Beaver Valley Unit 2 NRC Written Exam (2LOT22)

1. The plant is at 55% power with all systems in normal alignment for this power level. An electrical malfunction causes a Main Generator lockout.

   The plant responds as designed with the following exceptions:

   - 'A' Rx Trip breaker is Open
   - 'B' Rx Trip breaker is Closed

   1) How will the Steam Dumps respond to control Tavg during this event?
   2) How will the Pressurizer Spray valves respond 30 seconds after the reactor trip?

   Steam Dumps will maintain T_{avg} approximately _______(1)_______.
   Pressurizer Spray valves will _______(2)_______.

A. 1) 547 °F on the Rx Trip controller
   2) close to allow RCS pressure to recover

B. 1) 547 °F on the Rx Trip controller
   2) modulate open to lower RCS pressure

C. 1) 550 °F on the Load Rejection controller
   2) close to allow RCS pressure to recover

D. 1) 550 °F on the Load Rejection controller
   2) modulate open to lower RCS pressure

Question 1

Answer: C

Explanation/Justification: K/A is met because the candidate must determine that the RCS temperature will be maintained on the load rejection controller of the steam dumps and know how the przr spray valves will respond due to the RCS pressure lowering on a Rx Trip.

A. Incorrect. Without the P-4B relay, the steam dumps will remain on the Load Rejection controller and control approximately 3F higher than Tref. Plausible distracter since the candidate must know the inputs to arm and actuate the steam dumps and controllers. Przr spray valves will close because the Master pressure controller output will lower due to the RCS pressure lowering after the Rx trip.

B. Incorrect. Without the P-4B relay, the steam dumps will remain on the Load Rejection controller and control approximately 3F higher than Tref. Plausible distracter since the candidate must know the inputs to arm and actuate the steam dumps and controllers. Przr spray valves opening is plausible since on a Main Generator lockout the turbine trips immediately and the 30 second delay for the transfer to offsite power does not occur, which the candidate may see as a cause for RCS pressure to rise which would make the spray valves open to lower RCS pressure.

C. Correct. The steam dumps will arm and actuate on the Load rejection Controller and maintain Tavg approximately 3F higher than Tref. Tref will be 547 with the turbine tripped and 0% power, therefore 550F is a correct value. P-4B will not actuate since the B Rx Trip Breaker remained closed. Przr spray valves will close because the Master pressure controller output will lower due to the RCS pressure lowering after the Rx trip.

D. Incorrect. First part is correct. Przr spray valves opening is plausible since on a Main Generator lockout the turbine trips immediately and the 30 second delay for the transfer to offsite power does not occur, which the candidate may see as a cause for RCS pressure to rise which would make the spray valves open to lower RCS pressure.

Sys #	System	Category	KA Statement
000007	Reactor Trip, Stabilization, Recovery / 1	EA1 Ability to operate and monitor the following as they apply to a reactor trip:	RCS pressure and temperature

K/A# EA1.03 **K/A Importance** 4.2 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-21.5.A.12 Rev. 3 pg. 2
2OM-6.4.IF Rev. 13 pg. 24, 25

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(5)

Objective: 2SQS-6.4, Rev. 17 Obj. 18. Given a Pressurizer and Pressurizer Relief System configuration and without referenced material, describe the Pressurizer and Pressurizer Relief System control room response to the following actuation signals, including automatic functions and changes in equipment status as applicable. a. Reactor Trip

2SQS-21.1, Rev. 23 Obj. 11. Given a Main Steam Supply System configuration and without referenced material, describe the Main Steam Supply System control room response to the following actuation signals, including automatic functions and changes in equipment status as applicable. b. Reactor Trip

2. Given the following plant conditions:
   - Reactor Power is 100%.
   - Pressurizer (PRZR) pressure control is in its normal configuration.
   - Pressurizer Power Operated Relief Valve (2RCS*PCV455C) inadvertently lifts and does **NOT** fully reseat.
   - A4-1D, "PRESSURIZER CONTROL PRESSURE HIGH/LOW", annunciates.
   - PRZR Pressure is 2170 psig.

   With NO OPERATOR action, how will the PRZR Spray Valves (2RCS*PCV455A and 2RCS*PCV455B) and PRZR PORV Block Valves (2RCS-MOV535, 536, 537) respond to these plant conditions,

   PRZR Spray Valves ___(1)___.

   PRZR PORV Block Valves ___(2)___.

A. 1) remain open
   2) remain open

B. 1) close
   2) remain open

C. 1) remain open
   2) close

D. 1) close
   2) close

Answer: B

Explanation/Justification: K/A is met with the candidate's knowledge of how a Pressurizer Vapor Space Accident (Stuck open PORV) will lower przr pressure and cause the przr spray valve to close automatically, and that the PORV block valves will remain open due to the NSA switch position being "open".

A. **Incorrect. P**lausible if candidate fails to account for Pressurizer Pressure Control inputs closing Spray Valves as RCS Pressure lowers. PORV Block valves are NSA open, therefore the block valves will not close from an automatic close signal.

B. **Correct.** As pressurizer pressure lowers, 2RCS*PK444 will close 2RCS*PCV455A and B**.** PORV Block valves are NSA open, therefore the block valves will not close from an automatic close signal.

C. **Incorrect. P**lausible if candidate fails to account for Pressurizer Pressure Control inputs closing Spray Valves as RCS Pressure lowers. Plausible that PRZR Block Valves will automatically close when 2/3 PRZR pressures channels are @ 2185 psig if the control switch was in AUTO versus OPEN since this is the NSA position.

D. **Incorrect**. As pressurizer pressure lowers, 2RCS*PK444 will close 2RCS*PCV455A and B. Plausible that PRZR Block Valves will automatically close when 2/3 PRZR pressures channels are @ 2185 psig if the control switch was in AUTO versus OPEN since this is the NSA position.

Sys #	**System**	**Category**	**KA Statement**
000008	Pressurizer Vapor Space Accident / 3	AK2. Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following:	Valves

K/A# AK2.01 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2SQS-6.4 PPT Rev. 17 slide 19 (notes)
2OM-6.4.AAM rev. 3 page 6, 7
2OM-6.4.IF Rev. 13 pg. 25

Question Source: Bank - 1LOT8 Q2

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(3)

Objective: 2SQS-6.4-01-17: Describe the control, protection, and interlock functions for the control room components associated with the Pressurizer and Pressurizer Relief System, including automatic functions, setpoints, and changes in equipment status as applicable.

3. Given the following plant conditions:
   - A reactor trip has occurred.
   - Safety Injection is actuated **AND** all systems functioned as designed.
   - Containment pressure is 2 psig.
   - Containment radiation level 5 X 10^2 R/hr.
   - RCS pressure is 1350 psig and stable.
   - SG pressures are 1050 psig and stable.
   - All actions **REQUIRED** in E-0, "Reactor Trip or Safety Injection", have been taken.
   - The crew is about to transition to E-1, "Loss of Reactor or Secondary Coolant".

   Based on these plant conditions, which of the following describes the RCP status AND the status of the SGs as a heat sink?

   RCP's will ______(1)______.
   SG's are ______(2)______ for RCS heat removal.

A. 1) be running
   2) required

B. 1) be running
   2) **NOT** required

C. 1) **NOT** be running
   2) required

D. 1) **NOT** be running
   2) **NOT** required

Answer: A

Explanation/Justification: Meets the K/A because candidate must understand the interrelation between a small break LOCA and the S/G differential pressure impact on RCP's and secondary heat sink requirements. SBLOCAs require the operators to trip RCP's when D/P between the RCP's and the highest intact S/G pressure is at 205 (220) psid to prevent immediate break uncovery.

A. **(1) Correct**. RCS/SG ΔP is greater than both normal and adverse RCP trip requirements 205 (225) psid. **(2) Correct** With RCS pressure higher than SG pressure, a secondary heat sink is required.

B. **(1) Correct**, RCS/SG ΔP is greater than both normal and adverse RCP trip requirements 205 (225) psid**.** **(2) Incorrect** but plausible if candidate does not recognize that, with RCS pressure greater than S/G pressure, a heat sink is required.

C. **(1) Incorrect** but plausible if candidate is unfamiliar with RCS/SG ΔP trip criteria. **(2) Correct,** with RCS pressure higher than SG pressure, a secondary heat sink is required

D. **(1) Incorrect** but plausible if candidate is unfamiliar with RCS/SG ΔP trip criteria. **(2) Incorrect** but plausible if candidate does not recognize that, with RCS pressure greater than S/G pressure, a heat sink is required.

Sys #	**System**	**Category**	**KA Statement**
000009	Small Break LOCA / 3	EK2 Knowledge of the interrelations between the small break LOCA and the following:	S/Gs

K/A# EK.2.03 **K/A Importance** 3.0 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.E-0 (ISS3) Rev. 0 LHP
2OM-53B.1.FR-H.1 (ISS2) Rev. 2 page 48

Question Source: Bank - 2LOT8 Audit Q14

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(10)

Objective: 3SQS-53.2-01-01: State from memory the basis for RCP trip criteria, IAW BVPS EOP Executive Volume.
GO3ATA-4.2-01-05: Predict and explain how heat removal mechanisms change during a small break LOCA.

4. Which of the following describes the method used to remove decay heat 5 minutes after a LBLOCA has occurred?

A. Reflux boiling.

B. RCS Hot Leg recirculation.

C. Natural circulation and Steam Generator steaming.

D. ECCS injection and inventory loss from the break.

Answer: D

Explanation/Justification: The K/A is matched because the applicant must apply their knowledge of the core cooling mechanism used during a Large Break LOCA. During Large Break LOCA's, decay heat is removed by a continuous supply of water from the ECCS. Reflux boiling requires inventory in the RCS steam up to the S/G U-tubes, condense, and flow back to the core at a cooler temperature. Large Break LOCA's preclude this because the S/G water is hotter than the water in the core due to metal and water heat retention. As the sump fills, natural circulation occurs in the CNMT sump with the hotter water rising to the top of the water in the sump.

A. Incorrect: As seen in the Westinghouse E-1 background document, reflux boiling is credited for heat removal during a LOCA of a size greater than 1" in diameter to less than 13 ½" (1 square foot) in diameter. For LOCAs in excess of these dimensions (i.e. LBLOCAs), the secondary plant is not credited for any heat removal.

B. Incorrect: While it is true that during a LBLOCA decay heat removal is afforded by the ECCS; the use of Hot leg recirculation will not be made until 6 hours after the event has occurred.

C. Incorrect: As seen in the Westinghouse E-1 background document, the coupling of the RCS to the S/Gs is lost most probably before the 15 second point for a Large Break LOCA. Therefore, it is incorrect that natural circulation would be possible during a large break LOCA, however natural circulation in the sump water occurs throughout the event.

D. Correct: In accordance with the background document for E-1, during a LBLOCA, decay heat is removed by a continuous supply of water from the ECCS.

Sys #	System	Category	KA Statement
000011	Large Break LOCA / 3	EK1 Knowledge of the operational implications of the following concepts as they apply to the Large Break LOCA:	Natural circulation and cooling, including reflux boiling

K/A# EK1.01 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53B.4.E-1 Iss. 3 Rev. 2 pg.14

Question Source: Bank – 2015 Watts Barr Q4

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(3)

Objective: GO-ATA-4.2 Rev. 8 Obj. 3. Explain heat sources and heat removal mechanisms during LOCAs.

GO-ATA-4.2 Rev. 8 Obj. 10. Predict and explain the four characteristic stages of a large break LOCA

5. The plant is at 100% power.

   - The ATC operator stops the running charging pump because it was showing signs of cavitation.
   - The operator reports VCT outlet valves 2CHS*MOV115C and 115E are open and RWST outlet valves 2CHS*MOV115B and 115D are closed.

   When checking VCT level, which of the following VCT level channel failures would cause the observed indications?

   2CHS-LT112 – VCT Level Transmitter
   2CHS-LT115 – VCT Level Transmitter

A. 2CHS*LT112 failed LOW

B. 2CHS*LT112 failed HIGH

C. 2CHS*LT115 failed LOW

D. 2CHS*LT115 failed HIGH

Answer: D

Explanation/Justification: This matches the K/A because it addresses a "loss of makeup" (charging) from the perspective of the VCT makeup failure that leads to a loss of charging by causing VCT to drain with no RWST swapover. With no operator intervention there would be a loss of all charging due to gas intrusion from the VCT to the suction of the charging pumps as the VCT emergency diverts due to the instrument failure.

A. **Incorrect**. VCT level would be maintained by LT115. If level on LT-115 were to also lower to 5%, auto swapover to RWST would occur. Charging flow would be maintained. Plausible if the functions for LT115 are assumed for LT112.
B. **Incorrect**. This fully opens LCV-112 and LCV115A to divert water to the degassifiers, but LT115 controls auto makeup at 20-40% so VCT level would not be lost. Plausible if it is thought auto makeup is defeated.
C. **Incorrect**. Plausible if failure is misconstrued. LT115 LOW would initiate a continuous makeup and the VCT fills and diverts. Charging and letdown unaffected.
D. **Correct**. Auto makeup is lost. VCT level will decrease. No auto swapover to the RWST, at 5% will occur (2/2 required, LT112 and LT115). VCT empties, charging pumps cavitate, charging flow (RCS Makeup) decreases to 0 gpm.

Sys #	System	Category	KA Statement
000022	Loss of Reactor Coolant Makeup / 2	AA1. Ability to operate and / or monitor the following as they apply to the Loss of Reactor Coolant Makeup:	VCT level

K/A# AA1.08 **K/A Importance** 3.4 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-7.4.IF Rev. 3 pg. 9

Question Source: Bank – 2018 Diablo Canyon Q42

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 2SQS-7.1, Rev. 23 Obj. 18. Describe the control, protection and interlock functions for the control room components associated with the Chemical and Volume Control System, including automatic functions, setpoints and changes in equipment status as applicable. b. HI/LO VCT Level/Pressure

2SQS-7.1, Rev. 23 Obj. 21. Given a specific plant condition, predict the response of the Chemical and Volume Control System control room indication and control loops, including all automatic functions and changes in equipment status, for either a change in plant condition or for an off-normal condition

6. The plant is cooling down for a refueling outage.
RHR is in service with 'B' RHR pump running.
'A' RHR pump is on clearance.
A loss of RHR has occurred due to 'B' RHR pump tripping on overcurrent.
- AOP-2.10.1, Loss of Residual Heat Removal Capability is in progress
- The crew is at step 15, Pressurize or Makeup to RCS in preparation to startup an RCP
- All RCS loops are operable
- RCS Cold leg temperature is 180°F
- RCS pressure is 230 psig and RISING uncontrollably

What will the RHR system pressure be limited to?

A. 360 psig

B. 450 psig

C. 525 psig

D. 700 psig

Answer: B

Explanation/Justification: The K/A is met because the candidate must determine what the maximum pressure will be in the RHR system during a loss of RHR event based on the available components which provide overpressure protection to the system.

A. Incorrect. Plausible because 360 psig corresponds with the required pressure to place RHS in service per 2OM-52.4.R.1.F
B. Correct. This is the 2RHS-RV721A/B setpoint. As pressure rises in the RHR system, 2RHS-RV721A/B will lift to limit RHS pressure to ~450 psig.
C. Incorrect. Plausible because the OPPS setpoint 2RCS*PCV456 & 2RCS*PCV455C PRZR PORV OPPS setpoint for 180F, ~525 psig. The minimum OPPS lift setpoint at 140F is 480psig (Figure 5.2-8 in the PTLR)
D. Incorrect. Plausible because 2RHS*MOV701A(B), 702A(B) and 720A(B) have an auto-close feature when RCS pressure (RCS*PT440, or RCS*PT441) exceeds setpoint of 700 psig but are defeated while RHR is in service to prevent spurious actuations.

Sys #	System	Category	KA Statement
000025	Loss of Residual Heat Removal System / 4	AA2. Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System	Existence of proper RHR overpressure protection

K/A# AA2.06 **K/A Importance** 3.2 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-10.2.B Issue 4 Rev. 3 page 2

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(8)

Objective: 2SQS-10.1-01-04: Describe the control, protection and interlock functions for the field components associated with the Residual Heat Removal System, including automatic functions, setpoints and changes in equipment status as applicable.

7. Given the following:

- 2RCS*PT444 has failed high.
- The RO is performing IOA's of AOP-2.4.1 Part B, "PRZR Pressure Process Control Failure".
- Pressurizer Pressure is at 2180 psig and lowering.

How will the RO respond to this event?

A. Close 2RCS*PCV455C, Pressurizer Power Operated Relief Valve, and allow 2RCS*PK444, Master Pressure Controller, to return Pressurizer Pressure to normal.

B. Verify PORV(s) closed, place 2RCS*PK444, Master Pressure Controller, in manual, and adjust demand to 0%.

C. Verify PORV(s) closed, place 2RCS*PK444, Master Pressure Controller, in manual, and adjust demand to between 40% and 60%.

D. Close 2RCS*PCV455D and 2RCS*PCV456, Pressurizer Power Operated Relief Valves, and allow 2RCS*PK444, Master Pressure Controller, to return Pressurizer Pressure to normal.

Answer: B

Explanation/Justification: This matches the K/A because the operator must identify which of the IOA's must be performed in AOP 2.4.1 Part B with a high failure of 2RCS*PT444. This demonstrates their ability to interpret and execute procedure steps for a Pressurizer Pressure Control System Malfunction.

A. Incorrect. Plausible because 2RCS*PCV455C is the only PORV controlled from 2RCS-PT444, but if 2RCS*PT444 has failed high when 2RCS*PK444 is in auto, the pressurizer heaters will deenergize, spray valves will open, and PORV 2RCS*PCV455C will open. Plausible if candidate does not identify 2RCS*PT444 as the sole controlling instrument for the Master Pressure Controller or doesn't recognize the need to place 2RCS*PK444 it in manual and lower demand to zero.
B. Correct. AOP 2.4.1 IOAs state verify PORVs closed and place 2RCS*PK444 in manual and adjust to 0% demand. This will demand spray valves close, heaters energize, and PORV 2RCS*PCV455C remains closed.
C. Incorrect. Plausible if candidate incorrectly assumes that raising demand raises RCS pressure or misremembers IOA's of AOP 2.4.1. Adjusting 2RCS*PK444 between 40 and 60% will open spray valves and deenergize heaters which will further reduce RCS pressure. This is the RNO action if RCS pressure were >2250 psig.
D. Incorrect. Plausible if candidate assumes PCV455D and 2RCS*PCV456 is controlled by 2RCS*PT444, but they are controlled from PT445, and the master Pressure Controller must be taken to manual to regain control of the Heaters and spray.

Sys #	System	Category	KA Statement
000027	Pressurizer Pressure Control System Malfunction / 3	Generic	Ability to interpret and execute procedure steps.

K/A# 2.1.20 **K/A Importance** 4.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.4.1 Rev. 3 pg. 3
2OM-6.4.IF Rev. 13 pg. 24

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 2SQS-53C.1-01-01: State from memory all Immediate Manual Actions associated with the AOPs.

8. The crew is responding to an ATWS per FR-S.1, Response to Nuclear Power Generation – ATWS, and is checking if the Reactor is Subcritical.

- Reactor Power is 2% and lowering.
- IR Startup Rate is negative.
- Reactor Trip Breakers are closed.
- Pressurizer Pressure is 2200 psig and slowly rising.
- Safety Injection is actuated.
- Total AFW flow is stable at 270 gpm.
- All S/G Narrow Range Levels are offscale low.

Given the above, which of the following will the crew do?

A. Complete FR-S.1, then complete E-0, Reactor Trip or Safety Injection.

B. Exit criteria are met, transition to E-0, Reactor Trip or Safety Injection.

C. Exit criteria are met, transition to FR-H.1, Loss of Secondary Heat Sink.

D. Continue in FR-S.1 and perform FR-H.1, Loss of Secondary Heat Sink, in parallel.

Answer: C

Explanation/Justification: This K/A is met because the candidate must recognize exit criteria are met for procedure FR-S.1, Anticipated Trip Without Scram, by knowing setpoints for EOP transition criteria. Additionally, they must know transition criteria for FR-H.1 are met and take priority over E-0.

A. Incorrect. Transition criteria out of FR-S.1 are met. Plausible if candidate believes reactor trip breakers must be open or power level must be 0% before transitioning out of FR-S.1. Additionally, FR-H.1 transition criteria are met when the higher priority status tree is exited, therefore a transition to E-0 is a lower priority than addressing FR-H.1

B. Incorrect but plausible if candidate identifies that FR-S.1 exit criteria are met but fails to recognize the higher priority transition to FR-H.1.

C. Correct. Criteria to leave FR-S.1 are met. These criteria are that Reactor Power <5% and IR Flux is negative. Once leaving FR-S.1, red path criteria are met for a transition to FR-H.1. These criteria are <340 gpm total auxiliary feedwater flow and <12% Narrow Range Level in all steam generators.

D. Incorrect. Plausible if candidate assumes FR procedures may be performed in parallel like AOP's and EOP's.

Sys #	System	Category	KA Statement
000029	Anticipated Transient Without Scram / 1	Generic	Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.

K/A# 2.4.2 **K/A Importance** 4.5 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.FR-S.1 Iss. 2 Rev. 2 pg 6
2OM-53A.1.F-0.3 Iss. 3 Rev. 0
1/2OM-53B.2 Rev. 10 pg.8, 9

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(10)

Objective: 3SQS-53.3-01-06: Given a set of conditions, locate and apply the proper Emergency Operating Procedures, IAW BVPS EOP Executive Volume.
3SQS-53.1-01-02: Concerning critical safety function restoration, IAW BVPS EOP Executive Volume, state from memory the following: a. The CFS in the order of priority. b. The priorities of the color-coded end points of the CSF status trees. c.The red path summary conditions from the EOPs.

9. A SGTR has occurred, and current conditions are as follows:

- The crew has entered E-3, Steam Generator Tube Rupture.
- The crew is depressurizing the RCS to less than ruptured SG pressure.
- RCS pressure was just lowered below 2000 psig.

Which signal is required to be blocked/reset by the crew at this point in E-3?

A. Low Steam Line pressure SI is required to be blocked.

B. Low Pressurizer pressure SI is required to be blocked.

C. Containment Isolation Phase A is required to be reset.

D. Feedwater Isolation is required to be reset.

Answer: A

Explanation/Justification: K/A is met with the candidate's ability to operate the "Block Steam Line SI" switches when < 2000 psig (P-11) to remove the Main Steam Line Isolation on SG low pressure at 500 psig which would prevent cooldown using the condenser steam dumps.

A. Correct. Blocking low steam pressure SI performs two functions. The first is to block low steam pressure SI, and the second is to remove the low steam pressure MSI and replace it with a high rate MSI. Based on the need to prevent MSI when SGs are depressurized to cooldown the RCS to RHR conditions later in the E-3 series procedures. If the crew fails to do this, MSI will actuate during the cooldown, complicating the cooldown. There is no need to block SI signals, since SIS has already actuated, and a subsequent auto SIS actuation is already prevented by P-4 permissive.

B. Incorrect. Plausible because during a plant cooldown where SI was not required, the low pressurizer pressure SIS would be required to be blocked when <P-11 permissive.

C. Incorrect. Plausible since CIA was actuated when SI actuated, but it is reset later in E-3 (step 11), not when cooldown begins. Resetting CIA allows the opening of valves as directed in subsequent steps of the procedure.

D. Incorrect. Plausible because several places in the EOP network reset the FWI signal, but AFW is being used to feed the SGs.

Sys #	System	Category	KA Statement
000038	Steam Generator Tube Rupture / 3	EA1 Ability to operate and monitor the following as they apply to a SGTR:	Safety injection and containment isolation systems

K/A# EA1.30 **K/A Importance** 4.0 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.E-3 Iss 3 Rev 3 pg. 8, 9
2OM-53B.4.E-3 Iss 3 Rev 3 pg. 69, 70

Question Source: Bank – 1LOT21 Q10

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 3SQS-53.3, Rev. 5 Obj. 4. Explain from memory the basis for ALL Cautions and Notes, IAW BVPS-EOP Executive Volume.

10. Initial conditions:

- A plant startup was in progress.
- Power level was at 35%.

Current plant conditions are as follows:

- An automatic reactor trip has occurred.
- SG inside containment blowdown isolation valves (2BDG*AOV101A2,B2,C2) are closed.
- SG narrow range levels (all slowly rising):
  A – 15%
  B – 16%
  C – 18%.

The initiating event that caused the trip was ___(1)___ and ___(2)___ have a start signal.

A. 1) the operating Main Feed Pump tripped
   2) ONLY the Motor Driven Auxiliary Feedwater pumps

B. 1) the operating Main Feed Pump tripped
   2) BOTH the turbine driven AND the motor driven AFW pumps

C. 1) AMSAC actuated due to a loss of Station Instrument Air that caused all Main Feed Regulating valves to fail closed.
   2) BOTH the turbine driven AND motor driven AFW pumps

D. 1) AMSAC actuated due to a loss of Station Instrument Air that caused all Main Feed Regulating valves to fail closed.
   2) ONLY the Motor Driven Auxiliary Feedwater pumps

Answer: B

Explanation/Justification: KA is met by the candidate interpreting given plant conditions to determine the actuating event for AFW pump start when a MFP trips and determine which AFW pumps would start due to the given indications.

A. Incorrect. With the stated conditions, the MFP tripping is the cause for the plant tripping on low SG level. Only the MDAFW pump starting is plausible because the MDAFW pump will start on the trip of all running MFPs.

B. Correct. With the stated conditions, the MFP tripping is the cause for the plant tripping on low SG level. The BD trip valves being closed indicates an AFW signal is present. Since 2/3 S/G NR levels are <20.5%, all AFW pumps are expected to start.

C. Incorrect. Plausible if candidate assumes that AMSAC is available at this power level because an AMSAC initiation will give an AFW auto-start signal, resulting in all AFW pumps starting and B/D TVs closing but AMSAC is operationally blocked below 40% power.

D. Incorrect. Plausible if candidate assumes that AMSAC is available at this power level because an AMSAC initiation will give an AFW auto-start signal, resulting in all AFW pumps starting and B/D TVs closing but AMSAC is operationally blocked below 40% power.

Sys #	System	Category	KA Statement
000054	Loss of Main Feedwater /4	AA2. Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW):	Conditions and reasons for AFW pump startup

K/A# AA2.03 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-1.5.B.9 Rev. 0 pg. 4.

Question Source: Bank – 2016 Surry Q36

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 2SQS-24.1-01-14: Describe the control, protection, and interlock functions for the control room components associated with the Main Feedwater, Startup Feedwater, Auxiliary Feedwater System, and the Steam Generator Water Level Control System, including automatic functions, setpoints, and changes in equipment status as applicable.

11. Given the following plant conditions:

    - The plant is operating at 100% power when a Station Blackout caused a reactor trip.
    - 25 minutes after the trip, power was restored to Emergency Bus 2AE ONLY.
    - The Control Room has transitioned to ECA-0.1, "Loss of All AC Power Recovery Without SI Required".
    - All Steam Generator (S/G) pressures are 1000 psig and STABLE.
    - RCS pressure is 2220 psig and slowly RISING.
    - T-hot is 585°F in all three (3) loops and slowly RISING.
    - Core exit thermocouples indicate 590°F and RISING.
    - T-cold is 555°F in all three (3) loops and STABLE.
    - All systems function as designed.

    Based on these conditions, what is the status of RCS natural circulation heat removal?

    Natural Circulation cooling is __________

A. occurring and is being maintained by Condenser Steam Dumps.

B. occurring and is being maintained by S/G Atmospheric Steam Dumps.

C. **NOT** occurring and may be established by opening the S/G Atmospheric Steam Dumps.

D. **NOT** occurring but forced cooling may be established by opening Condenser Steam Dumps.

Answer: C

Explanation/Justification: K/A is met because the candidate will have to combine their knowledge of the establishment of natural circulation cooling criteria with the expected system responses and operational implications of a Station Blackout.

A. Incorrect. Natural circulation conditions do not exist IAW Attachment A-1.7. Condenser Steam dumps are unavailable.
B. Incorrect. Natural circulation conditions do not exist IAW Attachment A-1.7. Atmospheric steam dumps are not maintaining heat removal.
C. Correct. Tcold is too hot for existing steam pressure. Steam temperature and Tcold should be about the same if natural circulation is present. Without power to condenser cooling tower pumps, the condenser is unavailable and therefore atmospheric steam dumps must be used to increase steaming rate and thus establish natural circulation of the RCS through S/G cooling.
D. Incorrect. Correct that natural circulation does not exist, however due to the loss of all AC power, condenser steam dumps are unavailable.

Sys #	System	Category	KA Statement
000055	Station Blackout / 6	EK1 Knowledge of the operational implications of the following concepts as they apply to the Station Blackout	Natural circulation cooling

K/A# EK1.02 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate Steam Tables **Technical References:** 2OM-53A.1.ECA-0.1 Iss 3 Rev. 0 pg. 11
2OM-53A.1.A-1.7, Issue 1C, Rev. 1, pg. 2
2OM-53A.1.A-5.1, Rev. 2 pg. 1

Question Source: Bank - 2LOT8 Q11

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(5)

Objective: 3SQS-53.2 Rev. 2 Obj. 12. State from memory the five conditions which indicate natural circulation is occurring IAW BVPS EOP Executive Volume.

12. The plant tripped from 100% RTP due to a Loss of Offsite Power.

    - RCS Cooldown is currently in progress in accordance with ES-0.2, “Natural Circulation Cooldown”.

    The trend of RCS Temperature is as follows:

Time	0800	0830	0900
RCS Temperature	535F	495F	455F

In accordance with ES-0.2, which of the following completes the statements below?

1) RCS Temperature will be determined by monitoring of ___(1)___.
2) At 0900, the required cooldown rate ___(2)___ been exceeded.

A. (1) RCS Tavg
(2) has NOT

B. (1) RCS Tavg
(2) has

C. (1) RCS Tcold
(2) has NOT

D. (1) RCS Tcold
(2) has

Answer: D

Explanation/Justification: The K/A is met because the candidate must recognize the RCS temperature trend and calculate if cooldown rates during a natural circulation cooldown has exceeded ES-0.2 rates after a loss of offsite power caused a reactor trip. They must also determine the correct parameter used to measure cooldown rate.

A. **Incorrect.** RCS Tavg is a plausible distractor because it is common to refer to RCS Tavg when discussing plant temperature, but Tcold is used to determine the cooldown rate in ES-0.2. Plausible that the candidate thinks that the cooldown rate has not been exceeded because 100F/hr is an allowable cooldown rate in other EOP procedures.

B. Incorrect. RCS Tavg is a plausible distractor because it is common to refer to RCS Tavg when discussing plant temperature, but Tcold is used to determine the cooldown rate in ES-0.2. At 0900 the RCS will have cooled by 80F which exceeds the 25F/hour CDR limits of ES-0.2.

C. **Incorrect**. RCS Tcold is the parameter used to determine if we have exceeded the 25F per hour cooldown rate. Plausible that the candidate thinks that the cooldown rate has not been exceeded because 100F/hr is an allowable cooldown rate in other EOP procedures.

D. Correct. RCS Tcold is the parameter used to determine if we have exceeded the 25F per hour cooldown rate. At 0900 the RCS will have cooled by 80F which exceeds the 25F/hour CDR limits of ES-0.2

Sys #	System	Category	KA Statement
000056	Loss of Offsite Power / 6	Generic	Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.

K/A# 2.4.47 **K/A Importance** 4.2 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.ES-0.2 Iss 3 Rev 0 pg. 7

Question Source: Bank – 2015 Catawba Q10

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(2,5)

Objective: .3SQS-53.3-01-06: Given a set of conditions, locate and apply the proper Emergency Operating Procedures, IAW BVPS-EOP Executive Volume.

13. Given the following:

- A Loss of power to Vital Bus II has occurred.
- The crew is attempting to restore power.

In accordance with AOP-2.38.1B, Loss of Vital Bus II, which of the following describes the reason for pushing the "Alternate Source To Load" S202 pushbutton?

A. Aligns power from MCC2-E06 to the Vital Bus.

B. Allows operation of the rectifier manual bypass switch.

C. Bypasses the inverter synchronization relay to allow re-energization of the inverter from its normal source.

D. Isolates the inverter static switch from the alternate power source in the case of a vital bus inverter failure.

Answer: A

Explanation/Justification: This meets the K/A because it requires the candidates to apply systems knowledge and principles to the loss of a vital ac electrical instrument bus AOP actions to determine, from memory, the reason for pushing the Alternate Source to Load S202 pushbutton during a loss of Vital Bus II. NRC Exam Chief approved writing the question to AOP actions verses EOP actions.

A. **Correct**. AOP-2.38.1B directs the control room staff to align alternate power supply for 120VAC Vital Bus 2 by verifying MCC*2-E06 power supply is available, verify B4, alternate source AC input to static switch, is in the ON position, and then press the alternate source to load pushbutton S202.

B. **Incorrect**. S202 pushbutton not required for this. This is a manual operation that bypasses the inverter normal and alternate supply functions to Vital Bus II.

C. **Incorrect**. The inverter could be transferred if in synch using a reverse transfer PB on inverter. Pushbutton not required to bypass.

D. **Incorrect**. The inverter would be placed in OFF. This switch will not isolate the alternate source. When S202 pushbutton is depressed, it removes automatic transfer capability and forces the vital bus power to select the static switch.

Sys #	System	Category	KA Statement
000057	Loss of Vital AC Instrument Bus / 6	AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus:	Actions contained in EOP for loss of vital ac electrical instrument bus

K/A# AK3.01 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.38.1B Rev. 7 pg. 6
3SQS-38.1 U-2 PPNT Rev. 8 slide 25

Question Source: Bank - 1LOT7 Q51

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 3SQS-38.1-01-06: From memory, list the controls and instrumentation associated with the 120 VAC Distribution System located in the Field.

