Beaver Valley Unit 2 NRC Written Exam (2LOT8)

1. Given the following plant conditions:

- Reactor Power is 85%, steady state, all systems in NSA.
- A transient occurred resulting in a reactor trip and safety injection.
- RCS pressure is 1045 psig and LOWERING.
- RCS temperature is 545 °F.
- Pressurizer level is 78% and RISING.
- Reactor Coolant Pumps are tripped.

The Control Room Team is performing E-0, "Reactor Trip or Safety Injection" when the following plant conditions develop:

- RCS pressure is 1200 psig and slowly RISING.
- RCS temperature is 545 °F.
- Pressurizer level is 32% and LOWERING.

Which ONE of the following is the cause of these changing plant conditions?

A. An open PORV has reseated.

B. A faulted steam generator has boiled dry.

C. The size of the RCS leak has increased.

D. The turbine failed to trip and the MSIVs were closed.

Answer: A

Explanation/Justification:

A. Correct. The candidate must have knowledge of the interrelations between a PRZR vapor space accident and sensors and detectors. During situations where a steam vent path is established from the PRZR vapor space and where subcooling is not indicated, PRZR level may not be a true indication of RCS inventory. The candidate must sort through the various indications provided by sensors and detectors and analyze these indications to determine a PORV has lifted and is no longer lifting (vapor space accident). They must understand the interrelations of these indications to rule out the other choices.

B. Incorrect. PRZR level would act in the opposite way if the faulted S/G boiled dry.

C. Incorrect. RCS pressure would drop if the RCS leak size increased.

D. Incorrect. If the turbine failed to trip, PRZR level would act in the opposite direction due to initial plant cooldown until the MSIVs closed.

Sys #	**System**	**Category**			**KA Statement**
000008	Pressurizer Vapor Space Accident	AK2. Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following:			Sensors and detectors
K/A#	AK2.02	**K/A Importance**	2.7	**Exam Level**	RO

References provided to Candidate None **Technical References:** 2OM-53B.5.GI-11, Issue 2, Rev. 0, pg. 7 Simulator Response.

Question Source: Bank – Vision #46480

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.7 / 45.7)

Objective: 2SQS-6.4 41. Given a change in plant conditions due to a system or component failure, analyze the PRZR and PRZR Relief System to determine what failure has occurred.

2. Given the following plant conditions:

- The Unit was operating at Full Power with all systems in NSA.
- A LOCA occurred and the Control Room Team transitioned to E-1, "Loss of Reactor or Secondary Coolant".

The following plant conditions exist:

- RCS pressure is 550 psig and slowly LOWERING.
- Core Exit Thermocouple Temperatures are 472 °F and slowly LOWERING.
- RCS loop cold leg temperatures are 442 °F and slowly LOWERING.
- S/G pressures are 375 psig and slowly LOWERING.
- RCS ΔT is indicating UPSCALE.
- RCP's are **NOT** running.

Based on these conditions, which ONE of the following identifies the source(s) of SI flow providing core cooling, **AND** what is the status of natural circulation?

A. High Head SI flow **ONLY**; Natural Circulation is occurring.

B. High Head SI flow **ONLY**; Natural Circulation is **NOT** occurring.

C. High Head SI Flow **AND** SI Accumulators; Natural Circulation is occurring.

D. High Head SI flow **AND** SI Accumulators; Natural Circulation is **NOT** occurring.

Answer: C

Explanation/Justification:

A. Incorrect. Partially correct that High Head SI flow is a source of cooling, however, SI Accumulators are also a source. Correct natural circulation conclusion (refer to correct answer explanation)

B. Incorrect. Incorrect that natural circulation is not occurring. Partially correct that High Head SI flow is a source of cooling, however, SI Accumulators are also a source. (refer to correct answer explanation)

C. Correct. With RCS pressure at 550 psig, the High Head SI pumps & SI Accumulators (Begin to inject when RCS pressure drops < 600 psig) will be supplying SI flow for core cooling. The shutoff head for the Low Head SI pumps is about 178 psig so therefore will not be providing flow. Natural circulation is occurring because of the conditions specified on Attachment A-1.7 are met. Both ES-1.1 & 1.2 reference Attachment A-1.7 for verification of natural circulation flow in the LOCA series procedures making this question operational relevant.

D. Incorrect. Correct sources of SI flow. Incorrect natural circulation conclusion (refer to correct answer explanation)

Sys #	System	Category	KA Statement
000009	Small Break LOCA	EA2 Ability to determine or interpret the following as they apply to a small break LOCA:	Existence of adequate natural circulation

K/A# EA2.37 **K/A Importance** 4.2 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.A-1.7, Issue 1C, Rev. 1, Pg. 2
2SQS-11.1, Rev. 16, Pg. 6
2OM-53A.1.ES-1.1, Issue 1C, Rev. 12, pg. 14
2OM-53A.1.ES-1.2, Issue 1C, Rev. 10, Pg. 14

Question Source: Modified Bank – 1LOT8 NRC Exam Q#66

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 43.5 / 45.13)

Objective: 3SQS-53.2 11. State from memory five conditions which indicate that natural circulation is occurring, IAW BVPS EOP Executive Volume.

3. Given the following plant conditions:

- The Unit is at Full Power with all systems in NSA.
- The thermal barrier heat exchanger for the "21A" RCP develops a 75 gpm tube leak.
- All systems function as designed.

Which ONE of the following describes the effect this leak will have on the Primary Component Cooling Water System (CCP)?

The "21A" RCP thermal barrier ________.

A. outlet isolation valve automatically closes on high pressure.

B. inlet & outlet isolation valves automatically close on high flow.

C. outlet isolation valve automatically closes on high flow with the inlet isolated by a check valve.

D. inlet isolation valve automatically closes on high flow with the outlet isolated by a check valve.

Answer: C

Explanation/Justification:

A. Incorrect. Correct that "A" RCP outlet thermal barrier isolation valve isolates, however, the isolation is on flow versus pressure. Plausible because RCS pressure is higher than CCP.

B. Incorrect. There is only an outlet thermal barrier isolation valve that auto isolates.

C. Correct. The candidate must understand the system design features and system interrelationship between CCP and a thermal barrier leak. In accordance with OM Chapter 15/AOP at 58 gpm (significant tube leak – loss of Reactor Coolant Flow from system into CCP), the thermal barrier outlet isolation valve associated with the effected RCP will auto close.

D. Incorrect. Opposite of correct configuration. Plausible if the candidate does not know the system interrelations.

Sys #	**System**	**Category**			**KA Statement**
000015/000017	Reactor Coolant Pump (RCP) Malfunctions	AK2. Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following:			CCWS
K/A#	AK2.08	**K/A Importance**	2.6	**Exam Level**	RO
References provided to Candidate		None		**Technical References:**	2OM-15.1.D, Issue 4, Rev 1, pg. 13 & 14 2OM-15.5, OP Manual Figure 15-3, Rev. 9 2OM-53C.4.2.6.8, pg. 1, Rev. 8

Question Source: Bank – Vision #33301

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR 41.7 / 45.7)

Objective: 2SQS-15.1 27. Given a condition of excessive Reactor Coolant System RCP/CCP flow, summarize how the system will respond to the condition.

4. Given the following plant conditions:

- The Unit is shutdown and cooled down to 235 °F where Tavg is STABLE.
- All systems are aligned for these plant conditions.
- "A" RCP is running.
- The running charging pump experiences an overcurrent trip.
- The Control Room Team enters AOP 2.7.1, "Loss of Charging or Letdown".

Which ONE of the following actions will be **REQUIRED** within the next hour?

A. Isolate letdown and establish excess letdown.

B. Initiate boration to restore shutdown margin within limits.

C. Perform seal injection surveillance to ensure seal injection flow meets TS 3.5.5, "Seal Injection Flow" requirements.

D. Restore a charging pump to functional status to meet LRM 3.1.2, "Boration Flow Paths – Operating" requirements.

Answer: D

Explanation/Justification:

A. Incorrect. AOP 2.7.1 does direct letdown to be isolated so therefore this is a correct action. It is also plausible that excess letdown is placed in service although not procedurally required. There is also no 1 hour time limit for this action to occur.

B. Incorrect. This is not an action directed by AOP 2.7.1, however, TS 3.1.1 does have a less than 1 hour action statement to initiate boration to restore SDM within limits. Although plausible this is not an action that is necessitated based on the plant conditions provided since SDM should not have changed nor have been effected since Tavg is stable.

C. Incorrect. AOP 2.7.1 does direct action to check RCP seal injection flow. The TS 3.5.5 required action is a 4 hour action statement. Also this TS applies in Mode 1,2, & 3 and is not applicable in Mode 4.

D. Correct. The candidate must know that the plant is currently in Mode 4. The RO candidate is also required to know TS/LRM actions which are one hour or less from memory. LRM 3.1.2 is applicable in Mode 4 and requires the flowpath from the refueling water storage tank via one charging pump to the RCS to be functional. Condition C allows one hour to restore this flowpath from the RWST to functional status. The candidate must also have knowledge of AOP-2.7.1 actions in order to analyze and rule out the alternate choices. With RCS Temperature < 240 F (enable temperature) only one charging pump is functional/operable and an alternate charging pump will need to be made functional.

Sys #	System	Category	KA Statement
000022	Loss of Reactor Coolant Makeup	Generic	Knowledge of less than or equal to one hour Technical Specification action statements for systems.

K/A# 2.2.39 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.7.1, Rev. 4, pg. 1-3
LRM BVPS Unit 2, Rev. 67, pg. 3.1.2-1 & 2
LRM BVPS Unit 2, Rev. 67, pg. B 3.1.1-3.1.8
TS BVPS Unit 1 & 2, Amend 278/161, pg. 3.5.5-1
TS BVPS Unit 1 & 2, Amend 278/161, pg. 3.3.3-1

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 41.10 / 43.2 / 45.13)

Objective: 2SQS-7.1 24. For a given set of plant conditions, determine if the condition meets the criteria for entry into a less than or equal to one hour action statement in accordance with Technical Specifications.

5. Given the following plant conditions:

- The plant has been cooled down to 140 °F.
- RCS Pressure is 25 psig.
- The Pressurizer (PRZR) is solid.
- The following indications then occur:
  - A1-2G, "INCORE INST ROOM/CNMT SUMP LEVEL HIGH/VALVE NOT RESET" annunciated.
  - 2DAS*LI220, "Reactor CNMT Sump Level" reads 5.1" and is RISING.
  - 2DAS*LI222, "Reactor CNMT Sump Level" reads 5.1" and is RISING.
  - 2RCS-LI-462, "PRZR Cold Calib Level" is 70% and is rapidly LOWERING.

Based on these indications, which ONE of the following procedures will be entered **AND** what action will be taken?

(AOP 2.6.5, "Shutdown LOCA")
(AOP 2.10.1, "Loss of Residual Heat Removal Capability")

A. Enter AOP 2.6.5 and actuate Safety Injection.

B. Enter AOP 2.6.5 and start all charging pumps and then go to AOP 2.10.1.

C. Enter AOP 2.10.1 and isolate letdown/known drain paths.

D. Enter AOP 2.10.1 and check RCS Inventory and then go to AOP 2.6.5.

Answer: C

Explanation/Justification:

A. Incorrect. Incorrect procedure since the plant is in Mode 5 versus Mode 4. Incorrect plausible action that is checked but not directed by this procedure.

B. Incorrect. Incorrect procedure since the plant is in Mode 5 versus Mode 4. Correct action directed by this procedure.

C. Correct. The candidate must recognize from the indications provided that a leak into containment from the RHR or RCS is occurring. They must also have knowledge based on these indications of the actions taken in accordance with the applicable procedure. Both AOP 2.6.5 and 2.10.1 have entry conditions for uncontrollable PRZR level drop. AOP 2.10.1 is applicable in Mode 5 when not in a reduced inventory midloop condition and would be entered. One of the actions taken is to isolate letdown and known drain paths to attempt stopping the loss of inventory. AOP 2.6.5 is applicable in Mode 3 & 4 ONLY. The RO is required to know AOP entry conditions and understand overall mitigative strategies or sequence of events which occur.

D. Incorrect. Correct procedure entry with a plausible correct action to check inventory, however, since the plant is in Mode 5 a transition to AOP 2.6.5 is not applicable and therefore will not occur making this choice incorrect.

Sys #	System	Category	KA Statement
000025	Loss of RHR System	AA1. Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System:	Reactor building sump level indicators

K/A# AA1.11 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.10.1, Rev. 11, pg. 1,2,3,5, & 9
2OM-53C.4.2.6.5, Rev. 18, pg. 1 & 2
2OM-9.4.AAA, Rev. 4, pg 2, 5-7

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.7 / 45.5 / 45.6)

Objective: 2SQS-53C 7. Given a set of conditions, apply the correct AOP.

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

- The Plant is operating at 50% power.
- Control rods are in MANUAL.
- Pressurizer (PRZR) 2A & 2B Backup Heaters are in the ON position.
- The Pressurizer (PRZR) Master pressure controller output failed **AS IS.**
- A load rejection (step load decrease of 10%) occurs.
- No operator action is taken.

Based on these plant conditions, what will be the impact of the load rejection on PRZR Spray Valve [2RCS*PCV455A] position, PRZR PORV [2RCS*PCV455C] **AND** the two groups of energized PRZR Backup Heaters [2A & 2B]?

PRZR Spray Valve 2RCS*PCV455A will **INITIALLY** ___ (1) ___.
PRZR PORV 2RCS*PCV455C will **INITIALLY** ___ (2) ___.
Energized PRZR heaters will ___ (3) ___.

A. (1) open
(2) open
(3) de-energize

B. (1) further open
(2) open
(3) remain energized

C. (1) remain as is
(2) remain closed
(3) de-energize

D. (1) remain as is
(2) remain closed
(3) remain energized

Answer: D

Explanation/Justification:

A. Incorrect. Incorrect spray valve response. Plausible if candidate does not recognize the impact of the Master pressure Controller failure. PRZR heaters will remain energized. Plausible if the candidate believes PRZR level drops to 14% which cuts off PRZR heaters by interlock. PORV will remain closed.

B. Incorrect. Incorrect spray valve response. Without the malfunction it is correct that the valve would further open. Correct PRZR Backup Heater response. PORV will remain closed.

C. Incorrect. Correct spray valve response. PRZR heaters will remain energized. Plausible because PRZR heaters are designed to turn off with increasing PRZR pressure. PORV will remain closed.

D. Correct. A load rejection results in an increase in RCS temperature. (Plant will not trip due to reactor power level) The Tavg increase will cause an expansion of water into the PRZR (Insurge) compressing the vapor space which in turn will increase PRZR pressure. On increasing PRZR pressure, the Master Pressurizer Control System is designed to open the Spray Valves to lower PRZR pressure back to NOP (2235 psig). However, since the Master Pressure Controller has failed as is, it will not respond to the changing system parameters and therefore will not reposition Spray Valves OR the PORV open. Backup PRZR heaters 2A & 2B will remain energized because they are energized on and the master pressure controller has failed at a setpoint which will not cause them to turn off regardless of what happens to PRZR pressure following the transient. A 10% drop in power will result in a 3.6% PRZR level increase which is insufficient to turn all PRZR heaters ON (5% level increase needed).

Sys #	System	Category	KA Statement
000027	Pressurizer Pressure Control System Malfunction	AA1. Ability to operate and / or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions:	PZR heaters, sprays, and PORVs

K/A# AA1.01 **K/A Importance** 4.0 **Exam Level** RO

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

Question Source: Bank – 1LOT8 NRC Exam Q#8

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.7 / 45.5 / 45.6)

Objective: 2SQS-6.4 40. Given a specific plant condition, predict the response of the PRZR and Pressure Relief System control room indication and control loops, including all automatic functions and changes in equipment status, for either a change in plant conditions or for an off-normal condition (ie: Process instrument failure).

7. You have been sent to **LOCALLY** open reactor trip/bypass breakers during an ATWS event due to the reactor not tripping from the control room.

Which ONE of the following combinations of breaker positions will indicate the reactor is **NOT** tripped when you arrive at the Reactor Trip Breaker Panel?

RTA = Reactor Trip Breaker "A"
RTB = Reactor Trip Breaker "B"
BYA = Reactor Trip Bypass Breaker "A"
BYB = Reactor Trip Bypass Breaker "B"

	RTA	BYA	RTB	BYB
A.	CLOSED	OPEN	CLOSED	OPEN
B.	OPEN	OPEN	CLOSED	CLOSED
C.	CLOSED	OPEN	OPEN	OPEN
D.	OPEN	CLOSED	OPEN	OPEN

Answer: A

Explanation/Justification:

A. Correct. The candidate must know the interrelationship between the Reactor Trip and Bypass Breakers. During an ATWS condition operators are sent to locally trip the reactor. The operators must know what combinations will successfully result in a reactor trip in order to mitigate the adverse effect caused by an ATWS condition. All of the other combinations will indicate the reactor is tripped. This is the only combination that indicates the reactor is NOT tripped.

B. Incorrect. This breaker configuration will result in a reactor trip. (Refer to correct answer explanation)

C. Incorrect. This breaker configuration will result in a reactor trip. (Refer to correct answer explanation)

D. Incorrect. This breaker configuration will result in a reactor trip. (Refer to correct answer explanation)

Sys #	**System**	**Category**	**KA Statement**
000029	ATWS	EK2 Knowledge of the interrelations between the and the following an ATWS:	Breakers, relays, and disconnects

K/A# EK2.06 **K/A Importance** 2.9* **Exam Level** RO

References provided to Candidate None **Technical References:** BVPS UFSAR Unit 2, Rev. 0, pg. 7.2-1 & 7.2-2
BVPS UFSAR Unit 2, Figure 7.1-1 & 7.1-7

Question Source: New

Question Cognitive Level: Higher - Comprehension **10 CFR Part 55 Content:** (CFR 41.7 / 45.7)

Objective: 3SQS-1.2 3. Describe the control, protection and interlock functions for the field components associated with Reactor Protection System Hardware, including automatic functions, setpoints and changes in equipment status as applicable.

8. Given the following plant conditions:

- A Steam Generator Tube Rupture in the “A” S/G has occurred.
- [2SSR-RQI100], “Local - Steam Generator Blowdown” is in HIGH Alarm.
- The Control Room Team is performing E-3, “Steam Generator Tube Rupture” actions.
- All systems function as designed.

Which S/G Blowdown Outside CNMT Isolation Valve(s) will be CLOSED **AND** what is the reason for verifying isolation IAW E-3?

[2BDG*AOV100A1], “21A SG Blowdown Outside CNMT ISOL”.
[2BDG*AOV100B1], “21B SG Blowdown Outside CNMT ISOL”.
[2BDG*AOV100C1], “21C SG Blowdown Outside CNMT ISOL”.

_____ (1) ____ will be closed **AND** reason for isolation is to minimize _____ (2) _____.

A. (1) [2BDG*AOV100A1] **ONLY**
(2) radiological releases.

B. (1) All three SG Blowdown Outside CNMT Isolations
(2) radiological releases.

C. (1) [2BDG*AOV100A1] **ONLY**
(2) time to cover ruptured S/G U-tubes (promote thermal stratification).

D. (1) All three SG Blowdown Outside CNMT Isolations
(2) time to cover ruptured S/G U-tubes (promote thermal stratification).

Answer: B

Explanation/Justification:

A. Incorrect. Incorrect that only one of the B/D Valves isolates. Correct reason for isolation.

B. Correct. The affected S/G B/D Isolation valve automatically closes on a high radiation level. High radiation on 2SSR-RQI100 isolates all three S/G blowdown valves. The candidate must know the reason for this isolation according to the E-3 B/G document. The reason stated is to minimize radiological releases. This is the only automatic action in E-3 that has an automatic isolation signal provided by a process radiation monitor.

C. Incorrect. Incorrect that only one of the B/D Valves isolates. Incorrect reason for isolation. Plausible that limiting blowdown will decrease the time to fill the S/G. E-3 does require S/G U-tubes covered prior to isolation of feedwater flow to the ruptured S/G. Establishing and maintaining water level above the U-tubes in the ruptured S/G promotes thermal stratification to prevent ruptured S/G depressurization. According to the B/G this is the reason for checking ruptured S/G level, not for isolating B/D.

D. Incorrect. Correct that all three B/D valves isolate. Incorrect reason (refer to above explanation)

Sys #	**System**	**Category**	**KA Statement**
000038	Steam Generator Tube Rupture	EK3 Knowledge of the reasons for the following responses as the apply to the SGTR:	Automatic actions provided by each PRM

K/A# EK3.04 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-43.4.AEF, Rev. 7, pg. 2
2OM-53A.1.E-3, Issue 1C, Rev. 16, pg 4 & 5
2OM-53B.4.E-3, Issue 1C, Rev. 16, pg. 57 -59

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR 41.5 / 41.10 / 45.6 / 45.13)

Objective: 3SQS-53.3 3. State from memory the basis and sequence for the major action steps of each EOP IAW BVPS Executive Volume.

9. Given the following plant conditions:

- The Unit is operating at 100% power with all systems in NSA.
- A steam line break occurs outside containment upstream of 21A Main Steam Isolation Valve (MSIV).
- A Main Steam Line Isolation (MSLI) signal occurs.
- Assume all systems function as designed and **no operator action** occurs.

Given this event, which of the following is(are) the purpose(s) for Main Steam Line Isolation?

1. To terminate RCS cooldown.
2. To limit the blowdown to only one steam generator.
3. To ensure a supply of steam is available to the Terry Turbine.

A. 2 **ONLY**.

B. 1 AND 2 **ONLY**.

C. 1, 2, **AND** 3.

D. 2 **AND** 3 **ONLY**.

Answer: D

Explanation/Justification:

A. Incorrect. Correct reason for MSIV closure according to references, however, not the only correct answer.

B. Incorrect. Plausible that the cooldown will terminate eventually even if the break is upstream of the MSIVs when S/G blowdown is complete. However, the candidate must recognize that with no operator action, AFW flow will continue to feed the break which will further cooldown the RCS even after blowdown making this choice incorrect.

C. Incorrect. This is incorrect because #1 is incorrect. Refer to B explanation.

D. Correct. Correct reason for MSIV closure according to references.

Sys #	**System**	**Category**	**KA Statement**
000040	Steam Line Rupture – Excessive Heat Transfer	AK3. Knowledge of the reasons for the following responses as they apply to the Steam Line Rupture:	Operation of steam line isolation valves

K/A#	AK3.01	**K/A Importance**	4.2	**Exam Level**	RO
References provided to Candidate		None		**Technical References:**	2OM-21.1.B, Issue 4, Rev. 0, pg. 1 BVPS Unit 1 & 2 3.7.2 TS and Bases

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR 41.5,41.10 / 45.6 / 45.13)

Objective: 2SQS-21.1 36. Describe the design basis for the Main Steam Supply System and associated major components as documented in the UFSAR.

10. Given the following plant conditions:

- The plant has been operating at 100% power for 200 days with all systems in NSA.
- A complete Loss of Main Feedwater occurred.
- The Control Room Team has transitioned to FR-H.1, "Response to Loss of Secondary Heat Sink" and initiated Bleed and Feed.
- Subsequently, an AFW pump has been started and it is desired to recover Steam Generator (S/G) water level.
- S/G Primary side temperature is 550 °F and all S/G WR levels are 5%.

Which ONE of the following will be the method of recovering S/G water level **AND** associated reason why?

S/G Water Level will be recovered by initially feeding ___ (1) ___ to ensure S/G ___ (2) ___.

A. (1) all three S/Gs at ≤ 50 gpm
(2) tubes remain wetted and are fully covered before raising flowrate.

B. (1) all three S/Gs at ≤ 100 gpm
(2) thermal stress is minimized.

C. (1) only one S/G ≤ 50 gpm
(2) tubes remain wetted and are fully covered before raising flowrate.

D. (1) only one S/G ≤ 100 gpm
(2) thermal stress is minimized.

Answer: D

Explanation/Justification:

A. Incorrect. Incorrect number of S/Gs and flowrate. The reason and flowrate are plausible if the candidate confuses the FR-H.1 background with ECA-2.1 background.

B. Incorrect. Correct flowrate and reason but incorrect number of S/Gs.

C. Incorrect. Correct number of S/Gs with incorrect flowrate. The reason and flowrate are plausible if the candidate confuses the FR-H.1 background with ECA-2.1 background.background.

D. Correct. The candidate must know the background document bases for FR-H.1 information on how to restore feedwater flow to a hot dry S/G and understand the operational effect if this is not performed properly. Specifically, step 28 background states that a hot dry S/G is defined as having primary side of the S/G temperature > 525 F and <14% WR level. The background further states that the S/G water level should be restored to one S/G at a time and at a minimal flowrate not to exceed 100 gpm to minimize thermal stress.

Sys #	System	Category	KA Statement
000054	Loss of Main Feedwater	AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW):	Effects of feedwater introduction on dry S/G

K/A# AK1.02 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53B.4.FR-H.1, Issue 1C, Rev. 9, pg 85 & 86; 2OM-53B.4.ECA-2.1, Issue 1C, Rev. 11, pg 19

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

Objective: 3SQS-53.3 3. State from memory the basis and sequence of major Action steps IAW BVPS EOP Executive Volume.

11. Given the following plant conditions:

The Unit is operating at 100% power when a Station Blackout causes a reactor trip. Twenty five (25) minutes after the trip, power has been restored to Emergency Bus 2AE ONLY. The Control Room team 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.
- Reactor Coolant System (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. <u>NOT</u> occurring and may be established by opening the S/G Atmospheric Steam Dumps.

D. <u>NOT</u> occurring but forced cooling may be established by starting the "A" Reactor Coolant Pump.

<u>Answer: C</u>

Explanation/Justification:

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, "A" RCP in not available since only Bus 2AE is available.

Sys #	**System**	**Category**	**KA Statement**
000055	Station Blackout	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 (Red) **Technical References:** 2OM-53A.1.ECA-0.1, Rev. 7, pg. 11
2OM-53A.1.A-1.7, Issue 1C, Rev. 1, pg. 2
2OM-53A.1.A-5.1, Rev. 1, pg. 1

Question Source: New

Question Cognitive Level: Higher - Application **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

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

12. Given the following plant conditions:

- The Unit is operating at 100% power with all systems in NSA.
- A5-3A, "REACTOR PROTECTION SYSTEM TRAIN B TROUBLE" has annunciated.
- [2CCP-FI107A], "21A RCP Thermal Barrier Flow is reading 48 gpm.
- [2CCP-FI107B], "21B RCP Thermal Barrier Flow is reading 0 gpm.
- [2CCP-FI107C], "21C RCP Thermal Barrier Flow is reading 0 gpm.
- [2CHS-FI130A], "Seal Injection Flow" to "A" RCP is reading 8.5 gpm.
- [2CHS-FI124A], "Seal Injection Flow" to "B" RCP is reading 8 gpm.
- [2CHS-FI127A], "Seal Injection Flow" to "C" RCP is reading 8 gpm.

Based on these indications, which ONE of the following procedures will be entered?

A. AOP 2.38.1A, "Loss of Vital Bus 1".

B. AOP 2.38.1B, "Loss of Vital Bus 2".

C. AOP 2.38.1D, "Loss of Vital Bus 4".

D. E-0, "Reactor Trip or Safety Injection".

Answer: B

Explanation/Justification:

A. Incorrect. Incorrect but plausible distractor if the candidate believes Train B RPS is powered from Vital Bus 1. The "A" RCP Thermal Barrier Valve is powered from VAC Vital Bus 1.

B. Correct. The candidate must analyze the stated plant conditions and determine which procedure to enter based on these conditions. Train B Reactor Protection System Trouble can be caused by Loss of Power. Train B is supplied by either Vital AC Bus 2 or 4. An additional indication that the candidate needs to correctly narrow down the correct procedure is that AC Vital Bus 2 supplies power to the "B" & "C" RCP thermal barrier isolation valves which explains why they are closed. (The valve indications are powered by associated Vital Bus so therefore flow was used as opposed to valve position). The RO is required to know AOP entry conditions.

C. Incorrect. Plausible power supply because the Train B RPS Trouble can be caused by either Vital Bus 2 or 4.

D. Incorrect. Plausible because if a loss of all seal cooling occurs concurrently with a loss of CCP cooling to the thermal barrier, a reactor trip is required.

