

SENIOR REACTOR OPERATOR WRITTEN EXAM KEY- 2014 EXAM  
MILLSTONE UNIT 2

- |       |       |                                  |        |
|-------|-------|----------------------------------|--------|
| 1. D  | 33. A | 65. B                            | 97. B  |
| 2. A  | 34. C | 66. A                            | 98. A  |
| 3. C  | 35. B | 67. D                            | 99. D  |
| 4. A  | 36. D | 68. D                            | 100. D |
| 5. A  | 37. A | 69. A                            |        |
| 6. C  | 38. C | 70. D                            |        |
| 7. B  | 39. C | 71. C                            |        |
| 8. A  | 40. D | 72. A                            |        |
| 9. B  | 41. A | 73. B                            |        |
| 10. B | 42. B | 74. D                            |        |
| 11. A | 43. B | 75. B                            |        |
| 12. C | 44. B | 76. B                            |        |
| 13. A | 45. D | 77. D                            |        |
| 14. C | 46. D | 78. A                            |        |
| 15. C | 47. C | 79. B                            |        |
| 16. C | 48. C | 80. B                            |        |
| 17. D | 49. B | 81. C                            |        |
| 18. D | 50. B | 82. C                            |        |
| 19. B | 51. A | 83. A                            |        |
| 20. C | 52. C | 84. C                            |        |
| 21. D | 53. A | 85. B                            |        |
| 22. D | 54. A | 86. A                            |        |
| 23. B | 55. A | <del>87. A</del> q87 Deleted for |        |
| 24. D | 56. C | 88. C                            |        |
| 25. A | 57. D | 89. C                            |        |
| 26. D | 58. A | 90. D                            |        |
| 27. B | 59. C | 91. C                            |        |
| 28. C | 60. C | 92. D                            |        |
| 29. A | 61. B | 93. A                            |        |
| 30. B | 62. D | 94. A                            |        |
| 31. B | 63. B | 95. D                            |        |
| 32. D | 64. B | 96. B                            |        |

## QUESTION 1

Given the following conditions:

- A loss of offsite power has occurred.
- The plant has responded as designed to this event.
- The crew is performing EOP 2528, Loss of Offsite Power/Loss of Forced Circulation.

Per EOP 2528, which ONE of the choices listed below correctly completes the statement to describe the MAXIMUM acceptable loop  $\Delta T$  when checking for natural circulation?

When confirming natural circulation flow in at least one loop, check loop  $\Delta T$  is less than \_\_\_\_\_ °F

- A. 25
- B. 35
- C. 45
- D. 55

K&A Rating: E02 EA1.2 (3.3, 3.9)

K&A Statement: Ability to operate and or monitor the following as they apply to Reactor Trip Recovery: Operating behavior characteristics of the facility.

Key Answer: D

Justification (Question 1):

- A. **Incorrect:** EOP 2528 step 11 says 55°F.  
**Plausible:** 25°F is an example number given in the LP for 2% decay heat. Turbine load at 25% is a threshold for condenser backpressure limits (OP-2202). Reactor power at 25% is a threshold, below which FRV bypass valve operation is permitted. Per OP-2206, EOP 2525 is entered if pressurizer level lowers to less than 25%.
- B. **Incorrect:** EOP 2528 step 11 says 55°F.  
**Plausible:** This is a physically plausible number. Refuel pool level less than 35'6" requires compensatory actions per OP 2207. No load Tcold is maintained between 530°F and 535°F
- C. **Incorrect:** EOP 2528 step 11 says 55°F.  
**Plausible:** This is a physically plausible number. OP-2204 provides direction for starting the second feed pump between 45% and 48% power
- D. **CORRECT:** EOP 2528 step 11 says 55°F.

References: None

Student Ref: NONE

Learning Objective:

Question Source: new

Question History: new

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.5

Comments (Question 1):

## QUESTION 2

The unit is operating at 100% power when a pressurizer safety spuriously lifts and remains partially open. The reactor trips on low pressurizer pressure.

Which ONE of the following characterizes the relationship between pressurizer level and the reactor coolant inventory under the given conditions and the reason for this relationship?

- A. Pressurizer level is NOT an accurate indication of inventory. RCS voiding may result in a rapidly increasing pressurizer level.
- B. Pressurizer level is an accurate indication of inventory. RCP flow will sweep any voids from the RCS to the pressurizer steam space.
- C. Pressurizer level is NOT an accurate indication of inventory. The level instruments may behave erratically due to pressurizer steam space water hammer.
- D. Pressurizer level is an accurate indication of inventory. Voiding will occur first in the pressurizer due to the low pressure caused by the open safety valve.

K&A Rating: 008 AK3.01 (3.7, 4.4)

K&A Statement: Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident: Why PZR level may come back on scale if RCS is saturated.

Key Answer: **A**

Justification (Question 2):

- A. **CORRECT:** Stem conditions indicate subcooling has been lost and a bubble is forming in the reactor vessel head area. Therefore PZR level is no longer indicative of RCS inventory.
- B. **Incorrect:** Level does NOT indicate inventory accurately during vapor space accidents.  
**Plausible:** Common misconception that voids forming in the RCS will be transported by the reactor coolant pumps to the PZR. However once sub cooling is lost a bubble will form in the head area.
- C. **Incorrect:** Steam space water hammer is not an expected response and operating experience does not support a conclusion regarding erratic response due to water hammer.  
**Plausible:** Pressurizer level instruments may be somewhat inaccurate as compared to normal plant conditions of 2250 psia.
- D. **Incorrect:** Level does NOT indicate inventory accurately during vapor space accidents.  
**Plausible:** Common misconception that the lowest pressure in the system is at the leak and therefore any flashing to steam would occur in the PZR and not in the vessel area.

References: None

Student Ref: NONE

Learning Objective:

Question Source: new

Question History: new

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.5, 41.10

Comments (Question 2):

### QUESTION 3

The Unit has transitioned to two phase natural circulation flow (reflux boiling) due to a small break LOCA with inadequate HPSI flow.

The crew can enhance reflux boiling heat removal by increasing...

- A. RCS T-cold to  $> 550^{\circ}\text{F}$ .
- B. PZR level from 15 to 55%.
- C. SG NR level from 10% to 50%.
- D. PZR pressure from 1500 to 1600 psia.

K&A Rating: 009 Small Break LOCA EK1.01 (4.2)

K&A Statement: Knowledge of the operational implications of the following concepts as they apply to small break LOCA: Natural circulation and cooling, including reflux boiling.

Key Answer: **C**

Justification (Question 3):

- A. **Incorrect:** Changing RCS parameters will have negligible effect on reflux boiling.
- B. **Incorrect:** Changing RCS parameters will have negligible effect on reflux boiling.
- C. **CORRECT:** Reflux boiling is the process of steam going up the SG tubes, condensing and falling back into the RCS. The greater the tube coverage the greater the cooling.
- D. **Incorrect:** Changing RCS parameters will have negligible effect on reflux boiling.

References: None

Student Ref: NONE

Learning Objective: N/A

Question Source: Bank Palo Verde

Question History: Palo Verde 2007 RO NRC Exam

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.8, 41.10

Comments (Question 3):

#### QUESTION 4

The plant has tripped due to a large break LOCA and the crew has been successfully mitigating the event using the applicable EOP.

The following plant conditions exist 6 hours into the event:

- SIAS, CIAS, CSAS, MSI and SRAS have all been verified as completely actuated
- CTMT pressure = 2.3 psig and lowering slowly
- CTMT temperature = 220°F and lowering slowly
- Reactor Vessel level = 19% and stable
- All other plant equipment is functioning as designed

Then, at that time, a state-wide blackout causes a loss of the RSST and the following conditions now exist:

- Facility 1 components are unavailable due to electrical fault on bus 24C and/or 24E (24E is presently aligned to 24C).
- ESAS Cabinet 6 has failed to actuate due to blown cabinet fuses.
- "B" EDG starts and its output breaker is now closed.

Which ONE of the following lists the components that, in addition to Service Water and RBCCW Pumps, are procedurally required to be placed in service and why?

- A. HPSI pump for core cooling.  
CAR Fans for CTMT cooling.
- B. LPSI pump for core cooling.  
CAR Fans for CTMT cooling.
- C. HPSI pump for core cooling.  
CTMT Spray pump for CTMT cooling.
- D. LPSI pump for core cooling.  
CTMT Spray pump for CTMT cooling.



K&A Rating: 011 Large Break LOCA with Generic 2.4.9 (3.8,4.2)

K&A Statement: Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.

Key Answer: **A**

Justification (Question 4):

A. **CORRECT:** SW is the heat sink to RBCCW. RBCCW is the heat sink to the RCS because vessel level is too low to use the SG's as a heat sink. HPSI is required for flow through the core because LPSI cannot be used during sump Recirc. Present CTMT pressure and time dictate that CAR fans be used for CTMT cooling, not CTMT Spray.

B. **Incorrect:** In sump recirc (SRAS) the LPSI pumps are not used for RCS or core cooling.

C. **Incorrect:** With CTMT pressure less than 7 psig, CTMT spray would be secured by procedure.

D. **Incorrect:** In sump recirc (SRAS) the LPSI pumps are not used for RCS or core cooling.

References: EOP-2532, St, 5, 13, 22, 23 and 60.

Student Ref: NONE

Learning Objective:

Question Source: Bank Q ID 8000002

Question History: MS2 2009 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 4):

## QUESTION 5

In response to alarms, the following data for "A" Reactor Coolant Pump (RCP) was recorded on Attachment 7 of OP-2301C, Reactor Coolant Pump Operation.

Attachment 7				
RCP Estimated Seal Stage Failure Rate Worksheet				
(Sheet 1 of 1)				
Affected RCP: <u>    A    </u>				
Parameters		DATA		
Data acquisition time	(Time)	0000	0800	2400
RCS pressure	(A)	2250	2250	2250
Middle seal pressure	(B)	1390	1240	790
Upper seal pressure	(C)	545	250	250
Vapor seal pressure	(D)	60	60	60

Based on the data, which ONE of the following correctly describes the failure and degradation status of the seal stages on this RCP?

- A. The upper seal has failed. The middle seal has degraded.
- B. The upper seal has failed. No other seal has failed or degraded.
- C. The middle seal has failed. The upper seal has degraded.
- D. The middle seal has failed. No other seal has failed or degraded.

K&A Rating: 015/017 RCP Malfunctions AK3.02 (3.0, 3.5)

K&A Statement: AA2.01 Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): Cause of RCP failure

Key Answer: **A**

Justification (Question 5):

A. **CORRECT:** By 0800 the upper seal has failed (stage d/p at 190 psid) and at that point the middle seal begins to degrade (stage pressure 160 psi lower than nominal 1400 psi). By 2400 the seal conditions meet shutdown requirements of 2301C section 4.15.

B. **Incorrect:** The middle seal is degrading.

C. **Incorrect:** Opposite of what is actually happening.

D. **Incorrect:** The middle seal is degrading.

References: OP-2301C Section 4.15, Attachments 4, 5

Student Ref: NONE

Learning Objective: MB 01955

Question Source: Bank Q ID 88010

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.3

Comments (Question 5): A seal stage is considered failed when d/p across that stage is <200 psid AND RCS pressure is between 2200 and 2300 psia. A stage is considered degraded if stage pressure deviates from nominal values by 150 psig. Nominal stage pressures are as follows:

- Middle Seal 1,400 to 1,600
- Upper Seal 600 to 800
- Vapor Seal 60 to 90

## QUESTION 6

Given the following conditions:

- A loss of all charging flow has occurred due to failure of all charging pumps
- Maintenance expects to restore a charging pump within 4 to 6 hours
- The reactor has been tripped
- AOP 2512, Loss of All Charging and EOP 2526, Reactor Trip Recovery are in progress

Which ONE of the following is the correct action per AOP 2512?

- A. Commence boration from either BAST.
- B. Initiate safety injection at 10% pressurizer level.
- C. Cooldown, depressurize and borate using the RWST.
- D. Maintain Tcold above 530°F while a charging pump is restored.

K&A Rating: 022AK3.02 (3.5, 3.8)

K&A Statement: Knowledge of the reasons for the following responses as they apply to the loss of RCS makeup: Actions contained in SOPs and EOPs for RCPs, loss of makeup, loss of charging, and abnormal charging

Key Answer: C

Justification (Question 6):

A. **Incorrect:** There are no available means of boron injection from the boric acid storage tanks as charging pumps would be required.

**Plausible:** The applicant may think BASTs always preferred and not consider method of injection unavailable.

B. **Incorrect:** SI is not required.

**Plausible:** Rx trip is required at 10% below programmed level; applicant may remember the number but not the context.

C. **CORRECT:** The AOP directs cooldown, depressurization and injection with HPSI pumps, which are aligned to the RWST, if pressurizer level lowers to 10% below programmed value or charging restoration is determined unlikely. Pressurizer level will shrink to between 25 and 30% on a reactor trip. Within no more than 2.5 hours pressurizer level will be below the pressurizer heater cutoff level and will be more than 10% below program before a charging pump is expected to be restored.

D. **Incorrect:** Pressurizer level drops due to RCP bleedoff. The plant must be depressurized to inject.

**Plausible:** Maintaining hot standby avoids positive reactivity due to cooldown and would prevent the plant transient IF charging could be promptly restored.

References: AOP 2512, Loss of All Charging, Rev 001-04      Student Ref: NONE  
A-12-01C ppt

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 6):

## QUESTION 7

A LOCA has occurred. SRAS has actuated. HPSI Pumps "A" and "C" are running. RCS pressure is 870 psia with the following HPSI indications:

- HPSI injection is fluctuating between 100 and 200 gpm total flow
- HPSI pump amps are fluctuating

Which ONE of the following is a possible cause of these indications and an action specified in EOP 2532, Loss of Coolant Accident, Step 50, HPSI Pump Post SRAS Performance Criteria to address that cause?

- A. High RCS pressure is impeding HPSI flow; stop one HPSI pump and establish stable conditions for the remaining pump.
- B. Containment sump suction blockage is occurring; secure both CS pumps if containment conditions will allow.
- C. High RCS pressure is impeding HPSI flow; throttle HPSI and establish stable conditions for the HPSI pumps.
- D. Containment sump suction blockage is occurring; stop both HPSI pumps and ensure only one CS pump is operating.

K&A Rating: 025AK2.05 (2.6, 2.6)

K&A Statement: Knowledge of the interrelations between the Loss of RHR System and the following: Reactor building sump.

K&A Justification: Post event RHR function is HPSI in recirc mode, LPSI shutdown; "RHR System" is interpreted as the system providing the RHR function using the containment sump.

Key Answer: **B**

Justification (Question 7):

- A. **Incorrect:** Conditions indicate sump strainer clogging. HPSI pumps are at shutoff head at 1280 psig. HPSI flow should be approximately 600 gpm at the given pressure.  
**Plausible:** Procedure addresses high RCS pressure as a possible condition, action is correct for that condition.
- B. **CORRECT:** HPSI flow is significantly lower than expected for current RCS pressure. The fluctuating low flow and fluctuating amps are consistent with sump clogging. EOP 2532, LOCA, Step 50 Contingency Actions, directs securing CS pumps if indications of sump clogging are impacting HPSI pump performance and containment conditions meet given criteria.
- C. **Incorrect:** Conditions indicate sump strainer clogging and HPSI pump flow should be greater than 200 gpm at the given pressure.  
**Plausible:** Action is correct for that condition provided in the first part of the distractor.
- D. **Incorrect:** Action incorrect.  
**Plausible:** Action seems reasonable for a loss of suction issue.

References: EOP 2540C IC-2  
ECCS LP ECC-01-C Rev 4

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 7):

## QUESTION 8

The plant was operating at 100% when a reactor trip occurred.

Given the following conditions and events:

- 2 charging pumps are operating.
- Several CEAs failed to fully insert.
- Reactor power is 5% and slowly lowering at 1 minute after the trip.
- Boric Acid Isolation, 2-CH-514, will NOT open.
- Gravity Feed Isolations, 2-CH-508 and 2-CH-509, will NOT open.

Which ONE of the following statements correctly describes the procedure and required actions to be taken?

- A. Continue EOP-2541 "Appendix 3 - Emergency Boration" and emergency borate from the RWST.
- B. Continue EOP-2525, "Standard Post Trip Actions" to determine if any other problems exist. Maintain Tavg at or above 500°F.
- C. Refer to EOP-2540A, "Functional Recovery of Reactivity Control" and emergency borate using success path RC-3 (Boration using SI).
- D. Refer to AOP-2558, "Emergency Boration" and emergency borate for at least 2 hours by opening Boric Acid Flow Control Valve, 2CH-210Y.



K&A Rating: 029 ATWS 2.1.23 (4.3)

K&A Statement: 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation.

Key Answer: **A**

Justification (Question 8):

- A. **CORRECT:** EOP 2525 directs the applicant to emergency borate using EOP 2541 appendix 3. There is no time limit provided under emergency conditions. This boration path uses the charging pumps for injection
- B. **Incorrect:** If the candidate thinks that several CEAs failing to fully insert with reactor power at 5% and lowering will not pose a problem as long as Tavg remains above 500 F, this answer is plausible. However, EOP 2525 directs the operator to emergency borate using EOP 2541 appendix 3.
- C. **Incorrect:** If the candidate thinks that a failure of the CVCS primary emergency boration flow path is justification for referring to EOP 2540A, they could possibly select this answer. This is the correct success path if RC-1 (CEA Insertion) and RC-2 (Boration using CVCS) are not available. This success path uses the SI pumps not the charging pumps. Note that RC-2 directs the operator to borate using EOP 2541 Appendix 3.
- D. **Incorrect:** If the candidate thinks that referring to the AOP is permissible under these circumstances, the flow path will provide boric acid flow to the RCS. The thumb rule requirement in the AOP is to borate 1.5 hours for each additional CEA stuck beyond 1. In this case, if the AOP was used, the requirement to borate would be 3 hours not 2 hours. The applicant would select 2 hours if they used the thumb rule for 3 CEAs stuck out and neglected to recall that one of the CEAs is already considered stuck out in the safety analysis.

References: EOP 2525

Student Ref: NONE

Learning Objective:

Question Source: MS2 Bank #54226

Question History: MS2 2005 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 8):

## QUESTION 9

A SGTR has occurred in #1 SG concurrent with a loss of off-site power.

Initial cooldown on both RCS loops has been completed and #1 SG has been completely isolated.

Which ONE of the following conditions and values would indicate that the RCS cooldown was too aggressive and that the loops had become uncoupled?

- A. #1 loop Tc greater than or equal to 5° F lower than #2 loop Tc.
- B. #1 loop Th greater than or equal to 10° F higher than #2 loop Th.
- C. #1 loop delta-P greater than or equal to 5 psi lower than #2 loop delta-P.
- D. #1 SG pressure greater than or equal to 20 psi higher than #2 SG pressure.

K&A Rating: 038 SGTR 2.1.7 (4.4)

K&A Statement: 2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Key Answer: **B**

Justification (Question 9):

- A. **Incorrect:** Once #1 SG is completely isolated, #1 loop Tc will remain higher
- B. **CORRECT:** Uncoupling of the two loops is indicated by failure of Th in the loop with the isolated steam generator to track Th in the operating loop. Hot leg temperatures differing by more than 10°F is an indication that the isolated steam generator is limiting RCS cooldown and depressurization. (2nd note in note block, EOP-2534, Pg 26 of 67).
- C. **Incorrect:** Natural circ delta-P is ~1/2 # or less in loop #2, can't get 5# less.
- D. **Incorrect:** Isolated SG pressure remains elevated as part of success strategy to minimize pri-to-sec leakage

References: EOP 2534, Rev 026

Student Ref: NONE

Learning Objective:

Question Source: MS2 Bank #1000045

Question History: MS2 2005 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 9):

## QUESTION 10

The plant was operating at 100% power when a steam leak occurred. The crew is taking actions in EOP 2536, Excess Steam Demand Event, with the following conditions and events in sequence:

- The Reactor was manually tripped
- Main Steam Isolation has actuated
- Safety Injection Actuation Signal has occurred
- Reactor Coolant Pumps have been secured
- Tcold and S/G pressure on Loop 2 are decreasing much faster than Tcold and S/G pressure on Loop 1
- Auxiliary Feedwater Actuation Signal has NOT actuated
- Containment pressure and temperature are increasing

Which ONE of the following actions must be taken on Panel C-05 in accordance with EOP 2536, Excess Steam Demand Event to prevent feeding the most affected S/G?

- A. Place the aux feed isolation air assisted check valve, FW-12B to CLOSE.
- B. Place both auxiliary feed OVERRIDE/MAN/START RESET handswitches in PULL-TO-LOCK.
- C. Place both auxiliary feed regulating valve controllers in MANUAL and CLOSED.
- D. Place the aux feed regulating valve, FW-43B, RESET/NORM/OVRD handswitch momentarily to OVRD.

K&A Rating: EPE E05 Steam Line Rupture-Excessive Heat Transfer, EK2.2 (3.7, 4.2)

K&A Statement: Knowledge of the interrelations between the (Excess Steam Demand) and the following: Facility's heat removal systems, including primary coolant, emergency coolant, and the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

Key Answer: **B**

Justification (Question10):

- A. **Incorrect:** The air assisted check valves are designed to provide containment isolation in the event of an accident inside containment. These valves are 6 inch swing checks that will prevent a reversal of flow. Normal AFW flow will open the valves.  
**Plausible:** EOP Step (EOP-2536, Step 9.L, Pg 12 of 62) directs closing this valve in the event of a steam line break. Applicant may think that closing this valve will prevent AFW from reaching the most affected S/G.
- B. **CORRECT:** The AFW feed regulating valves will be closed until AFAS is actuated. Placing these switches in PULL-TO-LOCK prior to AFAS blocks the automatic initiation signal that opens the AFW FRVs. (AFW-00-C, Pg 19 of 56).
- C. **Incorrect:** An auto actuation signal will open the AFW feed regulating valves even if the manual loading stations are in MANUAL and CLOSED.  
**Plausible:** applicant may assume that the valve will not automatically open when in MANUAL.
- D. **Incorrect:** The No. 2 S/G AFW FRV's RESET NORM OVRD switch has no function until an AFAS occurs. Manipulating this switch now will not prevent feeding the most affected S/G if AFAS occurs after the RESET NORM OVRD was momentarily (spring return to normal) in OVRD.  
**Plausible:** applicant may think that once overridden, the valve will not react to an auto actuation signal until this same switch is taken to RESET.

References: EOP-2536, Step 9

Student Ref: NONE

Learning Objective:

Question Source: Bank Q ID 71648

Question History: MS2 2005 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 10):

## QUESTION 11

The plant is operating normally at 100% power when a loss of feedwater occurs. The crew has entered EOP 2537, Loss of All Feedwater. The only source of feed flow is the "A" Condensate Pump, which is running. A flowpath has been established from the hotwell to both Steam Generators (S/Gs). Other than the plant status described below, all other plant systems and components are operating normally. The following conditions exist:

- #1 S/G wide range level = 123"
- #2 S/G wide range level = 98"
- #1 S/G pressure = 665 psia
- #2 S/G pressure = 650 psia
- RC-402, Power Operated Relief Valve (PORV) is unavailable
- S/G depressurization at the maximum controllable rate has been initiated

Regarding Once-Through-Cooling (OTC), which ONE of the following describes the expected action in accordance with EOP 2537?

- A. Initiate OTC BEFORE either S/G lowers to 70" wide range.
- B. Do NOT initiate OTC, even if both S/Gs are less than 70" wide range, if condensate flow is greater than 125 gpm to each S/G.
- C. Do NOT initiate OTC UNTIL both S/Gs are less than or equal to 70" wide range.
- D. Initiate OTC AFTER either S/G lowers to 70" wide range.

K&A Rating: EPE E06 EA 1.3 Loss of Main Feedwater

K&A Statement: Ability to operate and / or monitor the following as they apply to the (Loss of Feedwater): Desired operating results during abnormal and emergency situations. (3.2, 4.0)

Key Answer: **A**

Justification (Question 11):

- A. **CORRECT:** Once through cooling should be initiated prior to steam generator wide range level reaching 70 inches if less than two trains of PORVs available.
- B. **Incorrect:** Adequate RCS Heat Removal is not determined by condensate flow rate.  
**Plausible:** Adequate secondary heat removal is restored by feeding the S/Gs.
- C. **Incorrect:** With any one S/G <70 inches and level not restoring, OTC should be initiated but crew should not wait for S/G wide range level to drop below 70 inches because only 1 PORV train is available in order to raise the likelihood of success of OTC, it should be initiated immediately.  
**Plausible:** OTC is not desired if S/G heat sink is available. Logical that one would want to wait to initiate until both S/Gs lower to 70 inches wide range.
- D. **Incorrect:** Because 1 PORV train is unavailable, operators should not wait for inadequate RCS Heat Removal which is determined by at least one S/G < 70 inches and level not restoring and heat removal via OTC should be established.  
**Plausible:** The procedure directs initiation with one S/G at 70 inches.

References: EOP-2537, Rev 022, NOTE before step 5.

Student Ref: NONE

Learning Objective: MB 05960

Question Source: Modified Bank Q ID 56617

Question History: MS2 2002 Audit

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 11):

## QUESTION 12

EOP 2530 Station Blackout (SBO) directs operators to perform DC load reduction for Vital Battery 201A if either of its battery chargers is NOT expected to be restored within \_\_\_\_ (1) \_\_\_\_ of a SBO event and involves de-energizing \_\_\_\_ (2) \_\_\_\_.

- A. (1) 1 hour  
(2) Inverter #1
- B. (1) 8 hours  
(2) Inverter #1
- C. (1) 1 hour  
(2) Inverter #3
- D. (1) 8 hours  
(2) Inverter #3



K&A Rating: 000055 Station Blackout EA 1.04 (3.5)

K&A Statement: Ability to operate and monitor the following as they apply to a Station Blackout:  
Reduction of loads on the battery.

Key Answer: C

Justification (Question 12):

- A. **Incorrect:** Inverter 1 is not de-energized due to the need to keep Vital Instrument Panel VA-10 energized, even though this vital instrument panel is backed up by an inverter powered by the turbine battery. (Right time, wrong load)  
**Plausible:** Inverters 1 and 3 are powered off the same vital battery bus.
- B. **Incorrect:** During a SBO, DC load reduction should occur on the associated bus if either battery charger cannot be restored within 1 hour of SBO event initiation. Inverter 1 is not de-energized; see reason in justification above. (Wrong time, wrong load).  
**Plausible:** Common misconception: 8 hours is the SBO coping time which assumes that DC load reduction occurred within 1 hour of event.
- C. **CORRECT:** During a SBO, DC load reduction should occur for vital battery if either of its battery chargers cannot be restored within 1 hour of SBO event initiation. Inverter 3 is de-energized. (Right time, right load).
- D. **Incorrect:** During a SBO, DC load reduction should occur on the associated bus if either battery charger cannot be restored within 1 hour of SBO event initiation. (Wrong time, right load).  
**Plausible:** Common misconception: 8 hours is the SBO coping time which assumes that DC load reduction occurred within 1 hour of event.

References: EOP 2530, Step 12; EOP 2541 Appendix 28 Steps 3 & 4 Student Ref: NONE

Learning Objective: MB 05912

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.8

Comments (Question 12):

### QUESTION 13

A cooldown is in progress following a sustained loss of offsite power. The RO is directed to cool the pressurizer while maintaining adequate subcooling. The following conditions exist:

- Highest RCS loop average temperature is 445.0°F
- Highest Core Exit Thermocouple temperature is 460.0°F
- Highest RCS cold leg temperature is 430.1°F
- Pressurizer pressure is 900 psia

In accordance with the EOPs, which ONE of the following is the MINIMUM permissible pressure for the current conditions to maintain adequate subcooling?

- A. 622 psia
- B. 467 psia
- C. 402 psia
- D. 540 psia

K&A Rating: 000056 Loss of Offsite Power AK1.04 (3.1, 3.2)

K&A Statement: Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: Definition of saturation conditions, implication for the systems

Key Answer: A

Justification (Question 13):

- A. **CORRECT:** Saturation pressure for 490°F which is CET max temp plus 30 degrees of subcooling.
- B. **Incorrect:** Distractor: Psat for Tsat of 460°F  
**Plausible:** Applicant could establish a margin from the given CET temperature and forget about the 30 degrees of subcooling required by EOP 2541 Appendix 2, RCS P/T.
- C. **Incorrect:** Distractor: Psat for Tsat of 445.0°F  
**Plausible:** Applicant could establish a margin from the RCS average temperature and forget that during natural circulation, CET is the most accurate and thus preferred indication of RCS temperature.
- D. **Incorrect:** Distractor: Psat for Tsat 475°F  
**Plausible:** Applicant could establish a 30 degree subcooling margin from the RCS average temperature instrument reading, forgetting that during natural circulation, CET is the most accurate and thus preferred indication of RCS temperature.

References: EOP 2528, Step 10, 11; EOP 2541 Appendix 2 Student Ref: Steam Tables

Learning Objective: MB-05861

Question Source: Bank Question ID 71607

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 13): The distractors are different in value from the original bank question but changes do not meet the "modified question" criteria in ES-401.