3SQS-38.1-01-03: From memory, sketch a basic one-line diagram of the 120 VAC Distribution System showing the following major components listed below (This Objective will be measured during walk through or oral examination activities). e. Static Switches f. Transfer Panels h. Vital Bus Panels

14. The plant is in Mode 3 with maintenance being performed on MCC2-E05 and Battery 2-3.

- Maintenance on MCC2-E05 will de-energize the MCC for 1 hour.
- The Battery maintenance will require the Battery Breaker to be OPEN.

During the maintenance, Battery Charger 2-3 AC Input Breaker [B301] **TRIPS** open.

The crew has entered AOP 2.39.1C, Loss of 125VDC Bus 2-3.

- All electrical equipment was in NSA prior to the event except for MCC2-E05.
- NO Operator actions have been taken.

Based on the above conditions, which of the following indications would be observed on 2RCS- LT461, PRZR CHANNEL 3 LEVEL indicator?

2RCS-LT461 will indicate _______________.

A. offscale low

B. offscale high

C. failed as-is

D. actual level

Answer: D

Explanation/Justification: K/A is met with the candidate's ability to determine that a vital bus 3 load 2RCS-LT461 will be indicating properly after a loss of both associated DC supplies (battery and charger), due to a substitute power source which automatically transfers to the inverter via the inverter static switch.

A. Incorrect. Plausible if the candidate fails to recognize that 2RCS-LT461 is powered from vital bus 3 and thinks that power is lost to the instrument because a deenergized przr level instrument would fail offscale low.
B. Incorrect. Plausible if the candidate fails to recognize that 2RCS-LY461 is powered from vital bus 3 and thinks that power is lost to the instrument, and thinks the instrument fails high to provide przr level high reactor trip coincidence.
C. Incorrect. Plausible since several components in the plant fail "as is" when they deenergize.
D. Correct. 2RCS-LT461 will be indicating properly because it is powered from vital bus 3 via MCC2-E07 from the static line voltage regulator (SLVR) through the static switch. Even though the UPS-3 has lost both it's normal 480 vac MCC-E05 and the DC supplies.

Sys #	System	Category	KA Statement
000058	Loss of DC Power/ 6	AA2. Ability to determine and interpret the following as they apply to the Loss of DC Power:	That a loss of dc power has occurred; verification that substitute power sources have come on line

K/A# AA2.01 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 3SQS-38.1 U2 PPNT Rev 8 slide 22
3SQS-39.1 U2 PPNT Rev. 9 slide 10
2SQS-6.4 LP Rev. 17 pg. 35

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 3SQS-38.1-01-13: Given a change in plant conditions, predict the 120 VAC distribution System response, to include automatic functions; and changes in system parameters and previously identified components and control systems.

15. Per ECA-1.2, LOCA Outside Containment:

    1) What strategy will be attempted to isolate the break?

    2) Which indication is used to determine if the leak has been isolated?

A. 1) Isolate CVCS piping connections.
   2) Pressurizer level is monitored, because with the break isolated, RCS inventory will rapidly rise.

B. 1) Isolate CVCS piping connections.
   2) RCS pressure is monitored, because SI flow will repressurize the RCS with the break isolated.

C. 1) Isolate the Low Pressure SI piping connections.
   2) Pressurizer level is monitored, because with the break isolated, RCS inventory will rapidly rise.

D. 1) Isolate the Low Pressure SI piping connections.
   2) RCS pressure is monitored, because SI flow will repressurize the RCS with the break isolated.

Answer: D

Explanation/Justification: This matches the K/A because a LOCA outside of containment is connected to the RCS, SI, or RHR systems which are the heat removal systems for all modes of operation. ECA-1.2 only explicitly directs the operators to close low pressure SI piping connections as all others should have previously been isolated.

A. Incorrect. Plausible because CVCS is an obvious system that exits containment; however it should have been previously isolated with the CIA and verified by EOP Attachment A-0.11. Second part is plausible if candidate believes that waiting for Pressurizer Level to rise is the best way to validate the break has been isolated.
B. Incorrect. Plausible because CVCS is an obvious system that exits containment, however it should have been previously isolated with the CIA and verified by EOP Attachment A-0.11. It is correct that RCS pressure is the parameter to monitor because, once the break is isolated, RCS pressure will rise.
C. Incorrect. Isolating the Low Pressure SI piping connections is correct per ECA-1.2. Second part is plausible if candidate believes that waiting for Pressurizer Level to rise is the best way to validate the break has been isolated.
D. Correct. Isolating the Low Pressure SI piping connections is correct per ECA-1.2. RCS pressure is monitored because, once the break is isolated, RCS pressure will rise.

Sys #	System	Category	KA Statement
WE04	LOCA Outside Containment / 3	EK2. Knowledge of the interrelations between the (LOCA Outside Containment) and the following:	Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

K/A# EK2.2 **K/A Importance** 3.8 **Exam Level** RO
References provided to Candidate None **Technical References:** 2OM-53B.4.ECA-1.2(ISS3) rev 0 pg. 1, 2
Question Source: New
Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(10)
Objective: 3SQS-53.3, Rev. 5 Obj. 3. State from memory the basis and sequence for the Major Action Steps of each EOP procedure, IAW BVPS-EOP Executive Volume.

16. Given the following plant conditions:

- A LOCA has occurred.
- Due to multiple equipment failures, the Control Room is performing actions of ECA-1.1, Loss of Emergency Coolant Recirculation.
- Two (2) Charging/HHSI pumps and two (2) LHSI pumps are running.
- One (1) Quench Spray pump is running.
- Containment pressure is 13 psig and SLOWLY LOWERING.
- RWST Level is 29 inches and SLOWLY LOWERING.

Which of the following describes the **REQUIRED** action in accordance with ECA-1.1?

A. STOP ALL pumps taking suction from the RWST and verify no backflow from the RWST to CNMT sump.

B. STOP ALL pumps taking suction from the RWST and initiate secondary depressurization to facilitate SI accumulator injection.

C. STOP ONLY ONE (1) HHSI and ONLY ONE (1) LHSI pump and initiate secondary depressurization to facilitate SI accumulator injection. Secure the Quench Spray pump.

D. STOP BOTH LHSI pumps and ONE (1) HHSI pump. Maintain Quench Spray pump running until containment pressure is < 11 psig and then add makeup to RCS from alternate sources.

Answer: B

Explanation/Justification: K/A is met with the candidate's ability to interpret plant conditions during ECA-1.1, Loss of Emergency Coolant Recirculation, and determine that the crew must consider the RWST empty (< 30 inches), requiring all pumps to be stopped, and SGs are depressurized to inject the SI accumulators.

A. Incorrect. Correct that all pumps are stopped. Incorrect plausible action.

B. Correct. The RO candidate must know the overall mitigative strategy of ECA-1.1 and sequence of events. ECA 1.1 directs the operator to secure all pumps taking suction from the RWST when level is < 30 inches. Once stopped the procedure directs the operator to check if all intact S/Gs should be depressurized.

C. Incorrect. Incorrect but plausible that one HHSI and one LSHI pump are secured because one of the procedural mitigating strategies is to conserve RWST water and in fact the procedure does directs action to secure pumps. Correct that the crew will initiate secondary depressurization to facilitate SI accumulator injection. Also correct that the Quench Spray pump is secured.

D. Incorrect. Incorrect but plausible action to maintain one pump running as noted above. Also plausible but incorrect that the Quench Spray pump is maintained running until containment pressure is < 11 psig. Normally by procedure this would be a correct action.

Sys #	System	Category	KA Statement
WE11	Loss of Emergency Coolant Recirculation / 4	EK3. Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation)	Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations.

K/A# EK3.3 **K/A Importance** 3.8 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.ECA-1.1 Iss. 3 Rev. 0, pg. 1, 26, 270000
2OM-53B.4.ECA-1.1 Iss. 3 Rev. 0 pg. 3, 4

Question Source: Bank - 2LOT8 Q18

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(5)

Objective: 3SQS-53.3, Rev. 5 Obj. 3. State from memory the basis and sequence for the Major Action Steps of each EOP procedure, IAW BVPS-EOP Executive Volume.

17. The following conditions exist:

- A8-3B, 4160V EMER BUS 2DF ACB 2F7 OVERCURRENT TRIP is LIT
- Computer point Y5172D, TURB DR AFW PP TRIPPED computer point shows "TRIP"
- 'A' MDAFW tripped on startup
- The crew has entered FR-H.1, Response to Loss of Secondary Heat Sink
- SG levels A – 9% WR
  B – 10% WR
  C – 7% WR

When feedwater is restored, what is the MAXIMUM feed flow allowed to the Steam Generators in accordance with FR-H.1?

A. 50 gpm to one SG

B. 50 gpm per SG to all SGs

C. 100 gpm to one SG

D. 100 gpm per SG to all SGs

Answer: C

Explanation/Justification: K/A is met by giving the candidate various annunciators which place them into FR-H.1 with SG conditions indicating all SG's are dry (≤14%). When feedwater is restored the candidate must apply FR-H.1 remedial actions of limiting feed to ≤100gpm on a single dry Steam Generator to prevent multiple SG failures due to thermal shock.

A. Incorrect. 50 gpm is a plausible distractor since it is a low feedrate and it is the minimum flowrate to each SG with a NR <12% in ECA-2.1, Uncontrolled depressurization of All SGs.
B. Incorrect. 50 gpm is a plausible distractor since it is a low feedrate and it is the minimum flowrate to each SG with a NR <12% in ECA-2.1, Uncontrolled depressurization of All SGs.
C. Correct. 100 gpm to one SG is correct per FR-H.1 to limit possible thermal shock failure to only one SG.
D. Incorrect. 100 gpm feedrate to all SGs is plausible, but FR-H.1 states to feed only one SG to prevent multiple SG failures due to thermal shock.

Sys #	System	Category	KA Statement
WE05	Loss of Secondary Heat Sink / 4	EK1. Knowledge of the operational implications of the following concepts as they apply to the (Loss of Secondary Heat Sink)	Annunciators and conditions indicating signals, and remedial actions associated with the (Loss of Secondary Heat Sink).

K/A# EK1.3 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.FR-H.1 Iss. 2 Rev. 2 pg. 22, 23
3SQS53.3 FR-H, Z PPNT Slide 19

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(10)

Objective: 2LOT-M5D12 Rev. 10 Obj. 2-4 Given a loss of heat sink, respond in accordance with FR-H.1 Loss of Secondary Heat Sink.
2LOT-M5D12 Rev. 10 Obj. 2-6 Given a loss of heat sink with dry SG criteria met, feed the Steam Generators in accordance with FR-H.1.

18. The crew is performing ECA-2.1, “Uncontrolled Depressurization of all Steam Generators”.

- All steam generator narrow range levels are offscale low.
- All steam generator wide range levels are lowering.
- RCS cooldown rate is currently 250F per hour.

In accordance with ECA-2.1, AFW flow ________________

A. will be limited to 50 gpm per S/G to prevent steam generator tube dryout.

B. will be secured to all Steam Generators to prevent further cooldown.

C. must be high enough to avoid FR-H.1, Response to Loss of Secondary Heat Sink, entry criteria.

D. must be maximized to provide maximum heat sink capability.

Answer: A

Explanation/Justification: This meets the K/A because the candidate must apply the caution to maintain auxiliary feedwater at a minimum limit to minimize the RCS cooldown rate and maintain the SGs in a wet condition to prevent the SGs from drying out. This will minimize the thermal shock to the SGs components when feed flow is increased.

A. Correct. ECA-2.1 step 3 caution basis states control feed flow to minimize SG dry out to minimize thermal stress when feed flow is increased. The 50 GPM value is representative of a minimum measurable feed flow to a steam generator.
B. Incorrect. Feed flow must be maintained to prevent tube dry out. Plausible because the preemptive actions for the BOP are to isolate feedwater to a faulted steam generator in all other circumstances.
C. Incorrect. Plausible because 340 GPM is the minimum AFW required to maintain heat sink in all other circumstances with Narrow Range Level <12%, but ECA-2.1 step 3 note states FR-H.1 is only implemented if feed flow is not capable of providing 340 gpm total flow.
D. Incorrect. Feed flow should be controlled to reduce cooldown rate to <100F per hour or 50 gpm per steam generator. Maximizing feed flow would cause unnecessary cooldown and addition of positive reactivity to the RCS as well as thermal stresses to the RCS with potential for pressurized thermal shock.

Sys #	System	Category	KA Statement
WE12	Uncontrolled Depressurization of All Steam Generators / 4	EK3. Knowledge of the reasons for the following responses as they apply to the (Uncontrolled Depressurization of all Steam Generators)	Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics

K/A# EK3.1 **K/A Importance** 3.5 **Exam Level** RO
References provided to Candidate None **Technical References:** 2OM-53B.4.ECA-2.1 Iss 3 Rev. 1 pg. 20
Question Source: New
Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(5)
Objective: 3SQS-53.3 Rev. 5 Obj. 3: State from memory the basis and sequence for the Major Action Steps of each EOP procedure, IAW BVPS-EOP Executive Volume.
3SQS-53.3 Rev. 5 Obj 4. Explain from memory the basis for ALL Cautions and Notes, IAW BVPS-EOP Executive Volume.

19. The Plant was operating at 100% power BOL with all systems NSA. A VPL failure occurred causing a large load rejection.

    Following the transient:

    - Control Bank D Group 1 and 2 step counter reads 163 steps.
    - Control Rod Group Selector Switch was taken to Manual.
    - The crew recognized that Rod F6 (Bank D Group 2) indicates 226 steps.

    Which of the following alarms would accompany this event?

    1. A4-4F NIS Power Range Comparator Deviation
    2. A4-8G Rod Position Deviation
    3. A4-4D Loop Tavg High
    4. A4-3F Loop Tavg Deviation
    5. A4-5H NIS Power Range High/Low SP Flux Deviation/Auto Defeat.

A. 2 and 4 ONLY

B. 1 and 5 ONLY

C. 1, 2, and 5 ONLY

D. 2, 3, and 4 ONLY

Answer: C

Explanation/Justification: This matches the K/A because the candidate is presented with plant conditions that include a stuck rod and determine/validate which alarms would accompany the stuck rod event with no further complications.

A. Incorrect. Plausible. because (2) A rod position deviation alarm will be received when Rod F6 differs from other Bank D Group 2 Rods by 12 steps, but (4) Loop Tavg Deviation will not come in. Loop Tavg Deviation setpoint is 3F above or below Median Tavg which is a plausible alarm because the candidate could mistake the 3% NIS deviation setpoint that will occur as a downstream impact for a single loop temperature deviation based on core location.

B. Incorrect. Plausible because both (1) A4-4F and (5) A4-5H will come in with a stuck rod event during a load rejection however they are accompanied by (2) Rod Position Deviation alarm at 12 steps difference between Rod F6 and other Bank D Group 2 Rods, so the answer is incorrect because it excludes this alarm.

C. Correct. (1) NIS Power Range Comparator Deviation alarm comes in when one of the PR channels differs from the others by +/- 3%. This would occur with the given plant conditions. (2) Rod Position Deviation alarms at 12 steps difference between Rod F6 and other Bank D Group 2 Rods. This would occur with the given plant conditions. (3) NIS Power Range High/Low SP Flux Deviation/Auto Defeat will alarm when the Upper Section deviates from the Lower section by /- 2%. This would occur given the above conditions.

D. Incorrect. Plausible because (2) A rod position deviation alarm will be received when Rod F6 differs from other Bank D Group 2 Rods by 12 steps but a (3) Loop Tavg High and (4) Loop Tavg Deviation alarm will not occur. These are both plausible alarms because (3) Loop Tavg High is plausible because a load rejection causes RCS Tavg to rise considerably. If the candidate believes that a stuck rod impairs Rod Controls capability to reduce temperature adequately, this alarm would come in. (4) Loop Tavg Deviation setpoint is 3F above or below Median Tavg. This is a plausible alarm because the candidate could mistake the 3% NIS deviation setpoint that will occur as a downstream impact for a single loop temperature deviation based on core location.

Sys #	**System**	**Category**	**KA Statement**
000005	Inoperable/Stuck Control Rod	N/A	Ability to verify that the alarms are consistent with the plant conditions.

K/A# 2.4.46 **K/A Importance** 4.2 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-2.4.AAK Rev. 5 page 2
2OM-1.4.ACF Rev. 10 page 3
2OM-2.4.AAD Rev. 5 page 2

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(1)

Objective: 2SQS-53C.1-01-02: State from memory the conditions or symptoms that would require entry into the AOP’s.

20. A plant startup is in progress.

- Rx is at 6% power and RISING
- 2RCS-LT461 fails LOW
- The crew has completed all required actions of the appropriate Instrument Failure procedure

30 minutes later the following conditions exist:

- Rx power is 8% and STABLE
- 2RCS-LT460 fails off scale HIGH
- NO OPERATOR actions have been taken

Complete the following statements.

1) The Reactor _______________ remain critical.

2) The pressurizer level high reactor trip bistables are set at _______________.

A. 1) will
2) 90%

B. 1) will
2) 92%

C. 1) will NOT
2) 90%

D. 1) will NOT
2) 92%

Question 20

Answer: B

Explanation/Justification: K/A is met by testing the candidate's ability to monitor the przr level failures and determine that even though the bistables for LT461 had been placed in trip, and LT460 fails high, that a reactor trip on przr level high at 92% will not occur since the plant is below P-7 (10% power).

A. Incorrect. The reactor will remain critical because the przr coincidence is 2/3 przr levels >92% when greater than P-7 (10% power). 90% is plausible because it is the 2/3 RCS Loop Low Flow Rx trip setpoint.

B. Correct. The reactor will remain critical because the przr coincidence is 2/3 przr levels >92% when greater than P-7 (10% power). In the stem Rx power is 8% when LT460 fails high, and the bistables for LT461 had already been placed in trip, therefore the plant is <P-7 and no trip occurs. 92% is the pressurizer level high reactor trip bistable setpoint.

C. Incorrect. The Rx will remain critical due to being <P-7 setpoint. 90% is plausible because it is the 2/3 RCS Loop Low Flow Rx trip setpoint.

D. Incorrect. The Rx will remain critical due to being <P-7 setpoint. 92% is the pressurizer level high reactor trip bistable setpoint.

Sys #	System	Category	KA Statement
028	Pressurizer (PZR) Level Control Malfunction / 2	AA1. Ability to operate and / or monitor the following as they apply to the Pressurizer Level Control Malfunctions:	PZR level reactor protection bistables

K/A# AA1.01 **K/A Importance** 3.8 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-1.5.B.9 rev 0 page 3, 5
2OM-6.4.IF Rev. 13 page 7, 8, 12

Question Source: Bank – 1LOT18 Q57

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 3SQS-1.1-01-09: Describe the control, protection and interlock functions for the control room components associated with the Reactor Protection System Trip Logics & Engineered Safeguards Features Actuation Signals, including automatic functions, setpoints and changes in equipment status as applicable.

2SQS-6.4, Rev. 17 Obj. 17. Describe the control, protection and interlock functions for the control room components associated with the Pressurizer and Pressurizer Relief System, including automatic functions, setpoints and changes in equipment status as applicable.

21. Given the following:

- The plant is in Mode 6
- Both Source Range detectors are reading approximately the same
- Due to a power supply malfunction, the detector voltage for NI-31 DROPS such that it is now significantly LOWER than N-32

Which of the following describes the type of detector used by the Source Range NIs and the effect of the lower voltage?

Source Range Detectors are ___(1)___, and N31 will be reading ___(2)___ than N32.

A 1) BF3 proportional counters
2) lower

B 1) BF3 proportional counters
2) higher

C 1) Compensated ion chambers
2) lower

D 1) Compensated ion chambers
2) higher

Answer: A

Explanation/Justification: This matches the K/A because the candidate must display knowledge of the operational implications for a loss of source range nuclear instrumentation voltage. Specifically, the candidate will have to identify that the source range detectors are proportional range instruments and therefore changes in voltage will cause different indications in the control room in a proportional manner.

A. Correct. SR detectors are BF3 proportional counter detectors. With a lower detector voltage, N31 will be reading lower than N32 because it is a proportional detector and as voltage lowers, the number of ion pairs collected will lower.

B. Incorrect. SR detectors are BF3 proportional counter detectors. Second part is plausible if the candidate thinks the SR acts as the IR detector and reads high when it is undercompensated.

C. Incorrect. Plausible because Compensated ion chamber detector is the type used for the Intermediate Range NI detector. Second part is correct, with a lower detector voltage, N31 will be reading lower than N32 because it is a proportional detector and as voltage lowers, the number of ion pairs collected will lower.

D. Incorrect. Plausible because Compensated ion chamber detector is the type used for the Intermediate Range NI detector. Second part is plausible if the candidate thinks the SR acts as the IR detector and reads high when it is undercompensated.

Sys #	System	Category	KA Statement
032	Loss of Source Range Nuclear Instrumentation / 7	AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of Source Range Nuclear Instrumentation:	Effects of voltage changes on performance

K/A# AK1.01 **K/A Importance** 2.5 **Exam Level** RO

References provided to Candidate None **Technical References:** 3SQS-2.1 PPNT slides 10, 11
GOGPF.C7 Rev. 4 pg. 77, 78

Question Source: Bank – 2014 South Texas Q51

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(2, 6)

Objective: 3SQS-2.1-01-01: Explain the operation of the BF_3, Compensated Ion Chamber, Uncompensated Ion Chamber and Fission Chamber (Unit 2) neutron detectors including; a. Which NIS channels utilize which detector type, and d. The effects of voltage changes on channel outputs

22. Given the following condition:

- The plant is in MODE 1
- A4-5A, Radiation Monitoring System Trouble annunciator is LIT.
- 2RMQ-RQI303, Waste Gas Storage Vault radiation monitor is in ALERT.

Which of the following actions are required in response to the Waste Gas Storage Vault radiation monitor in ALERT?

2HVQ-FN214A – Decontamination Building Filtered Exhaust Fan
2HVQ-FN214B – Decontamination Building Normal Exhaust Fan

A. Verify 2HVQ-FN214B and 2HVQ-FN214A trips and all exhaust flowpaths isolate.

B. Verify 2HVQ-FN214B and the unfiltered exhaust flowpath are in service.

C. Verify 2HVQ-FN214B trips and the unfiltered exhaust flowpath isolates, 2HVQ-FN214A starts and the filtered exhaust flowpath is in service.

D. Verify both 2HVQ-FN214B and 2HVQ-FN214A starts and the filtered flowpath is placed in service.

Answer: C

Explanation/Justification: K/A is met by the candidate's ability to verify what automatic actions should have occurred when the Waste Gas Storage Vault radiation monitor goes into Alert,

A. Incorrect. Plausible because these are the actions required if 2RMQ-RQI303, Waste Gas Storage Vault radiation monitor was in HIGH.
B. Incorrect. Plausible if candidate is unfamiliar with auto stop interlock of 2HVQ-FN214B with the ALERT on 2RMQ-RQI303 and thinks that the ventilation system will remain as normally aligned when an ALERT rad monitor is received.
C. Correct. When 2RMQ-RQI303 hits ALERT level, 2HVQ-FN214B trips and the unfiltered exhaust isolates while filtered exhaust dampers open to place it in service with 2HVQ-FN214A starting.
D. Incorrect. Plausible if the candidate thinks both fans start and align to the filtered path on an Alert rad level to increase air flow from the Waste Gas Storage Vault.

Sys #	**System**	**Category**	**KA Statement**
060	Accidental Gaseous Radwaste Release / 9	Generic	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.

K/A# 2.4.49 **K/A Importance** 4.6 **Exam Level** RO
References provided to Candidate None **Technical References:** 2OM-43.5.B.3 rev. 2 pg. 2
2OM-43.4.ABS Rev. 5 pg. 2
2SQS-44B.1 Rev. 9 PPNT Slide 34, 36

Question Source: New
Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(11)
Objective: 2SQS-44B.1-01-03: Describe the control, protection and interlock functions for the field components associated with the Process Cooling System, including automatic functions, setpoints and changes in equipment status as applicable.

23. The following conditions exist:

- Plant is at 80% power
- Control Room ACU Outside Air Intake and Exhaust Dampers 2HVC*MOD201B & D automatically CLOSED.
- Control Room Emergency Supply Fan [2HVC*FN241B] automatically STARTS 120 seconds after the Control Room isolation occurs

Which of the following radiation monitors, and setpoint would cause the above ventilation lineup?

A. Control Room Area [2RMC*RQ201] radiation monitor above the ALERT setpoint.

B. Control Room Area [2RMC*RQ202] radiation monitor above the HIGH setpoint.

C. Control Room Airborne Particulate [2RMC-RQ301A] radiation monitor above the ALERT setpoint.

D. Control Room Airborne Gas [2RMC-RQ301B] radiation monitor above the HIGH setpoint.

Answer: B

Explanation/Justification: K/A is met by re-aligning the Control Room ventilation system and having the candidate demonstrate the ability to determine which area radiation monitor alarm would cause the automatic ventilation alignment.

A. Incorrect. Plausible distractor because RQ201 does initiate CR isolation at the HIGH setpoint, but not at the alert setpoint.
B. Correct. RQ202 does initiate a CR isolation when at High setpoint.
C. Incorrect. Plausible distractor with it being a CR rad monitor. RQ301A will not initiate CR isolation.
D. Incorrect. Plausible distractor with it being a CR rad monitor. RQ301B will not initiate CR isolation.

Sys #	System	Category	KA Statement
061	Area Radiation Monitoring (ARM) System Alarms / 7	AA1. Ability to operate and / or monitor the following as they apply to the Area Radiation Monitoring (ARM)System Alarms:	Automatic actuation

K/A# AA1.01 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-43.4.ADB Rev.8 pg. 2, 3
1/2OM-44A.4A.A Rev. 17 pg. 3

Question Source: Bank - 2LOT15 Q64

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(11)

Objective: 2SQS-44A.1, Rev. 6 Obj. 5. Given a Unit-2 Control Area Ventilation System configuration and without reference material, describe the System’s field response to the following actuation signals, including automatic functions and changes in equipment status: b. Control Room Area Radiation Monitor Actuation.

24. Which of the following best describes the “2 in, 2 out” philosophy as mentioned in 1/2OM-56B.4A.B, Fire Brigade and Fire Fighting Procedures?

A. With 2 people fighting the fire, the 2 people outside are to maintain audible and/or visual contact and perform any needed emergency rescues.

B. If the 2 people fighting the fire’s SCBAs are running low, the 2 people outside are there to retrieve replacement bottles.

C. If 1 of the 2 people fighting the fire is injured, 1 of the 2 outside people can substitute in to continue firefighting efforts.

D. With 2 people fighting the fire, the 2 people outside are there to flake out hoses to aid the firefighting efforts.

Answer: A

Explanation/Justification: This matches the K/A because in 1/2OM-56B.4A.B the “2 in, 2 out” philosophy is discussed with regards to the search and rescue aspect of our fire plan. Candidate is required to know the reasons for that philosophy and how it is implemented for a Plant Fire on Site.

A. **Correct**. Per 1/2OM-56B.4A.B.3.d, the “two-in, two-out” rule sends 2 people in to fight the fire while maintaining audible or visual contact with the 2 outside people who are there to perform emergency rescues.
B. **Incorrect**. Plausible if candidates understand the purpose of standby personnel as auxiliary people to replace equipment, not as extraction personnel to save lives of those inside.
C. **Incorrect**. Plausible if candidates assume the outside personnel are standby firefighters, not as extraction personnel to save the lives of those inside.
D. **Incorrect**. Plausible if candidates are familiar with firefighting terminology but unfamiliar with 56B firefighting philosophy, but per 1/2OM-56B.4A.B the people outside are there to perform rescue activities.

Sys #	System	Category	KA Statement
067	Plant Fire on Site / 8	AK3. Knowledge of the reasons for the following responses as they apply to the Plant Fire on Site:	Steps called out in the site fire protection plan, FPS manual, and fire zone manual

K/A# AK3.02 **K/A Importance** 2.5 **Exam Level** RO

References provided to Candidate None **Technical References:** 1/2OM-56B.4A.B page 7
3SQS-56B.1 Rev. 11 PPNT Slide 79

Question Source: New

Question Cognitive Level: Low – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(10)

Objective: 3SQS-56B.1-01-01: Explain the purpose(s) of BVPS Fire Prevention and Control procedures, as well as 1(2)OM-56B and 1/2OM-56B Operating Manuals.

25. Given the following:
    - The plant has tripped from full power due to a Loss of Offsite Power (LOOP).
    - The crew is performing the actions of ES-0.3, Natural Circulation Cooldown with Steam Void in Vessel (With RVLIS)
    - All Pressurizer Pressure controls are in AUTOMATIC EXCEPT Pressurizer Pressure Controller, 2RCS-PK444A is in MANUAL.
    - RCS Tave = 510 °F.
    - RCS Pressure = 1650 psig.
    - Pressurizer level = 30%.
    - Reactor Vessel Water Level (RVLIS) Upper Head Level = 64%.

    Subsequently:
    - 2RCS-PK444A demand fails to zero output.

    Assuming no other operator actions are taken, how will RCS pressure and PRZR level respond?

A. RCS pressure will LOWER and Pressurizer Level will LOWER.

B. RCS pressure will LOWER and Pressurizer Level will RISE.

C. RCS pressure will RISE and Pressurizer Level will LOWER.

D. RCS pressure will RISE and Pressurizer Level will RISE.

Answer: C

Explanation/Justification: K/A is met with the candidate's knowledge that if the master pressure controller demand fails to zero while controlling RCS pressure with a steam void in the vessel, it will cause RCS pressure to rise due to heaters energizing, and the pressure rise will shrink the void in the vessel making przr level lower.

A. Incorrect: RCS pressure will rise, not lower, because the 0% demand from the Pressurizer Pressure controller will energize the heaters. Pressurizer level will lower, as stated, due to pressure rising.

B. Incorrect: RCS pressure will rise, not lower, because the 0% demand from the Pressurizer Pressure controller will energize the heaters. Pressurizer level will lower, not rise, because the rise in RCS pressure will reduce the head void causing water to replace some of the void volume.

C. CORRECT: Lowering the demand on the Pressurizer Pressure controller to 0% will cause the Pressurizer heaters to energize thereby raising RCS pressure. As pressure goes up, the void in the RV Head gets compressed. This will result in Pressurizer level lowering as inventory fills the RV Head area where the volume of the void is being reduced.

D. INCORRECT: RCS pressure will rise, as stated, but Pressurizer level will lower as the void in the head shrinks.

Sys #	System	Category	KA Statement
WE10	Natural Circulation with Steam Void in Vessel With/Without RVLIS / 4	EK2. Knowledge of the interrelations between the (Natural Circulation with Steam Void in Vessel with/without RVLIS) and the following:	Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

K/A# EK2.1 **K/A Importance** 3.3 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-6.4.IF Rev. 13 pg. 24, 25,

Question Source: Bank – South Texas 2011 Q33

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 2SQS-6.4, Rev. 17 Obj. 17. Describe the control, protection and interlock functions for the control room components associated with the Pressurizer and Pressurizer Relief System, including automatic functions, setpoints and changes in equipment status as applicable.

3SQS-53.2, Rev. 2 Obj. 13. State from memory how significant RCS voiding may occur, and how this can be mitigated, IAW BVPS EOP Executive Volume.

26. Given the following conditions:
    - The Plant was operating at 100% power.
    - A Main Steam line break inside containment has occurred on ‘A’ Steam generator.
    - The crew has entered FR-P.1, Response to Imminent Pressurized Thermal Shock Condition.

    Which of the following completes the statements below?

    1) Aux Feedwater flow to the faulted steam Generator will be ______(1)______.
    2) Safety Injection flow is terminated because ____________(2)____________.

A. 1) isolated
   2) the soak required by FR-P.1 requires it to be secured

B. 1) isolated
   2) it is a significant contributor to any cold leg temperature decrease or overpressure condition

C. 1) reduced to 50 gpm
   2) the soak required by FR-P.1 requires it to be secured

D. 1) reduced to 50 gpm
   2) it is a significant contributor to any cold leg temperature decrease or overpressure condition

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Answer: B

Explanation/Justification: K/A is met with the candidates knowledge of the need to isolate AFW to a faulted SG while in FR-P.1,, along with the knowledge that safety injection input to the RCS during a PTS condition will further reduce cold leg temperatures and possibly over pressurize an intact RCS due to the SI water temperature and system capacity.

A. Incorrect. The first major action step of the procedure is to stop RCS cooldown which in this case is caused by the ‘A’ MSL break, therefore AFW will be isolated to the SG. Safety Injection is not required to be terminated to perform the soak FR-P.1 as some conditions such as a SBLOCA may not permit termination.

B. Correct. The first major action step of the procedure is to stop RCS cooldown which in this case is caused by the ‘A’ MSL break, therefore AFW will be isolated to the SG. Terminating Safety Injection is required if conditions are met because it is a significant contributor to any cold leg temperature decrease or overpressure condition per major action step two.

C. Incorrect. Reducing AFW flow to 50 gpm is plausible because it is required per FR-P.1 if all SGs were faulted. Safety Injection is not required to be terminated to perform the soak FR-P.1 as some conditions such as a SBLOCA may not permit termination.

D. Incorrect. Reducing AFW flow to 50 gpm is plausible because it is required per FR-P.1 if all SGs were faulted. Terminating Safety Injection is required if conditions are met because it is a significant contributor to any cold leg temperature decrease or overpressure condition per major action step two.

Sys #	System	Category	KA Statement
WE08	Pressurized Thermal Shock / 4	EK1. Knowledge of the operational implications of the following concepts as they apply to the (Pressurized Thermal Shock)	Components, capacity, and function of emergency systems.

K/A# EK1.1 **K/A Importance** 3.5 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53B.4.FR-P.1 Iss.3 Rev. 0 Pg. 4
2OM-53A.1.FR-P.1 Iss.3 Rev. 0 Pg. 2, 3

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(8)

Objective: 3SQS-53.3, Rev. 5 Obj. 3. State from memory the basis and sequence for the Major Action Steps of each EOP procedure, IAW BVPS-EOP Executive Volume.