Sys #	**System**	**Category**			**KA Statement**
000057	Loss of Vital AC Electrical Instrument Bus	Generic			Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.
K/A#	2.4.4	**K/A Importance**	4.5	**Exam Level**	RO

References provided to Candidate None

Technical References:
2OM-1.4.AAJ, Rev. 3, pg. 4 & 6
2OM-53C.4.2.38.1A, Rev. 4, pg. 1 & 2
2OM-53C.4.2.38.1B, Rev. 5, pg. 1
2OM-53C.4.2.38.1D, Rev. 2, pg. 1

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 43.2 / 45.6)

Objective: 2SQS-53C.1 2. State from memory the conditions or symptoms that would require entry in the AOPs.

13. Given the following plant conditions:

- The following annunciators are received:
  - A8-9B, "125V DC Bus 2-2 Trouble"
  - A1-1C, "Vital Bus Inverter Operation/Trouble"
- DC BUS 2-2 VOLTS reads zero (0).
- All systems functions as designed.
- No operator action has yet occurred.

What will be the status of Battery Breaker [2BAT-BKR-2-2] **AND** Battery Charger [2BAT-CHG-2-2] control room indication? (Note this is not an all inclusive list of alarms present)

Battery Breaker [2BAT-BKR-2-2] ____ (1) ____.
Battery Charger [2BAT-CHG-2-2] ____ (2) ____.

	GREEN LIGHT	RED LIGHT
A.	(1) LIT	**NOT** LIT
	(2) LIT	**NOT** LIT
B.	(1) LIT	**NOT** LIT
	(2) **NOT** LIT	LIT
C.	(1) **NOT** LIT	LIT
	(2) LIT	**NOT** LIT
D.	(1) **NOT** LIT	**NOT** LIT
	(2) **NOT** LIT	**NOT** LIT

Answer: D

Explanation/Justification:

- **A.** Incorrect. This would be the indication for a Loss of Vital AC condition only.
- **B.** Incorrect. Incorrect battery charger breaker indication. Incorrect battery breaker indication.
- **C.** Incorrect. Incorrect battery charger breaker indication. Incorrect battery breaker indication.
- **D.** Correct. The candidate must be able to determine the operational implications of battery charger equipment and instrumentation as applied to a Loss of DC power. In order to have a loss of DC power both the battery charger and battery must be divorced from its associated bus. The candidate must analyze the annunciators and indications in the question stem and determine what the battery charger and battery breaker indications will be from the control room which is operationally relevant. Both the battery breaker and battery charger will have no indication from the control room. All distractors are plausible based on various combinations of light configurations which are valid indications for other operational implications with the battery or battery charger equipment.

Sys #	System	Category	KA Statement
000058	Loss of DC Power	AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power:	Battery charger equipment and instrumentation

K/A# AK1.01 **K/A Importance** 2.8 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-38.4.AAA, Rev. 7, pg. 2, 4, 9 & 10
2OM-39.4.AAE, Rev. 7, pg 2 – 4
2OM-53C.4.2.39.1B, Rev. 3, pg. 1
3SQS-39.1 Powerpoint Slides

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

Objective: 3SQS-38.1 18. Given a 125VDC configuration, and without reference material, describe the 125VDC control room response to the following malfunctions, including automatic functions and changes in plant status: Loss of AC Power, Loss of Station Battery, Loss of DC Power.

14. Given the following plant conditions:

- The plant was operating at 100% power with all systems in NSA.
- The Control Room Team manually tripped the plant based on excessive Steam Generator Tube Leakage.
- Currently they are performing actions in E-3, "Steam Generator Tube Rupture".
- While performing E-3 actions, the RO reports there are no Station Air Compressors running and instrument air pressure is lowering rapidly.

Which ONE of the following is the reason for restoring instrument air compressors according to the E-3 background document?

To ensure _______________

A. normal letdown and charging are available.

B. excess letdown and alternate charging are available.

C. intact Atmospheric Steam Dump Valve can be closed.

D. ruptured S/G Blowdown Isolation Valves can be closed.

Answer: A

Explanation/Justification:

A. Correct. The candidate must know the reason why Instrument Air Compressors are verified running while in E-3. Without instrument air compressors a loss of instrument air will occur and the result is the inability to use normal letdown and charging as well as other support systems.

B. Incorrect. The B/G document specifically refers to restoring normal charging and normal letdown. Plausible because the EOP does allow the alternate use of excess letdown if normal letdown in unavailable and alternate charging if normal charging is unavailable. Incorrect because alternate charging does not require instrument air.

C. Incorrect. Plausible action to close the intact atmospheric dump valves, however, these are hydraulically operated valves in Unit 2 making this choice incorrect.

D. Incorrect. Unit 2 S/G blowdown valves are supplied by Containment Instrument air which is supplied via station instrument air. It is plausible that the ruptured S/G blowdown valves are used for support system restoration in ES-3.2. These valves require air to open versus close.

Sys #	System	Category	KA Statement
000065	Loss of Instrument Air	AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air:	Actions contained in EOP for loss of instrument air

K/A# AK3.08 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53B.4.E-3, Issue 1C, Rev. 16, pg. 79 & 80

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR 41.5,41.10 / 45.6 / 45.13)

Objective: 3SQS-53.3 3. State from memory the basis and sequence of major action steps of each EOP procedure, IAW BVPS Executive Volume.

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

- The Unit is operating at 100% power with all systems in NSA **EXCEPT**:
  - There was a hydrogen gas leak on the Main Generator.
  - The hydrogen leak has been isolated.
  - Main Generator hydrogen gas pressure is 60 psig and STABLE.
- The Control Room has been notified by the DLC System Operations Control Center of possible grid instability and requests the control room maintain current power factor with maximum permissible megawatts.
- The US entered AOP ½.35.1, "Degraded Grid".
- The following Main Generator parameters are provided:
  - Power Factor = .97
  - MVAR's OUT = 230

Using Figure 35-14, "Main Generator Capability Curve, what will be the **MAXIMUM** permissible megawatt output for the Main Generator? **(Reference Provided)**

The maximum permissible megawatt output for the Main Generator is _______

A. 790 MW

B. 850 MW

C. 930 MW

D. 950 MW

Answer: C

Explanation/Justification:

A. Incorrect. Plausible if the candidate incorrectly applies MVARs and correctly uses the 60 psig hydrogen curve.

B. Incorrect. Plausible if the candidate incorrectly applies MVARs and incorrectly uses the 45 psig hydrogen pressure curve.

C. Correct. The RO requires the knowledge of how to implement the Main Generator Capability Curve as specified by the AOP for degraded grid conditions.

D. Incorrect. This is plausible if the candidate does not understand which side of the curve they must operate to protect the Main Generator. In order to arrive at this number they would correctly apply the hydrogen pressure curve and have understanding of MVARs.

Sys #	**System**	**Category**	**KA Statement**
000077	Generator Voltage and Electric Grid Disturbances	AA2. Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances:	Generator current outside the capability curve

K/A# AA2.03 **K/A Importance** 3.5 **Exam Level** RO

References provided to Candidate 2OM-35.5.A.14 **Technical References:** ½.OM-53C.4A.35.1, Rev. 8, pg. 4; 2OM-35.5.A.14, Rev. 3, pg. 2

Question Source: New

Question Cognitive Level: Higher - Application **10 CFR Part 55 Content:** (CFR: 41.5 and 43.5 / 45.5, 45.7, and 45.8)

Objective: 2SQS-53C.1 7. Given a set of conditions, apply the correct AOP.

16. Given the following plant conditions:

- A LOCA outside containment has occurred.
- The Control Room team is performing the actions in ECA-1.2, “LOCA Outside Containment”.

Which ONE of the following indications will be used to determine if the leak has been isolated **IN ACCORDANCE WITH ECA-1.2**?

A. RCS Pressure RISING.

B. RVLIS Indication RISING.

C. Safety Injection Flow LOWERING.

D. Aux Building Sump Level LOWERING.

Answer: A

Explanation/Justification:

A. Correct. In accordance with ECA-1.2, RCS pressure is used as an indication of whether leak isolation has occurred and determines whether transition to E-1 or ECA 1.1 will occur.

B. Incorrect. Other E-1 series procedures use RVLIS as an indication but other factors would also change level.

C. Incorrect. As RCS pressure rises, ECCS flow drops, but indication is not used in ECA-1.2.

D. Incorrect. Auxiliary building sump level will more than likely be dropping because of auto pump down feature depending on leak size, however, this is not an indication used in ECA-1.2 to determine if the leak has been isolated.

Sys #	System	Category			KA Statement
W/E04	LOCA Outside Containment	Generic			Ability to perform specific system and integrated plant procedures during all modes of plant operation.
K/A#	2.1.23	**K/A Importance**	4.3	**Exam Level**	RO

References provided to Candidate None **Technical References:** 2OM-53A.1.ECA-1.2, Issue 1C, Rev. 1, pg. 4
2OM-53B.4.ECA-1.2, Issue 1C, Rev. 1, pg. 2, 5, & 6

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.2 / 45.6)

Objective: 3SQS-53.3 3. State from memory the basis and sequence for the major actions steps of each EOP procedure, IAW BVPS Executive Volume.

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

- The Unit was operating at 100% power with all systems in NSA.
- A Complete Loss of Main Feedwater occurs resulting in a reactor trip.
- The transient has also resulted in a break in the RCS which caused containment pressure to rise to 6.2 psig.
- The Control Room Team is performing FR-H.1, "Response to Loss of Secondary Heat Sink" actions.

Which ONE of the following describes when Bleed and Feed is **REQUIRED** to be initiated in accordance with FR-H.1?

As soon as ___________

A. Narrow Range Level in ALL S/Gs lowers to 0%.

B. Wide Range Level in ALL S/Gs lowers to ≤ 14%.

C. Wide Range Level in any TWO S/Gs lowers to ≤ 32%.

D. Narrow Range Level in any TWO S/Gs lowers to ≤ 14%.

Answer: C

Explanation/Justification:

A. Incorrect. Plausible if the candidate mistakes narrow range and wide range S/G water level and believes that bleed and feed is required as soon as NR S/G water level goes off scale low.

B. Incorrect. Plausible but incorrect. This criteria does meet bleed and feed criteria, however, this is not the soonest value.

C. Correct. The candidate must have the ability to operate or monitor operating behavior characteristics of the facility as applied to the loss of secondary heat sink. The candidate must know the continuous action criteria for establishing Bleed & Feed because of its importance as an alternative heat sink to prevent core uncovery and inadequate core cooling. WR S/G water level in two or more S/Gs is Bleed and Feed initiation criteria IAW FR-H.1 step 2 when WR S/G level lowers to ≤ 32%. The candidate must recognize that > 5 psig containment pressure is an adverse containment number.

D. Incorrect. The candidate may confuse WR and NR S/G water level and also not recognize that adverse containment criteria exists.

Sys #	System	Category	KA Statement
W/E05	Loss of Secondary Heat Sink	EA1. Ability to operate and / or monitor the following as they apply to the (Loss of Secondary Heat Sink)	Operating behavior characteristics of the facility.

K/A# EA1.2 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.FR-H.1, Issue 1C, Rev. 9, pg. 2
2OM-53B.4.FR-H.1, Issue 1C, Rev. 9, pg. 48 & 49

Question Source: Bank – Vision #46864

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 / 45.6)

Objective: 3SQS-53.3 3. State from memory the basis and sequence of for the major action steps of each EOP procedure IAW BVPS Executive Volume.

18. Given the following plant conditions:

- A LOCA has occurred.
- Due to multiple equipment failures, the Control Room Team 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 ONE 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:

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**
W/E11	Loss of Emergency Coolant Recirculation	EA2. Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation):		Adherence to appropriate procedures and operation within the limitations in the Facility's license and amendments.
K/A#	EA2.2	**K/A Importance** 3.4	**Exam Level**	RO

References provided to Candidate None **Technical References:** 2OM-53A.1.ECA-1.1, Issue 1C, Rev. 10, pg. 1,3 & 18 & 19
2OM-53A.1.ECA-1.1, Issue 1C, Rev. 10, pg. 1-4, 6, 14, 57 & 59

Question Source: Bank – 2LOT5 NRC Exam Q# 56

Question Cognitive Level: Higher – Application **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

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

19. Given the following plant conditions:

- The plant is in Refueling Mode with systems aligned for core off-load.
- While lowering a spent fuel assembly into the Spent Fuel Pool, the assembly ruptures and releases **ALL** of the gasses from **ALL** of the rods in that assembly **ONLY**.
- [2RMF-RQ202], "Fuel Pit Bridge Area Radiation Monitor" goes into **HIGH** alarm.

Based on these plant conditions, what will be the status of [2RMF-RQ301], "Fuel Building Ventilation Radiation Monitor **AND** reason why?

[2RMF-RQ301] ____ (1) ____ be in **HIGH** alarm because ____ (2) ____.

A. (1) will
(2) the iodine and xenon released from the fuel assembly will **NOT** be sufficiently scrubbed out by the water above the assembly.

B. (1) will
(2) [2RMF-RQ301] is designed to detect gamma radiation (GM tube).

C. (1) will **NOT**
(2) the iodine and xenon released from the fuel assembly **WILL** be sufficiently scrubbed out by the water above the assembly.

D. (1) will **NOT**
(2) [2RMF-RQ301] is designed to detect beta radiation (scintillation).

Answer: A

Explanation/Justification:

A. Correct. The candidate must be able to determine and interpret the occurrence of a fuel handling incident as it applies to a fuel handling accident. Specifically to answer the question they must have fundamental knowledge of the type of detectors in the Fuel Pool building and associated design. They must also have knowledge of the UFSAR accident analysis regarding Fuel Handling Accidents. The UFSAR analysis states quite clearly that activity will be released into the buildings (Fuel or Containment) for the a fuel handling accident of this type. Therefore both detectors will be in HIGH alarm.

B. Incorrect. Correct 2RMF-RQ301 response, however, the detector type is incorrect. 2RMF-301 is NOT a GM tube. Opposite of correct detector type.

C. Incorrect. The UFSAR analysis states quite clearly that activity will be release into the buildings for a fuel handling accident of this type.

D. Incorrect. Even though the listed monitor type is correct (2RMF-301 is a scintillation detector), the fact that the area monitor went into an alarm condition implies that enough activity was released into the area to raise the activity level sensed in the ventilation duct.

Sys #	**System**	**Category**	**KA Statement**
000036	Fuel Handling Incidents	AA2. Ability to determine and interpret the following as they apply to the Fuel Handling Incidents:	Occurrence of a fuel handling incident

K/A# AA2.02 **K/A Importance** 3.4 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-43.4.ADF, Rev. 6, pg. 3 & 4
2OM-43.4, Issue 1, Rev. 4, pg 1
BVPS Unit 2 UFSAR, Rev. 16, pg. 15.7-2 – 4
GO-ATA-4.3, Rev. 6 pg. 57 & 58

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective: GO-ATA-4.3 2. Identify the "worst" case of initial conditions or, given a parameter, identify which direction of its magnitude would be "worse" for initial conditions for each listed accident.

20. Which ONE of the following RADIATION MONITOR detectors when in HIGH alarm will result in a Control Room Alarm and subsequent **AUTOMATIC** action?

A. [2RMC*RQ201], "Control Room Area".

B. [2RMR-RQ203], "Manipulator Crane Area".

C. [2RMR*RQ202A], "Outside Personnel Hatch Area".

D. [2RMR*RQ206], "In Containment High Range Area".

Answer: A

Explanation/Justification:

A. Correct. Since every ARM detector provides an alarm in the control room, the interrelationship between the ARM alarms and detectors at each location is an automatic action. The control room area monitor is the only area monitor that provides any automatic action.

B. Incorrect. This is an area radiation detector that has no automatic actions but does provide an alarm to the control room.

C. Incorrect. This is an area radiation detector that has no automatic actions but does provide an alarm to the control room.

D. Incorrect. This is an area radiation detector that has no automatic actions but does provide an alarm to the control room.

Sys #	System	Category	KA Statement
000061	ARM System Alarms	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-43.1.B, Issue 4, Rev. 1, pg. 4-6
2OM-43.4.ADB, Rev. 7, pg. 2
2OM-43.5.B.3, Rev. 2, pg. 2
2OM-43.1.C, Rev. 4, pg. 25, & 49

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR 41.7 / 45.5/45.6)

Objective: 2SQS-43.1 8. Given a specific plant condition, predict the response of the Radiation Monitoring 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.

21. Given the following plant conditions:

- The Unit is operating at 100% Power with all systems in NSA.
- Annunciator A11-1B, "CABLE VAULT & ROD CONT AREA CABLE TUNNEL FIRE" alarms.
- A serious fire in the East Cable Vault and Rod Control Area 735' 6" is confirmed.
- Assume all automatic fire suppression systems function as designed.

Based on these plant conditions, which ONE of the following describes the impact on Fire Brigade personnel?

The major concern to Fire Brigade personnel entering the East Cable Vault is ____ (1) ____ due to ____ (2) ____ used to automatically extinguish the fire in this area.

A. (1) asphyxiation from displacement of oxygen
(2) Halon **ONLY**

B. (1) flooding and subsequent electrocution
(2) CO2 and Water

C. (1) asphyxiation from displacement of oxygen
(2) CO2 **ONLY**

D. (1) flooding and subsequent electrocution
(2) Water **ONLY**

Answer: C

Explanation/Justification:

A. Incorrect. Correct that asphyxiation is a major concern. Incorrect that halon is used in this space (refer to correct answer).

B. Incorrect. Water is not used in the East Cable Vault as part of any automatic suppression fire fighting systems and therefore flooding is not a major concern. Note that there are manual water hose stations in the area, however, the question is asking about automatic actions.

C. Correct. The candidate must know that CO2 is the fire fighting agent used in the East Cable Vault to automatically distinguish fires. Water or Halon are NOT used in this area. The operational implications of a serious fire in the East Cable Vault is that CO2 is a major concern when entering this space due to the safety hazards it may cause (ie: cardiac arrest or nervous system effects). Note that there are manual water hose stations in the area, however, the question is asking about automatic actions. Also in Unit 2 there are other annunicators which will alarm, however, they are excluded from the question stem to preclude guiding the candidate toward the correct answer.

D. Incorrect. Water is not used in the East Cable Vault as part of any automatic suppression fire fighting systems and therefore flooding is not a major concern. Plausible that water is used as a fire extinguishing agent and flooding would then become a concern.

Sys #	**System**	**Category**	**KA Statement**
000067	Plant Fire On-site	AK1. Knowledge of the operational implications of the following concepts as they apply to Plant Fire on Site:	Fire fighting

K/A# AK1.02 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-33.4.ACK, Rev. 1, pg. 2, 3, & 5
2OM-33.1.B, Rev. 5, pg. 4
2OM-33.5.B.8, Issue 4, Rev. 0, pg. 1
2OM-33.4.ACT, Rev. 2, pg. 2 & 3

Question Source: Bank – 1LOT8 NRC Exam Q#22

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

Objective: 3SQS-33.1

4. Given a change in plant conditions, describe the response of the fire protection system field indication and control loops, including all automatic functions and changes in equipment status.

11. Given a fire protection system alarm condition and using the ARP, determine the appropriate alarm response, including automatic and operator actions in the control room.

22. Given the following plant conditions:

- The Plant is operating at Full Power with all systems in NSA.
- A small fire develops in the Control Room requiring Control Room Evacuation.
- The Control Room Crew carries out control room actions in accordance with AOP 2.33.1A, "Control Room Inaccessibility".
- One of these actions included tripping [2FWS-P21A], "Main Feedwater Pump" prior to evacuation.
- Following evacuation AOP 2.33.1A directs locally tripping the running "B" Main Feedwater Pump after Auxiliary Feedwater flow is verified.

Which ONE of the following describes how this task will be accomplished according to AOP 2.33.1A?

Go to Switchgear Room and trip open ________

A. pump control circuit 125VDC Bkr 8-1 on [PNL-DC2-08] **ONLY.**

B. local cubicle test switch on Bus 2C [4160 VAC Cub 2C1] **ONLY**.

C. local cubicle test switch on Bus 2D [4160 VAC Cub 2D1] **AND** Pump control circuit 125VDC Bkr 8-1 on [PNL-DC2-04]

D. [2FWS-P21B1] Pump Motor Breaker on Bus 2C [4160 VAC Cub 2C1] **AND** [2FWS-P21B2] Pump Motor Breaker on Bus 2D [4160 VAC Cub 2D1].

Answer: D

Explanation/Justification:

A. Incorrect. Plausible that DC power needs to be secured. This power is for the "A" MFW Pump.

B. Incorrect. This local cubicle test switch will only operate if the breaker is in test, so therefore will not be successful nor is it directed by procedure. Note that the switch mounted on the front of the cubicle is identical to switches that will control the associated breaker.

C. Incorrect. Incorrect switch with plausible correct DC power to B MFW Pump, however, not to be opened IAW AOP 2.33.1A.

D. Correct. The candidate must have knowledge of how to trip the MFW pumps during a control room evacuation situation. The AOP is specific enough to state that both motor breakers need to be opened and expects the operator has understanding of which breakers need to be tripped. The competent operator must fundamentally know that each MFW Pump has two motors and that each is tripped. The AOP has no action to trip condensate pumps.

Sys #	**System**	**Category**		**KA Statement**
000068	Control Room Evacuation	AA1. Ability to operate and / or monitor the following as they apply to the Control Room Evacuation:		Local trip of main feed pumps and Condensate pumps
K/A# AA1.27		**K/A Importance** 3.2*	**Exam Level**	RO
References provided to Candidate		None	**Technical References:**	2OM-53C.4.2.33.1A, Rev.12, pg. 1, 5, & 9 2OM-24.3.C, Rev. 16, 6 & 8

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR 41.7 / 45.5 / 45.6)

Objective: 2SQS-53C.1 7. Given a set of conditions, apply the correct AOP.

23. Given the following plant conditions:

- A rapid load reduction from 100% to 65% power was performed approximately three hours ago.
- [2CHS*RQ101A], "Reactor Coolant Low Range Monitor" is in HIGH alarm.
- [2CHS*RQ101B], "Reactor Coolant High Range Monitor" has just reached its HIGH alarm setpoint.
- Actions of 2OM-43.4.AAC, "Radiation Monitoring Level High" have been completed.
- Actions of AOP 2.6.6, "High Reactor Coolant Activity" have been completed.

Which ONE of the following reflects the desired plant line-up as specified in AOP 2.6.6?

A. Letdown demineralizers have been bypassed.

B. Letdown automatically isolated on high radiation.

C. [2CVS-P21A/B], "CNMT Vacuum Pumps" are BOTH running.

D. [2DGS-P21A/B], "Primary Drain Transfer Pumps" are BOTH in PTL.

Answer: D

Explanation/Justification:

A. Incorrect. The candidate may believe that letdown flow has been increased and this leads to higher temperature which auto bypasses the letdown demineralizers. Manual alignment to bypass deminalizers is plausible but opposite of the desired lineup. AOP 2.6.6 directs putting more demins in service.

B. Incorrect. Plausible that letdown is isolated on a high radiation condition. The candidate must have knowledge that there is no automatic function provided by the radiation monitors which are in high alarm.

C. Incorrect. Plausible incorrect action which is opposite of that specified in AOP 2.6.6 which stops the containment vacuum pumps. The candidate may have a misconception about maintaining a negative pressure inside the containment to keep radiation from leaking to the outside environment. They must understand that this action although it would maintain a more negative pressure would draw some of the activity to the outside making matters worse, while the overall intent of the procedure is to minimize exposure and reduce radiological concerns.

D. Correct. The candidate must understand the desired plant lineup as specified in AOP 2.6.6 for a High RCS Coolant Activity condition. One of the actions specified in AOP 2.6.6 is to place both PDT pumps in PTL. The RO is required to know the overall mitigative strategies of procedures.

Sys #	System	Category	KA Statement
000076	High Reactor Coolant Activity	Generic	Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.

K/A# 2.1.31 **K/A Importance** 4.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.6.6, Rev. 3, pg. 1 - 5

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 45.12)

Objective: 2SQS-53C.1 7. Given a set of conditions, apply the correct AOP.

24. Given the following plant conditions:

- The STA reports a Yellow path on **CORE COOLING** exists.
- The Unit Supervisor announces a transition to FR-C.3, "Response to Saturated Core Cooling".
- "C" Reactor Coolant Pump (RCP) is running.

Which ONE of the following is a mitigating strategy in FR-C.3?

A. Stop "C" RCP and open all RCS vent paths.

B. Depressurize S/Gs to depressurize the RCS.

C. Start "A" & "B" RCPs and open all RCS vent paths.

D. Establish SI flow to maintain minimum RCS subcooling.

Answer: D

Explanation/Justification:

A. Incorrect. Opening RCS vents is a major action category for FR-C.1. It is plausible that the running RCP is stopped before reducing RCS pressure to minimum.

B. Incorrect. This is a major action category for FR-C.1 & 2, but not for FR-C.3.

C. Incorrect. This is one of the major action categories for FR-C.1 versus FR-C.3. FR-C.3 checks for open paths but does not open them.

D. Correct. The candidate must be familiar with the basic purpose, overall sequence of events or overall mitigative strategy of Saturated Core Cooling. With knowledge of these procedures the RO demonstrates the ability to operate the plant and obtain desired operating results during these emergency plant conditions. A major action category for FR-C.3 is to establish SI flow and maintain minimum RCS subcooling.

Sys #	**System**	**Category**		**KA Statement**
W/E07	Saturated Core Cooling	EA1. Ability to operate and / or monitor the following as they apply to the (Saturated Core Cooling):		Desired operating results during abnormal and emergency situations.
K/A#	EA1.3	**K/A Importance** 3.5	**Exam Level**	RO
References provided to Candidate		None	**Technical References:**	2OM-53A.1.FR-C.3, Issue 1C, Rev. 2, pg. 1 2OM-53A.1.FR-C.1, Issue 1C, Rev. 5, pg. 1 2OM-53A.1.FR-C.2, Issue 1C, Rev. 4, pg. 1

Question Source: New

Question Cognitive Level: Lower- Memory or Fundamental   **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 / 45.6)

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

25. Given the following plant conditions:

- The plant was operating at Full Power with all systems in NSA.
- An unisolable Steam Line Break has necessitated a transition to FR-P.1, "Response to Imminent Pressurized Thermal Shock".
- This transition was based on an Orange CSF Status Tree condition.

Which ONE of the following describes the action that will be taken in FR-P.1 and the reason for this action?

A. Depressurize the RCS to maximize SI flow to the core.

B. Stabilize RCS pressure to minimize SI flow to the core.

C. Depressurize the RCS to minimize pressure stresses on the reactor vessel.

D. Stabilize RCS pressure to minimize pressure stresses on the PRZR surge line weld.

Answer: C

Explanation/Justification:

A. Incorrect. Maximizing SI flow would increase the cooldown and increase temperature stresses on the reactor vessel. Depressurizing the RCS is a correct action for the incorrect reason but correct effect.

B. Incorrect. SI flow is terminated if possible, however reactor vessel pressure is reduced to a minimum, decreasing the pressure stresses on the reactor vessel.

C. Correct. The candidate must have knowledge of the actions to reduce pressure and temperature effects in FR-P.1 and reasons for these actions. Specifically one of the major action categories is to depressurize the RCS to minimize pressure stress. According to the background document the reason for this action is to decrease pressure stress on the reactor vessel wall as much as possible.

D. Incorrect. System pressure is reduced to a minimum to decrease the pressure stresses on the reactor vessel versus PRZR surge line weld.

Sys #	**System**	**Category**	**KA Statement**
W/E08	RCS Overcooling – PTS	EK3. Knowledge of the reasons for the following responses as they apply to the (Pressurized Thermal Shock):	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** 3.4 **Exam Level** RO

References provided to Candidate None

Technical References: 2OM-53A.1.F-0.4, Issue 1C, Rev. 0, pg. 1
2OM-53A.1.FR-P.1,Issue 1C, Rev. 7, pg. 1, 12, & 19
2OM-53B.4.FR-P.1, Issue 1C, Rev. 7, pg. 37 & 38

Question Source: Bank – 2LOT4 NRC Exam Q#48

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5 / 41.10, 45.6, 45.13)

Objective: 3SQS-53.3 3. State from memory the basis and sequence for the major actions steps of each EOP procedure, IAW BVPS Executive Volume.