## QUESTION 14

Initial plant conditions:

- The plant is operating steady state at 100% power
- "C" Charging pump is operating
- "A" Charging pump is in standby
- "B" Charging pump is in PULL TO LOCK and aligned to Facility 2
- Charging Pump Selector Switch, 2HS-4868, is in P1 & P2 position
- Pressurizer Level Controllers, LIC-110X and LIC-110Y are in AUTO REMOTE
- Pressurizer Level Control HS-110 is selected to Channel "X"

The crew observes multiple alarms and all "A" Safety Channel indications are de-energized.

With NO operator action, which ONE of the following choices correctly describes the status of the charging pumps and letdown flow approximately 10 seconds after the plant transient condition occurs?

- A. ONLY ONE of the charging pumps is running.  
Letdown Flow Instrument FI-202 indicates approximately 40 gpm.
- B. ONLY ONE of the charging pumps is running.  
Letdown Flow Instrument FI-202 indicates approximately 0 gpm.
- C. TWO of the charging pumps are running.  
Letdown Flow Instrument FI-202 indicates approximately 28 gpm.
- D. TWO of the charging pumps are running.  
Letdown Flow Instrument FI-202 indicates approximately 0 gpm.

K&A Rating: 000057 Loss of Vital AC Inst. Bus AA1.02 (3.8, 3.7)

K&A Statement: Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus: Manual control of PZR level

Key Answer: C

Justification (Question 14):

- A. **Incorrect:** C Charging pump is running but letdown flow is not at 40 gpm. Letdown flow is reduced to minimum as a result of the LIC-100X Pressurizer Level Channel X controller failing low.  
**Plausible:** The applicant may not think letdown flow is affected by the loss of VA-10.
- B. **Incorrect:** C Charging pump is running but letdown flow is not 0 gpm. Letdown flow is reduced to minimum as a result of the LIC-100X Pressurizer Level Channel X controller failing low.  
**Plausible:** Applicant may confuse Loss of VA-10 with the loss of Non Vital Instrument Bus VR-11, which would cause letdown to go to 0 gpm.
- C. **CORRECT:** Conditions provided are indicative of a loss of VA-10. Both A and C Charging pumps are running as a result of LIC-100X Pressurizer Level Channel X failing low. Letdown is reduced to the minimum flow setting of the letdown limiter (28 gpm) as part of automatic pressurizer level response.
- D. **Incorrect:** Both A and C Charging pumps are running. However letdown flow is reduced to minimum, not lowered to 0 gpm.  
**Plausible:** Applicant may confuse Loss of VA-10 with the loss of Non Vital Instrument Bus VR-11, which would cause letdown to go to 0 gpm.

References: AOP 2504C Rev 003-09

Student Ref: NONE

Learning Objective: MB 05737

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 14):

## QUESTION 15

Given the following conditions:

- A plant cooldown is in progress in accordance with OP 2207, Plant Cooldown
- The Shutdown Cooling (SDC) system is operating concurrent with RCPs.
- A loss of Vital 125 VDC Instrument Panel DV10 has occurred.

Which ONE of the following will result from the loss of DV10?

- A. "A" RBCCW HX RBCCW outlet temperature will rise (C-06/7, TI-6031)
- B. "A" RBCCW HX service water flow will lower (C-06/7, FI-6433)
- C. SDC return temperature will rise (C-01, T351Y)
- D. SDC system flow will lower (C-01, FIC-306)

K&A Rating: 058 Loss of DC Power AA1.03 (3.1, 3.3)

K&A Statement: Ability to operate and / or monitor the following as they apply to the Loss of DC Power: Vital and battery bus components

Key Answer: **C**

Justification (Question 15):

- A. **Incorrect:** 2-SW-8.1A, "A" RBCCW HX Temperature Control Valve (TV6308), fails OPEN. HX outlet temperature will lower.  
**Plausible:** Valve fails on loss of DV-10 but open, not closed.
- B. **Incorrect:** 2-RB-13.1A, "A" SDC HX RBCCW Outlet Isolation (HV6050), fails OPEN. HX outlet flow will rise.  
**Plausible:** Valve fails on loss of DV-10 but open, not closed.
- C. **CORRECT:** 2-SI-657 SDC HX Flow Control Valve fails CLOSED. SDC system goes to minimum flow through the SDC heat exchangers because 657 fails closed. SDC return temperature will rise due to lack of HX cooling.  
**Plausible:** Valve fails on loss of DV-10 but closed, not open.
- D. **Incorrect:** 2-SI-306, SDC Total Flow Control Valve fails OPEN. Total SDC flow would rise, except that, per OP-2207, SDC is always placed in service with either LPSI Loop Injection Isolation SI-615 or SI-625 throttled in the only SDC path back to the RCS. The throttled LPSI Loop Isolation valve ensures that a failure of SI-306 will not result in a high flow condition and potential loss of the LPSI pump. Flow will either stay the same or rise very slightly. It will not lower.

References: AOP 2506A Rev 002-05, OP 2207 Rev 029-04      Student Ref: NONE

Learning Objective: MB 05727

Question Source: Modified Bank ID 71660

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 15):

## QUESTION 16

The plant is in MODE 1 at 100% power with the "A" DG running fully loaded during performance of the surveillance procedure for diesel generator operability testing.

The following occurs:

- DIESEL GEN 12U TROUBLE annunciator actuates on C-08
- The PEO reports SERVICE WATER FLOW LOW alarm has actuated on local "A" DG Alarm Panel C-38 and service water flow on "A" EDG is <1 gpm and steady by local indication.

Assuming service water cannot be restored then, per the SERVICE WATER FLOW LOW alarm response procedure, the diesel must be tripped within \_\_\_\_\_ minute(s).

- A. 10
- B. 5
- C. 3
- D. 1



K&A Rating: 000062 Loss of Nuclear Service Water AA2.06 (2.8/3.1)

K&A Statement: AA2.06 Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water (SWS): The length of time after the loss of SWS flow to a component before that component may be damaged.

Key Answer: C

Justification (Question 16):

- A. **Incorrect:** The ARP directs action within 3 minutes, not 10 minutes.  
**Plausible:** 10 minutes is a frequently used time limit. Example: LPSI motor starting duty limit of 10 minutes running between subsequent starts.
- B. **Incorrect:** The ARP directs action within 3 minutes, not 5 minutes.  
**Plausible:** 5 minutes is a frequently used time limit. Example: AOP-2564 Loss of RBCCW RCP trip criterion – loss of RBCCW for >5 minutes.
- C. **CORRECT:** Step #1 of the corrective actions in the ARP directs, "IF all service water flow is lost and flow cannot be established within 3 minutes, manually TRIP diesel." Lube oil and jacket cooling temperatures will rise as a result of the loss of service water flow.
- D. **Incorrect:** The ARP directs action within 3 minutes, not 1 minute.  
**Plausible:** 1 minute is a plausible time limit value. It would be reasonable to assume the vendor would not recommend running the diesel generator fully loaded for more than a minute with no service water.

References: SWS-00-C Rev 7 Change 1, SP-2613A Rev 022-11 Student Ref: NONE  
EDG-000-C Rev 7, Change 6 p.30 and p.94, ARP 2591A-004 Rev 001-04,  
ARP 2591A-009 Rev 001-05, ARP 2591A-035 Rev 001-01

Learning Objective: MB-02449

Question Source: NEW

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 43.5

Comments (Question 16):

#### QUESTION 17

Which ONE of the following choices indicates a manual reactor trip is required per AOP-2563, Loss of Instrument Air, during a loss of Instrument Air at 100% power?

- A. Letdown is isolated. VCT level is 69%.
- B. Instrument Air header pressure is 84 psig and lowering.
- C. Containment Instrument Air Isolation Valve, IA-27.1, goes closed and will not re-open.
- D. FRV position is constant. SG#1 level is 54% and lowering. SG#2 level is 71% and rising.

K&A Rating: 065 Loss of Instrument Air AK3.03 (2.9, 3.4)

K&A Statement : Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: Knowing effects on plant operation of isolating certain equipment from instrument air

Key Answer: **D**

Justification (Question 17):

- A. **Incorrect:** With letdown isolated, plant operation may continue and operators will control pressurizer level using charging pumps.  
**Plausible:** During a loss of Instrument Air, VCT level will lower. At VCT level <70% operator action is required to switch charging suction to the RWST.
- B. **Incorrect:** Reactor Trip criteria are met when Instrument air header pressure is 80 psig or less.  
**Plausible:** Applicant could think that trip criteria is met when Instrument Air pressure is <85 psig. If instrument air header pressure falls below 85 psig, station air valves, SA10.1 and SA-11.1 automatically open and close respectively.
- C. **Incorrect:** Plant operation may continue with instrument air to containment isolated because all safety related equipment that uses instrument air will fail in the safety position.  
**Plausible:** Applicant may believe that if instrument air is isolated to containment then many safety related valves cannot function.
- D. **CORRECT:** Per the AOP discussion section, "the reactor is tripped immediately when IA pressure lowers to the point where control of important systems is questionable. This may be indicated by system response or...". AOP Step 6.4 directs manually tripping the reactor if SG levels cannot be maintained between 55%-75%. Given conditions are indicative of the Feedwater Regulating Valves failing AS-IS on a loss of instrument air. Although OP-2385 provides direction for SGFP speed adjustment to control level, the divergent level trends of the SGs preclude effective level control with SGFP speed. Speed adjustment in either direction would adversely impact level in one or the other SG.

References: AOP 2563, Rev 009-07 Step 6.4  
OP-2385, Rev 010-08

Student Ref: None

Learning Objective: MB-05702

Question Source: Bank Question ID 71785

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.5, 41.10

Comments (Question 17):

## QUESTION 18

The Control Room is notified by CONVEX of degrading voltage condition. The crew has entered AOP 2580 Degraded Voltage and is carrying out actions. The Unit Supervisor directs the BOP operator to raise MVARs. While the BOP is raising MVARs, the MAXIMUM EXCITATION LIMIT annunciator alarms on C-06/7. The operator stops raising MVARs and reports the alarm to the Unit Supervisor.

Assuming NO further operator action, which ONE of the following correctly describes a potential or actual consequence?

- A. Generator power factor (PF) could become leading which is a prohibited condition and could result in generator damage.
- B. The VOLTAGE REG RECTIFIER OVERCURRENT alarm will actuate and the red light above CS-43, AC/DC REG TRANS, will be illuminated.
- C. Engineered Safety Function (ESF) components could be damaged as a result of high motor winding temperatures.
- D. The EXCITER FIELD BREAKER TRIP alarm will actuate and the turbine will trip on a loss of generator excitation.

K&A Rating: 000077 Generator Voltage & Electric Grid Disturbances AK2.02 (3.1, 3.3)

K&A Statement: AK2.02 Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following: Breakers, relays

Key Answer: D

Justification (Question 18):

- A. **Incorrect:** Raising MVARs on the unit causes the generator to become more lagging not leading.  
**Plausible:** Applicant could confuse leading and lagging power factors. There is a caution statement in OP 2204 Attachment 16 Generator Voltage Adjustment that warns against operation with excessive VARS, stating *"operation with lagging power factor (VARS out) beyond limits of the reactive curve will result in overheating the field winding due to excessively high field current."* The attachment also prohibits operation with a leading PF, stating *"CONVEX OI 6913 **does not permit** operating with reduced field current at a leading power factor (VARS in)."*
- B. **Incorrect:** The voltage reg rectifier overcurrent could possibly actuate under maximum excitation conditions. However, actuation of the alarm would cause the voltage regulator to swap to manual, illuminating the green light above the control switch.  
**Plausible:** Applicant could conclude that raising excitation will actuate the alarm and recognize the red indicator is normally lit and could conclude the alarm response requires operator manual action to shift the regulator to manual.
- C. **Incorrect:** ESF components are at risk of winding damage due to high current as a result of the degraded grid voltage and NOT raising MVARs on the unit.  
**Plausible:** Applicant could remember that the purpose of this AOP is to protect ESF components from damage due to high current.
- D. **CORRECT:** IF excitation voltage is not reduced below the annunciator setpoint within 10 seconds, the exciter field breaker trips. A turbine trip occurs due to the loss of excitation

References: AOP 2580 Rev 003-05, Step 3.9b, OP-2204 Att.16 Rev 025-06, ARP 2590E-223, Rev 00-01, ARP 2590E-218 Rev 00-0

Student Ref: None

Learning Objective: MB 05532

Question Source: NEW

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.4, 41.5, 41.7, 41.10

Comments (Question 18):

## QUESTION 19

Reactor power was lowered to 55% with Group 7 CEAs inserted to 155 steps for repairs to a Steam Generator Feed Pump.

Following repairs, a power escalation is in progress and the RO begins to withdraw Group 7 CEAs in MANUAL SEQUENTIAL to raise power. The RO releases the CEA Control Switch to respond to an expected alarm on Panel C-01. However, a malfunction of the CEA Control Switch withdraw contact causes Group 7 CEAs to continue to withdraw.

Assume all other plant components and systems respond to this event as designed and there is NO operator action.

Which ONE of the following is a sequence of control room indications that will occur during this event?

- A. RPS PRE TRIP alarm (C-04, AA-7)  
High Linear Power pre-trips on RPS Channels A thru D  
NIS HI PWR TRIP CH A, B, C, D alarms (C-04, CA-4/CB-4/DA-4/DB-4)  
The reactor trips
- B. RPS PRE TRIP alarm (C-04, AA-7)  
High Linear Power pre-trips on RPS Channels A thru D  
CEA WITHDRAW PROHIBIT alarm (C-04, AA-15)  
Group 7 CEAs stop moving
- C. RPS PRE TRIP alarm (C-04, AA-7)  
High Pressurizer Pressure pre-trips on RPS Channels A thru D  
CEA WITHDRAW PROHIBIT alarm (C-04, AA-15)  
Group 7 CEAs stop moving
- D. RPS PRE TRIP alarm (C-04, AA-7)  
Thermal Margin / Low Pressure pre-trips on RPS Channels A thru D  
TM-LP TRIP CH A, B, C, D alarms (C-04, CA-3/CB-3/DA-3/DB-3)  
The reactor trips

K&A Rating: 000001 Continuous Rod Withdrawal Generic 2.4.46 (4.2, 4.2)

K&A Statement: Ability to verify that the alarms are consistent with the plant conditions.

Key Answer: B

Justification (Question 19):

- A. **Incorrect:** A CEA Withdrawal Prohibit (CWP) would stop CEA withdraw once 2 of 4 High Power pre-trips are received. A CWP would prevent further CEA withdraw and prevent a reactor trip by limiting the contribution of the CEAs to the power increase.  
**Plausible:** Applicant may believe that this event would cause a reactor trip on High Linear Power which shows protection during a continuous rod withdraw casualty.
- B. **CORRECT:** RPS also causes a signal in the CEDS logic that prohibits further CEA withdrawal if 2/4 pre trips from TM/LP or High Power are received. This CEA Withdrawal Prohibit (CWP) signal tries to prevent a reactor trip by limiting the contribution of the CEAs withdrawal to a power increase.
- C. **Incorrect:** Hi Pressurizer Pressure pre-trips do not trigger a CWP.  
**Plausible:** Applicant may think that 2/4 High Pressurizer Pressure pre-trips trigger a CWP.
- D. **Incorrect:** CEA motion would stop on 2/4 TM/LP pre-trips which trigger a CWP.  
**Plausible:** Applicant may believe that this event would cause a reactor trip TM/LP which shows protection during a continuous rod withdraw casualty.

References: ARP 2590C Rev 005-01, OP2302A Rev 018-03 Attachment 5, OP2204 Rev 025-06 Att 14, CED-01-C LP R5C0

Student Ref:

Learning Objective: MB 02263

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 19):

## QUESTION 20

The unit is in MODE 1 with all rods out when CEA #39, a Group 7 CEA, falls into the core 10 steps and stops. CEA #39 will NOT move in response to motion demand signals. There are NO identified problems with CEDS or CEA position indication systems.

The crew has entered AOP 2556 CEA Malfunctions and has commenced a rapid down power in accordance with AOP 2575 Rapid Downpower. During the downpower, at 82% reactor power, a Local Power Density (LPD) pre-trip has triggered on RPS Channel B.

How should the crew proceed?

- A. Continue the rapid downpower and trip the reactor when power is <30%.
- B. Insert CEAs to maintain Axial Shape Index (ASI) within 0.05 axial shape units of Equilibrium Shape Index (ESI).
- C. Trip the reactor from the current power level and perform SPTAs.
- D. Continue the rapid downpower to be in MODE 3 within 6 hours from the time that CEA #39 became stuck.



K&A Rating: 000005 Inoperable/Stuck Control Rod AK1.01 (3.1, 3.8)

K&A Statement: Knowledge of the operational implications of the following concepts as they apply to Inoperable / Stuck Control Rod: Axial power imbalance

Key Answer: C

Justification (Question 20):

- A. **Incorrect:** Because there is a LPD pre-trip on an RPS channel, AOP 2556 directs tripping the reactor immediately and not waiting for an automatic RPS trip as a result of ASI becoming more or less negative.  
**Plausible:** Step 8.7 of AOP 2556 for an Untrippable CEA directs to trip the reactor at less than 30% power. If the LPD pre-trip had not occurred, this would be the correct course of action.
- B. **Incorrect:** CEA group 7 may be used for ASI control only if all group 7 CEAs are available for insertion. CEA#39 is a Group 7 CEA and it is stuck, thus NOT available for insertion.  
**Plausible:** ASI control is normally performed using Group 7 CEAs and according to OP2393 Core Power Distribution Monitoring and Control, For power transients or plant conditions that deviate from the reactivity plan, MAINTAIN ASI as follows (not to interfere with event mitigation): ASI shall be controlled within 0.05 axial shape index units of the ESI or within the COLR limits, whichever is more limiting.
- C. **CORRECT:** Step 8.5 of AOP 2556 directs immediately tripping the reactor and performing SPTAs if one or more Local Power Density pre-trip alarm actuates.
- D. **Incorrect:** Because there is a LPD pre-trip on a RPS channel, AOP 2556 directs tripping the reactor immediately.  
**Plausible:** Performing a rapid downpower to Mode 3 within 6 hours is the initial direction in AOP 2556 Section for Untrippable CEA.

References: AOP 2556 Rev 016-10 Steps 8.2, 8.5, 8.7, OP 2393 Rev 15-0, Step 4.1.9

Student Ref: None

Learning Objective:

Question Source: NEW

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.8, 41.10

Comments (Question 20):

## QUESTION 21

A reactor startup is in progress. Shutdown Banks A and B, and Regulating Groups 1, 2, and 3 CEAs are fully withdrawn. Group 4 CEAs are at 70 steps withdrawn on all indications, when the Channel "A" Wide Range Nuclear Instrument (WRNI) suddenly fails high.

Which ONE of the following describes expected effects of the failure?

- A. Channel "A" WRNI is NOT OPERABLE.  
Startup may continue as long as all other WRNIs are OPERABLE.  
CEAs will respond to inward and outward motion demand.
- B. High Linear Power and TM/LP pre-trips and trips occur on RPS Channel "A."  
The SG Low Pressure trip is NOT automatically enabled.  
CEAs will NOT respond to inward and outward motion demand.
- C. High Linear Power pre-trip and trip occur on RPS Channel "A".  
The TM/LP trip is automatically enabled.  
CEAs will respond to inward and outward motion demand.
- D. Regulating Group Power Dependent Insertion Limit alarms actuate on C-04.  
A CEA Motion Inhibit (CMI) occurs.  
CEAs will NOT respond to inward and outward motion demand.

K&A Rating: 000032 Loss of Source Range NI AK3.01 (3.2, 3.6)

K&A Statement: Knowledge of the reasons for the following responses as they apply to the Loss of Source Range Nuclear Instrumentation: Startup termination on source-range loss

Key Answer: D

Justification (Question 21):

- A. **Incorrect:** Startup cannot continue in the current state because CEAs will not move because the Channel "A" Level 2 bistable tripped. This bistable enables the CEAPDS PDIL Continuous Motion Inhibit. A CMI occurs because several groups of CEAs are below their Transient Insertion Limit. **Plausible:** Technical Specification 3.3.1 Reactor Protection Instrumentation requires 3 Power Level Hi channel functional units to be operable in Modes 1, 2 and 3.
- B. **Incorrect:** SG low pressure trip is automatically enabled above 800 psia SG pressure. **Plausible:** Channel "A" TM/LP and Hi Linear Power trips occur. Applicant may not remember that the PDIL CMI is enabled when any WRNI level 2 bistable trips at 10E-4% power.
- C. **Incorrect:** CEA motion is affected because a CMI occurs due to Regulating Group CEAs not above the Transient Insertion Limit. **Plausible:** A Hi Linear Power trip on Channel "A" occurs and the TM/LP trip is enabled. Applicant may recognize these two facts but not remember that all 4 WRNI channel Level 2 bistables must be below their respective reset point for the CEAPDS PDIL CMI to be bypassed. If 1 out of 4 Level 2 bistables is tripped, the CEAPDS PDIL CMI is enabled.
- D. **CORRECT:** A WRNI channel failing high or de-energizing at low power would automatically remove the block on the CEAPDS PDIL and PPDIL. The existing low height of the CEA groups activates an erroneous CMI. The CEAPDS PDIL CMI is enabled when the "LVL 2" bistable is tripped at > 10E-4% power. All 4 WRNI channel "LVL 2" bistables must be below their respective reset point for the CEAPDS PDIL CMI to be bypassed. The level 2 bistable is tripped on Channel "A" due to WRNI Channel "A" failing high. If the lowest CEA in a group is within 9 steps of the Technical Specification Transient Insertion Limit for the existing power level, a Pre-Power Dependent Insertion Limit (PPDIL) alarm will actuate. If the CEA inserts 5 steps further, such that it is 4 steps above the Transient Insertion Limit, the PDIL alarm will actuate and a CMI on all 61 CEAs will occur.

References: Unit 2 Tech Specs, CED-01-C LP R5C0

Student Ref: None

Learning Objective:

Question Source: NEW

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.5, 41.10

Comments (Question 21):

## QUESTION 22

During a core to core movement of a once used fuel bundle, the bundle is dropped and is lying across the remaining fuel bundles. There is NO indication of any broken or damaged fuel pins. Containment purge is in operation with both personnel access doors open. Health Physics has been notified to coordinate a containment evacuation and the containment evacuation alarm has been sounded.

Which ONE of the following is required per AOP 2577, Fuel Handling Accident?

- A. The containment purge valves will remain open to provide a path for any potential radioactive release and one containment access door will remain open to allow for recovery of the dropped bundle.
- B. After all personnel have been evacuated from containment, the personnel access doors will be closed and the containment purge valves will remain open until a containment ventilation high radiation signal is processed.
- C. At least one personnel access door will remain closed during the evacuation of containment and the containment purge valves will be closed only after a valid containment radiation monitor alarm is received.
- D. The personnel access doors will be closed after all personnel have been evacuated and the containment purge valves will be closed to contain any potential radioactive release.

K&A Rating: 000036 (BW/A08) Fuel Handling Accident (3.2, 3.6)

K&A Statement: AK3.03 Knowledge of the reasons for the following responses as they apply to the Fuel Handling Incidents: Guidance contained in EOP for fuel handling incident

Key Answer: D

Justification (Question 22):

A. **Incorrect:** AOP 2577 requires the containment purge valves to be closed and the personnel access doors to be closed when all personnel have been evacuated. The personnel access doors will be opened, one at a time, for personnel entry to recover the dropped bundle

**Plausible:** AOP 2577 directs operators to develop a plan for the recovery of the fuel bundle which would require a containment access door to be opened.

B. **Incorrect:** While it is true that the purge valves will close when a containment ventilation high radiation signal is processed, the purge valves must be closed at the onset of a fuel handling accident, per AOP 2577.

**Plausible:** Purge valves will close on a containment ventilation high radiation signal.

C. **Incorrect:** Both personnel air lock doors will be open until all personnel are evacuated. Additionally, the containment purge valves must be closed at the onset of a fuel handling accident, per AOP 2577.

**Plausible:** Both containment doors need to be shut after all personnel have evacuated containment. Examinee may think it would be more conservative to only use one door for evacuation. Purge valves will close on a containment ventilation high radiation signal.

D. **CORRECT:** Containment closure will be established after all personnel are evacuated from containment. Containment purge valves are closed.

References: AOP 2557 Rev 008-04 Steps 3.4, 3.5

Student Ref: None

Learning Objective: MB 05552

Question Source: Bank ID # 1100014

Question History: 2002 ILT Audit Exam

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.5, 41.10

Comments (Question 22):

### QUESTION 23

Given the following conditions:

- The Reactor is operating at full power in the month of June
- All Circ Water pumps are operating normally at 100% speed
- Long Island Sound temperature is 58°F

Then, Circ Water Pump "A" trips due to high traveling screen  $\Delta P$ .

What will correctly complete the statement to describe the effect on main generator output?

Main generator output will be \_\_\_\_\_.

- A. zero, because a manual reactor trip would have been required
- B. stable, but below the initial value due to degraded condensing ability
- C. lower, but will return to initial value when the waterbox crosstie is opened
- D. unchanged, because the three remaining pumps are sufficient to maintain load

K&A Rating: 051 AK1.01 (2.4)

K&A Statement: Knowledge of the operational implications of the following concepts as they apply to Loss of Condenser Vacuum: Relationship of condenser vacuum to circulating water, flow rate, and temperature.

Key Answer: **B**

Justification (Question 23):

- A. **Incorrect:** Trip required if two pumps lost in one waterbox  
**Plausible:** Loss of one pump degrades the plant
- B. **CORRECT:** Three pumps at 100% speed are enough to maintain vacuum above a trip threshold with typical June supply water temperature, but a reduction in circ water flow means loss of thermal efficiency.
- C. **Incorrect:** Reduced flow = increased  $\Delta T$  and outlet temp, which = reduced efficiency. Opening crosstie without closing normal inlet would cause flow enter the idle waterbox inlet, then flow backward to the circ water intake rather than forward through the condenser tube bundle.  
**Plausible:** Opening the crosstie will increase available heat transfer surface.
- D. **Incorrect:** Three pumps are sufficient for operation but thermal efficiency will be degraded.  
**Plausible:** Three pumps can handle full power

Note: Lesson Plans/ AOPs do not explicitly discuss the issue of reduced efficiency. They do discuss loss of load as an indicator of loss of flow.

References: AOP 2517 Circ Water Malfunction  
AOP 2574 Loss Cond Vacuum

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 23):

## QUESTION 24

The plant is in MODE 5, making preparations for a refueling outage.

Then:

- RM-8240, Containment High Range Area Radiation Monitor fails high
- Actual containment radiation conditions are normal

Which ONE of the following is correct?

- A. Any pre-outage containment atmosphere cleanup operation involving 2-AC-4 and 2-AC-6 ONLY is automatically terminated.
- B. Any pre-outage containment atmosphere cleanup operation involving 2-AC-4, AC-5, AC-6 & AC-7 is automatically terminated.
- C. Any containment venting operation using the hydrogen purge valves is automatically terminated ONLY on Facility 1.
- D. Any containment venting operation using the hydrogen purge valves is automatically terminated on BOTH Facilities 1 and 2.



K&A Rating: 000061 ARM System Alarms (3.6)

K&A Statement: AA1.01 Ability to operate and/or monitor the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: Automatic actuation.

Key Answer: D

Justification (Question 24):

- A. **Incorrect:** These dampers get a signal from the normal CTMT gaseous and particulate rad monitors, not the Post Incident Area Rad Monitors.  
**Plausible:** The examinee may think high radiation in the CTMT atmosphere will isolate any CTMT cleanup operation using these dampers.
- B. **Incorrect:** Any one of the four CTMT atmosphere rad monitors alarming would normally close these dampers, but not the CTMT Hi Range rad monitors.  
**Plausible:** It is logical to assume that if the lower range CTMT rad. monitors will isolate a CTMT cleanup, then the higher range rad monitors should as well.
- C. **Incorrect:** Either Hi Range CTMT Rad. Monitor will isolate both purge flow paths, even though each monitor only gets closes two of the four valves.  
**Plausible:** The examinee may remember that each rad monitor only isolates two valves but, incorrectly conclude a monitor therefore only isolates one path (for Facility separation purposes).
- D. **CORRECT:** When either of the Post Incident High Range Area monitors reaches its first setpoint of 5R/hr, the associated hydrogen purge valves (EB-92 & EB-99 for RM-8240 and EB-91 & EB-100 for RM-8241) receive a close signal and will close if they are open for purging operations in progress. EB-92 & EB-99 are the outside containment isolation valves for both facilities and EB-91 & EB-100 are the inside containment isolation valves for the two facilities.

References: OP-2383B Rev 009-01, LP RMS-00-C.R7C5

Student Ref: NONE

Learning Objective: MB 03129

Question Source: Millstone Bank 55426 Rev 3

Question History: Millstone Bank

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 24):

## QUESTION 25

Unit 2 has experienced a LOCA and Containment pressure is 10 psig.

- FAC 2 CIAS failed to actuate
- FAC 2 CIAS operated valves did NOT close

Which ONE of the following describes:

- (1) an additional malfunction that would prevent an isolation of an associated penetration, and
- (2) the specific ESAS signal, and the valve that should have been directly actuated by that signal, to prevent this additional malfunction.