27. Which of the following describes a function of the flywheel on the RCPs?

A. Prolongs RCP coastdown time to aid in maintaining loop flow thus maintaining hot channel factors at an acceptable level during certain loss of RCS flow events.

B. Prolongs RCP coastdown time to aid in maintaining loop flow thus maintaining DNBR within acceptable limits during certain loss of flow events.

C. Maintains constant RCP speed, minimizing the potential for spurious RCS low flow reactor trips and maintaining hot channel factors at an acceptable level during power operation.

D. Maintains constant RCP speed, minimizing the potential for spurious RCS low flow reactor trips and maintaining DNBR within limits during power operation.

Answer: B

Explanation/Justification: K/A is met by demonstrating the knowledge of the effects that the RCP flywheel has during RCP coast down and how this assists in maintaining DNBR within acceptable limits during certain loss of flow events.

A. Incorrect. Flywheel designed to provide inertia to aid DNBR, not specifically for hot channel factors. Hot channel factors are affected by control rods.
B. Correct.
C. Incorrect. Flywheel more important for loss of flow, where RCP coastdown time is important for heat removal. Hot channel factors are affected by control rods.
D. Incorrect. RCS flow is a consideration for DNBR, but at rated RCP speed, the flywheel inertia is insignificant in performing the function of maintaining flow.

Sys #	System	Category	KA Statement
003	Reactor Coolant Pump System	K5 Knowledge of the operational implications of the following concepts as they apply to the RCPS:	Effects of RCP coastdown on RCS parameters

K/A# K5.02 **K/A Importance** 2.8 **Exam Level** RO

References provided to Candidate None **Technical References:** 2SQS-6.3 LP Rev. 14 pg. 44

Question Source: Bank – 1LOT18 Q28

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(5)

Objective: 2SQS-6.3, Rev. 14 Obj. 19. Given a Reactor Coolant Pump and support system configuration and without referenced material, describe the Reactor Coolant Pump and support system control room response to the following off-normal conditions, including automatic functions and changes in equipment status as applicable. b. Loss of electrical power

28. Given the following plant conditions and sequence of events:

- A Load reduction is in progress at 1% per minute.
- Reactor power is 22% and preparations are being made to take the turbine off-line.
- The Main Feed Regulating Bypass Valves have been transferred to AUTO.
- The 'B' Reactor Coolant Pump (RCP) unexpectedly trips.
- No operator actions have been taken and the plant responds as designed.

Which of the following will be the **INITIAL** effects of the RCP shutdown?

'B' S/G Steam Flow will ____(1)____.

'B' S/G Pressure will ____(2)_____.

A. 1) decrease
2) decrease

B. 1) increase
2) decrease

C. 1) decrease
2) increase

D. 1) increase
2) remain the same

Answer: A

Explanation/Justification: K/A is met with the candidate's knowledge that when an RCP trips below P-8 that the SG pressure and steam flow in the idle loop will be lower due to a lower loop Tavg.

A. Correct. A loss of a single RCP below P-8 will NOT result in a reactor trip. The immediate effects of the tripped RCP in the effected loop is a decrease in steam flow (other two loops pick up flow). S/G pressure will drop since loop Tavg is lower.
B. Incorrect. Correct steam pressure response. Opposite Steam Flow Response. Steam flow will drop in effected loop but will increase in unaffected loops.
C. Incorrect. Correct that steam flow decreases. S/G pressure drops versus increases.
D. Incorrect. All parameter responses are incorrect. Plausible if the candidate does not understand RCP trip effects on these parameters.

Sys #	System	Category	KA Statement
003	Reactor Coolant Pump System	K5 Knowledge of the operational implications of the following concepts as they apply to the RCPS:	Effects of RCP shutdown on secondary parameters, such as steam pressure, steam flow, and feed flow

K/A# K5.04 **K/A Importance** 3.2 **Exam Level** RO
References provided to Candidate None **Technical References:** GO3ATA 3.2 U2 PPNT Abnormal Transients, Rev. 4 Slides 67, 70

Question Source: Bank – 1LOT8 Q28

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(5)

Objective: GO-3ATA 3.2, Rev. 4 Obj. 1. Predict and analyze the plant response (TAVG, Reactor Power, Net Reactivity, Pressurizer Pressure, Pressurizer Level, Steam Generator Pressure, Steam Generator Level, and Steam Flow) to the following transients: e. RCP Trip at Power (Affected and Unaffected Loops)

29. Given the following conditions:

- The plant is in MODE 1
- Tavg = 567.5°F
- RCS pressure is 2235 psig
- RCS Boron concentration is 1000 ppm.
- Rx Eng reports that a change of 25 ppm boron will cause Tavg to change by 0.1°F.

Using the provided Nomographs, what is the required amount of boric acid / water addition to raise RCS Tavg to 568.0°F?

REFERENCE PROVIDED

A. ~180 gallons of Boric Acid

B. ~900 gallons of Boric Acid

C. ~1,400 gallons of Dilution Water

D. ~7,000 gallons of Dilution Water

Answer: D

Explanation/Justification: K/A is met with the candidate's ability to determine the amount of boron dilution required to change RCS temperature by applying the change in boron concentration required to the boron dilution nomograph.

A. Incorrect. Plausible if the candidate thinks boron addition is required and thinks a 25-ppm addition is required.
B. Incorrect. Plausible if the candidate thinks boron addition is required and thinks a 125-ppm addition is required.
C. Incorrect. Plausible if the candidate recognizes a boron dilution is required but only adds for a 25 ppm change in boron concentration.
D. Correct. With initial boron concentration at 1000 ppm, and needing a 125 ppm dilution (25 ppm/.1F X 0.5F required = 125 ppm), they will determine that approximately 7,000 gal dilution is required.

Sys #	System	Category	KA Statement
004	Chemical and Volume Control System	Generic	Ability to interpret reference materials, such as graphs, curves, tables, etc.

K/A# 2.1.25 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate
2OM-7.5.A.45 (Fig 7-45) Iss. 1 Rev. 2
2OM-7.5.A.46 (Fig 7-46) Iss. 1 Rev. 2
2OM-7.5.B.1 (Table 7-1) Iss. 1 Rev. 3

Technical References:
2OM-7.5.A.45 (Fig 7-45) Iss. 1 Rev. 2
2OM-7.5.A.46 (Fig 7-46) Iss. 1 Rev. 2
2OM-7.5.B.1 (Table 7-1) Iss. 1 Rev. 3

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(5)

Objective: 2SQS-7.1, Rev. 23 Obj. 28. Given a set of plant conditions, adjust RCS boron concentration to meet the desired final plant conditions.

30. The following conditions exist:

- Plant is in Mode 5
- A1-2G, INCORE INSTR ROOM/CNMT SUMP LEVEL HIGH/VALVE NOT RESET is in alarm
- RHR HX A INLET TEMP is 113°F and STABLE
- 2RHS*FCV605A, RHS TRAIN A HX BYPASS FLOW CONTROL valve has OPENED an additional 5% in response to the leak

Based on the given conditions:

1) Which of the following is the location of the leak in the RHR system?

2) Which of the following procedures would be used to isolate the affected train of RHR?

A. 1) RHS*MOV720A, 'RHS Train Return to B Loop Isolation' INLET flange
2) AOP-2.10.1, "Loss of Residual Heat Removal Capability"

B. 1) RHS*MOV720A, 'RHS Train Return to B Loop Isolation' INLET flange
2) AOP-2.6.5, "Shutdown LOCA"

C. 1) 2RHS-E21A, ''A' RHR HX' OUTLET flange
2) AOP-2.10.1, "Loss of Residual Heat Removal Capability"

D. 1) 2RHS-E21A, ''A' RHR HX' OUTLET flange
2) AOP-2.6.5, "Shutdown LOCA"

Answer: C

Explanation/Justification: K/A is met by the candidate predicting the location of the RHR leak which is putting water into the Cnmt sump (BV does not have RHR emergency sumps) based on the RHS TRAIN A HX BYPASS FLOW CONTROL valve response, then based on system conditions decide which AOP would be used to mitigate and isolate the leak in the RHR system.

A. Incorrect. A leak at the inlet of RHS-MOV720A is downstream of (FT605A) flow element, therefore the loss in flow would not cause FCV-605A to respond because it is not seen by the flow element. AOP-2.10.1 is the correct procedure for plant conditions.

B. Incorrect. A leak at the inlet of RHS-MOV720A is downstream of (FT605A) flow element, therefore the loss in flow would not cause FCV-605A to respond because it is not seen by the flow element. AOP-2.6.5 is used for a loss of coolant accident when in mode 3 (after the accumulators are isolated) or mode 4.

C. Correct. A leak at the outlet of the RHR Hx will cause flow to be lower at (FT605A) flow element downstream of the Hx and FCV. This reduced flow will cause FCV-605A to open to raise flow back to the desired setpoint. AOP 2.10.1 is the correct procedure when there is a loss of coolant accident in mode 5 & 6.

D. Incorrect. This is the correct leak location, but the incorrect procedure for the plant conditions. AOP-2.6.5 is used for a loss of coolant accident when in mode 3 (after the accumulators are isolated) or mode 4.

Sys #	System	Category	KA Statement
005	Residual Heat Removal System	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RHRS controls including:	Detection of and response to presence of water in RHR emergency sump

K/A# A1.05 **K/A Importance** 3.3 **Exam Level** RO

References provided to Candidate None **Technical References:** RM-0410-001 Rev. 17
2OM-53C.4.2.10.1 rev. 16 pgs.1

Question Source: Bank – 2LOT15 Q5

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(10)

Objective: 2SQS-53C.1-01-02: State from memory the conditions or symptoms that would require entry into the AOPs.
2SQS-10.1, Rev. 20 Obj. 20. Given a change in plant conditions due to system or component failure, analyze the Residual Heat Removal System to determine what failure has occurred.

31. Given the following:

- The plant is in Mode 4, cooling down for refueling.
- 'A' RHR Pump and heat exchanger are in service.
- The auto setpoint on 2RHS-FCV605A, RHR Heat Exchanger Bypass Flow Control Valve drifts LOW.

Which of the following describes the effect on the RCS cooldown rate and why?

The RCS cooldown rate ____________________

A. increases, due to the increased flow through the RHR heat exchanger.

B. lowers, due to the decreased total flow through the RHR system.

C. lowers, due to the decreased flow through the RHR heat exchanger.

D. increases, due to the increased total flow through the RHR system.

Answer: A

Explanation/Justification: K/A is met by demonstrating the knowledge of how the cooldown rate is affected when 2RHS-FCV605A, RHR Heat Exchanger Bypass Flow Control Valve drifts low causing more RHR flow to flow through the RHR HX. Discussed with Chief that although Q30 and Q31 both deal with the RHR Bypass FCV, Q30 asks about leak response, and this question asks about temperature response, therefore they are not overlapping.

A. Correct. Less bypass flow with a lower setpoint for total flow, results in higher percentage of RHR flow through the heat exchanger, which results in a lower average temperature of RHR returning to RCS.
B. Incorrect. Cooldown rate will increase not lower, due to increased flow though the Hx when the Bypass FCV closes. It is correct that total system flow will decrease, but when this happens more flow will pass through the HX. The candidate may have a misconception of the valve response when the auto setpoint drift lows.
C. Incorrect. Cooldown rate will increase not lower, due to increased flow though the Hx when the Bypass FCV closes. It is incorrect that that the flow through the RHR HX decreases because it actually increases when the FCV605 closes. The candidate may have a misconception of the valve response when the auto setpoint drift lows.
D. Incorrect. Cooldown rate does increase. It is incorrect that total RHR system flow will increase. Higher flow through the heat exchanger, but not through the RHR system.

Sys #	**System**	**Category**	**KA Statement**
005	Residual Heat Removal System	K4 Knowledge of RHRS design feature(s) and/or interlock(s) which provide or the following:	RHR heat exchanger bypass flow control

K/A# K4.03 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-10.1.D Iss. 4 Rev. 0 pg. 9
2SQS-10.1 Rev. 20 PPNT Slide 11

Question Source: Bank – 1LOT18 Q31

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 2SQS-10.1, Rev. 20 Obj.16. Describe the control, protection and interlock functions for the control room components associated with Residual Heat Removal System, including automatic functions, setpoints and changes in equipment status as applicable.

32. The plant has just experienced a loss of AE Emergency 4KV bus.
The #1 diesel generator has failed to reenergize the bus.

Which of the following Safety Injection Accumulator discharge valves can be operated remotely given all other control interlocks are met?

A. 2SIS-MOV865A Only

B. 2SIS-MOV865B Only

C. 2SIS-MOV865A & C Only

D. 2SIS-MOV865B & C Only

Answer: D

Explanation/Justification: K/A is met by the candidate determining which ECCS Safety Injection accumulator discharge valves will still have power available to them after a loss of the AE Emergency bus.

A. Incorrect. Plausible if the candidate doesn't know the respective train for the discharge valve power supply.
B. Incorrect. Plausible because 2SIS-MOV865B does have power available, but 2SIS-MOV865C is also powered from the Train B bus DF.
C. Incorrect. Plausible because A and C components are normally powered from Train A power supplies.
D. Correct. 2SIS-MOV865B & C are both powered from 480 VAC MCC2-E6 which is powered from the DF Emergency bus.

Sys #	System	Category	KA Statement
006	Emergency Core Cooling System	K2 Knowledge of bus power supplies to the following:	Valve operators for accumulators

K/A# K2.02 **K/A Importance** 2.5 **Exam Level** RO
References provided to Candidate None **Technical References:** 2SQS-11.1 PPNT Rev. 18 Slide 60
Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(8)
Objective: 2SQS-11.1, Rev. 18 Obj. 4. Identify the power supplies for the components identified on the Normal-System-Arrangement System Flow-path drawing which are powered from the class 1E electrical distribution system. (For the 4160v system, include the power train and bus designation. For the 480v system, include only the power train.)

33. Given the following conditions:

- The plant has tripped on low RCS pressure, and Safety Injection has automatically initiated.
- 2SWS*P21A, 'A' Service Water pump tripped after the SI actuated.
- The Standby Service Water pumps failed to start automatically or manually.

Which, if any, of the following pump bearing temperatures would be **directly** affected by the current Service Water event?

A. 2SIS*P21A, 'A' LHSI Pump **only.**

B. 2CHS*P21A, 'A' Charging/HHSI pump **only.**

C. **Both** 2SIS*P21A, 'A' LHSI Pump **AND** 2CHS*P21A, 'A' Charging/HHSI pump.

D. **Neither** 2SIS*P21A, 'A' LHSI Pump **OR** 2CHS*P21A, 'A' Charging/HHSI pump lose cooling.

Answer: B

Explanation/Justification: K/A is met with the candidate's knowledge that a loss of service water to the HHSI pump lube oil cooler will cause the pump temperatures to rise.

A. Incorrect. Plausible because the LHSI pump is part of the ECCS system, but it has no lube oil cooler and is air cooled, so a loss of service water will have no direct effect on the pump temperatures.
B. Correct. Given that an SI has occurred, CIA causes SWS-MOV107s to close and split the SW headers, therefore no cooling water is supplied to the A charging pump lube oil cooler and the HHSI pump temperatures will rise.
C. Incorrect. LHSI pump is aired cooled.
D. Incorrect. HHSI will lose cooling to its lube oil cooler.

Sys #	System	Category	KA Statement
006	Emergency Core Cooling System	K6 Knowledge of the effect of a loss or malfunction on the following will have on the ECCS:	HPI/LPI cooling water

K/A# K6.05 **K/A Importance** 3.0 **Exam Level** RO

References provided to Candidate None **Technical References:** 2SQS-30.1 Rev. 24 PPNT Slide 9
2OM-7.1.C Rev. 9 pg. 3, 4

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(8)

Objective: 2SQS-30.1-01-01: Describe the function of the Service Water System and the associated major components.
2SQS-30.1-01-13: Given a Service Water System configuration, describe the Service Water System control room response to the following actuation signals, including automatic functions and changes in equipment status as applicable.

34. Given the following:

- The plant is at 100% power
- Containment pressure is 13.4 psia
- Containment temperature is 93°F

Subsequently:

- A load rejection results in a reactor trip
- Following the trip, a Pressurizer Safety valve opens, and will NOT reseat
- The PRT rupture disks function as designed
- Containment pressure is rising at 0.1 psia every 5 minutes
- Containment temperature is rising at 1°F every 5 minutes

Assuming these conditions remain constant, which of the following identifies the Containment Technical Specifications LCOs that will be affected one hour from now?

A. Both LCO 3.6.4, Containment Pressure, and LCO 3.6.5, Containment Air Temperature, will be exceeded.

B. Only LCO 3.6.4, Containment Pressure, will be exceeded.

C. Only LCO 3.6.5, Containment Air Temperature, will be exceeded.

D. Neither LCO 3.6.4, Containment Pressure, nor LCO 3.6.5, Containment Air Temperature, will be exceeded.

Answer: B

Explanation/Justification: The KA is matched because the operator must demonstrate knowledge of the effect that a loss the PRTS (Rupture Disk Releases) will have on the Containment (i.e. TS Limits are challenged).

A. Incorrect. Plausible if the candidate does not know the cnmt temperature or pressure Tech Spec values or miscalculates the one-hour trend.
B. Correct. After an hour cnmt pressure will rise 1.2 psia, therefore cnmt pressure will be 13.4 + 1.2 psia=14.6 psia. TS 3.6.4 - Containment pressure shall be ≥12.8 psia and ≤14.2 psia. Therefore, the LCO is NOT met at this time.
C. Incorrect. Plausible if the candidate does not know the cnmt temperature Tech Spec values. After the one-hour trend cnmt temp will rise 12°F to 105°F. TS 3.6.5 Containment average air temperature shall be ≥70°F and ≤108°F. Therefore, the LCO is met at this time.
D. Incorrect. Plausible if the candidate does not know the cnmt temperature or pressure Tech Spec values or miscalculates the one-hour trend.

Sys #	System	Category	KA Statement
007	Pressurizer Relief/Quench Tank System	K3 Knowledge of the effect that a loss or malfunction of the PRTS will have on the following:	Containment

K/A# K3.01 **K/A Importance** 3.3 **Exam Level** RO

References provided to Candidate None **Technical References:** TS 3.6.4 & TS 3.6.5

Question Source: Bank – 2LOT19 Q33 (previous 2 exams)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 3SQS-CONT ITS, Rev. 1 Obj. 3. Given plant conditions, determine the criteria necessary to ensure compliance with each Section Containment Systems LCO and Licensing Requirement in accordance with the Bases, Surveillance Requirements, and the Applicability

35. Given the following plant conditions:

- The plant is at 100% power steady-state
- The controller for 2CCP-TCV144, NON-REGEN HX TEMP CONTROL VALVE controller has just been placed in MANUAL due to erratic operation

Subsequently:

- A 60 gpm orifice is placed in service, replacing the 45 gpm orifice that had been in service by itself
- No adjustments have been made to 2CCP-TCV144

Which of the following completes the statements below?

Reactor Coolant System temperature will ______(1)______ due to the reactivity effects.

If letdown temperature continues to rise, 2CHS-TCV143, NON-REGEN HX DISCH DIVERTING VALVE will divert letdown flow to the VCT at ______(2)______.

A. 1) rise
2) 134°F

B. 1) rise
2) 143°F

C. 1) lower
2) 134°F

D. 1) lower
2) 143°F

Question 35

Answer: C

Explanation/Justification: The KA is met because the applicant must predict changes in parameters (RCS boron concentration/temperature) associated CCW temperature control valve in manual with increased letdown flow and is tested on knowledge of when a protective action occurs to prevent overheating ion exchange resign (to prevent exceeding design limits).

A. Incorrect. RCS temperature rising is incorrect but plausible because typically as temperature goes up solubility goes up, so the applicant could rationalize that more boron is removed from solution, thus less returns to the RCS and temperature would rise due to the positive reactivity effect. At 134F, 2CHS-TCV143 will swap to the VCT position to protect the demineralizer from high temperatures.

B. Incorrect. RCS temperature rising is incorrect but plausible because typically as temperature goes up solubility goes up, so the applicant could rationalize that more boron is removed from solution, thus less returns to the RCS and temperature would rise due to the positive reactivity effect. 143F is incorrect but plausible because candidates associate the temperature with the valve number, but the correct value is 134F.

C. Correct. By increasing the letdown flow and not adjusting CCP flow, the letdown temperature increases causing the ion exchanger resin to release boron. This negative reactivity effect is what causes RCS temperature to lower. At 134F, 2CHS-TCV143 will swap to the VCT position to protect the demineralizer from high temperatures.

D. Incorrect. By increasing the letdown flow and not adjusting CCP flow, the letdown temperature increases causing the ion exchanger resin to release boron. This negative reactivity effect is what causes RCS temperature to lower. 143F is incorrect but plausible because candidates associate the temperature with the valve number, but the correct value is 134F.

Sys #	System	Category	KA Statement
008	Component Cooling Water System	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCWS controls including:	CCW temperature

K/A# A1.02 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** GO-GPF.C4 Rev. 2 pg. 30
2SQS-7.1 Rev. 23 pg. 23

Question Source: Bank – 2014 Robinson Q35

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b()

Objective: GO-GPF.C4 Rev. 2 Obj. 22. Describe the demineralizer characteristics that can cause a change in boron concentration.
2SQS-7.1 Rev. 23 Obj. 21. Given a specific plant condition, predict the response of the Chemical and Volume Control System control room indication and control loops, including all automatic functions and changes in equipment status, for either a change in plant condition or for an off-normal condition

36. The plant is operating at 100% power.
    - 'A' CCP pump is RUNNING
    - 'B' CCP pump is in STANDBY
    - 'C' CCP pump is on clearance and unavailable

    'A' CCP pump TRIPS and cannot be restarted.

    1) At what pressure is 'B' CCP designed to AUTO start?
    2) If 'B' CCP pump fails to start automatically or manually, IAW the guidance provided in AOP-2.15.1, Loss of Primary Component Cooling Water, what sequence of actions is now **REQUIRED**?

A. 1) 34 psig
   2) Trip the reactor, Trip the RCPs, complete the IOA's of E-0, THEN close the RCP Thermal Barrier Outlet Isolation valves.

B. 1) 34 psig
   2) Trip the reactor, complete the IOA's of E-0, Trip the RCPs, THEN isolate letdown.

C. 1) 100 psig
   2) Trip the reactor, Trip the RCPs, complete the IOA's of E-0, THEN close the RCP Thermal Barrier Outlet Isolation valves.

D. 1) 100 psig
   2) Trip the reactor, complete the IOA's of E-0, Trip the RCPs, THEN isolate letdown.

Answer: D

Explanation/Justification: K/A is met with the candidate's knowledge that the standby CCW pump should auto start on low pressure, and that if the pump doesn't auto or manually start, the reactor and RCPs are required to be tripped iaw the Loss of Primary Component Cooling Water AOP.

A. Incorrect. 34 psig is plausible because the candidate must know normal operating pressure of CCP and know that this is the low pressure auto start setpoint for Service water pumps. The given sequence is plausible because the RCPs are required to be tripped but only after the IOAs are completed, and closing the RCP Thermal Barrier Outlet Isolation valves.is an expected action per AOP-2.6.8, Abnormal RCP Operation when the RCP shutdown is due to a loss of all seal cooling which is not correct.

B. Incorrect. 34 psig is plausible because the candidate must know normal operating pressure of CCP and know that this is the low pressure auto start setpoint for Service water pumps. The sequence is correct per AOP-2.15.1.

C. Incorrect. 100 psig is correct. The given sequence is plausible because the RCPs are required to be tripped but only after the IOAs are completed, and closing the RCP Thermal Barrier Outlet Isolation valves.is an expected action per AOP-2.6.8, Abnormal RCP Operation when the RCP shutdown is due to a loss of all seal cooling which is not correct.

D. Correct. 100 psig is the CCP pump auto start setpoint. Trip the reactor, complete the IOA's of E-0, Trip the RCPs, THEN isolate letdown is the correct sequence as stated in AOP-2.15.1.

Sys #	System	Category	KA Statement
008	Component Cooling Water System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Loss of CCW pump

K/A# A2.01 **K/A Importance** 3.3 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-15.2.B Rev. 2 pg. 4
2OM-53C.4.2.15.1 Rev. 4 pg. 3

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(10)

Objective: 2SQS-15.1-01-08: State the automatic starts and stops of the CCP pumps and how the automatic starts are altered when there is a change to the electrical lineup of the CCP pumps.

37. The following conditions exist:

- The plant is at 100% power.
- Both PRZR Spray Valves are CLOSED
- PRZR Pressure is 2220 psig and stable
- Regenerative HX Charging Outlet Temp 2CHS-TI123 is 430°F and stable

Which of the below listed actions will result in the **LARGEST** thermal shock to the PRZR spray nozzle?

A. Closing valve 2RCS-51, Bypass Spray Man Throttle **THEN** 1 hour later fully opening the associated PRZR spray valve.

B. Opening valve 2RCS-51, Bypass Spray Man Throttle **THEN** 1 hour later fully opening the associated PRZR spray valve.

C. Volume Control Tank level drops to 4%.

D. Energizing a PRZR backup heater.

Answer: A

Explanation/Justification: K/A is met with the candidate's knowledge of how the przr spray valve warm up flow design feature helps to minimize thermal shock to the przr spray nozzle by identifying what configuration would cause the largest thermal shock to the spray nozzles.

A. Correct. The BVPS design feature that provides spray valve warm-up is accomplished by throttling the PRZR Spray Valve Bypass valves. The line warm-up is procedurally controlled by throttling the manual bypass valves around the PRZR spray valves which provides a continuous small amount of spray flow. 2OM-6.4.H accomplishes this design concern. In order to answer the question, the candidate must have knowledge of how BVPS limits thermal stress/shock on the PRZR spray nozzle and must be aware that the NSA position of 2RCS-51 is throttled open. Since the valve is normally throttled open to limit stress/shock, closing it, then opening the spray valve defeats the purpose of the valve and will result in the largest thermal shock to the PRZR spray nozzle.

B. Incorrect. The initial opening of 2RCS-51 will put some stress on the nozzle, but this valve is only a ¾ valve and the stress will be smaller than choice A. Then opening the spray valve will result in little to no change in any thermal stress.

C. Incorrect. VCT level drop will result in an automatic swap of the charging pump suction to the cold RWST water. However, in NSA this will result in a thermal shock to the charging line penetration but not the PRZR spray nozzle. **IF** 2CHS-MOV311, aux. spray valve were open at this time, this would result in thermal shock to the PRZR spray nozzle.

D. Incorrect. This will result in a larger ΔT across the PRZR spray nozzle. However, the temperature rise is very gradual, and the KW rating of the heater is not large enough to cause thermal shock of the PRZR nozzle.

Sys #	System	Category	KA Statement
010	Pressurizer Pressure Control System	K4 Knowledge of PZR PCS design feature(s) and/or interlock(s) which provide for the following:	Spray valve warm-up

K/A# K4.01 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-6.4.H Rev. 4 pg. 2
2OM-6.2.A Rev. 25 P&L #63

Question Source: Bank – 1LOT14 Q37

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(3)

Objective: 2SQS-6.4, Rev. 17 Obj. 9. Given a set of plant conditions and the appropriate procedure(s), apply the operational sequence, parameter limits, precautions and limitations, and cautions & notes applicable to the completion of the task activities in the field. a. 2OM-6.2.A, Precautions and Limitations

38. Given the following conditions:

- A reactor startup is in progress
- The reactor is critical in the source range
- N42 Power Range channel has failed and has been removed from service with all bistables placed in the trip condition
- A loss of Vital Bus 1 occurs
- A12-1H, NOT P-7 changed state after the loss of Vital Bus occurred

What is the condition of the reactor, and source range detectors after Vital Bus 1 is lost?

A. Reactor trips
N31 Source Range channel is de-energized.
N32 Source Range channel is still in operation.

B. Reactor remains critical
BOTH source range channels are de-energized.

C. Reactor remains critical
N31 Source Range channel is de-energized.
N32 Source Range channel is still in operation.

D. Reactor trips
BOTH source range channels are de-energized.

Answer: D

Explanation/Justification: K/A is met by requiring knowledge of a loss of a 2nd (redundant) PR NI channel due to the loss of vital bus 1, and the effects it has on both the Rx Protection System causing a Rx trip and de-energizing both SR channels.

A. Incorrect. It is correct that the Rx will trip due to 2/4 PR high setpoints. N31 is de-energized by the loss of vital bus 1. N32 will not be in operation due to P-10 auto de-energizing both SR detectors

B. Incorrect. Reactor trips on a number of PR/SR trip setpoints. It is correct that both SR detectors will be de-energized

C. Incorrect. Reactor trips on a number of PR/SR trip setpoints. N31 is de-energized by the loss of vital bus 1. N32 will not be in operation due to P-10 auto de-energizing both SR detector.

D. Correct. A loss of Vital 1 causes a loss of power to N41. This loss also causes a loss of power to RPS channel 1. This will cause a trip condition for Power range trips for channel 1. Since N42 is already removed from service its bistable are in the tripped condition. This meets the 2/4 logic to cause a reactor trip. N31 is de-energized by the loss of vital bus 1. Additionally the signal for 2/4 power range channels above P-10 will cause the SR channels to auto de-energize causing N32 to de-energize.

Sys #	System	Category	KA Statement
012	Reactor Protection System	K6 Knowledge of the effect of a loss or malfunction of the following will have on the RPS:	Redundant channels

K/A# K6.02 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-2.2.A Rev. 1 (P&L 9)
UFSAR Fig. 7.3-8 and 7.3-9
2OM-2.3.C Rev. 5 pg. 3

Question Source: Bank – 2LOT15 Q37

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(6)

Objective: 3SQS-1.1, Rev. 8 Obj. 11. Given a specific plant condition, predict or describe the response of the Reactor Protection System Trip Logics & Engineered Safeguards Features Actuation Signals control room indication and control loops, including all automatic functions and changes in equipment status, for either a change in plant condition or for an off-normal condition.

3SQS-2.1, Rev. 9 Obj. 14. Given a specific plant condition, predict the response of the NIS, including all automatic functions and changes in equipment status, for a change in plant conditions.

39. Which of the following is the power supply to the Train “B” Solid State Protection System (SSPS) slave relays?

A. Vital Bus 1

B. Vital Bus 2

C. 125VDC Bus 1

D. 125VDC Bus 2

Answer: B

Explanation/Justification: K/A is met with the candidates knowledge of the power supply to the Train B Safeguards actuation slave relays comes from Vital Bus II.

A. Incorrect. Plausible because Vital bus I is the power supply to the Train “A” slave relays.
B. Correct IAW AOP-2.38.1B page 21 item 7.
C. Incorrect. Plausible because solid state protection uses various DC voltages, but slave relay power is provided by AC Vital bus 1.
D. Incorrect. Plausible because solid state protection uses various DC voltages, but slave relay power is provided by AC Vital bus 1.

Sys #	System	Category	KA Statement
013	Engineered Safety Features Actuation System	K2 Knowledge of bus power supplies to the following:	ESFAS/safeguards equipment control

K/A# K2.01 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 3SQS-1.2 Rev. 8 pg. 14
3SQS-1.2 Rev. 8 U2 PPNT Slide 11
2OM-53C.4.2.38.1B Rev. 8 pg.22

Question Source: Bank – 2LOT6Q39

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 3SQS-1.2, Rev. 8 Obj. 2. Identify the power supplies for the components identified on the Normal-System-Arrangement System flow-path drawing which are powered from the class 1E electrical distribution system.

40. Given:

- A reactor trip has occurred.
- A secondary steam leak is occurring in containment, SI has NOT actuated.
- ALL containment cooling has been lost.
- Containment temperature has risen from 96°F to 160°F over the last 15 minutes.

If this trend continues, which of the following describes the potential effect on the PRZR level instrumentation readings?

Indicated PRZR level will be _____(1)_____ actual level due to density _______(2)_______.

	(1)	(2)
A.	higher than	lowering in the reference leg
B.	higher than	lowering in the variable leg
C.	lower than	remaining constant in the variable leg
D.	lower than	remaining constant in the reference leg

Answer: A

Explanation/Justification: K/A is met with the candidate's knowledge of how the PRZR level instruments will respond to a loss of containment cooling in which containment temperature rises causing the density of the reference legs to lower making indicated level to be higher than actual level.

A. Correct. Reference leg density will lower due to exposure to the containment temperature rise, resulting in higher DP, since the variable leg density is unaffected. This will cause the indicated level to be higher than the actual level.
B. Incorrect. Indicated will be higher than actual, but it is due to the density in the reference leg changing, not the variable leg.
C. Incorrect. Plausible that indicated level would be lower than actual if the candidate doesn't understand that density will not rise due to the higher temperatures. Density will remain constant in the variable leg.
D. Incorrect. Plausible that indicated level would be lower than actual if the candidate doesn't understand that density will not rise due to the higher temperatures. Plausible that density in the reference leg remains constant if the candidate doesn't understand the design of the przr level instrument.

Sys #	System	Category	KA Statement
022	Containment Cooling System	K3 Knowledge of the effect that a loss or malfunction of the CCS will have on the following:	Containment instrumentation readings

K/A# K3.02 **K/A Importance** 3.0 **Exam Level** RO
References provided to Candidate None **Technical References:** 2SQS-6.4 Rev. 17 PPNT Slide 52
Question Source: Bank – 2014 Braidwood Q23
Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(3)
Objective: 2SQS-6.4, Rev. 17 Obj. 6. Given a change in plant conditions, describe the response of the Pressurizer and Pressurizer Relief System field indication and control loops, including all automatic functions and changes in equipment status.
GO-GPF.C7 Rev 4 Obj. 7. Describe the effect of the following changes on pressure and differential pressure detectors: a. Temperature

41. Given the following conditions:

- A LOCA has occurred
- CNMT pressure is 14.8 psig and lowering
- RWST level is 460 inches and lowering

Based on the conditions given, which of the following indications would be seen in the control room?