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

- The plant was operating at 85% Power with all systems in NSA.
- A Reactor Trip occurs.
- BV-Midland Z-30 138 KV Breaker OCB 85 OPENS **AND** simultaneously 2B STA Service Feeder 138 KV Breaker OCB 94 OPENS.
- Both 4160VAC Emergency Busses are energized.
- Both Trains of RVLIS are available.
- Immediate actions of E-0, "Reactor Trip or Safety Injection" are complete and a transition to ES-0.1, "Reactor Trip Response" has been made.
- It is desired to begin and maintain a plant cooldown to Mode 5 at ≤ 20 °F/hr.

Given these plant conditions, which ONE of the following procedures will be **REQUIRED** to achieve Mode 5?

A. Remain in ES-0.1.

B. ES-0.2, "Natural Circulation Cooldown".

C. ES-0.3, "Natural Circulation Cooldown with Steam Void in Vessel (with RVLIS)".

D. Applicable portions of 2OM-52.4.R.1.F, "Station Shutdown from 100% to Mode 5".

Answer: B

Explanation/Justification:

A. Incorrect. This procedure is applicable if forced circulation exists. Plausible if the candidate does not recognize these plant conditions result in no RCPs (natural circulation).

B. Correct. The candidate must be able to determine facility conditions (ie: no RCPs available and natural circulation operations are applicable due to Loss of Offsite Power due to OCB 84 & 95 opening subsequent to a reactor trip) and then determine which procedure should be selected to cool the plant down to Mode 5 at a specified cooldown rate. This is appropriate RO level knowledge because they are required to know the basic purpose and overall sequence of events that will occur or the overall mitigative strategy of a procedure.

C. Incorrect. This procedure will achieve Mode 5 however, is only entered when cooldown rate ≥25 F/hr. RVLIS available was added to question stem to increase plausibility. This is incorrect because C/D is to be maintained ≤25 F/hr.

D. Incorrect. This procedure will achieve Mode 5 however, will only be entered at the end of ES-0.1 if forced RCS cooling exists.

Sys #	System	Category	KA Statement
E09	Natural Circulation Operations	EA2. Ability to determine and interpret the following as they apply to the (Natural Circulation Operations)	Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

K/A# EA2.1 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.ES-0.1, Issue 1C, Rev. 8, pg. 1 & 13
2OM-53A.1.ES-0.2, Issue 1C, Rev. 10, pg. 1 & 9
2OM-53A.1.ES-0.3, Issue 1C, Rev. 6, pg. 1

Question Source: New
Question Cognitive Level: Higher – Application **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)
Objective: 3SQS-53.3 6. Given a set of conditions, locate and apply the proper EOP IAW BVPS Executive Volume.

27. Given the following plant conditions:

- The Unit was operating at Full Power with all systems in NSA.
- A Large Break LOCA occurred.
- The Control Room Team transitioned to E-1, "Loss of Reactor or Secondary Coolant".
- All systems function as designed.
- Containment pressure peaked at 35 psig and is now 10 psig and SLOWLY LOWERING.
- Indicated RWST Level is 380 inches and LOWERING.
- Assume no operator action related to equipment stated below.

Which ONE of the following describes what equipment **currently** will be in service for the containment pressure reduction?

A. Recirc Spray **ONLY**.

B. Quench Spray **ONLY**.

C. Recirc Spray **AND** Quench Spray.

D. Quench Spray, Recirc Spray, **AND** Containment Air Recirculation Fans.

Answer: C

Explanation/Justification:

A. Incorrect. Correct that Recirc spray is in service. Incorrect that it is the only equipment in service. (refer to correct answer explanation)

B. Incorrect. Correct that Quench spray is in service. Incorrect that it is the only equipment in service. (refer to correct answer explanation)

C. Correct. The candidate must analyze plant conditions and determine based on these conditions what components are functioning to automatically reduce high containment pressure caused by a LBLOCA. Specifically, the candidate must know that the Quench Spray pumps will start on a CIB signal which is caused when containment pressure increases above 11 psig. Note that current containment pressure is below 11 psig, but without operator action, these pumps will continue to run. E-1 directs the operator to secure these pumps at < 8.5 psig. The RSS pumps start upon an CIB signal plus RWST level < 381". At 380" these pumps are designed to AUTO start and therefore are running. The containment air recirculation fan automatically trips on a SI and/or sump level.

D. Incorrect. Containment air recirculation fans are tripped due to CIA actuation. The other two are correct. (refer to correct answer explanation)

Sys #	System	Category	KA Statement
W/E14	High Containment Pressure	EK2. Knowledge of the interrelations between the (High Containment Pressure) 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** 3.4 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-13.1.B, Rev. 3, pg 2; 2SQS-13.1 Powerpoint, Rev. 17

Question Source: Bank – 1LOT7 NRC Exam #14

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.7)

Objective:

28. Given the following plant conditions:

- The Unit is operating at Full Power with all systems in NSA.
- 21B RCP UBLO CLG WTR DISCH FLOW, [2CCP-FT104B] indicates 185 gpm and is SLOWLY **RISING**.
- 21B RCP LBLO CLG WTR DISCH FLOW, [2CCP-FT106B] indicates 9.6 gpm and is SLOWLY **RISING**.
- Containment temperatures as indicated on [2LMS*TI100-1,2,7,13,14,15] are **STABLE**.
- [2CCP-LI100A(B)], "CCP Surge Tank Level" is SLOWLY **LOWERING**.

If the leak is on the inlet flange side of the 21B RCP Stator Air Cooler Heat Exchanger, which of the following control room indications will confirm this leak location?

21B RCP Stator Clg Water Disch Flow [2CCP-FT-105B]
21B RCP Stator Winding temperatures on [2RCS-TR-448B]

	[2CCP-FT-105B]	[2RCS-TR-448B]
A.	rising	lowering
B.	lowering	lowering
C.	lowering	remains the same
D.	rising	remains the same

Answer: C

Explanation/Justification:

A. Incorrect. If the candidate believes the flow transmitter is located on the inlet side of the HX then it is plausible that 2CCP-FT-105B flow will be increasing. They may also have a misconception that if flow is increasing that stator temperature will decrease.
B. Incorrect. Correct flow indication. Incorrect but plausible stator temperature if the leak was on the outlet side of the HX where there would be more actual flow through the air cooler.
C. Correct. The candidate must be able to predict or monitor changes to 21B RCP stator winding temperature and flow based on a leak upstream of the stator air cooler HX. They must understand the system layout and location of the flow transmitter in relation to the air cooler HX to derive the correct answer. Based on system design a large amount of air flow through the RCP Stator Air Cooler is from the Containment Recirculation Fans. The stem of the question states that containment temperature remains stable, so therefore the impact of this system leak is minimal. Increasing is not used a distractor for stator winding temperature because it is difficult to ascertain the exact amount of cooling loss that would be needed to cause a stator temperature increase and could be challenged.
D. Incorrect. If the candidate believes the flow transmitter is located on the inlet side of the HX then it is plausible that 2CCP-FT-105B flow will be increasing. Potentially correct stator winding temperature response. Refer to correct answer explanation.

Sys #	System	Category	KA Statement
003	Reactor Coolant Pump	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RCPS controls including:	RCP motor stator winding temperatures

K/A# A1.03 **K/A Importance** 2.6 **Exam Level** RO

References provided to Candidate None **Technical References:** Op Manual Fig. 15-3
2OM-6.1.E, Rev. 6, pg. 51

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 45.5)

Objective: 2SQS-6.4 37. Given a specific plant condition, predict the response of the Reactor Coolant Pump and support 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.

29. Given the following plant conditions:

- Both Units are operating at 100% Power with all systems in NSA.
- A Loss of Offsite Power coincident with a Reactor Trip at both Units.
- The 2-1 EDG did **NOT** auto start.
- 138 KV Bus 1 & Bus 2 are verified de-energized.
- All systems function as designed.
- No operator actions have occurred.

Which ONE of the following will be the status of power to [2WTD-P23A/B], "Demineralized Water Pumps"?

	[2WTD-P23A]	**[2WTD-P23B]**
A.	Has power	Has power
B.	Has power	Has **NO** Power
C.	Has **NO** Power	Has power
D.	Has **NO** Power	Has **NO** Power

Answer: A

Explanation/Justification:

A. Correct. The candidate must analyze the plant conditions provided and determine the status of power to the Demineralized Water Pumps (Primary Makeup Pumps). 2WTD-P23A is powered from MCC-2-23 which is powered from Bus 1G. 2 WTD-P23B is powered from MCC-2-26 which is powered from Bus 1H. On a Loss of Offsite Power, the ERF Black EDG will start and auto close onto both busses (1H & 1G).

B. Incorrect. Correct that 2WTD-P23A has power. Plausible that 2WTD-P23B does not have power if the candidate does not understand the ERF Substation operations or is distracted by the 2-1 EDG not starting.

C. Incorrect. Correct that 2WTD-P23B has power. Plausible that 2WTD-P23A does not have power if the candidate does not understand the ERF Substation operations or is distracted by the 2-1 EDG not starting.

D. Incorrect. Plausible if the candidate does not know the power supplies or understand the impact of stated plant conditions.

Sys #	**System**	**Category**			**KA Statement**
004	Chemical and Volume Control	K2 Knowledge of bus power supplies to the following:			Makeup pumps
K/A#	K2.02	**K/A Importance**	2.9	**Exam Level**	RO
References provided to Candidate		None		**Technical References:**	2OM-32.3.C, Rev. 2, pg. 4 & 5 3SQS-58E.1 Powerpoint, Rev. 9
Question Source:	New				
Question Cognitive Level:		Higher – Comprehension or Analysis		**10 CFR Part 55 Content:**	(CFR: 41.7)
Objective:	3SQS-58E.1	24. Given an under voltage condition, predict the response of the ERF Electrical Distribution System and how the plant configuration will change as a result of the electrical systems actions.			

30. Given the following plant conditions:

- The Unit is in Mode 3.
- [2CHS*LCV115A], "VCT Level Cont Divert to Degas" Controller is in AUTO.
- [2CHS*LCV115A], "VCT Level Control Valve" control switch is in AUTO.
- [2CHS*LCV112], "VCT Level Cont Divert to CLNT RCVY Valve" Controller is in AUTO.
- VCT level Control Setpoint for [2CHS*LCV115A] is at 0% (HIC).
- VCT Level is currently 75% and LOWERING.
- The system is functioning as designed with no operator intervention.

Which ONE of the following will be the **current** status of [2CHS*LCV115A] **AND** [2CHS*LCV112] based on system design?

[2CHS*LCV115A] will be ____ (1) ____ **AND** [2CHS*LCV112] will be ____ (2) ____.

A. (1) partially diverted to the Degasifer
(2) fully diverted to Unit 1 Coolant Recovery Tanks.

B. (1) fully diverted to the VCT
(2) fully diverted to Unit 1 Coolant Recovery Tanks.

C. (1) fully diverted to the Degasifer
(2) partially diverted to Unit 1 Coolant Recovery Tanks.

D. (1) partially diverted to the VCT
(2) partially diverted to Unit 1 Coolant Recovery Tanks.

Answer: A

Explanation/Justification:

A. Correct. The candidate must be familiar with CVCS design and interlocks associated with VCT level and VCT Diversion valve positions as well as system flowpaths to answer this question. By design 2CHS*LCV115A will start to divert @ 65% and Full Divert @ 80%, so therefore at 75% is partially diverted to the Unit 1 Degasifier and partially diverted to the VCT. 2CHS*LCV112 will start to divert @ 55% and will full divert at 70%, so therefore will be full diverted @ 70% to the Unit 1 Coolant Recovery Tanks.
B. Incorrect. Correct that 2CHS*LCV115A is diverted to the VCT but only partially. Correct that 2CHS*LCV112 is fully diverted to the Unit 1 CRTs.
C. Incorrect. 2CHS*LCV115A is partially diverted to the degasifier. 2CHS*LCV112 position represents VCT level 55 – 70%.
D. Incorrect. Correct 2CHS*LCV115A valve position. 2CHS*LCV112 position represents VCT level 55 – 70%.

Sys #	System	Category	KA Statement
004	Chemical and Volume Control	K4 Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following:	Control interlocks on letdown system (letdown tank bypass valve)

K/A# K4.14 **K/A Importance** 2.8* **Exam Level** RO
References provided to Candidate None **Technical References:** 2SQS-7.1 Powerpoint Slides
Question Source: New
Question Cognitive Level: Higher – Application **10 CFR Part 55 Content:** (CFR: 41.7)
Objective: 2SQS-7.1 18. Describe the control and interlock functions for the control room components associated with the CVCS system including automatic functions, setpoints and changes in equipment status as applicable: HI-LO VCT level, RCS Makeup controls.

31. Given the following plant conditions:

- The Plant is in Mode 4 cooling down for a Refueling Outage.
- 2OM-10.4.A, "Residual Heat Removal System Startup" is in progress.
- RHR Inlet Temperature as read on [2RCS-TR604A], "RHR Hx Diff Temp Recorder" is reading 290°F.
- Preparations are being made to start [2RHS*P21A], "A" RHS Pump.

Which ONE of the following will be the MINIMUM allowable suction pressure **AND** MAXIMUM allowable system flow? **(Figures 10-11 & 10-12 are Provided)**

The minimum allowable suction pressure will be ____ (1) ___.
The maximum allowable system flow will be ____ (2) ____.

A. (1) 80 psig
(2) 3550 gpm which **excludes** RHR Pump mini-flow **ONLY**.

B. (1) 90 psig
(2) 4000 gpm which **includes** RHR Pump mini-flow **ONLY**.

C. (1) 80 psig
(2) 4000 gpm which **includes** RHR Pump mini-flow and letdown flow.

D. (1) 90 psig
(2) 3550 gpm which **excludes** RHR Pump mini-flow and letdown flow.

Answer: C

Explanation/Justification:

A. Incorrect. Correct minimum allowable pressure. Incorrect plausible maximum flow limit. This is the limit for two pump operation if vented. Incorrect that RHR pump mini flow is excluded from the flow limits.

B. Incorrect. Incorrect plausible value if the candidate misreads 300 F or thinks they need to be on the right side of the curve. Correct maximum flow. Correct that RHR pump mini flow is included in the flow limits, however, letdown flow is also included.

C. Correct. The candidate must be familiar with RHS precautions and limitations reasons and be able to apply them. Specifically, they must be able to determine the minimum suction pressure is 80 psig when RHR HX DT is 290 F. The maximum system flow to ensure adequate NPSH is 4000 gpm which does include RHR pump mini flow and letdown flow as part of the flow limits.

D. Incorrect. Incorrect plausible value if the candidate misreads 300 F or thinks they need to be on the right side of the curve. Incorrect plausible maximum flow. This is the limit for two pump operation if vented.

Sys # 005	**System** Residual Heat Removal	**Category** Generic		**KA Statement** Ability to explain and apply system limits and precautions.
K/A# 2.1.32		**K/A Importance** 3.8	**Exam Level**	RO
References provided to Candidate		2OM-10.5.A.11, Figure 10-11 2OM-10.5.A.12, Figure 10-12	**Technical References:**	2OM-10.4.A, Rev. 38, pg. 3 & 4 2OM-10.5.A.11, Issue 4, Rev. 0, pg. 1 2OM-10.5.A.12, Issue 4, Rev. 0, pg. 1
Question Source:	New			
Question Cognitive Level:		Higher – Application	**10 CFR Part 55 Content:**	(CFR: 41.10 / 43.2 / 45.12)
Objective:	2SQS-10.1	8. Given a set of plant conditions and 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.		

32. Given the following plant conditions:

- The plant is being cooled down for a refueling outage.
- Both trains of Residual Heat Removal System (RHS) are in service.
- RCS Temperature is 250 °F and LOWERING.
- A12-1D, "Safety Injection Signal" has annunciated.
- The Control Room Team confirms an Inadvertent Safety Injection Actuation occurred and enters the appropriate procedure.
- All systems function as designed.

Which ONE of the following will be the status of the RHS system flow? (Assume no operator action.)

A. RHS flow is affected because BOTH RHS pumps trip.

B. RHS flow continues to return to RCS "A" & "C" cold leg loops.

C. RHS flow continues to return to RCS "B" & "C" cold leg loops.

D. RHS flow is affected because one inlet isolation valve in each train AUTO closes.

Answer: C

Explanation/Justification:

A. Incorrect. This would be correct if a CIB were to occur. Since an inadvertent SI occurred, there is no reason to believe a high containment pressure condition exists.

B. Incorrect. Correct that RHS flow continues, however, the candidate may not know the SIS interrelationship is back to the B versus A cold leg common connection.

C. Correct. An SIS will not impact RHR system flow directly unless containment pressure were to increase greater than 11 psig (CIB) or a manual CIB signal were generated. AOP 2.6.9, "Inadvertent SI Actuation < 350 F does check RHR status because CCP flow will be effected to RHS because SIS causes a CIA which causes an isolation of CCP cooling to RHS HX's. RHS flow to the common loops where SIS and RCS tie together is however unaffected. The candidate must have knowledge of specific SIS signal cause/effect relationships as well as the physical connection where they tie into a common SI return line to the RCS.

D. Incorrect. Both inlet isolation valves on each train receive an auto close signal on high system pressure (700 psig). With no operator action it is plausible that RCS pressure may increase and cause auto isolation. At 250 F, OPPS has been placed in service and RHR inlet isolation valve auto closure has been defeated, therefore no isolation will occur.

Sys #	**System**	**Category**	**KA Statement**
005	Residual Heat Removal	K1 Knowledge of the physical connections and/or cause/effect relationships between the RHRS and the following systems:	SIS

K/A# K1.13 **K/A Importance** 3.3 **Exam Level** RO

References provided to Candidate None **Technical References:** 2SQS-10.1 Powerpoint
OP Manual Fig. 10-1, Rev. 16
2OM-53C.4.2.6.9, Rev. 0, pg. 7

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Objective: 2SQS-10.1 18. Given a specific plant condition, predict the response of RHR System control room indications and control loops, including all automatic functions and changes in equipment status, for either a change in plant condition or off normal condition.

33. Which ONE of the following ECCS actuation signals will directly result in a trip of the **[2FWS-P21A2]**, Main Feedwater Pump Motor?

A. Train "B" Feedwater Isolation Signal.

B. Train "B" Partial Feedwater Isolation Signal.

C. Train "A" Low Steam Line Pressure Safety Injection Signal.

D. Train "A" Low Pressurizer Pressure Safety Injection Signal.

Answer: A

Explanation/Justification:

A. Correct. According to UFSAR Logic and 2OM-24.1, A FWI signal from Train B will directly trip the 2FWS-P21A2 motor. This FWI signal is generated by ECCS actuation. The K/A is met because the candidate must know that the ECCS actuation signal has a cause/effect relationship with the MFW system.

B. Incorrect. A partial FWI signal will only close the MFRV's but will not trip the FW pump.

C. Incorrect. The "A" Low Steam Line Pressure SI signal will indirectly trip the 2FWS-P21A1 motor not the 2FWS-P21A2 motor. (Train specific)

D. Incorrect. The "A" Low PRZR Pressure SI signal will indirectly trip the 2FWS-P21A1 motor not the 2FWS-P21A2 motor. (Train specific)

Sys #	**System**	**Category**		**KA Statement**
006	Emergency Core Cooling	K1 Knowledge of the physical connections and/or cause/effect relationships between the ECCS and the following systems:		MFW System
K/A# K1.07		**K/A Importance** 2.9*	**Exam Level**	RO
References provided to Candidate		None	**Technical References:**	2OM-24.1.D, Rev. 6, pg. 10 UFSAR BVPS Unit 2 Figure 7.3-13 & 18

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Objective: 2SQS-24.1 35. Given a MF, S/U FW, AFW or SGWLC system configuration and without referenced material, describe the associated system control room response to the following actuation signals, including automatic functions and changes in equipment status as applicable: Safety Injection.

34. Given the following plant conditions:

- The plant was operating at 100% power with all systems in NSA.
- A 25% load rejection occurred.
- A4-3H, "PRESSURIZER RELIEF TANK TROUBLE" annunciates.
- PRT Temperature is 150 °F and RISING.
- PRT Pressure is 18 psig and SLOWLY RISING.
- The RO suspects a PRZR PORV or Safety Valve opened and is now stuck partially OPEN.

Which ONE of the following indications will confirm a Safety Valve is the cause of leakage **AND** what **AUTOMATIC** action will reduce PRT pressure if NO OPERATOR action were to occur?

PRZR Safety Relief line temperatures ___ (1) ___.
PRT Pressure will be reduced ____ (2) ____

A. (1) are RISING.
(2) when the PRT Rupture disc(s) blow.

B. (1) are consistent with PRZR temperature.
(2) when the PRT Relief Valve(s) open.

C. (1) are RISING.
(2) when [2RCS-AOV519], "Makeup Water to PRT Valve" opens **ONLY**.

D. (1) are consistent with PRZR temperature.
(2) when **BOTH** [2RCS-AOV519] **AND** [2RCS-MOV516] PRT Spray Valves open.

Answer: A

Explanation/Justification:

A. Correct. The candidate must be able to analyze the conditions provided and apply system knowledge. For the conditions provided a leaking PRZR or Safety Valve do discharge to the PRT and rising temperatures are indicative of discharge to the PRT. Correct that PRZR Safety Relief line temperature is rising. The PRT rupture disk(s) will automatically rupture to reduce PRT pressure.

B. Incorrect. Incorrect but plausible misconception of isenthalpic processes (TMI). Correct that the PRT relief valve functions to lift before the rupture disk(s) is (are) blown.

C. Incorrect. Correct PRZR Safety line temperature response. 2RCS-AOV519 is procedurally used to lower pressure, however, it is not an automatic action in Unit 2.

D. Incorrect. Incorrect PRZR Safety line temperature response. 2RCS-AOV519 and 2RCS-MOV516 are procedurally used to lower pressure, however, it is not an automatic action in Unit 2.

Sys #	**System**	**Category**			**KA Statement**
007	Pressurizer Relief/Quench Tank	A3 Ability to monitor automatic operation of the PRTS, including:			Components which discharge to the PRT
K/A#	A3.01	**K/A Importance**	2.7*	**Exam Level**	RO
References provided to Candidate		None		**Technical References:**	2SQS-6.4 Powerpoint Diagram, Rev. 15 2OM-6.1.C, Rev. 5, pg. 34 & 35 2OM-6.1.D, Rev. 3, pg. 7 – 9 2OM-6.4.AAY, Rev. 10, pg. 2 & 3

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5)

Objective: 2SQS-6.4 10. Given a specific plant condition, predict the response of the PRZR & PRZR Relief System control room indications and control loops, including all automatic functions and changes in equipment status, for either a change in plant condition or off-normal condition: excessive primary plant leakage.

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

- The Unit is at Full power with all systems in NSA.
- [2CCP*P21B] "B" Pri Comp Clg Wtr Pump is running.
- [2CCP*P21A] "A" Pri Comp Clg Wtr Pump is in standby.
- A Large Break LOCA occurs.
- Plant systems function as designed **except** Train "B" CIB fails to actuate.
- No operator actions occur.

Which ONE of the following describes the CCP flow indications on the MCB?

[2CCP*FI117A1] "PRI COMP CLG HIGH RNG FLOW" will ____ (1) ____
[2CCP*FI117B1] "PRI COMP CLG HIGH RNG FLOW" will ____ (2) ____
[2CCP-FI117A2] "PRI COMP CLG LOW RANGE FLOW" will ____ (3) ____
[2CCP-FI117B2] "PRI COMP CLG LOW RANGE FLOW" will ____ (4) ____

A. (1) lower to ZERO
(2) lower to ZERO
(3) lower to ZERO
(4) lower to ZERO

B. (1) remain the same
(2) lower to ZERO
(3) remain the same
(4) lower to ZERO

C. (1) remain the same
(2) remain the same
(3) remain the same
(4) remain the same

D. (1) lower to ZERO
(2) remain the same
(3) lower to ZERO
(4) remain the same

Answer: A

Explanation/Justification:

A. Correct. The candidate must be able to predict the impact of a Train A CIB signal on CCW flow rate. The impact of only a Train A CIB signal is that B CCP pump will continue to operate. 2CCP*MOV150-2, 151-1, 156-2 & 157-1 are closed from a Train A CIB. These valves close one valve in each header which will result in zero flow to both supply and return headers to both Train A & B.

B. Incorrect. Plausible if the candidate believes that Train A CIB only closes Train B supply & return header valves. Distractor symmetry.

C. Incorrect. Plausible if the candidate does not recognize the impact of CIB on CCP system or does not understand system flowpath and/or alignment.

D. Incorrect. Plausible if the candidate believes that Train A CIB only closes Train A supply & return header valves.

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

K/A# A1.01 **K/A Importance** 2.8 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-15.1.D, Issue 4, Rev. 1, pg. 1 & 2; OP Manual Figure 15-1 & 3; 2SQS-15.1 Powerpoint Slide

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 45.5)

Objective: 2SQS-15.1 Given a condition of excessive reactor coolant system RCP CCP flow, summarize how the system will respond.

36. Given the following plant conditions:

- The Unit is at 100% power with all systems NSA **EXCEPT**:
  - 2RCS-PCV-455A, "PRZR Spray Valve" is in its FAIL position due to a broken air line **AND** the Proportional Heater is in PTL.
- Reactor Coolant System (RCS) Pressure is 2235 psig and STABLE.
- RCS Tavg is 578°F and STABLE.
- 2RCS*PT444, "Pressurizer (PRZR) Control Channel", fails **HIGH** over a ONE (1) minute period.

With no operator action, which ONE of the following describes how the PRZR Pressure Control System will respond?

A. TWO (2) PRZR PORVs will be OPEN.

B. ONE (1) PRZR PORV and ONE (1) PRZR Spray Valve will be OPEN.

C. ALL PRZR B/U heaters will be OFF and BOTH PRZR Spray Valves will be CLOSED.

D. ALL PRZR B/U heaters will be OFF and ONE (1) PRZR Spray Valve will be in NSA position.

Answer: B

Explanation/Justification:

A. Incorrect. These indications are indicative of 2RCS*PT445 failing in the high direction. Plausible if the candidate confuses the PRZR pressure control system inputs or does not understand the impact of the items which are OOS for this system.

B. Correct. A failure of 2RCS*PT444 in the high direction will typically result in 2RCS-PCV-455C opening and both PRZR spray Valves failing full open. 2RCS-PCV-455A fails closed on a loss of air, therefore only 2RCS-PCV-455B will open.

C. Incorrect. Correct PRZR B/U heater response except that NSA two heaters will be ON, so therefore not all heaters will be OFF. Both spray valves closing is indicative of 2RCS*PT444 failing in the low direction without any malfunction.

D. Incorrect. Correct PRZR B/U heater response except that NSA two heaters will be ON, so therefore not all heaters will be OFF. At 100% power, 2RCS-PCV-455A is typically slightly open. Since it is failed closed, it is not NSA. The other spray valve will be opening and it is plausible based on the integral impact of the failure on the master pressure controller which makes it difficult to ascertain the exact valve position.

Sys #	**System**	**Category**	**KA Statement**
010	Pressurizer Pressure Control	K6 Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS:	PZR sprays and heaters

K/A# K6.03 **K/A Importance** 3.2 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-6.4.IF, Rev. 13, pg. 16 -21 & 24

Question Source: New

Question Cognitive Level: Higher - Application **10 CFR Part 55 Content:** (CFR: 41.7 / 45.7)

Objective: 2SQS-6.4 27. Given a change in plant conditions, describe the response of the PRZR and Pressure Relief System field indication and control loops, including all automatic functions and changes in equipment status.

37. Given the following plant conditions:

- The Unit is operating at 45% power with all systems in NSA for this power level.
- Testing is in progress on Train "B" of SSPS.
- The "B" Reactor Trip Bypass Breaker is racked-in and closed.
- An instrument malfunction results in a reactor trip from the Train "A' Reactor Protection System **ONLY**.
- All systems function as designed.
- No operator action occurs.

Which ONE of the following will be the response of the Reactor Protection System **AND** the effect on the Turbine Generator?

A. Only the "A" Reactor Trip Breaker will open;
The Turbine Generator will trip.

B. Only the "A" Reactor Trip Breaker will open;
The Turbine Generator will **NOT** trip.

C. Both the "A" Reactor Trip Breaker **AND** the "B" Reactor Trip Bypass Breaker will open;
The Turbine Generator will trip.

D. Both the "A" Reactor Trip Breaker **AND** the "B" Reactor Trip Bypass Breaker will open;
The Turbine Generator will **NOT** trip.

Answer: C

Explanation/Justification:

A. Incorrect. Plausible if the candidate does not understand the RPS logic that they may believe only the "A' RTB opens. Correct turbine status.

