Spent Fuel Pool is a paramount concern, given the potential for radiological release due to loss of heating, combined with loss of inventory in the pool. Further urgency (and plausibility) is added to this distractor by stating that the level is continuing to drop. However, the drop is slow and there is plenty of inventory above the top of the fuel before prompt action must be taken, in comparison to the imminent loss of AFW suction source. The procedure (OHP-4021-018-002) is plausible, since that procedure does address adding makeup water to the SFP and is referenced in the Annunciator response.
- D. Incorrect - Wrong because priority is wrong. It is plausible to believe that low level in the Spent Fuel Pool is a paramount concern, given the potential for radiological release due to loss of heating, combined with loss of inventory in the pool. Further urgency (and plausibility) is added to this distractor by stating that the level is continuing to drop. However, the drop is slow and there is plenty of inventory above the top of the fuel before prompt action must be taken, in comparison to the imminent loss of AFW suction source. The procedure (OHP-4022-018-001) is correct, adding further plausibility to this distractor.

Question ID (Status) RO27AUDIT-79

Comments:

Reference: 2-OHP-4024-205 Rev 15, Drop 27, 2-OHP-4024-216 Rev 43, Drop 43, 2-OHP-4023-ES-0.2 Rev 11, FOP

Source: Bank

Associated objective(s):

(RO-C-AOP0460412-E2) Given a set of plant conditions including a Loss of Condensate to the Auxiliary Feedwater Pumps, describe the required operator actions to correct, control, or mitigate the plant in accordance with OHP-4022-055-003, Loss of Condensate to Auxiliary Feedwater Pumps.

Associated K&A(s):

G 2.4.45

Importance Factor: 4.1/4.3

K&A Statement: Ability to prioritize and interpret the significance of each annunciator or alarm

G.APE.056

Importance Factor:

K&A Statement: Loss of Offsite Power