- (1) CH-515, Reactor Coolant Letdown Valve, is open.  
(2) FAC 1 SIAS should have closed CH-515.
- (1) P-33B, CTMT Sump Pump, is running with SSP-16.1, CTMT Sump Isolation Valve, open.  
(2) FAC 1 CIAS should have closed SSP-16.1.
- (1) CH-516, Reactor Coolant Letdown Valve, is open.  
(2) FAC 1 CIAS should have closed CH-516.
- (1) P-33B, CTMT Sump Pump, is running with SSP-16.2, CTMT Sump Isolation Valve, open.  
(2) FAC 1 SIAS should have closed SSP-16.2.

K&A Rating: 069 (W/E14) Loss of CTMT Integrity

K&A Statement: AA2.02 Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: Verification of automatic and manual means of restoring integrity

Key Answer: A

Justification (Question 25):

- A. **CORRECT:** CH-515 Letdown Loop Isolation Valve, closed by FAC 1 SIAS, is in series with Inboard Containment Letdown Isolation CH-516 and Outboard Containment Letdown Isolation CH-089. Both CH-516 and CH-089 receive FAC 2 CIAS to close. CH-515 therefore provides the redundant FAC 1 containment isolation function for the letdown line penetration.
- B. **Incorrect:** P-33B receives a stop signal on a FAC 2 CIAS. SSP-16.1 receives a close signal on a FAC 2 CIAS. This choice is incorrect because the listed components receive a FAC 2, not a FAC 1, CIAS. The redundant valve, SSP-16.2, which receives a FAC 1 CIAS, would have closed, isolating the penetration.  
**Plausible:** Pumping down the containment sump during a LOCA is a loss of containment integrity. Examinee may think FAC 1 CIAS closes SSP-16.1.
- C. **Incorrect:** CH-515, not CH-516, will close on FAC 1 SIAS as the redundant containment isolation to CH-516 and CH-089 isolation valves. Also, the isolation signal for CH-516 is FAC 2 CIAS.  
**Plausible:** Examinee may think CH-516 is the redundant containment isolation for this penetration and that it receives a FAC 1 CIAS.
- D. **Incorrect:** P-33B receives a stop signal on a FAC 2 CIAS. SSP-16.2 receives a close signal on a FAC 1 CIAS. This alignment (pump running, SSP-16.2 open), in conjunction with non-functioning FAC 2 CIAS given in the stem would result in a loss of containment integrity. However, the choice is incorrect because SSP-16.2 receives a CIAS, not a SIAS close signal.  
**Plausible:** Pumping down the containment sump during a LOCA is a loss of containment integrity. Examinee may recognize the alignment as a loss of integrity but may incorrectly think SSP-16.2 receives a SIAS rather than a CIAS close signal.

References: LP ESA-01-C.R3C6, TRM Table 3.6-1

Student Ref: NONE

Learning Objective: MB 02468

Question Source: New

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.3

Comments (Question 25):

## QUESTION 26

Given the following conditions:

- A LOCA has occurred.
- Both HPSI pumps have failed after a few minutes of injection.
- RCS pressure is approximately 800 psia.
- Subcooling is 0°F.
- The crew has entered EOP 2540 and is implementing IC-2, Functional Recovery of RCS Inventory Control.

Which ONE of the following actions is required?

- A. Stop LPSI pumps for equipment preservation.
- B. Depressurize for LPSI injection; cooldown with SGs and use main pressurizer spray.
- C. Restart a RCP to enhance SG cooling.
- D. Depressurize for LPSI injection; cooldown with SGs and use PORVs.

K&A Rating: 000074EK2.05 (3.9)

K&A Statement: Knowledge of the interrelations between Inadequate Core Cooling and the following: LPI pumps.

Key Answer: **D**

Justification (Question 26):

- A. **Incorrect:** A LOCA means injection is needed.  
**Plausible:** LPSI pumps are shut off above 360# if injection flow is adequate, which it won't be with no HPSI. The intent of LPSI shutdown is to prevent damaging the LPSI pumps as a result of extended operation without adequate flow through the pump.
- B. **Incorrect:** IC2 says depressurize the RCS, but spray won't do it with no RCPs.  
**Plausible:** IC2 does call for depress for adequate ECCS flow, main/aux spray options.
- C. **Incorrect:** Not a procedural action  
**Plausible:** Would enhance SG cooling.
- D. **CORRECT:** PORVs and "control RCS heat removal" are the only workable actions. SG steaming would seem to be the only means of "control heat removal".

**From IC2:**

**Depressurize the RCS**

\* 3. IF high RCS pressure is preventing adequate safety injection flow, DEPRESSURIZE the RCS by performing ANY of the following:

- a. **CONTROL RCS heat removal.**
- b. CONTROL pressurizer heaters and main or auxiliary pressurizer spray.
- c. IF HPSI throttle/stop criteria are met, PERFORM ANY of the following:
  - CONTROL charging and letdown.
  - THROTTLE HPSI flow.
- d. **OPERATE the PORVs.**

References: EOP 2540 IC2  
EOP Technical Guide for EOP 2540C1, Functional Recovery of IC

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 26):

## QUESTION 27

The plant was manually tripped from 100% power when a pressurizer spray valve failed partially open. All four RCPs were required to be secured. All other equipment operated as expected.

Assuming NO other operator action, what would be the expected plant response as Natural Circulation flow develops in the RCS (over the next 3 to 5 minutes after stopping the RCPs)?

- A. RCS Tavg will rise until both the Atmospheric Dump Valves go open.
- B. RCS Tavg will rise until all the Condenser Dump Valves go open.
- C. SG pressure will rise until both the Atmospheric Dump Valves go open.
- D. SG pressure will rise until all the Condenser Dump Valves go open.

K&A Rating: CE A13 Natural Circ: AK2.1 (3.0)

K&A Statement: Knowledge of the interrelations between Natural Circulation Operations and the following: Components, and functions of control and safety systems, including instrumentation signals, interlocks, failure modes and automatic and manual features.

Key Answer: B

Justification (Question 27):

- A. **Incorrect:** Tc will remain relatively constant due to the auto operation of PIC-4216, which will maintain SG pressure slightly over 900 psia. Therefore, the ADVs will be closed (S.P. = 920 psia). Also, when the CDVs open at Tavg > 540°F, SG pressure will lower even more below the ADV's setpoint.
- B. **CORRECT:** As NC develops, Th will rise, causing Tavg to rise. Eventually Tavg will rise above 540°F, causing TIC-4165 (Tavg controller) to open the condenser dumps. Tc will remain relatively constant due to the auto operation of PIC-4216, which will maintain SG pressure slightly over 900 psia. Therefore, the ADVs will be closed (S.P. = 920 psia). Also, when the CDVs open at Tavg > 540°F, SG pressure will lower even more below the ADV's setpoint.
- C. **Incorrect:** Tc will remain relatively constant due to the auto operation of PIC-4216, which will maintain SG pressure slightly over 900 psia. Therefore, the ADVs will be closed (S.P. = 920 psia). Also, when the CDVs open at Tavg > 540°F, SG pressure will lower even more below the ADV's setpoint.
- D. **Incorrect:** Tc will remain relatively constant due to the auto operation of PIC-4216, which will maintain SG pressure slightly over 900 psia. Therefore, the ADVs will be closed (S.P. = 920 psia). Also, when the CDVs open at Tavg > 540°F, SG pressure will lower even more below the ADV's setpoint.

References: LP RRS-01-C

Student Ref: None

Learning Objective: MB 03167

Question Source: Bank # 88057 Rev 2

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 27):



## QUESTION 28

The following initial conditions existed:

- The reactor is operating at 100% power
- RBCCW is in a normal alignment using 'A' and 'C' pumps and heat exchangers
- Bus 24E is aligned to Bus 24C

Then, a fault on Bus 24A results in the loss of Bus 24A.

All plant systems and components respond as designed to the loss of 24A, and "A" EDG has reenergized its respective bus.

Which ONE of the following describes

- (1) the status of the 'A' and 'C' RBCCW Pumps 5 seconds after the EDG energizes its bus, and
- (2) the required action regarding aligning and starting the 'B' RBCCW Pump, if any?

- A. (1) 'A' running, 'C' running  
(2) No action required
- B. (1) 'A' running, 'C' NOT running  
(2) Align and Start 'B'
- C. (1) 'A' NOT running, 'C' running  
(2) No action required
- D. (1) 'A' NOT running, 'C' running  
(2) Align and Start 'B'

K&A Rating: 003 K2.02 (2.5)

K&A Statement: Knowledge of bus power supplies to the following: CCW pumps.

Key Answer: C

Justification (Question 28):

- A. **Incorrect:** 'A' RBCCW is not running at this time. At 8 seconds after the EDG powers Bus 24C, 'A' RBCCW will be sequenced onto the bus and restarted. Plausible if candidate does not recall when RBCCW pumps are sequenced onto the bus.
- B. **Incorrect:** 'A' RBCCW has lost power. Plausible if candidate does not recall power supply to 'A' RBCCW. Aligning and starting 'B' RBCCW pump is not required in this situation.
- C. **CORRECT:** Due to loss of the 24C Bus, the 'A' RBCCW pump has initially stopped. The EDG has loaded onto its bus. Due to load sequencing, the 'A' RBCCW pump is restarted at 8 seconds after the EDG powers Bus 24C. Thus at 5 seconds, A RBCCW is not running but will be at 8 seconds; no need to align and start the 'B' RBCCW pump.
- D. **Incorrect:** Due to loss of the 24C bus, the 'A' RBCCW pump has initially stopped. The EDG has loaded onto its bus. Due to load sequencing, the 'A' RBCCW pump is started 8 seconds after the EDG loads the bus. Thus at 5 seconds, A RBCCW is not running but will be at 8 seconds; no need to align and start the 'B' RBCCW pump. Plausible if candidate does not recall when RBCCW pumps are sequenced onto the bus.

References: RBC-00-C, Rev. 7/1

Learning Objective: MB3015d, MB3005a

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 28):

## QUESTION 29

With the unit operating at 100% power the following occurs:

- "B" SGFP trips during surveillance testing
- The reactor automatically trips on steam generator low level
- Bus 25B fails to transfer to the RSST

Select the choice below that describes the status, 30 seconds after the reactor trip, of the following "B" and "D" Reactor Coolant Pump components:

- (1) 6.9kV motor supply breakers
- (2) RCP lift pumps

- A. (1) closed  
(2) NOT running
- B. (1) closed  
(2) running
- C. (1) open  
(2) NOT running
- D. (1) open  
(2) running

K&A Rating: 003 Reactor Coolant Pump (RCPS) A3.05 (2.7)

K&A Statement: Ability to monitor automatic operation of the RCPs, including: RCP lube oil and bearing lift pumps.

Key Answer: **A**

Justification (Question 29):

- A. **CORRECT:** RCP Breakers do not trip on UV. If the RCP breaker doesn't open, the lift oil pump will not auto start.
- B. **Incorrect:** RCP Breakers will be closed however second part is wrong, lift oil pump will not be running.
- C. **Incorrect:** RCP Breakers will be closed and therefore is incorrect.
- D. **Incorrect:** RCP Breakers will be closed and therefore is incorrect.

References: NA

Student Reference: None

Learning Objective: MB03042

Question Source: MS2 Bank #78260

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 29):

### QUESTION 30

The unit is at 100% power with "A" Charging Pump operating and Letdown Flow Controller HIC-110 in AUTO.

The LETDOWN FLOW HI alarm actuates on C-02/03.

Which ONE of the following describes (1) actions the operator would take per ARP, AND (2) what is the basis for the action?

- A. (1) Verify Letdown flow is high, check RCS temperature not changing, verify Pressurizer level, place Letdown flow control "HIC-110" in Manual, and stabilize Pressurizer level.  
(2) To prevent overheating resin in CVCS Ion Exchangers.
- B. (1) Verify Letdown flow is high, check RCS temperature not changing, verify Pressurizer level, place Letdown flow control "HIC-110" in Manual, and stabilize Pressurizer level.  
(2) To maintain Pressurizer level within the program band.
- C. (1) Check RCS temperature rising, verify Pressurizer level, verify charging and letdown flow have equalized.  
(2) To maintain Pressurizer level within the program band.
- D. (1) Check RCS temperature rising, verify Pressurizer level, verify charging and letdown flow have equalized.  
(2) To prevent overheating resin in CVCS Ion Exchangers.

K&A Rating: 004 Chemical and Volume Control (CVCS) A2.22 (3.2)

K&A Statement: A2.22 Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions: Mismatch of letdown and charging flows.

or operations:

Key Answer: **B**

Justification (Question 30):

- A. **Incorrect:** Basis is incorrect. Overheating resin is an issue associated with high letdown temperature, not high letdown flow.
- B. **CORRECT:** ARP 2590B-058 provides this direction in order to restore pressurizer level control to normal.
- C. **Incorrect:** The ARP directs restoring RCS temperature to normal if the letdown high flow condition is caused by rising RCS temperature.
- D. **Incorrect:** The ARP directs restoring RCS temperature to normal if the letdown high flow condition is caused by rising RCS temperature.

References: ARP 2590B-058

Student Ref: NONE

Learning Objective: MB 00375

Question Source: Bank Q ID 86003

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 30):

### QUESTION 31

Given the following conditions:

- The plant has shut down for refueling
- Core offload commenced this shift
- A sequential failure of "A" and "B" LPSI pumps has occurred
- The crew has entered AOP-2572, Loss of Shutdown Cooling
- Containment spray (CS) pumps are available

Which ONE of the choices below correctly completes the statement regarding AOP-2572 guidance relating to fuel movement following the shutdown cooling system failures?

Fuel movement \_\_\_\_\_.

- A. may continue for no more than 1 hour with the system out of service
- B. must be suspended until the system is restored with LPSI pumps only (not CS pumps)
- C. may continue for no more than 2 hours with the system out of service
- D. must be suspended until the system is restored using either LPSI pumps or CS pumps

K&A Rating: 005K3.07(3.2)

K&A Statement: Knowledge of the effect that loss or malfunction of the RHRS will have on the following: Refueling Operations

Key Answer: **B**

Justification (Question 31):

- A. **Incorrect:** Fuel movement must be suspended per AOP 2572 Step 3.1 and per TS 3.9.8.1.  
**Plausible:** CS is available for the SDC function and TS 3.9.8.1 allows for the required SDC train to be not in operation for up to 1 hour per 8 hour period.
- B. **CORRECT:** Per AOP-2572, Step 3.1 directs *if fuel movement is in progress, notify RE to stop fuel movement*. Discussion Step 1.2 explains CS pumps for DHR does NOT meet definition of an operable SDC train (LCO 3.9.8) and further states that no fuel movement is permitted when a CS pump is aligned to SDC per the AOP.
- C. **Incorrect:** Fuel movement must be suspended until SDC is restored using LPSI pumps.  
**Plausible:** The AOP does provide direction for aligning CS pumps to establish SDC and containment closure is required in two hours.
- D. **Incorrect:** Fuel movement must be suspended and cannot be recommenced until SDC is restored using LPSI, not CS, pumps.  
**Plausible:** The AOP does provide direction for aligning CS pumps to establish SDC.

References: AOP 2572 Loss of SDC, Rev. 009-08  
Training Diagram Shutdown Cooling-RHR.pdf

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 31):



## QUESTION 32

Given the following conditions:

- The plant tripped from 100% power
- A large break LOCA has occurred
- SIAS, CIAS, EBFAS and MSI have been initiated.
- SIAS had to be manually initiated because the automatic SIAS did NOT occur
- All plant components and systems are functioning as designed
- RCS pressure is 50 psia
- About 1 hour after the trip, the following two alarms are received on C-01:
  - RWST CH A LEVEL LO/LO
  - RWST CH C LEVEL LO/LO
- ESAS functions as designed, with the exception of SIAS, which failed to automatically actuate.

Which ONE of the following describes the expected status of the ECCS pumps under these conditions?

- A. HPSI and LPSI pumps are aligned to the RWST and injecting into the reactor vessel.
- B. HPSI and LPSI pumps are aligned to the recirculation sump and injecting into the reactor vessel.
- C. HPSI pumps are aligned to the RWST and injecting into the reactor vessel.  
LPSI pumps have tripped.
- D. HPSI pumps are aligned to the recirculation sump and injecting into the reactor vessel.  
LPSI pumps have tripped.

K&A Rating: 006 A1.15 (3.3)

K&A Statement: Ability to predict and/or monitor changes in parameters associated with operating the ECCS controls including: RWST level and temperature.

Key Answer: **D**

Justification (Question 32):

- A. **Incorrect:** This would be the alignment if SRAS had not initiated.
- B. **Incorrect:** The sump is the correct source but SRAS trips the LPSI pumps.
- C. **Incorrect:** The RWST is the incorrect source of water once SRAS has initiated. The pump alignment is correct.
- D. **CORRECT:** Manual SIAS actuation does not change the automatic response of ECCS equipment to a SRAS, which initiates on 2 of 4 RWST LOLO level bistable trips, as indicated by the RWST CH A LEVEL LOLO alarm concurrent with the RWST CH C LEVEL LOLO alarm. The SRAS signal will swap ECCS pump suction to the recirculation sump and trip the LPSI pumps.

References: ESFAS Lesson plan

Student Ref: NONE

Learning Objective: NA

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.5

Comments (Question 32):

### QUESTION 33

The crew is drawing a bubble in the pressurizer. RCS temperature is 205°F and all pressurizer heaters are energized. The LTOP SETPOINT SELECTOR switches are in LOW.

Which ONE of the following choices describes the expected condition of the PORVs?

- A. PORVs are closed. When RCS rises above 275°F, the PORVs will automatically open at 2397 psia in the pressurizer to provide over pressure protection.
- B. PORVs are closed. When RCS rises above 275°F, the PORVS will automatically open at 410 psia in the pressurizer to provide over pressure protection.
- C. PORVs are open to allow the Quench Tank to accept Pressurizer drainage during bubble formation.
- D. PORVs are open to prevent taking the plant solid during bubble formation.

K&A Rating: 007 Pressurizer Relief/Quench Tank (PRTS) (3.1, 3.4)

K&A Statement: K5.02 Knowledge of the operational implications of the following concepts as they apply to PRTS: Method of forming a steam bubble in the PZR

Key Answer: **A**

Justification (Question 33):

- A. **CORRECT:** PORVs are closed for steam bubble formation. When RCS temperature is >275°F, the bypass circuitry is removed without regard to positioning of the LTOP SETPOINT SELECTOR switches. Both PORVs will open if two of the four safety channel Pressurizer pressure detectors reach 2397 psia. PORVs are ensured closed by placing their hand switches in NORM while drawing the bubble in OP2301D step 4.2.19.
- B. **Incorrect:** PORVs are closed for steam bubble formation. However, with PORV LTOP SETPOINT SELECTOR switches in LOW, the PORVs will open for low pressure overpressure protection at 410 psia. However, this low pressure relief function is automatically removed above 275°F RCS. **Plausible:** PORVs are shut when drawing a bubble. They were recently being used for LTOP protection. Applicant may confuse setpoints in the PORV bypass circuitry.
- C. **Incorrect:** The Quench Tank is not used to accept drainage from the Pressurizer during bubble formation. The letdown system is aligned to accept the water displaced by the steam bubble. **Plausible:** Applicant may think that the Quench Tank can be used for drainage during bubble formation. Prior to bubble formation, the Quench Tank is used to accept overflow while filling and venting the Pressurizer.
- D. **Incorrect:** The Quench Tank is not used to prevent the plant from going solid during bubble formation. The plant is taken solid prior to commencing bubble formation. **Plausible:** Applicant may think that the Quench Tank can be used to prevent the Pressurizer from going solid during bubble formation. There is a NOTE in OP2301D before step 4.2.19 that states: *When the PORV is closed, the RCS is potentially solid while it is heated to 285°F. Water must be removed from the RCS to compensate for the thermal expansion of the water in the pressurizer. To minimize the potential for excessive RCS pressure rise, performance of step 4.2.27 [which directs controlling letdown flow with backpressure regulator PIC-201] must not be delayed.*

References: OP 2301D Rev 028-05, RCS-00-C.R9chg1 Figure 14 PORV LOGIC (86002901),  
Student Ref: None

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.5

Comments (Question 33):

#### QUESTION 34

Given the following:

- The plant is in MODE 3.
- RCS temperature is 535°F.
- "A" and "C" RCPs are running.
- The "C" RBCCW Pump trips and will NOT restart.
- The "B" RBCCW Pump is NOT available for at least the next 30 minutes.

Assuming NO other operator intervention, which ONE of the following statements is true?

- A. Letdown isolation valves will close on high temperature.
- B. Reactor power will rise slowly due to letdown temperature.
- C. Purification ion exchangers will bypass on high temperature.
- D. Running RCP controlled bleedoff will rise to the limiting temperature.

K&A Rating: 008 Component Cooling Water (CCWS) (3.4, 3.5)

K&A Statement: K3.01 Knowledge of the effect that a loss or malfunction of the CCWS will have on the following: Loads cooled by CCWS

Key Answer: C

Justification (Question 34):

- A. **Incorrect:** Letdown temperature will NOT increase to the 470°F setpoint to isolate Letdown because charging is still available to the Regenerative Heat Exchanger.  
**Plausible:** Applicant may forget that the Regenerative Heat Exchanger is not cooled by RBCCW.
- B. **Incorrect:** Letdown temperature will increase causing a drop in boron absorption in the Purification Ion Exchangers. Negative reactivity is added as a result of the ion exchangers' ability to absorb boron.  
**Plausible:** Applicant may confuse letdown temperature reactivity affects.
- C. **CORRECT:** At letdown heat exchanger outlet temperature (T-224) of 145°F, CH-520, ION EXCH BYPASS," bypasses the Purification Ion Exchangers to protect resin. Ion exchanger resin damage will occur at temperatures above 145F.
- D. **Incorrect:** "A" and "C" pumps are not the affected by the loss of "C" RBCCW pump.  
**Plausible:** Applicant may forget that "A" and "C" RCPs are cooled by the Train "A" RBCCW header.

References: OP 2330A Rev 024-02, AOP 2564 Rev 004-05, ARP 2590B-033 Rev 001-00

Student Ref: None

Learning Objective: MB 3011

Question Source: Modified Bank ID #53871

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 34):

### QUESTION 35

The plant is operating at 100% power, steady state. All systems and components are functioning normally in automatic with no evolutions in progress. Then, the Pressurizer Pressure Selected Controller setpoint fails to 2150 psia (100 psi step change).

Assuming no operator actions, which ONE of the following describes the status of the Pressurizer Pressure Control System when pressurizer pressure stabilizes?

- A. Spray valves partially open  
Proportional heaters at maximum  
Backup heaters all energized
- B. Spray valves partially open  
Proportional heaters at minimum  
Backup heaters all energized
- C. Spray valves partially open  
Proportional heaters at 50%  
Backup heaters all deenergized
- D. Spray valves partially open  
Proportional heaters at 50%  
Backup heaters all energized

K&A Rating: 010 Pressurizer Pressure Control (PZR PCS) (3.2, 3.6)

K&A Statement: K6.03 Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: PZR sprays and heaters

Key Answer: **B**

Justification (Question 35):

- A. **Incorrect:** The proportional heaters will be at minimum when the pressure is 25 psi above setpoint (or 2175 psia, based on a setpoint of 2150 psia).  
**Plausible:** Applicant may think the proportional heaters will operate similar to the backup heaters.
- B. **CORRECT:** The pressure is now much higher than setpoint, so the proportional heaters will be at minimum and spray valves will open because they are driven by the pressure controller output. This will cause the pressure to drop and cause backup heaters to energize at 2200, when the backup heater bistable activates. At 2200 psia, the Spray Valves will be throttled almost fully closed (~50 psi above S.P.) with B/U heaters on, equivalent to "Forcing Sprays". Pressure will eventually stabilize slightly above 2200 psia (but below the backup heater bistable "reset" value of 2225 psia), with the B/U heaters energized and the Spray Valves partially open..
- C. **Incorrect:** B/U heaters will remain energized because the spray valves will start to open and stop pressure from rising enough to deenergize the B/U heaters at 2225 psia.  
**Plausible:** Applicant may believe the B/U heaters will raise pressure above their reset value as they would with a normal pressure control setpoint.
- D. **Incorrect:** The spray valves would remain partially open to counteract the energy input from the B/U heaters.  
**Plausible:** Applicant may believe the spray valves would remain closed due to the abnormally low pressure needed to energize the B/U heaters.

References: Classroom lesson plan PLC-01-C Rev 4 Change 2

Student Ref: None

Learning Objective:

Question Source: Millstone Bank 75143 Rev 4

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 35):



QUESTION 36

Select the ONE choice which correctly completes the following statement.

A loss of Vital DC Instrument Bus DV-40 while at 100% power will cause \_\_\_\_\_ (1) \_\_\_\_\_ and AOP-2506D, Loss of DV-40 will direct operators to \_\_\_\_\_ (2) \_\_\_\_\_ .

- A. (1) a high pressurizer pressure reactor trip due to closure of #1 and #2 MSIVs  
(2) emergency stop the "B" DG and close the starting air header isolation valves
- B. (1) a low SG level reactor trip due to closure of 2-FW-5B, #2 SG Feedwater Isolation  
(2) emergency stop the "B" DG and close the starting air header isolation valves
- C. (1) Reactor Trip Circuit Breakers #2 and #6 to open  
(2) restore power to Bus DV-40
- D. (1) Reactor Trip Circuit Breakers #4 and #8 to open  
(2) restore power to Bus DV-40

K&A Rating: 012 Reactor Protection (RPS) (3.2, 3.7)

K&A Statement: A2.07 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

Key Answer: D

Justification (Question 36):

- A. **Incorrect:** A loss of DV-10 or DV-20 will cause MSIVs to fail close and without operator action, the reactor will trip on High Pressurizer Pressure.  
**Plausible:** Applicant may think that a loss of DV-40 will cause MSIVs to fail closed.
- B. **Incorrect:** A loss of DV-20 will cause 2-FW-5B, #2 S/G FEEDWATER ISOLATION valve to close  
**Plausible:** Applicant may think that a loss of DV-40 will cause this valve to fail closed if they confuse DV-20 loads with DV-40 loads.
- C. **Incorrect** A loss of DV-20 causes Reactor Trip Circuit breakers #2 and #6 to open.  
**Plausible:** Applicant may think that a loss of DV-40 opens these trip circuit breakers.
- D. **CORRECT:** During a loss of DV-40, Reactor Trip Circuit breakers #4 and #8 lose control power and open. Continued operation at power is allowed and AOP 2506D directs operators to restore power to the bus.

References: AOP 2506A Rev 002-05, AOP 2506B Rev 002-06, AOP 2506C Rev 000-00, AOP 2506D Rev 000-00.

Student Ref: None

Learning Objective: MB-05724

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.5, 43.5

Comments (Question 36):

### QUESTION 37

A normal plant cooldown was in progress. Both facilities of SIAS and MSI have been manually blocked.

The cooldown has been stopped while the OCC discusses unplanned changes to the outage work scope. RCS Thot is currently 490°F and RCS Tc is 489°F.

Based on current plant conditions, which ONE of the following statements correctly describes the Engineered Safety Features Actuation System (ESAS)?

- A. With the block present, both MSIVs will close if the MSI 2 INITIATE pushbutton is depressed.
- B. If 2 of 4 SG pressure channels on SG #1 spuriously rise to >700 psia, both MSIV's will close.
- C. With the block present, MSI will NOT actuate if auto initiation logic is satisfied by any condition.
- D. If 2 of 4 pressurizer pressure channels rise to >1850 psia, both SIAS and MSI will unblock.

K&A Rating: 013 K4.03 (3.9)

K&A Statement: Knowledge of the ESFAS design feature(s) and/or interlock(s) which provide for the following: Main Steam Isolation System

Key Answer: **A**

Justification (Question 37):

- A. **CORRECT:** The block pushbuttons will not block manual initiation or automatic initiation from containment pressure. Either the MSI 1 INITIATE or the MSI 2 INITIATE pushbutton, by itself, and regardless of block status, will close both MSIVs.
- B. **Incorrect:** The MSI block is automatically removed if any two sensor channels exceed 700 psia. However, SG pressure (Tsat/Psat) is approx. 620 psia, which is higher than the 572 psia MSI auto setpoint. MSI logic will not be met.  
**Plausible:** MSI would occur if the other two channels were below the MSI setpoint.
- C. **Incorrect:** The block pushbuttons will not block either a manual initiation or an automatic initiation on containment high pressure.  
**Plausible:** The MSI block prevents auto initiation on low steam generator pressure.
- D. **Incorrect:** MSI is not automatically unblocked by pressurizer pressure.  
**Plausible:** The SIAS block is automatically removed if any two sensor channels exceed 1850 psia.

References: LP ESA-01-C, Rev. 3

Student Ref: NONE

Learning Objective: MB-02467

Question Source: Millstone Bank Q78273 – modified

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 37): Modification - added RCS Th,Tc to stem to have SG pressure > MSI setpoint and changed the key answer.