	'A' Quench Spray Pump	'A' QS Pump Disch. Valve (2QSS-MOV101A)	'B' Recirc Spray Pump	'B' RS Pump Disch. Valve (2RSS-MOV156B)
A.	Off	Closed	Off	Closed
B.	Running	Open	Running	Open
C.	Running	Open	Off	Open
D.	Running	Open	Off	Closed

Answer: C

Explanation/Justification: K/A is met by demonstrating the ability to identify the expected conditions of the control switch indications of two containment spray system pumps and their associated discharge valves based on a CIB actuation condition, and an RWST level greater than the starting setpoint for the RSS pumps.

A. Incorrect. Plausible if the candidate doesn't recognize that a CIB has occurred which would start the QS pump, and provide an open signal to both discharge valves, even though they are both NSA open. It is correct that the RSS pump will not be running.
B. Incorrect. Plausible if the candidate recognizes that a CIB has occurred and thinks both the QS and RSS pumps will receive a start signal. This is incorrect because the RSS pump needs a CIB signal coincident with a low RWST level of 381 inches. Both discharge valves are NSA open.
C. Correct. With cnmt pressure >11.1 psig (CIB actuation setpoint) the QS pumps will auto start. The RSS pump will not start because even though there is a CIB signal present, the RSS pumps also require an RWST low level of 381 inches to auto start, but the stem states that the RWST is at 460 inches and lowering. Both discharge valves are NSA open, and also receive an open signal on a CIB actuation.
D. Incorrect. First three indications are correct, but the 'B' RSS pump discharge valve is normally open, and also receives an open signal upon a CIB actuation. Plausible because the pump is not running and 2RSS-MOV156B is a cnmt isolation valve.

Sys #	System	Category	KA Statement
026	Containment Spray System	A4 Ability to manually operate and/or monitor in the control room:	CSS controls

K/A# A4.01 **K/A Importance** 4.5 **Exam Level** RO
References provided to Candidate None **Technical References:** 2OM-13.1.D Rev. 4 pg. 2, 5, 6, 8
2OM-13.3.B.1 Rev. 11 pg. 3
2OM-13.3.B.2 Rev. 8 pg. 8
2SQS-13.1 LP Rev. 18 Iss. 1 pg. 39

Question Source: Bank – 2LOT19 Q43 (previous 2 exams)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 2SQS-13.1, Rev. 18 Obj.14. Given a specific plant condition, predict the response of the Containment Depressurization System control room indication and control loops, including all automatic functions and changes in equipment status, for either a change in plant condition or for an off-normal condition

42. Which of the following conditions, BY ITSELF, would result in automatic closure of the Main Steam Isolation Valves?

A. Raising RCS pressure to 2235 psig with RCS temperature at 460°F.

B. Cooling down the plant to 500°F with RCS pressure at 1950 psig.

C. RCS pressure lowering to 1830 psig due to a stuck open Pressurizer Safety Valve.

D. Containment pressure rising to 5.6 psig due to an RCS leak.

Answer: A

Explanation/Justification: K/A is met by evaluating the knowledge of the auto isolation setpoints of the Main steam isolation valves given various plant conditions

A. Correct. By raising RCS above the P-11 setpoint of 2000 psig will auto enable the auto MSLI for steamline pressure of 500 psig. Saturation pressure for 460F is approx. 451 psig, therefore a MSLI will occur.

B. Incorrect. Plausible distractor because 500F could be confused with the MSLI setpoint of 500 psig, but in this case 500F is approx. 665psig, and the RCS pressure is less than P-11 (2000 psig) which means the 500 psig MSLI may or may not be in effect depending whether it has been blocked. Either way this answer is incorrect.

C. Incorrect. Plausible distractor because the candidate may confuse the SI pressure with the steam line press. setpoint of the Auto MSLI.

D. Incorrect. Plausible distractor if the candidate thinks 5 psig will cause a MSLI. 5 psig is the SI auto initiation setpoint, and 7 psig is the auto MSLI setpoint.

Sys #	System	Category	KA Statement
039	Main and Reheat Steam System	A3 Ability to monitor automatic operation of the MRSS, including:	Isolation of the MRSS

K/A# A3.02 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** Tech Specs pg. 3.3.2-10 & 13

Question Source: Bank – 1LOT18 Q42

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(5)

Objective: 3SQS-1.1, Rev. 8 Obj. 9. Describe the control, protection and interlock functions for the control room components associated with the Reactor Protection System Trip Logics & Engineered Safeguards Features Actuation Signals, including automatic functions, setpoints and changes in equipment status as applicable.

43. When is the first Main Feedwater pump shutdown in accordance with 2OM-52.4.R.1.F, Station Shutdown From 100% Power To Mode 5?

A. When annunciator A6-8B, STM GEN FEED PUMP 21A/B RECIRC VALVE TROUBLE alarms.

B. When any LOOP (A, B, C) FEEDWATER FLOW > STEAM FLOW annunciator alarms.

C. When total feedwater flow reduces to 6.5 to 7.0 Mpph (51-58% power).

D. When annunciator A12-3G, "NOT P-9" alarms.

Answer: C

Explanation/Justification: K/A is met with the candidate's ability to monitor plant conditions and determine that the second main feedwater pump must be secured when total feedwater flow reduces to 6.5 to 7.0 Mpph, (51 to 58% power).

A. Incorrect. Plausible because the alarm comes in at less than 7500 gpm on both pumps, AND both pumps running. This occurs at approximately 58% power level, and the ARP states to stop one out of two running main feed pumps, but this is not what the procedure directs the CR operators to monitor.

B. Incorrect. Plausible distractor if the candidate thinks that feedwater flow is greater than steam flow because two feed pumps are supplying too much water, but this is incorrect because the Feed Reg. valves would adjust to maintain flow as required.

C. Correct. Step IV.10 of the shutdown procedure states, when total feedwater flow reduces to 6.5 to 7.0 Mpph, (51 to 58% power) shutdown one steam generator feed pump.

D. Incorrect. Plausible because this alarm will come in when reactor power is <49% which would be a possible place in the plant shutdown procedure to secure the second main feed pump.

Sys #	System	Category	KA Statement
059	Main Feedwater System	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MFW controls including:	Power level restrictions for operation of MFW pumps and valves

K/A# A1.03 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-52.4.R.1.F Rev. 44 pg. 9

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(4)

Objective: 3LOT-M4D7&8&9, Rev. 10 Obj. 1-5 Remove a Main Feed Pump from service in accordance with the current operations procedure.

44. The following conditions exist:

- The plant is operating at 100% power
- 21A SG Steam Flow Signal Selector is in the FT-475 CH 4 position
- 2MSS*PT476, ‘A’ SG CH. 4 Steam Pressure Transmitter fails HIGH

With no operator action, how will the ‘A’ Main Feed Regulating Valve (MFRV), 2FWS-FCV478 respond to this failure and why?

The ‘A’ MFRV will ____(1)____ because the density input to Steam Flow detector FT475 has ____(2)____.

A. 1) open
   2) increased

B. 1) open
   2) decreased

C. 1) close
   2) increased

D. 1) close
   2) decreased

Answer: A

Explanation/Justification: K/A is met with the candidate’s knowledge that the steam pressure detectors provide the density compensation for the steam flow transmitters which in turn provide input to the SG Water Level Control System which will respond to a failed high pressure transmitter by opening the MFRV to attempt to match the indicated increased steam flow.

A. Correct. The steam pressure transmitter provides density compensation to the steam flow detector since the density of a compressible fluid such as steam does not remain constant. As pressure rises, the density also rises, causing the flow transmitter to indicate high. In response to the high steam flow transmitter, the MFRV will open as required by the SGWLC system.

B. Incorrect. The MFRV will open. Second part is plausible if the candidate does not know that as steam pressure goes up, so does the density.

C. Incorrect. Plausible if the candidate thinks steam flow will lower causing the MFRV to close. Second part is correct.

D. Incorrect. Plausible if the candidate thinks steam flow will lower causing the MFRV to close. Second part is plausible if the candidate does not know that as steam pressure goes up, so does the density.

Sys #	System	Category	KA Statement
059	Main Feedwater System	COMPONENT: 191002 Sensors and Detectors	Temperature/density compensation requirements

K/A# K1.02 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** GO-GPF.C7, Rev. 4 App. A pg. 64-67
2OM-24.4.IF Rev. 20 pg. 38
2SQS-24.1 PPNT Rev. 26 Slide 108

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(5)

Objective: 2SQS-24.1, Rev. 26 Obj. 17. Given a specific plant condition, predict the response of the Main Feedwater, Startup Feedwater, Auxiliary Feedwater System or Steam Generator Water Level Control System’s control room indication and control loops, including all automatic functions and changes in equipment status, for either a change in plant condition or for an off-normal condition.

GO-GPF.C7, Rev. 4 Obj. 13. Given a potential failure mode for a differential pressure cell used for flow indication, describe how the indicated parameter will be effected. d. Failure of density compensation signal

45. Given the following conditions:

- The plant is at 100% power
- 'B' MDAFW pump is on clearance for corrective maintenance
- All applicable Tech Spec actions have been completed

An inadvertent Rx trip occurs, concurrent with a complete loss of AC power.

What is the current flowpath of the AFW system with NO operator action?

A. Only the TDAFW running but unable to feed the SGs through either train of AFW throttle valves.

B. Only the TDAFW feeding the SGs through both trains of AFW throttle valves

C. Only the TDAFW feeding the SGs through the 'A' Train of AFW throttle valves

D. Only the TDAFW feeding the SGs through the 'B' Train of AFW throttle valves

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Answer: D

Explanation/Justification: K/A is met with the knowledge that when the 'B' MDAFW pump is on clearance, the turbine driven AFP will be aligned to the 'B' header, therefore when the loss of all AC occurs, and no motor driven AFW pumps are available, the TDAFW pump will inject through the 'B' train AFW throttle valves.

A. Incorrect. Plausible if the candidate thinks that the AFW throttle valves are NSA closed, and there is no power to operate the valves on the AFW initiation signal. This is not correct because even though power is lost and the indicating lights will lose power, the NSA position of the MOV AFW throttle valves at 100% power is Open.

B. Incorrect. Plausible if the candidate thinks that the TDAFW pump is aligned to both AFW headers, but this is not correct.

C. Incorrect. Plausible if the candidate does not know about the TS requirements to realign the TDAFW pump which is NSA to 'A' header.

D. Correct. With the B MDAFW on clearance, TSs require that with one inoperable AFW pump (B MDAFW), the remaining two AFW pumps will be aligned to separate redundant headers capable of supplying flow to each steam generator. This means that the TDAFW pump would be aligned to the 'B' AFW header.

Sys #	System	Category	KA Statement
061	Auxiliary/Emergency Feedwater System	K6 Knowledge of the effect of a loss or malfunction of the following will have on the AFW components:	Pumps

K/A# K6.02 **K/A Importance** 2.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2SQS-24.1 Rev. 26 PPNT Slide 3
Tech Specs 3.7.5 Cond B

Question Source: Bank – 1LOT18 Q46

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(10)

Objective: 2SQS-24.1, Rev. 26 Obj. 8. Given a set of plant conditions and the appropriate procedure(s), apply the operational sequence, parameter limits, precaution and limitations, and cautions & notes applicable to the completion of the task activities in the field.

2SQS-24.1, Rev. 26 Obj. 17. Given a specific plant condition, predict the response of the Main Feedwater, Startup Feedwater, Auxiliary Feedwater System or Steam Generator Water Level Control System's control room indication and control loops, including all automatic functions and changes in equipment status, for either a change in plant condition or for an off-normal condition.

46. Given the following plant conditions:

- The plant is operating at 100% power.
- 2OST-36.2, "Emergency Diesel Generator (2EGS*EG2-2) Monthly Test" is in progress.
- 2-2 EDG is paralleled to the grid, carrying about 50% load.
- A grid disturbance causes frequency to drop very slightly.
- Grid Voltage remains constant.

Which of the following describes the response of 2-2 EDG **AND** what is the significance of operating the EDG above 4535 KW for extended periods of time?

The response of 2-2 EDG is that ______(1)______, AND the significance of operating this EDG > 4535 KW is excessive ______(2)______.

A. 1) KW output RISES and KVAR output is STABLE
2) mechanical stress on the EDG engine

B. 1) KW output LOWERS and KVAR output is STABLE
2) accumulation of combustion and lubricating products in the exhaust system

C. 1) KW output and KVAR output RISES
2) mechanical stress on the EDG engine

D. 1) KW output and KVAR output LOWERS
2) accumulation of combustion and lubricating products in the exhaust system

Answer: A

Explanation/Justification: K/A is met with the candidate's knowledge that when the diesel generator is paralleled to the grid, and grid frequency lowers, the DG will end up carrying more load and possibly overloading the DG, and the bases for exceeding the DG load capability is that more mechanical stresses will be placed on the engine.

A. Correct. If frequency drops, the EDG will attempt to increase speed, which will pick up real load causing KW to rise. KVAR output will remain essentially stable since grid voltage remained constant. TS Surveillance 3.8.1.3 bases states that the load band (3814 to 4238 kW) which is more restrictive than the rated load in 2OST-36.2 (4535 kW) is to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations for DG OPERABILITY.

B. Incorrect. KW output will rise when the EDG attempts to raise grid frequency. The reason for significance of EDG loading is for ensuring loading is maintained >50% for an hour when operating the EDG at low loads for extended periods of time. This limit is plausible in that it is more associated with operating the EDG at low loads and could be confused by the candidate.

C. Incorrect. KVAR output will remain essentially constant if grid voltage is constant. If it did change it would change in the opposite direction of KW. Significance of operating above rated limit is correct as explained above.

D. Incorrect. KW will rise. Reason for load limit is incorrect as explained above.

Sys #	**System**	**Category**	**KA Statement**
062	AC Electrical Distribution System	COMPONENT: 191005 Motor and Generators	Causes of excessive current in motors and generators, such as low voltage, overloading, and mechanical binding

K/A# K1.03 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** GO-GPF.C5 Rev. 2 PPNT Slide 104
2OST-36.2, Rev. 81 pg. 11
TS 3.8.1 & Bases pg. B3.8.1-22

Question Source: Bank - 2LOT17 Q48 (previous 2 exams)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 12. Given a specific plant condition, predict the response of the 4KV Distribution System control room indication control loops, including all automatic functions and changes in equipment status, for either a change in plant condition or for an off-normal condition.

47. The plant is in Mode 3 when a complete loss of offsite power occurs.
    - #1 Diesel Generator responds as designed.
    - #2 Diesel Generator starts but ACB 2F10, 2-2 Emer Gen Output Breaker fails to close.

    Which statement describes the effect of these failures on the 125 VDC system?

A. All 125VDC busses are energized from their respective battery charger. NO 125VDC busses are energized from a Battery.

B. 125VDC Bus 1 and 3 are energized from their respective battery charger. 125VDC Bus 2 and 4 are energized from their respective Battery.

C. 125VDC Bus 2 and 4 are energized from their respective battery charger. 125VDC Bus 1 and 3 are energized from their respective Battery.

D. ALL 125 VDC busses are energized from their respective Battery. NO 125VDC busses are energized from a battery charger.

Answer: B

Explanation/Justification: K/A is met with the candidate's knowledge of the relationships of the AC electrical supply to the DC Battery chargers and know that when AC power is lost to a charger then the Battery will carry the DC loads.

A. Incorrect. Plausible if the candidate does not understand the AC electrical distribution to the battery chargers.
B. Correct. Loss of offsite power will deenergize the power supplies to the battery chargers until the diesels start and load. #1 DG reenergized the Train A busses, therefore the 2-1 and 2-3 chargers are operating and carrying the Train A DC busses. Since the #2 DG output breaker fails to close, the 2-2 and 2-4 Batteries will be carrying the DC loads on Train B,
C. Incorrect. Plausible if the candidate is not familiar with the AC distribution system supplying the DC battery chargers or doesn't understand the different Trains of power available.
D. Incorrect. Plausible if the candidate doesn't recognize that the battery chargers are powered from their respective train emergency 480VAC busses.

Sys #	System	Category	KA Statement
063	DC Electrical Distribution System	K1 Knowledge of the physical connections and/or cause effect relationships between the DC electrical system and the following systems:	Battery charger and battery

K/A# K1.03 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 3SQS-39 Rev 9 U2 PPNT Slide 10

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 3SQS-39.1, Rev. 9 Obj. 10. Given a 125 VDC Distribution System configuration, and without reference material, describe the 125 VDC Distribution System field response to the following malfunctions, including automatic functions and changes in equipment status.
a. Loss of AC power

48. Given the following plant conditions:

The plant is operating at Full Power with all systems in NSA **EXCEPT**:

- 2EGA*C21B, 2-2 Emergency Diesel Generator Air Compressor control switch is in **OFF**.
- 2EGA*C21B is being placed on clearance for maintenance.
- While posting the clearance, 2EGA*C22B, 2-2 Emergency Diesel Generator Air Compressor control switch was inadvertently taken from the **AUTO** to **OFF** position.

Based on this plant configuration, which of the following will be the **first** control room indication, if any?

A. A2-4H, "Safety System Train B Inoperable".

B. 2EGA*C22B GREEN Indicating Light – **NOT** LIT.

C. DG 2-2 Starting Air Pressure indication slowly lowering

D. There will be no control room indication for this plant configuration.

Answer: A

Explanation/Justification: K/A is met with the candidate's ability to determine from the Control Room that both local Diesel Generator air compressors switches for the #2 EDG are in the off position causing the system to be inoperable.

A. Correct. The candidate must have knowledge of the impact in the control room of remote operation of the EDG air compressor switches. If both local air compressor control switches are in OFF for the associated EDG, then the control room will receive a BISI alarm (Safety System Train B Inoperable).
B. Incorrect. The Instrument Air Compressors have indicating lights on the MCB, however, there are no such lights for the EDG air compressors.
C. Incorrect. This indication is local versus in the control room. Plausible if the candidate does not know what EDG indications are in the control room.
D. Incorrect. Plausible that the candidate may believe there is no control room indication when operating the EDG remote air compressor switches.

Sys #	System	Category	KA Statement
064	Emergency Diesel Generator System	A4 Ability to manually operate and/or monitor in the control room:	Remote operation of the air compressor switch (different modes)

K/A# A4.04 **K/A Importance** 3.2 **Exam Level** RO
References provided to Candidate None **Technical References:** 2OM-36.4.ADF, Rev. 5, pg 2 & 12
Question Source: Bank – 2LOT8 Q50
Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)
Objective: 2SQS-36.2-01-11 Rev. 22 Describe the control, protection and interlock functions for the control room components associated with the EDG, including automatic functions, setpoints and changes in equipment status as applicable.

49. The plant is in Mode 3 with all systems in normal alignment for this Mode.

- 125V DC Bus 1 Voltage is ZERO
- Subsequently, a Loss of Offsite power occurs

How will these conditions impact #1 EDG start capabilities?

EDG #1 _____(1)_____ be **MANUALLY** started from the control room by verifying the AUTO-Exercise switch is in NORMAL, then depressing the START pushbutton

AND

EDG #1 _____(2)_____ be **LOCALLY** started by placing the AUTO/LOCAL switch to LOCAL, then depressing one local ENGINE START pushbutton.

A. (1) CAN
(2) CANNOT

B. (1) CAN
(2) CAN

C. (1) CANNOT
(2) CANNOT

D. (1) CANNOT
(2) CAN

Answer: C

Explanation/Justification: The K/A is met with the candidate's knowledge that a loss of 125 VDC will cause the air start solenoids to be de-energized thus preventing the diesel from starting remotely or locally.

A. Incorrect. Plausible if candidate believes that only the local manual start circuitry is impacted by these conditions.
B. Incorrect. Plausible if candidate believes that only the Auto start feature is impacted by these conditions.
C. Correct. The EDG start solenoids will not have power and cannot be started from the CR or locally. The sequence for all of the manual /local starts are all correct for starting the EDG if there was power available to the solenoids.
D. Incorrect. Plausible if candidate believes that only the CR manual start circuitry is impacted by these conditions.

Sys #	System	Category	KA Statement
064	Emergency Diesel Generator System	K1 Knowledge of the physical connections and/or cause effect relationships between the ED/G system and the following systems:	DC distribution system

K/A# K1.04 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2SQS-36.2 Rev. 22 pg.37
2OM-53C4.2.39.1A Rev. 4 pg. 10

Question Source: Bank – 1LOT14 Q50

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 2SQS-36.2-01-06: Given an EDG configuration describe the EDG field response to the loss of electrical power, including automatic functions and changes in equipment status as applicable.

50. 1) Which of the following radiation monitors would cause an automatic ventilation alignment to occur if it were to fail high?

    2) IAW the appropriate Alarm Response procedure, what actions are you required to verify for this high alarm condition?

A. 1) 2HVS-RQI101, Ventilation Vent Radiation Monitor
   2) Verify 2HVS*MOD201A & B, Contiguous Area Normal Unfiltered Leak Collection Dampers are Closed, and 2HVS*MOD202A & B, Contiguous Area Normal Filtered Leak Collection Dampers are Open

B. 1) 2RMR-RQI301, Leak Collection Ventilation Radiation Monitor
   2) Verify 2HVS*MOD201A & B, Contiguous Area Normal Unfiltered Leak Collection Dampers are Closed, and 2HVS*MOD202A & B, Contiguous Area Normal Filtered Leak Collection Dampers are Open

C. 1) 2HVS-RQI101, Ventilation Vent Radiation Monitor
   2) Verify 2HVS-FN263A, Leak Collection Normal Exhaust Fan is Tripped.

D. 1) 2RMR-RQI301, Leak Collection Ventilation Radiation Monitor
   2) Verify 2HVS-FN263A, Leak Collection Normal Exhaust Fan is Tripped.

Answer: B

Explanation/Justification: K/A is met with the candidate's ability to identify which radiation monitor will cause an automatic SLCRS/PAB ventilation alignment when it fails high and mitigate the possible consequences of the failure by verifying the alignment as directed by the Alarm response Procedure.

A. Incorrect. 2HVS-RQI101, Ventilation Vent Radiation Monitor is plausible because it monitors for activity in the normal exhaust discharge flowpath, but there are no automatic actions that occur on a high alarm. The dampers are the correct alignment but only for 2RMR-RQI301, Leak Collection Ventilation Radiation Monitor in high alarm.

B. Correct. When 2RMR-RQI301, Leak Collection Ventilation Radiation Monitor fails high, it will automatically cause the unfiltered contiguous areas to be isolated from the normal exhaust path (2HVS*MOD201A & B closes) and be re-aligned to the filtered exhaust path (2HVS*MOD202A & B opens). Leak Collection Ventilation [RMR-RQI301] High Alarm Level ARP verifies this alignment automatically occurs.

C. Incorrect. 2HVS-RQI101, Ventilation Vent Radiation Monitor is plausible because it monitors for activity in the normal exhaust discharge flowpath, but there are no automatic actions that occur on a high alarm. 2HVS-FN263A, Leak Collection Normal Exhaust Fan is Tripped is plausible because it would stop the unfiltered discharge, and it will trip when 2HVS*MOD201A & B go closed, but the ARP does not mention the fan because an isolation is what is required.

D. Incorrect. 2RMR-RQI301is the correct radiation monitor. 2HVS-FN263A, Leak Collection Normal Exhaust Fan is Tripped is plausible because it would stop the unfiltered discharge, and it will trip when 2HVS*MOD201A & B go closed, but the ARP does not mention the fan because an isolation is what is required.

Sys #	System	Category	KA Statement
073	Process Radiation Monitoring System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Detector failure

K/A# A2.02 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-43.5.B.3 Rev. 2 pg. 2
2OM-43.4.AEB Rev. 6 pg. 2, 3

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(12)

Objective: 2SQS-16.1, Rev. 12 Obj. 6. Given a SLCRS configuration and without reference material, describe the SLCRS field response to the following actuation signals, including automatic functions and changes in equipment status. b. High radiation condition

51. Given the following plant conditions:

- The plant is operating at 80% power with all systems in NSA.
- A DBA LOCA results in a Reactor Trip.
- All safety systems actuated as designed.

Which of the following will have Service Water available for cooling?

1. Recirc Spray (RSS) heat exchangers
2. Primary Component Cooling Water (CCP) heat exchangers
3. Safeguards Area air conditioning units
4. Control Room air conditioning units

A. 1 **AND** 2 **ONLY**

B. 2 **AND** 4 **ONLY**.

C. 1, 3, **AND** 4.

D. 1, 2, 3, 4

Answer: C

Explanation/Justification: K/A is met with the candidate's ability to determine that an SI and CIB has occurred, and how the Service Water system valves automatically align to provide the emergency heat loads which are needed to place the plant in a safe condition.

A. Incorrect. Plausible because RRS Hxs will align due to the CIB, but the CCP Hxs will be isolated due 2SWS*MOV106A & B isolating.

B. Incorrect. Plausible because Control Room air conditioning units will not be affected by any of the safety actuations, but CCP Hx's will be isolated due to the CIB.

C. Correct. The DBA LOCA would cause CIA, SI, and CIB to actuate. The CIB actuation will cause 2SWS*MOV106A & B to isolate the headers to the CCP heat exchangers, and 2SWS*MOV103A & B to open to supply the RSS heat exchangers. The Safeguards Area air conditioning units and Control Room air conditioning units are supplied from upstream MOV106's and will be unaffected by any automatic alignments.

D. Incorrect. Plausible if the candidate either doesn't recognize that a DBA LOCA causes the 106's to isolate the CCP heat exchanger's or thinks that CCP is required during a DBA LOCA. Other emergency heat loads are correct.

Sys #	System	Category	KA Statement
076	Service Water System	A3 Ability to monitor automatic operation of the SWS, including:	Emergency heat loads

K/A# A3.02 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-30.1.B rev. 6 pg. 7
2SQS-30.1 PPNT Rev. 24 Slide 9

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 2SQS-30.1-01-12 Describe the control, protection and interlock functions for the control room components associated with the Service Water System, including automatic functions, setpoints and changes in equipment status as applicable.

52. Given the following plant conditions and sequence of events:

- The plant is operating at 100% power.
- A6-3C, STATION INSTRUMENT AIR RECEIVER TANK TROUBLE is LIT
- 2IAS-PI106, "STA INST AIR HEADER PRESS" Indicator is 84 psig and LOWERING.
- 2IAS-PI106B, "STA INST AIR RCVR PRESS" Indicator is 84 psig and LOWERING.
- All systems function as designed.
- Assume NO operator actions.

Based on **these** air pressure readings, what will be the status of 2SAS-AOV105, Station Air Header Trip Valve **AND** 2IAS-C21, Diesel Driven Air Compressor?

2SAS-AOV105, Station Air Header Trip Valve will be ______(1)_____.

2IAS-C21, Diesel Driven Air Compressor will ______(2)______.

A. 1) OPEN
2) be RUNNING

B. 1) CLOSED
2) be RUNNING

C. 1) OPEN
2) **NOT** be RUNNING

D. 1) CLOSED
2) **NOT** be RUNNING

Answer: D

Explanation/Justification: K/A is met by demonstrating the candidate's ability to monitor control room pressure gauges and determine if the automatic instrument air system lineups have occurred.

A. Incorrect. Plausible if the candidate does not know the pressure at which 2SAS-AOV105 closes (86 psig). The second part is incorrect because no operator actions were taken, and the Diesel Driven Air Compressor does not auto start until 82 psig.
B. Incorrect. 2SAS-AOV105 will be closed since it automatically shuts on low pressure (86 psig) at the instrument air receiver. The second part is incorrect because no operator actions were taken, and the Diesel Driven Air Compressor does not auto start until 82 psig.
C. Incorrect. Plausible if the candidate does not know the pressure at which 2SAS-AOV105 closes (86 psig). The Diesel Driven Air Compressor will not be running since there were no operator actions take and it auto starts at 82 psig.
D. Correct. 2SAS-AOV105 will be closed since it automatically shuts on low pressure (86 psig) at the instrument air receiver This pressure is sensed by 2IAS-PS105 (located on instrument air receiver outlet line). The Diesel Driven Air Compressor will not be running since there were no operator actions take and it auto starts at 82 psig.

Sys #	System	Category	KA Statement
078	Instrument Air System	A4 Ability to manually operate and/or monitor in the control room:	Pressure gauges

K/A# A4.01 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2SQS-34.1, Rev. 18, PPNT Slide 6

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(4)

Objective: 2SQS-34.1 Rev. 18 Obj. 13. Describe the control, protection and interlock functions for the control room components associated with the various Unit 2 Compressed Air Systems, including automatic functions, setpoints and changes in equipment status as applicable.

53. Given the following conditions:

- The plant is at 100% power
- Containment Instrument Air is being supplied by Station Instrument Air
- A Large Break Loss of Coolant Accident occurs
- All systems function as designed
- No operator actions have been taken

Based on these plant conditions, which valve(s) will need to be **reopened** to restore instrument air to the containment?

1. 2IAC-MOV130, CNMT Instrument Air Isol Vlv.
2. 2IAC-MOV131, CNMT Instrument Air Backup Supply Vlv.
3. 2IAC-MOV133, CNMT Instrument Air Isol Vlv.
4. 2IAC-MOV134, CNMT Instrument Air Isol Vlv.

A. 1 **ONLY**.

B. 1 **AND** 2 **ONLY**.

C. 3 **AND** 4 **ONLY**.

D. 1, 2, **AND** 3.

Answer: A

Explanation/Justification: K/A met with the required knowledge that CNMT instrument air is supplied from station instrument air, and that a CIA signal will close 2IAC-MOV130 and isolate air to CNMT.

A. Correct. 2IAC-MOV131 and 2IAC-MOV130 are open at 100% power to supply instrument air from instrument air compressors into containment. BVPS Unit 2 no longer uses containment air compressors. Upon a large break LOCA and SI, the subsequent CIA signal will auto close 2IAC-MOV130. In order to restore instrument air to containment, this valve needs to be reopened only.

B. Incorrect. Correct that 2IAC-MOV130 needs to be reopened. Plausible if the candidate does not know that 2IAC-MOV131 does not receive a CIA signal or believes this valve is affected by this signal. The EOP directs both of these valves opened, however, the EOP deals with all modes of operation and in the stated plant mode, the candidate must know it is not necessary to reopen 2IAC-MOV131.

C. Incorrect. 2IAC-MOV133 & 134 are both NSA closed and de-energized. Both valves use to receive a CIA signal and close, but this was the old configuration when running CNMT IAC instrument air to containment. Opening these valves will not restore IA to containment.

D. Incorrect. 2IAC-MOV130 does needs to be reopened after a CIA actuation, but 2IAC-MOV133 & 134 are both NSA closed and de-energized. The candidate may believe that all three of these valves need to be reopened to restore instrument air.

Sys #	System	Category	KA Statement
078	Instrument Air System	K1 Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems:	Containment air

K/A# K1.03 **K/A Importance** 3.3 **Exam Level** RO

References provided to Candidate None **Technical References:** U2 RM-0434-003 rev. 18
2OM-34.3.B.4 Rev.12 pg. 4
2OM-34.1.D Rev. 4 pg. 7

Question Source: Bank – 2LOT15 Q53

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(4)

Objective: 2SQS-34.1, Rev. 18 Obj. 14. Given a Unit 2 Compressed Air System configuration and without referenced material, describe the Compressed Air System control room response to the following actuation signal, including automatic functions and changes in equipment status as applicable. a. Containment Isolation Signal, Phase A (CIA)

54. Given the following plant conditions:

- The plant was operating at Full Power with all systems in NSA.
- A steam line break occurred inside containment.
- An automatic reactor trip occurs
- Safety injection occurred from Train 'A' **ONLY**.
- Peak containment pressure reached 9.1 psig and is SLOWLY LOWERING.
- All other ESF equipment functions as designed.

1) Which of the following will be the status of the Containment penetration lines for the Phase 'A' (CIA) and Phase 'B' (CIB) isolation valves?

2) What operator action, if any, are **REQUIRED** IAW EOP Attachment A-0.11?

A. 1) All CIA & CIB valves reposition.
2) No operator action is required to isolate CIA/CIB penetrations.

B. 1) Train 'A' CIA & CIB valves reposition.
2) Operators must manually actuate Train 'B' CIA **AND** CIB valves.

C. 1) All CIA valves close. All CIB valves do **NOT** reposition.
2) No operator action is required to isolate CIA/CIB penetrations.

D. 1) Train 'A' CIA valves close. All CIB valves do **NOT** reposition.
2) Operators must manually actuate both trains of CIA valves.

Answer: D

Explanation/Justification: K/A is met by the candidate predicting that only train 'A' CIA valves will close due the conditions given of containment pressure and only train 'A' Safety Injection actuated, and that the actions in EOP attachment A-0.11 requires that both trains of CIA must be manually actuated to mitigate containment isolation.

A. Incorrect. Plausible if the candidate believes that either train of SI will isolate both trains of CIA isolation valves in which case there would be no need for operator action. The candidate must know that 11 psig is required to actuate CIB and may confuse MSLI which occurs at 7.1 psig.

B. Incorrect. Correct that Train A CIA valves are closed. Incorrect that Train A CIB valves are closed. Plausible action that the operators would close the Train B valves if they failed to isolate.

C. Incorrect. Plausible if the candidate believes that either train of SI will isolate both trains of CIA isolation valves in which case there would be no need for operator action. Correct that CIB valves did not reposition.

D. Correct. The candidate must be able to analyze the stated plant conditions and be able to apply knowledge of how a Train 'A' SI will effect CIA. A Train 'A' SI signal will actuate the Train 'A' CIA valves ONLY since it is train specific (unless manually actuated). They must also understand the impact of the SLB inside containment on CIB. Since containment pressure did not reach 11 psig, no CIB actuation will occur. The correct action if all CIA valves do not isolate is for the operator to ensure Train 'B' CIA valves are isolated. E-0 directs the operator to perform Attachment A-0.11, Verification of Automatic Actions which directs the operators to manually actuate both trains of CIA.

Sys #	System	Category	KA Statement
103	Containment System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the containment system and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations	Phase A and B isolation

K/A# A2 03 **K/A Importance** 3.5 **Exam Level** RO

References provided to Candidate None **Technical References:** UFSAR Logic Diagram Figure 7.3-13
2OM-1.5.B.9 Rev. 0 pg. 4
2OM-53A.1.A-0.11 Rev. 10, pg. 9

Question Source: Bank - 2LOT8 Q54

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 3SQS-1.1 Obj. 9. Given a Reactor Protection System Trip Logics & ESF configuration and without referenced material, describe the RPS & ESF control room response to the following actuation signals, including automatic functions and changes in plant equipment status as applicable: Main Steam Line Break Accident

55. While trying to establish Reactor Coolant System (RCS) flow during a Loss of ALL Normal 4KV Power, which of the following would cause natural circulation flow to RISE?

A. **LOWERING** RCS pressure using auxiliary spray.

B. **RAISING** the demand on the Residual Heat Release Valve.

C. **LOWERING** the setpoint on the Condenser Steam Dump Valve Controller.

D. **RAISING** the setpoint on the Steam Generator Atmospheric Relief Valves.

Answer: B

Explanation/Justification: K/A is met with the candidate's knowledge that RCS natural circulation flow is controlled by the temperature and density differences between the core and the SGs which is controlled by the operators ability to increase cooldown by raising steam flow therefore raising natural circulation flow.

A. Incorrect. While it is plausible to use aux spray without forced RCS cooling flow, lowering RCS pressure will reduce subcooling which does not enhance natural circulation cooling.
B. Correct. Increasing the steam rate will help establish the required Delta Temperature and this ensures natural circulation cooling of the RCS.
C. Incorrect. Condenser steam dumps will be unavailable due to loss of ALL normal power and therefore no condenser availability due to no cooling tower pumps. Lowering the setpoint would increase the cooldown rate and is plausible.
D. Incorrect. Although a plausible available method to increase steaming rate, the operator would need to lower the setpoint of the atmospheric dump valve versus raise the setpoint

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Sys #	System	Category	KA Statement
002	Reactor Coolant System	K5 Knowledge of the operational implications of the following concepts as they apply to the RCS:	Causes of circulation

K/A# K5.13. **K/A Importance** 3.5 **Exam Level** RO
References provided to Candidate None **Technical References:** 2OM-53B.5.GI-4, Iss. 2 Rev. 0 pg. 1, 2
Question Source: Bank – 2LOT7 Q26
Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(5)
Objective: 3SQS-53.2, Rev. 2 Obj. 11. List from memory the conditions needed to cause/allow natural circulation to occur, IAW BVPS EOP Executive Volume.

56. Given the following plant conditions and sequence of events:

- The plant is at 100% power
- 2RCS-LK459F, PRZR LEVEL CONTROLLER fails AS-IS
- The plant is then reduced to 50% power at 2%/min
- Assume **NO** operator action is taken, related to the failure

Which of the following describes how Charging Flow **AND** Programmed PRZR Level will indicate at 50% as compared to 100% power?

2CHS-FI122A, Charging Flow will be ___(1)___.

2RCS-LR459, **PROGRAM** PRZR Level will be ___(2)___.

A. 1) lower
2) lower

B. 1) the same
2) higher

C. 1) the same
2) lower

D. 1) the same
2) the same

Answer: C

Explanation/Justification: K/A is met with the candidate's knowledge of how charging flow will respond on a down power event if the master level controller were to fail as-is based on 100% power Tavg.

A. Incorrect. Charging flow lowering is plausible as it is indicative of 2RCS-LT459 failing in the as is position. Second part is correct.

B. Incorrect. Correct that charging flow will remain the same. These indications are plausible if the candidate misconceptions related to actual vs. programmed PRZR level and distractor balancing.

C. Correct. If the PRZR Level controller fails as is and a load reduction occurred, then the input to 2CHS-FCV122 will not change. Therefore 2CHS-FI122A indicated flow will remain the same. Since a power reduction results in a Tavg decrease, then Program Level as indicated on 2RCS-LR459 will drop to correlate with the PRZR Level Program. Program level is impacted by power reduction not the failure of PRZR level controller 2RCS-LK459F.

D. Incorrect. Correct that charging flow will remain the same. If the candidate does not understand the implication of power reduction and associated Tavg decrease, it is plausible that actual versus program PRZR would remain the same since charging flow has not changed.

Sys #	System	Category	KA Statement
011	Pressurizer Level Control System	K3 Knowledge of the effect that a loss or malfunction of the PZR LCS will have on the following:	CVCS

K/A# K3.01 **K/A Importance** 3.2 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-6.4.IF, Rev. 13, pg. 12
2SQS-6.4 PPNT, Rev. 17 Slide 48

Question Source: Bank – 1LOT8 Q19

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 2SQS-6.4, Rev. 17 Obj. 20. Given a specific plant condition, predict the response of the Pressurizer and Pressurizer Relief System control room indication and control loops, including all automatic functions and changes in equipment status, for either a change in plant condition or for an off-normal condition. c. Process Instrument Failure

57. The plant is preparing for a reactor startup per 2OM-50.4.D1, Reactor Startup From Mode 3 To Mode 2 - Initial Criticality.

1) When the ATC depresses the Step Counter Reset pushbutton, which Group Step Counters will reset to zero?

2) Other than Bench Board ‘B’, where can the Group Step Counter indications be monitored?

A. 1) **Only** Control Bank groups
2) Plant Computer System (PCS)

B. 1) **Only** Control Bank groups
2) Safety Parameter Display System (SPDS)

C. 1) **Both** Control Bank and Shutdown Bank groups
2) Plant Computer System (PCS)

D. 1) **Both** Control Bank and Shutdown Bank groups
2) Safety Parameter Display System (SPDS)

Answer: C

Explanation/Justification: K/A is met by the candidate’s ability to understand the expected response of depressing the Step Counter Reset pushbutton during a reactor startup and know that the monitoring of the group step counters can be observed on the plant computer system.

A. Incorrect. Plausible to think only the Control Banks are reset since the candidate may recall that the Step Counter Reset pushbutton also resets the bank overlap unit which does not include the shutdown banks. Shutdown banks are withdrawn by the individual banks. The Plant Computer System (PCS) Rod Supervision program monitors the group step counter indications and provides indications on the PCS screens.
B. Incorrect. Plausible to think only the Control Banks are reset since the candidate may recall that the Step Counter Reset pushbutton also resets the bank overlap unit which does not include the shutdown banks. Shutdown banks are withdrawn by the individual banks. The SPDS is plausible because it does monitor vital parameters of the plant, but Control Rod position is not monitored.
C. Correct. When the Step Counter Reset pushbutton is depressed, all the shutdown and control rod groups will reset to zero. The Plant Computer System (PCS) Rod Supervision program monitors the group step counter indications and provides indications on the PCS screens.
D. Incorrect. When the Step Counter Reset pushbutton is depressed, all the shutdown and control rod groups will reset to zero. The SPDS is plausible because it does monitor vital parameters of the plant, but Control Rod position is not monitored.

Sys #	System	Category	KA Statement
014	Rod Position Indication System	A4 Ability to manually operate and/or monitor in the control room:	Re-zeroing of rod position prior to startup

K/A# A4.04 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 3SQS-1.3 Rev. 8 PPNT Slide 120
2OM-1.1.D Rev 1 pg. 19
2OM-5A.1.B Rev. 2 pg. 9

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(6)

Objective: 3SQS-1.3 Iss. 1 Rev. 8 Obj. 23. Discuss the Control Room indications and controls that are available to manipulate and monitor the Rod Control System.
2SQS-5A.2 Rev. 1 Obj. 7. Given a plant parameter, use the PCS to determine the parameter value.

58. Given the following conditions:

- A small break LOCA has occurred
- RVLIS Full Range indicates 30%
- Highest RCS Hot Leg temperature is 550°F
- Core exit thermocouples indicate 558°F
- RCS Wide Range pressure indicates 1000 psig

1) Based on the given information, what is the state of the RCS coolant?

2) Which of the following indications are used when evaluating the Core Cooling Status Tree?

A. 1) Subcooled
2) Hot leg temperatures

B. 1) Subcooled
2) Core exit thermocouples

C. 1) Superheated
2) Hot leg temperatures

D. 1) Superheated
2) Core exit thermocouples

Answer: D

Explanation/Justification: K/A is met with the candidate's knowledge that the in core temperature monitors (CETs) are the most reliable method of determining core temperatures and use the CET temperatures to determine that the RCS is in a superheated condition.

A. Incorrect. RCS is ~10F superheated. Hot leg temperatures are plausible, but the Core cooling background document states they are significantly slower than the CETs for uncovery of the core indication.
B. Incorrect. RCS is ~10F superheated. The 3 Max Core exit thermocouples from the Plant Safety Monitoring System (PSMS) are used for evaluating the Core Cooling status tree.
C. Incorrect. RCS is superheated. Hot leg temperatures are plausible, but the Core cooling background document states they are significantly slower than the CETs for uncovery of the core indication.
D. Correct. RCS is superheated because saturation temperature for 1014 psig is approximately 548F and the CETs indicate 558F, therefore ~10F superheat. The 3 Max Core exit thermocouples from the Plant Safety Monitoring System (PSMS) are used for evaluating the Core Cooling status tree.

Sys #	System	Category	KA Statement
017	In Core Temperature Monitor System	K1 Knowledge of the physical connections and/or cause effect relationships between the ITM system and the following systems:	RCS

K/A# K1.02 **K/A Importance** 3.3 **Exam Level** RO

References provided to Candidate Steam Tables **Technical References:** 2OM-53A.1.F-0.2 Iss. 3 Rev. 0 pg. 1
2OM-53B.4.F-0.2 Iss. 3 Rev. 0 pg. 4

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(2)

Objective: 3SQS-53.3, Rev. 5 obj. 5. Explain from memory the basis for the decision blocks of each Status Tree, IAW BVPS-EOP Executive Volume.

59. The plant is at 100% power.

- Tref is 578°F
- Loop 1 Protection Tavg has failed to 620°F

Subsequently, 2RCS*TE432B1, Loop 3 Hot Leg RTD fails to 630°F.

With the above failures, Loop Protection Tavg indications are as follows:

- Loop 1 - 2RCS-TI412D is 620°F
- Loop 2 - 2RCS-TI422D is 577°F
- Loop 3 - 2RCS-TI432D is 580°F

Based on these indications, what will be the HIGHEST Rod Speed indicated on 2RCS-SI408?

A. 0 SPM

B. 8 SPM

C. 48 SPM

D. 72 SPM

Answer: B

Explanation/Justification: K/A is met by understanding of how individual loop Tavg is used, and that Median Tavg is used for auto Rod Control. In this question individual loop Tavg indications are given in the stem, and knowledge that the individual loop Tavgs undergo Median Select where the high and low Tavgs are rejected, and the Median passes through for use of the automatic Rod Control.

A. Incorrect. Plausible distractor if the 2F Tavg>Tref mismatch is recognized, but the candidate thinks that there is a 3F deadband instead of 1.5F deadband. At BV after the 1.5F deadband, rod speed is 8 SPM.

B. Correct. Due to median Tavg selector Tavg used by Rod Control will be 580F. Therefore the Tavg-Tref mismatch is 2F. Rod speed is 8 SPM between 1.5-3F mismatch. The candidate will have to know that Tavg median select is used by Rod Control, and the variable rod speeds in auto.

C. Incorrect. Plausible distractor if Tavg > Tref is recognized, but variable rod speed is not known. 48 SPM is the manual rod speed.

D. Incorrect. Plausible distractor if the Tavgs are averaged (620+577+580=1777/3=592F. This would be 14F mismatch. When Tavg > Tref by ≥5F the rod speed is 72 SPM.

Sys #	System	Category	KA Statement
016	Non-nuclear Instrumentation	A3 Ability to monitor automatic operation of the NNIS, including	Relationship between meter readings and actual parameter value

K/A# A3.02 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 3SQS-1.3 Rev. 7 Iss. 1 PPNT slides 105, 110
2SQS-6.5 PPNT Rev. 18 Slide 35

Question Source: Bank – 1LOT16 Q58

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(5)

Objective: 3SQS-1.3, Rev. 8 Obj. 10 - State the three modes of rod control, the rod step speeds for each, and how and when each mode is selected.
3SQS-1.3, Rev. 8 Obj. 20 - Determine how automatic rod control is affected when any of the process control input signals fail.

60. The plant has just completed a refueling outage:

- Both Trains of Fuel Pool Cooling are in service
- 2FNC*P21A, 'A' Fuel Pool Cooling Pump tripped on overload and cannot be restarted
- A6-1A, SPENT FUEL POOL COOLING TROUBLE is in ALARM
- 2FNC-TI103A, Spent Fuel Pool Temp is 115°F

Complete the following statements regarding how the crew will respond to these conditions.

The crew will increase cooling water flow to the fuel pool heat exchanger by throttling open the Fuel Pool Cooler Cooling Water Inlet valve to supply more ______(1)______ to the Fuel Pool heat exchanger.

IAW 2OM-20.4.AAC, FUEL POOL PURIFICATION TROUBLE, the SFP purification system must be shutdown if the inlet to the Ion Exchanger reaches ______(2)______ to prevent damage to the SFP Purification ion exchanger.

A. 1) Service Water
2) 120°F

B. 1) Service Water
2) 135°F

C. 1) Component Cooling Water
2) 120°F

D. 1) Component Cooling Water
2) 135°F

Answer: D

Explanation/Justification: K/A is met with the candidate's ability to determine that a high temperature of the SFPCS caused by a loss of a FP cooling pump will require them to increase CCP to the FP Hx, and shutdown FP purification system as directed by the ARPs when temperature reached 135F to prevent damage to the resin.

A. Incorrect. Service water is plausible for a large plant heat load, but it is not correct. 120F is plausible because it is a high temperature for FP temperatures, but not improbable for after a refueling outage with only one FP Cooling pump running.

B. Incorrect. Service water is plausible for a large plant heat load, but it is not correct. The ARP for Fuel Pool Purification Trouble states that FP Purification flow must be secured if the ion exchanger inlet temperature reaches 135F or greater.

C. Incorrect. Component Cooling Water is correct. 120F is plausible because it is a high temperature for FP temperatures, but not improbable for after a refueling outage with only one FP Cooling pump running.

D. Correct. Component Cooling Water is correct. The ARP for Fuel Pool Purification Trouble states that FP Purification flow must be secured if the ion exchanger inlet temperature reaches 135F or greater.

Sys #	System	Category	KA Statement
033	Spent Fuel Pool Cooling System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Loss of SFPCS

K/A# A2.02 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-20.4.AAA Rev. 9 pg. 8
2OM-53C.4.2.20.1 Rev. 4 pg. 4
2OM-20.4.AAC Rev. 10 pg. 9

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(10)

Objective: 2SQS-20.1-01-07: Given a Fuel Pool Cooling and Purification System alarm condition, determine the appropriate alarm response, including automatic and operator actions in the field.

61. Given the following conditions during a plant shutdown for refueling.

- Reactor power is being held at 30% for Steam Line Safety Valve Testing.
- MSSV testing is in progress IAW 2-MSP-M-21-300, Trevitest Method for Main Steam Safety Valve Setpoint Check.
- 2MSS*SV101A fails to reseat and is mechanically gagged.

1) Is Tech Spec 3.7.1, Main Steam Safety Valve (MSSV) LCO met with 2MSS*SV101A gagged?

2) If a pressure transient were to occur after 2MSS*SV101A was gagged, at what pressure would 2MSS*SV102A lift to relieve pressure from the 'A' Steam Generator?

A. 1) Yes, LCO 3.7.1 is met.
   2) 1085 psig

B. 1) No, LCO 3.7.1 is NOT met.
   2) 1085 psig

C. 1) Yes, LCO 3.7.1 is met.
   2) 1125 psig

D. 1) No, LCO 3.7.1 is NOT met.
   2) 1125 psig

Answer: B

Explanation/Justification: K/A is met with the candidate's ability to determine that when a MSSV which provides overpressure protection to the Steam Generator/Main steam system is gagged due to failing to reseat during testing, that the associated MSSV LCO will no longer be met in modes 1-3.

A. Incorrect. Plausible if the candidate doesn't know that all 5 of the MSSVs are required to be operable to meet the LCO, or thinks that we can have one gagged, and just operate a reduced power level as Condition A & B states. 2MSS*SV102A setpoint is 1085 psig +/-3%.

B. Correct. LCO 3.7.1 requires 5 MSSVs to be operable per SG in modes 1-3. Plant conditions are given as mode 1. Knowing that each SG only has 5 MSSVs, and if 1 MSSV is gagged causing it not to be capable of performing its function, the LCO is not met. With 2MSS*SV101A gagged (setpoint 1075 psig), 2MSS*SV102A will not open until pressure reaches 1085 psig+/-3%.

C. Incorrect. Plausible if the candidate doesn't know that all 5 of the MSSVs are required to be operable to meet the LCO, or thinks that we can have one gagged, and just operate a reduced power level as Condition A & B states. 1125 psig is incorrect, see plausibility below.

D. Incorrect. LCO is not met. 1125 psig is plausible because 2MSS*SV105A lifts at 1125 psig, but the setpoint of 2MSS*SV102A which is the next expected safety to lift with 2MSS*SV101A gagged is 1085 psig. MSSV setpoints are 1075, 1085, 1095, 1110, and 1125 psig. 2MSS*SV105A setpoint of 1125 was chosen to ensure it was not a correct answer because the safety valves have a +/-3% tolerance which gives 2MSS*SV102A a high range of 1117 psig.

Sys #	**System**	**Category**	**KA Statement**
035	Steam Generator System	Generic	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.

K/A# 2.2.36 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** T.S 3.7.1 pg. 3.7.1-1 & 5

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(5)

Objective: 3SQS-PLTSYS ITS, Rev. 2 Obj. 3. Given plant conditions, determine the criteria necessary to ensure compliance with each Section Plant Systems System LCO and Licensing Requirement in accordance with the Bases, Surveillance Requirements, and the Applicability.

2SQS-21.1, Rev. 23 Obj. 2. Describe the control, protection and interlock functions for the field components associated with the Main Steam Supply System, including automatic functions, setpoints and changes in equipment status as applicable.

62. Given the conditions:

- The plant is discharging 2SGC-TK23A, Steam Generator Blowdown Evaporator Test Tank, Contents to Cooling Tower Blowdown IAW 2OM-25.4.L
- 2SGC-P26A, Steam Generator Blowdown Test Tank Pump is RUNNING
- 2SGC-HCV100, Liquid Waste Eff High Rad Isol valve is in AUTO

An hour after the discharge begins, 2SGC-RQ100, Liquid Waste Process Radiation Monitor power supply fails.

What will be the status of 2SGC-HCV100 and 2SGC-P26A after the Liquid Waste Process Radiation Monitor power supply fails?

2SGC-HCV100, Liquid Waste Eff High Rad Isol valve
SGC-P26A, Steam Generator Blowdown Test Tank Pump

	2SGC-HCV100	2SGC-P26A
A.	Open	Remain running
B.	Open	Trips
C.	Shut	Remains running
D.	Shut	Trips

Answer: C

Explanation/Justification: K/A is met by evaluating the candidate's knowledge of the automatic actions which occur due to a failed power supply to 2SGC-RQ100, Liquid Waste Process Radiation Monitor when performing a liquid waste discharge.

A. Incorrect. Plausible that 2SGC-HCV100 remains open if the candidate does not know that a power failure to the radiation monitor causes it to close or doesn't know the automatic features of 2SGC-RQ100. SGC-P26A does remain running.
B. Incorrect. Plausible that 2SGC-HCV100 remains open if the candidate does not know that a power failure to the radiation monitor causes it to close or doesn't know the automatic features of 2SGC-RQ100. It is plausible that SGC-P26A trips because other radiation monitors control valves, fans, and dampers, but there are no inputs to from 2SGC-RQ100 to the pump.
C. Correct. 2SGC-HCV100 will trip to isolate the discharge path on a failure of the power supply to 2SGC-HCV100, and the 'A' Steam Generator Blowdown Test Tank Pump will continue to run since there are no trips of the pump associated with the radiation monitor.
D. Incorrect. 2SGC-HCV100 will trip to isolate the discharge path on a failure of the power supply to 2SGC-HCV100. It is plausible that SGC-P26A trips because other radiation monitors control valves, fans, and dampers, but there are no inputs to from 2SGC-RQ100 to the pump.

Sys #	System	Category	KA Statement
068	Liquid Radwaste System	K6 Knowledge of the effect of a loss or malfunction on the following will have on the Liquid Radwaste System:	Radiation monitors

K/A# K6.10 **K/A Importance** 2.5 **Exam Level** RO

References provided to Candidate None **Technical References:** 2SQS-17.1 Rev. 9 pg. 20
2OM-25.1.D Iss. 4 Rev. 1 pg. 4, 10

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(12)

Objective: 2SQS-17.1, Rev. 9 Obj. 9. Given a Liquid Waste Disposal System configuration and without reference material, describe the Liquid Waste Disposal System control room response to the following off-normal conditions, including automatic functions and changes in equipment status as applicable. b. Loss of electrical power.

63. Initial conditions:

- The plant is at 100% power
- 2OST-30.6B, Service Water Pump [2SWS*P21C] Test on Train B Header is in progress
- 2SWS*P21C, 'C' SWS is RUNNING on 2DF Bus
- 2SWS*P21B, 'B' SWS is racked on the bus with the CS in Auto-After Stop

Current Conditions:

- A Loss of Offsite Power occurred following a design basis earthquake
- The Control Room crew is performing actions of E-0, "Reactor Trip or Safety Injection"
- A8-2B, 4160V EMER BUS 2AE ACB 2E7 OVERCURRENT TRP is LIT

With NO Operator action, one minute after the Loss of Offsite Power, which of the following statements describe the status of the Service Water Pumps?

A. 2SWS*P21A and 2SWS*P21B are running

B. 2SWS*P21A and 2SWS*P21C are running

C. Only 2SWS*P21B running

D. Only 2SWS*P21C running

Answer: C

Explanation/Justification: K/A is met by demonstrating the knowledge of the available power and pump start interlocks of the essential SWS pumps following a loss of offsite power coincident with a failure of 2AE emergency bus to load. BV2 Service water system is a continuous makeup water supply to the Circ water Cooling tower basin.

A. Incorrect. 'A' SWS pump will not be energized due to bus 2AE being de-energized with A8-2B annunciator lit. 2-1 DG will start but 2E10 will not close due to the overcurrent trip on 2E7. The candidate must know the effects of this annunciator condition. 'B' SWS will auto start even though the CS is in Auto-After Stop and the 'C' SWS is racked in on the DF bus.

B. Incorrect. 'A' SWS pump will not be energized due to bus 2AE being de-energized with A8-2B annunciator lit. 2-1 DG will start but 2E10 will not close due to the overcurrent trip on 2E7. The candidate must know the effects of this annunciator condition. 'C' SWS will not auto start even though power is available, and it was running, due the 'B' SWS pump being racked onto the 2DF bus with the CS in Auto-After Stop. It is still the priority pump and will be loaded on the diesel.

C. Correct. With the CS in Auto-After Stop, 'B' SWS pump is the priority pump and will be loaded on the diesel even though the 'C' SWS is racked onto the 2DF bus.

D. Incorrect. Even though 'C' SWS pump has power available and was running, 'B' SWS pump will auto start and load onto the diesel because it the priority pump.

Sys #	System	Category	KA Statement
075	Circulating Water System	K2 Knowledge of bus power supplies to the following:	Emergency/essential SWS pumps

K/A# K2.03 **K/A Importance** 2.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-30.1.D Rev. 8, Pgs. 2-4; U2 LSK-017-001A Rev. 14; 2OM-36.4.ACD Rev. 3 pg. 3

Question Source: Bank – 2LOT15 Q65

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(7)

Objective: 2SQS-30.1-01-03: Identify the power supplies for the components identified on the Normal-System-Arrangement System Flow-path drawing which are powered from the class 1E electrical distribution system (For the 4160v system include the power train and bus designation. For the 480v system, include only the power train.).

64. The plant has experienced an event and the crew has entered the EOP network. The Unit Supervisor has assigned you as the RO to monitor two Continuous Action steps from E-1, Loss of Reactor or Secondary Coolant. The crew now transitions to FR-C.1, Response to Inadequate Core Cooling.

The Continuous Actions from E-1 _______________.

A. remain applicable until superseded by directed actions of FR-C.1

B. remain applicable throughout the performance of FR-C.1

C. are NOT applicable upon entering FR-C.1

D. may be performed at the Unit Supervisors discretion upon entry into FR-C.1

Answer: C

Explanation/Justification: KA is met with knowledge of the conduct of ops in which procedure use is one of the RO knowledges from 1/2OM-48.2.C Conduct of Operations - Adherence and Familiarization to Operating Procedures. Sect VII.C.1 requires knowledge of procedure rules of usage as an admin requirement for RO's to understand and be able to adhere to without the procedure in hand.

A. Incorrect - Plausible if the student misunderstands the requirement for continuous action steps in the FRGs.
B. Incorrect. Plausible if the student confuses the transition to FRGs and other ORGs since normally they do apply.
C. Correct - Optimal Recovery Guideline actions are not to be performed while a Critical Safety Function is being restored from a RED or ORANGE condition iaw 1/2OM-53B.2 pg. 7. The Reactor Operators at BVPS are expected to monitor Continuous Actions throughout the EOP network by reading the CAs from each briefing book as they progress through the EOP network, and they are expected to have knowledge of the EOP rules of usage.
D. Incorrect. Plausible because this could be correct if the transition was to another ORG, but 1/2OM-53B.2 states, Optimal Recovery Guideline actions are not to be performed while a Critical Safety Function is being restored from a RED or ORANGE condition.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of conduct of operations requirements.

K/A# 2.1.1 **K/A Importance** 3.8 **Exam Level** RO
References provided to Candidate None **Technical References:** 1/2OM-48.2.C Rev 24 pg. 9
1/2OM-53B.2 rev 10 pg. 6-7

Question Source: Bank – 1LOT18 Q66

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(10)
Objective: 3SQS-53.1, Rev. 2 Obj. 1 - 1. State from memory "All" of the Emergency Operating Procedures user's guide rules of usage as defined in 1/2OM53B.2.

65. Given the following conditions:

- ESOMS is NOT functioning.
- The ATC is maintaining a manual narrative log.

The following log entries had been made:

- 0956 2CHS*P21A tripped due to electrical fault.
- 1005 2CHS*P21B started per AOP 2OM-53C.4.2.7.1
- 1011 Established normal letdown.

Subsequently at 1030, the ATC realizes they forgot to make a 0957 entry that letdown had been isolated.

Which one of the following identifies a proper entry in accordance with 1/2OM-48.5.A, Logs and Reports?

A. ∆ 1030 Letdown isolated in accordance with 2OM-53C.4.2.7.1 (0957)

B. Late Entry 1030 Letdown isolated in accordance with 2OM-53C.4.2.7.1 (0957)

C. ∆ 0957 Letdown isolated in accordance with 2OM-53C.4.2.7.1

D. Late Entry 0957 Letdown isolated in accordance with 2OM-53C.4.2.7.1

Answer: D

Explanation/Justification: This meets the K/A because operators must be able to correct and add late log entries to ensure accurate logs are maintained per 1/2OM-48.5.A, Logs and Reports.

A. Incorrect. Plausible because the delta symbol is often used to delineate differences or mistakes in the nuclear power industry. Even though it was realized at 1030, the entry only needs to state LE 0957 and what occurred.
B. Incorrect. Plausible because LE would be used but with it written LE 0957, not late entry for the time it was discovered.
C. Incorrect. Plausible because the delta symbol is often used to delineate differences or mistakes in the nuclear power industry.
D. Correct. Per 1/2OM-48.5.A, Logs and Reports, step B.10.c, late entries recorded during the same shift that the event occurred SHALL be identified with “Late Entry” or the abbreviation “LE” and the time of occurrence, and what the event or condition was.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to make accurate, clear, and concise logs, records, status boards, and reports.

K/A# 2.1.18 **K/A Importance** 3.6 **Exam Level** RO
References provided to Candidate None **Technical References:** 1/2OM-48.5.A Rev. 8 pg. 9, 10
Question Source: Bank - 2016 Harris Q67
Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(10)
Objective: 3SQS-48.1-01-06: From memory, explain how the logs and the shift turnover should be completed.

66. Given the following conditions:

- The plant is in Mode 3.
- The following leaks are known to the crew:
    - The ‘A’ S/G has a 0.04 gpm tube leak
    - The ‘B’ S/G has a 0.00 gpm tube leak
    - The ‘C’ S/G has a 0.03 gpm tube leak
    - 2RCS-PCV456, PRZR PORV has 1.2 gpm of seat leakage
    - 2RCS-MOV557A, RCL ‘A’ DRAIN valve inlet weld has a 0.2 gpm leak
    - 2CHS-MOV289, Normal Charging Hdr Isol valve has 0.2 gpm valve stem leakage
    - 2RCS-MOV591, RCL ‘A’ Cold Leg Isolation valve has 0.4 gpm valve stem leakage

The RCS Water Inventory Balance surveillance was just performed and indicates **4 gpm** of total RCS leakage.

Which Tech Spec RCS Operational leakage limits have been exceeded?

A. Pressure Boundary Leakage and Unidentified Leakage

B. Unidentified Leakage and Identified Leakage

C. Identified Leakage and Primary to Secondary Leakage

D. Primary to Secondary Leakage and Pressure Boundary Leakage

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Answer: A

Explanation/Justification: K/A is met with the candidate’s ability to recognize the entry conditions into Tech Spec 3.4.13 for RCS Operational LEAKAGE.
TS 3.4.13 states operational leakage shall be limited to 1) No pressure boundary leakage 2) 1 gpm unidentified 3) 10 gpm identified 4) 150 gpd though any one SG.

A. Correct. Pressure boundary leakage is correct due to MOV-1RC-557A valve inlet weld leakage of 0.2 gpm and TS allows 0.0 gpm leakage from a pressure boundary. Unidentified Leakage is correct as it is 2 gpm and TS only allows 1 gpm leakrate.

B. Incorrect. Unidentified Leakage is correct as it is 2 gpm and TS only allows 1 gpm leakrate. Identified Leakage is plausible because the candidate may get confused with the 1 gpm Unidentified leakage allowed by TS, but Identified is allowed to be 10 gpm, and the above total is 2 gpm.

C. Incorrect. Identified Leakage is plausible because the candidate may get confused with the 1 gpm Unidentified leakage allowed by TS, but Identified is allowed to be 10 gpm, and the above total is 2 gpm. Primary to Secondary Leakage is plausible because there was tube leakage identified which equates to ‘A’ SG – 57.6 gpd and ‘C’ SG -43.2 gpd, but TS allowable leakage is 150 gpd though any one SG.

D. Incorrect. Primary to Secondary Leakage is plausible because there was tube leakage identified which equates to ‘A’ SG – 57.6 gpd and ‘C’ SG -43.2 gpd, but TS allowable leakage is 150 gpd though any one SG. Pressure boundary leakage is correct due to MOV-1RC-557A valve inlet weld leakage of 0.2 gpm and TS allows 0.0 gpm leakage from a pressure boundary.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to recognize system parameters that are entry-level conditions for Technical Specifications.

K/A# 2.2.42 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** Tech. Spec 3.4.13 pg. 3.4.13 - 1

Question Source: Bank – 1LOT21 Q 70

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41.b(10)

Objective: 3SQS-RCS ITS, Rev. 1 Obj. 1. Apply the following definitions to ensure compliance with applicable requirements: a. LEAKAGE
3SQS-RCS ITS, Rev. 1 Obj. 3. Given plant conditions, determine the criteria necessary to ensure compliance with each RCS LCO and Licensing Requirement in accordance with the Bases, Surveillance Requirements, and the Applicability.

67. The plant is exiting a refueling outage with the following conditions:

Time	0800	1100	1400	1600
Average Coolant Temp (°F)	330	450	547	547
Rated Thermal Power (%)	0	0	2	6
Keff	<.99	<.99	1.00	1.00

At what time is the plant in **Mode 4** and **Mode 1**?

	Mode 4	**Mode 1**
A.	0800	1400
B.	0800	1600
C.	1100	1400
D.	1100	1600

Answer: B

Explanation/Justification: K/A is met by the candidate's ability to determine the plant mode of operation based on various plant conditions applicable to the Tech Spec modes of operation definitions.

A. Incorrect. 0800 is correct for Mode 4. 1400 is plausible for Mode 1 if the candidate thinks mode 1 is >0% thermal power and doesn't recognize that 2% thermal power is Mode 2 (Keff ≥0.99 and power ≤5%).
B. Correct. Mode 4 is defined as <0.99 Keff and 350 > Tavg >200F. Mode 1 is defined as ≥0.99 Keff and Thermal power >5%.
C. Incorrect. 1100 is plausible if the candidate does not know the temperatures associated with the various plant modes. 450F is Mode 3. 1400 is plausible for Mode 1 if the candidate thinks mode 1 is >0% thermal power and doesn't recognize that 2% thermal power is Mode 2 (Keff ≥0.99 and power ≤5%).
D. Incorrect. 1100 is plausible if the candidate does not know the temperatures associated with the various plant modes. 450F is Mode 3. 1600 is correct for Mode 1.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to determine Technical Specification Mode of Operation.

K/A# 2.2.35 **K/A Importance** 3.6 **Exam Level** RO
References provided to Candidate None **Technical References:** Tech Spec Table 1.1-1 pg. 1.1-7
Question Source: Bank – 2015 Farley Q65
Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(5)
Objective: 3SQS-RULES ITS, Rev. 3 Obj. 4. State the ITS definition of the following terms - c. Modes of operation

68. Which of the following plant conditions/evolutions can result in significantly higher radiation levels in the Safeguards Building?

A. Venting an idle charging pump IAW 2OM-7.4.AK, "Venting of Idle Charging Pump".

B. Performing the Low Head SI Pump Test IAW 2OST-11.1, "LHSI Pump [2SIS*P21A] Test".

C. Transferring to Cold Leg Recirculation IAW ES-1.3, "Transfer to Cold Leg Recirculation".

D. Placing the deborating demineralizer in operation IAW 2OM-7.4AM, "Mixed Bed/Deborating Demineralizer Operation".

Answer: C

Explanation/Justification: K/A is met with the knowledge that radiation levels will rise in the safeguards building when Transfer to Cold Leg Recirculation occurs in ES-1.3 due to cnmt sump water will flow through the Recirc piping in the safeguards building.

A. Incorrect. This is a plausible evolution which is a radiation hazard and requires RP assistance due to the potential for high radioactive gaseous release. This hazard is in the PAB as opposed to the safeguards area. This evolution has a potential to result in EPP initiation.
B. Incorrect. LHSI Pumps are located in Safeguards and this evolution recirculates the RWST through the safeguards which makes this distractor plausible. However, this evolution should not increase radiation levels in safeguards.
C. Correct. The candidate must have knowledge of radiation or contamination hazards that may arise during any plant activity. Specifically, they must sort through a list of valid situations and determine that transfer to cold leg recirculation during a LOCA has the greatest potential to increase Safeguards and/or PAB radiation levels. ES-1.3 has a caution that warns the operator of this hazard.
D. Incorrect. This evolution has a potential to increase radiation levels, however, the procedure is more concerned with the potential reactivity event which could occur as a result of this evolution. Increased radiation levels would be more of a concern in the PAB as opposed to Safeguards.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.

K/A# 2.3.14 **K/A Importance** 3.4 **Exam Level** RO
References provided to Candidate None **Technical References:** 2OM-53A.1.ES-1.3, Iss. 3 Rev 1 pg. 2
Question Source: Bank – 2LOT8 Q71
Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(12)
Objective: 3SQS-53.3, Rev. 5 – Obj. 4. Explain from memory the basis for ALL Cautions and Notes, IAW BVPS-EOP Executive Volume.

69. Given the following plant conditions:

- A Loss of Coolant Accident (LOCA) occurred.
- Safety Injection was lost and containment radiation level increased to 3E+5 R/hr.
- Safety Injection has been re-established and containment radiation is now 2E+3 R/hr and trending DOWN.

Which of the following describes the correct use of Adverse Containment parameter values for this event?

A. **NOT** required during this transient.

B. Required as soon as the dose rate limit was exceeded, but are no longer required because the dose rate is now below the limit.

C. Required as soon as the dose rate limit was exceeded, and remain in effect for the duration of the event because total integrated dose is unknown.

D. Required as soon as the dose rate limit was exceeded, and remain in effect for the duration of the event, because since the dose rate was exceeded, the integrated dose rate was also exceeded.

Answer: C

Explanation/Justification: K/A is met by the candidate's knowledge that when operating in the EOP network, and containment radiation exceeds $1X10^5$ R/hr, that adverse containment requirements must remain in effect until the TCS/Rad Pro determines whether the Integrated Cnmt Radiation is less than $1x\ 10^6$ R. This knowledge is not stated in the EOP Left-hand pages but is gained through their knowledge of the bases of the EOP Generic Instrumentation document.

A. Incorrect. Containment Radiation levels exceeded 1E + 5 R/hr, so therefore adverse parameters are required.
B. Incorrect. Although it is true that the limit of 1E + 5 R/hr was exceeded and also true that the radiation levels are now below this limit, 2OM-53B.5.GI-2 requires that integrated dose remained less than 1E +6 R/hr. This value is not known in the stated plant conditions and until it is known, the operator must continue to use adverse parameters.
C. Correct. IAW 2OM-53B.5.GI-2, Generic Instrumentation document states that once the cnmt radiation levels have exceeded 1E + 5 R/hr adverse containment requirements must remain in effect until TSC/Rad Pro determine that Integrated Cnmt Radiation has not exceeded 1E +6 R. Since this parameter was not given in the stated plant conditions, the operator must continue to use adverse parameters.
D. Incorrect. There is no way of determining if integrated dose was exceeded based on stated plant conditions. Additionally, it is not true that whenever dose rate is exceeded that the integrated dose is exceeded.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of the specific bases for EOPs.

K/A# 2.4.18 **K/A Importance** 3.3 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53B.5.GI-2 Iss 2 Rev 0 pg. 14
3SQS-53.2 Iss 2 Rev 2 PPNT Slide 93

Question Source: Bank – 1LOT16 Q27

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41 b(10)

Objective: 3SQS-53.2, Rev. 2 Obj. 15. Define from memory adverse containment conditions, IAW BVPS EOP Executive Volume.

70. BVPS Unit 2 was operating at steady-state 100 percent power near the end of a fuel cycle when a reactor trip occurred. Immediately after the trip, shutdown margin was determined to be **-**5.883 %ΔK/K.

Over the next 72 hours, the reactor coolant system was cooled down and reactor coolant boron concentration was increased. The reactivities affected by the change in plant conditions are as follows:

<u>Reactivity</u>	<u>Change (+) or (–)</u>
Xenon =	( ) 2.675 %ΔK/K
Moderator temperature =	( ) 0.5 %ΔK/K
Boron =	( ) 1.04 %ΔK/K

What is the value of shutdown margin 72 hours after the trip?

A. -1.668 %ΔK/K

B. -3.748 %ΔK/K

C. -7.018 %ΔK/K

D. -9.098 %ΔK/K

<u>Answer: B</u>

Explanation/Justification: K/A is met be giving the candidate the initial shutdown margin value and having them determine how the other reactivities will change the shutdown margin 72 hours after the plant is cooled down and borated.

A. Incorrect. Plausible if candidate doesn't understand how or what reactivities change based in the given conditions.

B. Correct. The candidate must recognize that the initial reactivity given when the plant tripped was -5.883 %ΔK/K and 72 hrs later the plant had been cooled down and borated which changes the core reactivity. They must recognize that reactivity due to Xe is positive because Xe has peaked at ~10 hrs. Colder RCS will make moderator temperature a positive reactivity, and Boron will add a negative reactivity value. Therefore, -5.883 %ΔK/K + (+) 2.675 %ΔK/K + (+) 0.5 %ΔK/K + (-) 1.04 %ΔK/K

C. Incorrect. Plausible if candidate doesn't understand how or what reactivities change based in the given conditions.

D. Incorrect. Plausible if candidate doesn't understand how or what reactivities change based in the given conditions.

Sys #	**System**	**Category**	**KA Statement**
192002	REACTOR THEORY	Neutron Life Cycle	Evaluate change in shutdown margin due to changes in plant parameters.

K/A# K1.14 **K/A Importance** 3.8 **Exam Level** RO

References provided to Candidate None **Technical References:** GO-GPF.R2, Rev. 2 App. A pg. 41
GO-GPF.R6, Rev. 1 App. A pg. 18

Question Source: Bank - NRC GF Exam Bank P647

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41 b(1)

Objective: GO-GPF.R2, Rev. 2 Obj. 8. Calculate shutdown margin and changes in shutdown margin for given plant parameters.

71. BVPS Unit 2 is operating at steady-state 50 percent power near the end of a fuel cycle when the operator withdraws Control Bank 'D' rods for 5 seconds. (Assume main turbine load remains constant and the reactor does not trip.)

In response to the control rod withdrawal, actual reactor power will stabilize _____(1)_____ the initial power level and reactor coolant temperature will stabilize _____(2)_____ the initial temperature.

A. 1) above
   2) at

B. 1) above
   2) above

C. 1) at
   2) at

D. 1) at
   2) above

Answer: D

Explanation/Justification: K/A is met by the candidate's knowledge of how reactor power will respond to a rod withdrawal when the plant is operating at 50% power based on the various reactivity characteristics involved in an operating reactor core.

A. Incorrect. Candidate may have misconceptions of positive/negative reactivity changes due to either rods or RCS temperature response.
B. Incorrect. Candidate may have misconceptions of positive/negative reactivity changes due to either rods or RCS temperature response.
C. Incorrect. Candidate may have misconceptions of positive/negative reactivity changes due to either rods or RCS temperature response.
D. Correct. Power will be at the initial power level because withdrawing rods will add $+\rho$ causing power to initially rise. As the power rises, doppler adds $-\rho$ until net ρ equals 0. With primary power being greater than secondary power T_{AVG} will rise adding $-\rho$. As power drops doppler will adds $+\rho$. Reactor power drops until primary power equals secondary power. Tavg will be higher than initial because withdrawing rods will add $+\rho$ causing power to initially rise. As the power rises, T_{AVG} will rise causing MTC to add $-\rho$. T_{AVG} rises until $\Delta\rho$ (MTC) equals $\Delta\rho$ (Rods) at which time net ρ equals 0. Therefore, T_{AVG} rises until $-\rho$ from MTC equals the $+\rho$ from the rods and remains at this higher value. The assumption given stating that the main turbine load remains constant is vital to the Rx power remaining constant.

Sys #	System	Category	KA Statement
192005	REACTOR THEORY	Control Rods (Full and/or Part Length)	Predict direction of change in reactor power for a change in control rod position.

K/A# K1.03 **K/A Importance** 3.5 **Exam Level** RO
References provided to Candidate None **Technical References:** GO-3ATA 3.1, Rev. 3 pg. 9, 10
Question Source: Bank - NRC GF Exam Bank P1054
Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41 b(1)
Objective: GO-3ATA 3.1, Rev. 3 Obj. 1. Predict and analyze the plant response (TAVG, Reactor Power, Net Reactivity, Pressurizer Pressure, Pressurizer level, Steam Generator Pressure, Steam Generator Level, and Steam Flow) to the following transients. a. Ten step control rod position changes

72. BVPS Unit 2 had been operating at 100% power for two weeks when power was reduced to 50% over a one-hour period.

    To maintain reactor power stable during the next 24 hours, which one of the following incremental control rod manipulations will be required?

A. Withdraw rods periodically during the entire period.

B. Withdraw rods periodically at first, and then periodically insert rods.

C. Insert rods periodically during the entire period.

D. Insert rods periodically at first, and then periodically withdraw rods.

Answer: B

Explanation/Justification: K/A is met with the candidate's knowledge of how Xe responds after a downpower event, and understands that control rods will have to be withdrawn for ~8-10 hours as the Xe peaks, then insert control rods until equilibrium conditions are met in order to maintain power constant during the 24 hour period.

A. Incorrect. Plausible if the candidate knows rods have to be withdrawn for the positive reactivity needed, but thinks the Xe peaks after 24 hrs.
B. Correct. After the power reduction Xe135 will increase until it peaks at 8-10 hours after the downpower, therefore control rods will have to be withdrawn to add positive reactivity to maintain power stable. After Xe peaks rods will have to be inserted until Xe reaches equilibrium Xe conditions approximately 40-50 hours after the initial downpower.
C. Incorrect. Plausible if the candidate thinks Xe would be decreasing like in an up power transient which would require the rods to be inserted for negative reactivity.
D. Incorrect. Plausible if the candidate thinks Xe would be decreasing like in an up power transient which would require the rods to be inserted for approximately 5 hrs to add negative reactivity, then pull rods until Xe reaches equilibrium conditions ~30 after the initial power increase.

Sys #	System	Category	KA Statement
192006	REACTOR THEORY	Fission Product Poisons	Describe the following processes and state their effect on reactor operations: -- Transient Xenon

K/A# K1.06 **K/A Importance** 3.2 **Exam Level** RO

References provided to Candidate None **Technical References:** GO-GPF.R6 App. A Rev. 1 pg. 22, 23
GO-GPF.R6 App. C PPNT Rev. 1 Slide 24

Question Source: Bank - NRC GF Exam Bank P2061

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41 b(1)

Objective: GO-GPF.R6 Rev. 1 Obj. 5. Describe the following processes and state their effect on reactor operation: b. Xenon behavior following power changes

73. Initially, BVPS Unit 2 was operating at steady-state 85% reactor power when the extraction steam to the 1st Point Feedwater Heater became isolated. Main generator load was returned to its initial value of 825MW.

When the plant stabilizes, reactor power will be ______(1)______ than 85% power, and the steam cycle thermal efficiency will be ______(2)______.

A. 1) greater
2) lower

B. 1) greater
2) higher

C. 1) less
2) lower

D. 1) less
2) higher

Answer: A

Explanation/Justification: K/A is met with the candidates knowledge of how the loss of extraction steam to the feedwater heaters (secondary system) will cause reactor power to increase due to colder feedwater, and cause overall thermodynamic efficiency to lower because the heat from the extraction steam will be wasted to the condenser.

A. Correct. The loss of extraction steam to a high-pressure feedwater heater will cause power to increase because the feedwater is no longer being preheated causing colder water to enter the SGs which in turn will lower the RCS temperatures causing Rx power to increase. Efficiency goes down because steam that was used to preheat feedwater now passes through the turbine to condenser.
B. Incorrect. Plausible if the candidate has a conceptual misunderstanding and doesn't understand the overall plant efficiency process and thinks since Rx power went up, thermal efficiency increased.
C. Incorrect. Plausible if the candidate thinks since the extraction steam preheating was lost, that thermal efficiency was lower, causing Rx power to be lower.
D. Incorrect. Plausible if the candidate thinks since the extraction steam preheating was lost to the feedwater that more work will be done by the turbine causing efficiency to increase.

Sys #	System	Category	KA Statement
193005	THERMODYNAMICS	Thermodynamic Cycles	Describe how changes in secondary system parameter affect thermodynamic efficiency.

K/A# K1.03 **K/A Importance** 2.5 **Exam Level** RO
References provided to Candidate None **Technical References:** GO-GPF.T5 App. A Rev. 3 pg. 27, 28
Question Source: Bank - NRC GF Exam Bank P1980
Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.41 b(14)
Objective: GO-GPF.T5 Rev. 3 Obj. 9 Explain how changes in secondary system parameters affect plant efficiency.:

74. A natural circulation cooldown is in progress at BVPS Unit 2. The cooldown rate is being controlled by releasing steam from the Steam Generator (SG) Atmospheric Steam Dump Valves in manual control.

If voids interrupt the RCS natural circulation flow, how will the following parameters respond?

(Assume feedwater flow rate, SG relief valve positions, and decay heat level are constant.)

	SG Pressures	Core Exit Thermocouples
A.	Decrease	Increase
B.	Decrease	Remain Constant
C.	Increase	Increase
D.	Increase	Remain Constant

Answer: A

Explanation/Justification: K/A is met by the candidate's knowledge of the primary and secondary impacts caused by voiding during natural circulation. The candidate must know how the reduced flow from interrupted natural circulation will impact the heat transfer from the RCS to the SG's and the secondary impact that has on the heat source and heat sinks.

A. Correct. Voids interrupting the natural circulation flow will cause a reduction in heat transfer from the primary to secondary systems. With feedwater flow, SG relief valve positions, and decay heat remaining constant, the primary coolant will have a reduced capability to transfer heat from the fuel to the secondary. This will result in rising CET temperatures. As a result of the reduced heat input to the SG's, SG temperature and pressure will lower.

B. Incorrect. The first part is correct. Voids interrupting the natural circulation flow will cause a reduction in heat transfer from the primary to secondary systems. With feedwater flow, SG relief valve positions, and decay heat remaining constant, the primary coolant will have a reduced capability to transfer heat from the fuel to the secondary. As a result of the reduced heat input to the SG's, SG temperature and pressure will lower. The second part is plausible because when natural circulation is established with feedwater flow, SG relief valve positions, and decay heat remaining constant, CET's will be relatively constant. Candidate may incorrectly assume that CET's remain constant during this interruption of natural circulation.

C. Incorrect. The first part is plausible if candidate believes an interruption of natural circulation will result in a rising SG temperature and pressure due to the reduced RCS flow as natural circulation is interrupted. Second part is correct. Voids interrupting the natural circulation flow will cause a reduction in heat transfer from the primary to secondary systems. With feedwater flow, SG relief valve positions, and decay heat remaining constant, the primary coolant will have a reduced capability to transfer heat from the fuel to the secondary. This will result in rising CET temperatures.

D. Incorrect. The first part is plausible if candidate believes an interruption of natural circulation will result in a rising SG temperature and pressure due to the reduced RCS flow as natural circulation is interrupted. The second part is plausible because when natural circulation is established with feedwater flow, SG relief valve positions, and decay heat remaining constant, CET's will be relatively constant. Candidate may incorrectly assume that CET's remain constant during this interruption of natural circulation.

Sys #	System	Category	KA Statement
193007	THERMODYNAMICS	Heat Transfer	Describe how the presence of gases or steam can affect heat transfer and fluid flow in heat exchangers

K/A# K1.04 **K/A Importance** 2.8 **Exam Level** RO

References provided to Candidate None **Technical References:** GO-GPF.T8, App. A Rev. 1, Issue 1 pg. 50-51

Question Source: Bank - NRC GF Exam Bank P2093

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41 b(14)

Objective: GO-GPF.T7 Rev. 2, Issue 2 Obj 10. Describe the relationship between heat transfer rate in a heat exchanger and the factors which affect it.

GO-GPF.T8 Rev. 1, Issue 1 Obj. 25. Describe how gas binding affects natural circulation.

75. Unit 2 has entered FR-P.1, Response to Imminent Pressurized Thermal Shock Condition. The concern for this event is that Brittle fracture may occur due to ______(1)______ stress at relatively ______(2)______ temperatures.

A. 1) compressive
   2) high

B. 1) compressive
   2) low

C. 1) tensile
   2) high

D. 1) tensile
   2) low

Answer: D

Explanation/Justification: K/A is met with the candidate's knowledge that tensile stress and low temperatures are contributors to brittle fracture mode of failure.

A. Incorrect. Compressive stress is plausible because it is a stress we are concerned with in a nuclear plant. High temperature is plausible, but it is usually associated with ductile fractures.
B. Incorrect. Compressive stress is plausible because it is a stress we are concerned with in a nuclear plant. Lower temperature is correct for brittle fracture.
C. Incorrect. Tensile stress is correct. High temperature is plausible, but it is usually associated with ductile fractures.
D. Correct. Brittle fracture involves little or no plastic deformation prior to fracture and is characterized by lower temperatures and tensile stress.

Sys #	System	Category	KA Statement
193010	THERMODYNAMICS	Brittle Fracture and Vessel Thermal Stress	State the brittle fracture mode of failure.

K/A# K1.01 **K/A Importance** 2.8 **Exam Level** RO
References provided to Candidate None **Technical References:** GO-GPF.T10, App. A Rev. 1 pg. 24-25
Question Source: Bank - NRC GF Exam Bank P296
Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41 b(14)
Objective: GO-GPF.T10, Rev. 1 Obj. 5. Describe the brittle fracture mode of failure.

76. Given the following conditions:

- The plant is in MODE 3
- 'A' and 'B' RCP's are in operation.
- Rod Control System is capable of rod withdrawal.

The 'A' RCP trips due to a locked rotor.

According to Technical Specifications only:

1) Which of the following actions must the operating crew take?
2) What is the basis for the action(s)?

A. 1) Verify steam generator secondary side water levels are >15.5% for required RCS Loops within 1 hour.
2) To ensure adequate heat sink is available for decay heat generation.

B. 1) Place the Rod Control System in a condition incapable of rod withdrawal OR restore required RCS loops to operation within 1 hour.
2) To ensure minimum shutdown margin with reduced or absent forced circulation.

C. 1) Place the Rod Control System in a condition incapable of rod withdrawal OR restore required RCS loops to operation within 1 hour.
2) To ensure accident analysis are met for a continuous rod withdrawal event.

D. 1) Verify steam generator secondary side water levels are >15.5% for required RCS Loops within 1 hour.
2) To ensure cooldown and depressurization capability exists.

Question 76

Answer: C

Explanation/Justification: This meets SRO-Only requirements of ES-4.2 Section E.3.b fig. 4.2-2, 3rd bullet, because it requires the SRO to analyze plant conditions, make a determination on the operability of RCS Loops, determine the required action from the LCO, and requires knowledge of the basis to choose the correct answer. The accident analyzed for LCO 3.4.5 action is only found in the TS Bases (SRO ONLY).

This meets the K/A because it requires the SRO to identify the limiting conditions for operation and safety limits caused by the malfunction of a reactor coolant pump as well as identify the basis for that action. With 1 required loop not in service (RCP trip) and rods capable of rod withdrawal, this changes the required action to restoring loops or making rods incapable of withdrawal within 1 hour. The basis for that action is to meet accident analysis for a continuous rod withdrawal event in MODE 3.

A. Incorrect. Plausible if candidate mistakes completion of SR 3.4.5.2 (Steam Generator Water Levels) as the only requirement for loop operability. Also plausible if candidate confuses requirements for loop operability with MODE 5 requirements for loop availability. Secondary heat sink is also required, but the T/S actions are to restore loop operability or disable rod control. Second part is incorrect because it is the basis for SG water levels >15.5% which is incorrect.

B. Incorrect. First part is correct. Second part is incorrect but plausible if candidate correctly understands SDM is a concern but fails to prioritize continuous rod withdrawal as the primary concern in this condition.

C. Correct. An OPERABLE loop per LCO 3.4.5 Basis states "An OPERABLE RCS loop consists of one OPERABLE RCP and one OPERABLE SG, which has the minimum water level specified in SR 3.4.5.2. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required. In MODE 3 the only options for satisfying LCO 3.4.5 are to restore 2 RCS loops to OPERATING or to render the Rod Control System incapable of Rod Withdrawal. The primary concern with rods capable of rod withdrawal is a continuous rod withdrawal event per T/S Basis. 2 Loops of forced circulation are required to ensure accident analysis is met.

D. Incorrect. Plausible if candidate mistakes completion of SR 3.4.5.2 (Steam Generator Water Levels) as the only requirement for loop operability. Also plausible if candidate confuses requirements for loop operability with MODE 5 requirements for loop availability. Secondary heat sink is also required, but the T/S actions are to restore loop operability or disable rod control. Second part is plausible if candidate thinks that the SGs water level requirement is necessary to ensure cooldown and depressurization capability exists.

Sys #	System	Category	KA Statement
000015	Reactor Coolant Pump Malfunctions / 4	Generic	Knowledge of limiting conditions for operations and safety limits.

K/A# 2.2.22 **K/A Importance** 4.7 **Exam Level** SRO

References provided to Candidate None **Technical References:** Tech Spec pgs. 3.4.5-1 & 2, B 3.4.5-1

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(2)

Objective: 3SQS-RCS-ITS-01-05: From memory, identify a condition concerning the RCS Technical Specifications and Licensing Requirements that require Tech Spec action to be taken in one hour or less.

77. A large Steam break accident inside containment has occurred.

- Containment pressure peaked at 20 psig.
- All Equipment functioned as designed **EXCEPT** all seal injection flow has been lost.
- SI, CIA, and CIB have all been reset.
- SWS has been restored to the CCP heat exchangers.
- CCP flow has been restored.
- While performing EOP Attachment A-1.2, Establishing RCP CCP Cooling and Seal Injection, the Reactor Operator is unable to “OPEN” 21A RCP Thermal Barrier Outlet Isolation Valve [2CCP*AOV107A], using the benchboard control switch.

In order to “OPEN” 2CCP*AOV107A it will be necessary to defeat the “CLOSE” signal to 2CCP*AOV107A.

IAW EOP Attachment A-1.2, Establishing RCP CCP Cooling and Seal Injection:

What direction(s) are you **REQUIRED** to give the local operator to defeat the “CLOSE” signal to 2CCP*AOV107A?

A. Remove the valve’s associated secondary process rack power supply card.

B. Install jumpers across the opening contacts of the valve’s control circuit.

C. Remove the valve’s associated control circuit power supply fuse.

D. Install jumpers across the contacts of the high discharge flow transmitter.

Question 77

Answer: A

Explanation/Justification: This meets SRO-Only requirements of ES-4.2 Section E.3.e fig. 4.2-3, 1st bullet, because in order to differentiate between distractors, SRO must have specific knowledge with the directions from EOP Attachment A-1.2 step 4, as systems knowledge will not provide that distinction. Additionally, the other distractors list actions from A-1.2 that do not accomplish opening the valve. Per ES-4.2 section e, knowledge of a procedure to recover or with which to proceed is SRO knowledge.

This meets the K/A because it provides direction of/given to local operator during an emergency as one of the recovery actions from a loss of Component Cooling Water event.

A. Correct. Per 2OM-53A.1.A-1.2 step 4, to align thermal barrier cooling water flow to 2RCS*P21A, if necessary to defeat the Close signal to 2CCP*AOV107A, Obtain Key No.117(118), loosen screws for RK*2SEC-PROC-A, Card CA-352, Pull card out, and then the control room will have the capability to open 2CCP*AOV107A.

B. Incorrect. Plausible because the candidate may have a working knowledge of the circuitry and this may open the valve, it would not be in accordance with 2OM-53A.1.A-1.2 step 4. This is not something a tour operator would be tasked with doing, and an SRO should know that.

C. Incorrect. Plausible if candidate is unfamiliar with circuitry but vaguely familiar with A-1.2 as this action will fail the valve CLOSED. Additionally, this action would not be in accordance with A-1.2.

D. Incorrect. Plausible if candidate is unfamiliar with circuitry but vaguely familiar with A-1.2 as this action will defeat the high flow signal BUT NOT the high pressure. Additionally, this action would not be in accordance with A-1.2.

Sys #	System	Category	KA Statement
026	Loss of Component Cooling Water / 8	Generic	Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.

K/A# 2.4.35 **K/A Importance** 4.0 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53A.1.A-1.2 rev. 2 pg. 4

Question Source: Bank - 2LOT6 Q100

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.43.b(5)

Objective: 2SQS-15.1-01-15 Given a plant CIB signal, describe how the CCP System valves, pumps, flow, and/or electrical configuration will change as a result of the signal.

78. The plant was operating at 100% power when a barge impacted the intake structure resulting in a loss of all Service Water.

- The crew has implemented AOP 2.30.1, “Service Water/Main Intake Structure Loss”.
- Attempts to restore Service Water have failed.
- The reactor has been manually tripped and E-0 implemented in parallel with AOP 2.30.1.

Per **AOP 2.30.1**, which of the following actions will be taken?

1) Secure all Charging/ HHSI pumps
2) Align the Fire Protection header to the Service Water system
3) Secure all RCPs
4) Secure all CCP pumps
5) Isolate Letdown

A. 1, 2, 3, ONLY

B. 2, 3, 4 ONLY

C. 1, 3, 5, ONLY

D. 1, 4, 5 ONLY

Question 78

Answer: C

Explanation/Justification: This meets SRO-Only requirements of ES-4.2 Section E.3.e fig. 4.2-3, 1st bullet. Specifically, the SRO must make an assessment of plant conditions and then select a procedure or section of a procedure to mitigate or recover, or with which to proceed. In this case the SRO must determine which actions are applicable to the loss of Service Water procedure based on detailed knowledge of the AOP and determine that the correct equipment actions are taken.

K/A is met by understanding of the action steps of the response not obtained steps for a loss of both the Service Water and Standby Service water pumps. This requires a detailed knowledge of the abnormal operating procedure for Loss of Service Water and comprehension of the actions contained within.

A. Incorrect. Plausible because securing the RCPs and Charging pumps are correct actions, cross connecting the Fire Protection system with SWS is not an action in the procedure. There is a cross connect valve between the Fire Protection system and Service Water system, but it is not called out in the loss of Service Water AOP.

B. Incorrect. Plausible because securing the RCPs is a correct action. Securing the CCP pumps is plausible since the SWS system is the cooling medium for the CCP system, but there are no directions to secure the CCP pumps in the loss of Service Water AOP. Cross connecting the Fire Protection system with SWS is plausible but is not an action in the procedure.

C. Correct. Per AOP 2.30.1, the Charging pumps are secured due to the loss of cooling water (Service Water), the RCPs are secured since SWS cools the CCP heat exchangers. Letdown is isolated since charging flow is isolated and CCP cooling to the non-regenerative heat exchanger is lost due to the loss of SWS.

D. Incorrect. Plausible because securing the Charging pumps and isolating Letdown are correct actions but securing the CCP pumps is not an action per AOP 2.30.1.

Sys #	System	Category	KA Statement
062	Loss of Nuclear Service Water / 4	Generic	Knowledge of abnormal condition procedures.

K/A# 2.4.11 **K/A Importance** 4.2 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.30.1 Rev. 9 pg. 2, 3

Question Source: Bank – 1LOT18 Q81

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(10)

Objective: 2SQS-53C.1-01-04 Discuss the flowpath of each procedure including the importance of step sequencing, where applicable.

2SQS-30.1-01-17: Given a set of plant conditions, apply the operational sequence, parameter limits, precaution and limitations, and cautions & notes applicable to the completion of the task activities in the control room.

79. Given the following plant conditions:

- The plant is at 82% power during a plant startup.
- A loss of Station Instrument Air has occurred.
- The crew is attempting to restore Instrument Air in accordance with 2OM-53C.4.2.34.1, "Loss of Station/Cnmt Instrument Air".
- S/G NR levels are 23% and lowering.
- PZR level is 60% and rising.
- RCS temperature is 575°F and rising.

Based on the current plant conditions:

1) Why is the reactor manually tripped?

2) In accordance with the Transient Response Guidelines, is it permitted to perform AOP-2.34.1 concurrently with E-0, Reactor Trip or Safety Injection?

A. 1) loss of S/G level control
2) Yes. AOP's can be performed in parallel with EOP's to mitigate the event.

B. 1) loss of S/G level control
2) No. EOP's supersede AOP's and if actions are required, the EOP's will address them.

C. 1) loss of PZR level control
2) Yes. AOP's can be performed in parallel with EOP's to mitigate the event.

D. 1) loss of PZR level control
2) No. EOP's supersede AOP's and if actions are required, the EOP's will address them.

Question 79

Answer: A

Explanation/Justification: This is SRO-Only per ES-4.2 section E.3.e Fig. 4.2-3 1st and 4th bullets, because the SRO must use their knowledge of Abnormal operating procedures and the transient response guidelines to identify the trip condition and then know the hierarchy of EOP's and AOP's and use their knowledge of the Rules of Usage to determine parallel implementation is acceptable. This qualifies as detailed knowledge of AOP procedures and the application of them that is not required for RO's. "Knowledge of administrative procedures that specify hierarchy, implementation, and/or coordination of plant normal, abnormal, and emergency procedures."

This meets the K/A because the candidate must recognize the loss of station instrument air has caused the feed regulating valves to close which based on a note in Attachment E of the AOP is an indication that instrument air is below 65 psig, which coincides with AOP continuous step 5 which states manually trip the reactor if instrument air is <65 psig.

A. Correct. In accordance with AOP-34.1, a sign that station instrument air has dropped below the trip setpoint of 65 psig is that the Feedwater Regulating Valves have begun to drift shut, resulting in a lower than program S/G Narrow Range Level. This corresponds to the AOP continuous step 5 which states manually trip the reactor if instrument air is <65 psig. In accordance with BVBP-OPS-0024, Transient Response Guidelines, appropriate AOP's may be performed in parallel with EOP's, giving priority to the EOP network.

B. Incorrect. In accordance with AOP-34.1, a sign that station instrument air has dropped below the trip setpoint of 65 psig is that the Feedwater Regulating Valves have begun to drift shut, resulting in a lower than program S/G Narrow Range Level. This corresponds to the AOP continuous step 5 which states manually trip the reactor if instrument air is <65 psig. Second part is plausible if candidate believes they cannot implement AOPs in parallel with the EOP network because EOPs are a higher priority.

C. Incorrect. Plausible since AOP 34.1 Attachment G informs that 2CHS*FCV122 will fail to the open position as it loses instrument air resulting in a rising pressurizer level. Candidate must recognize that there is no procedurally directed trip criteria for high pressurizer level, only actions to isolate the charging header. In accordance with BVBP-OPS-0024, Transient Response Guidelines, appropriate AOP's may be performed in parallel with EOP's, giving priority to the EOP network.

D. Incorrect. Plausible since AOP 34.1 Attachment G informs that 2CHS*FCV122 will fail to the open position as it loses instrument air resulting in a higher than program pressurizer level. Candidate must recognize that there is no procedurally directed trip criteria for high pressurizer level, only actions to isolate the charging header. Plausible if candidate believes they cannot implement AOP 2.34.1 in parallel with the EOP network because EOP's are a higher priority.

Sys #	System	Category	KA Statement
065	Loss of Instrument Air / 8	AA2. Ability to determine and interpret the following as they apply to the Loss of Instrument Air:	When to trip reactor if instrument air pressure is de-creasing

K/A# AA2.06 **K/A Importance** 4.2 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.34.1 Rev. 26 pg. 3, 11
BVBP-OPS-0024 Rev. 13 pg. 15, 16

Question Source: Bank - Sequoyah 2013 (Q80)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(5)

Objective: 2SQS-34.1, Rev. 18 Obj. 15. Given a Unit 2 Compressed Air System configuration and without referenced material, describe the Compressed Air System control room response to the following off-normal conditions, including automatic functions and changes in equipment status as applicable. a. Loss of instrument air

3SQS-53.3-01-06: Given a set of conditions, locate and apply the proper Emergency Operating Procedures, IAW BVPS-EOP Executive Volume.

80. The plant is operating at 100% power when the following indications occur:

- ALL 4kV bus voltages are gradually lowering, currently 115 Volts.
- ALL 4kV bus frequencies are oscillating between 58.5 and 60.5 Hz.
- AOP 1/2-35.1, Degraded Grid, is entered at Unit 1 and Unit 2

In accordance with AOP 1/2-35.1, the crew must manually trip the reactor when frequency is ______(1)______, and the automatic reactor trip setpoint is ______(2)______.