B. Incorrect. Plausible if the candidate does not understand the RPS logic that they may believe only the "A' RTB opens. Incorrect turbine status.

C. Correct. The candidate must have knowledge of the effect that a malfunction of the RPS (Train A functions ONLY) and resultant effect on the Turbine Generator. The candidate must have knowledge of the RPS breaker configuration (RPS K/A). In the current plant configuration an "A" Train reactor trip signal will open both the "A" RTB and BYB. The turbine will trip because the reactor tripped. The candidate may confuse the P-9 logic and because we are below P-9 (49%), a turbine trip will not result in a reactor trip however this is not true in reverse.

D. Incorrect. Correct RPS status. Incorrect turbine status (refer to correct answer explanation).

Sys #	**System**	**Category**	**KA Statement**
012	Reactor Protection	K3 Knowledge of the effect that a loss or malfunction of the RPS will have on the following:	T/G

K/A# K3.02 **K/A Importance** 3.2* **Exam Level** RO

References provided to Candidate None **Technical References:** UFSAR Logic Figure 7.3.7 & 7.3-20
3SQS-1.1 Powerpoint Slide

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.6)

Objective: 3SQS-1.1 10. Given a specific plant condition, predict or describe the response of the RPS & ESF 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.

38. Given the following plant conditions:

- The plant is stable in Mode 3 following a reactor trip.
- Containment Pressure Transmitter 2LMS*PT950 has failed high.
- All required actions directed by the Instrument Failure Procedure were completed.
- Subsequently, 2LMS*PT951 fails high.

What will be the CIB and Safety Injection response, if any?

A. Both CIB and Safety Injection actuate.

B. CIB actuates but Safety Injection doesn't.

C. Neither CIB or Safety Injection actuate.

D. Safety Injection actuates but CIB doesn't.

Answer: C

Explanation/Justification:

A. A. Incorrect. Refer to correct answer explanation.

B. B. Incorrect. Refer to correct answer explanation.

C. C. Correct. The candidate must recognize that the initial failure was on CH-I. The stem states that all required actions of the IF procedure have been completed, which means that the CH-I input to the CIB actuation circuitry has been bypassed which changes the actuation logic from 2/4 to 2/3. Upon a subsequent failure of a 2nd channel, (CH-II), NO CIB actuations will occur because only 1 of 3 Channels have seen the failure. CH I does not provide input to Safety Injection actuation circuitry, so therefore when CH II fails it does not satisfy the 2/3 logic required for Safety Injection to actuate, therefore no SI actuation occurs. All distractors are plausible if the candidate does not know SSPS logics or impacts of these failures upon the system.

D. D. Incorrect. Refer to correct answer explanation.

Sys #	**System**	**Category**		**KA Statement**
013	Engineered Safety Features Actuation	K6 Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS:		Sensors and detectors

K/A# K6.01 **K/A Importance** 2.7* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-1.4.IF, Rev. 9, pg. 4-6

Question Source: Bank - Vision

Question Cognitive Level: Higher - Application **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 to 45.8)

Objective: 3SQS-1.1 10. Given a specific plant condition, predict or describe the response of the reactor protection system trip logics & ESFAS 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.

39. Given the following plant conditions:

- The Unit is operating at Full Power with all systems in NSA to ensure train separation.
- [2HVR*FN201A], "CNMT Air Recirc Fan" is running.
- [2HVR*FN201B], "CNMT Air Recirc Fan" is secured for maintenance.
- [2HVR*FN201C], "CNMT Air Recirc Fan" is running.
- A Loss of Bus 2P occurs.
- No operator action has occurred and all systems function as designed.

Which ONE of the following will be the **CURRENT** status of [2HVR*FN201A/C] Containment Air Recirculation Fans?

	[2HVR*FN201A]	[2HVR*FN201C]
A.	RUNNING	RUNNING
B.	RUNNING	**NOT** RUNNING
C.	**NOT** RUNNING	**NOT** RUNNING
D.	**NOT** RUNNING	RUNNING

Answer: B

Explanation/Justification:

A. Incorrect. Correct that 2HVR*FN201A is running, however, 2HVR*FN201C is tripped. Plausible because 2HVR*FN201C can be selected to either power supply.

B. Correct. 2HVR*FN201A is powered from Bus 2N, 2HVR*FN201B is powered from Bus 2P and 2HVR*FN201C can be powered from either 2N or 2P. In the stated plant conditions 2HVR*FN201C is running. Since 2HVR*FN201A is being supplied from 2N, NSA would dictate that 2HVR*FN201C would be aligned to the 2P bus to allow train separation. If 2P is lost then 2HVR*FN201A will be the only running containment air recirc fan. It is necessary to state train separation in the question stem since procedurally it is allowable to run the "C" fan aligned to either bus. The candidate must have knowledge of how the "C" fan is aligned in order to answer this question.

C. Incorrect. Correct that 2HVR*FN201C is not running. Incorrect that 2HVR*FN201A is not running.

D. Incorrect. Opposite of the correct fan status.

Sys #	System	Category	KA Statement
022	Containment Cooling	K2 Knowledge of power supplies to the following:	Containment cooling fans

K/A# K2.01 **K/A Importance** 3.0* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-44C.3.C, Rev. 10, pg. 5 - 8; 2SQS-44C.1 PPNT, Rev.11

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: 2SQS-44C.1 2. Identify the power supplies for the components identified on the Normal System Arrangement System flowpath drawing which are powered from the class 1E electrical distribution system.

40. Given the following plant conditions:

- A Unit Trip from 100% power with all systems in NSA due to a LOCA occurred.
- The Control Room Team transitioned to ES-1.3, “Transfer to Cold Leg Recirculation”.
- The following automatic actuations on Attachment A-0.7, “Cold Leg Recirculation Actuation” have been verified.
  - [2RSS*P21C/21D], “C/D” Recirc Spray Pumps” are running.
  - [2SIS*MOV8887A/B], “LHSI Crossover Valves” are CLOSED.
  - [2SIS*MOV8811A/B], “C/D” RSS Discharge to LHSI Discharge Line Valves” are OPEN.
  - [2RSS*MOV156C/D], “RSS 21C/D Spray Header Isol Valves” are CLOSED.

Which of the following valves will **automatically** CLOSE to **prevent** radioactive release from the containment to the RWST? (disregard system check valves)

1. LHSI Pump Mini Flow Valves [2SIS*MOV8890A/B]
2. LHSI Pump Suction Valves [2SIS*MOV8809A/B]
3. RWST Valves to HHSI Pump Suction Valves [2CHS*LCV115B/D]
4. LHSI Pump Discharge to Cold Leg Valves [2SIS*MOV8888A/B]

A. 1, 2, 3 **AND** 4.

B. 1 **AND** 3 **ONLY**.

C. 2 **AND** 4 **ONLY**.

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

Answer: D

Explanation/Justification:

A. Incorrect. (refer to correct answer explanation) 4 is not correct.

B. Incorrect. (refer to correct answer explanation) 2 is also an interlock that prevents radioactive release.

C. Incorrect. (refer to correct answer explanation) 3 is also an interlock that prevents radioactive release.

D. Correct. The candidate must know the design features for cold leg recirculation swapover and be aware of how these realignments by design minimize the escape of radioactivity from the containment to the RWST. The stem of the question describes the containment spray lineup to satisfy the system K/A and ensures that we have a flowpath from the containment to outside of containment. The next automatic action is for LHSI pumps to start which by interlock will close LHSI suction valves. When the LHSI are stopped (flow <1000 gpm) the associated mini flow valves close. The RWST valves to HHSI pump suction valves close when 2SIS*MOV863A/B open which occurs also after the LHSI pumps trip. The LHSI Pump Discharge to Cold Leg Valves do not close on interlock and are not associated with preventing radioactive release to the RSWT. Plausible because the candidate may believe the LSHI suction and discharge valves are both necessary to prevent backflow. The question is focused on automatic interlocks so therefore disregard system check valves is included in the question stem.

Sys #	System	Category	KA Statement
026	Containment Spray	K4 Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following:	Prevention of path for escape of radioactivity from containment to the outside (interlock on RWST isolation after swapover).

K/A# K4.09 **K/A Importance** 3.7* **Exam Level** RO

References provided to Candidate None

Technical References: BVPS-2 UFSAR, Rev. 17, pg. 6.3.3 & 4
2SQS-11.1 Powerpoint Figures
2OM-53A.1.ES-1.3, Issue 1C, Rev. 6, pg. 4
2OM-53A.1.A-0.7, Rev. 3, pg. 2-4

Question Source: New

Question Cognitive Level: Higher – Analysis & Application **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: 2SQS-13.1 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 conditions or for an off-normal condition.

41. Given the following plant conditions:

- The Control Room Team is performing 2OM-52.4.R.1.F, "Station Shutdown from 100% Power to Mode 5".
- The procedure directs RCS cooldown by dumping steam by adjusting [2MSS-PK464], Main Stm Manifold Press Control in AUTO or MANUAL.
- Current RCS temperature is 495 °F and LOWERING.

The maximum allowable normal RCS C/D rate allowed by 2OM-52.4.R.1.F is ___ (1) ___ **AND** the reason for this C/D limit is to ensure ___ (2) ___.

A. (1) 50°F/hr
(2) reactor vessel brittle fracture margins are maintained.

B. (1) 60°F/hr
(2) reactor vessel brittle fracture margins are maintained.

C. (1) 90°F/hr
(2) TS & LRM limits are not exceeded.

D. (1) 100°F/hr
(2) TS & LRM limits are not exceeded.

Answer: C

Explanation/Justification:

A. Incorrect. 50 F/hr is a cool-down rate specified in accordance with 2OM-52.4.R.1F to initially begin RCS C/D but is not the maximum allowable rate. Correct reason for limit.

B. Incorrect. 60 F/hr is the maximum allowed heatup rate in accordance with 2OM-52.4.R.1F. Correct reason for limit.

C. Correct. 90 F/hr is the TS maximum allowed normal RCS C/D limit allowed by 2OM-52.4.R.1F. During abnormal or emergency conditions this limit does not apply. The basis of this C/D rate is so the RCS is not operated under conditions that can result in brittle fracture of the RCPB. Violating LCO limits places the reactor vessel outside the bounds of the stress analyses. The LCO establishes operating limits that provide a margin to brittle failure of the reactor vessel and piping of the Reactor Coolant Pressure Boundary. So therefore the limit is to ensure TS & LRM limits are not exceeded.

D. Incorrect. According to LRM Section 5.2, 100 F/hr is the maximum allowed RCS cooldown rate. Correct C/D rate bases.

Sys #	System	Category	KA Statement
039	Main and Reheat Steam	K5 Knowledge of the operational implications of the following concepts as the apply to the MRSS:	Bases for RCS cooldown limits

K/A# K5.05 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** BVPS TS 3.4.3, Amend 278/161
LRM 5.2.1.1, Rev. 62, pg. 5.2-1, 2,13, & 17
BVPS TS 3.4.3 Bases, Rev. 0
2OM-52.4.R.1.F, Rev. 23, pg 29 - 33 & 79

Question Source: New

Question Cognitive Level: Lower- Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5 / 45.7)

Objective: 3SQS-ITS.007 2. State the purpose of each TS 3.4 specification as described in the Applicable Safety Analysis section of the TS Bases.

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

- The plant is operating at 100% power with all systems in NSA EXCEPT:
    - [2FWE*P23A], "A Motor Driven Auxiliary Feedwater Pump" is OOS.
- A Loss of Offsite power coincident with a turbine trip occurs.
- Bus 2DF has an overcurrent lockout.
- All systems function as designed.

With no operator action, which ONE of the following describes the response of the Auxiliary Feedwater (AFW) System?

A total AFW flow of approximately ____ (1) ____ GPM will be provided to ALL Steam Generators through the ____ (2) _____.

A. (1) 375
(2) "A" Header ONLY.

B. (1) 700
(2) "B" Header ONLY.

C. (1) 700
(2) "A" Header ONLY.

D. (1) 900
(2) "A" AND "B" Headers.

Answer: C

Explanation/Justification:

A. Incorrect. Incorrect capacity. Correct header. Plausible if the candidate does not know the capacities or misunderstands the initial plant conditions. One validator chose this distractor based on confusing the AFW pump capacities.

B. Incorrect. Correct capacity. Incorrect header. Plausible if the candidate believes NSA is to the "B" header or believes the impact of 2FWE*P23A is realignment of 2FWE-P22 to the "B" header.

C. Correct. A loss of offsite power coincident with a turbine trip results in a reactor trip and subsequent loss of both MFW pumps. The EDGs are designed to start on a loss of power to AE and DF bus which will power both electric AFW pumps. In the stated conditions, with an overcurrent condition on the DF bus, 2FWE*P23B will not have power. Since 2FWE*P23A is already OOS, only 2FWE-P22 (Turbine Driven AFW pump) will start to provide approximately 700 gpm AFW flow. The AFW system is designed to feed all three S/G based on NSA alignment requirements. NSA has 2FWE-P22 aligned to the "A" Header.

D. Incorrect. Correct capacity. If the candidate does not know the capacities or understand the impact based on initial plant conditions, then it is plausible that AFW flow would be provided through the "A" header by 2FWE-P22 and the "B" header by 2FWE*P23B. In this case the total flow will be 900 gpm based on limiting orifices which limit flow to 300 gpm per S/G. Incorrect because 2FWE*P23B has no power.

Sys #	System	Category	KA Statement
059	Main Feedwater	K3 Knowledge of the effect that a loss or malfunction of the MFW will have on the following:	AFW system

K/A# K3.02 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-24.1.C, Rev.2, pg. 5 & 6
2SQS-24.1, Rev. 24 PPNT slide.

Question Source: Bank – 1LOT8 NRC Exam Q#42

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.6)

Objective: 2SQS-24.1 16. Given a Main Feedwater, Startup Feedwater, Auxiliary Feedwater System or Steam Generator Water Level Control System configuration and without referenced material, describe the associated system's control room response to the following off-normal conditions, including automatic functions and changes in equipment status as applicable. Loss of instrument air or Loss of electrical power.

43. Given the following plant conditions:

- The plant is in Mode 3 following a reactor trip from an extended 450 day run.
- A 50 °F/hr cool down from 547 °F has just begun.
- S/G NR Water Levels are being maintained constant at 44% using AFW.

Which ONE of the following describes the **REQUIRED** AFW flow trend **REQUIRED** to maintain a constant RCS cool down rate to Mode 5?

A. AFW flow requirements will be constant as long as the C/D rate remains constant.

B. Less AFW flow will be required to maintain S/G Water Level due to decreased density.

C. AFW flow requirements will be constant as long as S/G Water Level remains constant.

D. Less AFW flow will be required to maintain S/G Water Level because heat input to S/Gs drops.

Answer: D

Explanation/Justification:

A. Incorrect. Eventually as the cool down continues, RHS will be placed in service which will reduce the steaming rate if the cool down rate is maintained constant. Less steam requires less AFW flow.

B. Incorrect. Density will increase versus decrease. Less AFW flow is required as the amount of heat transfer from the RCS to S/Gs drops.

C. Incorrect. It requires less feedwater to maintain a constant S/G water level as the RCS cooldown continues. Otherwise, AFW pumps would be adequate for full power operation.

D. Correct. This is an operational fundamental question that requires the candidate to simply understand that decay heat rate drops over time. Therefore less AFW flow is required as the amount of heat transfer from the RCS to S/Gs drops.

Sys #	**System**	**Category**	**KA Statement**
061	Auxiliary/ Emergency Feedwater	K5 Knowledge of the operational implications of the following concepts as the apply to the AFW:	Relationship between AFW flow and RCS heat transfer

K/A# K5.01 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** Thermodynamic/Reactor Theory Fundamentals

Question Source: Bank – 2LOT5 NRC Exam #20

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5 / 45.7)

Objective: 2SQS-24.1 17. Given a specific plant condition, predict the response of the MF, S/U Feed, AFW, or SGWLC system's control room indication and control loops, including all automatic functions and changes in equipment status, for either a change in plant conditions or for an off normal condition.

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

- The Unit was operating at 45% with AMSAC removed from service for testing.
- A reactor trip occurred one minute ago.
- Safety Injection did **NOT** actuate and is **NOT REQUIRED**.
- ALL Steam Generator Narrow Range level indicators dropped to the following levels before recovering:
    - "A" S/G 33%
    - "B" S/G 11%
    - "C" S/G 22%

Containment conditions are normal and all equipment functioned as designed.
No operator action has yet occurred.

After completion of E-0, "Reactor Trip or Safety Injection" IOAs, which ONE of the following will be the Auxiliary Feedwater Pump(s) status and associated flow requirements, if any?

A. Turbine driven pump running with no flow requirements.

B. Turbine driven pump running with flow > 340 gpm required.

C. Motor and Turbine driven pumps running with no flow requirements.

D. Motor and Turbine driven pumps running with flow > 340 gpm required.

Answer: A

Explanation/Justification:

A. Correct. The candidate must be able to analyze plant conditions and apply the conditions to the automatic start status of the AFW pumps. Specifically they must monitor changes in S/G water level as well as other parameters to determine which AFW pumps have started and also determine heat sink requirements based on these S/G levels. None of the start permissives have been met to auto start the motor driven AFW pumps. The Turbine AFW pump has started on low S/G water level in "B" S/G due to water level being < 20.5% (2/3 Lo-Lo S/G Levels on 1/3 S/Gs). Since "A" & "C" S/G have >12% (31%) with no adverse containment, then no flow is required to meet heat sink requirements. All distractors are plausible if the candidate does not properly apply the auto start permissives for the AFW pumps (Motor Driven AFW Pumps require 2/3 Lo-Lo S/G Levels on 2/3 S/Gs). Unit 2 requires >12% in any S/G or 340 gpm total feedwater flow for heat sink IAW F-0.3 Heat Sink.

B. Incorrect. Correct pump status. Incorrect heat sink requirement (refer to correct answer explanation)

C. Incorrect. Incorrect pump status. Correct heat sink requirement (refer to correct answer explanation)

D. Incorrect. Incorrect pump status. Incorrect heat sink requirement (refer to correct answer explanation)

Sys #	**System**	**Category**	**KA Statement**
061	Auxiliary/ Emergency Feedwater	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW controls including:	S/G level

K/A# A1.01 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-24.1.D, Rev. 6, pg. 16 – 18
2OM-53A.1.F-0.3, Issue 1C, Rev. 2, pg. 1
2OM-24.2.B, Rev. 16, pg. 2

Question Source: Bank – Vision # 51709

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 45.5)

Objective: 2SQS-24.1 40. Given a specific plant condition, predict the response of the MFW, SUFW, AFW, or SGWLC systems 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.

45. Given the following plant conditions:

- The Unit is operating at Full Power with all systems in NSA.
- The Control Room Crew is synchronizing the 2-1 Emergency Diesel Generator (EDG) to the grid for surveillance IAW 2OST-36.1, "EDG [2EGS*EG2-1], "Monthly Test".
- 2-1 EDG speed is approximately 514 RPM.
- 2-1 EMERG GEN SYNCHRONIZING SELECTOR switch is positioned to the BUS 2AE position.
- The EDG synchroscope needle begins rotating very slowly in the counter-clockwise direction.

Which ONE of the following is the next **REQUIRED** action to parallel the EDG to the grid?

Place 2-1 EMERG GEN _______________.

A. GOVERNOR switch to the RAISE position

B. OUTPUT breaker control switch to CLOSE

C. GOVERNOR switch to the LOWER position

D. MTR operated GND Disconnect switch to CLOSE

Answer: A

Explanation/Justification:

A. Correct. The candidate must have knowledge of OST-36.1 and be able to monitor and operate control switches to parallel the EDG to the grid for surveillance from the control room. Specifically they must know the evolution sequence and also that the indications provided reflect that the EDG is slower than the grid frequency, therefore the governor switch must be placed to raise to increase the EDG speed so that the synchroscope is rotating slowly in the clockwise direction.

B. Incorrect. This action may result in damage to the EDG since there is no out of phase protection. Plausible if the candidate believes we have the proper initial conditions to parallel power sources.

C. Incorrect. The governor switch would be placed in the raise position as opposed to the lower position in order to get the synchroscope rotating in the clockwise direction. Plausible if the candidate does not understand the operation of this switch or required direction.

D. Incorrect. This step was completed prior to placing the synchronizing selector switch to the Bus 2AE position. Plausible if the candidate does not understand system lineup or procedural direction. When performing other procedures such as accelerated run-in this switch is closed just prior to closing the EDG output breaker.

Sys #	**System**	**Category**			**KA Statement**
062	AC Electrical Distribution	A4 Ability to manually operate and/or monitor in the control room:			Synchronizing and paralleling of different ac supplies
K/A#	A4.07	**K/A Importance**	3.1*	**Exam Level**	RO

References provided to Candidate None **Technical References:** 2OST-36.1, Rev. 66, pg. 35 – 38

Question Source: New

Question Cognitive Level: Higher - Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 / to 45.8)

Objective: 2SQS-36.2 15. Given a set of plant conditions and the appropriate procedure(s), apply the operational sequence, parameter limits, precaution and limitations, and cautions and notes applicable to the completion of the task activities in the control room.

46. Given the following plant conditions:

- The Unit is operating at Full Power with all systems in NSA EXCEPT:
  - Power Range Nuclear Instrument N-43 is OOS and associated bistables are tripped.
- A1-1C, "VITAL BUS INVERTER OPERATION/TROUBLE" annunciator is received.
- Computer address V0101D indicates Vital Bus 2-1 INV TROUBLE.
- Once dispatched the NLO reports Inverter failure is indicated on [UPS*VITBS2-1].
- The reactor remains at power.

Assuming the system functioned as designed and no operator action has occurred, which ONE of the following will be the impact on Vital Bus 2-1 Loads?

Vital Bus 2-1 Loads _________

A. are being supplied by 125 VDC SWBD 2-1.

B. are being supplied by an alternate source (MCC2-E05) via static switch.

C. are being supplied by an alternate source (MCC2-E08) via static switch.

D. are **NOT** being supplied until the static switch is manually transferred.

Answer: B

Explanation/Justification:

A. Incorrect. Plausible because this would be the supply of power for a rectifier failure. Indications provided do not support this as the cause. Since A1-1C is a common annunciator, the plant computer would have a different message specifying Vital Bus 2-1 Batt Operating which indicates a rectifier failure as opposed to a inverter failure has occurred.

B. Correct. The candidate must know the system design for the UPS power sources. They must understand the indications provided in the question stem as noted above. On a loss of UPS inverter, a static switch is designed to automatically swap over to an alternate source of power which will be from MCC2-E05.

C. Incorrect. Correct that Vital Bus 1 will be supplied by an alternate source via a static switch, however, the candidate must know that MCC2-E07 is the alternate power supply to Vital Bus 4 versus Bus 1.

D. Incorrect. Plausible if a complete loss of power to Vital Bus 1 occurred, however, the candidate must recognize that with NI-43 de-energized that N-41 is still energized, otherwise a reactor trip would have occurred since the 2 of 4 logic would be made up.

Sys #	**System**	**Category**	**KA Statement**
062	AC Electrical Distribution	K4 Knowledge of ac distribution system design feature(s) and/or interlock(s) which provide for the following:	Uninterruptable ac power sources

K/A# K4.10 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-38.4.AAA, Rev. 7, pg. 2, 7 & 8
3SQS-38.1 Powerpoint Slides, Rev. 6
2OM-38.1.B, Issue 4, Rev. 1, pg. 2-3

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: 3SQS-38.1 4. From memory, describe the control, protection, and interlock functions associated with the 120 VAC Distribution System operation for the following: as applicable include automatic functions, setpoints, and changes in equipment status: Static Switches.

47. Given the following plant conditions:

- The plant is operating at Full Power with all systems in NSA.
- Multiple control room alarms and indications simultaneously occur.
- The following indications exist:
  - All Rod Bottom Lights are LIT.
  - All Main Steam Isolation Valves are closed.
  - Loss of benchboard indicating lights for loads on 4KV Bus 2AE and 480V Bus 2-8N.
  - Letdown flow indicates ZERO (0).
- All systems function as designed.
- No operator actions have yet occurred.

Based on these plant conditions, which ONE of the following is the cause of these plant conditions?

A. A Loss of 480V Bus 2N occurred.

B. A Loss of 125VDC Bus 2-1 occurred.

C. A Loss of 125VDC Bus 2-2 occurred.

D. A Loss of 120VAC Vital Bus 1 occurred.

Answer: B

Explanation/Justification:

A. Incorrect. Plausible since it has some commonalities. The reactor would not trip for this condition.

B. Correct. The candidate must be able to evaluate the plant conditions and make an operational judgment based on indications provided related to the DC Electrical System. The judgment necessary to be made is the cause of plant performance or conditions provided in the stem. The candidate must recognize that the reactor is tripped based on all rod bottom lights lit. A Loss of DC Bus 1 will result in an automatic reactor trip due to MSIV's closing. An automatic letdown isolation will occur. Another non direct symptom provided is Loss of Benchboard lights for loads on 2AE and Bus 8N.

C. Incorrect. Plausible since all of the indications are the same for a Loss of DC Bus 2 with the exception of the opposite bus 2DF and 9P are impacted.

D. Incorrect. Plausible if the candidate confuses a Loss of Vital Bus 1 with a Loss of DC Bus. Letdown will isolate in both cases.

Sys #	**System**	**Category**	**KA Statement**
063	DC Electrical Distribution	Generic	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

K/A# 2.1.7 **K/A Importance** 4.4 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.38.1A, Rev. 4, pg 1
2OM-53C.4.1.39.1A, Rev. 3, pg. 1, 2, & 7
2OM-53C.4.1.39.1B, Rev. 3, pg. 1

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.12 / 45.13)

Objective: 3SQS-39.1 20. Given a change in plant conditions due to a system/component failure, analyze the 125VDC Distribution System to determine what failure occurred.

48. Given the following plant conditions:

- The Unit is operating at 100% power with all systems in NSA.
- A8-10A, "125V DC Bus 2-1 Ground" is received and acknowledged.
- The Control Room Team references 2OM-39.4.F, "Clearing Grounds (125 VDC Buses 2-1 and 2-2)".

Which ONE of the following is the impact if more than one ground exists **AND** what action will be taken to preclude this impact according to this procedure?

The impact of multiple DC grounds is that ____ (1) ____.
To preclude this impact ____ (2) ____.

A. (1) inadvertent actuations may occur.
(2) de-energize DC Bus 2-1 until grounds are located.

B. (1) inadvertent actuations may occur.
(2) open knife switches or breakers prior to resetting relays.

C. (1) control functions may not occur when called upon.
(2) de-energize DC Bus 2-1 until grounds are located.

D. (1) control functions may not occur when called upon.
(2) the unit must be shutdown within 1 hour if grounds are not isolated.

Answer: B

Explanation/Justification:

A. Incorrect. Correct impact according to 2OM-39.4.F. Incorrect but plausible action. Grounds are located by isolating individual components supplied by DC-Bus 2-1. If the entire bus were de-energized it would be difficult to locate and isolate the ground.

B. Correct. The candidate must be able to predict the impacts of multiple DC grounds on DC Bus 2-1. According to 2OM-39.4.F, the impact of multiple grounds is that inadvertent actuations may occur. BVPS has had some actual OE regarding this issue. The candidate must also be able to use procedures to control the impact of multiple grounds. According to the precautions and limitations of the same reference, the method of control is to open knife switches or breakers prior to resetting relays.

C. Incorrect. Correct impact not referenced in our procedure, however, from research it is also possible with a DC ground that control functions may not operate when called upon depending on the resistance of the circuit. Incorrect but plausible action as explained in A above.

D. Incorrect. Correct impact not referenced in our procedure, however, from research it is also possible with a DC ground that control functions may not operate when called upon depending on the resistance of the circuit. Plausible incorrect action. TS 3.8.4 actions if a battery charger is inoperable is a 2 hour action. The RO is required to know ≤ 1 hour TS actions from memory.

Sys #	**System**	**Category**	**KA Statement**
063	DC Electrical Distribution	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** 2.5 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-39.4.AAJ, Issue 4, Rev. 1, pg. 2
2OM-39.4.F, Rev. 5, pg. 2 – 4
NETA World 2008, pg. 2

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Objective: 3SQS-39.1 19. Given a 125 VDC Distribution System alarm condition and using the ARP determine the appropriate alarm response, including automatic and operator actions in the control room.