### QUESTION 38

The following plant conditions exist:

- Vital 120 VAC electrical bus VIAC-3 (VA-30) is aligned to its alternate power supply.
- While in this alignment a complete Loss of Normal Power occurs concurrent with a loss of Inverter 4 (INV-4 trips off-line).

Which ONE of the following describes the effects of this electrical alignment / casualty on the ESAS, excluding the impact from failed radiation monitors?

- A. All ESAS components and systems actuated.
- B. Both facilities of ESAS fully actuated, except for AEAS and SRAS.
- C. Both facilities of ESAS actuated only their respective UV functions.
- D. "C" and "D" ESAS sensor cabinets deenergized and then reenergized.

K&A Rating: 013 K4.07 (3.7)

K&A Statement: Knowledge of the ESFAS design feature(s) and/or interlock(s) which provide for the following: Power supply loss

Key Answer: C

Justification (Question 38):

A. **Incorrect:** See explanation for correct answer.

**Plausible:** If the backup power to VA-30 & VA-40 (VR-11 & 21) momentarily deenergized on the LNP, ESAS would see two channels of safety parameters fail to their accident condition. This would meet the 2/4 requirement and would result in a total ESAS actuation.

B. **Incorrect:** See explanation for correct answer.

**Plausible:** Because the RWST level loops get their power from the ESAS sensor cabinets, which never totally lost power, SRAS does not fire. AEAS does not actuate because EBFAS actuation blocks it.

C. **CORRECT:** All ESAS sensor channels have backup power from the opposite facility. Channel 'A' from VA-10/40, Channel 'B' from VA-20/30, Channel 'C' from VA-30/20 and Channel 'D' from VA-40/10. The Actuation Cabinets receive power from VA-10 and VA-20, which were not affected by any of the malfunctions indicated. A plant modification added Battery-backed UPS power to VR-11 & VR-21. Because of this change and the conditions given, none of the cabinets would lose either primary or backup power supplies. Therefore ESAS will respond normally to the loss of offsite power.

D. **Incorrect:** SIAS signal does not open the normal CAR outlet valves.

**Plausible:** The sensor cabinets have backup power supplies from the complimentary VIAC source to prevent this very condition from occurring.

References: NA

Student Ref: NONE

Learning Objective: MB 00162

Question Source: Bank Q ID 54051 Rev 6

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 38):

### QUESTION 39

The unit is in MODE 3 with CAR Fans A, C and D running normally in fast speed per OP-2313A, Containment Air Recirculation and Cooling System. CAR Fan B is stopped and RBCCW flow to its cooler has been isolated in accordance with OP-2313A, Step 4.2.6 by closing its inlet valve, its 10 inch outlet valve and its 6 inch outlet valve.

Subsequently, a spurious Facility 2 SIAS occurs.

Assuming no operator action, which ONE of the choices correctly identifies **ALL** of the CAR Cooler Outlet RBCCW valves listed below that will be **OPEN** after the actuation.

- Valve 1: "B" CAR Cooler 10 inch outlet valve
- Valve 2: "B" CAR Cooler 6 inch outlet valve
- Valve 3: "D" CAR Cooler 10 inch outlet valve
- Valve 4: "D" CAR Cooler 6 inch outlet valve

- A. Valves 2 and 4 ONLY
- B. Valves 2, 3 and 4 ONLY
- C. Valves 1, 3 and 4 ONLY
- D. Valves 1, 2, 3 and 4

K&A Rating: 022 Containment Cooling (CCS) K1.01 (3.5)

K&A Statement: K1.01 Knowledge of the physical connections and/or cause effect relationships between the CCS and the following systems: SWS/cooling system

Key Answer: C

Justification (Question 39):

- A. **Incorrect:** SIAS opens 10 inch valves and the 6 inch valve on D CAR will already be open.  
**Plausible:** The applicant may think the 6 inch valves are the emergency valves that receive the SIAS to open.
- B. **Incorrect:** SIAS opens the 10 inch valves, not the 6 inch valves.  
**Plausible:** Both valves will be open on the D cooler per normal operating practice.
- C. **CORRECT:** A Facility 2 SIAS automatically opens the 10 inch outlet valves on the B and D coolers. Per OP-2313A, both cooler outlet valves are opened when operating the CAR Fan coolers to maintain RBCCW pumps within their optimal flow range. Since D Fan is running when the spurious SIAS signal occurs, its 10 inch and 6 inch valves are already open and will remain open. The Facility 2 SIAS signal will open the 10 inch valve on the B CAR cooler. Applicant must remember the normal valve positions when operating and that only the 10 inch valves get the SIAS open signal.
- D. **Incorrect:** SIAS does not open the 6 inch normal CAR outlet valves.  
**Plausible:** The applicant may think that the SIAS opens both the 6 inch and 10 inch valves for maximum cooling of containment during an accident.

References: OP-2313A, Rev 009-06 (Sections 1.2 and 4.2)

Student Ref: NONE

Learning Objective: MB 02229

Question Source: Modified Bank Q ID 53466

Question History: None

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 39):



#### QUESTION 40

Given the following conditions:

- A large break LOCA is in progress
- "B" CS Pump has tripped, "A" CS Pump has degraded flow
- Facility 1 CAR fans are NOT running due to an ESAS actuation module failure
- Facility 2 CAR fans are running
- Containment pressure is 30 psig and rising

Select the choice below that correctly completes the statement describing the appropriate actions per EOP-2532, Loss of Coolant Accident, for the given conditions.

ENSURE the running CAR fans are operating in (1) speed AND 2) .

- A. (1) FAST  
(2) start ONE additional CAR fan in FAST speed (do NOT start the fourth)
- B. (1) FAST  
(2) do NOT start additional CAR fans
- C. (1) SLOW  
(2) start ONE additional CAR fan in SLOW speed (do NOT start the fourth)
- D. (1) SLOW  
(2) start TWO additional CAR fans in SLOW speed

K&A Rating: 022 A1.02(3.6)

K&A Statement: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating CCS controls including: containment pressure.

Key Answer: D

Justification (Question 40):

- A. **Incorrect:** By design and by EOP requirements, all CAR fans must be running in SLOW on a high containment pressure condition.  
**Plausible:** No more than 3 fans in fast is a normal operating precaution to prevent over-pressurizing ducting.
- B. **Incorrect:** By design and by EOP requirements, all CAR fans must be running in SLOW on a high containment pressure condition.  
**Plausible:** Fast speed would be logical because of the higher rate of heat transfer. Applicant may think the additional fans not desired when EDG is powering the bus.
- C. **Incorrect:** By design and by EOP requirements, all CAR fans must be running in SLOW on a high containment pressure condition.  
**Plausible:** Applicant may misapply the OP precaution on no more than 3 fans in operation.
- D. **CORRECT:** By design and by EOP requirements, all CAR fans must be running in SLOW on a high containment pressure condition.

References: OP2313A (Precaution 3.3) Student Ref: NONE  
Cntmt and Cntmt Systems LP  
EOP 2532 (Step 10), EOP 2540F CTPC-2 (Step 1),  
TS 3/4.6.2 Bases

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.8

Comments (Question 40):

#### QUESTION 41

What prevents clogging of the containment spray nozzles following a Design Loss of Coolant Accident while on recirculation?

- A. The screens in the recirculation sump will block any particles big enough to clog the nozzle.
- B. Duplex filters on the pumps remove particles large enough to clog the spray nozzles.
- C. Anti-vortex blades create centrifugal force to keep large particles out of the pump suctions.
- D. The pump suction lines are located 2 feet above the recirculation sump floor.

K&A Rating: 026 K4.05 (2.8)

K&A Statement: Knowledge of the CSS design feature(s) and/or interlock(s) which provide for the following: Prevention of material from clogging nozzles during recirculation.

Key Answer: A

Justification (Question 41):

- A. **CORRECT:** Accident analysis assumes 1/16 inch holes in sump screens will not allow particles to pass that are big enough to clog the CSS nozzles.
- B. **Incorrect:** There are no filters on the discharge of the pumps.
- C. **Incorrect:** Anti-vortex blades are present in the sump suction to improve flow conditions to the pumps, thus minimizing the potential for cavitation
- D. **Incorrect:** Suction lines are located <1 foot above the sump floor (11 inches). Accident analysis assumes 1/16 inch holes in sump screens will not allow particles to pass that are big enough to clog the CSS nozzles

References: CSS Lesson Plan

Student Ref: NONE

Learning Objective: NA

Question Source: Palo Verde 2005 NRC Exam

Question History: Palo Verde 2005 NRC Exam Q42

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.3

Comments (Question 41):

## QUESTION 42

The plant is steady state at 80% power when an instrument air leak occurs in the turbine building. The equipment operator isolates the leak by closing 2-IA-474, the manual isolation for the affected instrument air branch line. This action removes control supply air for the following valves:

- 2-ES-76H, MSR Drain Tank 1A Normal Level Control Valve
- 2-ES-76F, MSR Drain Tank 1B Normal Level Control Valve
- 2-HD-103A, FWH 1A Normal Level Control Valve
- 2-HD-102A, FWH 1A High Level Control Valve
- 2-HD-103B, FWH 1B Normal Level Control Valve
- 2-HD-102B, FWH 1B High Level Control Valve

Assuming NO further operator action, which ONE of the choices below describes a plant effect of isolating control air to the listed valves?

- A. Turbine efficiency will increase
- B. Reactor power will increase
- C. MSR level will increase
- D. MSR tubes will experience water hammer

K&A Rating: 039 Main and Reheat Steam (MRSS) (3.1, 3.2)

K&A Statement: K1.01 Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: S/G

Key Answer: B

Justification (Question 42):

- A. **Incorrect:** Plant efficiency will decrease because of less preheating as MSR drains are no longer being added into the feedwater flow to the Steam Generators and there is less FW pre-heating in the #2 FW heaters.  
**Plausible:** MSRs and FW heaters, when functioning properly, increase secondary plant efficiency.
- B. **CORRECT:** The closure of the MSR Drn Tk normal level control valves will reduce feedwater preheating as this hot water will now be directed to the main condenser via the high level dump valves. Hot water from the #1 FW heaters will now bypass the shell of the #2 FW heaters and go directly into heater drain tanks, also reducing feedwater preheating. Colder FW into the steam generators will add positive reactivity, raising reactor power.
- C. **Incorrect:** On a loss of Instrument Air pressure, the normal drain valve fails closed and the high level dump valves fail open. When the normal drain path is lost, drain tank level will increase until the High Level Dump to the condenser opens to keep water from backing up from the drain tank to the MSR.  
**Plausible:** Applicant may think that because the MSR drain tanks cannot drain to feedheater drains, the MSRs will back up.
- D. **Incorrect:** Reheater drains collect from the shell side of the MSRs. There is no impact to the tube side thus no risk of causing water hammer. Furthermore, drainage will still occur and if the drain tanks are full they will send drainage to the condenser via the high level dump valves.  
**Plausible:** Water hammer is a common concern in steam piping systems.

References: Dwg 25203-26009 Sht 2 (G-8)  
MSR LP MSR-00-C Rev 6/3  
Dwg 25203-26003 Sht 1 (D-3)

Student Ref: None

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.2- 41.9

Comments (Question 42):

## QUESTION 43

Given the following conditions:

- Unit is in MODE 1 operating at 100% power
- All Channel "B" indications have lost power
- The following annunciators lit on C-08:
  - INVERTER INV-2 TROUBLE
  - VA-20 ON ALTERNATE SUPPLY INV-6
  - INVERTER INV-6 TROUBLE
- The following annunciator is lit on C-05:
  - S/G LEVEL SETPOINT DEVIATION HI/LO
- #1 Steam Generator level is 68% and steady
- #2 Steam Generator level is 76% and steady
- ALL level transmitter green LEDs are lit for BOTH Steam Generators

Which ONE of the following lists actions required to control #2 Steam Generator level?

- A. Trip the reactor and perform EOP 2525, Standard Post Trip Actions. Close SG 2 FRV Block Valve FW-42B and feed using SG 2 FRV Bypass FW-41B.
- B. Press the "A" and "B" SGFP manual pushbuttons, use RAISE or LOWER to control flow. Establish Local-Manual control of #2 FRV.
- C. Press the "A" and "B" SGFP manual pushbuttons, use RAISE or LOWER to control flow. Press MSTR, LIC-5274, controller "M" button and manually operate controller.
- D. Press MSTR, LIC-5274, controller "M" button and manually operate #2 FRV. Transfer control to #2 Steam Generator alternate feedwater flow transmitter.

K&A Rating: 059 Main Feedwater (MFW) (4.2, 4.4)

K&A Statement: 2.2.44 Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.

Key Answer: **B**

Justification (Question 43):

- A. **Incorrect:** Reactor trip is not required for a loss of Vital Instrument panel VA-20. Furthermore, FW-41B, #2 SG FRV bypass, closes and control from C-05 is lost during a loss of VA-20.  
**Plausible:** Applicant may believe that a reactor trip is necessary for a loss of VA-20.
- B. **CORRECT:** AOP 2585 Immediate Actions directs taking manual control of a SGFP to regain control of Steam Generator level for a level abnormality. The loss of VA-20 has caused the #2 Steam Generator FRV to fail as-is. Operators will not be able to control this valve from the control room. A PEO will be stationed at the valve for local-manual control in accordance with AOP 2504D Loss of Vital Instrument Panel VA-20.
- C. **Incorrect:** The first part of this answer choice is correct. Manual control of #2 Steam Generator FRV is not possible due to the loss of power supply VA-20.  
**Plausible:** Applicant may manual control of the #2 Steam Generator FRV is possible. If power was available, this would be an acceptable method for controlling steam generator level.
- D. **Incorrect:** Manual control of #2 Steam Generator FRV is not possible due to the loss of power supply VA-20. A transmitter failure does not exist based on the given conditions (green LEDs lit).  
**Plausible:** Applicant may think manual control of the #2 Steam Generator FRV is possible. If power was available, this would be an acceptable method for controlling steam generator level. A transmitter failure could cause level in #2 Steam Generator to be out of band.

References: AOP 2504D Rev 03-009, AOP 2585 Rev 0, Student Ref: None  
OP 2385 Rev 10-008, ARP 2590D-064 Rev 00-001

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.5, 43.5

Comments (Question 43):



#### QUESTION 44

Unit 2 was operating at 100% power when a reactor trip occurred due to a loss of main feedwater. Given the following events and conditions:

- A and B S/G levels dropped to 15%
- The turbine driven AFW pump was started
- Vital DC Bus DV10 was deenergized due to a fault

As a result of the given conditions, which ONE of the choices below correctly describes the position of the Aux Feed Regulating Valves, and whether or not each valve can be repositioned from C-05?

- |    |                                |                  |
|----|--------------------------------|------------------|
| A. | FW-43A OPEN<br>FW-43B CLOSED   | CANNOT<br>CANNOT |
| B. | FW-43A OPEN<br>FW-43B OPEN     | CANNOT<br>CAN    |
| C. | FW-43A CLOSED<br>FW-43B CLOSED | CAN<br>CANNOT    |
| D. | FW-43A CLOSED<br>FW-43B OPEN   | CAN<br>CAN       |

K&A Rating: 061 Auxiliary/Emergency Feedwater (AFW) (3.9, 3.9)

K&A Statement: A3.03 Ability to monitor automatic operation of the AFW, including: AFW S/G level control on automatic start

Key Answer: **B**

Justification (Question 44):

- A. **Incorrect:** FW-43B will be failed open due to the AFAS and can be controlled from C-05.  
**Plausible:** Student may believe the loss of power affects both valves because each facility of AFAS affects both valves.
- B. **CORRECT:** FW-43A fails open due to loss of DV-10. FW-43B will not lose power and fails open on the AFAS. However, it can be overridden and controlled from C-05.
- C. **Incorrect:** Both valves will be open, FW-43A due loss of power and FW-43B due to the AFAS.  
**Plausible:** Student may believe the loss of DC prevents an AFAS from occurring.
- D. **Incorrect:** FW-43A will fail open on loss of DV-10 and control is lost from C-05.  
**Plausible:** Student may believe the loss of DV-10 will prevent AFAS from affecting FW-43A, but not impact C-05 manual control.

References: AOP 2506A Rev 002-04

Student Ref: None

Learning Objective: MB 05486

Question Source: Bank ID # 5000059 (Modified stem and all four choices)

Question History: 5000059 was NRC generated for the 2005 License Exam.

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 44):

#### QUESTION 45

The BOP is preparing to synchronize the main generator to the offsite transmission network. The following conditions exist:

- INCOMING voltage is slightly lower than the RUNNING voltage.
- Synchroscope is rotating SLOWLY in the SLOW direction.

What adjustments must be made to the Main Generator to (1) match voltages and (2) establish proper synchroscope rotation in preparation for synchronization?

- A. (1) Lower voltage to match Running Voltage.  
(2) Raise speed.
- B. (1) Lower voltage to match Incoming Voltage.  
(2) Lower speed.
- C. (1) Raise voltage to match Incoming Voltage.  
(2) Lower speed.
- D. (1) Raise voltage to match Running Voltage.  
(2) Raise speed.

K&A Rating: 062 AC Electrical Distribution (AFW) (2.8, 2.9)

K&A Statement: A4.03 Ability to manually operate and/or monitor in the control room:  
Synchroscope, including an understanding of running and incoming voltages

Key Answer: **D**

Justification (Question 45):

A. **Incorrect**

B. **Incorrect**

C. **Incorrect**

D. **CORRECT:** When the Synchroscope is going in the SLOW direction, the generator is rotating too slowly and speed must be raised. When synchronizing the generator to the grid, the generator is the "incoming" machine and the grid is "running". In this case the "Incoming" (Main Generator) voltage must be raised to match the grid voltage.

References: OP2324A Rev 017-01

Student Ref: None

Learning Objective: MB 02087

Question Source: Bank ID # 85460

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 45):

#### QUESTION 46

The plant has tripped from 100% power due to a loss of Vital 125 VDC Bus 201B on a Battery bus breaker trip. On the trip, the "A" Main Steam header ruptured in containment.

The following additional conditions exist:

- Pressurizer pressure is 1700 psia
- Containment pressure is 4.44 psig
- Vital 4.16kV Bus 24C failed to transfer to the RSST and is being powered by the Emergency Diesel Generator.

All other components are functioning as designed based on the conditions. The crew is performing the actions of EOP 2525, Standard Post Trip Actions.

Which ONE of the following actions are required and why?

- A. Trip the "B" AFW pump breaker to prevent feeding the affected Steam Generator.
- B. Locally operate the Turbine Driven Auxiliary Feedwater Pump to control #2 SG level.
- C. Operate the "B" Atmospheric Dump Valve remotely from Hot Shutdown Panel C-21 to control RCS temperature.
- D. Cross-tie Station Air with Unit 3 to allow for remote ADV operation to control RCS temperature.

K&A Rating: 063 DC Electrical Distribution (2.9, 3.1)

K&A Statement: K2.01 Knowledge of bus power supplies to the following: Major DC loads

Key Answer: **D**

Justification (Question 46):

- A. **Incorrect:** Although the #2 AFRV will fail open on loss of DC tripping the "B" AFW pump breaker locally is not necessary, the #1 AFRV can still be closed to prevent feeding the break. #1 Steam Generator is affected by the Main Steam rupture. Feed should be secured to #1 Steam Generator not #2 Steam Generator.  
**Plausible;** Loss of 201B de-energizes half of the vital DC busses and if the "B" steam header ruptured the "B" AFW pump breaker would have to be tripped
- B. **Incorrect:** Local operation of the TDAWP is not necessary because the BOP can swap control power for the TDAFP to DV-10 using the key switches on C05, and use it to supply AFW.  
**Plausible:** DV-20, the normal supply to the TDAFP, was lost with the loss of 201B. Loss of control power would require use of a PEO to locally operate the TDAWP.
- C. **Incorrect:** Control of the "B" ADV from C-05 was not lost because VR-21 is still energized by the new UPS, which is good for one to four hours.  
**Plausible:** In the recent past, loss of 24D would cause a loss of VR-21. After about 10 minutes, the battery backup for Foxboro IA control signals (normally powered by VR-21) would deplete and prevent control of the "B" ADV from the control room.
- D. **CORRECT:** The loss of DV-20 will cause Bus 24D to de-energize on the subsequent plant trip. The "D" Instrument Air Compressor lost power when 24C did not transfer to the RSST. On a Loss of Offsite Power (failure of 24C to transfer to the RSST) with a concurrent SIAS (caused by the ESD in Cntmt), the operators are not allowed to re-start the vital Instrument Air Compressor and are required to cross-tie air with Unit 3. Although their buses are reenergized by diesel generators after a LNP, the compressors do not restart without operator action. Procedures allow the compressors to be restarted only after an LNP without a SIAS signal. The diesel power is required for the additional components operating during a safety injection condition

References: AOP 2505B Rev 001-08,  
AOP 2504B Rev 004-01, ISA-00-C.R8C1

Student Ref: None

Learning Objective: MB 05615

Question Source:

Question History: NRC-2011

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 46):

#### QUESTION 47

Given the following conditions:

- A Loss of Offsite Power has occurred.
- EDGs have started and loaded.
- "480V BUS 22E TO B51, B52 BKR TRIP" annunciator lit
- B51 is de-energized due to a fault.

What is the effect on the "A" EDG due to the loss of this MCC and the required operator action?

- A. EDG trip on over speed due to loss of the governor. Restart "A" EDG, manually control speed.
- B. Inability to restart the EDG if it trips due to loss of start air compressors. Manually cross tie starting air to "B" EDG.
- C. Loss of the EDG room vent fan, potential to exceed 120°F room temperature limit. Comply with Technical Specification LCO requirements.
- D. Trip of the EDG due to low jacket water pressure. Start backup jacket water pump, restart the EDG.

K&A Rating: EDGA2.13

K&A Statement: Ability to (a) determine predict the impact of the following malfunctions or operations and (b) use procedures to correct, control, or mitigate the consequences: Consequences of opening aux feeder bus (EDG sub supply)

Key Answer: C

Justification (Question 47):

- A. **Incorrect:** Governor unaffected.  
**Plausible:** Applicant must know governor is not a 480v load.
- B. **Incorrect:** Air compressors available, cross tie-able, not on this MCC  
**Plausible:** Applicant must know air start system, which busses power compressors
- C. **CORRECT:** This MCC powers the ventilation fan. Lack of fan will allow room to heat.
- D. **Incorrect:** Jacket water okay.  
**Plausible:** Other MCCs power jacket water pumps.

References: EDG-00-C EDG LP pg 27  
EDG Systems ppt/LP  
AOP2503E

Student Ref: NONE

Learning Objective:

Question Source: new

Question History: new

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.8

Comments (Question 47):



#### QUESTION 48

The plant is in MODE 3 with bus 24E aligned to 24D.

Then, the "A" Service Water (SW) Pump breaker shorts internally, causing a fault on Bus 24C. The RSST supply to 24C trips open on the bus fault and all other plant equipment responds as expected for the given conditions.

Which ONE of the following operator actions is required per EOP-2528, Loss of Offsite Power/Loss of Forced Circulation, to prevent damage to the "A" EDG?

- A. Perform a normal shutdown of the "A" EDG.
- B. Align the "B" Service Water header to the "A" EDG.
- C. Depress the "A" EDG Emergency Stop pushbuttons.
- D. Place the "B" SW pump handswitch in the START position.

K&A Rating: 064 Emergency Diesel Generator (ED/G) K3.03 (3.6)

K&A Statement: K3.03 Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following: ED/G (manual loads)

Key Answer: C

Justification (Question 48):

- A. **Incorrect:** EOP-2528 requires EDG shutdown. With LNP start signal, an emergency shutdown is required. Plausible because procedures and lesson material stress that normal shutdown generally preferable because less stressful to engine.
- B. **Incorrect:** No procedural guidance provided to allow crosstie of Facility 2 RBCCW with Facility 1 EDG. Plausible because crosstie is physically possible.
- C. **CORRECT:** The question describes a fault divorces Bus 24C from its RSST source. Bus 24E fed from Facility 2 Bus 24D indicates that swing bus 24E is powered from Facility 2. Since "A" EDG is running without any service water, it should be tripped to prevent damaging the machine. The fault on Bus 24C will prevent the "A" EDG breaker from closing. The "B" SW pump is not aligned to Facility 1. EOP 2528, Loss of Offsite Power/Loss of Forced Circulation, (Contingency Step 12.b.1) directs stopping the affected EDG. The "A" EDG emergency trip pushbuttons will be used because of the LNP auto start signal.
- D. **Incorrect:** The "B" pumps are aligned to Facility 2. Plausible because start of a standby pump is a logical choice.

References: EOP-2528, Rev 019-00 (Contingency Step 12.b.1) Student Ref: NONE  
OP-2260, Rev 010-00 (Step 1.3.1)

Learning Objective: MB 02449

Question Source: MS2 Bank# 53401

Question History: 2005 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 48):

#### QUESTION 49

The following conditions exist on Unit 2:

- “B” Steam Generator has a 10 gpm tube leak
- The crew is performing a rapid down power and is currently at 95% power
- The SJAE Rad Monitor RM-5099 is in ALERT

As the down power reaches 80%, the leak increases to 40 gpm and the SJAE Rad Monitor RM-5099 goes to HIGH alarm.

Which ONE of the choices correctly completes the statement to describe the expected indication on Steam Generator Blowdown Monitor RM-4262 as power continues to be reduced below 80%?

Blowdown activity on RM-4262 will \_\_\_\_\_ .

- A. DECREASE, and continue to DECREASE due to lowering power
- B. NOT change with leak rate due to the monitored sample not being representative
- C. INCREASE, and continue to INCREASE due to the change in leak rate
- D. NOT be predictable due to lowering power offsetting the effect of rising leakage

K&A Rating: 073 Process Radiation Monitoring (PRM) A1.01 (3.2)

K&A Statement: A1.01 Ability to predict and/or monitor changes in parameters  
(to prevent exceeding design limits) associated with operating the PRM system  
controls including: Radiation levels

Key Answer: **B**

Justification (Question 49):

- A. **Incorrect:** Blowdown is isolated and therefore the rad monitor will not respond to changing plant conditions..
- B. **CORRECT:** When the SJAE rad monitor goes into high alarm the SG blowdown valves 2-MS-220 A&B close, isolating the SG from the blowdown line. The SG Blowdown rad monitor reading will no longer be representative of SG activity.
- C. **Incorrect:** Blowdown is isolated and therefore the rad monitor will not respond to changing plant conditions
- D. **Incorrect:** The rad monitor will respond to tube leaks, however due to the low sensitivity it will take about 30 minutes to alarm and detect a tube leak, which will have been detected by other means.

References: NA

Student Ref: NONE

Learning Objective: MB 00491

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 49):

## QUESTION 50

Given the following conditions:

- Unit is at full power
- A SGTR occurs in SG #2
- RM-4299C, Main Steam Line #2 radiation monitor is in alarm
- The crew trips the reactor and performs immediate actions of EOPs
- SG levels are 30% and rising

Which ONE of the following is true in regards to the output value of RM-4299C following the trip, assuming no fuel damage has occurred?

- A. Remains at the alarm value until SG #2 is isolated
- B. Lowers towards normal due to the effect of inserting all CEAs
- C. Lowers towards normal due to a lower primary to secondary d/p
- D. Remains at the alarm value until SG #2 NR level rises above 40%

## QUESTION 60

The SFP Cooling system is in a normal lineup, when the following Control Room overhead annunciators are received:

- SFP CLG PUMP SUCTION FLOW LO
- SFP LEVEL LO
- SFP PUMPS OVERLOAD/TRIP

The cause of the alarms is determined to be a leak between the SFPC Pumps and the SFPC heat exchangers (assume that check valves operate with no leakage).

With no operator action, SFP level will lower until water level reaches:

- A. the bottom of the low suction
- B. 12 '6" above the storage racks
- C. the suction line siphon breaker
- D. the discharge line siphon breaker

K&A Rating: 033 Spent Fuel Pool Cooling (SFPCS) K4.01 (2.9)

K&A Statement: K4.01 Knowledge of design feature(s) and/or interlock(s) which provide for the following: Maintenance of spent fuel level

Key Answer: C

Justification (Question 60):

- A. **Incorrect:** The low or "deep" suction is lower than the suction line siphon break and therefore will not be uncovered.
- B. **Incorrect:** The fuel pool will not drain to this level. Per the SFPC lesson plan, the pool is designed and maintained to prevent inadvertent draining of the pool below a level of 22'6".
- C. **CORRECT:** The leak is on the suction line and will be stopped by the suction line siphon breaker. The question stem states the examinee is to assume check valves operate with no leakage.
- D. **Incorrect:** The question stem states the examinee is to assume check valves operate with no leakage. Given the leak location between SFP Cooling Pumps discharge and the SFP Cooling Heat Exchangers, the Downstream Check Valves 2-RW-8 and 2-RW-10 would prevent any back-leakage from the pool through the discharge line, without reliance on the discharge line siphon breaker.

References: LP SFP-00-C.docx  
Dwg 25203-26023 Sheet 2

Student Ref: NONE

Learning Objective: MB 00088

Question Source: Bank Q ID 55162

Question History: None

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 60):

# QUESTION 61

The plant has tripped from 100% power and the Quick Open circuit has failed in the "active", energized state. SG pressures are dropping rapidly.