A. 1) below 58.5 Hz for > 5 minutes
2) 57.5 Hz

B. 1) below 58.5 Hz for > 5 minutes
2) 58.0 Hz

C. 1) between 58.5 and 59.5 Hz for > 10 Minutes
2) 57.5 Hz

D. 1) between 58.5 and 59.5 Hz for > 10 Minutes
2) 58.0 Hz

Question 80

Answer: A

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.e Fig. 4.2-3 1st bullet. The SRO is required to have specific knowledge of the content of the procedures. Specifically, the SRO must know that the Degraded Grid AOP requires the reactor to be manually tripped when generator frequency is below 58.5 Hz for > 5 minutes.

K/A is met with the candidate's ability to determine that a manual reactor trip is required during a grid disturbance if generator frequency is below 58.5 Hz for > 5 minutes.

A. Correct. IAW AOP 1/2-35.1 states that operation below 58.5 Hz should be limited to 5 minutes after which time the generator must be tripped. Since the plant is at 100% power, the reactor would be manually tripped. 57.5 Hz is correct because it is the RCP Bus underfrequency reactor trip setpoint.

B. Incorrect. It is required to manually trip the reactor if generator frequency is below 58.5 Hz for > 5 minutes. 58.0 Hz is plausible because it is the frequency that requires a manual reactor trip per 2OM-35.2.A, Main Generator and Transformer precautions and limitations.

C. Incorrect. Plausible distractor because the frequency range is discussed in the AOP, but the time period is required to be >15 minutes. 57.5 Hz is correct because it is the RCP Bus underfrequency reactor trip setpoint.

D. Incorrect. Plausible distractor because the frequency range is discussed in the AOP, but the time period is required to be >15 minutes. 58.0 Hz is plausible because it is the frequency that requires a manual reactor trip per 2OM-35.2.A, Main Generator and Transformer precautions and limitations.

Sys #	System	Category	KA Statement
077	Generator Voltage and Electric Grid Disturbances / 6	AA2. Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances:	Criteria to trip the turbine or reactor

K/A# AA2.08 **K/A Importance** 4.4 **Exam Level** SRO

References provided to Candidate None **Technical References:** 1/2OM-53C.4A.35.1 Rev. 11 pg. 3
2OM-1.5.B.9 Rev, 0 pg. 3

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.43.b(1)

Objective: 3SQS-1.1, Rev. 8 obj. 9. Describe the control, protection and interlock functions for the control room components associated with the Reactor Protection System Trip Logics & Engineered Safeguards Features Actuation Signals, including automatic functions, setpoints and changes in equipment status as applicable.

2SQS-53C.1-01-05 Respond to abnormal conditions using the applicable AOP during simulator scenarios.

81. The plant is operating at 100% power with all systems in NSA.

- A LOCA **OUTSIDE** containment occurs.
- At step 20 of E-0, Reactor Trip or Safety Injection, the crew enters ECA 1.2, LOCA Outside Containment.
- At the completion of ECA 1.2, the crew has been **UNABLE** to locate and isolate the break.

The following plant conditions **NOW** exist:

- All SG pressures are 800 psig and stable.
- All SG NR levels are 35% and slowly rising.
- All Secondary radiation monitors are consistent with pre-event values.
- CNMT Pressure is -1.0 psig and stable.
- CNMT sump level is consistent with pre-event values.
- CNMT radiation is consistent with pre-event values.
- RCS Subcooling is 40°F and slowly dropping.
- AFW flow is 700 gpm and stable.
- RCS Pressure is 1125 psig and slowly dropping.
- PRZR level is 12% and slowly dropping.
- Auxiliary Building Radiation levels are rising.
- Auxiliary Building sump levels are rising.

Based on these conditions:

What procedural transition is **REQUIRED**?

A. E-0, Reactor Trip or Safety Injection

B. ES-1.2, Post-LOCA Cooldown and Depressurization.

C. E-1, Loss of Reactor or Secondary Coolant.

D. ECA-1.1, Loss of Emergency Coolant Recirculation.

Question 81

Answer: D

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.e Fig. 4.2-3 1st bullet. Specifically, the SRO must have knowledge of diagnostic steps and decision points in ECA-1.2, LOCA Outside Containment that require a transition to ECA-1.1 at the end of the procedure due the RCS break not being isolated.

K/A is met by requiring the candidate to determine that a transition to ECA-1.1, Loss Of Emergency Coolant Recirculation is required at the end of ECA-1.2, LOCA Outside Containment due to the break not being isolated. The question demonstrates integrated plant procedure use in the EOP network.

A. Incorrect. Plausible since many of the procedures in the EOP network have the crew returning to procedure and step in effect. There are also procedures that have the crew do this even if the procedure was ineffective in correcting the problem.
B. Incorrect. Plausible since plant conditions support entry into ES-1.2 from E-1 but NOT from ECA-1.2.
C. Incorrect. Plausible since E-1 would be the appropriate entry if RCS pressure were rising. Since RCS pressure is NOT rising, ECA-1.1 is the appropriate entry procedure to enter.
D. Correct. IAW ECA-1.2 step 4 RNO. SRO level since this requires a candidate to have a detailed understanding of what the required transition would be when ECA-1.2 is essentially ineffective. ROs would NOT be required to have this detailed knowledge.

Sys #	System	Category	KA Statement
WE04	LOCA Outside Containment / 3	EA2. Ability to determine and interpret the following as they apply to the (LOCA Outside Containment)	Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

K/A# EA2.1 **K/A Importance** 4.3 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53A.1.ECA-1.2 Iss. 3 Rev. 0 Step 4 RNO

Question Source: Bank – 1LOT21 Q81

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(5)

Objective: 3SQS-53.3, Rev. 5 Obj. 6. Given a set of conditions, locate and apply the proper Emergency Operating Procedures, IAW BVPS-EOP Executive Volume.

82. The plant is at 7% power controlling on the Steam Dumps with the following conditions and sequence of events:

At 1200:
- The crew is preparing to roll the Turbine.
- Control Bank (CB) D is at 117 steps.
- Rods are in Manual.
- RCS Tavg is 551°F.

At 1210:
- Control Bank 'D' rods are pulled 2 steps, and rods continue to step outward after releasing the IN-HOLD-OUT switch.

The following response occurred:
- AOP-2.1.3, Unexpected Control Rod Movement was entered.
- Rods were placed in AUTO but continued to step outward.
- A Manual reactor trip was attempted with reactor power at 11%.
- NEITHER CR Benchboard RX TRIP switch caused the Reactor Trip Breakers to open.
- The Rx was tripped locally, and all rod bottom lights were LIT.

Which one of the following completes the statements below?

When the ROD CONTROL BANK SELECTOR SWITCH was placed in AUTO, CB 'D' rods should have immediately stopped, ______(1)______

The highest classification for this event was an ______(2)______.

Do not consider Emergency Director Judgement as a basis for your emergency classification.

A. 1) then step in
2) Unusual Event

B. 1) and remain stopped
2) Unusual Event

C. 1) then step in
2) Alert

D. 1) and remain stopped
2) Alert

Question 82

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.g 7th bullet. SRO is required to have knowledge of the Emergency Classifications. Specifically, the candidate must recognize that a manual reactor trip failed from the control room and an operator had to be sent out to locally trip the reactor trip breakers.

K/A is met by demonstrating the ability to classify and declare an event after the AOP immediate operator actions failed to stop a continuous rod withdrawal event, and a manual reactor trip from the control room failed to trip the reactor.

A. Incorrect. The rods will step in due to the 4F mismatch between Tref and Tavg. Unusual Event is plausible if the candidate misreads SU6 and interprets Note 8: A manual trip action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core as local operator actions.

B. Incorrect. Plausible that the candidate thinks the rods will remain stopped if they don't recognize the 4F difference between no load Tref (547F) and Tavg. Unusual Event is plausible if the candidate misreads SU6 and interprets Note 8: A manual trip action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core as local operator actions.

C. Correct. RCS temp is above the no load Tavg of 547°F by 4°F; so when the rod control bank selector switch was placed in AUTO, the rods would insert due to the deviation of >1.5F. Alert is the correct classification due to SA6 Automatic or manual trip fails to shut down the reactor and subsequent manual actions taken at the Control Room Benchboards are not successful in shutting down the reactor.

D. Incorrect. Plausible that the candidate thinks the rods will remain stopped if they don't recognize the 4F difference between no load Tref (547F) and Tavg. Alert is the correct classification.

Sys #	System	Category	KA Statement
001	Continuous Rod Withdrawal /1	AA2. Ability to determine and interpret the following as they apply to the Continuous Rod Withdrawal:	Proper actions to be taken if automatic safety functions have not taken place.

K/A# AA2.03 **K/A Importance** 4.8 **Exam Level** SRO

References provided to Candidate EPP Wallboard with Mode Table redacted

Technical References: EPP-I-1b.F01 Rev.3
3SQS-1.3 Rev. 8 PPNT Slides 108, 110

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(5)

Objective: 3SQS-1.3 Rev. 8 Obj. 21. Explain how the automatic rod speed and direction error signal is developed by the Reactor Control Unit.
EPP-9281, Rev. 13 Obj. 11. Given specific plant conditions, classify the condition in accordance with EPP I-1a & b.

83. The plant was in Mode 3 with all systems in normal alignment for this Mode and RCS temperature at 547°F and STABLE.

- A SG tube leak occurred on the 21A SG and the crew has entered AOP 2.6.4, Steam Generator Tube Leakage.
- Letdown flow has been reduced to 45 gpm.
- 21A SG has been isolated.
- An RCS cooldown to 500°F has been initiated.
- Charging flow is 55 GPM and STABLE.
- PRZR level is 22% and slowly dropping.
- 21A SG NR level is 95% and slowly rising
- SI has NOT been actuated.

The crew has progressed through AOP 2.6.4 to step 17 “Control RCS pressure and Charging flow to Minimize RCS-to-Secondary leakage”.

Based on these conditions, and IAW the guidance in AOP 2.6.4, how will charging flow and RCS pressure be controlled to minimize RCS-to-Secondary leakage?

A. Lower charging flow and depressurize the RCS.

B. Lower charging flow and turn OFF all PRZR heaters.

C. Raise charging flow and depressurize the RCS.

D. Raise charging flow and turn OFF all PRZR heaters.

Question 83

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.e fig. 4.2-3 1st bullet. The SRO must have knowledge of the content of the procedure. Specifically, the SRO must interpret the control room indications during a SG tube leak and control RCS pressure and charging flow to minimize the RCS to secondary leakage in accordance with AOP-2.6.4, SG Tube Leakage.

K/A is met with the candidate's ability to interpret the given control room indications and apply their knowledge of the SG Tube Leakage AOP to minimize the RCS to secondary leakage.

A. Incorrect. These are the actions from AOP 2.6.4 step 20 if PRZR level is between 50% and 76 % and SG level is rising.

B. Incorrect. Lowering charging flow and turning OFF the PRZR heaters would allow RCS pressure to drop which would "backfill" water from the ruptured SG and raise PRZR level. However, this is not the technique employed by AOP 2.6.4 step 20.

C. Correct. IAW AOP 2.6.4 step 20 chart. Since przr level is <31% and the 'A' SG level is rising, the crew is directed raise charging flow and depressurize the RCS.

D. Incorrect. Raising charging flow is correct, turning OFF all PRZR heaters will cause RCS pressure to drop however this is not the required action of AOP 2.6.4 step 20.

Sys #	System	Category	KA Statement
037	Steam Generator Tube Leak / 3	Generic	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.

K/A# 2.2.44 **K/A Importance** 4.4 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.6.4 Rev. 31 pg. 21

Question Source: Bank – 2LOT8 Q85

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(5)

Objective: 2SQS-53C.1-01-04: Discuss the flowpath of each procedure including the importance of step sequencing, where applicable

84. A plant shutdown is in progress in accordance with 2OM-52.4.R.1.F, Station Shutdown from 100% Power to MODE 5.

- Turbine power is currently 250 MWe when fouling of the traveling water screens occurs.
- Service water was not affected, but Main Condenser Vacuum lowered and stabilized at 23.5" 5 minutes ago.
- The crew has entered AOP-2.26.2, Loss of Main Condenser Vacuum.

Which of the following is required for this event?

A. Turbine trip conditions are met per AOP-2.26.2. Trip the Reactor and go to E-0, Reactor Trip or Safety Injection.

B. Turbine trip conditions are met per AOP-2.26.2. Trip the Turbine and go to AOP-2.26.1, Turbine and Generator Trip.

C. Turbine trip conditions are met per AOP-2.26.2. Trip the Turbine and remain in AOP-2.26.2 to stabilize the plant, then return to 2OM-52.4.R.1.F.

D. Turbine trip conditions are NOT met per AOP-2.26.2. Normal shutdown should continue per 2OM-52.4.R.1.F.

Question 84

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.e first paragraph. The SRO must assess plant conditions (normal, abnormal, or emergency) and then (2) selecting a procedure or section of a procedure to mitigate the event. Specifically, the SRO must have in depth knowledge of the abnormal operating procedure for Loss of Condenser Vacuum, the hierarchy of AOP's compared to NOP's, and trip setpoints and times as stated in the AOP.

K/A Match Justification: The ability to determine and interpret conditions requiring reactor and/or turbine trip during a loss of condenser vacuum is met with this question. This question requires the candidate to correlate MW's to reactor power, determine the required vacuum compared to its new lower value, and then determine the correct procedure and action to take based on the degraded plant conditions.

A. Incorrect. Plausible if the SRO incorrectly calculates corresponding power to be greater than P-9. If Rx power were >P-9, a Reactor Trip and entry into procedure E-0, Reactor Trip or Safety Injection, would be correct.
B. Correct. At this power level, the required vacuum is 26.2" Vacuum. 23.5" is less than this value. This turbine power level listed before the loss of vacuum occurs would correspond with a reactor power level below P-9. However, the candidate may have some confusion as to the setpoint and the fact that this power listed is prior to the loss of vacuum. Since a turbine trip is required and power is <P-9 setpoint, the correct action is to trip the turbine and enter AOP-2.26.1, Turbine and Generator Trip.
C. Incorrect. It is plausible that AOP-2.26.2 could contain the steps necessary for stabilizing the plant in these conditions as there are not many actions needed. However, an SRO should know the procedure hierarchy and transition required following a turbine trip.
D. Incorrect. Plausible if the candidate confuses the automatic turbine trip setpoint with the procedurally required turbine trip setpoints contained in AOP-2.26.2 and is therefore inclined to stay in the NOP's rather than transitioning to AOP for Turbine Trip.

Sys #	System	Category	KA Statement
051	Loss of Condenser Vacuum / 4	AA2. Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum:	Conditions requiring reactor and/or turbine trip

K/A# AA2.02 **K/A Importance** 4.1 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.26.2 Rev. 2 pg. 2, 3

Question Source: Bank – 2018 Indian Point Q83

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(5)

Objective: 2SQS-53C.1-01-04: Discuss the flowpath of each procedure including the importance of step sequencing, where applicable.

85. The plant is operating at 100% power. L5 logs indicate a steady rise in containment pressure over the last 24 hours.

    Current Containment pressure is 14.3 psia and rising 0.1 psig per hour.

    Based on the above conditions, the crew must ________(1)________ because we are outside of the design containment pressure limits which ________(2)________.

A. 1) restore Containment Pressure within limits within 1 hour.
   2) prevents an accidental Quench Spray actuation from exceeding our MINIMUM design containment pressure. Restoring Containment Pressure returns operation to within the bounds of the containment analysis.

B. 1) be in MODE 3 within 1 hour
   2) prevents an accidental Quench Spray actuation from exceeding our MINIMUM design containment pressure. Being in MODE 3 sufficiently reduces the likelihood of an accidental Quench Spray actuation from occurring, satisfying our design basis.

C. 1) restore Containment Pressure within limits within 1 hour
   2) prevents a DBA LOCA from exceeding our MAXIMUM design containment pressure. Restoring Containment Pressure returns operation to within the bounds of the containment analysis.

D. 1) be in MODE 3 within 1 hour
   2) prevents a DBA LOCA from exceeding our MAXIMUM design containment pressure. Being in MODE 3 sufficiently reduces the likelihood of a DBA LOCA from occurring, satisfying our design basis.

Question 85

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.b Fig. 4.2-2, 3rd bullet. Specifically, the SRO must have knowledge of Tech Spec bases that is required to analyze required actions and terminology. In this case the SRO must analyze Containment pressure and determine the required action, and the bases for restoring containment pressure in band to prevent exceeding the containment design pressure in the event of a DBA LOCA.

K/A met by applying knowledge of less than or equal to one-hour Technical Specification action statements for High Containment Pressure per LCO 3.6.4.

A. Incorrect. LCO 3.6.4 Condition A does require restoration of Containment Pressure within 1 hour. Second part is plausible if the candidate is not familiar with the LCO pressure range of ≥ 12.8 psia and ≤14.2 psia and thinks it's on the low end of the band. An inadvertent actuation of the Quench Spray System could result in the reduction containment pressure to below the minimum design pressure of 8 psia.

B. Incorrect. Plausible because the actions to achieve MODE 3 would be applicable if containment pressure cannot be restored within normal operating parameters within an hour, but TS allows 6 hours to be in Mode 3. Second part is plausible if the candidate is not familiar with the LCO pressure range of ≥ 12.8 psia and ≤14.2 psia and thinks it's on the low end of the band. An inadvertent actuation of the Quench Spray System could result in the reduction containment pressure to below the minimum design pressure of 8 psia.

C. Correct. LCO 3.6.4 Condition A requires restoration of Containment Pressure within 1 hour if containment pressure is outside the LCO range of pressure range of ≥ 12.8 psia and ≤14.2 psia. Per LCO 3.6.4 Bases, Containment Pressure must be maintained less than or equal to the LCO upper pressure limit to prevent a DBA LOCA from exceeding our MAXIMUM design containment pressure of 45 psig.. Restoring Containment Pressure returns operation to within the bounds of the containment analysis.

D. Incorrect. Plausible because the actions to achieve MODE 3 would be applicable if containment pressure cannot be restored within normal operating parameters within an hour, but TS allows 6 hours to be in Mode 3. Preventing a DBA LOCA from exceeding maximum containment pressure is correct , but placing the plant in Mode 3 is plausible because placing the plant in Mode 3 within 6 hours and MODE 5 within 36 hours to place the plant in a low energy state, sufficiently reducing the likelihood of a DBA LOCA.

Sys #	System	Category	KA Statement
WE14	High Containment Pressure / 5	Generic	Knowledge of less than or equal to one hour Technical Specification action statements for systems.

K/A# 2.2.39 **K/A Importance** 4.5 **Exam Level** SRO

References provided to Candidate None **Technical References:** Tech Spec LCO 3.6.4 pg. 3.6.4-1, B3.6.4-1 & 2

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.43.b(2)

Objective: 3SQS-CONT.ITS-01-05: From memory, identify a condition concerning the Containment Systems Technical Specifications and Licensing Requirements that requires Tech Spec action to be taken in one hour or less.

3SQS-CONT.ITS-01-03: Given plant conditions, determine the criteria necessary to ensure compliance with each Section Containment Systems LCO and Licensing Requirement in accordance with the Bases, Surveillance Requirements, and the Applicability.

86. Given the following conditions:
- The plant is operating at 20% power
- AOP 2.6.8, 'Abnormal RCP Operation' has been entered due to rising temperatures on the 'B' RCP

The following conditions exist:

Time	RCS*P21B MTR LWR RADIAL [T0435A]	RCS*P21B MTR UPR THRUST [T0434A]
1000	181°F	184°F
1005	189°F	188°F
1010	197°F	194°F
1015	204°F	201°F

1) Which Motor Bearing reaches the RCP trip setpoint **FIRST** in accordance with AOP-2.6.8?

2) What actions will be directed by the Unit Supervisor?

A. 1) Motor Lower RADIAL Bearing
2) Shutdown 'B' RCP, go to AOP-2.51.1, Unplanned Power Reduction, and perform a controlled plant shutdown.

B. 1) Motor Lower RADIAL Bearing
2) Trip the reactor, go to E-0, complete the IOAs, then shutdown 'B' RCP.

C. 1) Motor Upper THRUST Bearing
2) Shutdown 'B' RCP, go to AOP-2.51.1, Unplanned Power Reduction, and perform a controlled plant shutdown.

D. 1) Motor Upper THRUST Bearing
2) Trip the reactor, go to E-0, complete the IOAs, then shutdown 'B' RCP.

Question 86

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.e Fig. 4.2-3 1st bullet. Specifically, the SRO is required to have knowledge of the content of the procedures and transitions between Abnormal and EOPs. The SRO must evaluate the plant conditions and determine which setpoint has been exceeded for continued RCP operation. Then the SRO must determine the specific sequence of actions to take when securing the RCP, the sequence of actions are listed as sub-steps in the Abnormal Operating Procedure. Additionally directing the action to secure the pump is to occur following completion of the IOAs, which is SRO knowledge of the AOP procedure content. Per the EOP users guide, the Continuous Actions are on the fold out page, the Reader (US) is responsible for reviewing and monitoring the CA page and informing the crew when conditions are met to apply the action.

K/A is met by demonstrating the ability to predict the impact of a rising RCP bearing temperature, then based on reaching a required RCP immediate shutdown setpoint, choose the appropriate procedure to shutdown the Rx and the RCP after the IOAs of E-0 are complete. This is an abnormal RCP shutdown sequence in that the Rx is tripped, then the RCP is tripped. Normally RCP shutdowns occur prior to the Rx being critical during plant heat up, or after plant cooldown.

A. Incorrect. Correct bearing. Incorrect RCP shutdown sequence and procedure for shutting down the plant. Plausible distractor because tripping of an RCP when power is <30% (P-8) does not generate an automatic Rx trip, and a controlled shutdown would be plausible, but not permitted.
B. Correct. IAW the AOP, motor bearing temperature setpoint for trip criteria is >195F which is met at 1010 by the MTR LWR RADIAL BEARING at 197F. AOP-2.6.8 Continuous action step 1 directs tripping the Rx, E-0, IOAs, then tripping RCP.
C. Incorrect. Incorrect bearing. Incorrect RCP shutdown sequence and procedure for shutting down the plant. Plausible distractor because tripping of an RCP when power is <30% (P-8) does not generate a Rx trip, and a controlled shutdown would be plausible, but not permitted.
D. Incorrect. Incorrect bearing. Correct Rx trip, IOAs, and RCP shutdown sequence.

Sys #	System	Category	KA Statement
003	Reactor Coolant Pump System (RCPS)	Generic	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.

K/A# 2.4.8 **K/A Importance** 4.5 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.6.8 Rev. 14

Question Source: Bank – 2LOT15 Q86

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(5)

Objective: 2SQS-6.3, Rev. 14 Obj. 21. Given a change in plant conditions due to system or component failure, analyze the Reactor Coolant Pump and support system to determine what failure has occurred.
2SQS-53C.1-01-05 rev. 12 Respond to abnormal conditions using the applicable AOP during simulator scenarios.

87. The plant has sustained a main steam line break affecting all 3 SGs.

The crew is currently performing ECA 2.1, Uncontrolled Depressurization Of All Steam Generators.

AFW flow to each SG has been throttled as required by ECA-2.1 and Safety Injection Termination Criteria have NOT been met.

The following conditions exist:

SG	Level	Pressure
SG ”A”	19% WR slowly decreasing	320 psig decreasing
SG “B”	18% WR slowly decreasing	310 psig decreasing
SG “C”	26% WR slowly increasing	380 psig increasing

Which of the following describes the required action and the reason for the action?

A. Transition to E-2, Faulted Steam Generator Isolation because there is an intact SG available.

B. Transition to FR-H.1, Loss Of Secondary Heat Sink because there is a RED condition on the Heat Sink Status Tree.

C. Transition to E-3, Steam Generator Tube Rupture because there is an unexplained increase in SG level.

D. Continue with ECA 2.1, Uncontrolled Depressurization Of All Steam Generators, because Safety Injection termination is not complete.

Question 87

Answer: A

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.e Fig. 4.2-3 3rd bullet. Specifically, the SRO must assess the given plant conditions while in ECA-2.1 and apply this knowledge to determine that E-2 must be implemented based on rising SG pressure in one SG iaw the left-hand page which identifies the systematic response/unexpected conditions of ECA-2.1 and the reason for the transition.

K/A is met with the candidate's knowledge of EOP ECA-2.1 left hand page which contains the systematic response / unexpected conditions associated with ECA-2.1 to determine that a transition to E-2 is required based on rising SG pressure in one SG.

A. Correct. IAW LHP action of ECA-2.1 requires transition to E-2 when any one SG pressure increases except when performing SI termination in step 13-23. The stem of the question states SI termination criteria has not been met, therefore, transition to E-2 is warranted. At BVPS LHP items include unexpected response conditions such as the one addressed in this question.

B. Incorrect. Plausible, however Operator action reduced feed. Caution prior to Step 3 indicates FR-H.1 would not be entered.

C. Incorrect. Plausible. One SG is higher than the others but does not constitute uncontrolled or unexplained increase.

D. Incorrect. Plausible if SI termination had been started, but the stem states SI termination criteria have NOT been met yet, so transition to E-2 can be made.

Sys #	System	Category	KA Statement
039	Main and Reheat Steam System	Generic	Knowledge of the operational implications of EOP warnings, cautions, and notes.

K/A# 2.4.20 **K/A Importance** 4.3 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53A.1.ECA-2.1 Iss. 3 Rev. 1 LHP

Question Source: Bank – 2LOT6 Q99

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(5)

Objective: 3SQS-53.2, Rev. 2 Obj. 5. State from memory the basis for the foldout and left-hand page, IAW BVPS EOP Executive Volume.
3SQS-53.3, Rev. 5 Obj. 4. Explain from memory the basis for ALL Cautions and Notes, IAW BVPS-EOP Executive Volume.

88. The plant is operating at 100% power with all systems in NSA.

- A 100 volt ground exists on 125 VDC Bus 2-1.

The crew is attempting to locate the ground in accordance with 2OM-39.4.F, “Clearing Grounds” (125 VDC Busses 2-1 and 2-2).

1) Which of the following describes the **SEQUENCE** for locating the ground in accordance with 2OM-39.4.F?

2) What will be the Technical Specification impact, if any, if the ground is discovered on the Battery?

A. 1) Isolate Charger, **THEN** Battery using Plant Manager discretion.
2) Technical Specification entry is required for the grounded battery.

B. 1) Isolate Battery, **THEN** Charger using Unit/Shift Manager discretion.
2) Technical Specification entry is required for the grounded battery.

C. 1) Isolate Charger, **THEN** Battery using Unit/Shift Manager discretion.
2) Technical Specification entry is **NOT** required for the grounded battery as long as the charger remains operable.

D. 1) Isolate Battery, **THEN** Charger using Plant Manager discretion.
2) Technical Specification entry is **NOT** required for the grounded battery as long as the charger remains operable.

Question 88

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.e, first paragraph and section E.3.b. Specifically, the SRO must have specific knowledge of the content of the Battery Ground procedure which states that the shift manager or unit supervisor will make the decision on whether to isolate the battery or the charger first to identify the grounded component. The SRO will then have to determine if the LCO must be entered using Tech Spec bases knowledge of what components are required to have an operable DC subsystem.

K/A is met with the candidate's ability to predict the impact that a ground will have on the DC distribution system and mitigate of the consequences by determining the Tech Spec implications.

A. Incorrect. Plausible sequence but Plant Manager is not the correct authority. Entry is required in LCO 3.8.4 since the battery is required to be operable as it is part of the DC subsystem.

B. Correct. 2OM-39.4.F states that the order of the DC system ground isolation is at the discretion of the SM/US, therefore this statement is correct. The Battery is required to operable per the LCO bases which states each subsystem consisting of two batteries, battery charger for each battery and the corresponding control equipment and interconnecting cabling supplying power to the associated bus within the train are required to be OPERABLE.

C. Incorrect. The procedure states that the order of the DC system ground isolation is at the discretion of the SM/US, therefore this statement is correct. TS entry not being required is plausible if the candidate doesn't understand what makes up the required operable DC subsystem and assumes that if the battery charger is maintaining the DC buses, then entry is not required.

D. Incorrect. Plausible sequence but Plant Manager is not the correct authority. TS entry not being required is plausible if the candidate doesn't understand what makes up the required operable DC subsystem and assumes that if the battery charger is maintaining the DC buses, then entry is not required.

Sys #	System	Category	KA Statement
063	DC Electrical Distribution System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Grounds

K/A# A2.01 **K/A Importance** 3.2 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-39.F Rev. 6 pg. 3
Tech Spec 3.8.4 pgs. 3.8.4-1 & B3.8.4-4

Question Source: Bank – 2LOT8 Audit Q90

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.43.b(2)

Objective: 3SQS-ELEC ITS-01-03: Given plant conditions, determine the criteria necessary to ensure compliance with the Electrical Power System's LCO's and Licensing Requirement's in accordance with the Bases, Surveillance Requirements, and the Applicability.

3SQS-39.1, Rev. 9 Obj. 21. Given a change in plant conditions due to system/component failure, analyze the 125 VDC Distribution System to determine what failure has occurred.

89. The plant is at 100% power with all systems in normal alignment **except** 2SWE-P21B, 'B' Standby Service Water pump is on clearance.

- 2SWS-P21A, 'A' Service Water pump tripped on overcurrent due to a shaft seizure
- A1-4G, Service Water Header Pressure Low is LIT
- 2SWE-P21A, Standby Service Water pump failed to auto start
- All other equipment operated as designed

1) Which of the following Tech Spec LCOs is/are required to be entered when 2SWS-P21A, 'A' Service Water pump tripped?

TS 3.7.8, Service Water System
TS 3.8.1, AC Sources - Operating

The crew has entered AOP-2.30.1, Service Water/Main Intake Structure Loss, and taken the appropriate Control Room actions to restore Service Water Header pressures to normal.

No Field Operator actions have been taken.

2) Is LCO 3.7.8, Service Water System met once the Service Water Header pressures are restored to normal?

A. 1) Tech Spec 3.7.8 only.
2) Yes, LCO 3.7.8 is met.

B. 1) Tech Spec 3.7.8 only.
2) No, LCO 3.7.8 is not met.

C. 1) Tech Spec 3.7.8 and 3.8.1.
2) Yes, LCO 3.7.8 is met.

D. 1) Tech Spec 3.7.8 and 3.8.1.
2) No, LCO 3.7.8 is not met.

Question 89

Answer: D

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.b 3rd bullet. Specifically, the SRO must apply the applicable tech specs when a train of SW is lost and have sufficient knowledge of the tech spec bases to determine that given the plant condition, the TS may not be exited.

K/A is met with the ability to predict the impact that a loss of one service water pump will have on the SWS system other associated systems involving equipment operability. Then based on system and tech spec knowledge, the candidate must know that to mitigate the consequences of the standby service water being cross tied to the SWS, that TS 3.7.8 must remain in effect.

A. Incorrect. TS 3.7.8 only is plausible if they do not remember the note stating to enter TS 3.8.1, or don't remember that the SWS is required for EDG operation. Exiting TS 3.7.8 is plausible because the standby service water pump will operate and maintain the header pressure as required, but that portion of the system is not qualified to maintain SWS operable.

B. Incorrect. TS 3.7.8 only is plausible if they do not remember the note stating to enter TS 3.8.1, or don't remember that the SWS is required for EDG operation. Second part is correct. TS 3.7.8 cannot be exited until 'C' SW pump is placed in service, and 2SWEMOV116A is closed isolating the non-qualified piping of the standby service water system.

C. Incorrect. Both TS 3.7.8 and TS 3.8.1 must be entered is correct. Exiting TS 3.7.8 is plausible because the standby service water pump will operate and maintain the header pressure as required, but that portion of the system is not qualified to maintain SWS operable.

D. Correct. Both TS 3.7.8 and TS 3.8.1 must be entered. TS 3.7.8, because the 'A' service water pump is inoperable and standby service water piping is not qualified. TS 3.8.1 must be entered because the note on condition A states it must be entered for the diesel generator made inoperable due to inoperable SWS. TS 3.7.8 cannot be exited until 'C' SW pump is placed in service, and 2SWEMOV116A is closed isolating the non-qualified piping of the standby service water system. By stating no field actions have been taken it ensures that the 'C' SWS is not available.

Sys #	System	Category	KA Statement
076	Service Water System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Loss of SWS

K/A# A2.01 **K/A Importance** 3.7 **Exam Level** SRO

References provided to Candidate None **Technical References:** TS 3.7.8 pg. 3.7.8-1
2OM-53C.4.2.30.1 Rev. 9 pg. 2
TS 3.7.8 bases pg. B3.7.8-2
2OM-30.4.AAB rev. 4 pg. 3
2SQS-30.1, Rev. 24 pg. 56

Question Source: Bank – 2LOT19 Q89 (Previous 2 Exams)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(2)

Objective: 3SQS-PLTSYS ITS, Rev. 2 Obj. 3. Given plant conditions, determine the criteria necessary to ensure compliance with each Section Plant Systems System LCO and Licensing Requirement in accordance with the Bases, Surveillance Requirements, and the Applicability.

3SQS-ELEC ITS, Rev. 1 Obj. 3. Given plant conditions, determine the criteria necessary to ensure compliance with each Section Electrical Power Systems LCO and Licensing Requirement in accordance with the Bases, Surveillance Requirements, and the Applicability.

90. The plant is in Mode 1. The crew is performing an emergency entry into Containment IAW 2OM-47.4.F, Emergent Containment Entry.

1) IAW 2OM-47.4.F, who must authorize this Containment entry?
2) Where must the Movable Incore Detectors (MIDS) be located for this entry prior to personnel entering Containment?

_____(1)_____ authorization is required to make an emergent containment entry.

The Movable Incore Detectors are required to be _______(2)_______.

A. 1) Shift Manager
   2) fully inserted in the core **only**

B. 1) Shift Manager
   2) fully inserted in the core **or** in their shielded storage location

C. 1) Radiation Protection Manager
   2) fully inserted in the core **only**

D. 1) Radiation Protection Manager
   2) fully inserted in the core **or** in their shielded storage location

Question 90

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.d second bullet. Specifically, the SRO must have specific knowledge of the content of the Emergent Containment Entry procedure identifying who must authorize the emergent containment entry, and understand to minimize the entrants radiation dose, the incore flux detectors must be shielded in their storage location or fully inserted in the core.

K/A is met by demonstrating the knowledge of who must authorize an emergent containment entry in accordance with plant procedures, and knowledge of the procedural requirements to protect the entrants from the radiological hazards associated with the movable incore detectors.

A. Incorrect. First part is correct. Second part is plausible because it would make sense that the activated detectors be fully inserted into the core to provide shielding for plant personnel when entering containment, but they may also be stored in their shielded storage location during entry.

B. Correct. The Shift Manager/Unit Supervisor must approve emergent containment entry. The P&Ls of 2OM-47.4.F, Emergent Containment Entry requires the Incore Detectors be fully inserted in the core or be stored in their shielded storage location during entry.

C. Incorrect. First part is incorrect, but plausible because the Radiation Protection Manager would be informed of work in containment and responsible for providing necessary Radiation Protection support for RBC entries during normal cnmt entries, but the RPM does not have to give authorization for entry. Second part is plausible because it would make sense that the activated detectors be fully inserted into the core to provide shielding for plant personnel when entering containment, but they may also be stored in their shielded storage location during entry.

D. Incorrect. First part is incorrect, but plausible because the Radiation Protection Manager would be informed of work in containment and responsible for providing necessary Radiation Protection support for RBC entries during normal cnmt entries, but the RPM does not have to give authorization for entry. Second part is correct.

Sys #	System	Category	KA Statement
103	Containment System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the containment system and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations	Necessary plant conditions for work in containment

K/A# A2.02 **K/A Importance** 3.2 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-47.4.F Rev. 1 pg. 4

Question Source: Bank – 2LOT19 Q98 (Previous 2 Exams)

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.43.b(4)

Objective: 2SQS-47.1-01-02: Given a set of plant conditions and the appropriate procedure(s), summarize the operational sequence, parameter limits, precaution and limitations, and cautions and notes applicable necessary to complete the task.

91. I&C is performing 2MSP-1.04-I, Reactor Protection System Train A Test.

The following plant conditions exist:

- Plant is in Mode 1
- Reactor Trip Breaker A (RTA) is OPEN
- Bypass Breaker A (BYA) is CLOSED
- Reactor Trip Breaker B (RTB) is CLOSED
- Bypass Breaker B (BYB) is OPEN
- Rod Drive MG sets are running

1) Is LCO 3.3.1 met for the Reactor Trip Breakers when in this configuration?

During the surveillance test, A4-8F, Rod Control MG Set Trouble alarms due to ‘B’ Rod Drive MG set Generator Over Current trip.

2) What procedure will the Unit Supervisor direct the crew to perform?

A. 1) LCO is met
2) E-0, Reactor Trip or Safety Injection

B. 1) LCO is met
2) 2OM-1.4.G, Reactor Rod Drive Control System Shutdown

C. 1) LCO is **NOT** met
2) E-0, Reactor Trip or Safety Injection

D. 1) LCO is **NOT** met
2) 2OM-1.4.G, Reactor Rod Drive Control System Shutdown

Question 91

Answer: D

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.b third bullet. Specifically, the SRO must have knowledge of the bases for TS TS 3.3.1 RTS Instrumentation function 18 for the Reactor Trip Breakers so that they can recognize that when 'A' Bypass breaker is closed to bypass the 'A' RTB, the 'A' RTB is no longer capable of performing its safety function and the bypassed RTB is inoperable. Therefore, the LCO is not met.

K/A is met by the candidate recognizing that when the 'B' Rod Drive MG set trips on Generator Over Current, the 'A' RDMG set is still supplying power to the reactor trip breakers and a reactor trip will not occur, but the alarm response procedure for Rod Control MG Set Trouble requires the RDMG set to be shutdown iaw 2OM-1.4.G, Reactor Rod Drive Control System Shutdown.

A. Incorrect. Plausible to think the LCO is still met since the 'A' Bypass breaker is closed, but the 'A' Bypass breaker is tripped by protection system train 'B', therefore both trains of RTBs are not operable. Another possible reason for thinking the LCO is met is because a note in Condition N states that one train may be bypassed for 4 hrs for surveillance testing, but the LCO must still be entered. E-0 is plausible if the candidate thinks that the Rod Drive MG sets are train specific (in series), but the RDMG outputs are paralleled, therefore power will remain to the paralleled Rx Trip and Bypass breakers.

B. Incorrect. Plausible to think the LCO is still met since the 'A' Bypass breaker is closed, but the 'A' Bypass breaker is tripped by protection system train 'B', therefore both trains of RTBs are not operable. Another possible reason for thinking the LCO is met is because a note in Condition N states that one train may be bypassed for 4 hrs for surveillance testing, but the LCO must still be entered. The ARP directs the crew to 2OM-1.4.G to shutdown the RDMG set with the Generator Over Current trip.

C. Incorrect. It is correct that the LCO is not met. E-0 is plausible if the candidate thinks that the Rod Drive MG sets are train specific (in series), but the RDMG outputs are paralleled, therefore power will remain to the paralleled Rx Trip and Bypass breakers.

D. Correct. The LCO is not met as stated in the TS 3.3.1 function 18 bases, when an RTB bypass breaker is racked in and closed to bypass an RTB, the RTB is no longer capable of performing its safety function and the bypassed RTB is inoperable. The ARP directs the crew to 2OM-1.4.G to shutdown the RDMG set with the Generator Over Current trip.

Sys #	System	Category	KA Statement
001	Control Rod Drive System	A2 Ability to (a) predict the impacts of the following malfunction or operations on the CRDS- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Loss of power source to reactor trip breakers

K/A# A2.02 **K/A Importance** 4.3 **Exam Level** SRO

References provided to Candidate None

Technical References:
TS 3.3.1 Cond. N pg 3.3.1-6
TS Bases B3.3.1 function 18 pg. B3.3.1-31, 32
2OM-1.4.AAG Rev. 3 pg. 4
3SQS1.3 PPNT Rev. 8 Slide 26
2OM-1.5.A.1 Iss. 1 Rev. 1

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(2)

Objective: 3SQS-1.3, Rev. 8, Iss. 1 Obj. 3. Describe how power is supplied to the Rod Drive Motor Generator (RDMG) sets, Logic/Power Cabinets, DC Hold Cabinet, and the Control Rod Drive Mechanism (CRDM) coils.

3SQS-INST ITS, Rev. 1 Obj. 3. Given plant conditions, determine the criteria necessary to ensure compliance with each Instrumentation LCO and Licensing Requirement in accordance with the Bases, Surveillance Requirements, and the Applicability.

92. A Plant startup is in progress with the reactor critical at 10^{-8} amps on the intermediate range. All systems are in normal alignment for this condition.

- Annunciator A4-4E, NIS Detector/Compensator Trouble alarms
- The Loss of Comp.Volt status light is LIT on the N-35 Intermediate Range drawer.

IF the reactor were to trip with these conditions, N35 intermediate range indication would be reading _____(1)_____ than N36 intermediate range indication.

In order to maintain power operations, AOP 2.2.1B, Intermediate Range Channel Malfunction, **REQUIRED** actions are to place the N-35 LEVEL TRIP switch to the bypass position **AND** _____________(2)________________.

A. 1) lower
2) Within 24 hours **EITHER** reduce thermal power to < P-6 **OR** Raise thermal power to > P-10.

B. 1) higher
2) Place **BOTH** the Intermediate Range A and B block switches to BLOCK.

C. 1) lower
2) Place **BOTH** the Intermediate Range A and B block switches to BLOCK.

D. 1) higher
2) Within 24 hours **EITHER** reduce thermal power to < P-6 **OR** Raise thermal power to > P-10.

Question 92

Answer: D

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.e first paragraph. The SRO must have knowledge of the content of the procedure. Specifically, the SRO must know that the AOP states if power is between P-6 and P-10, that thermal power must lowered or raised to remove the Intermediate range detector from the range that it is required for the detector to monitor and provide protection.

K/A is met by the candidate's ability to predict the impact that a loss of compensating voltage will have on the IR NI reading and determine that since power is between P-6 and P-10, action must be taken iaw AOP 2.2.1B, Intermediate Range Channel Malfunction to raise or lower reactor power.

A. Incorrect. Lower reading would indicate an over compensated detector which is not the case with a loss of compensating voltage. The candidate must recognize that 10 -8 amps is >P-6 (>1.0 X 10-10 Amps) but, <P-10 (10% power) and realize that within 24 hours EITHER reduce thermal power to < P-6 OR raise thermal power to > P-10.

B. Incorrect. If compensating voltage is lost, the detector will be under compensated, and the intermediate range will indicate higher. Placing the block switches to block is plausible if the candidate doesn't recognize that this is the action to be taken if power is above P-10 and is not procedurally allowed until the P-10 permissive is received.

C. Incorrect. Lower reading would indicate an over compensated detector which is not the case with a loss of compensating voltage. Placing the block switches to block is plausible if the candidate doesn't recognize that this is the action to be taken if power is above P-10 and is not procedurally allowed until the P-10 permissive is received.

D. Correct. If compensating voltage is lost, the detector will be under compensated, and the intermediate range will indicate higher. The candidate must recognize that 10 -8 amps is >P-6 (>1.0 X 10-10 Amps) but, <P-10 (10% power) and realize that within 24 hours EITHER reduce thermal power to < P-6 OR raise thermal power to > P-10.

Sys #	System	Category	KA Statement
015	Nuclear Instrumentation System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the NIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Faulty or erratic operation of detectors or compensating components

K/A# A2.02 **K/A Importance** 3.5 **Exam Level** SRO

References provided to Candidate None **Technical References:** 3SQS-2.1 Rev. 9 PPNT Slide 16
2OM-53C.4.2.2.1B Rev. 5 pg. 2, 3

Question Source: Bank – 2LOT8 Q91

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43 b(5)

Objective: 3SQS-2.1, Rev. 9 Obj. 1. Explain the operation of the BF3, Compensated Ion Chamber, Uncompensated Ion Chamber and Fission Chamber (Unit 2) neutron detectors including: d. The effects of voltage changes on channel outputs

93. Given the following plant conditions:

- The plant is operating at 100% power with all systems in NSA.
- The Control Room is performing 2OM-19.4.G, "Filling the Unit 2 Gaseous Waste Storage Tanks from Unit 2 Surge Tank".
- Oxygen concentration has been verified < 2% by sample.
- Gaseous Waste Storage Tanks, 2GWS-TK25A-G pressures are 10 psig and stable.
- Gaseous Waste Surge Tank, 2GWS-TK21 pressure is 62 psig and stable.
- The Waste Gas Storage Tanks Radiation Monitor, 2GWS-RQ104 is out of service.
- The last grab sample was taken and analyzed by Health Physics at 0800 YESTERDAY.

1) Where is 2GWS-AOV108, Gaseous Waste Storage TK Inlet Header Isolation Valve controlled from?

2) What is the **latest** time that the next grab sample could be taken per the ODCM?

(REFERENCE PROVIDED)

A. 1) Control Room panel (BB-A)
   2) 0800 TODAY

B. 1) Control Room panel (BB-A)
   2) 1400 TODAY

C. 1) Gaseous Waste Tank Panel (PNL-2GWSTP)
   2) 0800 TODAY

D. 1) Gaseous Waste Tank Panel (PNL-2GWSTP)
   2) 1400 TODAY

Question 93

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.b second & fourth bullets. Specifically, the question requires the SRO to evaluate and apply ODCM surveillance requirement 4.0.2 to extend the required time for the grab sample and achieve the latest time that it can be performed. The SRO must apply surveillance requirement 4.0.2 to the stated "once per.." 24 hour frequency on the second sample which may be used "if a completion time requires periodic performance on a 'once per' basis" and it cannot be used on the initial performance or if the frequency specifies "once".

This matches the K/A because it requires the SRO to identify the place that the Gaseous Waste Storage TK Inlet Header Isolation Valve is controlled from.

A. Incorrect. 2GWS-AOV108 is controlled from BB-A. 0800 Today is plausible if the candidate only determines that ODCM surveillance 4.11.2.5.1 requires 24 hours frequency when adding to the tanks, and does not recognize that ODCM surveillances may be extended per ODCM surveillance requirement 4.0.2.

B. Correct. 2GWS-AOV108 is controlled from BB-A. 1400 Today is correct because the candidate must determine that ODCM surveillance 4.11.2.5.1 (ODCM attachment O) requires the tanks be tested at least once per 24 hours when radioactive materials are being added to the tanks, then the SRO candidate must recognize that ODCM surveillance requirement 4.0.2 can be applied to extend the required time for the grab sample and achieve the latest time that it can be performed. (24 hours X 1.25 = 30 hours)

C. Incorrect. Plausible because Gaseous Waste Tank Panel (PNL-2GWSTP) is where the individual Gaseous Storage Tank Inlet and Outlet Isolation valves and the Gaseous Waste Recirculation Pump are controlled from. 0800 Today is plausible if the candidate only determines that ODCM surveillance 4.11.2.5.1 requires 24 hours frequency when adding to the tanks, and does not recognize that ODCM surveillances may be extended per ODCM surveillance requirement 4.0.2.

D. Incorrect. Plausible because Gaseous Waste Tank Panel (PNL-2GWSTP) is where the individual Gaseous Storage Tank Inlet and Outlet Isolation valves and the Gaseous Waste Recirculation Pump are controlled from. 1400 Today is correct because the candidate must determine that ODCM surveillance 4.11.2.5.1 (ODCM attachment O) requires the tanks be tested at least once per 24 hours when radioactive materials are being added to the tanks, then the SRO candidate must recognize that ODCM surveillance requirement 4.0.2 can be applied to extend the required time for the grab sample and achieve the latest time that it can be performed. (24 hours X 1.25 = 30 hours)

Sys #	System	Category	KA Statement
071	Waste Gas Disposal System	Generic	Ability to locate and operate components, including local controls.

K/A# 2.1.30 **K/A Importance** 4.0 **Exam Level** SRO

References provided to Candidate 1/2-ODC-3.03 Rev. 18 with Table 1.1 removed (pg. 11) **Technical References:** 2OM-19.4.G Rev. 4 pg. 3; 1/2-ODC-3.03 Rev. 18 pg. 67, 18

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.43.b(2)

Objective: 2SQS-43.1, Rev. 11 Obj. 13. Using a copy of the Technical Specifications or Offsite Dose Calculation Manual, analyze a given set of plant conditions for compliance with the licensing requirements, including the determination of equipment operability and applicable action statements.

94. Given the following conditions:

- E-3, Steam generator Tube Rupture has been implemented
- The Shift Manger has declared an Alert
- The TSC is activated and has assumed the Emergency Director responsibilities from the Shift Manager

Based on the given conditions, per NOP-OP-1002, Conduct of Operations, when plant conditions permit, whose responsibility is it to announce the resumption of normal alarm response mode?

A. Emergency Director

B. Shift Manager

C. Shift Technical advisor

D. Command SRO

Answer: D

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.e third bullet. SRO is required to have knowledge of administrative procedures that specify coordination of plant normal, abnormal, and emergency procedures. It is the Command SROs responsibility to determine when the crew will return to normal alarm response mode and verbally announce it to the crew.

K/A is met with the candidate's knowledge that when implementing the EOPs the "transient" alarm response mode is activated, and normal alarm response mode can only be verbally conveyed to the crew by the Command SRO.

A. Incorrect. Emergency Director is plausible because an emergency declaration has been implemented but this is not the ED's responsibility.
B. Incorrect. Shift Manager is plausible since the SM is in charge of the control room crew, but it is the Command SRO's (US) responsibility.
C. Incorrect. Shift Technical advisor is plausible since the STA oversees the technical aspects of the plant operation, but it is not the STA's responsibility.
D. Correct. Per the Conduct of Operations procedure, when plant conditions permit, the Command SRO shall announce the resumption of normal alarm response mode.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of the station's requirements for verbal communications when implementing procedures.

K/A# 2.1.38 **K/A Importance** 3.8 **Exam Level** SRO

References provided to Candidate None **Technical References:** NOP-OP-1002 Rev. 16 pg. 62, 63

Question Source: Bank – Davis Besse 1LOT20 Q100

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(5)

Objective: 3SSG-Admin Rev. 9 Obj. 6. DESCRIBE the process for disseminating operating shift instructions in accordance with NOP-OP-1002, Conduct of Operations.

95. Which of the following are the roles and responsibilities of the Clearance Authority as defined by NOP-OP-100, Clearance/Tagging Program?

1. Ensures a physical walkdown of the clearance tags is or has been performed.
2. Determines restoration positions are compatible with current plant conditions.
3. Responsible for ensuring continuous protection of the workers who are working under the protection of the clearance.
4. Identifies component configurations that will not be independently verified during clearance placement and restoration, and annotates these exceptions on the clearance hardcopy.

A. 1 and 3 **only**

B. 2 and 4 **only**

C. 1, 2, and 3 **only**

D. 1, 2, 3, and 4

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.2 second bullet. The SRO is required to have knowledge of administrative procedures that specify unique responsibilities of the SRO position. Specifically, the Clearance Authority is an SRO Licensed individual assigned responsibility for authorizing and issuing Clearances and keeping Control Room personnel informed of all plant status changes prior to establishing or removing a Clearance, and the learning objective is only taught in a lesson requiring SRO only personnel.

K/A is met with the candidate's knowledge of the Clearance Authority's roles and responsibilities as defined in NOP-OP-100, Clearance/Tagging Program.

A. Incorrect. #1 is plausible since it would seem to be a responsibility of the Clearance Authority, but it is the workers responsibility to ensure a physical walkdown of the clearance tags has been performed. #3 is plausible since it would seem to be a responsibility of the Clearance Authority but ensuring continuous protection of the workers who are working under the protection of the clearance is the Clearance Holders responsibility.
B. Correct. #2 and 4 are both responsibilities of the Clearance Authority per NOP-OP-1001.
C. Incorrect. #2 is the responsibility of the Clearance Authority, but #1 and 3 are not as described above.
D. Incorrect. #2 and 4 are the responsibility of the Clearance Authority, but #1 and 3 are not as described above.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of tagging and clearance procedures.

K/A# 2.2.13 **K/A Importance** 4.3 **Exam Level** SRO

References provided to Candidate None **Technical References:** NOP-OP-1001 Rev. 33 pg. 15, 16, 18

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.41.b(10)

Objective: GEN- TAGCLRAUTH_FEN-01 Rev. 2 Obj. Discuss the Clearance Authority's duties and responsibilities.

96. The plant is in Mode 5 for a refueling outage.

Unplanned maintenance must be performed which will require an outage schedule change that will change the Spent Fuel Pool Cooling Safety Function from YELLOW risk to ORANGE risk.

1) Based on the above conditions, who must approve the outage schedule change?

2) When is a Shutdown Defense in Depth Contingency Plan required?

A. 1) General Plant Manager
2) Red risk activities **only**

B. 1) General Plant Manager
2) **Both** Orange and Red risk activities

C. 1) Site Vice President
2) Red risk activities **only**

D. 1) Site Vice President
2) **Both** Orange and Red risk activities

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.2 second bullet. The SRO is required to have knowledge of administrative procedures that specify unique responsibilities of the SRO position. Specifically, the SRO must know that when a maintenance item effects the outage schedule and elevates the Shutdown Defense in Depth risk to an Orange Risk, that the Plant Manager must approve the additional maintenance and that a contingency plan is required during the performance of the maintenance. This is an SRO only task at Beaver Valley.

K/A is met with the candidate's knowledge that when a maintenance activity elevates the Shutdown Defense in Depth risk that it requires the Plant Mangers approval and a contingency plan to be established to assess all work activities during an outage.

A. Incorrect. General Plant Manager is correct. Red risk activities only are plausible but NOP-OP-1005 section 4.9 states that both Orange and Red risks will require a contingency plan be developed.

B. Correct. Changes to the outage schedule that result in entry into an elevated risk (i.e., a higher risk color change) shall require the approval from the General Plant Manager prior to the schedule change. Shutdown Defense in Depth Contingency Plans should be developed for all Orange and Red Risk activities.

C. Incorrect. Site Vice President is plausible since an Orange risk activity is a Higher Risk Evolution and the site VP is ultimately responsible for the site. Red risk activities only are plausible but NOP-OP-1005 section 4.9 states that both Orange and Red risks will require a contingency plan be developed.

D. Incorrect. Site Vice President is plausible since an Orange risk activity is a Higher Risk Evolution and the site VP is ultimately responsible for the site. Shutdown Defense in Depth Contingency Plans should be developed for all Orange and Red Risk activities.

Sys #	**System**	**Category**	**KA Statement**
N/A	N/A	Generic	Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.

K/A# 2.2.18 **K/A Importance** 3.9 **Exam Level** SRO

References provided to Candidate None **Technical References:** NOP-OP-1005 Rev. 17 pg. 12

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.43.b(1)

Objective: 3SSG – Admin Rev. 9 Obj. 13. DESCRIBE the controls instituted to maintain safe shutdown conditions during refueling outages and forced outages in accordance with: a. NOP-OP-1005, Shutdown Defense in Depth

97. The Plant is operating at 100% power.
    - Unit 2 is discharging the contents of the Gaseous Waste Storage tanks IAW 1/2OM-19.4A.B, 'Unit 2 GW Storage Tk Disch To Unit 1 Atmos Vent'
    - Rad Monitor RM-1GW-108B, Gaseous Waste Gas fails downscale and is declared inoperable
    - The crew terminates the discharge

    In order to re-start the discharge, what 1/2-ODC-3.03, 'ODCM: Controls for RETS and REMP Programs' actions will be **REQUIRED**?

    (Reference provided)

A. The system/process flow rate is estimated at least once per 4 hours (or assumed to be at the ODCM design value).

B. At least two independent samples of the tank's content are analyzed and at least two technically qualified members of the Facility Staff independently verify the release rate calculations and discharge valve lineup.

C. Grab samples (or local monitor readings) are taken at least once per 12 hours. If grab samples are taken, these samples are to be analyzed for gross activity within 24 hours.

D. Samples are continuously collected with auxiliary sampling equipment as required in ODCM Control 3.11.2.1, Table 4.11-2, or sampled and analyzed once every 12 hours.

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.d first bullet. SRO is required to have knowledge of the Offsite Dose Calculation Manual and actions required for failed monitoring equipment. This is a SRO position function only.

This question requires the candidate to use their knowledge of the provided ODCM (83 pgs.), and determine which attachment is applicable for determining the status of RM-1GW-108B. Then determine whether a continuous or batch discharge is in progress. Based on that decision, follow up with any actions associated with the release.

K/A is met by identifying what controls must be used for radioactive releases if a Gaseous Waste gas detector is inoperable during a Gaseous Waste discharge.

A. Incorrect. Plausible distractor because this is a required action if FR-GW-108 is OOS (Action 28A) not RM-GW-108B.
B. Correct. IAW ODCM 1/2-ODC-3.03 Att.F page 39 and action 27 on page 43.
C. Incorrect. Plausible distractor because this is the required action for all continuous releases thru this pathway. (Action 29)
D. Incorrect. Plausible distractor because this is the required action for continuous releases if the alt channel 109 is also not available (Action 32). For Batch release alt. RM-1GW-109 shall not be used as a comparable alternate monitoring channel iaw Att. F page 39.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to control radiation releases.

K/A# 2.3.11 **K/A Importance** 4.3 **Exam Level** SRO

References provided to Candidate 1/2-ODC-3.03 Rev. 18 with Table 1.1 removed (pg. 11) **Technical References:** ODCM ½-ODC-3.03 Rev. 18 Att.F pages 39 & 43

Question Source: Bank – 2LOT15 Q98

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(4)

Objective: 2SQS-43.1 Rev. 11 Obj. 13. Using a copy of the Technical Specifications or Offsite Dose Calculation Manual, analyze a given set of plant conditions for compliance with the licensing requirements, including the determination of equipment operability and applicable action statements.

98. The plant has been in Mode 6 for 3 weeks, and the following conditions exist:

- Fuel movement is in progress
- The following annunciators associated with this event are LIT:
  - A6-2A, REFUELING CAVITY LEVEL HIGH-LOW/TEMP HIGH
  - A6-1B, SPENT FUEL POOL LEVEL HIGH/LOW
  - A1-2G, INCORE INST ROOM/CNMT SUMP LEVEL HIGH/VALVE NOT RESET
- Refuel SRO reports Refuel Cavity level is below Tech Spec minimum level and LOWERING
- Both CNMT Sump Pumps are running, and level is RISING
- RWST level is 250” and STABLE
- Leakage around the Reactor Cavity Seal has been reported from Containment
- A used fuel assembly has just been unlatched and is in the Upender in the upright position

In accordance with ARP A6-2A, Refueling Cavity Level Low, which of the following completes the statements below?

The fuel assembly must be placed in ______(1)______.

The initial method of makeup to the reactor cavity during the leak will be the ______(2)______.

A. 1) a horizontal position
   2) RWST via the LHSI system per 2OM-11.4.C, Filling Reactor Refueling Cavity

B. 1) a horizontal position
   2) Blender per 2OM-7.4.AR, Blender Operation In MODE 1

C. 1) an open area inside the core
   2) RWST via the LHSI system per 2OM-11.4.C, Filling Reactor Refueling Cavity

D. 1) an open area inside the core
   2) Blender per 2OM-7.4.AR, Blender Operation In MODE 1

Question 98

Answer: A

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.g first bullet. Fuel handling facilities and procedures. Refuel floor SRO responsibilities. Specifically, the candidate must have knowledge that the irradiated fuel must be placed in the horizontal position to maximize the time during a refuel cavity leak to prevent a high radiation condition on the refuel deck. Also meets SRO only guidance of ES-401 Attachment 2 per section II .E page 21 third bullet. SRO is required to have knowledge of the content of the procedures. Specifically, the SRO must know that makeup water to the refuel cavity is from the RWST per the ARP for lowering refuel cavity level. Detailed knowledge of the content is required to select the correct procedural direction.

K/A is met with the knowledge that the spent fuel assembly must be placed horizontal during fuel movement when a leak occurs. By placing the assembly horizontal, more time is available to resolve the cavity leak to prevent high radiation condition on the refuel deck.

A. Correct. With the fuel assembly in the Upender in the upright position, the ARP states to place the fuel assembly and upender in the horizontal position. The preferred method of makeup to the Refuel cavity per the ARP is the RWST via the LHSI system due to the available makeup capabilities of the RWST and low head system.

B. Incorrect. First part is correct. Second part is plausible because it could be an available makeup source to the cavity, but the ARP does not direct this as a makeup source. The ARP clearly states to commence makeup to the cavity by performing 2OM-11.4.C using the RWST

C. Incorrect. Plausible distractor since the upender is upright and the candidate may feel that using the manipulator crane and placing the assembly in an open area of the core would be better, but laying it horizontal is specifically addressed in the ARP. Second part is correct.

D. Incorrect. Plausible distractor since the upender is upright and the candidate may feel that using the manipulator crane and placing the assembly in an open area of the core would be better, but laying it horizontal is specifically addressed in the ARP. Second part is plausible because it could be an available makeup source to the cavity, but the ARP does not direct this as a makeup source. The ARP clearly states to commence makeup to the cavity by performing 2OM-11.4.C using the RWST

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

K/A# 2.3.12 **K/A Importance** 3.7 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-20.4.AAD Rev. 6 pg. 9, 10
2OM-11.4.C Rev. 33 pg. 10, 11, 14

Question Source: Bank – 1LOT16 Q99

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.43.b(4, 7)

Objective: 3SQS-6.12, Rev. 7 Obj. 9 - IDENTIFY the safe Fuel Assembly storage locations in the event of loss of water resulting from a Refueling Cavity seal failure during fuel movement. (SOER 85-1 Rx Cavity Seal Failure Rec. 5a, 5b).

3SQS-6.13, Rev. 6 Obj. 8 - Given a Fuel Handling System alarm condition and using the Alarm Response Procedure(s), determine the appropriate alarm response, including automatic and operator actions in the control room.

99. The plant is in Mode 3 when a small fire breaks out in the control room requiring personnel to evacuate the control room.

    AOP-2.33.1A, Control Room Inaccessibility has been entered.

    1) Which of the following control room personnel will report to the Emergency Shutdown Panel (SDP)?

    2) What Boration flowpath will be established by the Operators at the Emergency Shutdown Panel IAW AOP-2.33.1A to ensure the shutdown boron concentration is achieved?

A. 1) US and RO
   2) Safety Injection will be initiated from the SDP for RCS Boration.

B. 1) STA and BOP
   2) Safety Injection will be initiated from the SDP for RCS Boration.

C. 1) US and RO
   2) Emergency Boration will be initiated via 2CHS-MOV350 from the SDP for RCS Boration.

D. 1) STA and BOP
   2) Emergency Boration will be initiated via 2CHS-MOV350 from the SDP for RCS Boration.

Question 99

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.e first paragraph. The SRO must have knowledge of the content of the procedure. Specifically, the SRO must know that the US and the RO are directed to the SDP when performing AOP-2.33.1A, and that the expected boration flowpath is the emergency boration valve.

K/A is met with the candidate's knowledge of the Reactor Operators expected actions to man the Emergency Shutdown Panel during implementation of the Control Room Inaccessibility AOP, and knowing how a boration flowpath is established to the RCS to ensure the proper shutdown boron concentration is achieved.

A. Incorrect. The Unit Supervisor and the Reactor Operator are directed to proceed to the Emergency Shutdown Panel. Safety Injection is plausible because it would borate the RCS but it is incorrect since the AOP directs 2CHS-MOV350 to be opened, or aligning the charging pump suction from the VCT to the RWST.

B. Incorrect. The STA and BOP are plausible because they are both relevant crew members, but in this case, neither are directed to the SDP. The STA is not discussed in the AOP, and the BOP is designated as the communicator/Nuclear Operator #3 (att.6). Safety Injection is plausible because it would borate the RCS but it is incorrect since the AOP directs 2CHS-MOV350 to be opened, or aligning the charging pump suction from the VCT to the RWST.

C. Correct. The Unit Supervisor and the Reactor Operator are directed to proceed to the Emergency Shutdown Panel. The AOP establishes a Boration flowpath by directing 2CHS-MOV350 to be opened and starting the BA transfer pump, or (RNO) aligning the suction from the RWST.

D. Incorrect. The STA and BOP are plausible because they are both relevant crew members, but in this case, neither are directed to the SDP. The STA is not discussed in the AOP, and the BOP is designated as the communicator/Nuclear Operator #3 (att.6). The AOP establishes a Boration flowpath by directing 2CHS-MOV350 to be opened and starting the BA transfer pump, or (RNO) aligning the suction from the RWST.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.

K/A# 2.4.34 **K/A Importance** 4.1 **Exam Level** SRO

References provided to Candidate None **Technical References:** 20M-53C.4.2.33. 1A Rev. 16 pg. 5, 11, 36

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** 55.43.b(5)

Objective: 2SQS-53C.1-01-04: Discuss the flowpath of each procedure including the importance of step sequencing, where applicable

100 The plant was operating at 100% power when a large break LOCA occurred coincident with a Loss of 4KV Bus DF.

The follow conditions exist:

- ‘A’ Quench Spray Pump [2QSS-P21A] tripped on startup
- 3 Max CETs indicate 810ºF
- RCS is superheated
- CNMT Pressure is 31 psig
- CNMT Temperature is 240ºF
- All RCPs have been tripped
- RVLIS Full Range indicates 35%
- 4KV Bus DF remains de-energized during this event

Based on the above conditions, which answer below completes the following statement?

The required EAL classification is based upon the _______________.

A. LOSS of one fission product barrier and POTENTIAL Loss of another barrier

B. LOSS of two fission product barriers

C. LOSS of two fission product barriers and a POTENTIAL loss of a third barrier

D. LOSS of all three fission product barriers

Question 100

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-4.2 section E.3.e third paragraph. SRO is required to have knowledge of the Emergency Classifications. This is an SRO position function only.

K/A is met by demonstrating the knowledge to determine the event classification based on the conditions given using the provided EPP classification chart.

Candidate will have to recognize a General Emergency would be declared based on the following conditions which they will have to interpret from the conditions given in the stem.
FC – Loss due to FR-C.1 Red Path Entry
RCS - Loss due to RCS leak requiring automatic or manual ECCS (SI) actuation required by UNISOLABLE RCS leakage.
CT – Potential Loss due to Cnmt pressure >11 psig AND less than one full train of depressurization equipment operating.

A. Incorrect. Plausible if it is not recognized that FR-C.1 entry conditions have been met for Fuel Clad failure, or a Loss based on RCS Leak Rate.
B. Incorrect. Plausible if it is not recognized that Potential Loss due to Cnmt pressure >11 psig AND less than one full train of depressurization equipment operating
C. Correct. GE based on answer explanation above.
D. Incorrect. Plausible if it is not recognized that containment barrier is a potential loss, and not a loss. This would identify a weakness of CT-8 based on pressure response not consistent with LOCA conditions.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of the emergency action level thresholds and classifications.

K/A# 2.4.41 **K/A Importance** 4.6 **Exam Level** SRO

References provided to Candidate EPP Wallboard with Mode Table redacted **Technical References:** 2OM-53A.1.F-0.2 Iss. 3 Rev. 0
EPP-I-1b.F01 Rev. 3

Question Source: Bank – 2LOT15 Q77

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** 55.43.b(10)

Objective: EPP-9281, Rev. 13 Obj. 11. Given specific plant conditions, classify the condition in accordance with EPP I-1a & b.