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

- The Unit suffered a Loss of Off-Site Power.
- Both Emergency Diesel Generators (EDGs) are supplying emergency busses.
- Grid stability is confirmed and the Operations Manager has granted permission to return to the grid.
- The Control Room Team is performing 2OM-36.4.E, "Transferring 4KV Emergency Bus 2AE to Bus 2A".
- EDG 2-1 is being synchronized to the grid and ACB 2E7 is closed.
- Upon ACB 2E7 closure, the following annunciator sequence occurs:
  - A8-2B, "4160V EMER BUS 2AE ACB 2E7 OVERCURRENT TRIP" received.
  - A8-2A, "4160V EMER BUS 2AE ACB 2A10/2E7 AUTO TRIP" received.
  - A8-2B, "4160V EMER BUS 2AE ACB 2E7 OVERCURRENT TRIP" clears.
- A8-4E, "DIESEL GEN 2-1 LOCAL PANEL TROUBLE" was also received.
- The NLO confirms the cause of EDG 2-1 local alarm is High Lube Oil Temperature.

Which ONE of the following describes the impact on EDG 2-1?

EDG 2-1 will ________ cooling water available.

A. trip <u>with</u>

B. trip <u>without</u>

C. continue to run <u>with</u>

D. continue to run <u>without</u>

<u>Answer: C</u>

Explanation/Justification:

A. Incorrect. EDG 2-1 does not trip but remains running. Plausible that the EDG would trip on an overcurrent condition, however, protection in this scenario is provided by ACB 2E7. Correct that cooling is still available. (refer to correct answer explanation)

B. Incorrect. EDG 2-1 does not trip but remains running. Plausible that the EDG would trip on an overcurrent condition, however, protection in this scenario is provided by ACB 2E7. Also incorrect that cooling water is not available. (refer to correct answer explanation)

C. Correct. For the given conditions, EDG 2-1 is running paralleled to the grid. An overcurrent condition was caused by the closure of ACB2E7 and results in ACB 2A10 & 2E7 automatically opening. Upon ACB-2E7 opening, the overcurrent condition clears which is indicative of the problem being downstream of ACB 2E7. The EDG will continue to run with cooling since ACB2E10 remains closed and EDG cooling would be maintained from the running "A" Train SW pump being supplied by the AE Bus powered by the EDG. It is not RO knowledge to select procedures so therefore only the first part of the higher cognitive K/A was tested. For purposes of satisfying the K/A, the Aux Feeder Breaker is the 2E7 breaker to the AE bus, this is where the SW pump is powered and the 480V sub supply to the cooling water valves for the EDG. On an emergency start the Lube Oil High Temperature EDG trip is bypassed.

D. Incorrect. Correct that EDG 2-1 remains running, incorrect that it is running without cooling. Plausible if the candidate believes the overcurrent trip opens ACB 2E10 and does not recognize or understand the RW system configuration. If the EDG did trip the opposite train SW cooling would need to be manually aligned.

Sys #	**System**	**Category**	**KA Statement**
064	Emergency Diesel Generator	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Consequences of opening auxiliary feeder bus (ED/G sub supply)

K/A# A2.13 **K/A Importance** 2.6* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-36.4.E, Rev. 10, pg. 3 & 4
2OM-36.4.ACC, Rev. 8, pg. 3 & 4
2OM-36.4.ACD, Rev. 3, pg. 3
4KV and SW Powerpoint Slides
2OM-36.1.D, Issue 4, Rev. 3, pg. 24

Question Source: Bank – 1LOT8 NRC Exam Q#48

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Objective: 2SQSQ-36.2 13. Given an EDG configuration and without referenced material, describe the EDG control room response to the following actuation signals, including automatic functions and changes in equipment status as applicable: SI or Bus UV.

50. Given the following plant conditions:

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

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

Based on this plant configuration, which ONE 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:

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	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
2OM-36.4.ADC, Rev. 7, pg 2 & 3
2OM-36.4.AEI, Rev. 16, pg. 2
2OM-36.1.D, Issue 4, Rev. 3, pg. 23 & 24
2OM-36.1.C, Rev. 4, pg. pg. 8 & 9

Question Source: New

Question Cognitive Level: Higher - Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 to 45.8)

Objective: 2SQS-36.2 36. 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.

51. Given the following plant conditions:

- The plant is operating at 100% with all systems in NSA.
- A liquid waste discharge is in progress to the Unit 1 Cooling Tower Blowdown.
- [2SWS-RQI102], "Component Cooling HX SW" fails upscale **HIGH**.
- [2CCP-RQI100], "Component Cooling Water" is reading normal and is unchanged.
- The following alarms are received:
  - A4-5A, "RADIATION MONITORING SYSTEM TROUBLE"
  - A4-5C, "RADIATION MONITORING LEVEL HIGH"
- On RM-11, it is confirmed that COMPONENT COOLING HX SW [2SWS-RQI102] is blinking RED.
- No other alarms are present and no operator action has occurred.
- All systems function as designed.

What will be the impact of this process monitor failure on the effluent release in progress?

The release will ____________

A. automatically terminate immediately.

B. continue and **IS** required to be manually terminated.

C. automatically terminate after a short time delay.

D. continue and is **NOT** required to be manually terminated.

Answer: D

Explanation/Justification:

A. Incorrect. Plausible if the candidate confuses this monitor with 2SGC-RQ100 which would result in auto termination if an upscale failure occurred.

B. Incorrect. Correct that release will continue and plausible but incorrect that the release must be manually terminated. The candidate must understand system interrelationships. With CCP in normal there is no reason to believe there is any radiation coming from the CCP system into the SW system.

C. Incorrect. Plausible if the candidate confuses this monitor with 2SGC-RQ100 which would result in auto termination if an upscale failure occurred and they also confuse or do not know that there is no time delay with this failure.

D. Correct. The candidate must understand how the failure of 2SWS-RQI102 will impact the effluent release in progress. There is no automatic action associated with this radiation monitor. Therefore an upscale failure will have no impact on the release. The candidate must also know the system interrelationships between CCP and SW. If there were a leak from the RCS into CCP, then there would be an alarm from 2CCP-RQI100. The ARP does not require any release to be terminated.

Sys #	**System**	**Category**	**KA Statement**
073	Process Radiation Monitoring	K3 Knowledge of the effect that a loss or malfunction of the PRM system will have on the following:	Radioactive effluent releases

K/A# K3.01 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None

Technical References:
2OM-43.4.AAA, Rev. 8, pg 2, 3, & 8
2OM-43.4.AAC, Rev. 1, pg. 2 & 3
2OM-43.4.ACG, Rev. 5, pg. 2
2OM-43.4.AEI, Rev. 7, pg. 2
2OM-43.4.ACO, Rev. 7, pg. 2
2OM-43.1.C, Rev. 4, pg. 55 & 59

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.6)

Objective: 2SQS-43.1 8. Given a specific plant condition, predict the response of the RM 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.

52. Given the following plant conditions:

- The Unit is operating at 80% power with all systems in NSA.
- A LOCA results in a Reactor Trip and SAFETY INJECTION.
- Immediately following the safety injection, [2SWS*P21A], Service Water Pump trips.
- All systems function as designed and NO operator actions occur.

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

1. [2CHS*P21A], HHSI Pump
2. [2CHS*P21B], HHSI Pump
3. [2SIS*P21B], LHSI Pump
4. [2HVC*ACU201B], Control Room Ventilation

A. 2 **AND** 4 **ONLY**.

B. 3 **AND** 4 **ONLY**.

C. 1 **AND** 2 **ONLY**.

D. 1, 2, **AND** 4.

Answer: D

Explanation/Justification:

A. Incorrect. Both B HHSI pump and B Control Room Ventilation will have cooling. This is incorrect because the A HHSI pump will also have cooling. Plausible if the candidate does not know about the auto start feature of A ESW for A header restoration.

B. Incorrect. LHSI pumps are cooled by local air cooling and require no service water cooling. Plausible if the candidate confuses LHSI and HHSI pump cooling. Correct that B Control Room Ventilation has SW cooling,

C. Incorrect. Correct that A & B HHSI pump will have cooling. Plausible if the candidate knows that LHSI pumps do not receive SW cooling and is unaware of the cooling medium to the B Control Room Ventilation.

D. Correct. Service Water provides cooling to the charging pump lube oil coolers. These pump become the High Head SI pumps on a SI signal. When the A" SW Pump tripped, a low pressure condition occurred resulting in an AUTO start of the "A" Emergency Service Water Pump which restores cooling to the "A" SW header. Therefore both High Head SI Pumps will have SW available. Control Room Ventilation is another emergency heat load which will have SW cooling.

Sys #	**System**	**Category**		**KA Statement**
076	Service Water	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. 5-7 OP Manual Figure 30-1,1A, & 2

Question Source: New

Question Cognitive Level: Higher - Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5)

Objective: 2SQS-30.1 36. Describe the control, protection and interlock functions for the control room components associated with the SW system, including automatic functions, setpoints, and changes in equipment status as applicable.

53. Given the following plant conditions:

- The Unit is at 100% power.
- Containment 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:

A. Correct. 2IAC-MOV131 and 2IAC*130 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 and subsequent CIA signal will auto close 2IAC*130. 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 both receive a CIA signal and close. This was the old configuration when running CNMT IAC instrument air to containment. Opening these valves will not restore IA to containment.

D. Incorrect. All three of these valves receive a CIA signal and close from their NSA open positions. The candidate may believe that these valves all need to be reopened to restore instrument air.

Sys #	**System**	**Category**			**KA Statement**
078	Instrument Air	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:**	2SQS-34.1, Rev. 18, pg. 3 2SQS-34.1 Power-point slide 2OM-53A.1.E-0, Issue 1C, Rev. 8, pg. 12

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.2 to 41.9)

Objective: 2SQS-34.1 14. Given a Unit 2 Compressed Air 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: Containment Isolation Signal Phase A (CIA)

54. Given the following plant conditions:

- The Unit was operating at Full Power with all systems in NSA.
- A steam line break occurred inside containment.
- An automatic reactor trip and 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.

Which ONE of the following will be the status of the Containment penetration lines for the Phase "A" (CIA) and Phase "B" (CIB) isolation valves **AND** what operator action is **REQUIRED**, if any?

A. All CIA & CIB valves close.
No operator action is required to isolate CIA/CIB penetrations.

B. Train "A" CIA & CIB valves close.
Operators must manually isolate Train "B" CIA **AND** CIB valves.

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

D. Train "A" CIA valves close. All CIB valves do **NOT** reposition.
Operators must manually isolate Train "B" CIA valves **ONLY**.

Answer: D

Explanation/Justification:

A. Incorrect. Plausible if the candidate believes that either train will isolate both trains 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. (refer to correct answer explanation)

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 only one train isolates all CIA valves. Correct that CIB valves did not reposition. Plausible incorrect action. (refer to correct answer explanation)

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 control room team 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 attempt manual isolation.

Sys #	System	Category	KA Statement
103	Containment	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-53A.1.E-0, Issue 1, Rev. 8, pg. 4
2OM-53A.1.A-0.11, Rev. 6, pg. 6
3SQS-1.1 Powerpoint, Rev. 7

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Objective: 3SQS-1.1 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. Given the following plant conditions:

- A Large Break LOCA occurred.
- An ORANGE path has developed on the Containment CSF Status Tree due to an abnormal rise in containment sump level.
- The Control Room Team transitions to FR-Z.2, "Response to Containment Flooding".

Which ONE of the following describes the mitigating strategy of this procedure?

The mitigating strategy of this procedure is to ____________________________

A. check for and isolate a faulted steam generator.

B. identify unexpected sources of sump water and isolate.

C. establish minimum safety injection flow to remove decay heat.

D. verify phase A containment isolation and start containment sump pumps.

Answer: B

Explanation/Justification:

A. Incorrect. Incorrect but plausible strategy related to FR-Z.1 versus FR-Z.2.

B. Correct. The RO candidate must have knowledge of the mitigation strategies related to containment flooding. They must have knowledge of FR-Z.2 major action categories. The major action category for this procedure is to identify unexpected sources of sump water and isolate. They must know that to get to FR-Z.2 that the sources of water must be beyond that provided by Safety Injection.

C. Incorrect. Throttling back on SI to reduce containment sump level is plausible, however, this is a mitigating strategy for ECA-1.1 versus FR-Z.2.

D. Incorrect. Plausible strategy related to FR-Z.1 versus FR-Z.2. Starting sump pumps to reduce containment level is plausible but an incorrect action.

Sys #	**System**	**Category**			**KA Statement**
103	Containment	Generic			Knowledge of EOP mitigation strategies.
K/A#	2.4.6	**K/A Importance**	3.7	**Exam Level**	RO
References provided to Candidate		None		**Technical References:**	2OM-53A.1.FR-Z.1, Issue 1C, Rev. 2, pg. 1 2OM-53A.1.FR-Z.2, Issue 1C, Rev. 2, pg. 1 & 2 2OM-53B.4.FR-Z.2, Issue 1C, Rev. 2, pg 1, 2, & 4

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective: 3SQS-53.3 3. State from memory the basis and sequence for the major action steps of each EOP procedure, IAW BVPS EOP Executive Volume.

56. Which ONE of the following describes the sequence of components from power supply to the Control Rod Drive Mechanism (CRDM's)?

    (RTB's = Reactor trip Breakers)
    (RDMG's = Rod Drive Motor Generators)

A. 480 VAC Substation 8N & 9P, RDMG's, RTB's, Power Cabinets.

B. 480 VAC Substation 8N & 9P, Power Cabinets, RDMG's, RTB's.

C. 480 VAC Substation 2-1 & 2-2, RDMG's, RTB's, Power Cabinets.

D. 480 VAC Substation 2-1 & 2-2, Power Cabinets, RDMG's, RTB's.

Answer: C

Explanation/Justification:

A. Incorrect. Plausible incorrect emergency power supply with correct flowpath.

B. Incorrect. Plausible emergency power supply with incorrect flowpath.

C. Correct. The candidate must know the power supply to the Motor Generator Sets and have understanding of the flowpath of this power to the Control Rod Drive Mechanisms. 480 VAC Substation 2-1 supplies power to 2RDS-MG21 and 480 VAC Substation 2-2 supplies power to 2RDS-MG22. The proper flowpath is via the RDMGs via the RTBs through the power cabinets to the CRDMs.

D. Incorrect. Correct power supply with plausible incorrect flowpath.

Sys #	**System**	**Category**	**KA Statement**
001	Control Rod Drive System	K2 Knowledge of bus power supplies to the following:	M/G sets

K/A# K2.05 **K/A Importance** 3.1* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-1.3.C, Rev. 18, pg. 13; 2OM-1.3 Powerpoint, Rev. 6

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: 3SQS-1.3 3. Describe how power is supplied to the Rod Drive Motor Generator sets, Logic/Power cabinets, DC Hold Cabinet, and the Control Rod Drive Mechanism coils.

57. Given the following plant conditions:

- The Unit is operating at 100% power with all systems in NSA.
- 120 VAC Vital Bus II de-energizes.

Which ONE of the following describes an **IMMEDIATE** consequence associated with the Loss of 120 VAC Vital Bus II?

A. MANUAL rod withdrawal is blocked.

B. All Atmospheric Steam Dump Valves failed closed.

C. RCS low flow reactor trip logic changes from 2/3 in 1/3 loops to 1/2 in 2/3 loops.

D. All Power Range NI 2/4 logic is reduced to 2/3 until the required bistables are tripped.

Answer: A

Explanation/Justification:

A. Correct. High Power Rod Stop logic is ¼. A loss of Vital Bus II causes a loss of control power which feeds bistables which when de-energized perform their function. The NIS Power Range High Setpoint Overpower Rod Stop Block Rod Withdrawal functions to prevent manual rod withdrawal. Auto rod withdrawal has been disabled.

B. Incorrect. The atmospheric steam dump valves will become unavailable for a Loss of Vital Bus 1 and are not affected by the Loss of Vital Bus II.

C. Incorrect. P-8 logic becomes 1/2 in 1/3 loops (above P-8).

D. Incorrect. The Vital Bus II loss results in the associated bistables tripping which results in a 1/3 remaining logic.

Sys #	System	Category	KA Statement
015	Nuclear Instrumentation	Generic	Ability to determine operability and/or availability of safety related equipment.

K/A# 2.2.37 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 3SQS-2.1 Powerpoint Slide
2OM-2.5.A.4, Rev. 5, pg. 2
2OM-2.1.C, Rev. 2, pg. 15

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 43.5 / 45.12)

Objective: 3SQS-2.1 16. 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.

58. An internal fault (short circuit) occurs in the PRZR Press Control [2RCS-PK444A] Controller.

Which ONE of the following describes the effect this fault will have on the Reactor Protection System?

The **CONTROLLER** fault could ________

A. **NOT directly** feed back into the protection circuit due to use of isolation devices.

B. **directly** feed back into the protection circuit, causing the **SELECTED** channel to trip.

C. **directly** feed back into the protection circuit, preventing the **SELECTED** channel from tripping.

D. **NOT directly** feed back into the protection circuit since separate transmitters are used.

Answer: D

Explanation/Justification:

A. Incorrect. This is the design feature for PRZR Level control circuit but is not the same for the pressure control/protection circuit.

B. Incorrect. PRZR pressure control is separate from the protection and do not have isolation amplifiers. The candidate could confuse PRZR Level circuitry with PRZR pressure circuitry. The transmitters do share common taps off of the same instrument line. A PRZR pressure reference controller failure will indirectly have an impact on actual PRZR pressure so therefore will impact RPS indirectly.

C. Incorrect. PRZR pressure control is separate from the protection and do not have isolation amplifiers. The candidate could confuse PRZR Level circuitry with PRZR pressure circuitry. The transmitters do share common taps off of the same instrument line. The candidate may focus on whether the fault causes reference pressure to fail high or low which makes B & C distractors plausible.

D. Correct. The candidate must have knowledge of the operational implications of separation of control and protection circuits for non-nuclear instrumentation. Specifically, they must have knowledge of how a fault on the NNIS (control side of PRZR pressure) impacts RPS (protection side of PRZR pressure). PRZR pressure uses separate transmitters so therefore the NNIS does not directly feedback into the Reactor Protection circuitry. Indirectly a failure of the reference PRZR pressure controller could impact actual plant pressure and therefore indirectly effect RPS.

Sys #	System	Category		KA Statement
016	Non-nuclear Instrumentation	K5 Knowledge of the operational implication of the following concepts as they apply to the NNIS:		Separation of control and protection circuits
K/A#	K5.01	**K/A Importance** 2.7*	**Exam Level**	RO
References provided to Candidate		None	**Technical References:**	2OM-6.4.IF, Rev. 13, pg. 23 & 24 Ops Manual Figures 6-35 & 36

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5 / 45.7)

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

59. Given the following plant conditions:

- A Reactor Trip from Full power occurred due to low RCS pressure.
- RCS pressure is currently 885 psig and LOWERING.
- Containment pressure is 6 psig and RISING.
- All ESF equipment functioned as designed.
- Core Exit Thermocouples (CET) are currently 532 °F and STABLE.

Based on these parameter trends, what will happen to CET reliability and what is the current condition of the RCS?

CET indication will ____ (1) ____ **AND** the RCS is currently ____ (2) ____.

A. (1) remain reliable
(2) superheated.

B. (1) remain reliable
(2) saturated.

C. (1) become less reliable since adverse conditions exist
(2) saturated.

D. (1) become less reliable since adverse conditions exist
(2) superheated.

Answer: B

Explanation/Justification:

A. Incorrect. Correct status of CET's. Incorrect RCS condition. Misapplication of the conversion from psig to psia is a common fundamental problem.

B. Correct. The candidate must be able to predict or monitor changes in core exit temperature as the containment conditions degrade. They must also be able to apply the thermocouple reading to obtain correct condition of the RCS. 900 psia corresponds to 532 F. which means the RCS is in a saturated condition. Misapplication of the conversion will result in a different end result.

C. Incorrect. Plausible as containment conditions become more adverse that instrumentation will become less accurate however the CETs are designed to operate in this type of environment. Correct RCS condition.

D. Incorrect. Plausible as containment conditions become more adverse that instrumentation will become less accurate however the CETs are designed to operate in this type of environment. Incorrect but plausible RCS condition, if the candidate does not know how to use steam tables.

Sys #	**System**	**Category**		**KA Statement**
017	In-Core Temperature Monitor System (ITM)	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ITM system controls including:		Core exit temperature
K/A#	A1.01	**K/A Importance** 3.7	**Exam Level**	RO

References provided to Candidate None **Technical References:** 2OM-2.3.1, Issue 1, Rev. 2, pg. 2
3SQS-3.1, Rev. 5, pg. 12, 13, & 16

Question Source: Bank – Vision #68041

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 45.7)

Objective: 3SQS-3.1 8. Describe the response of a thermocouple readout to an adverse containment environment.

60. Given the following plant conditions:

- A Plant Startup is in progress.
- Control Rods are in MANUAL.
- Reactor power is currently at 23%.
- [2MSS-PK464], "Main Stm Manifold Pressure Control" is in AUTO with Zero (0) demand.
- Steam Dumps are in the Tavg Mode.
- Main Feedwater Regulating Bypass valves are in AUTO.
- An Inadvertent Turbine Trip occurs.

Which ONE of the following describes the steam dump and S/G NR Water Level response to the turbine trip, assuming **NO** operator actions?

Steam Dumps will ___ (1) ___
S/G NR Water Level will ___ (2) ___

A. (1) open and close.
(2) drop and then rise.

B. (1) open and remain open.
(2) rise and then drop.

C. (1) open and remain open.
(2) drop and then rise.

D. (1) open and close.
(2) rise and then drop.

Answer: C

Explanation/Justification:

A. Incorrect. Correct that steam dumps open, however, the candidate must understand that with control rods in manual, that the increased Tavg caused by the turbine trip will not be reduced until the operators insert control rods. Therefore the steam dumps will remain open until Tavg is reduced to Tref. Correct S/G water level response.

B. Incorrect. Correct steam dump response. Incorrect opposite S/G water level response.

C. Correct. The candidate must analyze the plant conditions and understand steam dump operation and S/G water level response. With steam dumps in Tavg Mode initially, they would be closed. When the turbine trips, Tavg increases and the steam dumps will open based on temperature difference between Tref as sensed by first stage pressure and Tavg (C-7A Load Rejection Arms). The steam dumps will remain open until the operator inserts control rods to lower Tavg. S/G water level will initially drop to due to a decrease in steam demand (turbine trip). Once the steam dumps open in response to increasing Tavg, the S/G water level will begin to increase due to increase in steam demand which leads to S/G swell. Also note that there are other dynamics in play such as SGWLC. With Bypass valves in auto, the SGWLC system will respond by opening the bypass valves which will increase feedwater flow and also increase S/G water level. The tie between steam dumps and S/G water level is the change in steam demand.

D. Incorrect. Correct that steam dumps open, however, the candidate must understand that with control rods in manual, that the increased Tavg caused by the turbine trip will not be reduced until the operators insert control rods. Therefore the steam dumps will remain open until Tavg is reduced to Tref. Incorrect opposite S/G water level response.

Sys #	**System**	**Category**			**KA Statement**
041	Steam Dump System (SDS) and Turbine Bypass Control	K1 Knowledge of the Physical connections and/or cause-effect relationships between the SDS and the following systems:			S/G level
K/A#	K1.02	**K/A Importance**	2.7	**Exam Level**	RO
References provided to Candidate		None		**Technical References:**	2OM-21.5.A.12, Rev. 3, pg. 2 2OM-21.5.A.13, Rev. 3, pg. 2 2OM-24.1.D, Rev. 6, pg. 2 - 6

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Objective: 2SQS-21.1 12. Given a change in plant conditions predict the response of the MSSS control room indications and control loops, including all automatic functions and changes in equipment status, for either a change in plant conditions or for an off normal condition.

61. Which ONE of the following is the minimum **REQUIRED** Fuel Storage Pool Boron Concentration to ensure adequate shutdown margin (Keff ≤ 0.95) in accordance with Technical Specification 3.7.16? (assume current rack configuration)

A. 0 ppm

B. ≥ 495 ppm

C. ≥ 1050 ppm

D. ≥ 2000 ppm

Answer: D

Explanation/Justification:

A. Incorrect. Plausible because it is the TS 4.0 design features value mentioned in section 4.3.1.2.b. Unit 2 can only maintain Keff ≤ 1.0 without crediting soluble boron.

B. Incorrect. Plausible because it is the TS 4.0 design features value mentioned in section 4.3.1.c.

C. Incorrect. Plausible since it is the TS 3.7.16 Unit 1 number.

D. Correct. The candidate must have knowledge of the Spent Fuel Pool Cooling Design features/interlocks which ensures adequate S/D margin (Cb concentration). Unit 2 is currently undergoing a major rerack project. Some of these numbers have been incorporated into our Technical Specifications and therefore even though the project may not complete by the time 2LOT8 takes the ILT exam, we are testing current TS's. According to TS 3.7.16, Unit 2 requires 2000 ppm to ensure Keff ≤ 0.95. This is a conservative value to ensure no credible boron dilution event will reduce boron concentration below 450 ppm. This is RO level of knowledge since it tests LCO knowledge.

Sys #	**System**	**Category**	**KA Statement**
033	Spent Fuel Pool Cooling	K4 Knowledge of design feature(s) and/or interlock(s) which provide for the following:	Adequate SDM (boron concentration)

K/A# K4.05 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** BVPS TS 3.7.16, Amend 278/161, pg. 3.7.16-1
BVPS TS 4.3, Amend 278/161, pg 4.0-1 – 4
UFSAR, Rev. 13, pg 3.1-44

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: 2SQS-20.1 30. Describe the design basis for the Fuel Pool Cooling and Purification System and the associated major components as documented in the UFSAR.
28. For a given set of plant conditions, determine if the condition meets the criteria for entry into a one hour or less action statement in accordance with TS's.

62. Given the following plant conditions:

- Unit 2 is in Mode 6 during a refueling outage.
- The Containment Equipment Hatch is closed.
- Fuel Movement is in progress.
- Containment Purge is in operation.
- **NO** features have been defeated (Lock out jacks are installed).
- [2HVR*RQ104B], Containment Purge Radiation Monitor fails upscale **HIGH**.
- [2HVR*RQ104A], Containment Purge Radiation Monitor is unaffected.
- All systems function as designed.
- No operator action has occurred.

What will be the impact on Containment Purge AND fuel movement?

Containment Purge will _______(1)________ AND fuel movement _______(2)________.

A. (1) automatically isolate with no time delay
(2) may continue

B. (1) automatically isolate after a short time delay
(2) must be immediately suspended

C. (1) be unaffected and will require manual isolation
(2) must be immediately suspended

D. (1) be unaffected and will **NOT** require manual isolation
(2) may continue

Answer: A

Explanation/Justification:

A. Correct. The candidate must have knowledge of the impact of a radiation monitor upscale failure high. Specifically, if 2HVR*RQ104B fails high, it will cause an automatic isolation of containment purge. This is the only radiation monitor which has any automatic functions associated with fuel handling. Also note that there is no actual high radiation condition, rather an IF condition exists. The stem of the question states that Containment Purge is in operation and no auto functions have been defeated. This is to alleviate any confusion based on procedure flexibility which allows auto isolation features to be defeated at the end of 2OM-44.C.4.A (Containment Purge Startup). The K/A is met because the malfunctioning radiation monitor results in a loss of containment purge which has impact on fuel handling operations. TS 3.9.3 requires the Containment Purge to be capable of automatic isolation. Since the purge system is operable and functioning, fuel movement may continue.

B. Incorrect. Correct that containment purge auto isolates but not after a short time delay. Plausible because some of BVPS radiation monitors have time delays. TS 3.9.3 requires the Containment Purge to be capable of automatic isolation. Since the purge system is operable and functioning, fuel movement may continue.

C. Incorrect. Plausible if the candidate believes the logic is 2/2 for containment purge to isolate and that manual isolation is required due to impact on fuel handling operations. TS 3.9.3 requires the Containment Purge to be capable of automatic isolation. Since the purge system is operable and functioning, fuel movement may continue.

D. Incorrect. Plausible if the candidate believes there is no auto isolation and isolation is NOT required which is correct for these plant conditions. (ie: has no impact on fuel handling operations) TS 3.9.3 requires the Containment Purge to be capable of automatic isolation. Since the purge system is operable and functioning, fuel movement may continue.