Which ONE of the following describes (1) the position of the Atmospheric Dump Valves (ADV) and (2) the actions that will terminate the event?

- A. (1) CLOSED  
(2) Shift all steam dump controllers on C05 to Manual with a zero output signal.
- B. (1) OPEN  
(2) Shift the Quick Open Permissive switch on C05 to "OFF" AND close both MSIVs.
- C. (1) CLOSED  
(2) Shift all steam dump controls to Foxboro IA control with a zero output signal.
- D. (1) OPEN  
(2) Shift the RCS Tavg controller on C05 to Manual AND close both MSIVs.



K&A Rating: 041 Steam Dump System (SDS) and Turbine Bypass Control. A2.02 (3.6)

K&A Statement: A2.02 Ability to (a) predict the impacts of the following malfunctions or operations on the SDS: and (b) ) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations of those malfunctions or operations: Steam valve stuck open.

Key Answer: **B**

Justification (Question 61):

- A. **Incorrect:** The quick open signal goes to all steam dump valves (4 steam dumps to condenser and 2 ADVs) and therefore they are all open. Also, the action in this choice will not prevent the Quick Open signal from keeping the ADVs open, as the Quick Open signal is not affected by the valve controllers.
- B. **CORRECT:** The lesson plan explains the quick open permissive defeats the quick open signal to the ADVs but does not affect the quick open signal to the steam dumps to the condenser. The switch is referred to in OP-2316A as "ATMOS STM DUMP QUICK OPEN PERMISSIVE." Closing the MSIVs isolates the failed open condenser steam dump valves.
- C. **Incorrect:** The quick open signal goes to all steam dump valves (4 steam dumps to condenser and 2 ADVs) and therefore they are all open. Also the action in this choice has no effect on the Quick Open signal as Foxboro should have already tried to stop it.
- D. **Incorrect:** Shifting the Tavg controller to Manual will not affect the open ADVs.

References: LP RRS-01-C.R4.doc, EOP 2525,  
OP-2316A Rev 034-01

Student Ref: NONE

Learning Objective: MB 03167

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 61):

## QUESTION 62

A normal plant shutdown is in progress with the following conditions:

- Reactor power at 12% and slowly lowering
- Turbine generator load has been transferred to the "A" steam dump bypass valve
- Tavg is approximately 536°F
- Feedwater Regulating Valves are closed
- Feedwater Regulating Bypass Valves are in automatic and modulating

The operator opens the second generator output breaker, taking the generator off line. Seconds later, the main turbine control valves fail open due to a control circuit failure and the turbine trips on overspeed. Reactor power peaked at 12.5% at the time of the turbine trip. All other plant components respond as expected.

Which ONE of the choices below correctly completes the following statement regarding the reactor response and the cause of the trip of generator protective lockout relays following the turbine overspeed trip?

The reactor   (1)   and the generator protective lockout relays trip due to turbine trip with   (2)   .

- A. (1) trips  
    (2) reverse power
- B. (1) does NOT trip  
    (2) reverse power
- C. (1) trips  
    (2) 345kV Disconnect 15G-2X1-4 MOD closed
- D. (1) does NOT trip  
    (2) 345kV Disconnect 15G-2X1-4 MOD closed

K&A Rating: 045 Main Turbine Generator (MT/G) (3.6, 3.9)

K&A Statement: K4.11 Knowledge of MT/G system design feature(s) and/or interlock(s) which provide for the following: T/G reactor trip

Key Answer: **D**

Justification (Question 62):

- A. **Incorrect:** The reactor does not trip on turbine trip below 15% linear range power.  
**Plausible:** RPS does initiate a reactor trip on a turbine trip when above 15% reactor power.
- B. **Incorrect:** The generator protective relays do not trip on reverse power for this event since they trip first on the turbine trip with disconnect closed interlock.  
**Plausible:** The generator does have a reverse power trip relay and the generator would trip on reverse power following a turbine trip if the generator wasn't already tripped by the turbine trip with disconnect closed interlock.
- C. **Incorrect:** The reactor does not trip on turbine trip below 15% linear range power.  
**Plausible:** RPS does initiate a reactor trip on a turbine trip when above 15% reactor power.
- D. **CORRECT:** The reactor does not trip because turbine trip-reactor trip is automatically bypassed below 15% linear range power. The generator protective lockout relays (86G1A/B & 86G1A/B) trip when the turbine trips due to 15G-2X1-4 being closed.

References: OP2205 Rev 016-02,  
MGS-00-C.R5C5

Student Ref: NONE

Learning Objective: MB 02793

Question Source: Based on Bank ID # 79977 (found several errors in bank question)

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 62):

QUESTION 63

AOP 2569 Steam Generator Tube Leak, directs verification of automatic actions if Steam Jet Air Ejector Discharge Rad Monitor RM 5099 or Steam Generator Blowdown Rad Monitor RM-4262 alarms.

Which ONE of the following is an automatic action that must be verified?

- A. S/G Blowdown Sample valves, 2-MS-191A and 2-MS-191B, close
- B. Blowdown Tank Discharge Isolation valve, 2-MS-15, closes
- C. Atmospheric Drain Collection Tank Drain to Long Island Sound valve, 2-CN-334, closes
- D. Condenser Air Removal to Unit 2 Stack valve, 2-EB-57, closes

K&A Rating: 055 Condenser Air Removal (CARS) (2.6, 2.6)

K&A Statement: K1.06 Knowledge of the physical connections and/or cause effect relationships between the CARS and the following systems: PRM system

Key Answer: **B**

Justification (Question 63):

A. **Incorrect:** These valves do not close on a SJAE or SGBD radmonitor alarm.

**Plausible:** These valves do close on a CIAS.

B. **CORRECT:** For SJAE RM-5099, if a high radiation alarm or instrument failure occurs the following valves automatically close (if open) (same functions as SGBD RM-4262):

- 2-MS-220A (#1 SG blowdown isolation)
- 2-MS-220B (#2 SG blowdown isolation)
- 2-MS-15 (blowdown tank discharge to CW)
- 2-MS-135 (blowdown quench tank discharge to CW)
- 2-S-537 (#1 SG blowdown sample to secondary sample sink)
- 2-S-538 (#2 SG blowdown sample to secondary sample sink)

C. **Incorrect:** Atmospheric Drain Collection Tank Drain to Long Island Sound valve, 2-CN-334, does not close automatically as a result of a SJAE or SGBD radmonitor alarm.

**Plausible:** This valve is manually closed later on in AOP 2569 Steam Generator Tube Leak during actions to minimize unmonitored releases.

D. **Incorrect:** Condenser Air Removal to Unit 2 Stack valve, 2-EB-57, does not close automatically as a result of a SJAE or SGBD radmonitor alarm. This valve is normally closed during operation and does not receive any automatic signals.

**Plausible:** Applicant may think that this sounds like a valve that should be closed if there is a potential for a release.

References: AOP 2569 Rev 009-07, RMS-00-C.R7c5

Student Ref: NONE

Learning Objective: MB 2903

Question Source: Millstone Bank ID #55424

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.2 - 41.9

Comments (Question 63):

#### QUESTION 64

The plant is at 100% power and a discharge of the "A" Waste Gas Decay Tank is in progress. A control room operator has just noted the link between the Met Tower and the Plant Process Computer is NOT working (the Met Tower is off-line).

Which ONE of the following actions is required per SP2617BA, "A" WGDT Gaseous Waste Discharge?

- A. Solicit required weather parameters from CONVEX and document every 15 minutes for the duration of the discharge.
- B. Terminate the discharge and log the termination due to loss of the link between the Met Tower and the Plant Process Computer.
- C. Document weather parameters from the Bridgeport weather facility at Sikorsky Airport every 15 minutes for the duration of the discharge.
- D. Lower the Discharge Controller PIC-9099 setpoint to 2 psig for the duration of the discharge and document the new flowrate on Form SP2617BA-001.

K&A Rating: 071 Waste Gas Disposal (WGDS) A4.26 (3.1)

K&A Statement: Ability to manually operate and/or monitor in the control room: Authorized waste gas release, conducted in compliance with radioactive gas discharge permit.

Key Answer: B

Justification (Question 64):

- A. **Incorrect:** Not per SP 2617BA  
**Plausible:** Control room in frequent with CONVEX regarding weather threats to the grid.
- B. **CORRECT:** Per SP 2617BA, Precaution 3.4, "*discharge must be terminated [if...] any Meteorological monitoring instrumentation listed in step 4.1.3 is not FUNCTIONAL.*" Met tower wind speed, wind direction and differential temperatures are listed in Step 4.1.3. Procedure Step 4.1.30 contains the same termination criterion and is applicable throughout the discharge.
- C. **Incorrect:** Not per SP 2617BA  
**Plausible:** Unit 3 FSAR Section 2.3 describes use of long term data from the Bridgeport weather facility at Sikorsky Airport in initial site studies.
- D. **Incorrect:** Not per SP 2617BA  
**Plausible:** SP 2617BA Step 4.1.39 lists conditions (elevated RM readings, reduced dilution flow) under which the setpoint must be reduced to 2 psig.

References: SP2617BA Rev 001-04

Student Ref: NONE

Learning Objective: NA

Question Source: MS Bank #155013

Question History: 2000 MS2 NRC exam

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 64): Minor modifications to the bank question to adjust for procedure changes and to improve distractor plausibility and psychometrics of the choices.

## QUESTION 65

A reactor trip occurred from 100% power. The 6900 volt AC buses de-energize due to failure to transfer to the RSST. All other electrical buses are energized from their normal source.

Which ONE of the following correctly identifies action(s) that must be taken in response to loss of power effects on the secondary plant and the reason for the action(s)?

- A. ADVs must be opened manually from the control room per EOP 2528, Loss of Offsite Power/Loss of Forced Circulation, to protect the condenser because the loss of condensate flow to the main turbine seals will cause a loss of condenser vacuum.
- B. MSIVs must be closed and the condenser vacuum breaker must be opened per EOP 2525, Standard Post Trip Actions, because the loss of condensate cooling flow to the steam jet air ejectors will cause a loss of condenser vacuum.
- C. Steam supply valves to the FW heaters must be closed per OP 2320, Feedwater System, to protect the FW heaters because severe water hammer will occur in the FW heaters due to the loss of condensate cooling flow.
- D. Condensate hotwell reject flow to the condensate surge tank must be isolated per OP 2319B, Condensate Storage and Surge System, because the condensate surge tank will overflow resulting in a chemical spill.



K&A Rating: 056 Condensate System A2.04 (2.6)

K&A Statement: Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:  
Loss of condensate pumps

Key Answer: **B**

Justification (Question 65):

- A. **Incorrect:** Turbine seals will still be maintained by gland seal steam and NOT condensate flow until the MSIVs are closed. Closing the MSIVs will result in an automatic opening of the atmospheric dump valves. This is credible if the student does not remember what supplies the turbine seals. Also, the student may incorrectly believe that the ADVs must be opened in manual to protect the condenser. If ADVs are operated, they will be operated to control primary temperature, not to protect the condenser.
- B. **CORRECT:** A loss of 6.9 kV AC buses results in a loss of condensate pumps and thus a loss of cooling flow to the SJAEs. EOP 2525, step 11 states that if offsite power is lost or the condenser is NOT available, then close both MSIVs and open 2-AR-17, condenser vacuum breaker.
- C. **Incorrect:** Although cooling flow is lost to the feedwater heaters, closing the steam supply valves does not matter since there is not any extraction steam from the turbine to supply the heaters.
- D. **Incorrect:** Condensate pump discharge pressure provides flow to the Condensate Surge Tank. A loss of 6.9kV AC buses causes a loss of condensate pumps; therefore the surge tank will NOT fill up.

References: EOP 2525 Standard Post Trip Actions

Student Ref: NONE

Learning Objective:

Question Source: Bank 83738

Question History: NRC Exam 2008

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.5, 45.3, 45.13

Comments (Question 65):

#### QUESTION 66

The plant is shutdown in MODE 4. The Shift Manager (SM) is on watch in the control room with two (2) licensed ROs. The Unit Supervisor (US) has temporarily left the control room to tour the plant.

Then, a tour group of six (6) dignitaries and a picture badged escort enters the SM's office from the outside hallway. The escort asks the SM for permission for the group to leave the SM's office and enter the "at the controls area," so that the group can get a close look at the control room layout.

Which ONE of the following correctly describes the action which should be taken?

- A. The Shift Manager should immediately have an RO escort the entire group from the control room and contact Security.
- B. The Shift Manager should have the group remain in the SM's office until the US returns before allowing the tour to proceed into the "at the controls area."
- C. The Shift Manager should immediately escort the entire tour group from the control room and have an RO notify Security.
- D. The Shift Manager should allow only one-half of the group to enter the "at the controls area" at a time while the other half remains in the SM's office.

K&A Rating: Generic, Conduct of Operations (2.5, 3.2)

K&A Statement: 2.1.13 Knowledge of facility requirements for controlling vital/controlled access.

Key Answer: **A**

Justification (Question 66):

A. **CORRECT:** The visitors need to be immediately escorted out of the control room as the number of escorts to visitors is greater than that allowed by security procedures. No more than 5 visitors may be escorted by a single escort in any vital area. The SM is the only SRO in the control room and must not leave the room.

B. **Incorrect:** The SM's office is still inside the vital area of the control room, even though it is a separate room.

**Plausible:** Reasonable that the full control room shift complement should be in the area when a large group tour is conducted.

C. **Incorrect:** The SM is required to remain in the control room complex. Minimum shift staffing per OP-AA-100, Conduct of Operations, and per TS Table 6.2-1 in MODES 1 thru 4 is 2 ROs and 2 SROs. OP-AA-100 describes a control room "command function" that must be maintained and no provision is provided for all SROs to leave the control room in any MODE. 10CFR50.54(m)(iii) requires a minimum of 1 licensed operator in the control room "for each fueled nuclear power unit", whenever the unit is not in cold shutdown or refueling AND also a second operator, senior licensed.

**Plausible:** Applicant may think it permissible for the SRO to leave the control room short-term in MODE 5 because minimum staffing is reduced in that MODE from 2 SROs to 1.

D. **Incorrect:** No more than 5 visitors are permitted to be escorted in vital areas by an escort. The group must be escorted out to re-establish compliance with security requirements.

**Plausible:**

References: OP-AA-100, Rev 025-00, Plant Access Training  
10CFR50.54(m)(iii)

Student Ref: NONE

Learning Objective:

Question Source: Millstone Bank 30000004 Rev 0

Question History: Bank

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 66): The Q appears to be testing SRO level knowledge. However it is actually testing expected RO knowledge. An RO applicant is required to know minimum shift staffing requirements and security requirements for visitors in vital areas.

## QUESTION 67

The plant is operating in MODE 1 at full power.

In this plant condition, for which ONE of the following evolutions does OP-AP-300, Reactivity Management, require the crew to ensure power is reduced to maintain margin to less than 100.0 percent before conducting the evolution?

- A. Lowering steam generator blowdown rate
- B. Stopping a CW pump and isolating the associated CW pump's waterbox
- C. Increasing the temperature of letdown
- D. Overspeed testing of the AFP turbine following trip mechanism repair

K&A Rating: Generic, Conduct of Operations, 2.1.37 (4.3, 4.6)

K&A Statement: 2.1.37: Knowledge of procedures, guidelines, or limitations associated with reactivity management

Key Answer: D

Justification (Question 67):

- A. **Incorrect:** Lowering steam generator blowdown rate does not add positive reactivity.  
**Plausible:** Applicant may confuse this with RAISING steam generator blowdown rate which adds positive reactivity.
- B. **Incorrect:** Stopping a circ water pump and isolating a water box does not add positive reactivity.  
**Plausible:** OP2325A Circulating Water System directs lowering power if condenser backpressure is hard to maintain when stopping a circulating water pump and cross-tying water boxes.
- C. **Incorrect:** Raising letdown temperature adds negative reactivity (boron release from resin).  
**Plausible:** Applicant may confuse reactivity effect of raising letdown temperature with lowering letdown temperature which DOES add positive reactivity and requires a power reduction beforehand in accordance with OP-AP-300 Reactivity Management.
- D. **CORRECT:** The overspeed trip test of the AFW pump turbine adds positive reactivity. Steam is admitted to the turbine to perform this test when in MODES 1 thru 4, in accordance with SP-2660. OP-AP-300 Attachment 2 states, "ENSURE power is reduced to maintain margin to less than 100.0 percent before conducting evolutions that are known to add positive reactivity....for example...operating steam-driven auxiliary feed water pump turbines."

References: OP-AP-300 Rev 017-00 Attachment 2,  
SP-2660 Rev 007-09, OP2325A Rev 032-00

Student Ref: NONE

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.1, 43.6

Comments (Question 67):

QUESTION 68

SP 2613L, "Diesel Generator Slow Start Operability Test, Facility 2", is in use when it is discovered that a section of the procedure needs three steps re-sequenced.

A Field Change procedure modification is being processed to correct the error.

Which ONE of the following has final approval authority for the Field Change?

- A. Facility Safety Review Committee
- B. Operations Manager
- C. Corrective Action Review Board
- D. Shift Manager

K&A Rating: Generic, Equipment Control, 2.2.6 (3.0, 3.6)

K&A Statement: 2.2.6 Knowledge of the process for making changes to procedures.

Key Answer: **D**

Justification (Question 68):

- A. **Incorrect:** Facility Safety Review Committee approval is required for all other procedure changes, except a Field Change.  
**Plausible:** Applicant may believe that Facility Safety Review Committee approval is needed for a Field Change.
- B. **Incorrect:** Operations Manager approval is not required. The correct answer is Shift Manager.  
**Plausible:** Applicant may believe that the Operations Manager approval is needed for a Field Change.
- C. **Incorrect:** The correct answer is Shift Manager.  
**Plausible:** Corrective Action review Board approval is required to proceed with the change, but the final approval belongs to the Shift Manager.
- D. **CORRECT:** As stated on MP-05-DC-SAP01-005, Field Change Approval Form, "Shift Manager is final approval for all Field Changes."

References: MP-05-DC-SAP01 Rev 009-01  
Note at Section 2.2 Field Change,  
MP-05-SAP01-005 Rev 003

Student Ref: NONE

Learning Objective: MB 00427

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 68):

## QUESTION 69

The Letdown Strainer is being isolated for maintenance. The Work Order requires isolating the letdown strainer by closing Letdown Strainer Inlet Valve CH-017 and Letdown Strainer Outlet Valve CH-018 and opening Letdown Strainer Bypass Valve CH-022. These valves have reachrods connected to their handwheels for operation.

Regarding safety tagging requirements, per OP-AA-200, Equipment Clearance, what action, if any, is required for:

(1) the reachrod's handwheel

(2) the handwheel on the body of the valve, to which the reachrod is connected?

- |    | <u>(1)</u>         | <u>(2)</u>         |
|----|--------------------|--------------------|
| A. | danger tag         | no action required |
| B. | caution tag        | danger tag         |
| C. | no action required | danger tag         |
| D. | disconnect linkage | danger tag         |



K&A Rating: Generic, Conduct of Operations, 2.2.13 (4.1, 4.3)

K&A Statement: 2.2.13: Knowledge of tagging and clearance procedures.

Key Answer: **A**

Justification (Question 69):

- A. **CORRECT:** When tagging valves with reachrods, place the danger tag on the reach rod handwheel. An additional danger tag may be hung on the valve, if desired. If the reachrod is disconnected or broken, and then hang the danger tag on the valve and hang a caution tag on the reach rod handwheel indicating the reach rod is broken.
- B. **Incorrect:** The reachrod handwheel must be danger tagged, not caution tagged.  
**Plausible:** Applicant may think that a caution tag on the reachrod is suffice since it is not really part of the valve and that the valve should be danger tagged.
- C. **Incorrect:** The reachrod handwheel must be danger tagged if it is connected to the valve.  
**Plausible:** Applicant may believe that the reachrod doesn't require a danger tag because it is not actually part of the valve. A danger tag on the valve would be suffice.
- D. **Incorrect:** Reach rod is not required to be disconnected.  
**Plausible:** Applicant may believe that it would be safer to remove the reachrod and danger tag the valve directly.

References: OP-AA-200 Rev 019-00 (Step 3.4.1.f)

Student Ref: NONE

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 69):

## QUESTION 70

Emergency Core Cooling Systems Technical Specification Limiting Condition for Operation 3.5.2 states that two ECCS subsystems shall be OPERABLE.

Which ONE of the following correctly identifies the complete set of MODES and, if applicable, other conditions under which this LCO is applicable?

- A. MODES 1, 2 and 3 (no additional conditions apply)
- B. MODES 1, 2, 3 and 4 (no additional conditions apply)
- C. MODES 1, 2 and 3 with  $T_{avg} \geq 515^{\circ}\text{F}$
- D. MODES 1, 2 and 3 with Pressurizer pressure  $\geq 1750$  psia

K&A Rating: Generic, Equipment Control, 2.2.22 (4.0, 4.7)

K&A Statement: 2.2.22: Knowledge of limiting conditions for operations and safety limits.

Key Answer: **D**

Justification (Question 70):

- A. **Incorrect:** Only required in MODE 3 if Pressurizer pressure is > 1750 psia.  
**Plausible:** PORVs are required to be operable in Modes 1, 2 and 3.
- B. **Incorrect:** Only required in MODE 3 if Pressurizer pressure is > 1750 psia.  
**Plausible:** Reasonable that ECCS subsystems would be required any time an RCS break could result in coolant flashing to steam out the break.
- C. **Incorrect:** Only required in MODE 3 if Pressurizer pressure is > 1750 psia.  
**Plausible:** 515°F is TS minimum temperature for criticality. Reasonable to think 2 subsystems required only when approaching possibility of an at-power loss of coolant accident that could challenge fuel integrity
- D. **CORRECT:** Per Technical Specification 3.5.2.

References: Unit 2 TS LCO 3.5.2 9/9/2004 Amend 283

Student Ref: NONE

Learning Objective:

Question Source: NEW

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.7, 41.10, 43.2

Comments (Question 70):

## QUESTION 71

The Unit 2 Control Room has been evacuated due to a fire, with the following:

- Operators are required to enter a radiologically posted area in order to manually close Containment Isolation Valves
- The highest dose rate in the area is 1500 mR/hr

Which ONE of the following describes the radiological requirements for the area and the entry?

This area is required to be posted as a \_\_\_\_ (1) \_\_\_\_ and personnel entering the area are required to maintain each entrance closed and locked except \_\_\_\_ (2) \_\_\_\_.

- A. (1) High Radiation Area  
(2) when inside the area so personnel are not prevented from leaving the area
- B. (1) Locked High Radiation Area  
(2) when inside the area so personnel are not prevented from leaving the area
- C. (1) Locked High Radiation Area  
(2) for periods of ingress or egress, unless guarded to prevent unauthorized entry
- D. (1) High Radiation Area  
(2) for periods of ingress or egress, unless guarded to prevent unauthorized entry

K&A Rating: Generic, 2.3.12 (3.2)

K&A Statement: 2.3.12: Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

Key Answer: C

Justification (Question 71):

- A. **Incorrect:** The area radiation reading is greater than the threshold for a high radiation area but is also above the locked high radiation area limit so posting at the lower level would be incorrect.
- B. **Incorrect:** The area radiation reading >1000 mR/hr require posting this area as a locked high radiation area. The entrance to each locked high radiation area must remain closed and locked except periods of ingress and egress unless the entrance is guarded to prevent unauthorized entry. **Plausible:** Although barriers must be designed to ensure personnel are not prevented from leaving the area; this does not mean that they are to be left unlocked to achieve this goal. An applicant may misinterpret the requirement to not restrict egress from the area as the ability to maintain the opening unlocked.
- C. **CORRECT:** The area radiation reading >1000 mR/hr require posting this area as a locked high radiation area. The entrance to each locked high radiation area must remain closed and locked except periods of ingress and egress unless the entrance is guarded to prevent unauthorized entry.
- D. **Incorrect:** The area radiation reading >1000 mR/hr requires it to be posted as a locked high radiation area (see Choice 'C' above). **Plausible:** The controls in Item 2 are correct in this answer. This is a plausible answer for a candidate that incorrectly classifies the radiation area classification required at the specified dose rate.

References:

Student Ref: NONE

Learning Objective:

Question Source: Bank

Question History: NMP1 2009 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.12

Comments (Question 71):

## QUESTION 72

Refueling operations have just commenced. A fully burnt fuel assembly at its most radioactive condition at the start of the event has been dropped in the refueling cavity due to grapple failure and has significant damage. What is the design basis potential radiological hazard, if any, from this event?

- A. Negligible hazard to control room personnel and offsite, based on minimum fuel decay time of 100 hours and the Alternate Source Term analysis.
- B. Potential for several hundred millirem thyroid dose and several millirem whole body dose to control room personnel, but offsite doses will be less than one millirem.
- C. Potential for >1R thyroid dose and several millirem whole body dose in the control room and at the site boundary.
- D. Potential internal dose >5R whole body equivalent for personnel in the control room and offsite doses may exceed 10CFR50.67 limits.

K&A Rating: 2.3.14 (3.4)

K&A Statement: Knowledge of radiation hazards that may arise during normal, abnormal, or emergency conditions or activities.

Key Answer: **A**

Justification (Question 72):

- A. **CORRECT:** This accident has been re-analyzed using the methods and assumptions contained in Regulatory Guide 1.183. The results of this analysis are within the limits as defined by 10CFR50.67 and within the criteria identified in Regulatory Guide 1.183.
- B. **Incorrect:** Significant hazard.  
**Plausible:** A water level is maintained for shielding and scrubbing, but doesn't eliminate hazard.
- C. **Incorrect:** Re-analysis states the dose received will be within the limits of 10CFR50.67.  
**Plausible:** This was the correct answer for containment and site boundary doses before re-analysis defined the Alternate Source Term.
- D. **Incorrect:** Offsite doses will remain within 10CFR50.67 limits.  
**Plausible:** Applicant must know what "10CFR50.67 limits" means.

References: AOP 2577  
A77-01-C AOP 2577 LP

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.9,10,12

Comments (Question 72):

### QUESTION 73

The crew has just entered MODE 4 and is making preparations to place SDC in service. Suddenly, numerous annunciators alarm, several Facility 1 components change position, and several Facility 1 indicators are deenergized.

Within 5 minutes after the initial event, the following plant conditions exist:

- The "A" RBCCW Heat Exchanger indicates 9,000 gpm Service Water flow.
- Letdown indicates '0' flow.
- "A" ESF Room Cooler indicates 60 gpm flow.
- "A" SDC Heat Exchanger indicates 2,000 gpm RBCCW flow.
- The SFP Cooling Low Flow annunciator is in alarm.
- #1 S/G level indicates 65% and is slowly rising.
- #2 S/G level indicates 65% and is stable.
- Indicating lights for all Bus 24C breakers are out.

Which ONE of the following is the appropriate procedure to enter for this event?

- A. Loss of 125 VDC Instrument Panel, D-11, AOP 2507A
- B. Loss of 125 VDC Instrument Panel, DV-10, AOP 2506A
- C. Restoring DC and Vital Instrument AC Buses, EOP 2541, Appendix 29.
- D. Loss of 125 VDC Bus 201D, AOP 2505C



K&A Rating: 2.4.4 (4.5)

K&A Statement: Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.

Key Answer: **B**

Justification (Question 73):

- A. **Incorrect:** Indications are not consistent with the loss of D-11.
- B. **CORRECT:** The above indications are associated with a loss of either Vital Bus 201A or Vital DC Panel, DV-10. The appropriate AOPs may be used while in lower modes; EOPs cannot be used from lower modes
- C. **Incorrect:** Appendix 29 only provides actions for energizing Bus 201A from Battery 201A. Additionally, it would be inappropriate to enter Appendix 29 directly while in MODE 5
- D. **Incorrect:** Indications are not consistent with the loss of Bus 201D.

References: AOP-2506A, DV-10 Load List

Student Ref: NONE

Learning Objective: NA

Question Source: Bank #8000037

Question History: 2009 MS2 NRC Exam (Q#89)

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 73):

#### QUESTION 74

The plant is operating at 100% power, MOL, when a VCT low level alarm is annunciated.

The US directs the RO to make up to the VCT using the appropriate blend. During the blend, the RO is momentarily distracted by a fire panel trouble alarm. As the RO is addressing the fire alarm, a PMW FLOW HI/LO annunciator is received on C-04 and inadvertently acknowledged by the BOP.

A few minutes later, the RO notices reactor power slowly lowering.

Which ONE of the following could have caused this condition?

- A. A high level in the VCT automatically isolated makeup from the PMW Storage Tank.
- B. The PMW flow controller output failed high resulting in an automatic isolation of PMW.
- C. The Boric Acid flow controller failed low automatically causing makeup to be from the RWST.
- D. PMW flow was stopped or lowered resulting in too much Boric Acid being added to the VCT.

K&A Rating: 2.4.46 (4.2)

K&A Statement: Ability to verify that the alarms are consistent with the plant conditions

Key Answer: **D**

Justification (Question 74):

- A. **Incorrect:** because a high level in the VCT will automatically stop PMW AND Boric Acid if the controls are in "AUTO". This is credible if the student thinks that only PMW is isolated on a high level to prevent a dilution event.
- B. **Incorrect:** because a failure of the PMW controller output will raise flow to maximum. It will NOT automatically isolate flow. This is credible if the student believes that PMW is automatically isolated by the controller failure.
- C. **Incorrect:** because a failure of the Boric Acid controller will NOT automatically swap makeup to the RWST. This is credible if the student believes that makeup flow will be diverted to the RWST on a Boric Acid controller failure to prevent losing Boric Acid makeup capabilities.
- D. **CORRECT:** PMW flow was somehow decreased to less than 10 gpm (alarm setpoint) by an unspecified failure which resulted in only Boric Acid being injected to the VCT. After a short duration, the VCT Boron concentration increased which caused a power reduction.

References: NA

Student Ref: NONE

Learning Objective: NA

Question Source: Bank #1000105

Question History: MP2 2002 NRC Exam Q22

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 74):

## QUESTION 75

EOP 2534 Steam Generator Tube Rupture requires that the plant be cooled down to 515°F That in both loops before shutting the MSIV on the affected SG. What is the basis for this requirement?

- A. Steaming both SGs removes mass from the ruptured SG thereby delaying the potential overfill of the ruptured SG due to break flow.
- B. The cooldown prevents potentially lifting a safety on the ruptured SG. Controlled steaming can be secured when desired; a safety may fail to close.
- C. Cooldown with only one SG will not allow SI termination within the time frame assumed for the FSAR accident analysis.
- D. Rapid cooldown with both SGs minimizes exposure to the potential for a loss of offsite power and increased release due to slow natural circulation cooldown.

K&A Rating: 2.4.18 (3.3)

K&A Statement: Knowledge of the specific bases for EOPs.

Key Answer: **B**

Justification (Question 75):

A. **Incorrect:** Not the purpose of the requirement.

**Plausible:** This is a physical effect.

B. **CORRECT:** If affected loop RCPs are secured and the MSIV closed,  $T_h = T_h = P_{sat}$  will lift a safety.

C. **Incorrect:** Single SG can remove decay heat and cooldown.

**Plausible:** Applicant may think about single ADV cooldown, reduced of HR capacity.

D. **Incorrect:** Not the reason.

**Plausible:** LOOP is part of DBA basis; statement is factual, just not the actual basis

References: EOP2534 LP  
EOP2534 bases

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.8

Comments (Question 75):

## QUESTION 76

Given the following conditions:

- The plant is at 100% power
- Pressurizer level channel X indicates pegged high
- Pressurizer level channel Y (controlling) shows a down trend
- The standby charging pump starts; level stabilizes on channel Y
- Containment temperature and pressure are slowly trending up

Which ONE of the following identifies the leaking Channel X instrument line and, based on that leak location, the action required per AOP 2568 RCS Leak?

- A. variable leg  
Trip the reactor and go to EOP 2525 Standard Post Trip Actions.
- B. reference leg  
Initiate shutdown per either OP 2204 Load Changes or AOP 2575, Rapid Downpower.
- C. variable leg  
Initiate shutdown per either OP 2204 Load Changes or AOP 2575, Rapid Downpower.
- D. reference leg  
Trip the reactor and go to EOP 2525 Standard Post Trip Actions.

K&A Rating: 000009SBLOCA EA2.02 (3.8)

K&A Statement: Ability to determine and/or interpret the following as they apply to a small break  
LOCA: possible leak paths

Key Answer: B

Justification (Question 76):

- A. **Incorrect:** Variable leg causes low failure.  
**Plausible:** Applicant has to understand instrument.
- B. **CORRECT:** Reference leg break fails indication high, and it's an RCS leak. PER AOP 2568 RCS Leak, step 4.4.c if pressure boundary leak shutdown to mode 5. From indications in stem this is pressure boundary leakage.
- C. **Incorrect:** Variable leg causes low failure  
**Plausible:** Applicant has to understand instrument.
- D. **Incorrect:** Indications do not require trip.  
**Plausible:** Applicant has to understand trip criteria. Per AOP 2568 step 4.1 if leak exceeds charging capacity then trip reactor. From stem second charging pump stabilized level.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: PZR LVL & Press LP

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

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

Comments (Question 76):

## QUESTION 77

Given the following conditions:

- Unit is at 100% power
- "RCP A ANTIREV ROT FLOW LO" alarms on Panel C02.
- The anti-reverse bearing is 195°F and rising very slowly.

Based on these indications, which ONE of the following describes required (1) procedural guidance and (2) actions?

- A. (1) OP 2301C Reactor Coolant Pump Operation  
(2) Trip the reactor, stop the 'A' RCP, and carry out EOP 2525.
- B. (1) RCP A ANTIREV BRG TEMP HI ARP 2590B-081  
(2) Inform the OMOC, commence a down power at 195°F, monitor temperature, trip the reactor and stop the 'A' RCP at 250°F.
- C. (1) OP 2301C Reactor Coolant Pump Operation  
(2) Start the lift pump, monitor temperature and vibration, trip the reactor and stop the 'A' RCP if temperature at 221°F or vibration exceeds 11 mils.
- D. (1) RCP A ANTIREV BRG TEMP HI ARP 2590B-081  
(2) Inform the OMOC, start the lift pump, monitor temperature, commence down power at 221°F, trip reactor and stop 'A' RCP at 250°F.



K&A Rating: 015/17 AA2.10 (3.7) RCP Malfunctions

K&A Statement: Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): When to secure RCPs on loss of cooling or seal injection

Key Answer: **D**

Justification (Question 77):

- A. **Incorrect:** Plausible because the operating procedure has guidance, however the steps are incorrect.
- B. **Incorrect:** Plausible that ARP would have guidance however is incorrect.
- C. **Incorrect:** Plausible because the operating procedure has guidance, however the steps are incorrect.
- D. **CORRECT:** These are the actions for this alarm response procedure.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: ARP 2590B-081 Rev 000-00

Student Ref: NONE

Learning Objective: NA

Question Source: Bank #1000014

Question History: MS2 2002 ILT Audit

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

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

Comments (Question 77):

## QUESTION 78

The following conditions exist:

- A large break LOCA occurred approximately 9 hours ago.
- SRAS was initiated approximately 7.5 hours ago.
- Chemistry Department reports the current RCS sample indicates 1500 ppm boron concentration.
- A RCS sample taken 4 hours ago indicated a boron concentration of 1945 ppm.
- ONLY Facility 1 power is available.
- All other conditions are as expected for this event.

Given these conditions, which ONE of the following is the procedurally preferred operator action that must be directed by the US?

- A. Ensure "A" LPSI Pump is running, stop the 'A' HPSI Pump, align the 'A' HPSI pump to the auxiliary spray line, and start the 'A' HPSI Pump.
- B. Ensure 'A' HPSI pump is running, align the 'A' LPSI pump through the warmup line to the SDC suction line, and start "A" LPSI Pump.
- C. Make-up to the BASTs, restart all of the available charging pumps, and inject into the 'A' HPSI header.
- D. Align the 'A' LPSI pump to inject to the RCS through the auxiliary spray line, maintain HPSI injection as-is.

K&A Rating: 011 2.4.6 (4.7) Large Break LOCA

K&A Statement: 2.4.6 Knowledge of EOP Mitigation Strategies.

Key Answer: **A**

Justification (Question 78):

- A. **CORRECT:** Boron precipitation is expected. With Facility 2 NOT available, a Facility 1 HPSI pump is utilized to establish flow through the PZR spray nozzle (via Aux. spray), through the Pressurizer into the #2 hot leg and back through the core such that water in the core is flushed out the cold leg break. Flow via this path is required to prevent the boric acid concentration in the fuel region from reaching the level at which crystallization would occur. (EOP 2541, App. 18-B). The Face 1 LPSI pump will provide cold leg injection.
- B. **Incorrect:** If ONLY Facility 1 is available, then the "A" LPSI Pump cannot be used to inject to the SDC suction line.
- C. **Incorrect:** This would be the actions if additional boron injection was required and the normal path was not available.
- D. **Incorrect:** With ONLY one facility available, the "A" LPSI Pump cannot be used to inject into the RCS through the auxiliary spray line.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: EOP 2541 Attachment 18

Student Ref: NONE

Learning Objective: NA

Question Source: Bank #54119

Question History: MS2 2009 NRC Exam Q79

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

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

Comments (Question 78):

## QUESTION 79

Given the following conditions:

- The unit is at 100% power.
- RBCCW Pump "A" is tagged out for maintenance
- RBCCW Pump "B" is supplying the "A" Header via the "B" RBCCW HX
- RBCCW Pump "C" is supplying the "B" Header via the "C" RBCCW HX
- RBCCW PUMP HDR B PRESS LO alarm on C-06/7
- RBCCW PUMP C OVERLOAD/TRIP alarm on C-06/7
- RCP B LOWER SEAL TEMP HI alarm on C-02/3
- RCP D LOWER SEAL TEMP HI alarm on C-02/3

Which ONE of the following identifies (1) actions that are required and (2) within how soon would the NRC need to be notified via ENS per 10CFR50.72 IF the reactor was tripped?

- A. (1) Immediately trip the reactor, secure affected RCPs and perform SPTAs.  
(2) 1 hour
- B. (1) Immediately trip the reactor, secure affected RCPs and perform SPTAs.  
(2) 4 hours
- C. (1) Monitor RCP temps. If cooling flow cannot be restored within 5 minutes or lower seal temp rises >170°F on affected RCPs, trip the reactor, stop affected RCPs and perform SPTAs.  
(2) 1 hour
- D. (1) Monitor RCP temps. If cooling flow cannot be restored within 5 minutes or lower seal temp rises >170°F on affected RCPs, trip the reactor, stop affected RCPs and perform SPTAs.  
(2) 4 hours

K&A Rating: 000026 Loss of Component Cooling Water (4.4)

K&A Statement: 2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.

Key Answer: **B**

Justification (Question 79):

A. **Incorrect:** A 4 hour report is required.

**Plausible:** Physically, it is possible to cross-tie RBCCW between facilities but not procedurally allowed in Mode 1. This can only be performed in Modes 5, 6 or defueled. Ref RBC-00-C.R7c1 or see AOP 2564 subsection. 10CFR50.72 requires a 4 hour report for any condition that results in actuation of the reactor protection system and also for initiation of any shutdown required by Tech Specs.

B. **CORRECT:** From AOP 2585 Loss of RBCCW Pump Immediate Actions. This section is to be performed from memory. RBCCW Pump "A" is not available and RBCCW Pump "C" cannot be restarted because it tripped on overload. An immediate trip is required. 10CFR50.72 requires a 4 hour report for any condition that results in actuation of the reactor protection system and also for initiation of any shutdown required by Tech Specs.

C. **Incorrect:** RBCCW Pump "C" cannot be restarted. A 4 hour report is required.

**Plausible:** Applicant may believe that one restart is possible. AOP 2585 IOAs directs a restart for a Loss of RBCCW Pump if the RBCCW Pump Overload/Trip annunciator is not lit.

D. **Incorrect:** Trip criteria met because flow cannot be restored to the "C" header.

**Plausible:** ARP for RCP B LOWER SEAL TEMP HI directs reactor trip after lower seal temps rise >170°F. 10CFR50.72 requires a 4 hour report.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting the appropriate procedure and immediate actions to take to mitigate plant conditions and place the plant in a safe condition and 10CFR50.72 reporting time requirements.

References: AOP 2585 Rev 0, AOP 2564 Rev 004-05, RBC-00-C.R7c1, ARP 2590B-079 Rev 000-00  
Student Ref: NONE

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:

Comprehensive/Analysis: X

10CFR55: 43(b) (5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations  
43(b) (2) Facility operating limitations in the technical specifications and bases

Comments (Question 79):

## QUESTION 80

The plant is operating in MODE 1, 100% power when a fault in the Millstone 345KV Switchyard causes the loss of the North Bus and a plant trip. All equipment actuates as expected with the exception of the following:

- "A" Diesel Generator trips on start and cannot be reset.

The crew performs SPTAs and enters EOP 2528 Loss of Offsite Power. The crew is performing steps in EOP 2528 when the following occurs:

- Annunciator DIESEL GEN 13U BKR TRIP lit on C-08
- Annunciator DIESEL GEN 13U BKR CLOSING CKT BLOCKED lit on C-08
- A report from the field indicates Bus 24D is faulted

Vital 4kV Bus 24E has since been energized from Unit 3. Based on these conditions, which ONE of the following choices identifies (1) the required procedure and (2) steps to close A305, 24C/24E Tie Breaker, and energize Vital 4kV Bus 24C, assuming NO fault on the bus?

- A. (1) EOP 2541, Appendix 23, Restoring Electrical Power  
(2) Reset the Sequencer on Actuation Cabinet 5.
- B. (1) EOP 2541, Appendix 23, Restoring Electrical Power  
(2) Place all four UV BUS A3 keys in INHIBIT and reset the ESAS UV signal.
- C. (1) AOP 2583, Loss of All AC Power During Shutdown Conditions  
(2) Place all four UV BUS A3 keys in INHIBIT and reset the ESAS UV signal.
- D. (1) EOP 2540B, Functional Recover of Vital Auxiliaries (AC and DC Power)  
(2) Reset the Sequencer on Actuation Cabinet 5.

K&A Rating: 000055 Station Blackout (4.1)

K&A Statement: EA2.06 Ability to determine or interpret the following as they apply to a Station Blackout: Faults and lockouts that must be cleared prior to re-energizing buses

Key Answer: **B**

Justification (Question 80):

- A. **Incorrect:** Resetting the Sequencer on Actuation Cabinet 5 is NOT adequate to allow energizing Bus 24C from Bus 24E. Because the "A" DG started, the Sequencer fired and does not require a reset. The UV must be reset to restore power to the bus.  
**Plausible:** Appendix 23 is the correct procedure to use. The applicant may believe that the Sequencer failed to actuate because the DG output breaker failed to close. Additionally, the examinee may think that the UV may be reset without bypassing all four UV channels
- B. **CORRECT:** To allow closing A305, 24C/24E Tie Breaker, the four channels of UV for Bus 24C must be bypassed, then the UV actuation signal on Facility 1 (Bus A3) must be reset prior to energizing Bus 24C. EOP 2541 Appendix 23, Restoring Electrical Power would be chosen because the crew was in EOP 2530 SBO which directs it.
- C. **Incorrect:** AOP 2583 would not be entered from EOP 2530 SBO. AOP 2583 entry occurs from Mode 5, 6 or defueled.  
**Plausible:** Applicant may believe that AOP 2583 is appropriate because the loss of the second vital 4kV bus didn't occur until later on while the crew was taking actions in EOP 2528 Loss of Offsite Power.
- D. **Incorrect:** The Functional Recovery would not be entered because EOP 2530 Station Blackout assumes a Loss of Offsite Power. Furthermore, resetting the Sequencer on Actuation Cabinet 5 is NOT adequate to allow energizing Bus 24C from Bus 24E.  
**Plausible:** Distractor. Applicant may think that the crew should enter the Functional Recovery because there are two events in progress: Loss of Offsite Power and Station Blackout. The applicant may believe that the Sequencer failed to actuate because the DG output breaker failed to close. However, because the "A" DG started, the Sequencer fired. Additionally, the examinee may think that the UV may be reset without bypassing all four UV channel

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question also requires knowledge of when to implement attachments and appendices, including how to transition to event specific emergency contingency procedures. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: AOP 2583 Rev 002-07, EOP 2530 Rev 012-00  
ARP 2590F-033 Rev 000-00, IHE-00-C.R9c3  
OP 2343 Rev 021-11, EOP 2541-App 23 Rev 000-01

Student Ref: NONE

Learning Objective:

Question Source: Modified Millstone Bank ID 1154565

Question History: Q used on NRC 2011 Exam, but significantly modified for this exam

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

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

Comments (Question 80):



## QUESTION 81

Given the following conditions:

- The plant is in MODE 6 for a refueling outage.
- 0900: Vital 125VDC Bus 201B is de-energized and tagged-out for repairs.
- 1200: 125 VDC LOAD CENTER 201A TROUBLE annunciator actuates on C-08.
- 1201: PEO sent to East DC Switchgear room to investigate alarm on Vital 125 VDC Bus 201A.
- 1215: Vital 125 VDC Bus 201A voltmeter on C-08 suddenly drops to 0 Volts.
- 1216: Electricians are looking into whether a DC Bus can be restored.

Which ONE of the following is correct regarding the event, including the time(s) ALLOWED for taking the stated action(s)?

Notes:

- (1) If selecting a choice that implies an EAL threshold HAS been exceeded, apply the maximum time limits established by the NRC as reasonable for assessing, classifying, and notifying.
- (2) If selecting a choice that implies an EAL threshold HAS NOT been exceeded, apply the action from the exact time when the LCO is not met.

- A. 1215: Event classification  
1230: Report to Conn State, Dept of Energy and Environ Protection and local officials  
1315: Report to NRC
- B. 1230: Event classification  
1245: Report to Conn State, Dept of Energy and Environ Protection and local officials  
1330: Report to NRC
- C. 1245: Event classification  
1300: Report to Conn State, Dept of Energy and Environ Protection and local officials  
1345: Report to NRC
- D. An EAL threshold has NOT been met. At 1215, immediately suspend all core alterations and movement of irradiated fuel in accordance with Technical Specification Action Statement 3.8.2.4 D.C. Distribution- Shutdown.

K&A Rating: 000058 Loss of DC Power (4.1)

K&A Statement: 2.4.30 Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.

Key Answer: C

Justification (Question 81):

- A. **Incorrect:** Initiating condition for NOUE occurs at 1230 when both DC buses are without power for more than 15 minutes. NRC notification is due within 60 minutes of event declaration and made after notifying local officials and CT State DEEP.  
**Plausible:** Applicant may assume that needs to immediately declare and 15 minute wait for loss of DC buses is not necessary.
- B. **Incorrect:** Initiating condition for NOUE occurs at 1230 when both DC buses are without power for more than 15 minutes.  
**Plausible:** Applicant may assume that 15 minute wait for loss of DC buses is not necessary and the event should be classified and declared within 15 minutes of the initial loss of Vital 125VDC Bus 201A.
- C. **CORRECT:** Event classification/declaration must be made within 15 minutes from the event initiation. After the event has been classified, regulations require the prompt notification of off-site authorities within 15 minutes. NRC regulations require the licensee to notify the NRC immediately after notification of state and local agencies, but not later than one hour after declaration of an emergency classification. (Ref: MP-26-EPI-FAP07 and MP-26-EPI-FAP06-002). Initiating event occurs at time 1230 when Unusual Event (D-2, PU2) met for Loss of Voltage on both DC Buses 201A AND 201B > 15 Minutes. Therefore have 15 minutes (until 1245) to declare the event and another 15 minutes to make notifications.
- D. **Incorrect:** Unusual Event met for Loss of Voltage on DC Buses 201A AND 201B > 15 Minutes.  
**Plausible:** Technical Specification Action Statement 3.8.2.4 D.C. Distribution- Shutdown is applicable because of NO operable Vital 125VDC buses.

SRO Only Justification: This question is SRO only as it requires knowledge of Emergency Action Levels and required reports to external agencies and local officials as directed by administrative procedures.

References: MP-26-EPI-FAP06-002 Rev 009, Student Ref: NONE  
MP-26-EPI-FAP07 Rev 018-01 Section 1.4.2  
MP-26-EPI-FAP01-001 Rev. 010-01, Unit 2 TS 3.8.2.4 Amend 305.

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

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

Comments (Question 81):

## QUESTION 82

The plant is in a normal 100% power lineup, when a Steam Generator tube leak develops.

Present plant conditions are as follows:

- Letdown has lowered to 32 gpm and stabilized
- No backup charging pumps are running
- Pressurizer level is 64% and stable

The crew then takes the applicable actions to begin a plant shutdown.

Which ONE of the following conditions would indicate that the Steam Generator tube leak rate has risen to a new stable value and when is the plant required to be in HOT STANDBY per the TS?

- A. After starting the second charging pump, the RO adjusts letdown flow until pressurizer level stabilizes at 65%. Letdown flow rises to 70 gpm and stabilizes.  
Be In HOT STANDBY within 4 hours.
- B. After starting the second charging pump, the RO adjusts letdown flow to 84 gpm. Pressurizer level then lowers to 63.5% and letdown flow lowers to 76 gpm before both stabilize.  
Be In HOT STANDBY within 4 hours.
- C. After starting the second charging pump, the RO adjusts letdown flow until pressurizer level stabilizes at 65%. Letdown flow rises to 70 gpm and stabilizes.  
Be In HOT STANDBY within 6 hours.
- D. After starting the second charging pump, the RO adjusts letdown flow to 84 gpm. Pressurizer level then lowers to 63.5% and letdown flow lowers to 76 gpm before both stabilize.  
Be In HOT STANDBY within 6 hours.

K&A Rating: 000037 Steam Generator Tube Leak (4.1)

K&A Statement: AA2.12 Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: Flow rate of leak

Key Answer: C

Justification (Question 82):

- A. **Incorrect:** TS 3.4.6.2 Action B requires to be in hot standby in 6 hours.
- B. **Incorrect:** Initial leak rate from conditions given is 8 gpm based on Charging/Letdown mismatch with 4gpm RCP bleed off flow. Manually raising letdown flow to match the new charging flow will force the pressurizer level control system to readjust letdown flow to account for the 8 gpm leak. Leak rate is still 8 gpm in the answer choice. TS 3.4.6.2 action B requires to be in hot standby in 6 hours.
- C. **CORRECT:** PZR level stabilizes with the new charging flow (88gpm). Letdown flow stabilizes more than 8 gpm below the expected charging flow for two pumps. Based on Charging/Letdown mismatch, the leak rate has gone from 8 gpm to 14 gpm. TS 3.4.6.2 action B requires to be in hot standby in 6 hours.
- D. **Incorrect:** Initial leak rate from conditions given is 8 gpm based on Charging/Letdown mismatch with 4gpm RCP bleed off flow. Manually raising letdown flow to match the new charging flow will force the pressurizer level control system to readjust letdown flow to account for the 8 gpm leak. Leak rate is still 8 gpm in the answer choice.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and determining how conditions are changing and applying TS knowledge of > 1 hour action requirements. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: A68-01-C Rev 2

Student Ref: NONE

Learning Objective:

Question Source: Bank ID #1000038

Question History: 2001 Audit exam

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

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

Comments (Question 82):

### QUESTION 83

The "A" Aerated Waste Monitor Tank discharge was inadvertently started using the permit for the "A" Clean Waste Monitor Tank. The error was not discovered until after the discharge was completed.

Chemistry has calculated the total tritium activity discharged and has determined the total activity of all other detected radioactive isotopes discharged at approximately 1/10 of the tritium activity.

Which ONE of the following Millstone documents provides the information necessary to determine if any limits were exceeded?

- A. Radioactive Effluent Monitoring / Offsite Dose Calculation Manual (REMDCM)
- B. National Pollutant Discharge Elimination System (NPDES) permit
- C. Technical Specifications, Appendix A to the Facility License (TS)
- D. Technical Requirements Manual (TRM)

K&A Rating: 000059 Accidental Liquid Rad Waste Rel 2.2.38. (4.5)

K&A Statement: 2.2.38 Knowledge of conditions and limitations in the facility license.

Key Answer: **A**

Justification (Question 83):

- A. **CORRECT:** REMODCM limits the total activity of tritium that can be released to ensure that the limits of 10CFR20 are not exceeded.
- B. **Incorrect:** NPDES does NOT limit the total volume of any radioactive discharge; however, it does limit the volume of other biological threats to the environment, like chemicals and temperature of the discharge water.  
**Plausible:** NPDES limits the discharge of chemicals; therefore it would be logical to think it also limits the discharge of radioactive liquids
- C. **Incorrect:** Although Technical Specifications, Section 6.9.1.9, Annual Radiological Reports, requires an annual report on Effluent Releases, it does NOT contain any limits on the isotopes discharged from Aerated or Clean Waste.  
**Plausible:** Tech Specs, Section 6.9.1.9, requires annual reports on Radioactive Effluent Releases, but does not set limits on the amount of activity released for each discharge.
- D. **Incorrect:** Although the TRM contains information pertaining to leakage of highly radioactive fluids outside of Containment (Section 6.13), there are NO limits on the total amount of radioactivity released.  
**Plausible:** TRM Section 6.13, System Integrity Requirements, discusses the "release of highly radioactive fluids outside of Containment" and need to reduce the leakage to as low as practical.

SRO Only Justification: This question is SRO only as it tests knowledge of the REMODCM.

References: REMODCM Rev 027-00

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: 43.b.(1) Conditions and limitations in the facility license.

Comments (Question 83):

#### QUESTION 84

Plant is stable at 100% power with no activities in progress and no equipment out of service when the FIRE SYSTEM TROUBLE (AB-19, C-06/7) and the 'A' DIESEL ROOM (Zone 12, C-26) alarms are received.

- Approximately 1 minute later the following conditions are confirmed:
- U3 Electric Fire Pump is stopped in standby
- U3 Diesel Fire Pump is stopped in standby
- U2 Electric Fire Pump is stopped in standby
- Jockey Fire Pump is running
- Panel C-26H ('A' DG local fire panel) alarm light lit
- Panel C-26H one heat detector light lit
- Panel C-26H audible alarm horn actuated
- Other Panel C-26H indications are normal
- No other control room alarms have actuated
- No PEO has entered the DG room.

Which ONE of the following statements describes the situation and the procedure required to address the event?

- A. Fire in the diesel generator room; go to AOP-2559, "Fire".
- B. Melted fusible link in deluge system, go to PI-AA-200, "Corrective Actions".
- C. Failure of the heat detector, go to ARP-2590I, "C-26 Alarm Response".
- D. Loss of ventilation, go to OP-2315E, "Diesel Generator Ventilation System".



K&A Rating: 067 Plant Fire On-site 2.2.37 (4.6)

K&A Statement: 2.2.37 Ability to determine operability and/or availability of safety related equipment.

Key Answer: C

Justification (Question 84):

- A. **Incorrect:** Fire would open deluge valve, resulting in additional alarms.
- B. **Incorrect:** Melted fusible link would initiate spray flow, actuating deluge valve opening alarm.  
VALID DISTRACTOR: Plausible that alarm caused by melted link.
- C. **CORRECT:** YES Actual fire would melt fusible link, causing supervisory air low pressure alarm.
- D. **Incorrect:** Temperature Switch TS-8435 provides a Diesel Gen 12U Room Temp Hi/Lo alarm on C-08 at 110°F. VALID DISTRACTOR: Plausible that room temperature increase has caused the alarm

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and selection of appropriate procedures during an abnormal event. The question cannot be answered by solely knowing systems knowledge, or LCO information listed in the LCO statement.

References: Fire TRM

Student Ref: NONE

Learning Objective: NA

Question Source: MS2 Exam Bank #5000048

Question History: 2005 MS2 NRC Exam Q91

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

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

Comments (Question 84):

## QUESTION 85

After entering EOP 2540 with a SGTR and a concurrent Loss Of All Feedwater, the operators have the following conditions:

- Reactor Power is  $2 \times 10^{-5} \%$  and lowering
- 24C and 24D both failed to transfer to the RSST
- "A" Emergency Diesel Generator started, but the breaker failed to close
- 24D is being powered by the "B" Emergency Diesel Generator
- #1 S/G level 280" and lowering
- #2 S/G level 250" and lowering
- #1 S/G pressure 890 psia and stable
- #2 S/G pressure 890 psia and stable
- No Main or Auxiliary Feedwater pumps are available
- Condensate pump discharge pressure 550 psig
- Containment Radiation Monitors not in alarm, not going up
- Secondary Radiation Monitors in alarm
- CTMT pressure = 0 psig and stable
- Reactor vessel level = 80%
- RCS pressure is 1500 psia and lowering
- RCS Th is 531°F
- All charging pumps are operating
- HPSI injection flow is ~~~250 gpm and rising~~ 0 gpm and stable
- RWST level ~~= 95% and lowering~~ is stable
- One Shutdown CEA is stuck out
- All plant components and systems responded as designed

Given these conditions, what Success Path in EOP 2540 must be addressed FIRST?

- A. EOP 2540A, Reactivity Control; Success Path: RC-3: Boration Using SI
- B. EOP 2540D, Heat Removal; Success Path: HR-3: Once-Through-Cooling
- C. EOP 2540E, Containment Isolation; Success Path: CI-1: Automatic/Manual Isolation
- D. EOP 2540B, Vital Auxiliaries; Success Path: MVA-AC-2: Emergency Diesel Generators

K&A Rating: EA2.1 (4.4)

K&A Statement: Ability to determine and/or interpret the following as they apply to FUNCTIONAL RECOVERY: Facility conditions and selection of appropriate procedures during abnormal and emergency operations CE/E09 Functional Recovery

Key Answer: B

Justification (Question 85):

- A. **Incorrect:** Reactivity Safety Function IS being met with NI power < 10E-4% and going down.  
**Plausible:** Reactivity Control is the first Safety Function that is evaluated and it is being met with a 3rd (highest) stated Success Path. This would imply it is the first one to be addressed.
- B. **CORRECT:** HR-3 is not being met because no main or aux feed, condensate flow not yet established and RCS pressure > 1200 psia.
- C. **Incorrect:** CTMT Isolation Safety Function is NOT being met due to the secondary rad. Levels. However, this is not as high a priority as HR  
**Plausible:** Because CI is not being met.
- D. **Incorrect:** Vital Auxiliaries Safety Function IS being met because only ONE facility of AC power (combined with the like facility of DC power) is required to meet this SF.  
**Plausible:** It is logical to assume Vital AC power should be attended to first because it would probably be a major contributor to the lack of feed water. It also increases the vulnerability of meeting the other Safety Functions.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: EOP 2540

Student Ref: NONE

Learning Objective:

Question Source: Millstone Bank 53988 Rev 10

Question History: Bank

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

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

Comments (Question 85):

QUESTION 86

The unit is operating at 50% power.