Sys #	System	Category	KA Statement
034	Fuel Handling Equipment	K6 Knowledge of the effect of a loss or malfunction on the following will have on the Fuel Handling System :	Radiation monitoring systems

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

References provided to Candidate None **Technical References:**
2OM-43.1.C, Rev. 4, pg 18
BVPS TS 3.9.3, Amend 278/161, pg. 3.9.3-1
BVPS B/G TS 3.9.3, Rev. 0, pg. B3.9.3-1 – 4
BVPS LRM 3.9.3, Rev. 52, pg. 3.9.3-1
2OM-53C.4.2.49.1, Rev. 9, pg. 2

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 45.7)

63. Given the following plant conditions:

- The plant is operating at 100 % power with all systems in NSA.
- A Valid High Radiation Alarm exists on 2ARC-RQI-100, “Condenser Air Ejector Discharge”.
- All systems function as designed.

With no operator action, which ONE of the following describes the alignment of the Unit 2 Condenser Air Ejector Off-Gas?

A. Air Ejector discharge is AUTO aligned to Unit 2 containment.

B. 2MSS*SOV120, “Common Header Isolation Downstream” AUTO OPENS.

C. Air Ejector discharge is AUTO aligned through the Charcoal Delay Beds.

D. No AUTO action occurs, discharge continues to atmosphere until manual action occurs.

Answer: D

Explanation/Justification:

A. Incorrect. Plausible if the candidate confuses Unit 2 with Unit 1 since Unit 1 does AUTO align to the containment.

B. Incorrect. Plausible because one of the ARP actions is to manually align 2MSS*SOV120. This valve does auto open on an SI signal.

C. Incorrect. The air ejector discharge is aligned to the charcoal delay beds however, this is not an AUTO action.

D. Correct. The ARP directs the air ejector discharge be aligned to the gaseous waste system through the delay beds in accordance with 2OM-19.4.H due confirmed high radiation level from the condenser air removal system which is indicative of a S/G tube leak. AOP 2.6.4 also directs the alignment through the delay beds.

Sys #	System	Category	KA Statement
055	Condenser Air Removal	K1 Knowledge of the physical connections and/or cause/effect relationships between the CARS and the following systems:	PRM system

K/A# K1.06 **K/A Importance** 2.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-43.1.C, Rev. 4, pg. 8
2OM-43.4.ACN, Rev. 5, pg. 2 & 3
2OM-53C.4.2.6.4, Rev. 26, pg. 21
2OM-19.4.H, Rev. 14, pg. 2 - 4

Question Source: New

Question Cognitive Level: Higher - Comprehension **10 CFR Part 55 Content:** (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Objective: 2SQS-43.1 Given a specific plant condition, predict the response of the RM system control room indications and control loops, including any automatic functions and changes in equipment status for either a change in plant conditions or an off-normal condition.

64. Given the following plant conditions:

- The Unit is operating at 100% power with all systems in NSA.
- The Control Room Team 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.

Which ONE of the following components and/or indications have the capability of being operated or monitored from the control room to perform this evolution IAW 2OM-19.4.G?

1. [2GWS-OA100A], "Oxygen Analyzer" sample flow.
2. [2GWS-SOV125A1 through 125G1], "Tank 25A through 26G Inlet Isolation Valves".
3. [2GWS-AOV108], "Gaseous Waste Storage TK Inlet Header Isolation Valve".
4. Gaseous Waste Storage Tank Pressures

A. 3 **ONLY**.

B. 3 & 4 **ONLY**.

C. 1, 2, & 4 **ONLY**.

D. 1, 3, & 4 **ONLY**.

Answer: B

Explanation/Justification:

A. Incorrect. Correct that this valve is operated from the control room, however, it is not the only indication/valve provided.

B. Correct. The candidate must have knowledge of monitoring or manually operating valves, indications, sample line and gas decay tanks associated with the Waste Gas Disposal System. In order to operate or monitor, they must have knowledge of where valves and indications are located. In accordance with 2OM-19.4.G, 2GWS-AOV108 is operated from BB-A and Gaseous Waste Storage tank Pressures are monitored from either the computer or at local indications. All indications/valves provided are plausible since they are called out by the referenced procedure.

C. Incorrect. Oxygen Analyzers are operated from the auxiliary building. Since Oxygen Concentration may be obtained by sample or computer point, sample flow is specified which is locally obtained only. Waste gas Storage Tanks Inlet isol Valves are also operated locally in the PAB at PNL-2GWSTP. Gaseous Waste Storage Tank Pressures may be obtained locally or in the control room.

D. Incorrect. Refer to previous discussions. 1 & 2 are incorrect. 3 & 4 are correct.

Sys #	**System**	**Category**			**KA Statement**
071	Waste Gas Disposal	A4 Ability to manually operate and/or monitor in the control room:			Gas decay tanks, including valves, indicators, and sample line
K/A#	A4.05	**K/A Importance**	2.6*	**Exam Level**	RO
References provided to Candidate		None		**Technical References:**	2OM-19.4.G, Rev. 4, pg. 2-4 2SQS-19.1, Rev. 17 Powerpoint Slides

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 to 45.8)

Objective: 2SQS-19.1 10. Describe the control, protection, and interlock functions for the control room components associated with the GWDS, including automatic functions, setpoints and changes in plant equipment status as applicable.

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

- The plant is performing an initial startup following a refueling outage.
- Reactor Power is currently 55%.
- The following alarms are received within several minutes of each other.
  - A6-3E, "Cooling Tower Pump Trouble".
  - A6-5G, "Condenser Vacuum Low/Low-Low".
  - A5-5B, "Condenser Vacuum Low Turbine Trip"
- [2CNM-PR103], "Main Condenser Side A & B Vacuum Recorder" is reading 24 IN-VAC and LOWERING.
- PRZR Pressure is 1965 psig and SLOWLY LOWERING.
- All systems function as designed.
- No operator actions have yet occurred.

Which ONE of the following will be the status of the reactor **AND** safety injection?

A reactor trip ____ (1) ____ **AND** safety injection ____ (2) ____ as a result of these plant conditions.

A. (1) has occurred
(2) has actuated

B. (1) has occurred
(2) has **NOT** actuated but will actuate if PRZR pressure reaches 1945 psig

C. (1) will occur when vacuum drops below 22 IN-VAC
(2) has **NOT** and will **NOT** actuate

D. (1) has occurred
(2) has **NOT** actuated but will actuate if PRZR pressure reaches 1845 psig

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Answer: D

Explanation/Justification:

A. Incorrect. Correct reactor response. Incorrect SI response. (refer to correct answer explanation)

B. Incorrect. Correct reactor response. Incorrect that SI will occur at 1945 psig. This is the reactor trip setpoint on low PRZR pressure. (refer to correct answer explanation).

C. Incorrect. Incorrect reactor response. Plausible if the candidate does not know the Low Vacuum reactor trip setpoint. A reactor trip has already occurred. Incorrect that SI will not actuate.

D. Correct. The candidate must be able to analyze the stated plant conditions and based on these indications apply knowledge of RPS & ESFAS functions. If systems function as designed, the turbine will trip on low condenser vacuum at 24 IN-VAC. Because the reactor was operating > P-9 (49%) power, a turbine trip will result in a reactor trip. Without circulating water or condenser vacuum the candidate must understand that eventually the condenser steam dumps will be lost and at BOC life, minimum decay heat, with no operator action, OE has shown that SI will occur. AFW will auto start and provide feedwater and the plant will cycle on the atmospheric dump valves with no operator action to remove decay heat. With minimal decay @ BOC, the AFW flow will cause PRZR pressure to drop and approach the SI setpoint. It is an important operator concept and a reason for pre-emptive action to throttle back AFW flow. TS 3.3.1, Function 8 states that P-4 is an ESFAS function.

Sys #	**System**	**Category**	**KA Statement**
075	Circulating Water	K3 Knowledge of the effect that a loss or malfunctions of the circulating water system will have on the following:	ESFAS

K/A# K3.07 **K/A Importance** 3.4* **Exam Level** RO

References provided to Candidate None

Technical References:
2OM-31.4.AAB, Rev. 9, pg. 2
2OM-26.4.AAK, Rev. 13, pg. 3
2OM-26.4.AAB, Rev. 1, pg. 2
2OM-1.5.B.1, Rev. 2, pg. 3
2OM-1.5.B.4F, Issue 4, Rev. 0, pg. 1 & 2
BVPS TS, Amendments 278/164, Table 3.3.2-1

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.6)

Objective: 3SQS-1.1 10. Given a set of plant conditions, predict or describe the response of the RPS & ESFAS 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.

66. Given the following plant conditions:

- The US provides you a working copy of 2OST-45.11, "Cold Weather Verification".
- You note that this procedure has not been annotated as the latest approved procedure.
- All Plant systems are operable.

Which ONE of the following will be the **REQUIRED** method, if any, to validate 2OST-45.11 is the latest revision in accordance with NOP-LP-2601, "Procedure Use and Adherence"?

A. **NOT** required to be validated prior to use.

B. **MUST** be validated by comparing to FileNet prior to use.

C. **MUST** be validated by comparing to Control Room Copy prior to use.

D. **ONLY** required to be validated by comparing to FileNet once per week.

Answer: B

Explanation/Justification:

A. Incorrect. Plausible incorrect answer. During emergency operations and drills, the documents in the emergency facilities may be used without validating to FileNet.

B. Correct. The candidate must have knowledge of how a controlled copy of an operating procedure is verified. In accordance with NOP-LP-2601, this is the requirement for all other procedures other than emergencies or safeguard information which is not viewable in FileNet.

C. Incorrect. Plausible incorrect answer. Only required to compare with control room copies if FileNet is unavailable. Correct that the procedure is required to be validated prior to use.

D. Incorrect. Plausible because NOP-LP-2601 does require procedures other than emergencies or drills to be validated every three days thereafter. The procedure is also required to be validated prior to use.

Sys #	**System**	**Category**			**KA Statement**
N/A	N/A	Generic			Ability to verify the controlled procedure copy.
K/A# 2.1.21		**K/A Importance**	3.5*	**Exam Level**	RO

References provided to Candidate None **Technical References:** NOP-LP-2601, Rev. 4, pg. 20 & 21

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 45.10 / 45.13)

Objective: 3SQS-48.1 11. From memory, explain the requirements of adherence to and familiarization with operations procedures.

67. Given the following plant conditions:

- The plant was operating at 100% power with all systems in NSA.
- A reactor trip and safety injection occurred.
- The US directs the BOP to perform Attachment A-0.11, "Verification of Automatic Actions".

Which ONE of the following conditions in accordance with Attachment A-0.11 will require the BOP to direct action **outside** the control room **AND** which operator will be dispatched?

A. SWS Pumps seal water pressure **LOW**.
Dispatch the Outside Operator.

B. Two Hydrogen Analyzers **NOT** running.
Dispatch the PAB Operator.

C. Two Service Water pumps **NOT** running.
Dispatch the Outside Operator.

D. All Train "B" orange CIA marks are **LIT**. (several Train "A" CIA marks are **NOT LIT**)
Dispatch the PAB Operator.

Answer: A

Explanation/Justification:

A. Correct. The candidate must be able to coordinate personnel activities outside the control room. In order to direct these actions they must be aware of conditions which require local action. The competent RO must be able to verify automatic actions following safety injection IAW Attachment A-0.11 and be able to coordinate local actions in the event that automatic actions have not occurred. Of all of the conditions provided, a SWS pump low seal water pressure condition requires the BOP to dispatch an NLO to the intake structure to investigate this plant condition. The Outside operator will be dispatched to investigate this condition.

B. Incorrect. Although Attachment A-0.11 does check two hydrogen analyzers running, the required action is to start the analyzers performed in the control room as opposed to outside the control room. Plausible that the PAB operator would be dispatched.

C. Incorrect. Although Attachment A-0.11 does check two service water pumps running, the required actions for this condition are all performed in the control room as opposed to outside the control room. Plausible that the Outside operator would be dispatched.

D. Incorrect. No action is required outside the control room for this condition. As long as all of the valves are closed in one train the redundant train valves do not need to be locally closed. Plausible that the PAB operator would be dispatched.

Sys #	**System**	**Category**	**KA Statement**
N/A	N/A	Generic	Ability to coordinate personnel activities outside the control room.

K/A# 2.1.8 **K/A Importance** 3.4 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.E-0, Issue 1C, Rev. 8 pg. 4
2OM-53A.1.A-0.11, Rev. 6, pg. 5 & 6
2OM-53A.1.A-0.2, Issue 1C, Rev. 0, pg. 2

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 45.5 / 45.12/45.13)

68. Given the following plant conditions:

- The Unit is operating at 85% power with all systems in NSA for this power level.
- [2FWS-FR478], "21A SG Feedwater Flow Signal Selector is selected to position FT-476 (Yellow Channel IV).
- [2FWS-FR478], "21A SG Steam Flow Signal Selector is selected to position FT-475 (Yellow Channel IV).
- [2MSS*PT476], "21A STM PRESS" (Yellow Channel IV) fails to 400 psig.

How will the following indications **INITIALLY** respond to [2MSS*PT476] failing to this value? (Assume these indications are used just prior to required operator action, if any.)

[2FWS-FI476], "21A SG Feed Flow" will ___ (1) ___.
[2FWS-FI475], "21A SG Steam Flow" will ___ (2) ___.
Status Panel 19, D1, "MAIN STM HDR A PRESS LOW CHAN IV" Status Light will __ (3) __.

A. (1) lower
(2) lower
(3) be LIT

B. (1) remain the same
(2) remain the same
(3) be LIT

C. (1) rise
(2) rise
(3) be LIT

D. (1) remain the same
(2) remain the same
(3) **NOT** be LIT

Answer: A

Explanation/Justification:

A. Correct. The candidate must be able to indentify and interpret the diverse indications associated with a failed low steam pressure transmitter to validate the response to this failed low transmitter. When 2MSS*PT476 fails to 400 psig, the candidate must recognize that steam pressure provides density compensation input to steam flow. A failed low steam pressure input will lower the steam flow input to SGWLC and therefore feed flow will also lower. The status light for main steam header low pressure will come in when pressure is < 500 psig, so therefore will be LIT.

B. Incorrect. If the candidate does not recognize that steam pressure provides input to steam flow or does not understand system alignment, then it is plausible that steam flow and feed flow remain the same. Correct that D1 status light is LIT.

C. Incorrect. Opposite incorrect effect on SGWLC. Plausible if the candidate has the concept of density compensation backwards. Correct that D1 status light is LIT.

D. Incorrect. If the candidate does not recognize that steam pressure provides input to steam flow or does not understand system alignment, then it is plausible that steam flow and feed flow remain the same. Incorrect that D1 status light is LIT. Plausible if the candidate does not know the proper setpoint to validate this indication.

Sys #	**System**	**Category**	**KA Statement**
N/A	N/A	Generic	Ability to identify and interpret diverse indications to validate the response of another indication.

K/A# 2.1.45 **K/A Importance** 4.3 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-24.4.IF, Rev. 16, pg 36 – 38, 42, 43 & 45; 2OM-21.4.AAD, Rev. 3, pg 3

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 43.5 / 45.4)

Objective: 2SQS-24.1 17.Given a specific plant condition, predict the response of the MF, SUF, AFW, or SGWLC 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. Process Instrument Failure

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

0000	The plant is operating at 75% power with all systems in NSA for this power level.
0015	All Four Delta Flux indicators read -5% on BB-B.
0030	A Load Rejection to 45% power occurs.
0031	RCS Pressure rises to 2290 psig and begins to slowly lower.
0032	RCS Pressure drops to 2185 psig and continues to slowly lower.
0033	A4-9D, "ROD CONTROL BANK D LOW-LOW" alarms.
0034	RCS pressure is 2200 psig and continues to slowly rise.
0036	RCS Pressure returns to 2235 psig.
0045	All Four Delta Flux indicators read -11% on BB-B.
0046	A4-9D, "ROD CONTROL BANK D LOW-LOW" clears.

Based on these plant conditions, which ONE of the following describes the total time that each Technical Specification (TS) LCO(s) must be tracked, if applicable?
(ie: time from LCO entry until LCO no longer applies)

1. LCO 3.1.6, Control Bank Insertion Limits
2. LCO 3.2.3, Axial Flux Difference (AFD)
3. LCO 3.4.1, RCS Pressure, Temperature, & Flow Departure from Nucleate Boiling Limits

A. 1. Not applicable
2. ~ 30 minutes
3. ~ 2 minutes

B. 1. ~13 minutes
2. Not applicable
3.~ 4 minutes

C. 1. ~13 minutes
2. ~ 30 minutes
3. Not applicable

D. 1. ~ 13 minutes
2. Not applicable
3.~ 2 minutes

Answer: D

Explanation/Justification:

A. Incorrect. Incorrect that RIL is N/A. AFD entry not required so no tracking is not necessary. Correct DNB time.

B. Incorrect. Correct that RIL is applicable however the candidate must recognize < 50% power AFD is N/A. Plausible because -11 would require entry at 100% power. 4 minutes is plausible for DNB entry if the candidate believes NOP must be restored.

C. Incorrect. Correct RIL entry. Incorrect that AFD is applicable`. Incorrect that DNB is N/A.

D. Correct. The RO is required to know LCO statements and associated applicability information (ie: the information above the double line separating the actions from the LCO and associated statements). The candidate must analyze plant conditions provided and recognize which TS LCOs are applicable and for what period of time. They must recognize that RCS pressure dropped below 2214 psia at approximately 0032 and rose above 2214 psia (2200 psig) about two minutes later. Also, they must recognize the significance of the Bank D Low-Low RIL and that LCO entry is required upon receiving the alarm until the alarm cleared about 13 min. later. AFD is not required to be tracked because reactor power is < 50%.

Sys #	**System**	**Category**	**KA Statement**
N/A	N/A	Generic	Ability to track Technical Specification limiting conditions for operations.

K/A# 2.2.23 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None

Technical References: BVPS TS 3.1.6/3.2.3/3.4.1
BVPS LRM COLR Cycle 16, pg. 5.1-5, 5.1-9 & 5.1-11
2OM-1.4.AAM, Rev. 4, pg. 3

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 43.2 / 45.13)

Objective: 3SQS-ITS.01 1. Given plant conditions, apply the rules of ITS section 3.0 to ensure compliance with technical specification.

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

- The Unit is in Mode 6 with core reload in progress.
- The crew has completed Train swap to the "A" Train after completing operability run on the 2-1 Emergency Diesel Generator (EDG).
- 2-2 EDG has been placed on clearance for maintenance activities.
- Several hours later the control room receives a report that after reviewing the maintenance work order for 2-1 EDG, incorrect gasket material installation makes 2-1 EDG inoperable.

Which of the following TS 3.8.2, "AC Sources – Shutdown" LCO(s) action(s) is (are) **immediately** required?

1. Suspend Core Alterations.
2. Suspend operations involving positive reactivity additions that could result in a loss of shutdown margin or boron concentration.
3. Initiate action to restore required EDG to operable status.

A. 1 **ONLY**.

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

C. 2 **AND** 3 **ONLY**.

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

Answer: D

Explanation/Justification:

A. Incorrect. (refer to correct answer explanation)
B. Incorrect. (refer to correct answer explanation)
C. Incorrect. (refer to correct answer explanation)
D. Correct. The RO candidate must be able to analyze the effect of maintenance activities on the EDG and determine the status of LCOs for TS 3.8.2. The ROs are expected to know the LCO statements and associated applicability information (ie: the information above the double lines separating actions from the LCO and associated applicability statements). ROs are also required to know ≤ 1 hour action statements. Based on stated plant conditions TS 3.8.2 requires one EDG capable of supplying one train of the onsite Class 1E AC electrical power distribution subsystems during modes 5 & 6. Since there are no operable EDGs, TS 3.8.2 Condition B requires all of the actions above to be immediately performed.

Sys #	**System**	**Category**	**KA Statement**
N/A	N/A	Generic	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operation.

K/A# 2.2.36 **K/A Importance** 3.1 **Exam Level** RO
References provided to Candidate None **Technical References:** TS 3.8.2 Amend. 278/161, pg. 3.8.2-1 & 3.
Question Source: New
Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 43.2 / 45.13)
Objective: 3SQS-ELECT ITS 4. Given plant conditions that constitute non-compliance with any electrical power systems LCO, or LRM, determine the applicable condition(s), required action(s), and associated completion times.

71. Which ONE 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:

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, Issue 1C, Rev. 6, pg. 2
2OM-7.4.AK, Rev. 14, pg. 3 – 5
2OM-7.4.AM, Rev. 15, pg. 2 & 3

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.12 / 43.4 / 45.10)

72. Given the following plant conditions:

- Unit 2 has declared an ALERT due to a LOCA.
- An entry must be made into the PAB to preserve High Head Safety Injection (HHSI) integrity.
- This action will prevent failure of equipment necessary to protect the health and safety of the public.
- There are NO **ORANGE or RED** Critical Safety Functions at this time.
- There is NO offsite release to the environment at this time.
- The highest dose rate in this area is 20 R/hr.

Which ONE of the following is the maximum time a worker can remain in the area to prevent exceeding the radiation emergency exposure TEDE limits according to ½-EPP-IP-5.3, "Emergency Exposure Criteria and Control"?

A. 0.5 hours

B. 1.25 hours

C. 3.75 hours

D. 10 hours

Answer: A

Explanation/Justification:

A. Correct. EPIP-IP-5.3 states that for activities performed on an immediate basis to prevent failure of equipment necessary to protect the public health and safety, the TEDE of personnel directly involved shall not exceed 10 REM. Therefore in an area where the highest dose rate is 20 R/Hr the worker can remain a maximum of .5 hours.

B. Incorrect. Plausible since the math works out to 1.25 hours for a 25 REM limit which is the limit to save a life, to restore equipment necessary to maintain critical safety functions and to maintain a safe shutdown or to prevent or mitigate a release of radioactivity to the environment for which offsite protection measures may be required. This limit is applicable if actions establishing adequate or equivalent protection, with less dose are not readily available.

C. Incorrect. Same as B above except if action will exceed 25 REM which are allowed up to 75 REM without Site VP approval. The math for this limit works out to 3.75 hours.

D. Incorrect. Same as C except with VP approval more than 75 REM can be exceeded. The math for 100 REM works out to 10 hours.

Sys #	**System**	**Category**			**KA Statement**
N/A	N/A	Generic			Knowledge of the radiation exposure limits under normal or emergency conditions.
K/A# 2.3.4		**K/A Importance**	3.2	**Exam Level**	RO
References provided to Candidate		None		**Technical References:**	½-EPP-IP-5.1, Rev. 10, pg 2 ½-EPP-IP-5.3, Rev. 11, pg. 4, 5 & 9

Question Source: New

Question Cognitive Level: Higher - Application

10 CFR Part 55 Content: (CFR: 41.12 / 43.4 / 45.10)

73. The Unit Two Control Room has been evacuated.

Which of the following indications will be **directly** available at the Emergency Shutdown Panel for post accident monitoring?

1. RCS Tavg
2. RCS Wide Range Pressure
3. Steam Generator Wide Range Water Level
4. PRZR Level

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

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

C. 1 **AND** 3 **ONLY**.

D. 2, 3, **AND** 4 **ONLY**.

Answer: D

Explanation/Justification:

A. Incorrect. Refer to correct answer explanation.

B. Incorrect. Refer to correct answer explanation.

C. Incorrect. Refer to correct answer explanation.

D. Correct. The candidate must be able to identify which instrumentation provides indication for post accident monitoring at the emergency shutdown panel for a control room inaccessibility situation. RCS Tavg is NOT directly available, however, Tc & Th indications are available and Tavg is procedurally derived from these two indications. S/G wide range level as opposed to narrow range level is available. RCS Wide Range pressure and PRZR Level are available at the alternate S/D panel and can be directly read at this location.

Sys #	**System**	**Category**			**KA Statement**
N/A	N/A	Generic			Ability to identify post-accident instrumentation.
K/A# 2.4.3		**K/A Importance**	3.7	**Exam Level**	RO

References provided to Candidate None **Technical References:** BVPS TS Amend 278/161, pg. 3.3.3-3 & 4 & B3.3.3-1
2OM-53C.4.2.33.1A, Rev. 12, pg. 8 – 10 & 12

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.6 / 45.4)

Objective: 3SQS-53.5 Describe the actions for control room inaccessibility.

74. Given the following plant conditions:

- An unexpected automatic Reactor Trip and Safety Injection from 100% power occurred.
- All systems responded normally to actuation signals.
- E-0, "Reactor Trip or Safety Injection", Step 4 is being implemented.
- The BOP opens [2CCS-AOV118], "Domestic Water to Station Air Compressor Valve".

Which ONE of the following describes the action taken by the BOP?

According to BVBP-OPS-0024, "Transient Response Guidelines" this action was ________

A. allowed.

B. **NOT** allowed at this time.

C. **NOT** allowed until first transition.

D. allowed by obtaining US/SM concurrence during IOAs.

Answer: B

Explanation/Justification:

A. Incorrect. Refer to correct answer explanation. Plausible if the candidate does not know his role in performing pre-emptive actions.

B. Correct. The RO must know his roles and responsibilities during EOP usage. The candidate must know that opening 2CCS-AOV118 is an allowable pre-emptive action. This action should not be performed during IOA's and shall not be performed with out SM/US concurrence. Since the crew is performing Step 4 of E-0, IOA's have not been completed.

C. Incorrect. Refer to correct answer explanation. Plausible if the candidate confuses rules of usage for FRP implementation.

D. Incorrect. The SRO may not provide concurrence during IOA's. IOAs are not complete until read and verified. The SRO may assign pre-emptive actions prior to reactor trip however, since the reactor trip was unexpected automatic there was no time for this assignment to be made in the circumstances provided.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of crew roles and responsibilities during EOP usage.

K/A# 2.4.13 **K/A Importance** 4.0 **Exam Level** RO

References provided to Candidate None **Technical References:** 1/2OM-53B.2, Issue 1C, Rev. 7, pg. 7 & 29
BVBP-OPS-0024, Rev. 4, pg. 9

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 45.12)

Objective: 3SQS-48.1 24. Explain from memory all of the Operations Managers Expectations.

75. Given the following plant conditions:

- A serious fire in the cable spreading room has been reported.
- The Shift Manager determines actions of 2OM-56C, "Alternate Safe Shutdown From Outside the Control Room" are necessary.
- The SM directs the RO to perform actions of 2OM-56C.4.C, "NCO Procedure".

Which ONE of the following will be a time critical action performed by the Reactor Operator (RO) outside the Control Room **AND** reason why?

In accordance with 2OM-56C.4.C, the RO will __________

A. close [2RCS*PCV455A], "PRZR Spray Valve" to prevent safety injection.

B. trip [2FWE*P23B], "B" AFW Pump" to prevent Steam Generator overfill.

C. trip [2FWS*P21B], "B" MFW Pump" to prevent Steam Generator overfill.

D. close [2CHS*HCV186], "RCP Seal Hdr Flow Control Valve" to protect RCP seals.

Answer: B

Explanation/Justification:

A. Incorrect. This is a plausible action which is not performed in this procedure series.

B. Correct. The candidate must have knowledge of RO actions performed outside the control room during alternate safe shutdown and understand the operational effect of this task. According to 2OM-56.C.4.C, pg. 5, it is time critical that the RO secure 2FWE*P23B within 40 minutes to prevent S/G overfill.

C. Incorrect. This action is performed prior to control room evacuation. Correct reason but incorrect pump.

D. Incorrect. There is a time critical action performed by the NLO versus RO to fail open 2CHS*HCV186 versus close this valve. Plausible incorrect action based on similar actions to isolate RCP seals to prevent action such as ECA-0.0.

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** 4.2 **Exam Level** RO

References provided to Candidate None

Technical References: 2OM-56C.4.C, Rev. 18, pg. 5
2OM-56C.4.D, Rev. 22, pg. 2
2OM-56C.4.B, Rev. 30, pg. 3, 4 &13

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective: 2SQS-56C.1 1. Describe the function of Alternate Safe Shutdown from Outside the Control Room and the associated major components as documented in Operating Manual Chapter 2OM-56C.

76. The plant is at 100% power with all systems in NSA.
- A Reactor trip occurs.
- The FAST bus transfer to offsite power fails to occur and all Normal 4Kv power is lost.
- All other systems respond as designed.

The problem with offsite power has been corrected, and all 4Kv power has been restored.