The following conditions exist:

- RCP A bleedoff flow 3 gpm and stable
- RCP A bleedoff temperature 135°F and stable
- RCP A vapor seal pressure 24 psig and stable
  
- RCP B bleedoff flow 0.5 gpm and stable
- RCP B bleedoff temperature 180°F and stable
- RCP B vapor seal pressure 25 psig and stable
  
- RCP seal header pressure 23 psig and stable

Which ONE of the following identifies a required action and the procedure directing that action?

- A. Adjust seal header pressure on C-02 per RCP A BLEED-OFF FLOW HI ARP.
- B. Commence a controlled plant shutdown per RCP A BLEED-OFF FLOW HI ARP.
- C. Trip the reactor and stop the **B** RCP per RCP B BLEED-OFF FLOW LO ARP.
- D. Commence a controlled plant shutdown per RCP B BLEED-OFF TEMP HI ARP.

K&A Rating: 003 Reactor Coolant Pump (RCPS) (3.9)

K&A Statement: A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:  
Problems with RCP seals, especially rates of seal leak-off

Key Answer: **A**

Justification (Question 86):

- A. **CORRECT:** Increased bleedoff could be caused by low leakoff backpressure. Backpressure is given as 23 psig. The ARP directs action to control backpressure between 40 psig and 75 psig.
- B. **Incorrect:** The high bleedoff flow ARP does not direct a controlled shutdown.  
**Plausible:** The applicant may make a reasonable assumption that the ARP directs a controlled shutdown.
- C. **Incorrect:** The low bleedoff flow ARP (2590B-101) directs tripping the reactor and stopping the RCP if the pump's CBO excess flow check valve has closed due to imminent seal failure. However, the seal flow and the vapor seal pressure indicate the excess flow check valve is open.  
**Plausible:** The ARP does contain conditional trip guidance and the bleedoff flow is low, below the ARP alarm setpoint of 0.75 gpm.
- D. **Incorrect:** A controlled shutdown is not required unless temperature is rising and approaching 195°F.  
**Plausible:** The temperature is elevated to the alarm setpoint and the ARP does direct a controlled shutdown under specific conditions, not met in this question.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting the appropriate procedure to mitigate plant conditions and place the plant in a safe condition.

References: ARP-2590B-100, 101, 102

Student Ref: NONE

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

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

Comments (Question 86):

## QUESTION 87

Given the following conditions:

- The plant is recovering from a reactor trip that occurred 5 days ago
- Burnup is 1000 MWD/MTU
- Boron concentration 2 hours ago, prior to commencing the startup was 1300 ppm

A manual VCT makeup has just been completed. When the makeup was completed, unknown to the crew, PMW flow continued at 100 gpm. CEAs have since been withdrawn to a position that is at 0.07%  $\Delta p$  less than the critical rod position on the ECP when criticality is declared at a SUR of 0.3 dpm with no rod motion.

Approximately how much time elapsed from the onset of dilution until criticality AND what action is required per OP 2202, Reactor Startup ICCE?

- A. 4 minutes. ICCE termination criteria are NOT met. Send criticality data to RE.
- B. 8 minutes. ICCE termination criteria are NOT met. Send criticality data to RE.
- C. 4 minutes. ICCE termination criteria ARE met. Trip the reactor.
- D. 8 minutes. ICCE termination criteria ARE met. Trip the reactor.

Q #87 Deleted  
and

K&A Rating: 004A2.10 (4.2)

K&A Statement: Ability to predict the impact of the following malf and use procedures to mitigate:  
Inadvertent boration/dilution.

Key Answer: **A**

Justification (Question 87):

A. **CORRECT:**

(1) The boron concentration at criticality is equal to sample concentration (1300 ppm) plus the product of the given reactivity offset (-0.07%  $\Delta\rho$ ) and the inverse boron worth (118.7 ppm/% $\Delta\rho$ ). [ Crit Boron (**1291.691**) = Sample Boron (1300) + (negative 0.07% $\Delta\rho$  \* IBW 118.7 ppm/% $\Delta\rho$ ) ].

(2) The quantity of water to effect the concentration change is given by OP 2208 formula, VOL =  $62,490 * \ln(C_i/C_f)$ . [  $62,490 * \ln(1300/1291.691) =$ **401 gallons** ].

(3) The time to effect the necessary concentration change is given by dividing the volume of water by the volumetric flow rate of water addition. [ 401 gals / 100 gals/min = **4 min** ].

None of the actions in OP 2202 Attachment 5 Conditional Actions are required. Criticality occurred well within the + 0.5%  $\Delta\rho$  band. This is not a direct lookup. The calculations require use of multiple references and the calculation methodology is not provided in the references. While an inadvertent dilution during startup is a serious reactivity management concern, it does not meet criteria for ICCE termination as listed in OP 2202 Attachment 8.

B. **Incorrect:** Wrong time.

**Plausible:** Applicant may make a calculation error.

C. **Incorrect:** Wrong action. The action listed is not consistent with that associated with meeting ICCE termination criteria.

**Plausible:** Applicant may think ICCE criteria are met and that the given action is required.

D. **Incorrect:** Wrong time, wrong action. The action listed is not consistent with that associated with meeting ICCE termination criteria.

**Plausible:** Applicant may make a calculation error. Applicant may think ICCE criteria are met and that the given action is required.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: OP2202 Rev 022-01 Att 5  
OP2208 Rev 015-01Att 4  
RE Curve Book Cycle 23 Rev 000

Student Ref: OP2208 Attachment 4  
RE Curve Book RE-F-02 (Pg 41 of 42 only)

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis:

X

10CFR55: 43(b)(6) Procedures and limitations involved in initial core loading, alterations in core configuration, control rod programming, and determination of various internal and external effects on core reactivity

Comments (Question 87):



## QUESTION 88

An automatic reactor trip and SIAS have occurred while operating at power.

30 minutes into the event, the following conditions exist:

- SIAS, CIAS, EBFAS, MSI and CSAS have actuated
- The crew is performing EOP-2532 "Loss of Coolant Accident"
- CET temp 320°F and lowering slowly
- Pressurizer pressure 28 psia and steady
- Containment pressure 9 psig and lowering slowly
- RWST level is 8% and lowering
- SRAS Manual Initiation pushbuttons on C01 have been depressed
- 2 LPSI , 2 HPSI and 2 Charging Pumps are running

Which ONE of the following is the NEXT correct action per EOP-2532?

- A. Manually stop both Containment Spray pumps.
- B. Manually close both RWST Header Isolation Valves (CS-13.1A and B).
- C. Manually stop both Low Pressure Safety Injection pumps.
- D. Manually close 3 LPSI Injection Valves (SI-635 and any 2 of 3 others).

K&A Statement: Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure of automatic recirculation transfer.

Key Answer: C

Justification (Question 88):

- A. **Incorrect:** Even though RWST level is low and containment spray is running at this time, there is no procedural direction to stop the spray pumps at this time.
- B. **Incorrect:** The correct action is to stop LPSI pumps  
**Plausible:** This contingency action is directed per Step 48 if the LPSI pumps cannot be stopped.
- C. **CORRECT:** Must determine that SRAS should have actuated and has not which puts you at Step 48 of EOP-2532. Step 48 directs the action in this answer.
- D. **Incorrect:** The correct action is to stop LPSI pumps  
**Plausible:** This contingency action is directed per Step 48 if the LPSI pumps cannot be stopped

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: EOP-2532

Student Ref: None

Learning Objective: NA

Question Source: MS2 Bank # 5000052 (Q#95)

Question History: 2005 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

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

Comments (Question 88):

## QUESTION 89

The plant is at 100% power and stable when the "PZR Pressure Selected Channel Deviation HI/LO" alarm is received.

The following plant conditions are noted:

- Pressurizer pressure is at 2225 psia and slowly lowering
- Both Pressurizer pressure controllers are in AUTO mode with setpoints at 2250 psia
- Both Pressurizer pressure controllers indicate 0% output
- Facility 1 Proportional Heater amp meter averages 0 amps
- Facility 2 Proportional Heater amp meter averages 170 amps
- All other control room indications are unchanged from pre-event values

Which ONE of the following describes an additional required action and the administrative impact of the situation?

- A. Energize Pressurizer Backup Heaters as necessary to maintain pressure at 2250 psia. Pressurizer pressure is below the value assumed in the FSAR, such that if the design basis accident were to happen now, fuel centerline melt would occur.
- B. Raise the output of the in-service pressure controller to maximize Proportional Heater output and maintain pressure at 2250 psia. Pressurizer pressure must remain above 2225 psia to ensure the specified limits for the accident and transient analysis remain valid.
- C. Energize Pressurizer Backup Heaters as necessary to maintain pressure at 2250 psia. Pressurizer heater output is below the administrative limit needed to enhance the capability to control Pressurizer pressure for natural circulation.
- D. Place the in-service pressure controller in manual and energize all available Pressurizer Backup Heaters to force Pressurizer Sprays. The loss of automatic Pressurizer pressure control would result in exceeding an LSSS setpoint if power were to drop 10% or  $\geq 5\%$  per minute.

K&A Rating: 010 Pressurizer Pressure Control (PZR PCS) (4.2)

K&A Statement: 2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

Key Answer: C

Justification (Question 89):

- A. **Incorrect:** 2225 psia is the limit for the DNB TS, however fuel centerline melt is not based on the DNBR limit.
- B. **Incorrect:** Proportional heaters are already putting out max output. Raising the output will not give desired result.
- C. **CORRECT:** Facility 1 proportional heaters are lost, which equates to half of the required TS heaters. The bases stated in the spec can no longer be met. .
- D. **Incorrect:** Auto pressurizer pressure control has not been lost. Heaters should not be taken to manual.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and making a decision based on knowledge of the Technical Specification bases.

References: TS Bases 3.4.4, ARP 2590B-212 Rev 000-00

Student Ref: NONE

Learning Objective:

Question Source: Millstone Bank Q 8000062

Question History: Millstone 2009 NRC Exam Q88

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 89):

QUESTION 90

The unit is in MODE 1.

The Manual Bypass Switch on Static Switch "VS-1" is placed in the "INV" position

Which ONE of the following describes the operability of INV-5 and VA-10 and the required Technical Specification Limiting Condition(s) for Operation to enter, if any?

- A. INV-5 AND VA-10 are BOTH OPERABLE. No LCO action statement is required.
- B. INV-5 AND VA-10 are INOPERABLE. Enter the LCO for INV-5 (LCO 3.8.2.1A) and the LCO for AC electrical busses (LCO 3.8.2.1).
- C. INV 5 is OPERABLE, VA-10 is INOPERABLE. Enter the LCO for AC electrical busses (T.S. 3.8.2.1).
- D. INV 5 is INOPERABLE, VA-10 is OPERABLE. Enter the LCO for INV-5 and INV-6 (T.S. 3.8.2.1A).

K&A Rating: 062 AC Electrical Distribution 2.2.40 (4.7)

K&A Statement: 2.2.40 Ability to apply Technical Specifications for a system.

Key Answer: **D**

Justification (Question 90):

- A. **Incorrect:** INV-5 is inoperable.
- B. **Incorrect:** VA-10 is operable.
- C. **Incorrect:** INV-5 is inoperable and VA-10 is inoperable.
- D. **CORRECT:** Static Switch VS1 is designed, when in AUTO, to automatically swap power sources to the VA panel as needed. In any other position the static switch has no automatic function. In the INV position, the VA panel is connected directly to its normal source, 2-INV-1 Inverter and will not automatically transfer to the backup 2-INV-5 power source. The capability for automatic swapover is associated with the LCO for the backup power source and not for the VA panel. The TS surveillance requirement for INV-5 and INV-6 requires that VA-10 and VA-20 automatically transfer to their alternate sources. Placing the Manual Bypass Switch on VS1 in the "INV" position locks out the transfer capability of the static switch, making INV 5 inoperable. VA-10 is operable when the Panel is energized from a source other than the diesel generator.

SRO Only Justification: This question is SRO only as it requires applying technical specifications.

References: TS, OP2345B Rev 017-08,  
LP LVD-00.C.R6

Student ref: TS 3.8.2.1  
TS 3.8.2.1A

Learning Objective: MB-04877

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 90):

## QUESTION 91

Given the following conditions:

- Unit tripped from 100% power on Thermal Margin/Low Pressure
- SIAS/CIAS/EBFAS and CSAS have actuated
- Bus 24D is deenergized due to a fault on the bus
- Bus 24E is aligned to Bus 24D
- Containment pressure is 32 psig and rising
- The Unit Supervisor has implemented EOP 2532, Loss of Coolant Accident
- All RCPs have been secured
- RVLMS readings are 43% and lowering
- CET temperature is 460°F and stable
- RCS Pressure is 470 psia and stable
- Pressurizer Level is 0%
- The BOP operator has initiated a cooldown
- Total SI flow is 80 gpm.

30 minutes later:

- Reactor power is slowly rising on all 4 Wide Range Monitor safety channels
- CET temperature is 560°F and rising
- RCS pressure is 465 psia and slowly lowering
- Reactor Vessel Level indication is 0%
- Total SI flow is 120 gpm

Which ONE of the following is the correct diagnosis and mitigation strategy for the conditions above?

- A. WRNIs are responding to boron stratification; Perform EOP 2541 Appendix 18, Simultaneous Hot and Cold Leg Injection.
- B. A void has formed in the Reactor Vessel; Perform void elimination actions in EOP 2541 Appendix 24, Void Elimination.
- C. Safety injection flow is not adequate; Restore SI flow within requirements of EOP 2541 Appendix 2, Figures.
- D. Shutdown margin is not met; Perform EOP 2541 Appendix 3, Emergency Boration.

K&A Rating: 015 Nuclear Instrumentation (NIS) (3.8)

K&A Statement: A2.05 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: Core void formation

Key Answer: C

Justification (Question 91):

- A. **Incorrect:** Reactor power rise is a consequence of core voiding and does NOT indicate an actual change in core power levels. Hot leg injection is not required.  
**Plausible:** Applicant may think the WRNI response is associated with stratification in core due to cold leg break.
- B. **Incorrect:** These are indications of core voiding; however, Appendix 24 would NOT eliminate the void. The actions of Appendix 24 require RCS pressure to be raised and lowered. Given the conditions in the RCS, the PZR heaters are uncovered (can't be energized) and Auxiliary Spray would be ineffective.  
**Plausible:** Applicant may believe that the void may be eliminated by the use of Appendix 24, Void Elimination; however, there is no way to control Pressurizer pressure.
- C. **CORRECT:** Safety injection flow is NOT adequate. The only way to restore adequate safety injection is to energize Bus 24E from Unit 3 or swap Bus 24E to Bus 24C, then start the "B" HPSI Pump.
- D. **Incorrect:** Reactor power rise is a consequence of core voiding and does NOT indicate that Shutdown Margin is not met  
**Plausible:** Applicant may believe that shutdown margin has deteriorated because of the LOCA and rise in WRNI power level.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigation strategy of a procedure.

References: EOP 2532 Rev 030-00, ICC-00-C.r2

Student Ref: NONE

Learning Objective: MB 05940

Question Source: Palo Verde Written Exam 2012 Q44063

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

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



Comments (Question 91): Q matches K/A because examinee must predict and evaluate rising NIS readings and other given conditions to recognize they are caused by core voiding and then determine this condition must be corrected by increasing SI flow.

## QUESTION 92

Given the following conditions:

- The plant is in MODE 6
- Full core offload is in progress
- The upender is in VERTICAL position in the RFP
- An irradiated fuel assembly is in the refuel machine
- The refuel machine is near the upender
- The following alarms have been received at C-06/7:
  - SFP CLG PUMP SUCTION FLOW LO
  - SFP LEVEL LO
- SFP level is lowering at approximately 1 inch per minute

The Refueling SRO, in accordance with AOP-2578, Loss of Refuel Pool and Spent Fuel Pool Level, will direct which ONE of the following?

- A. Lower the fuel assembly into an open core location, ensure the upender is VERTICAL and empty, then close the Transfer Tube Isolation Valve.
- B. Lower the fuel assembly into the south saddle and place the upender in HORIZONTAL. Do NOT close the Transfer Tube Isolation Valve.
- C. Place the fuel assembly in the upender and place upender in HORIZONTAL. Do NOT close the Transfer Tube Isolation Valve.
- D. Place the fuel assembly in the upender and transfer fuel to the spent fuel pool, then close the Transfer Tube Isolation Valve.

K&A Rating: 033 A2.03

K&A Statement: Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Abnormal spent fuel pool water level or loss of water level

Key Answer: D

Justification (Question 92):

- A. Incorrect:** Per Step 4.1.11 the fuel assembly will be transferred to the SFP. The Transfer Tube Isolation Valve would not be closed with the upender in containment.  
**Plausible:** The core is listed as a safe location in the note preceding Step 4.1.11. The note does not list the upender as a possible transfer location. Applicant may select this answer if he/she knows the guidance in the note regarding Refueling SRO tasks but does not know the procedural guidance that follows the note.
- B. Incorrect:** Closing the transfer tube isolation valve is a priority to limit the loss of level to the affected pool. Step 4.1.11 directs transfer to the SFP.  
**Plausible:** Applicant may reason that leaving the transfer tube gate open is preferable because the rate of SFP level drop will significantly increase with the gate closed and closing the gate limits capability for maintaining SFP level through use of LPSI injection into the core.
- C. Incorrect:** Leaving the assembly in the upender, even in HORIZONTAL is not a designated safe storage location. Closing the transfer tube isolation valve is a priority to limit the loss of level to the affected pool.  
**Plausible:** Applicant may reason that leaving the transfer tube gate open is preferable because the rate of SFP level drop will significantly increase with the gate closed and closing the gate limits capability for maintaining SFP level through use of LPSI injection into the core.
- D. CORRECT:** AOP-2578 Step 4.1.11 directs placing fuel in upender, positioning to HORIZONTAL, transferring to SFP and then closing Transfer Tube Isolation Valve.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions (rate of RFP level decrease, location of leak in SFP) and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question relates to duties of the Refueling SRO and cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: AOP 2578 Rev 006-04

Student Ref: NONE

Learning Objective:

Question Source: Modified Bank

Question History: Waterford 2012 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:

Comprehensive/Analysis:

X

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases  
43(b)(7) Fuel handling facilities and procedures

Comments (Question 92):

## QUESTION 93

Which ONE of the following correctly describes

- (1) a refueling equipment design feature or interlock and
  - (2) the Tech Spec LCO or TRM Requirement that is met by this feature/interlock.
- 
- A. (1) Control circuit design ensures lifting forces will not exceed refuel machine design maximum load capacity.  
(2) TRM 3.9.6, Containment Building Refuel Machine
  - B. (1) An interlock on the SFP Platform Crane prevents manually placing a new fuel assembly in a Region C location.  
(2) Tech Spec 3.9.18, Spent Fuel Pool - Storage
  - C. (1) An interlock prevents the cask crane monorail hoist from colliding with the SFP Platform Crane.  
(2) TRM 3.9.7, Spent Fuel Pool Cask Crane Travel Limits
  - D. (1) Control circuit design ensures the refuel machine will not operate unless the bridge-mounted source range speaker is energized.  
(2) Tech Spec 3.9.2, Instrumentation

K&A Rating: 034K4.02 (3.3)

K&A Statement: Knowledge of design features and/or interlocks which provide for the following: fuel movement.

Key Answer: **A**

Justification (Question 93):

- A. **CORRECT:** The Programmable Logic Controller (PLC) on the Refuel Machine has several hoist load limits programmed in to prevent overloading the machine during various conditions. The absolute maximum limit is determined by external hardware is set to prevent exceeding the TRM limit of less than or equal to 3590 lbs in the "fuel plus hoist" region.
- B. **Incorrect:** There are TS restrictions for placing new fuel in Region C and the SFP Platform Crane is programmed to ensure proper placement of fuel bundles in the SFP; however, there are no interlocks to prevent manually placing new fuel in any SFP location.  
**Plausible:** Operators do NOT operate the SFP Platform Crane resulting in unfamiliarity with the crane. Therefore, it would be logical to assume the new crane has an interlock to prevent placing new fuel in an area that Tech Specs would NOT allow.
- C. **Incorrect:** TRM 3.9.7 provides travel limits to prevent fuel damage. There is NO interlock or design feature that prevents the monorail hoist from colliding with the SFP Platform Crane.  
**Plausible:** An examinee may believe that an interlock prevents the collision which could result in fuel damage. Collisions have occurred before (OE).
- D. **Incorrect:** There is a speaker on the Refuel Bridge dedicated to only providing audible indication of Source Range neutron counts. The speaker provides only audible signals and has NO interlocks or design features.  
**Plausible:** Because the operators do not operate the Refuel Machine and the Refuel Machine is relatively new, it's plausible to assume that a dedicated speaker could have an interlock to prevent Refuel Machine operation if the speaker is not energized.

SRO Justification: This is a system question concerning refueling systems, which are SRO only systems. This question requires the SRO applicant to recognize a condition that should be prevented by interlock.

References: REF-04-C.R3, Refueling Equipment

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: 43(b)(7) Fuel handling facilities and procedures

Comments (Question 93):

QUESTION 94

Given:

- Unit 2 has been shutdown to replace a pressurizer PORV
- All CEAs are fully inserted
- RCS Boron concentration is 2100 ppm
- Keff is 0.945
- RCS temperature is 195°F

Which ONE of the following meets (and does NOT exceed) the MINIMUM required shift staffing on Unit 2 in accordance with Tech Spec 6.2.2?

- A. 1 SM, 1 RO, and 1 NLO
- B. 1 SM, 1 US, 1 RO and 1 NLO
- C. 1 SM, 1 US, 2 ROs and 2 NLOs
- D. 1 SM, 1 US, 2 ROs, 1 STA and 2 NLOs

K&A Rating: 2.1.5 (3.9)

K&A Statement: 2.1.5 Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.

Key Answer: **A**

Justification (Question 94):

- A. **CORRECT:** This crew composition meets the requirement of T.S. 6.2.2, Table 6.2-1 for MODE 5, which requires 1 SRO, 1 RO, and 1 NLO.
- B. **Incorrect:** This crew composition exceeds the requirement of T.S. 6.2.2, Table 6.2-1 for MODE 5
- C. **Incorrect:** This crew composition exceeds the requirement of T.S. 6.2.2, Table 6.2-1 for MODE 5.
- D. **Incorrect:** This crew composition exceeds the requirement of T.S. 6.2.2, Table 6.2-1 for MODE 5.

SRO Justification: Requires knowledge of Technical Specifications.

References: TS 6.2.2

Student Ref: NONE

Learning Objective: NA

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: **X**  
Comprehensive/Analysis:

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 94):



## QUESTION 95

A plant startup is in progress with the following conditions:

- "B" Condensate pump is tagged for overhaul.
- Plant startup will continue using the "A" Condensate pump.

Which ONE of the choices below describes an administrative requirement for documenting completion of the following step in OP2203, Plant Startup?

4.4.10 ENSURE the following valves fully open:

- 2-CN-4A, "A' CONDENSATE PUMP DISCHARGE ISOLATION"
- 2-CN-4B, "B' CONDENSATE PUMP DISCHARGE ISOLATION"
- 2-CN-4C, "C' CONDENSATE PUMP DISCHARGE ISOLATION"

- A. The BOP may initial and date the steps not performed as delegated by the SM/US.
- B. The BOP may N/A the steps not performed because the intended actions are not required due to operation of redundant equipment.
- C. The SM/US may initial and date the steps not performed because the intended actions are not required due to operation of redundant equipment.
- D. The SM/US may N/A the steps not performed after the appropriate evaluation and must document the reason in section 5.

K&A Rating: 2.1.23 (4.4)

K&A Statement: Ability to perform specific system and integrated plant procedures during all modes of plant operation.

Key Answer: **D**

Justification (Question 95):

- A. **Incorrect:** The BOP should not sign & date a step not performed unless it is not in 2200 procedure and the step contains bulletized list of choices..  
**Plausible:** The applicant may think the action is permissible.
- B. **Incorrect:** The BOP cannot N/A a step in the 2200 procedure series, only the SM/US can N/A a step in the 2200's.  
**Plausible:** The applicant may think the action is permissible.
- C. **Incorrect:** The SM/US should not initial and date the steps not performed.  
**Plausible:** The applicant may think supervisor signing of steps is required.
- D. **CORRECT:** the SM or US may N/A a step in the OP 2200 series that cannot be performed provided that the step is adequately evaluated for procedural impact and the reason is documented in Section 5 of the procedure.

SRO Only Justification: This question is SRO only as it requires knowledge of procedures required to obtain authority for operating changes in the facility. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: OP-2203

Student Ref: NONE

Learning Objective: MB 00889

Question Source: Bank 78837

Question History: Bank

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: 43(b)(3) Facility licensee procedures required to obtain authority for design and operating changes in the facility

Comments (Question 95):

## QUESTION 96

Given the following conditions:

- Unit is in MODE 3 and performing a plant heat-up in accordance with OP 2201 following a refueling outage
- 3 RCPs are running ("A," "B," and "C")
- RCS temperature is 505°F and slowly rising
- RCS Pressure is 2250 psia and pressure control is in automatic

The crew is making preparations to energize Control Rod Drive Mechanisms (CEDMs) per OP-2201, Plant Heatup, to support I&C testing.

Given the above conditions, select the ONE choice below which identifies (1) the plant condition which, by itself, would allow CEDMs to be energized and (2) the reason.

	(1)	(2)
A.	High Power Trip is operable	The consequences of a CEA withdraw with a subcritical core will stay within acceptable safety analysis levels.
B.	A boron concentration that ensures $K_{eff} < 0.95$	Adequate Shutdown Margin is maintained even if all CEAs are withdrawn from the core.
C.	A boron dilution is NOT in progress	Lowers possibility of two consecutive positive reactivity additions.
D.	Local Power Density Trip is operable	The consequences of a CEA withdraw with a subcritical core will stay within acceptable safety analysis levels.

K&A Rating: Generic, Equipment Control 2.2.1 (4.4)

K&A Statement: 2.2.1 Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.

Key Answer: **B**

Justification (Question 96):

- A. **Incorrect:** Because 4 Reactor Coolant Pumps are not running, the MODE 3 conditions to energize CEDMs are still not met.  
**Plausible:** TS 3.1.3.7 bases provides this as the reason for allowing CEDMs to be energized with 4 RCPs running, PZR pressure >2000 psia, RCS temperature > 500°F and the High Power Trip operable, the plant is within the bounds of the safety analysis for a CEA withdraw accident from subcritical core.
- B. **CORRECT:** TS 3.1.3.7 states that the control rod drive mechanisms shall be de-energized in MODES 3\*, 4, 5 and 6, whenever the RCS boron concentration is less than refueling concentration of Spec 3.9.1. TS 3.9.1 states that refueling boron concentration is > 1720 ppm. The note for MODE 3\* states that the control rod drive mechanisms may be energized for MODE 3 as long as 4 reactor coolant pumps are OPERATING, the reactor coolant system temperature is greater than 500°F, pressurizer pressure is > 2000 psia and the high power trip is OPERABLE. Since only 3 RCPs are running, this note does not apply; however, if RCS Boron concentration is greater than 1720 ppm then CEDMs may be energized. OP 2201 step 4.10.4 which directs that if any of the conditions listed in step 4.10.2 do NOT exist (4 RCPS running, RCS Temp > 500°F, Pressurizer Pressure > 2000 psia and High Power Trip Operable) AND RCS boron concentration is less than refueling boron concentration, VERIFY CEDMS de-energized. From the bases for TS 3.1.3.7, the drive mechanisms may be energized with the boron concentration greater than or equal to the refueling concentration since, under these conditions, adequate SHUTDOWN MARGIN is maintained, even if all CEAs are fully withdrawn from the core.
- C. **Incorrect:** This does not satisfy the Technical Specification requirement for energizing CEDMs in MODE 3.  
**Plausible:** Preventing situations that cause two consecutive positive reactivity additions is a common reactivity management principle.
- D. **Incorrect:** This does not satisfy the Technical Specification requirements for energizing CEDMs in MODE 3.  
**Plausible:** Applicant may confuse the High Power Trip operability requirement with the Local Power Density Trip.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and applying knowledge of Technical Specification bases to analyze TS required actions. The question cannot be answered by solely knowing systems knowledge, or LCO information listed in the LCO statement.

References: OP 2201 Rev 033-03, Student Ref: NONE  
TS 3.1.3.7 03/16/2006 Amend 291 and Bases, LP CED-01-C

Learning Objective: MB-02256

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 96):

# QUESTION 97

The plant is at 100% power when the Unit Supervisor discovers that SP 2611G, "A" RBCCW Pump Tests, was performed 95 days ago. This is a quarterly surveillance (every 92 days). Which ONE of the choices below correctly completes the following statement to describe the operability of the pump?

"A" RBCCW Pump \_\_\_\_\_

- A. may be considered OPERABLE only as long as missed surveillance is performed within the next three months, with a risk evaluation if delayed greater than 24 hours.
- B. may be considered OPERABLE for an additional 25% of the required surveillance time interval provided the surveillance is successfully completed within the additional time.
- C. must be considered NOT OPERABLE if both the missed surveillance and a risk evaluation are NOT performed within 24 hours from the time of discovery.
- D. must be considered NOT OPERABLE from the time of discovery, and will remain NOT OPERABLE until the required surveillance is successfully completed.

K&A Rating: Generic, Equipment Control 2.2.37 (4.6)

K&A Statement: 2.2.37 Ability to determine operability and/or availability of safety related equipment.

Key Answer: **B**

Justification (Question 97):

- A. **Incorrect:** LCO 4.0.3 does not yet require action under the RBCCW LCO because there is still 115-92 = 23 days left to perform the surveillance under the 25% extension allowed by LCO 4.0.2. Furthermore, the risk evaluation within 24 hours is not required.  
**Plausible:** Applicant may confuse the use of LCO 4.0.2 with LCO 4.0.3.
- B. **CORRECT:** In accordance with LCO 4.0.2, a maximum allowable extension not to exceed 25% of the surveillance time interval. 25% of 92 days (quarterly) is 115 days.
- C. **Incorrect:** The surveillance must be performed but 24 hours is not the limit. LCO 4.0.2 allows a maximum allowable extension not to exceed 25% of the surveillance time interval. 25% of 92 days (quarterly) is 115 days.  
**Plausible:** Distractor, LCO 4.0.3 states that if it is discovered that Surveillance was not performed within its specified surveillance interval, then compliance with the requirement to declare the Limiting Condition for Operation not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified surveillance interval, whichever is greater. The applicant may only remember the 24 hour extension.
- D. **Incorrect:** The pump is still operable. LCO 4.0.2 allows a maximum allowable extension not to exceed 25% of the surveillance time interval. 25% of 92 days (quarterly) is 115 days.  
**Plausible:** Applicant may believe that failing to meet the surveillance frequency requirement deems the pump inoperable. This would be the case if the pump failed the surveillance.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and applying knowledge of generic LCO requirements (SR 4.0.2, SR 4.0.3 and SR 4.0.5). The question cannot be answered by solely knowing systems knowledge, or LCO information listed in the LCO statement.

References: TS 10/15/2002 Amend 271 (SR 4.0.2, and 4.0.3)      Student Ref: NONE  
and 07/31/2008 Amend 304 (SR 4.0.5)

Learning Objective: MB 01864

Question Source: Modified Millstone Bank ID 86709

Question History: Original question was a LCO 4.0.3 question. This modification tests LCO 4.0.2 applicability.

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 97):

## QUESTION 98

While operating at 100% power, a Steam Generator Tube Rupture occurred in #1 Steam Generator. The Reactor was manually tripped and all appropriate actions were performed up to isolation of the affected Steam Generator.

Forty minutes has elapsed since the trip. It has been determined that reactor coolant activity levels are significantly above normal levels. The Shift Manager has just upgraded to a General Emergency, Alpha, due to a partially stuck open Atmospheric Dump Valve and the associated high radiation levels. All personnel have evacuated the Auxiliary and Enclosure Buildings. A site evacuation has begun. The control room crew has determined that the #1 Atmospheric Dump Valve must be manually isolated locally; however, the dose rate in the general area is 5 REM per hour.

Based on the present radiological conditions at the #1 ADV and station administrative limits, what is the maximum stay time WITHOUT obtaining any special authorization for an operator with NO exposure for the present year?

- A. 54 minutes
- B. 22 minutes
- C. 5 hours
- D. 2 hours



K&A Rating: Generic, Radiation Control 2.3.4 (3.7)

K&A Statement: 2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions.

Key Answer: **A**

Justification (Question 98):

- A. **CORRECT:**  $4.5 \text{ REM} / 5 \text{ REM/hr} = 54 \text{ minutes}$ . When an Alert or higher classification has been declared, exposures up to a Total Effective Dose Equivalent (TEDE) of 4.5 Rem per year (inclusive of year-to-date exposures) are automatically authorized within the 10 CFR 20 limit of 5 Rem. Emergency exposures are exposures which may be authorized above 10 CFR 20 limits to enable SERO personnel to operate the plant and take actions to mitigate the effect of the emergency to plant systems and the public.
- B. **Incorrect:** Correct answer is based on a 4.5 Rem administrative limit.  
**Plausible:** If the examinee assumes a normal administrative limit of 1900 mr, then  $1900 \text{ mr} / 5 \text{ REM/hr} = 0.38 \text{ hours} \times 60 \text{ minutes/hr} = 22.8 \text{ minutes}$ .
- C. **Incorrect:** Correct answer is based on 4.5 REM administrative limit.  
**Plausible:** If the examinee assumes a limit of 25 REM, then  $25 \text{ REM} / 5 \text{ REM/hr} = 5.0 \text{ hours}$ . 25 REM is authorized for life saving.
- D. **Incorrect:** Correct answer is based on a 4.5 Rem administrative limit.  
**Plausible:** If the examinee assumes a limit of 10 REM, then  $10 \text{ REM} / 5 \text{ REM/hr} = 2.0 \text{ hours}$ .

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and applying knowledge of ODCM requirements and station administrative controls. The question cannot be answered by solely knowing systems knowledge, Technical Specification Safety Limits or LCO information listed in the LCO statement.

References: MP-26-EPI-FAP09 Rev 004 Section 1.4.1

Student Ref: NONE

Learning Objective: MB-02634

Question Source: Millstone Bank ID 83766

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: 43(b)(4) Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions.

Comments (Question 98):

## QUESTION 99

While in EOPs, maintaining the Safety Function is of a higher priority than maintaining Technical Specification (TS) compliance for the following reason:

- A. Technical Specifications are limits intended to ensure that plant configuration at the start of an accident is consistent with Design Basis Accident assumptions. Safety functions ensure that acceptable fuel design limits are not exceeded during implementation of EOPs.
- B. Technical Specifications are limits only during plant operation and are not applicable during an accident. Safety functions ensure that acceptable fuel design limits are not exceeded during implementation of EOPs.
- C. Technical Specifications are limits only during plant operation and are not applicable during an accident. Safety functions prevent core damage or minimize radiation releases to the general public during an accident.
- D. Technical Specifications are limits intended to ensure that plant configuration at the start of an accident is consistent with Design Basis Accident assumptions. Safety functions prevent core damage or minimize radiation releases to the general public.

K&A Rating: Generic, Emergency Procedures, Plan 2.4.22 (4.4)

K&A Statement: 2.4.22 Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.

Key Answer: **D**

Justification (Question 99):

- A. **Incorrect:** GDC 20, Protection System Functions are designed to ensure acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences. The purpose of Safety Functions is to provide a set of conditions or actions needed to prevent core damage or minimize radiation releases to the general public. Depending on the accident sequence and whether or not it is beyond design basis will determine whether or not fuel limits are exceeded. The safety functions do not by themselves ensure fuel limits are maintained.  
**Plausible:** The applicant may know the purpose of Technical Specifications but not understand the purpose of Safety Functions.
- B. **Incorrect:** Technical Specifications do not only apply during plant operation. During an emergency, the crew's attention has to be directed to completing the procedure to mitigate the event, and not be distracted by documenting T/S LCO Action Statements. Documentation of TSAS entered can be reconstructed later from procedures and rough logs.  
**Plausible:** Applicant may believe that Technical Specifications do not apply during an accident.
- C. **Incorrect:** Technical Specifications do not only apply during plant operation. During an emergency, the crew's attention has to be directed to completing the procedure to mitigate the event, and not be distracted by documenting T/S LCO Action Statements. Documentation of TSAS entered can be reconstructed later from procedures and rough logs.  
**Plausible:** Applicant may believe that Technical Specifications do not apply during an accident.
- D. **CORRECT:** This is the basis for prioritizing Safety Functions over Technical Specifications during EOP usage from the definition of Safety Function and Section 1.5 Technical Specifications in OP 2260 EOP User Guide.

SRO Only Justification: This question is SRO only as it requires knowledge of administrative procedures that specify hierarchy, implementation, and/or coordination of plant normal, abnormal, and emergency procedures. The question cannot be answered by solely knowing systems knowledge, Technical Specification Safety Limits or LCO information listed in the LCO statement.

References: OP 2260 Rev 010-00

Student Ref: NONE

Learning Objective: MB-05969

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 99):

QUESTION 100

A Sodium Hypochlorite spill has occurred shortly after midnight in the Unit 2 intake structure. An Alert has been declared and the control room has just initiated action for SERO activation.

Conditions necessitate relaxation of security safeguards for the Unit 2 intake structure, which will require a departure from license conditions, invoking 10CFR50.54(x).

Which ONE of the answer choices correctly identifies the individual(s) in the emergency response positions listed below that has(have) the authority to approve this action?

1. Station Duty Officer (SDO)
2. Manager of Security (MOS)
3. Control Room Director of Station Operations (CR-DSEO)

- A. 1 ONLY
- B. EITHER 1 OR 2
- C. EITHER 2 OR 3
- D. 3 ONLY

K&A Rating: Generic, Emergency Procedures/Plan 2.4.37 (4.1)

K&A Statement: 2.4.37 Knowledge of the lines of authority during implementation of the emergency plan.

Key Answer: **D**

Justification (Question 100):

- A. **Incorrect:** The SDO position is manned by the unaffected unit's Shift Technical Advisor, a position that may be filled by a Unit 3 licensed senior operator, but will not generally be an individual with a senior operator license on Unit 2.  
**Plausible:** This is an ERO position that by title would appear to have significant management authority.
- B. **Incorrect:** The MOS is not a position generally occupied by an individual who is a licensed senior operator on Unit 2.  
**Plausible:** Reasonable that either the SDO or the MOS would hold authority for decision making on station security issues.
- C. **Incorrect:** The MOS is not a position generally occupied by an individual who is a licensed senior operator on Unit 2.  
**Plausible:** Reasonable that the MOS would have authority in his area of responsibility.
- D. **CORRECT:** The CR-DSEO is filled by a licensed senior operator, generally the Shift Manager, on the affected unit. The CR-DSEO has the authority to make the decision.

SRO Only Justification: This question is SRO only as the authority to make the decision resides with a position only filled by a licensed senior operator and only senior operators hold responsible event management positions in the ERO.

References: MP-26-EPI-FAP01 Rev 005-02 (Section 1.4.4.b)

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: 43(b)(1) Conditions and limitations in the facility license.

+

Comments (Question 100):

K&A Rating: 073 Process Radiation Monitoring (PRM) K5.01 (2.5)

K&A Statement: K5.01 Knowledge of the operational implications as they apply to concepts as they apply to the PRM system: Radiation theory, including sources, types, units, and effects

Key Answer: B

Justification (Question 50):

- A. **Incorrect:** N-16 production will drop following reactor shutdown and before the SG is isolated. Isolating the S/G will not affect the reading on the radiation monitor.
- B. **CORRECT:** MS Rad Monitor is used to detect N-16. N-16 is dependent on power level and goes away almost immediately following the reactor trip.
- C. **Incorrect:** N-16 detectors are very sensitive and will detect any leak, the reduction in DP when SG pressure increases by 100 psia is insignificant.
- D. **Incorrect::**Raising level is used for iodine scrubbing and will not affect N-16 production.

References: PRM Lesson Plan, Student Ref: NONE  
OP-2260 Rev 010, Attachment 1, Step 5.f.(Iodine scrubbing)

Learning Objective: MB 00491

Question Source: 2007 Palo Verde NRC Exam Q34

Question History: 2007 Palo Verde NRC Exam Q34

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.5

Comments (Question 50):

## QUESTION 51

Given the following conditions:

- Unit 2 is at 100% when a LOCA occurs.
- EOP 2525 is being implemented.

Which ONE of the following sequences of events would result in reduced Containment Spray Flow (as compared to the same LOCA event without a loss of an MCC)?

- A. Loss of MCC B61, followed 2 minutes later by SIAS and CSAS actuations
- B. Loss of MCC B52, followed 2 minutes later by SIAS and CSAS actuations
- C. SIAS and CSAS actuations, followed 2 minutes later by loss of MCC B51
- D. SIAS and CSAS actuations, followed 2 minutes later by loss of MCC B62



K&A Rating: 026 Containment Spray System (CSS) 026K2.02 (2.7)

K&A Statement: K2.02 Knowledge of bus power supplies to the following: MOVs

Key Answer: **A**

Justification (Question 51):

- A. **CORRECT:** Containment Spray flow is reduced because Containment Spray Isolation valve CS4.1B MOV is powered by B61. This valve fails "AS IS" and the valve is normally closed. The valve will not open on a CSAS.
- B. **Incorrect:** Containment Spray system is not affected by a Loss of B52.
- C. **Incorrect:** Containment Spray Isolation valve CS 4.1A opens on the CSAS. Its MOV will lose power on the Loss of B51 but the valve fails in the AS IS position. There is no reduction in CS flow since CS 4.1A is already open.
- D. **Incorrect:** Containment Spray system is not affected by a Loss of B62.

References: CSS-00-C, OP-2344B

Student Ref: NONE

Learning Objective: MB 02225

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 51):

## QUESTION 52

Technical Specification 3.7.4.1 states "two service water loops shall be operable."

Which ONE of the following conditions of the Service Water (SW) system would NOT meet the LCO?

- A. The "A" SW pump is operating on the "A" SW header and the "C" SW pump is operating on the "B" SW header. The "B" SW pump is shutdown.
- B. The "A" SW header is supplying the "B" RBCCW HX and the "B" SW header is supplying the "C" RBCCW HX.
- C. "A" and "B" SW pumps are running on independent headers, and "C" SW pump is shutdown. "B" SW strainer is powered from MCC B51 and Annunciator A-5 "SERVICE WATER PUMP STRAINER POWER MISMATCH" is in alarm.
- D. "A" and "B" SW pumps are running on the same SW header and "C" SW pump is running on an independent header. Annunciator AA-19 "SW PUMP B SIAS/LNP START MANUALLY BLOCKED" is in alarm.

K&A Rating: 076 Service Water (SWS) 2.2.22 (4.0)

K&A Statement: 2.2.22 Knowledge of limiting conditions for operations and safety limits

Key Answer: **C**

Justification (Question 52):

- A. **Incorrect:** This configuration will have 2 independent headers so it is allowed.
- B. **Incorrect:** This configuration will have 2 independent headers so it is allowed.
- C. **CORRECT:** The "B" SW Pump and the "B" SW Strainer must always be powered by the same ESF emergency power supply train. In this configuration a single failure could cause a failure of both strainers and inop both pumps.
- D. **Incorrect:** The "B" swing pump is running but the alarm means that on a SIAS signal the "B" pump will be blocked from starting, therefore only 2 pumps will start, preventing overload of an EDG.

References: SWS LP, RBCCW LP

Student Ref: NONE

Learning Objective: MB 03265

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 52):

### QUESTION 53

The unit is shutdown in MODE 4 and the following conditions exist:

- A and B RCPs are running
- SDC is in service
- CVCS is in a normal at power flowpath
- RCS temperature is 285°F and steady

Then, Containment Instrument Air Isolation Valve, IA-27.1, fails closed due to an apparent control system malfunction.

Without operator action, which ONE of the following parameters would be expected to LOWER, based on the subsequent loss of instrument air pressure in containment?

- A. Letdown flow
- B. RCS pressure
- C. Pressurizer level
- D. Shutdown cooling flow

K&A Rating: 078 Instrument Air System (IAS) K3.01 (3.1)

K&A Statement: K3.01 Knowledge of the effect that a loss or malfunction of the IAS will have on the following: Containment Air System.

Key Answer: **A**

Justification (Question 53):

- A. **CORRECT:** Letdown Isolation Valve 2-CH-515 will fail closed on loss of containment instrument air. Letdown flow will lower to 0 gpm.
- B. **Incorrect:** RCS temperature is being controlled with SDC. Pressurizer heaters are off. With no sprays and no letdown, pressure will either remain relatively steady or rise due to positive imbalance between charging and letdown.
- C. **Incorrect:** Pressurizer level will rise, not lower with charging and no letdown.
- D. **Incorrect:** Shutdown cooling flow control valves receive control air from outside containment and are therefore unaffected by the failure.

References: AOP 2563 Rev 009-07, Dwg 25203-26017 Shts 1-3      Student Ref: NONE  
OP-2207 Rev 029-04

Learning Objective: MB 02395

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 53):

#### QUESTION 54

The unit is in Hot Standby with Reactor Coolant System average temperature at 532°F and Pressurizer pressure at 2250 psia.

The Instrument Air System has been completely depressurized as the result of a system rupture.

What is the flow path for the Reactor Coolant Pump seal bleed-off? (Assume that no operator action has been taken to realign the seal bleed-off flow path from the normal full power alignment.)

- A. Via 2-CH-507, RCP CNTL BLEED OFF HDR REL ISO, and 2-CH-199, RCP CNTL BLEED OFF HDR REL, to the Primary Drain Tank
- B. Via 2-CH-507, RCP CNTL BLEED OFF HDR REL ISO, and 2-CH-199, RCP CNTL BLEED OFF HDR REL, to the Quench Tank
- C. Via 2-CH-506, RCP CNTL BLEED OFF INSIDE CTMT, and 2-CH-505, RCP CNTL BLEED OFF TO EDST, to the Equipment Drain Sump Tank
- D. Via 2-CH-506, RCP CNTL BLEED OFF INSIDE CTMT, and 2-CH-198, RCP BLEED OFF TO VCT, to the Volume Control Tank

K&A Rating: 078 Instrument Air System (IAS) K3.02 (3.4)

K&A Statement: K3.02 Knowledge of the effect that a loss or malfunction of the IAS will have on the following: Systems having pneumatic valves and controls. .

Key Answer: **A**

Justification (Question 54):

- A. **CORRECT:** Normal flow path is isolated due to valves failing shut on the loss of IA. Therefore flow path is to the Primary Drain Tank via the relief valve.
- B. **Incorrect:** The flow path is not to the quench tank.
- C. **Incorrect:** The flow path is not to the equipment drain sump.
- D. **Incorrect:** The flow path is not to the VCT.

References: P&ID 25203-26017 Sh. 2 and -26024 Sh. 1

Student Ref: NONE

Learning Objective: MB 02395

Question Source: MS2 Bank #53417

Question History: None

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 54):

## QUESTION 55

Select the choice below that describes equipment actuations that are expected to result from depressing BOTH Containment Isolation Actuation Signal pushbuttons on C-01.

- A. STOP: F23 Containment Purge Supply Fan  
CLOSE: 2-CH-089 Regen HX Disch to Letdown HX and 2-RB-402 L/D HX RBCCW TCV
- B. CLOSE: 2-CH-515 Reactor Coolant Letdown Valve  
START: F25A/B Enclosure Building Filtration Fans  
OPEN: 2-EB-52 & 42 Enclosure Bldg Fans 25A & B Disch Dampers  
CLOSE: RCP Controlled Bleed Off Isolation Valves, 2-CH-505, 2-CH-506 and 2-CH-198.
- C. CLOSE: 2-CH-515 Letdown Isolation, 2-CH-501 VCT Outlet Valve  
START: Boric Acid Pumps P19A and P19B  
CLOSE: 2-CH-089 Regen HX Disch to Letdown HX and 2-RB-402 L/D HX RBCCW TCV
- D. CLOSE: 2-MS-64A/B MSIVs 1&2 and 2-MS-65A/B MSIV Bypasses 1&2  
CLOSE: 2-FW-42A/B SG 1&2 Feedwater Block Valves



K&A Rating: 103 Containment (3.9, 4.2)

K&A Statement: A3.01 Ability to monitor automatic operation of the containment system, including: Containment isolation

Key Answer: **A**

Justification (Question 55):

A. **CORRECT:** Manual activation of CIAS from the control room causes these equipment actuations.

B. **Incorrect:** Manual actuation of CIAS does not activate SIAS and EBFAS. SIAS closes CH-551 Reactor Coolant Letdown valve, EBFAS starts F25A/B Enclosure Building Filtration Fans and opens 2-EB-42. CIAS does close RCP Controlled Bleed Off Isolation Valves, 2-CH-505, 2-CH-506 and 2-CH-198.

**Plausible:** Because automatic actuation of SIAS causes a EBFAS and CIAS, applicant may believe that manual actuation of CIAS will cause a SIAS and EBFAS.

C. **Incorrect:** SIAS closes CH-515 Reactor Coolant Letdown, CH-501 VCT Outlet Valve and starts Boric Acid Pumps P19A and P19B. CIAS closes 2-CH-089 Regenerative Heat Exchanger Discharge to Letdown HX and 2-RB-402 Letdown Heat Exchanger RBCCW TCV.

**Plausible:** Applicant may believe that manual initiation of CIAS also initiates SIAS because automatic initiation of SIAS initiates CIAS.

D. **Incorrect:** All of these components are activated by a MSI.

**Plausible:** MSI and CIAS have the same Containment Pressure setpoint of 4.42 psig. Applicant may believe that CIAS also isolates these valves because they allow steam to exit containment.

References: ESA-01-C.R3C6

Student Ref: None

Learning Objective: MB-02476

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 55):

#### QUESTION 56

The plant is at 25% power and all systems are aligned normally. RCS Tavg and pressurizer level are both on program with pressurizer level at 44%.

The RCS Loop 2 Thot control RTD signal from TE-121X, fails to 520°F.

Which ONE of the following describes an effect of this failure?

- A. ADVs are prevented from opening on a plant trip.
- B. Letdown flow will increase to maximum limit.
- C. Proportional heaters will go to maximum output.
- D. Backup heater breakers will immediately trip.

K&A Rating: 011 Pressurizer Level Control (PZR LCS) (2.9, 3.3)

K&A Statement: K6.03 Knowledge of the effect of a loss or malfunction on the following will have on the PZR LCS: Relationship between PZR level and PZR heater control circuit.

Key Answer: C

Justification (Question 56):

- A. **Incorrect:** The ADVs are not prevented from opening on a trip. If SG pressure increases sufficiently, they will still modulate open on plant trip. The pressure controls for the ADVs are not affected by the Thot instrument failure.  
**Plausible:** Rx Reg uses Tavg to enable the Quick Open solenoids for all six dump/bypass valves. The solenoids are enabled as long as Tavg is above 554°F. The applicant may believe that the ADVs would be prevented from opening on a Rx trip because the solenoids are disabled. However, if SG pressure rises sufficiently on the trip, the ADVs will open.
- B. **Incorrect:** Pressurizer level control system causes letdown flow to go to maximum when pressurizer level is 9% above pressurizer level setpoint. The Thot failure results in a Tavg of ~535°F, which changes pressurizer level setpoint from ~44% prior to the failure to the minimum capped value of 40%. With indicated level 4% greater than calculated setpoint, letdown will rise but will not be at maximum.  
**Plausible:** Applicant may guess that the level deviation is sufficient to increase letdown to maximum.
- C. **CORRECT:** The proportional heaters are turned on maximum output on a high pressurizer level deviation signal +3.6%. At 25% power, Tc is normally 536.25°F and Th is 548°F. Tavg with this failure would be  $(520^{\circ}\text{F} + 548^{\circ}\text{F} + 536.25^{\circ}\text{F} + 536.25^{\circ}\text{F}) / 4 = \sim 535^{\circ}\text{F}$ . The pressurizer level setpoint is capped on the low end at 40% for Tavg < 538°F. Therefore the failure will reduce the level setpoint to 40%. Prior to the failure, at 25% power, the pressurizer level setpoint was ~44%, greater than the +3.6% level deviation necessary to fully energize the proportional heaters.
- D. **Incorrect:** Backup heaters are not affected by this failure.  
**Plausible:** Applicant may believe that this failure causes pressurizer level to drop to 20%, which would cause backup heater breakers to open.

References: OP2204 Rev 025-06, RRS-01-C.R4, Student Ref: None  
MSS-00-C.R7c1

Learning Objective: MB-02985

Question Source: Modified Bank ID #53575

Question History:

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 56):

#### QUESTION 57

A plant down power is in progress with present power level at ~12% and dropping slowly. Three of the four RPS Linear Power Range bistables have been reset (LEDs have gone out).

However, the Channel "D" power range bistable will NOT reset (the LED remains lit and is not blinking).

I&C investigation reveals the RPS Channel "D" Level 1 bistable is failed in the "armed" state, but all other components of Channel "D" are operating normally and are expected to continue functioning as designed.

Which ONE of the following describes the effect of the Channel "D" RPS Level 1 bistable failure?

- A. The Channel "D" trip signal to the 15G-8T-2 and 9T-2 is blocked.
- B. One of the four CEDS Bus Undervoltage Relays is failed or tripped.
- C. Tripping the Main Turbine for the plant shutdown will trip the reactor.
- D. The Local Power Density trip on RPS Channel "D" is still armed.

K&A Rating: 015 Nuclear Instrumentation (NIS) K6.04 (3.1)

K&A Statement: K6.04 04 Knowledge of the effect of a loss or malfunction on the following will have on the NIS: Bistables and logic circuits.

Key Answer: D

Justification (Question 57):

- A. **Incorrect:** The RPS channels sense closure the main turbine "control" valves, NOT the stop valves. It is a failure of the "stop" valve close signal that would prevent the 8T & 9T from getting a trip signal.
- B. **Incorrect:** CEDS undervoltage relays have no direct input to RPS. When RPS trips the reactor, the CEDS UV relays deenergize and send a signal to the turbine control system to trip the turbine.
- C. **Incorrect:** RPS channel "D" will process the turbine trip and trigger. However, because of the 2/4 logic, the reactor will NOT trip.
- D. **CORRECT:** Level 1 Bistables will "reset" below 15% NI power as sensed by the Linear channels to bypass the turbine trip and LDP trip for that channel of RPS. Therefore, they are still armed for this channel.

References:

Student Ref: NONE

Learning Objective: NA

Question Source: MS2 Bank #8064354

Question History: 2009 MS2 NRC Exam (Q#58)

Cognitive Level: Memory/Fundamental Knowledge:  
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 57):

QUESTION 58

The Enclosure Building Filtration System (EBFS) charcoal filters are designed to remove \_\_\_\_\_ from the enclosure building atmosphere.

- A. Iodine
- B. Chlorine
- C. Particulate
- D. Xenon

K&A Rating: 027 Containment Iodine Removal (CIRS) K5.01 (3.1)

K&A Statement: K5.01 Knowledge of the operational implications of the following concepts as they apply to the CIRS: K5.01 Purpose of charcoal filters

Key Answer: **A**

Justification (Question 58):

- A. **CORRECT:** Per the design basis the charcoal filters can remove 90% of the Iodine released.
- B. **Incorrect:** Charcoal can filter Chlorine, however this is not the concern that the charcoal filters are designed to remove.
- C. **Incorrect:** The pre filters and HEPA filters are designed to remove the particulates.
- D. **Incorrect:** Xenon is a fission product, but is not the major isotope concerned with off site dose rates.

References: Containment Lesson Plan

Student Ref: NONE

Learning Objective: NA

Question Source: Fort Calhoun 2014 Exam Q59

Question History: Fort Calhoun 2014 Exam Q59

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 58):

QUESTION 59

Which ONE of the following CEDS interlocks or design features will be affected by the loss of the Plant Process Computer?

- A. Group Deviation Backup
- B. Upper Electrical Limit
- C. Sequential Permissive
- D. CEA Motion Inhibit



K&A Rating: 014 Rod Position Indication K4.06 (3.4)

K&A Statement: K4.06 Knowledge of RPS design features and/or interlocks which provide for the following: individual and group misalignment

Key Answer: C

Justification (Question 59):

- A. **Incorrect:** Although the PPC generates two different Group Deviation alarms, the CEDS interlock on Group Deviation is generated by CEAPDS (RPIS). Therefore, if the PPC is lost, the alarms are affected but the INTERLOCK is not.
- B. **Incorrect:** The Upper Electrical Limit is driven by a separate set of reed switches that also feed the core mimic, NOT the PPC. The Upper Core Stop (sometimes confused with the UEL) is the CEDS interlock that is controlled by the PPC.
- C. **CORRECT:** The Sequential Permissive is generated by the PPC to allow withdrawal of the next group of CEAs when its preceding group withdraws above its Upper Sequential Permissive. Without the PPC, this signal is unavailable and CEA groups must be withdrawn in individual mode only.
- D. **Incorrect:** The CMI is a function of CEAPDS

References: CED-01-C, Rev. 4, Control Element Drive System; Student Ref: NONE  
Table 5 - Interlocks and Alarms, [or Table 6 - Steps vs  
Functions table (end of the document)

Learning Objective:

Question Source: Bank

Question History: 2006 Millstone NRC Exam Q#58

Cognitive Level: Memory/Fundamental Knowledge: X  
Comprehensive/Analysis:

10CFR55: CFR 41.5

Comments (Question 59):