The crew has transitioned to ES-0.1, Reactor Trip Response and is currently at step 12 attempting to start all RCPs. The following plant conditions exist:
- All RCP #1 seal leakoffs are 0.25 gpm and stable.
- "A" RCP seal injection flow is 7.0 gpm and stable
- "B" RCP seal injection flow is 6.5 gpm and stable
- "C" RCP seal injection flow is 5.0 gpm and stable
- "A" RCP thermal barrier temperature is 95 °F and stable
- "B" RCP thermal barrier temperature is 75 °F and stable
- "C" RCP thermal barrier temperature is 80 °F and stable
- All other RCP support conditions are within range for starting the RCPs.

Based on these conditions and IAW the guidance provided in ES-0.1, what is the order of priority for starting the RCPs?

Start:

A. "C" RCP, then "B" RCP, then "A" RCP

B. "B" RCP, then "A" RCP, then "C" RCP

C. "A" RCP, then "B" RCP, **DO NOT** start "C" RCP

D. "C" RCP, then "B" RCP, **DO NOT** start "A" RCP

Answer: C

Explanation/Justification:

A. Incorrect. This would be the priority if the candidate does not recognize that normal support conditions do not exist for the "C" RCP and believes that the "B" pump supplies the "B" spray valve.

B. Incorrect. This is the starting sequence in FR-C.1 to address ICC conditions.

C. Correct. IAW ES-0.1 step 12 and the preceding note and the bases document for this step and note. The SRO must be familiar with the content and bases of ES-0.1 including EOP Attachment A-1.31. SRO Only in that the SRO must assess plant conditions (normal, abnormal, or emergency) and then select a procedure or section of a procedure to mitigate, recover, or with which to proceed.

D. Incorrect. This would be the sequence if the candidate does not recognize that the C RCP seal injection flow is too low and believes that the A RCP thermal barrier temperature is too high support RCP start.

Sys #	**System**	**Category**			**KA Statement**
000007	Reactor Trip –Stabilization	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:**	ES-0.1 step 12 and preceding note. ES-0.1 step 12 and preceding note bases; EOP Attachment A-1.31.

Question Source: New
Question Cognitive Level: High - Analysis   **10 CFR Part 55 Content:** 10 CFR 55.43(b)(5)
Objective:

77. A Large Break LOCA occurred coincident with some fuel damage.
    - A General Emergency has been declared at 0900 hours.
    - A non-routine airborne release of radioactive material as a result of this event is in progress due to 2FWE*P22 [Steam Driven AFW Pump] operation.
    - No radioactive release has occurred or is imminent (within 1 hour).
    - The TSC has **NOT** yet been activated.
    - Health Physics has provided the following dose projections:
      At the EAB: 15 mRem TEDE; 10 mRem CDE
      At 5 miles: 2.9 mRem TEDE; 3.5 mRem CDE
      At 2 miles: 5.0 mRem TEDE; 8 mRem CDE

    The following meteorological conditions exist:
    - 35' wind direction is from 110° at 8 MPH.
    - 150' wind direction is from 135° at 15 MPH.
    - 500' wind direction is from 150° at 20 MPH.

    Based on these conditions, what Protective Action Recommendation (PAR) is **REQUIRED**?
    (Refer to attached reference)

A. Evacuate 0-5 miles, 360 degrees **AND** shelter the remainder of the 10 mile EPZ **AND** advise the general public to administer KI in accordance with the State plan.

B. Evacuate 0-2 miles, 360 degrees **AND** shelter the remainder of the 10 mile EPZ **AND** advise the general public to administer KI in accordance with the State plan.

C. Evacuate 0-2 miles, 360 degrees and 5 mile downwind wedge NPQRAB **AND** shelter the remainder of the 10 mile EPZ **AND** advise the general public to administer KI in accordance with the State plan.

D. Evacuate 0-2 miles, 360 degrees and 5 mile downwind wedge MNPQRAB **AND** shelter the remainder of the 10 mile EPZ **AND** advise the general public to administer KI in accordance with the State plan.

Answer: C

Explanation/Justification:

- **A.** Incorrect. If the candidate incorrectly applies 1/2-EPP-IP-4.1, Offsite Protective Actions Attachment A they will select this answer.
- **B.** Incorrect. If the candidate incorrectly applies 1/2-EPP-IP-4.1, Offsite Protective Actions Attachment A they will select this answer.
- **C.** Correct. IAW 1/2-EPP-IP-4.1, Offsite Protective Actions Attachment A. SRO only in that it requires the implementation of administrative procedures that specify implementing emergency procedures. Specifically the offsite PAR which at BVPS is an SRO task.
- **D.** Incorrect. If the candidate incorrectly applies the 35 foot wind speed to the wedge calculation, they will select this answer.

Sys #	System	Category	KA Statement
000011	Large Break LOCA	Generic	Knowledge of emergency plan protective action recommendations.

K/A# 2.4.44 **K/A Importance** 4.4 **Exam Level** SRO

References provided to Candidate 1/2-EPP-IP-4.1, Offsite Protective Actions **Technical References:** 1/2-EPP-IP-4.1, Offsite Protective Actions Attachment A

Question Source: New

Question Cognitive Level: High - Application **10 CFR Part 55 Content:** 10 CFR 55.43(b)(5)

Objective:

78. The plant is at 100% power with all systems in NSA.
- An unisolable leak occurs in the Primary Plant Component Cooling Water (CCP) discharge header.
- Pri Comp Cooling Surge Tank Level [2CCP*LCV100A and B] valves are in Auto and full open.
- CCP Surge Tank Level is slowly dropping.
- The crew has entered AOP 2.15.1, Loss of Primary Plant Component Cooling Water.

IAW the guidance provided in AOP 2.15.1, which of the below listed conditions will **require** a manual reactor trip?

CCP pump flow and amps____.

A. fluctuating **AND** CCP Surge Tank Level drops to offscale low

B. fluctuating **AND** as soon as CCP Surge Tank Level drops to 3 inches

C. steady **AND** CCP Surge Tank Level drops to offscale low

D. steady **AND** as soon as CCP Surge Tank Level drops to 3 inches

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Answer: A

Explanation/Justification:

A. Correct. IAW AOP 2.15.1 Rev.3 step 1 CAS RNO. The SRO must be familiar enough with the contents of the AOP to know what conditions will require a manual reactor trip. The candidate must interrupt the data given in the stem and determine that the conditions are met for directing a reactor trip. SRO Only in that the SRO must assess plant conditions (normal, abnormal, or emergency) and then select a procedure or section of a procedure to mitigate, recover, or with which to proceed. At BV, the ROs are not required to memorize all Rx trips that are addressed within all procedures. ROs are required to know Rx trip setpoints from SSPS. The SROs are expected to be familiar enough with the content of procedures to address what actions will be required to proceed.

B. Incorrect. CCP Surge Tank Level dropping to 3 inches is the setpoint for isolation of the non-essential CCP header

C. Incorrect. In addition to CCP Surge Tank Level dropping to off scale low, AOP 2.15.1 also has a requirement to have indication of cavitation on the CCP pumps. This choice does not contain indications of cavitation.

D. Incorrect. CCP Surge Tank Level dropping to 3 inches is the setpoint for isolation of the non-essential CCP header. There is also a requirement to have indication of cavitation on the CCP pumps. This choice does not contain indications of cavitation.

Sys #	System	Category	KA Statement
000026	Loss of Component Cooling Water	Generic	Ability to interpret and execute procedure steps.

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

References provided to Candidate None **Technical References:** AOP 2.15.1 Rev.3 step 1 CAS RNO

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** 10 CFR 55.43(b)(5)

Objective:

79. The Plant is operating in the following condition:
    - Tavg is 385 °F and stable
    - PRZR Pressure is 500 psig and stable
    - "A" Charging pump is running.
    - All systems in normal alignment for this condition.

    138 KV Motor Oper Disc SW 89-2A inadvertently opens and cannot be closed.
    The following annunciators are in alarm:
    - A8-2C, 4160V EMERG BUS 2AE UNDERVOLTAGE
    - A8-2A, 4160V EMERG BUS 2AE ACB 2A10 AUTO TRIP
    - A8-6D, 480V EMERG BUS 2N UNDERVOLTAGE

    The following breakers have their white indicating lights LIT and their red indicating lights NOT LIT:
    - 2-1 Emer Gen Output BKR ACB 2E10
    - 2A SS Serv TFMR To 4KV Bus 2A ACB 42A
    - 4KV Bus 2A To Emer Bus 2AE ACB 2A10
    - 4KV Emer Bus 2AE To 4KV Bus 2A ACB 2E7

    The following annciators are NOT in alarm:
    - A8-2B, 4160V EMERG BUS 2AE ACB 2E7 OVERCURRENT TRIP
    - A8-4C, DIESEL GEN 2-1 ELECTRICAL FAULT

    Based on these conditions, what procedure entry is **REQUIRED** and what actions will be taken?

A. Enter AOP 2.36.1, Loss of All AC Power When Shutdown and attempt to start and load the 2-1 emergency diesel generator.

B. Enter AOP 2.36.1, Loss of All AC Power When Shutdown and DO NOT attempt to start the 2-1 emergency diesel generator and go to AOP 2.37.1, Loss of 480 VAC Emergency Bus.

C. Enter AOP 2.36.2, Loss of 4KV Emergency Power and DO NOT attempt to start the 2-1 emergency diesel generator and go to AOP 2.37.1, Loss of 480 VAC Emergency Bus.

D. Enter AOP 2.36.2, Loss of 4KV Emergency Power and attempt to start and load the 2-1 emergency diesel generator.

Answer: D

Explanation/Justification:

A. Incorrect. AOP 2.36.1, Loss of All AC Power When Shutdown is only applicable if RHS is being used to control RCS temperature. Even though the title suggests that it is applicable when shutdown. Correct actions.

B. Incorrect. AOP 2.36.1, Loss of All AC Power When Shutdown is only applicable if RHS is being used to control RCS temperature. Even though the title suggests that it is applicable when shutdown. Incorrect actions although this action may be warranted..

C. Incorrect. Correct procedure entry. Incorrect action, although this action would be correct if either A8-2B or A8-4C were in alarm.

D. Correct. IAW AOP 2.36.2 Rev.12 step 8. SRO Only in that the SRO must assess plant conditions (normal, abnormal, or emergency) and then select a procedure or section of a procedure to mitigate, recover, or with which to proceed. SRO must determine that ANN A8-2B is no longer lit and it is acceptable to energize the emergency bus.

Sys #	System	Category	KA Statement
000056	Loss of Offsite Power	AA2. Ability to determine and interpret the following as they apply to the Loss of Offsite Power:	Indicators to assess status of ESF breakers (tripped/not-tripped) and validity of alarms (false/not-false)

K/A# AA2.45 **K/A Importance** 3.9 **Exam Level** SRO

References provided to Candidate None **Technical References:** AOP 2.36.2 Rev.13 step 8.

Question Source: New

Question Cognitive Level: High - Analysis **10 CFR Part 55 Content:** 10 CFR 55.43(b)(5)

80. The Unit is operating at 100% power with all systems in NSA.
    - A large leak occurs in the Service Water System.
    - The control room receives A1-4H, "SERVICE WATER SYSTEM TROUBLE" followed shortly after by A1-4G, "SERVICE WATER HEADER PRESSURE LOW".
    - "A" & "B" SW Header Pressures **BOTH** indicate 28 psig and slowly DROPPING.
    - "A" & "B" CCS Water HX Service Water Supply Header Isolation Valves (2SWS*MOV107A/B/C/D) automatically isolate **AND** cannot be re-opened.
    - **AFTER** 2SWS*MOV107A/B/C/D automatically isolate, "A" & "B" SW Header Pressures begin to RISE.

    (1) Based on these plant conditions, which Service Water System component is leaking?

    (2) IAW AOP 2.30.1, Service Water/Normal Intake Structure Loss which of the below listed components are **required** to be tripped?
    - All Station Air Compressors
    - All Main Feed Pumps
    - All Heater Drain Pumps
    - All Condensate Pumps

A. (1) The in service Primary Component Cooling Heat Exchangers [2CCP*E21A, B ,C]
(2) ONLY the Main Feed Pumps and Condensate Pumps

B. (1) The in service Centrifugal Water Chillers [2CDS-CHL23A, B, C]
(2) ONLY the Main Feed Pumps and Heater Drain Pumps

C. (1) The in service Primary Component Cooling Heat Exchangers [2CCP*E21A, B ,C]
(2) ONLY Station Air Compressors and Heater Drain Pumps

D. (1) The in service Centrifugal Water Chillers [2CDS-CHL23A, B, C]
(2) ONLY the Station Air Compressors and Condensate Pumps

Answer: B

Explanation/Justification:

A. Incorrect. Incorrect leaking component and condensate pumps are not to be tripped in AOP 2.30.1.

B. Correct. Since pressure recovered when 2SWS*MOV107A/B/C/D isolated, the leak must be in the secondary side header. The Centrifugal Water Chillers are on the secondary side header and the Primary Component Cooling Heat Exchangers are on the primary side header. The first part of the question can be answered with RO knowledge. The second part is SRO only since it requires specific knowledge of procedure content and cannot be answered with system knowledge alone. All four pumps listed in the stem of the question will lose cooling when the 107 valves close. The SRO must be familiar enough with the AOP content to know what actions are to be taken. The procedure directs the alignment of an alternate cooling water supply to the air compressors, and the starting of one condensate pump if none are running. The SRO must therefore assess plant conditions (normal, abnormal, or emergency) and then select the actions with which to proceed.

C. Incorrect. Incorrect leaking component and air compressors are not to be tripped in AOP 2.30.1.

D. Incorrect. Correct leaking component and air compressors and condensate pumps are not to be tripped in AOP 2.30.1.

Sys #	System	Category	KA Statement
000062	Loss of Nuclear Service Water	AA2. Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water:	Location of a leak in the SWS

K/A# AA2.01 **K/A Importance** 3.5 **Exam Level** SRO

References provided to Candidate None **Technical References:** AOP 2.30.1 Rev. 9 Steps 7, 9, & 10. Simplified SWS Drawing (2SQS-LP-301 slides 6 and 8).

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** 10 CFR 55.43(b)(5)

81. The plant was at 100% power with all systems in NSA.

- A main steam line break affecting all 3 SGs occurred.
- The crew is currently performing ECA 2.1, Uncontrolled Depressurization Of All Steam Generators.
- AFW flow has been throttled to 50 gpm to each SG to minimize the RCS cooldown.
- Safety Injection Termination Criteria have been met.
- The crew has just stopped all but one charging pump IAW step 16 of ECA-2.1.

The following Steam Generator conditions exist:

SG	**SG Level**	**SG Pressure**
SG "A"	20% WR and stable	320 psig decreasing
SG "B"	22% WR and stable	310 psig decreasing
SG "C"	26% WR slowly increasing	420 psig increasing

Which of the following describes the **REQUIRED** procedure transition, if any, and what is the bases for this decision?

A. Transition to FR-H.1, Loss Of Secondary Heat Sink; there is a RED condition on the Heat Sink Status Tree.

B. Transition to ES-1.1, SI Termination; the SI termination criteria have been met.

C. Transition to E-2, Faulted Steam Generator Isolation; there is an intact SG available.

D. Continue with ECA 2.1, Uncontrolled Depressurization Of All Steam Generators; Safety Injection termination is not complete.

Answer: D

Explanation/Justification:

A. Incorrect. Both SG level and AFW flow meet the criteria for FR-H.1 entry, However a Caution prior to Step 3 indicates FR-H.1 would not be entered since, Operator action reduced feed.

B. Incorrect. There are no transitions to ES-1.1 within ECA-2.1. ECA-2.1 has the necessary steps to address SI termination. Additionally, SI termination transitions would only occur after transitioning to E-2 first.

C. Incorrect. IAW LHP action of ECA-2.1 requires transition to E-2 when any one SG pressure increases UNLESS SI termination is in progress and has not yet been completed.

D. Correct. IAW LHP action of ECA-2.1 requires transition to E-2 when any one SG pressure increases UNLESS SI termination is in progress and has not yet been completed. SRO Only in that the SRO must assess plant conditions (normal, abnormal, or emergency) and then select a procedure or section of a procedure to mitigate, recover, or with which to proceed.

Sys #	**System**	**Category**	**KA Statement**
W/E12	Steam Line Rupture – Excessive Heat Transfer	EA2. Ability to determine and interpret the following as they apply to the (Uncontrolled Depressurization of all Steam Generators)	Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

K/A# EA2.1 **K/A Importance** 4.0 **Exam Level** SRO

References provided to Candidate None **Technical References:** ECA-2.1 LHP

Question Source: New

Question Cognitive Level: High - Analysis **10 CFR Part 55 Content:** 10 CFR 55.43(b)(5)

82. The Plant is stable at 55% power with all systems in normal alignment for this condition.
    - Tavg is 565°F and stable
    - Control Bank D is at 190 steps.
    - Control Bank D Demand step counters are at 190 steps.
    - Control Rod Group Selector Switch is in the "AUTO" position.

    Plant Parameters are **NOW** as follows:
    - Tavg is 562 °F and slowly dropping.
    - RCS Pressure is 2230 psig and slowly dropping.
    - A4-8G, Rod Position Deviation is in alarm.
    - Reactor power has dropped to 51% and is slowly rising.
    - PR N-43 Negative Rate Trip bistable is LIT
    - All other PR Negative Rate Trip bistables are NOT LIT
    - Control Bank D Demand step counters remain at 190 steps.
    - DRPI indication for Rod D4 is 12 steps.

    Based on these conditions:

    What procedure entry is **REQUIRED** and what operator action will be **REQUIRED** by this procedure?

    Enter:

A. AOP 2.1.7, Rod Position Indication Malfunction and reduce thermal power to $\leq$ 50% within 8 hours.

B. AOP 2.1.7, Rod Position Indication Malfunction and place Control Rod Group Selector Switch to "MAN".

C. AOP 2.1.8, Rod Inoperability and reduce thermal power to $\leq$ 50% within 8 hours.

D. AOP 2.1.8, Rod Inoperability and place Control Rod Group Selector Switch to "MAN".

Answer: D

Explanation/Justification:

A. Incorrect. Rod position deviation is listed as symptom/entry condition for AOP 2.1.7, however this it be accompanied by no corresponding change in power or Tavg. The stem has power and Tavg changing. Additionally, reducing power to below 50% is only an option if the demand counters are inoperable.

B. Incorrect. Rod position deviation is listed as symptom/entry condition for AOP 2.1.7, however this it be accompanied by no corresponding change in power or Tavg. The stem has power and Tavg changing. Additionally, placing rods in manual is not a required action of AOP 2.1.7.

C. Incorrect. Correct procedure entry, wrong required action.

D. Correct. IAW AOP 2.1.8 symptoms the alarms and plant response are consistent with a dropped rod. AOP 2.1.8 addresses a dropped rod in Part A. and directs rod to be placed in manual. First part of the question can be answered with RO knowledge since it involves AOP entry conditions. 2nd part of the question requires SRO knowledge of procedure content. SRO candidate must evaluate the given conditions, and select what actions will be necessary to address the given situation.

Sys #	System	Category	KA Statement
000003	Dropped Control Rod	AA2. Ability to determine and interpret the following as they apply to the Dropped Control Rod:	Dropped rod, using in-core/ex-core instrumentation, in-core or loop temperature measurements

K/A# AA2.03 **K/A Importance** 3.8 **Exam Level** SRO

References provided to Candidate None **Technical References:** AOP 2.1.8 Rev. 3 pages 1 & 2

Question Source: New

Question Cognitive Level: High - Analysis **10 CFR Part 55 Content:** 10 CFR 55.43(b)(5)

83. The plant was at 100% power with all systems in NSA.
    - A Large Break LOCA occurs coincident with a loss of all LHSI flow.
    - The 5 hottest core exit T/Cs reach 730 °F and the crew Transitions to FR-C.2, Response to Degraded Core Cooling.

    1.5 hours after the trip, the following conditions exist:
    - CNMT pressure is 4 psig and slowly dropping.
    - All CNMT spray systems are operating as designed.
    - The 5 hottest core exit T/Cs, as indicated on the Plant Safety Monitor System (PSMS), are 750 °F and slowly rising.
    - In-Containment High Range Area radiation monitors [2RMR-RQ206 & 207], as indicated on the Digital Radiation Monitor System (DRMS), are reading 2.0×10^7 mR/hr and stable.
    - All RCPs have been secured.
    - RVLIS Full Range level, as indicated on the Plant Safety Monitor System (PSMS), is 33% and slowly dropping.

    Based on these conditions, what Emergency Action Level (EAL) classification is **REQUIRED**?
    (Refer to attached reference)

A. Unusual Event

B. Alert

C. Site Area Emergency

D. General Emergency

Answer: D

Explanation/Justification:

A. Incorrect. Candidates would choose this if they only recognized the potential loss of the CNMT barrier.

B. Incorrect. Candidates would choose this if they only recognized the loss of the fuel clad or RCS barrier.

C. Incorrect. Candidates would choose this if they failed to recognized the potential loss of the CNMT barrier.

D. Correct. IAW EPP/I-1b Attachment A Fission Product Barrier Matrix. SRO only in that it requires the implementation of administrative procedures that specify implementing emergency procedures. Specifically, implementing the E-Plan. The SRO must utilize the computer data provided (PSMS and DRMS) to determine that a RED path condition (ICC) exist for core cooling and this RED path condition means that a loss of both the fuel clad barrier and the RCS barrier are present as a result. Additionally, the CNMT barrier is also potentially lost as a result of the rad monitor readings and the time since RX trip.

Sys #	System	Category	KA Statement
000074	Inadequate Core Cooling	Generic	Ability to use plant computers to evaluate system or component status.

K/A# 2.1.19 **K/A Importance** 3.8 **Exam Level** SRO

References provided to Candidate EPP/I-1b Attachment A **Technical References:** EPP/I-1b Attachment A

Question Source: New

Question Cognitive Level: High - Analysis **10 CFR Part 55 Content:** 10 CFR 55.43(b)(5)

Objective:

84. The plant was operating at 100% power with all systems in NSA.
    - A Small break LOCA occurs and all systems function as designed.
    - The Crew has transitioned to E-1, Loss of Reactor or Secondary Coolant and are currently at step 8, Check if SI flow should be reduced.

    The following plant conditions exist:
    - RCS pressure is 1085 psig and stable
    - All S/G NR level are 33% and stable
    - Core exit T/Cs are 452 °F and slowly dropping
    - All S/G pressures are 950 psig and slowly dropping
    - RWST level is 490 inches and slowly dropping
    - CNMT pressure is 3.5 psig and stable
    - Total AFW flow is 900 gpm and stable
    - PRZR level is 18% and slowly rising

    Based on these conditions, what procedural transition is **REQUIRED**?

    Transition to____.

A. ECA-2.1, Uncontrolled Depressurization of All Steam Generators

B. ES-1.2, Post LOCA Cooldown and Depressurization

C. ES-1.3, Transfer to Cold leg Recirculation

D. ES-1.1, SI Termination

Answer: D

Explanation/Justification:

A. Incorrect. All S/G pressures are dropping, however they are dropping as a result of the RCS cooldown. The S/Gs are not faulted.
B. Incorrect. SI termination criteria are met, which negates the need to perform ES-1.2.
C. Incorrect. RWST level is not low enough to meet the procedure transition (400 inches).
D. Correct. IAW E-1 step 8 and E-1 LHP SI termination criteria are met. SRO only since it requires the SRO to assess plant conditions (normal, abnormal, or emergency) and then select a procedure or section of a procedure to mitigate, recover, or with which to proceed.

Sys #	System	Category	KA Statement
WE02	SI Termination	EA2. Ability to determine and interpret the following as they apply to the (SI Termination)	Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

K/A# EA2.1 **K/A Importance** 4.2 **Exam Level** SRO
References provided to Candidate None **Technical References:** E-1 step 8
Question Source: New
Question Cognitive Level: High - Analysis **10 CFR Part 55 Content:** 10 CFR55.43(b)(5)
Objective:

85. 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.

Answer: C

Explanation/Justification:

A. Incorrect. These are the actions from AOP 2.6.4 step 17 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 17.

C. Correct. IAW AOP 2.6.4 step 17 chart. SRO only since it requires the SRO to assess plant conditions and then select a section of a procedure with which to proceed. Specifically, the appropriate actions from step 17 that will prevent SG overfill and thus prevent water entry into the steamlines.

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 17.

Sys #	System	Category	KA Statement
000037	Steam Generator (S/G) Tube Leak	AA2. Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak:	Actions to be taken if S/G goes solid and water enters steam lines

K/A# AA2.14 **K/A Importance** 4.4 **Exam Level** SRO

References provided to Candidate None **Technical References:** AOP 2.6.4 step 17

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** 10 CFR55.43(b)(5)

Objective:

86. The following plant conditions exist:
    - K_{eff} is 0.90.
    - T_{avg} is 250 °F and stable
    - All SI Accumulators have been isolated.
    - OPPS is in service with PRZR PORVs [2RCS*PCV455C & 456] operable with lift settings within the limits specified in the Pressure Temperature Limit Report (PTLR).
    - All RCS cold leg temperatures are below the enable temperature specified in the PTLR.
    - Only one Charging pump is capable of injecting into the RCS.
    - A steam bubble exists in the PZR.
    - RCS pressure is 400 psig and stable.

    RCS pressure then rises above the variable lift setting pressure specified in the PTLR.
    - Neither PRZR PORV [2RCS*PCV455C & 456] automatically opens.
    - The RO (ATC) attempts to open PRZR PORV [2RCS*PCV456] but it will NOT open.
    - The RO (ATC) manually opens PRZR PORV [2RCS*PCV455C] and reduces RCS below the variable lift setting pressure specified in the PTLR.
    - RCS pressure is **STABILIZED** at 400 psig.

    Based on these plant conditions and this sequence of events, what Tech Spec actions will be **REQUIRED**?
    (Refer to attached reference)

A. Within 12 hours depressurize the RCS and establish an RCS vent of ≥ 3.14 in^2.

B. Within 24 hours restore PRZR PORVs [2RCS*PCV455C & 456] to operable status.

C. Within 37 hours enter Mode 5.

D. Within 7 days restore PRZR PORV [2RCS*PCV456] to operable status.

Answer: A

Explanation/Justification:

A. Correct. IAW TS 3.4.12 condition G. SRO only since it involves application of Required Actions in Section 3 of the TS.
B. Incorrect. This would be the required action if the plant was in Mode 5.
C. Incorrect. This would be the TS 3.0.3 required action if no action statement was available for the conditions in the stem.
D. Incorrect. This would be the required action if the candidate believes 2RCS*PCV455C was operable since in was manually opened.

Sys #	System	Category	KA Statement
010	Pressurizer Pressure Control System (PZR PCS)	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	PORV failures

K/A# A2.03 **K/A Importance** 4.2 **Exam Level** SRO
References provided to Candidate TS 3.4.12 **Technical References:** TS 3.4.12 Condition G
Question Source: New
Question Cognitive Level: High - Application **10 CFR Part 55 Content:** 10 CFR 55.43(b)(2)
Objective:

87. The plant is operating at 100% power with all systems in normal alignment for this power level.

- A Loss of 125VDC Bus 2-2 occurs
- All systems function as designed

(1) What impact, if any, will this loss of 125VDC Bus 2-2 have on Rx trip breaker status?

(2) IAW the guidance provided in AOP 2.39.1B, Loss of 125VDC Bus 2-2, what compensatory action would be necessary to control SG water level?

The Reactor trip breakers will_____(1)______.
In order to control SG water level it will be necessary to ________(2)___________.

A. (1) open
(2) control Auxiliary Feedwater flow

B. (1) remain closed
(2) place the Startup Feedwater pump in service

C. (1) open
(2) control SG Feedwater Bypass Control Vlvs [2FWS*FCV 479, 489, & 499]

D. (1) remain closed
(2) control SG Main Feed Reg Vlvs [2FWS*FCV 478, 488, & 498]

Answer: A

Explanation/Justification:

A. Correct. IAW AOP 2.39.1B rev. 3 Attachment 1 page 7. There is no direct Rx trip from loss of this DC bus. SRO must realize that the trip will occur from the loss of the MSIVs or loss of both the main feed reg valves and the bypass valves. ROs are not required to know from memory all components that are powered from a DC bus. The SROs are required to be familiar enough with the content of AOPs to direct the recovery actions. For a loss of either DC bus 2-1 or 2-2, the MSIVs will close and cause a Rx Trip. Part 1 of the question can therefore be answered with RO knowledge. However, Part 2 of the question will require SRO knowledge of the additional components that will be lost, and the compensatory actions need to control the plant. SRO only by ensuring that the additional knowledge of the procedure's content is required; Assessing plant conditions and then selecting a section of a procedure to mitigate, recover, or with which to proceed. In this case the compensatory actions of Attachment 1 of AOP 2.39.1B.

B. Incorrect. The reactor will trip on low SG water level. Placing the Startup feedwater pump in service may help control SG level, but is not addressed in the AOP attachment.

C. Incorrect. The reactor will trip on low SG level but the bypass feed reg valves will not be available.

D. Incorrect. The reactor will trip on low SG water level. The main feed reg valves are not available.

Sys #	System	Category	KA Statement
012	Reactor Protection System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Loss of dc control power

K/A# A2.07 **K/A Importance** 3.7 **Exam Level** SRO
References provided to Candidate None **Technical References:** AOP 2.39.1B rev. 3 Attachment 1 page 7
Question Source: New
Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** 10 CFR55.43(b)(5)
Objective:

88. The plant is in Mode 5 preparing to enter Mode 4.

- Maintenance is performing 2MSP-13.01-I, 2QSS-L104A, Refueling Water Storage Tank 2QSS-TK21 Level Loop Channel I Test.
- All bistables associated with this RWST level channel have been placed in their Tech Spec required condition.
- Maintenance reports the as found setpoint for:
  2QSS-LSEL104A RWST Ext-Lo Level SI Switchover Comparator Trip is 29' 6"
  (Tech Spec Allowable Value is between 31' 8" and 31' 10")
  AND
  2QSS-LSL104A Recirc Spray Pump Start Interlock Comparator Trip is 32' 9"
  (Tech Spec Allowable Value is between 32' 8" and 32' 10")

(1) What is the status of the following Tech Spec **REQUIRED** Engineered Safety Feature Actuation System (ESFAS) Instrumentation?

- RWST level Extreme low SI Switchover
- RWST level low Recirc Spray Pump Start Interlock

(2) Assuming all other requirements for Mode 4 entry have been met, what additional actions, if any, would be **REQUIRED** to enter Mode 4? (Assume the as found setpoints will remain as is)

(1) This channel of RWST____________________________________.
(2) Mode 4 entry is allowed____________________________________.
(Refer to attached reference)

A. (1) level Extreme low **AND** level low are BOTH still OPERABLE
(2) with no additional actions required

B. (1) level Extreme low is INOPERABLE **AND** level low is still OPERABLE
(2) **ONLY** if an additional risk assessment is performed

C. (1) level Extreme low is INOPERABLE **AND** level low is still OPERABLE
(2) with no additional actions required

D. (1) level Extreme low **AND** level low are BOTH INOPERABLE
(2) **ONLY** if an additional risk assessment is performed

Answer: C

Explanation/Justification:

A. Incorrect. Extreme level low is inoperable since it is outside the allowable band on the low side. If it was outside on the high side, it could still be operable dependent on the outcome of an evaluation to determine if it could still perform its function. Since the bistables are already tripped, no additional actions would be required to enter Mode 4 IAW TS 3.0.4. since the action statements allow continued operation for an unlimited period of time.

B. Incorrect. Correct operability determination. However, since the bistables are already tripped, no additional actions would be required to enter Mode 4 IAW TS 3.0.4. since the action statements allow continued operation for an unlimited period of time.

C. Correct. IAW TS page 3.3.2-9 item 2.b.2.and page 3.3.2-13 item 7.b and TS 3.0.4

D. Incorrect. Extreme level low is inoperable since it is outside the allowable band on the low side. If it was outside on the high side, it could still be operable dependent on the outcome of an evaluation to determine if it could still perform its function. Since the bistables are already tripped, no additional actions would be required to enter Mode 4 IAW TS 3.0.4. since the action statements allow continued operation for an unlimited period of time.

Sys #	**System**	**Category**		**KA Statement**
013	Engineered Safety Features Actuation System (ESFAS)	Generic		Ability to determine operability and/or availability of safety related equipment.
K/A#	2.2.37	**K/A Importance** 4.6	**Exam Level**	SRO
References provided to Candidate		TS 3.3.2	**Technical References:**	TS page 3.3.2-9 item 2.b.2.and page 3.3.2-13 item 7.b and TS 3.0.4
Question Source:	New		**Objective:**	
Question Cognitive Level:	High - Analysis		**10 CFR Part 55 Content:**	10 CFR 55.43(b)(2)

89. Given the following conditions:

- The plant is at 100% power with all systems in NSA.
- The RO (ATC) has recently performed a small dilution for Tavg control.

Shortly after the dilution, the following conditions exist:

- Power Range NI's are increasing.
- Tavg is decreasing.
- Steam flow and feed flow are slightly elevated.
- Reactor power is 101% and rising slowly.

Which ONE of the following describes the event in progress and the action REQUIRED?

A. Main steam line leak; reduce power to less than 100% by reducing turbine load IAW AOP 2.51.2, Reactor Overpower.

B. Condensate Feedwater Heater Bypass Valve [2CNM-AOV100] has inadvertently OPENED; reduce power to less than 100% by adjusting control rods IAW AOP 2.51.2, Reactor Overpower.

C. Main steam line leak; trip the reactor and enter E-0, Reactor Trip Or Safety Injection.

D. Condensate Feedwater Heater Bypass Valve [2CNM-AOV100] has inadvertently OPENED; trip the reactor and enter E-0, Reactor Trip Or Safety Injection.

Answer: A

Explanation/Justification:

A. Correct. Conditions in the stem indicate a steam break. IAW AOP 2.51.2 step 2 RNO. Diagnosis of the event is RO knowledge. Selecting the appropriate procedure and directing the appropriate actions is SRO only knowledge. SRO must evaluate plant conditions and determine appropriate procedural action, in this case power must be brought below 100% and step 2 of the AOP is a continuous action step for the SRO to direct the crew to reduce turbine load as necessary and at rate determined by the SRO.

B. Incorrect. Inadvertent opening of 2CNM-AOV100 will cause Tavg to drop (loss of feed heating) and reactor power to increase. However, steam flow and feed flow will remain unaffected. Reducing power is the correct action, but not by rod movement.

C. Incorrect. Conditions in the stem indicate a steam break. AOP 2.51. 2 does not direct a reactor trip. If the steam break indications were more severe, then a trip would be warranted based on approaching the high flux trip setpoint.

D. Incorrect. Inadvertent opening of 2CNM-AOV100 will cause Tavg to drop (loss of feed heating) and reactor power to increase. However, steam flow and feed flow will remain unaffected. AOP 2.51. 2 does not direct a reactor trip. If the steam break indications were more severe, then a trip would be warranted based on approaching the high flux trip setpoint.

Sys #	System	Category	KA Statement
039	Main and Reheat Steam System (MRSS)	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Increasing steam demand, its relationship to increases in reactor power

K/A# A2.05 **K/A Importance** 3.6 **Exam Level** SRO

References provided to Candidate None **Technical References:** AOP 2.51.2 Rev.0 step 2 CAS and RNO

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** 10 CFR55.43(b)(5)

Objective:

90. The Plant is operating at 100% power with all systems in NSA **EXCEPT:**

- 2MSS*SOV105A Turb Driven AFW Pump STM HDR A Supply Isol valve was placed on clearance today (September 1) at 0100 hours for SOV replacement.
- At 1300 hours today, 2MSS*SOV105E Turb Driven AFW Pump STM HDR B Supply Isol valve **Is Declared INOPERABLE.** (The valve cannot be cycled open or closed)

Based on these conditions, what Tech Spec action(s) will be **REQUIRED**?

(Refer to attached reference)

A. Be in Mode 3 by 1900 hours on September 1 **AND** Mode 4 by 0700 hours on September 2.

B. Restore AFW train to OPERABLE status by 1300 hours on September 4.

C. Restore 2MSS*SOV105E **OR** 2MSS*SOV105A to OPERABLE status by 1300 hours on September 8.

D. Restore 2MSS*SOV105E **OR** 2MSS*SOV105A to OPERABLE status by 0100 hours on September 11.

Answer: C

Explanation/Justification:

A. Incorrect. This would be the required action if the candidate believes that having two steam supply lines unavailable constitutes two inoperable trains of AFW.

B. Incorrect. This would be the required action if the candidate believes that having two steam supply lines unavailable constitutes an inoperable steam driven AFW pump. The requirement to re-align the supply headers is already being met by the NSA alignment.

C. Correct. IAW T. S. 3.7.5 and bases ONLY two of three steam supply lines are required for steam driven AFW pump operability. The candidate will need to use the TS bases to recognize that ONLY two of three steam supply lines are required for steam driven AFW pump operability. The Condition A statement specifically says one of the **required** steam supply lines inoperable. Therefore, taking 2MSS*SOV105A out of service would not require any TS action since 2 trains are still available. When 2MSS*SOV105E fails to meet the required stroke time, it must be declared inoperable and Cond. A action would apply. It is an SRO responsibility to be familiar enough with the operability requirements for the SOV to declare it inoperable based on the performance data presented in the stem. SRO only because it requires Application of Required Actions in Section 3 of the TS, which is an SRO responsibility.

D. Incorrect. This would be the required action if the candidate believes that the 10 day statement in Cond. A provides an additional allowance for two inoperable steam supplies. The bases for this 10 day statement is to limit the time allowed in thi condition when Cond. A and B are entered concurrently.

Sys #	**System**	**Category**	**KA Statement**
061	Auxiliary / Emergency Feedwater (AFW) System	Generic	Knowledge of operator responsibilities during all modes of plant operation.

K/A# 2.1.2 **K/A Importance** 4.7 **Exam Level** SRO

References provided to Candidate T. S. 3.7.5 and bases **Technical References:** T. S. 3.7.5 Cond A and bases

Question Source: New

Question Cognitive Level: High - Application **10 CFR Part 55 Content:** 10 CFR 55.43(b)(2)

Objective:

91. 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, the 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.

Answer: D

Explanation/Justification:

A. Incorrect. Wrong response, Correct action

B. Incorrect. Correct response. Wrong action. These are the actions to be taken if power is above P-10. Placing the block switches to block is not procedurally allowed until the P-10 permissive is received.

C. Incorrect. Wrong response. Wrong action. These are the actions to be taken if power is above P-10. Placing the block switches to block is not procedurally allowed until the P-10 permissive is received.

D. Correct. It is an RO fundamental knowledge to predict what impact loss of compensating voltage will have on the IR response. Lesson plan 3SQS-2.1 slide 18 illustrates this response. Correct action IAW AOP 2.2.1B step 5. SRO only by ensuring that the additional knowledge of the procedure's content is required; Assessing plant conditions and then selecting a section of a procedure to mitigate, recover, or with which to proceed.

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:** AOP 2.2.1B rev. 3 step 5

Question Source: New

Question Cognitive Level: High - Analysis **10 CFR Part 55 Content:** 10 CFR55.43(b)(5)

Objective:

92. The Unit is in Mode 6. A fuel assembly is being lowered into the core.

IF the fuel assembly "**BINDS**" against another fuel assembly, downward motion of the hoist will be automatically stopped to prevent fuel assembly damage.

What manipulator crane interlock provides this protection?

A. Tube Down

B. Underload

C. Overload

D. Gripper Air Solenoid

Answer: B

Explanation/Justification:

A. Incorrect. Tube down interlock will stop hoist downward motion when the hoist is all the way down.

B. Correct. IAW LP 3SQS-6.13 slide 49. (2RP-3.3) SROs are responsible for the assessment of fuel handling equipment surveillance requirement acceptance criteria, and this is a required manipulator crane interlock for fuel movement.

C. Incorrect. Overload will stop UPWARD motion if an assembly is binding while moving upward.

D. Incorrect. The Gripper air solenoid interlock does not allow the gripper to be disengaged unless the load is less than 1200 pounds. If an assembly were binding on the way down, load cell indication could drop below 1200 pounds. This does not stop hoist downward motion, rather it would make the setpoint for allowing the gripper to disengage.

Sys #	**System**	**Category**	**KA Statement**
034	Fuel Handling Equipment System (FHES)	K4 Knowledge of design feature(s) and/or interlock(s) which provide for the following:	Fuel protection from binding and dropping

K/A# K4.01 **K/A Importance** 3.4 **Exam Level** SRO

References provided to Candidate None **Technical References:** LP 3SQS-6.13 slide 103. (2RP-3.3)

Question Source: BVPS2 Bank

Question Cognitive Level: Low - Memory **10 CFR Part 55 Content:** 10 CFR 55.43(b)(7)

Objective:

93. The Plant is operating at 100% power with all systems in NSA.
- An inadvertent Reactor Trip occurs
- After the automatic FAST bus transfer, SSST 2A experiences an under frequency condition, which causes 4Kv busses 2A and 2B to de-energize.
- All other systems function as designed.

The crew enters E-0, Reactor Trip or Safety Injection and has just completed the Immediate Operator Actions.
Safety Injection has not actuated and is not required.

Current plant conditions are as follows:
- RCS pressure is 2100 psig and slowly rising.
- S/G pressures are 1000 psig and stable.
- Tavg is 550 °F and slowly rising
- Tcold is 542 °F in all three loops and stable.
- NR S/G levels are 10% and rising.
- Total AFW flow is 900 gpm and stable.

For these plant conditions, what EOP procedural action(s) will be **REQUIRED** to **AVOID** an automatic Safety Injection actuation?

The Unit Supervisor will direct the crew to ______________________________.

A. Manually actuate Steam line Isolation

B. Place the Steam Dump Control in Steam Pressure Mode

C. Throttle total AFW flow to greater than or equal to 300 gpm

D. Place the Low Steamline Pressure SI block switches to block

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Answer: B

Explanation/Justification:

A. Incorrect. Manually actuating SLI will physically prevent SI. However, there is NO EOP procedural guidance to perform this action.

B. Correct. IAW 1/2OM-53B.2 Iss 1C Rev. 7 page 7 preemptive action guidelines. The SM/US should direct this action to avoid the SI. SRO only since the SRO must assess plant conditions and then selecting a section of a procedure to mitigate, recover, or with which to proceed. In this case the SRO must recognize that the setting up of natural circulation with the steam dumps in Tavg mode will result in an inappropriate SI. The SRO must further recognize that an EOP preemptive action exists for this situation, and direct the crew to place the steam dumps in the steam pressure. Mode.

C. Incorrect. Throttling AFW flow is also a preemptive action. However, this is only required to control a cooldown and no cooldown exists. Additionally, throttling AFW flow will not prevent the SI for these conditions.

D. Incorrect. This would prevent the SI if RCS pressure was below 2000 psig. Since RCS pressure is above 2000 psig SI will not be blocked.

Sys #	**System**	**Category**	**KA Statement**
041	Steam Dump System (SDS) and Turbine Bypass Control	Generic	Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.

K/A# 2.1.31 **K/A Importance** 4.3 **Exam Level** SRO

References provided to Candidate None **Technical References:** 1/2OM-53B.2 Iss 1C Rev. 7 page 7

Question Source: New

Question Cognitive Level: High - Analysis **10 CFR Part 55 Content:** 10 CFR55.43(b)(5)

Objective:

94. NOP-LP-4011, FENOC Work Hour Control requires the Unit Supervisor to ensure that no personnel exceed 10 CFR 26 work hour limits without appropriate prior authorization.

Which of the below listed items are 10 CFR 26 work hour limits?

(Assume both Units are at 100% power with all systems in NSA)

1. No more than 20 work hours in any 32-hour period.
2. No more than 16 work hours in any 24-hour period.
3. No more than 26 work hours in any 48-hour period.
4. No more than 72 work hours in any 7-day.
5. No more than 72 work hours in any 168-hour period.
6. A 34-hour break in any 9-day period.

A. 1, 2, 3, & 4, ONLY

B. 1, 2, 5, & 6 ONLY

C. 2, 3, 4, 5, & 6 ONLY

D. 1, 3, 4, 5, & 6 ONLY

Answer: C

Explanation/Justification:

A. Incorrect. Item 1 is not required and item 6 is required.
B. Incorrect. Item 1 is not required and item 4 is required.
C. Correct. IAW NOP-LP-4011 Rev. 5 pages 15 and 16. NOP-LP-4011 is one of the tools that BV uses to ensure the Tech Spec required minimum staffing requirements are being met. This meets the SRO only requirement for meting conditions and limitations in the facility license as defined in 10CFR 55.43(b)(1). This is also an SRO only task at BV as stated in the NOP itself.
D. Incorrect. Item 1 is not required and item 2 is required.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.

K/A# 2.1.5 **K/A Importance** 3.9 **Exam Level** SRO
References provided to Candidate None **Technical References:** NOP-LP-4011 Rev. 6 page 16
Question Source: New
Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** 10 CFR 55.43(b)(1)
Objective:

95. The Unit is in Mode 1 at 89% following a power reduction from 100%. Control Bank "D" Group 1 indicates the following:

- Group step counter position is 196 steps.
- DRPI indicates the following:

  - o Control Rod H02 at 192 steps.
  - o Control Rod H14 at 204 steps.
  - o Control Rod P08 at 174 steps.
  - o Control Rod B08 at 180 steps.

For these plant conditions, the **REQUIRED** Tech Spec action is to be in Mode 3 within 6 hours. What is the bases for this Tech Spec Action?

A. Shutdown Margin is not met.

B. Rod drop times cannot be met.

C. AFD limits cannot be met.

D. Accident analysis assumptions are not met.

Answer: D

Explanation/Justification:

A. Incorrect. SDM may be impacted by two misaligned rods, but this is not a given. TS for these conditions also requires SDM verification w/I 1 hour and if necessary initiate boration to restore. It is not the bases for Mode 3 entry w/I 6 hours.

B. Incorrect. It is true that one rod may take longer to drop than the rest of the rods in the bank, but this is not the reason for Mode 3 entry w/I 6 hours. TS required rod drop times are measured from full out position.

C. Incorrect. AFD may be adversely impacted by misaligned rods. However, the AFD actions are to reduce power below 50%. This would not be a reason Mode 3 entry w/I 6 hours.

D. Correct. IAW TS Bases page B 3.1.4-8 Action D2. The SRO must first recognize that the items in the stem are indicative of two rods that have violated the TS required rod alignment limits. The SRO must then explain why it required to enter Mode 3 w/I 6 hours. SRO only since it requires knowledge of TS bases that are required to analyze TS required actions. The SRO must also apply the TS knowledge that misaligned does not necessarily mean INOPERABLE.

Sys #	**System**	**Category**	**KA Statement**
N/A	N/A	Generic	Ability to explain and apply system limits and precautions.

K/A# 2.1.32 **K/A Importance** 4.0 **Exam Level** SRO
References provided to Candidate None **Technical References:** TS Bases page B 3.1.4-8 Action D2
Question Source: New
Question Cognitive Level: High - Analysis **10 CFR Part 55 Content:** 10 CFR 55.43(b)(2)
Objective:

96.
- The Plant is operating at 100% power with all systems in NSA.
- Preparations are being made to receive New Fuel.
- The 480V power supply breaker [MCC-2-21 cubicle 2C] to the New Fuel elevator trips while testing the elevator with a "Dummy" fuel assembly.

Electrical Maintenance and System Engineering desire to implement troubleshooting activities on this breaker to determine the cause of the trip.

- The troubleshooting will NOT result in any unanticipated control room alarms.
- The troubleshooting will ONLY involve taking voltage/current readings, at the breaker with the breaker energized.
- The breaker has **NO** test points for voltage or current.

IAW NOP-ER-3001, Problem Solving and Decision Making Process what type of Troubleshooting Plan will be **REQUIRED** and what **Minimum** approval authority will be **REQUIRED**?

(Refer to attached reference)

A ________(1)_________ troubleshooting plan will be required.

Minimum required approval of this plan will be from ________(2)_________

A. (1) Simple
(2) a Senior Reactor Operator

B. (1) Simple
(2) the Electrical Maintenance Manager

C. (1) Complex
(2) any Maintenance Manager with concurrence of the Shift Manager

D. (1) Complex
(2) the Plant Duty Manager with concurrence of the Shift Manager

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Answer: A

Explanation/Justification:

A. Correct. IAW NOP-ER-3001 Rev. 5 Att. 3 pages 26 thru 30. SRO only since it requires the SRO to have a working knowledge of the process for making changes to plant equipment. In particular the process for managing troubleshooting activities.
B. Incorrect. Correct Plan. Wrong approval level.
C. Incorrect. Incorrect plan with appropriate approval for that plan if the candidate mis-applies the procedure.
D. Incorrect. Incorrect plan with appropriate approval for that plan if the candidate mis-applies the procedure.

Sys #	**System**	**Category**	**KA Statement**
N/A	N/A	Generic	Knowledge of the process for managing troubleshooting activities.

K/A# 2.2.20 **K/A Importance** 3.8 **Exam Level** SRO
References provided to Candidate NOP-ER-3001 Rev. 5 **Technical References:** NOP-ER-3001 Rev. 5 Att. 3 pages 26 thru 30.
Question Source: New
Question Cognitive Level: High - Application **10 CFR Part 55 Content:** 10 CFR 55.43(b)(3)
Objective:

97. Unit 1 and Unit 2 are at 100% power with all systems in NSA.

- A RWDA-L has been prepared for discharging Steam Generator Blowdown Evaporator Test Tank [2SGC-TK23A].
- After the RWDA-L is approved by Radiation Protection, the Unit 2 SM or US is then required to review the RWDA-L to confirm the status of various items as part of the approval process.

IAW the guidance in 2OM-25.4.L, Discharging Steam Generator Blowdown Evaporator Test Tank [2SGC-TK23A(B)] Contents to Cooling Tower Blowdown, which of the below items is **NOT REQUIRED** as part of this review/approval?

A. Verify the effective period for the RWDA-L has **NOT** expired.

B. Verify Unit 2 cooling tower blowdown flow is greater than the minimum flow specified on the permit.

C. Verify the tank data is correct.

D. Verify all hand calculations are correct.

Answer: B

Explanation/Justification:

A. Incorrect. IAW 2OM-25.4.L Rev. 29 step IV.A.12 page 16 this is a required item.

B. Correct. IAW 2OM-25.4.L Rev. 29 step IV.A.12 page 16 this is **NOT** a required item. Minimum Cooling tower blowdown flow for liquid discharges is based on the combined flow of Unit 1 and Unit 2. With both Units at full power, the RWDA-L bases the Minimum Cooling tower blowdown flow on this combined flow. The SM/US is required to verify that the combined U1 and U2 cooling tower blowdown flow is greater than that specified on the permit. Unit 2 flow alone will NEVER meet this requirement. SRO only in that this an SRO task and involves the process for liquid releases.

C. Incorrect. IAW 2OM-25.4.L Rev. 29 step IV.A.12 page 16 this is a required item.

D. Incorrect. IAW 2OM-25.4.L Rev. 29 step IV.A.12 page 16 this is a required item.

Sys # N/A | **System** N/A | **Category** Generic | **KA Statement** Ability to approve release permits.

K/A# 2.3.6 | **K/A Importance** 3.8 | **Exam Level** SRO

References provided to Candidate None | **Technical References:** 2OM-25.4.L Rev. 30 step IV.A.12 pages 16 & 17

Question Source: New

Question Cognitive Level: High - Comprehension | **10 CFR Part 55 Content:** 10 CFR 55.43(b)(4)

Objective:

98. The Plant is operating at 100% power with all systems in NSA.
    - 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 ½-ODC-3.03, ODCM: Controls for RETS and REMP Programs actions will be **REQUIRED**?

    (Refer to attached reference)

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:

A. Incorrect. This is a required action if FR-GW-108 is OOS **NOT** RM-GW-108B. (Action 28A)
B. Correct. IAW ODCM ½-ODC-3.03 Att.F page 38 and action 27 on page 42.
C. Incorrect. This is the required action for all continuous releases thru this pathway. (Action 29)
D. Incorrect. This is required action 32 for continuous releases if the alt channel 109 ch5 is also not available.

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		½-ODC-3.03		**Technical References:**	ODCM ½-ODC-3.03 Rev. 11 Att.F pages 38-43
Question Source:		New			
Question Cognitive Level:		High - Application		**10 CFR Part 55 Content:**	10 CFR 55.43(b)(4)
Objective:					

99. The Plant is operating at 100% power with all systems in NSA.
- A loss of all 4KV AC power occurs
- The crew enters ECA-0.0, Loss of All AC Power

After 30 minutes, power is restored to one 4KV Emergency bus and the crew has reached the end of procedure ECA-0.0 and are in the process of selecting the appropriate recovery procedure. The following conditions now exist:
- RCS subcooling is ZERO degrees
- PRZR level is 2% and dropping
- HHSI and LHSI flows are ZERO gpm
- A RED path condition exists for the heat sink status tree

Based on these conditions, what procedure transition is **REQUIRED**?

Transition to ____.

A. FR-H.1, Response To Loss Of Secondary Heat Sink

B. ECA-0.1, Loss of All AC Power Recovery Without SI Required

C. ECA-0.2, Loss of All AC Power Recovery With SI Required

D. ES -0.2, Natural Circulation Cooldown

Answer: C

Explanation/Justification:

A. Incorrect. FRPs usually have higher priority than ECA procedure. In tis case they do not since ECA-0.1 and 0.2 are structured such that they will restart ESF equipment. Only after completing these steps will FR-H.1 be implemented.

B. Incorrect. The conditions in the stem indicate the need for SI.

C. Correct. IAW the NOTE prior to step 1 of ECA-0.0 FRPs are not to be implemented while in ECA-0.0. A note prior to step 1 of both ECA-0.1 and 0.2 then reminds the operator to complete steps 1-11 before implementing any FRP. Therefore, the appropriate transition is to ECA-0.2 since the conditions in the stem indicate the need for SI. SRO only since it requires the additional knowledge of the procedure's content and; assessing plant conditions and then selecting a procedure to mitigate, recover, or with which to proceed.

D. Incorrect. Without any normal 4KV power, the RCP will not be running and this would be a transition if 4KV emergrncy had not been lost.

Sys #	**System**	**Category**	**KA Statement**
N/A	N/A	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:** ECA-0.0. step 39 & step 1 NOTE

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** 10 CFR55.43(b)(5)

Objective:

100. The plant is operating at 75% power with all systems in NSA.

- 1B First Stage Steam Press [2MSS-PT447] instantaneously fails LOW.
- All systems respond as designed.

Based on these conditions:

(1) Which of the below listed annunciators will be LIT 30 seconds AFTER the failure? (Assume no operator action for this 30 second period.)

a. A12-1E, AMSAC bypassed by C-20 Permissive
b. A6-12G, AMSAC Trouble
c. A12-4B, Load Rejection > 35% (C7-B)
d. A12-1F, P-13 Permissive
e. A12-2H, NOT P-13

(2) What procedural actions will be **REQUIRED** as a result of this failure?

A. (1) b, c, & d ONLY
(2) Place rod control to MAN; Place the STM Dump Control Mode Selector Switch to RESET; verify the P-13 interlock is in its required state.

B. (1) a, b, c, & d ONLY
(2) Place rod control to MAN; Place the STM Dump Control Mode Selector Switch to STM PRESS; verify the P-13 interlock is in its required state.

C. (1) b, c, & e ONLY
(2) Place the STM Dump Control Mode Selector Switch to RESET; place P-13 permissive bistable (2PS/447E (BS-1)) in the tripped condition.

D. (1) a, b, c, & e ONLY
(2) Place the STM Dump Control Mode Selector Switch to STM PRESS; place P-13 permissive bistable (2PS/447E (BS-1)) in the tripped condition.

Answer: A

Explanation/Justification:

A. Correct. IAW 2OM-24.4.IF rev. 16 Attachment 5. Part 1 can be answered with RO knowledge. Part 2 SRO only since it requires the additional knowledge of the procedure's content and; assessing plant conditions and then selecting actions with which to proceed.
B. Incorrect. A12-1E will not actuate for 180 seconds. All other alarms and actions are correct.
C. Incorrect. A12-2H will NOT be LIT and A12-1F will be lit. P-13 bistables are not required to be tripped.
D. Incorrect. A12-1E will not actuate for 180 seconds, A12-2H will NOT be LIT and A12-1F will be lit. P-13 bistables are not required to be tripped.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to verify that the alarms are consistent with the plant conditions.

K/A# 2.4.46 **K/A Importance** 4.2 **Exam Level** SRO
References provided to Candidate None **Technical References:** 2OM-24.4.IF rev. 16 Attachment 5.
Question Source: New
Question Cognitive Level: High - Application **10 CFR Part 55 Content:** 10 CFR 55.43(b)(5)
Objective: