Final Submittal

(Blue Paper)

WATTS BAR 2008-301

Written Exam Administered 06/13/2008

COMBINED RO/SRO WRITTEN EXAM

WITH KAS, ANSWERS, REFERENCES,

Watts Bar Nuclear Plant
NRC Initial License Written Examination - 2008
Master Examination

Please note: The following 81 pages are the Master Examination copy for the RO portion of the examination, including the answer key and distractor analysis data.

WRITTEN QUESTION DATA SHEET

Question Number: 1

K/A: 000007 EK3.01
Reactor Trip - Stabilization - Recovery
Knowledge of the reasons for the following as the(y) apply to a reactor trip: Actions contained in EOP for reactor trip.

Tier:	**1**	**RO Imp: 4.0**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 4.6**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.5/41.10/45.6/45.13

Learning Objective: 3-OT-EOP0000 Objective 9: Discuss the basis for monitoring RCS temp using T-cold when no RCPs are running as directed by ES-0.1.

References: ES-0.1 Rev. 21.

Question:

Given the following plant conditions:

- A reactor trip has occurred.
- Off-Site power is lost.
- All other equipment has functioned as designed.
- The crew is entering ES-0.1, REACTOR TRIP RESPONSE.

Upon entering ES-0.1, Step 3 directs the operators to monitor for RCS temperature trending to 557°F.

Which temperature indication will the operators use and why?

A. Tavg, to ensure adequate RCS heat removal is occurring.

B. Tavg, to check for natural circulation established.

C. Tcold, to ensure adequate RCS heat removal is occurring.

D. Tcold, to check for natural circulation established.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since Tavg is a commonly used indication for many aspects of transients, but in this case, with a loss of offsite power, there is no power to the RCPs, and therefore Tavg is not a reliable indication. Candidate correctly recognizes that the reason for monitoring RCS temperature at 557° F is to ensure adequate heat removal is occurring.
b. Incorrect. Plausible, since Tavg is a commonly used indication for many aspects of transients, but in this case, with a loss of offsite power, there is no power to the RCPs, and therefore Tavg is not a reliable indication. Checking for natural circulation is plausible since this is a goal of the procedure, but only towards the end, and is not the specific reason.
c. CORRECT. Tcold is the correct indication to use, per ES-0.1, and because there are no RCPs in service, Tcold is the most accurate indication.
d. Incorrect. Plausible, since Tcold is the correct indication to use, since there are no RCPs in service. Checking for natural circulation is plausible since this is a goal of the procedure, but only towards the end, and is not the specific reason.

Question Number: 2

K/A: 000009 EK2.03
Knowledge of the interrelations between the small break LOCA and the following: S/Gs.

Tier: 1 **RO Imp:** 3.0 **RO Exam:** Yes **Cognitive Level:** HIGH
Group: 1 **SRO Imp:** 3.3 **SRO Exam:** Yes **Source:** DC COOK 2006, SIG MOD

Applicable 10CFR55 Section: 41.7/45.7
Learning Objective: 3-OT-EOP0001 Objective 12: Discuss the purpose of ES-1.2 Post LOCA Cooldown and Depressurization.

References: ES-1.2, Rev. 14.

Question:

Given the following plant conditions:

- A 200 gpm RCS leak is in progress.
- Containment pressure is stable at 3 psig.

For these plant conditions, what is the MINIMUM S/G water level required in at least one S/G and why?

A. 29%. Ensures adequate feedwater flow or S/G inventory to ensure a secondary heat sink.

B. 39%. Ensures S/G tubes are covered in order to promote reflux cooling.

C. 29%. Ensures S/G tubes are covered in order to promote reflux cooling.

D. 39%. Ensures adequate feedwater flow or S/G inventory to ensure a secondary heat sink.

DISTRACTOR ANALYSIS

a. Incorrect. Candidate correctly understands that a Small Break LOCA is in progress (based on the given RCS leak rate). Candidate also realizes that for this size LOCA, the S/G is important because it provides the needed heat sink. However, candidate fails to recognize that containment is in the adverse condition, and apply this knowledge to conclude that 29% is too low to ensure an adequate heat sink.
b. Incorrect. Candidate recognizes the correct minimum level for adverse containment, but incorrectly believes that reflux cooling is needed for heat removal.
c. Incorrect. Candidate fails to realize that containment conditions are adverse, and selects the incorrect required S/G level. Also incorrectly believes that reflux cooling is the heat removal mechanism for a LOCA this size.
d. CORRECT. Candidate realizes that a containment pressure of 3.0 psig means adverse conditions (which requires 39% minimum level in the S/G), and that the mechanism for heat removal is via the S/G.

Question Number: 3

K/A: 000015/17 AK1.04
Knowledge of the operational implications of the following concepts as they apply to Reactor Coolant Pump Malfunctions (Loss of RC Flow): Basic steady state thermodynamic relationship between RCS loops and S/Gs resulting from unbalanced RCS flow.

Tier:	**1**	**RO Imp: 3.0**	**RO Exam:Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 4.0**	**SRO Exam:**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.8/41.10/45.3

Learning Objective:

References:

Question:

Given the following:

- Unit 1 at 22% reactor power.
- RCP #1 trips due to a bearing failure.

Which ONE of the following identifies the immediate effect that the RCP trip will have on Loop 1 ΔT AND on SG #1 level?

	Loop 1 Δ T	S/G #1 Level
A.	Decreases	Increases
B.	Increases	Increases
C.	Decreases	Decreases
D.	Increases	Decreases

DISTRACTOR ANALYSIS

a. Incorrect. The response of the delta T stated is correct. SG level response is incorrect. SG level decreases due to the shrink associated with the temperature reduction.
b. Incorrect. Both the delta T and SG level responses are incorrect.
c. CORRECT. Tavg (affected loop) decreases to Tcold due to backflow in the loop caused by the delta P across the reactor vessel. Delta T (affected loop) decreases due to reduction in steam generation in the loop. Tavg (unaffected loops) remains the same. Delta T (unaffected loops) becomes larger. SG #1 level drops due to "shrink" associated with the temperature reduction.
d. Incorrect. The response of the delta T stated is incorrect. SG level response is correct. SG level decreases due to the shrink associated with the temperature reduction.

Question Number: 4

K/A: 000022 G2.4.31

Loss of Reactor Coolant Makeup
Knowledge of annunciator alarms, indications, or response procedures.

Tier:	**1**	**RO Imp: 4.2**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	1	SRO Imp: 4.1	SRO Exam:	Yes	**Source:**	**DC COOK 2006, SIG MOD.**

Applicable 10CFR55 Section: 41.10/45.3

Learning Objective: Lesson Plan 3-OT-SYS062A, Objectives 10 Explain the VCT level program, and 12. Explain the automatic actuation logic and interlocks associated with the VCT outlet valves, FCV-62-132 and 133 and the CCP suction valves from the RWST, FCV-62-135 and 136.

References: ARI 109-A VCT LEVEL HI/LO, Rev. 15.

Question:

Given the following plant conditions:

- The Unit is at 45%.
- Letdown is in service at 120 gpm per Chemistry request.

The OAC observes the following indications on 1-M-6:

- VCT level is 38% and decreasing.
- Annunciator Window 109-A, VCT LEVEL HI/LO, is LIT.
- 1-LCV-62-118 indicating light is LIT for Divert to Holdup Tank.

Assuming NO operator actions, and based on these indications, actual VCT level will lower to...

A. a level which will cause eventual loss of CCP suction.

B. a level which will cause a swapover to the RWST.

C. 20% and cause auto makeup flow to maintain 20% level.

D. 20% and cause auto makeup flow to return level to 41%.

DISTRACTOR ANALYSIS

a. CORRECT. A failure of 1-LT-62-130 high causes letdown to divert to the Holdup Tank. Auto VCT makeup attempts to control VCT level between 20% and 41% (makeup will not keep up with 120 gpm letdown). Eventually, the VCT level lowers to the RWST switchover setpoint of 7%. With 1-LT-62-130 failed high, the coincidence for switchover will not be made up and level continues lowering to 0%. At this time suction is lost to the charging pump and it will trip.

b. Incorrect. The auto swapover signal requires multiple inputs. With 1-LT-62-130 failed high, swapover does not occur. Plausible if candidate does not remember swapover logic.

c. Incorrect. VCT Makeup is not sufficient to replace the 120 gpm lost through diversion to the Holdup Tank. Plausible if candidate does not remember that auto makeup flowrate is approximately 70 gpm plus any boron. Distractor implies that makeup flow is sufficient to stabilize level once it started.

d. Incorrect. VCT Makeup is not sufficient to replace the 120 gpm lost through diversion to the Holdup Tank. Plausible if candidate does not remember that auto makeup flowrate is approximately 70 gpm plus any boron. Distractor implies that the makeup flow is greater than the 120 gpm, causing VCT level to rise.

Question Number: 5

K/A: 000025 AK3.02
Knowledge of the reasons for the following responses as they apply to the Loss of Residual Heat Removal System: Isolation of RHR low-pressure piping prior to pressure increase above specified level.

Tier:	**1**	**RO Imp: 3.3**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 3.7**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.5/41.10/45.6/45.13

Learning Objective: 3-OT-AOI1400, Objective 7 Demonstrate ability/knowledge of AOI, to correctly: a. Respond to Action steps, b. Respond to Notes & Cautions.

References: AOI-14, Rev. 34; ARI -109-115, Rev 15.

Question:

Given the following plant conditions:

- Unit is in Mode 5 on RHR cooling with Train A in service in normal alignment.
- RCS conditions initially are:
  - Temperature at 220°F.
  - Pressure at 330 psig.
  - Pressurizer level at 30%.

- A transient occurs causing the RCS pressure to start rising and the crew enters AOI-14, Loss of Shutdown Cooling. The crew also notes the following annunciator is LIT:

- Annunciator 113E, RHR SUCT FCV-74-1, 2, 8, 9 OPEN & HI PRESS.

In response to increasing RCS pressure, which ONE of the following identifies:

(1) Why the Hot leg Loop 4 RHR suction valves, 1-FCV-74-1 and 1-FCV-74-2, are directed to be closed?

AND

(2) What are the implications of Annunciator 113E being LIT?

A. (1) To protect the RHR low pressure suction piping.
(2) At least one of the valves failed to close automatically when pressure reached setpoint.

B. (1) To protect the RHR low pressure suction piping.
(2) With the valves closed, at least one of the valves could NOT be reopened.

C. (1) To ensure available ECCS makeup capacity is not exceeded if suction relief valve opens.
(2) At least one of the valves failed to close automatically when pressure reached setpoint.

D. (1) To ensure available ECCS makeup capacity is not exceeded if suction relief valve opens.
(2) With the valves closed, at least one of the valves could NOT be reopened.

DISTRACTOR ANALYSIS

a. Incorrect. The valves are closed to protect the RHR low pressure suction piping, however the valves do not close automatically on high pressure. Plausible because the reason for closing the valves is correct and high pressure did automatically close the valves prior to the signal removal. High pressure with one of the valves open would cause the alarm.

b. CORRECT. The valves are closed to protect the RHR low pressure suction piping. If the valves are closed and 113E annunciator is lit, then either a power supply is open or a pressure switch is failed, affecting the ability to re-open one of the valves.

c. Incorrect. The reason identified for closing the valves is not correct and the valves do not close automatically on high pressure. Plausible because in Mode 4 the ECCS pumps available for injection is reduced (1CCP and both SIPs out of service). High pressure did automatically close the valves prior to the signal removal and high pressure with one of the valves open would cause the alarm.

d. Incorrect. The ability to reopen one of the valves is affected if the alarm is in; however, the reason identified for closing the valves is not correct. Plausible because the ability to reopen one of the valves is affected and in Mode 4 the ECCS pumps available for injection is reduced (1CCP and both SIPs out of service).

Question Number: 6

K/A: 000026 AA1.02
Ability to operate and/or monitor the following as they apply to the Loss of Component Cooling Water: Loads on the CCWS in the control room.

Tier:	**1**	**RO Imp: 3.2**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp:**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.7, 45.5

Learning Objective: 3-OT-AOI1500 Objective 18 Correctly locate all control room controls and indications associated with the Component Cooling System.

References: AOI-15, Rev. 31, ARI-241-253, Rev 9, Drawing 147W859-1 (B4).

Question:

Given the following plant conditions:

- Unit 1 is operating at 100% power.
- The Component Cooling System (CCS) is in its normal full power alignment.

Which of the following indications is abnormal and requires changing plant conditions to compensate for the condition?

A. #4 RCP Thermal Barrier Flow - 40 gpm.

B. #4 RCP Lower Oil Cooler Flow - 9 gpm.

C. 1A ESF Header Supply Flow - 1500 gpm.

D. 1B ESF Header Supply Flow - 5500 gpm.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the candidate must recall the normal range for Upper Oil Cooler Flow is 40-50 gpm.
b. Incorrect. Plausible, since the candidate must recall the normal range of 5-10 gpm per RCP.
c. CORRECT. For the stated alignment, the flow rate through the 1A ESF Header should be ~100 gpm. A flow rate of 1500 gpm would be indicative of a leak, and would require that the leak be isolated and A Train components placed in STOP-Pull-to-lock.
d. Incorrect. Plausible, since the candidate must recall the normal flow should be between 5000-6000 gpm.

Question Number: 7

K/A: 000027 AA2.02
Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: Normal values for RCS pressure.

Tier:	1	**RO Imp:** 3.8	**RO Exam:**	Yes	**Cognitive Level:**	**HIGH**
Group:	1	**SRO Imp:** 3.9	**SRO Exam:**	Yes	**Source:**	**NEW**

Applicable 10CFR55 Section: 43.5/45.13

Learning Objective: Lesson Plan 3-OT-SYS068C Objective 8: Describe the operation of the master pressure controller.

Lesson Plan 3-OT-SYS099A, Objective 17: Identify the Reactor trips and give setpoints and list logic required for the Reactor trips.

References: AOI-18, Rev. 21.

Question:

Given the following plant conditions:

- A power escalation is in progress.
- Plant is currently holding power at 30% for a secondary chemistry hold.
- Pressurizer Pressure Channel Selector Switch 1-XS-68-340D is in the "PT-68-340 & 334" position.
- Pressurizer Pressure Transmitter 1-PT-68-340 fails HIGH.

(1) What action is required to stabilize RCS pressure at its normal value?

AND

(2) If that action was unsuccessful, what will ensure that adequate departure from nucleate boiling ratio (DNBR) is maintained?

A. (1) Manually increasing the master controller output.
(2) Automatic Reactor trip when Pressurizer pressure lowers to SI initiation setpoint.

B. (1) Manually increasing the master controller output.
(2) Automatic Reactor trip when Pressurizer pressure lowers to RPS trip setpoint.

C. (1) Manually decreasing the master controller output.
(2) Automatic Reactor trip when Pressurizer pressure lowers to SI initiation setpoint.

D. (1) Manually decreasing the master controller output.
(2) Automatic Reactor trip when Pressurizer pressure lowers to RPS trip setpoint.

DISTRACTOR ANALYSIS

a. Incorrect. Increasing the master controller output maintains the spray valves open, worsening the transient. Second part is correct. With power at 30%, the low Pressurizer pressure trip is enabled.
b. Incorrect. Increasing the master controller output maintains the spray valves open, worsening the transient. Low pressure trip is enabled by P-7, with reactor power > 10% (P-10) or turbine load > 10% (P-13).
c. Incorrect. Manually decreasing the output of the master controller closes the spray valves and turns on PZR heaters, stopping the pressure reduction. The reactor would trip prior to the initiation of the SI.
d. CORRECT. Manually decreasing the output of the master controller closes the spray valves and turns on PZR heaters, stopping the pressure reduction. Low pressure trip is enabled by P-7, with reactor power > 10% (P-10) or turbine load > 10% (P-13).

Question Number: 8

K/A: 000038 G2.2.40
Steam Generator Tube Rupture
Ability to apply Technical Specifications for a system.

Tier:	1	**RO Imp:** 3.4	**RO Exam:**	Yes	**Cognitive Level:**	**HIGH**	
Group:	1	**SRO Imp:** 4.7	**SRO Exam:**	Yes	**Source:**	**NEW**	

Applicable 10CFR55 Section: 41.10/43.2/43.5/45.3

Learning Objective: 3-OT-TS0307. Objective 3: Given plant conditions and parameters, correctly determine the OPERABILITY of components associated with different Plant Systems in Section 7 of Technical Specifications.

References: E-3, Rev. 22; WBN Tech Spec Section 3.4 Reactor Coolant System; 3.7 Plant Systems.

Question:

Given the following plant conditions:

- A steam generator tube rupture is in progress.
- The Chemistry Lab has just informed the crew that the activity levels in #1 S/G are high, and that sample values have been confirmed.
- The crew is implementing E-3, STEAM GENERATOR TUBE RUPTURE.

As a result of actions directed by E-3, which ONE of the following requires entry into a Technical Specification Action statement?

A. Adjusting the #1 SG PORV controller setpoint to 90%.

B. Closing the #1 SG MSIV.

C. Closing the TD AFW pump steam supply valve from #1 SG.

D. Cooling down to target incore temperature of 479°F at the maximum rate.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the action is taken in E-3, but adjusting the setpoint on the SG PORV controller to 90% does not render the PORV inoperable.
b. Incorrect. Plausible, since the action is taken in E-3, but closing the MSIV does not render the MSIV inoperable
c. CORRECT. The closure of the TD AFWP steam supply valve requires LCO 3.7.5 entry.
d. Incorrect. Plausible, since the initial cooldown is not greater than 100°F in an hour, but it is accomplished at maximum rate.

Question Number: 9

K/A: 000040 (W/E12) EA2.2
Ability to determine and interpret the following as they apply to the (Uncontrolled Depressurization of all Steam Generators): Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

Tier:	**1**	**RO Imp: 3.4**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 3.9**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 43.5/45.13

Learning Objective: 3-OT-ECA0201, Objective: Describe the major actions of ECA-2.1, Uncontrolled Depressurization of all Steam generators.

References: ECA-2.1, Rev. 9.

Question:

Given the following plant conditions:

- Unit 1 is initially in Mode 3 preparing for a reactor startup.
- A steam leak downstream of the MSIVs requiring safety injection has occurred.
- Operators are unable to close any MSIV from the Control Room.
- The applicable EOP has directed MSIV closure.
- Attempts to isolate an MSIV from the Auxiliary Control Room have been unsuccessful.

Which ONE of the following describes:

(1) The actions required by the procedure in effect,

AND

(2) When that action has been taken, how will the control room operator know it was successful?

A. (1) Dispatch operator to locally isolate and bleed off the control air to the MSIVs.
(2) Requires local verification of MSIV closure.

B. (1) Dispatch operator to locally isolate and bleed off the control air to the MSIVs.
(2) Main control room operator notes GREEN light above MSIV control switches is LIT.

C. (1) Dispatch operator to attempt MSIV closure by pulling control power fuses.
(2) Requires local verification of MSIV closure.

D. (1) Dispatch operator to attempt MSIV closure by pulling control power fuses.
(2) Main control room operator notes GREEN light above MSIV control switches is LIT.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since candidate may think that, as with various other valves in the plant, isolating control air causes the valve to close. However, in this case, the MSIVs have an accumulator which maintains the valves in position for a period of time. Additionally, this is not the prescribed action per the appropriate procedure in use for these conditions.
b. Incorrect. Plausible, since candidate may think that, as with various other valves in the plant, isolating control air causes the valve to close. However, in this case, the MSIVs have an accumulator which maintains the valves in position for a period of time. Further plausibility is due to the correct method of determining the local action was successful (GREEN light lit in main control room).
c. Incorrect. Plausible, since the action is correct, although local verification of valve position is not required by procedure.

d. CORRECT. This is the correct action per the procedure, and the GREEN light above each handswitch in the main control room will indicate actual MSIV position.

Question Number: 10

K/A: 000055 EA1.01
Ability to operate/monitor the following as they apply to a Station Blackout: In-core thermocouple temperatures.

Tier:	**1**	**RO Imp: 3.7**	**RO Exam:**	**Yes**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp: 3.9**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.7/45.5/45.6

Learning Objective: 3-OT-ECA0000, Objective 8: Given a set of plant conditions, use ECA-0.0, ECA-0.1, and ECA-0.2 to correctly diagnose and implement: Action Steps, RNOs, Notes and Cautions.

References: ECA-0.0, Rev. 19.

Question:

Unit 1 is in Mode 3 following a loss of offsite power and the failure of both the Unit 1 diesel generators to start.

Which ONE of the following identifies how the MCR crew will monitor Core Exit Thermocouples and the effect on the post accident monitoring (PAM) instrumentation Tech Spec LCO for Core Exit Temperature?

A. Plasma displays on the control board.
PAM Tech Spec LCO entry is required.

B. Plasma displays on the control board.
PAM Tech Spec LCO entry is NOT required.

C. Integrated Computer System (ICS) since the plasma displays on the control board will be unavailable.
PAM Tech Spec LCO entry is required.

D. Integrated Computer System (ICS) since the plasma displays on the control board will be unavailable.
PAM Tech Spec LCO entry is NOT required.

DISTRACTOR ANALYSIS

a. Incorrect. The plasma displays would be available during the blackout, but no PAM instrumentation LCO entry would be required. Plausible because the candidate could conclude that the LCO entry would be required due to the loss of power.
b. CORRECT. The plasma displays would be available during the blackout. The plasma displays are PAM instruments and no PAM instrumentation LCO entry would be required.
c. Incorrect. The use of the ICS would not be required because the plasma displays would be available during the blackout, therefore no PAM instrumentation LCO entry would be required. Plausible because the candidate could conclude that the LCO entry would be required with the plasma display unavailable.
d. Incorrect. The use of the ICS would not be required because the plasma displays would be available during the blackout. Additionally, the second part of the distractor is correct in that no PAM instrumentation LCO entry would be required. Plausible because the candidate could conclude that the LCO entry would not be required but conclude that the plasma display would be unavailable.

Question Number: 11

K/A: 000057 AK3.01
Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: Actions contained in EOP for loss of vital ac electrical instrument bus.

Tier:	**1**	**RO Imp: 4.1**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 4.4**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.5/41.10/45.6/45.13

Learning Objective: Lesson Plan 3-OT-AOI2500, Objective1: Demonstrate ability to recognize a loss of any 120V AC Vital Power Bd, including effects on equipment and controls (SOER 81-02).

References: AOI-25.01, LOSS OF 120V AC VITAL INSTRUMENT POWER BOARDS 1-I AND 2-I, Rev. 27, Appendix A and C.

Question:

Given the following plant conditions:

- Unit 1 is at 100% power.
- Alarms received indicate that an electrical board has failed.
- All trip status lights are OFF on Panel 1-XX-55-5 (on 1-M-5).

Which ONE of the following identifies (1) which electrical board failed and (2) the reason that manipulation of controls in the Auxiliary Control Room (ACR) is required?

	(1)	(2)
A.	120 VAC Vital Instrument Board 1-I.	ACR Auxiliary Feedwater Controllers for S/G 3 and 4 have swapped to MANUAL and require adjustment to ensure an operable heat sink is maintained.
B.	120 VAC Vital Instrument Board 1-II.	ACR Auxiliary Feedwater Controllers for S/G 1 and 2 have swapped to MANUAL and require adjustment to ensure an operable heat sink is maintained.
C.	120 VAC Vital Instrument Board 1-I.	1-FCV-62-93 and 1-FCV-62-89 have failed OPEN and related controls must be taken to the AUX position to reestablish charging and RCP seal flows.
D.	120 VAC Vital Instrument Board 1-II.	1-FCV-62-93 and 1-FCV-62-89 have failed OPEN and related controls must be taken to the AUX position to reestablish charging and RCP seal flows.

DISTRACTOR ANALYSIS

a. Incorrect. The board failure is correct, and the ACR AFW controllers do swap to MANUAL but the SG AFW controllers are incorrect (Board 1-I would shift controllers for S/G 1 and 2).
b. Incorrect. The board failure is incorrect, and the ACR AFW controllers do swap to MANUAL but the SG AFW controllers are incorrect (Board 1-II would shift controllers for S/G 3 and 4).
c. CORRECT. AOI-25.01 states that the listed flow control valves will fail OPEN, and Appendix C , Alternate Control of Letdown and Charging specifically addresses placing the transfer switches for 1-FCV-62-93 and 1-FCV-62-89 in the AUX position on Panel 1-L-11B and 1-L-11A respectively.
d. Incorrect. The board failure is incorrect, and the fail positions of the flow control valves are incorrect.

Question Number: 12

K/A: 000058 AK1.01
Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power: Battery charger equipment and instrumentation.

Tier:	**1**	**RO Imp: 2.8**	**RO Exam:**	**Yes**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp: 3.1**	**SRO Exam:**	**Yes**	**Source:**	**SQN MODIFIED**

Applicable 10CFR55 Section: 41.8/41.10/45.3

Learning Objective: 3-OT-SYS057P, Objective 1: Describe the 125v Vital, 250v, 48v and 24v battery systems in terms of the following:
d. Location and normal and alternate supplies to associated battery chargers.
f. Normal and alternate supplies to battery boards.
g. Typical feeds from battery boards.

References: 45W700-1, Rev 24.

Question:

Given the following plant conditions:

- Unit 1 is at 100% power with no Tech Spec LCO Actions in effect.
- The 125 V DC Power System is normally aligned with the exception of the 6-S Vital Battery Charger being aligned to the 125v Vital Battery Board II due to scheduled maintenance on the 125v Vital Charger II.
- Offsite power is lost.
- All diesel generators start and load except for the 2B-B diesel generator which FAILS to start.

Which ONE of the following identifies the condition of the 125V Vital DC batteries II and IV?
(Assume NO operator action is taken.)

A. Battery II is being maintained at normal voltage.
Battery IV is discharging.

B. Battery IV is being maintained at normal voltage.
Battery II is discharging.

C. Both batteries are being maintained at normal voltage.

D. Both batteries are discharging.

DISTRACTOR ANALYSIS

a. CORRECT. Battery Board II has no power from an AC source and therefore Battery II is discharging. Battery IV has no power since 2B-B DG, and therefore is not discharging.
b. Incorrect. Based on 1-45W700-1, the 6-S charger receives power from 480V RX MOV board 1B2-B. The failure of 1B-B DG results in a loss of power to the charger, and Battery II is discharging. Battery IV is powered from 2B-B DG through its normal feed and normal charger.
c. Incorrect. Battery Board II has no power from an AC source, and therefore Battery II is discharging. Battery IV has power from 2B-B DG, and therefore is not discharging.
d. Incorrect. Battery Board II has no power from an AC source and therefore Battery II is discharging. Battery IV has power from 2B-B DG, and therefore is not discharging.

Question Number: 13

K/A: 000062 AA2.02
Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: The cause of possible SWS loss.

Tier:	**1**	**RO Imp: 2.9**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 3.6**	**SRO Exam:**	**Yes**	**Source:**	**WBN BANK**

Applicable 10CFR55 Section: 43.5/45.13

Learning Objective: 3-OT-AOI1300, Objective 5: Identify the general location of a rupture given a low hdr pressure coincident with no strainer high ΔP.

References: AOI-13, LOSS OF ESSENTIAL RAW COOLING WATER, Rev. 35.

Question:

Given the following plant conditions:

- The Unit is at 100% power.
- ERCW system is in normal alignment.
- ERCW headers 1A and 2A are indicating low flow.
- The following MCR alarms are LIT on 1-M-27A:
  - Window 223-A, "ERCW HDR A SUP PRESS LO".
  - Window 223-C, "ERCW HDR 1A STRAINER ΔP HI".
  - Window 223-B, "ERCW PMP A-A Discharge Pressure Low".
  - Window 226-B, "ERCW PMP D-A Discharge Pressure Low".

Which ONE of the following describes what has occurred in the 1A ERCW header?

A. Supply header has ruptured in the Auxiliary Building.

B. Discharge header has ruptured in the Auxiliary Building.

C. Supply header has ruptured upstream of the 1A strainer.

D. Supply header has ruptured between the IPS and Auxiliary Bldg.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible if the candidate confuses the diagnostics for a break in the Auxiliary Building. Per AOI-13, symptoms of a supply line break in the Auxiliary Building include a building flooded alarm, which is not present in the stem.

b. Incorrect. Plausible if the candidate confuses the diagnostics for a break in the Auxiliary Building. Per AOI-13, symptoms of a discharge line break in the Auxiliary Building include a building flooded alarm, which is not present in the stem

c. Incorrect. Plausible if the candidate confuses the diagnostics for a break in the Auxiliary Building. Per AOI-13, symptoms of a supply line break in the Intake Pumping Station (IPS) include an IPS flooded alarm, which is not present in the stem. Additionally, a break in the IPS is characterized by the lack of the strainer ΔP high alarm.

d. CORRECT. All indications provided in the stem support the diagnosis of an ERCW break in the yard.

Question Number: 14

K/A: 000065 AK3.04
Knowledge of the reasons for the following response as they apply to the Loss of Instrument Air: Cross-over to backup air supplies.

Tier:	**1**	**RO Imp: 3.0**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 3.2**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.5/41.10/45.6/45.13

Learning Objective: 3-OT-SYS001A, Objective 22: Explain the operation of the atmospheric relief valve in auto, manual, and with loss of air pressure.

References: AOI-30.2, Plant Fires Pg. 8 of 1291; WBN N3-1-4002, Rev.14, page 75 of 117.

Question:

Complete the following statement:

The reason a backup nitrogen supply is provided to the SG PORVs is to ensure that during _____(1)_____ the crew has the capability to operate them for a minimum number of cycles, and the alignment is initiated _____(2)_____.

	(1)	(2)
A.	an Appendix R Fire	automatically on low control air pressure.
B.	a Loss of Offsite Power	manually.
C.	an Appendix R Fire	manually.
D.	a Loss of Offsite Power	automatically on low control air pressure.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the Appendix R Fire is the correct plant condition. However, the backup nitrogen function is not initiated automatically. This aspect is plausible because there are various other plant components that have automatic backup functions, but not this one.
b. Incorrect. Plausible if candidate does not differentiate between a complete loss of AC power and a loss of offsite power. Candidate correctly recognizes that the nitrogen backup must be manually aligned.
c. CORRECT. Per the supporting reference, this backup is for an Appendix R Fire, and it is initiated manually.
d. Incorrect. Plausible if candidate does not differentiate between a complete loss of AC power and a loss of offsite power. The auto backup aspect is plausible because there are various other plant components that have automatic backup functions, but not this one.

Question Number: 15

K/A: W/E04 EK3.3
Knowledge of the reasons for the following responses as they apply to the (LOCA Outside Containment) Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations.

Tier:	**1**	**RO Imp:**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp:**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.5/41.10/45.6/45.13

Learning Objective: 3-OT-ECA0101, Objective 1: Identify and explain the major actions of procedures ECA-1.1 and 1.2.

References: ECA-1.2, Rev 4. WOG ERG Background Document ECA-1.2, Rev. 2; Case 2 and 3.

Question:

When performing ECA-1.2, LOCA OUTSIDE CONTAINMENT, why are RHR components addressed BEFORE other ECCS components?

A. To maintain suction to CCPs if containment sump swapover has already occurred.

B. This allows the CCPs to maintain RCP seal injection.

C. Isolation of RHR components requires manipulations outside the MCR.

D The leak is most likely to occur in the RHR system.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible because RHR pumps do supply suction to CCPs after swapover.
b. Incorrect. Plausible because if the RHR was the source of the leak, the RCP support conditions would not have been unnecessarily interrupted.
c. Incorrect. Plausible, since alignment of the RHR system to establish normal RHR cooldown flowpaths require local valve manipulation.
d. CORRECT. If check valve leakage occurs, low pressure piping would be exposed to RCS pressure, and would be a probable leak source.

Question Number: 16

K/A: W/E11 EA1.3
Ability to operate and / or monitor the following as they apply to the (Loss of Emergency Coolant Recirculation): Desired operating results during abnormal and emergency situations.

Tier:	**1**	**RO Imp: 3.7**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 4.2**	**SRO Exam:**	**Yes**	**Source:**	**WBN BANK**

Applicable 10CFR55 Section: 43.5/45.13

Learning Objective: 3-OT-ECA0101, Objective 1: Identify and explain the major actions of procedures ECA-1.1 and 1.2.

References: ECA-1.1, Rev. 11

Question:

Given the following plant conditions:

- A Large Break LOCA has occurred.
- Containment pressure is 10.5 psig.
- RWST level is 20%.
- Containment sump level is 68%.
- 1A RHR pump tripped due to severe damage to its motor.
- 1-FCV-63-73, CNTMT SUMP TO RHR PMP B SUCT failed to open automatically and attempts to open it manually have failed.

Which ONE of the following describes the proper alignment of the Containment Spray (CS) pumps for the existing plant conditions while the CS pumps suction is aligned to the RWST?

A. Stop both CS pumps and place the control switches in P-T-L (Pull-To- Lock).

B. Stop both CS pumps and place the control switches in A-Auto.

C. Stop ONE CS pump and place its control switch in P-T-L (Pull-To- Lock).

D. Stop ONE CS pump and place its control switch in A-auto.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since Step 4.C. RNO directs the operator to place any CS pump not required in P-T-L position.
b. Incorrect. Plausible since the procedure will have the handswitches placed in A-AUTO under different circumstances at Step 7.
c. CORRECT. With containment pressure at 10.5 psig, ECA-1.1 requires only one CS pump in service. Step 4.C. RNO directs the operator to place any CS pump not required in P-T-L position.
d. Incorrect. Plausible since the procedure will have the handswitches placed in A-AUTO under different circumstances at Step 7.

Question Number: 17

K/A: W/E05 EA2.2
Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink): Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

Tier:	**1**	**RO Imp: 3.7**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 4.3**	**SRO Exam:**	**Yes**	**Source:**	**WBN BANK**

Applicable 10CFR55 Section: 43.5/45.13

Learning Objective: FRH0001, Loss of Secondary Heat Sink
16. List the 2 conditions that define a "dry" S/G in the contexts of procedures FR-H.1 and FR-H.5.
22. Explain the purpose for and basis of each step in FR-H.1, FR-H.2, FR-H.3, FR-H.4 and FR-H.5.

References: FR-H.1, Rev. 17.

Question:

Which ONE of the following is an adverse consequence of delaying bleed and feed cooling if the conditions for initiating bleed and feed are met in FR-H.1, "Response to Loss of Secondary Heat Sink"?

A. An over pressure challenge to the reactor vessel.

B. Inability to refill the S/Gs without damage from high thermal stresses.

C. Inability to provide sufficient injection for core cooling prior to core uncovery.

D. Steam formation in the hot legs will accelerate the degradation of natural circulation flow.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, if candidate believes since there is no heat removal mechanism for RCS heat removal that pressure will rise high enough to challenge vessel integrity. Pressure does rise, but the real concern for delaying feed and bleed core cooling is the pressure being high enough to prevent adequate safety injection leading to prolonged loss of inventory and core uncovery.
b. Incorrect. Plausible, since candidate could correctly recognize conditions in a dry S/G which will cause a concern for thermal shocking of the S/G components when refilling.
c. CORRECT. The mass flow rate out of the pressurizer PORVs is anywhere from 50 to 100 lbm/sec. The charging/SI pump system can inject about 40 lbm/sec (290 gpm), with both trains operating, at an RCS pressure of 2300 psig. Since makeup flow from the charging/SI pump system will not keep up with inventory lost out of the pressurizer PORVs, the RCS will eventually dry out enough to cause core uncovery.
d. Incorrect. Plausible, if candidate believes that steam formation in the hot legs is a concern during the initial stages of a loss of heat sink event.

Question Number: 18

K/A: 000077 G2.1.20
Generator Voltage and Electric Grid Disturbances
Ability to interpret and execute procedure steps.

Tier:	**1**	**RO Imp: 4.6**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 4.6**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.10/43.5/45.12

Learning Objective: 3-OT-SYS057A, Objective 14: Describe the generator Capability Curve, and how it is used; Objective 15 Discuss how generator excitation affects reactive load.

References: TI-12.15, Rev. 22; 1-PI-OPS-1-MCR, Section 5.4, (Monitoring Generator Loading), Rev. 39.

Question:

Given the following conditions:

- Plant is at 100% power.
- All systems normally aligned.
- The Transmission Operator has notified the plant that system grid voltage is high and forecasted to go higher.

If the Transmission Operator requests the plant to take in the maximum value of MVARs to help stabilize the grid, what is the maximum allowed MVAR incoming value, and how is the adjustment made in accordance with 1-PI-OPS-1-MCR, Main Control Room?

	MAX INCOMING VALUE	**METHOD OF ADJUSTMENT**
A.	100 MVARs	Exciter Voltage Adjuster
B.	100 MVARs	Exciter Base Adjuster
C.	200 MVARs	Exciter Voltage Adjuster
D.	200 MVARs	Exciter Base Adjuster

DISTRACTOR ANALYSIS

a. CORRECT. The first step of 1-PI-OPS-1-MCR, Section 5.4 for Monitoring Generator Loading, specifies the Exciter Voltage Adjuster as the means for voltage control on the Northeast Area Dispatcher (NEAD) schedule. In the next step, incoming Mvar loading is restricted to less than 100 Mvars.

b. Incorrect. Candidate correctly recognizes the lower limit on Mvars in, but incorrectly believes the base adjuster is the procedurally specified method of making the adjustment. Plausible, since use of the base adjuster is allowed, but ONLY if you are already selected to the base adjuster. The conditions in the stem, "all systems normally aligned", requires the candidate to understand that the Exciter Voltage Adjuster is the selected method.

c. Incorrect. Candidate fails to recall that 200 Mvars is twice the allowed value for Mvars in, per the procedure. The correct value is - 100 Mvars. This distractor is plausible since the Exciter Voltage Adjuster is the specified method of making vars adjustments for the given conditions.

d. Incorrect. Candidate fails to recall that 200 Mvars is twice the allowed value for vars in, per the procedure. The correct value is - 100 Mvars. Distractor is plausible since the Exciter Base Adjuster is the correct method, but ONLY if you are already selected to the base adjuster. The conditions in the stem, "all systems normally aligned", requires the candidate to understand that the Exciter Voltage Adjuster is the selected method.

Question Number: 19

K/A: 000001 AK2.01
Knowledge of the interrelations between the Continuous Rod Withdrawal and the following: Rod bank step counters.

Tier:	**1**	**RO Imp: 2.9**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**2**	**SRO Imp: 3.2**	**SRO Exam:**	**Yes**	**Source:**	**SQN BANK**

Applicable 10CFR55 Section: 41.7/45.7

Learning Objective: 3-OT-SYS085A, Objective 23: Given a failure of the controlling input instrumentation for rod control and no operator action, describe the effects of rod motion on the plant, if any.

References: FSAR Section 7.7.1, Tech Spec 3.1.8.

Question:

Given the following plant conditions:

- Unit 1 is at 50% power.
- Rod control is in AUTO with Bank D at 176 steps.
- Tavg auctioneering unit fails LOW.
- Bank D group 2 step counter fails to move.

As a result, rods will ____(1)_____ and the Bank D control rod CERPI indications must be matched within ___(2)____.

	(1)	(2)
A.	Insert	± 12 steps of each other (highest to lowest rod).
B.	Insert	± 12 steps of the of the Group 1 step counter.
C.	Withdraw	± 12 steps of each other (highest to lowest rod).
D.	Withdraw	± 12 steps of the of the Group 1 step counter.

DISTRACTOR ANALYSIS

a. Incorrect. With the auctioneering unit output failed low, Tavg will appear to be lower than Tref. This error signal will cause rods to withdraw at maximum speed. Plausible since the rod mismatch given is correct.
b. Incorrect. Wrong direction, wrong allowable difference.
c. CORRECT. With the auctioneering unit output failed low, Tavg will appear to be lower than Tref. This error signal will cause rods to withdraw at maximum speed. The maximum difference allowed between CERPI and Group Step counters of ±12 steps is correct.
d. Incorrect. Correct direction, wrong allowable difference.

Question Number: 20

K/A: 000028 AK1.01
Knowledge of the operational implications of the following concepts as they apply to Pressurizer Level Control Malfunctions: PZR reference leak abnormalities.

Tier:	**1**	**RO Imp: 2.8**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**2**	**SRO Imp: 3.1**	**SRO Exam:**	**Yes**	**Source:**	**COMANCHE PEAK MODIFIED**

Applicable 10CFR55 Section: 41.8/41.10/45.3

Learning Objective: 3-OT-SYS068C, Objective 15: Describe the response to a deviation from pressurizer level program.

References: 1-47W611-68-2, Rev. 7

Question:

Given the following plant conditions:

- 1-XS-68-339E PRZ LVL CTRL CHAN SELECT is in the 339 /335 position.
- With actual pressurizer level at 50%, 1-LT-68-339 Pressurizer Level Transmitter develops a slow leak in the reference leg.

What is the effect on Pressurizer level and charging flow?

A. Actual level in the Pressurizer will be increasing, causing charging flow to lower.

B. Actual level in the Pressurizer will be decreasing, causing charging flow to rise.

C. Indicated level on 1-LT-68-339 will be increasing, causing charging flow to lower.

D. Indicated level on 1-LT-68-339 will be decreasing, causing charging flow to rise.

DISTRACTOR ANALYSIS

a. Incorrect. LT-68-339 is the controlling level channel. As far as the circuit is concerned, level will be increasing in the pressurizer. This results in a level error signal causing a drop in actual pressurizer level. Plausible if the candidate confuses ACTUAL with INDICATED level.
b. Incorrect. LT-68-339 is the controlling level channel. As far as the circuit is concerned, level will be increasing in the pressurizer. This results in a level error signal causing a drop in actual pressurizer level. Plausible if the candidate confuses ACTUAL with INDICATED level. Actual level cannot be seen by the circuit due to the failure in progress.
c. CORRECT. Level indicated on 1-LT-68-339 will be increasing. Since the transmitter is selected for control, charging flow will be decreasing, attempting to control level on program.
d. Incorrect. Plausible since this is the response that would be expected of 1-LT-68-339 and charging flow if the variable leg of 1-LT-68-339 were to develop a leak. With the reference leg developing the leak the plant response is opposite.

Question Number: 21

K/A: 000032 AK2.01
Knowledge of the interrelations between the Loss of Source Range Nuclear Instrumentation and the following: Power supplies, including proper switch positions.

Tier:	1	**RO Imp:** 2.7	**RO Exam:**	Yes	**Cognitive Level:**	**HIGH**
Group:	2	**SRO Imp:** 3.1	**SRO Exam:**	Yes	**Source:**	**WBN BANK**

Applicable 10 CFR 55 Section: 41.7, 45.7
Learning Objective: 3-OT-SYS092A, Objective 31: Describe the distribution of Instrument and Control Power in the Nuclear Instrumentation System, including the effects of a loss of one or both supplies under various plant conditions.

References: 3-OT-SYS092A; 1-47W611-99-2, Rev. 12.

Question:

Which ONE of the following describes the Reactor Protection System response to a loss of control power versus a loss of instrument power to N-31 Source Range Monitor with the "TRIP BYPASS SWITCH" in the "BYPASS" position?

	Control Power Loss	Instrument Power Loss
A.	Reactor trip	No trip
B.	Reactor trip	Reactor trip
C.	No trip	No trip
D.	No trip	Reactor trip

DISTRACTOR ANALYSIS

a. CORRECT. With the TRIP BYPASS SWITCH in BYPASS, a loss of control power will cause a reactor trip. However, with the TRIP BYPASS SWITCH in BYPASS, a loss of instrument power will not cause a reactor trip.
b. Incorrect. Correct response for loss of control power, incorrect response for loss of instrument power.
c. Incorrect. Incorrect response for loss of control power, correct response for loss of instrument power.
d. Incorrect. Incorrect response for loss of control power, incorrect response for loss of instrument power.

Question Number: 22

K/A: 000059 AK3.01
Knowledge of the reasons for the following responses as they apply to the Accidental Liquid Radwaste Release: Termination of a release of radioactive liquid.

Tier:	**1**	**RO Imp: 3.5**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**2**	**SRO Imp: 3.9**	**SRO Exam:**	**Yes**	**Source:**	**WBN BANK**

Applicable 10CFR55 Section: 41.5 , 41.10 / 45.6 / 45.13

Learning Objective: 3-OT-AOI3100, Rev 6, Objective 3: Explain operator actions on abnormal release of radioactive material.

References: SOI-14.03 Rev 0045, AOI-31 Rev 22, ARI-180-187 Rev 30.

Question:

Given the following plant conditions:

- Operators are responding to an unexpected annunciator, 182-B "TB SUMP DISCH 0-RM-212 LIQ RAD HI.
- The station sump pumps discharge is currently aligned to the Low Volume Waste Pond.

Which ONE of the following identifies the effect the high radiation condition has on the Station Sump pumps and how the pumps' discharge should be aligned as a result of the alarm in accordance with AOI-31, Abnormal Release of Radioactive Material?

	Effect on Station Sump Pumps	**Station Sump Pump Discharge Aligned to**
A.	Pumps stop automatically.	Unlined Chemical Holdup Pond
B.	Pumps stop automatically.	Lined Chemical Holdup Pond
C.	Requires operator action to manually stop pumps.	Unlined Chemical Holdup Pond
D.	Requires operator action to manually stop pumps.	Lined Chemical Holdup Pond

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DISTRACTOR ANALYSIS

a. Incorrect. Pumps are not automatically stopped but the discharge is aligned to the unlined pond. Plausible because some HI RAD signals on release points to auto terminate the release and the alignment of the discharge is correct.
b. Incorrect. Pumps are not automatically stopped and the discharge is not aligned to the lined pond. Plausible because some HI RAD signals on release points to auto terminate the release and the discharge could be aligned lined pond under different conditions.
c. CORRECT. The HI RAD alarms but, will not automatically stop the pumps. AOI-31 directs the pumps to be stopped and directs the alignment to the Unlined Chemical Holdup Pond. The alarm refers the operator to AOI-31.
d. Incorrect. Pumps require manual action to stop but the discharge is not aligned to the lined pond. Plausible because the candidate may know that manual action is required to stop the pumps and the discharge could be aligned lined pond under different conditions.

Question Number: 23

K/A: 000067 AA1.07
Ability to operate and / or monitor the following as they apply to the Plant Fire on Site: Fire alarm reset panel.

Tier:	**1**	**RO Imp: 2.9**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**2**	**SRO Imp: 3.0**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.7, 45.5, 45.6

Learning Objective: 3-OTAOI3000, Objective 2: When a valid fire is reported to the Main Control Room (MCR), describe the information obtained from the person reporting the fire.

References: SOI-13, Fire Detection System, Rev 22; AOI-30.1, Plant Fires, Rev 9.

Question:

If a local fire panel has a TROUBLE lit after being reset, which ONE of the following identifies how the main control room panel (0-M-29) will indicate a subsequent trouble AND a fire alarm on the same local panel?

	Subsequent Trouble	Alarm
A.	Would be indicated.	Trouble condition would clear, Alarm would be indicated.
B.	Would be indicated.	Trouble condition would mask alarm condition.
C.	Would NOT be indicated.	Trouble condition would clear, Alarm would be indicated.
D.	Would NOT be indicated.	Trouble condition would mask alarm condition.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since various alarm functions throughout the plant do have "reflash" feature for annunciating subsequent alarm conditions. However, for the fire panel in the control room, it does not. Second half of distractor is correct, lending further plausibility to overall distractor.
b. Incorrect. Plausible, since various alarm functions throughout the plant do have "reflash" feature for annunciating subsequent alarm conditions. However, for the fire panel in the control room, it does not.
c CORRECT. An alarm coming IN on a panel causes all zone trouble lamps and panel trouble lamp to go out. It will also cause 0-M-29 to indicate the panel trouble is out, even if the trouble condition still exists. While the alarm is in, no troubles for the affected panel will be indicated locally or on 0-M-29. Further, a trouble in on a panel will prevent any subsequent troubles from being indicated on 0-M-29. However, the troubles will still be indicated.
d. Incorrect. Plausible, since the first part of the distractor is correct. Second (incorrect) portion of the distractor is plausible for a similar reason as that described in the first half of distractor analysis for distractor A.

Question Number: 24

K/A: 000069 (W/E14) EA2.1
Ability to determine and interpret the following as they apply to the (High Containment Pressure):
Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

Tier:	**1**	**RO Imp: 3.3**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**2**	**SRO Imp: 3.8**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 43.5, 45.13

Learning Objective: 3-OT-FRZ0001, Objective 1: Given a set of plant conditions, use the FR-Z status tree to determine which, if any, Containment Function Restoration Procedure should be implemented.

References: FR-0, Rev. 13, FR-Z.1, Rev. 10, FR-Z.2 Rev. 6, TI-12.04, Rev. 6.

Question:

A large break LOCA is in progress. Which ONE of the following identifies conditions that require entry into FR-Z.1 High Containment Pressure?

	Containment Pressure	Containment Spray Pumps
A.	3.0 psig	No pumps running
B.	6.0 psig	1 pump running
C.	9.0 psig	1 pump running
D.	12.0 psig	2 pumps running

DISTRACTOR ANALYSIS

a. CORRECT. Per FR-0 Containment Status Tree, with containment pressure above the Phase B isolation setpoint of 2.8 psig one containment spray pump is required to be in service. Containment pressure at 3 psig and NO pumps running requires entry into FR-Z.1 due to an ORANGE status.
b. Incorrect. Plausible since prior revision to FR-0 and FR-Z.1 required entry into FR-Z.1 if pressure was above Phase B setpoint regardless of the number of spray pumps in service.
c. Incorrect. Plausible since prior revision to FR-0 and FR-Z.1 required entry into FR-Z.1 if pressure was above Phase B setpoint regardless of the number of spray pumps in service.
d. Incorrect. Plausible if the candidate believes that a RED path condition exists with containment pressure at 12 psig.

Question Number: 25

K/A: 000076 G2.2.38
High Reactor Coolant Activity
Knowledge of conditions and limitations in the facility license.

Tier:	**1**	**RO Imp: 3.6**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**2**	**SRO Imp: 4.5**	**SRO Exam:**	**Yes**	**Source:**	**SQN BANK**

Applicable 10CFR55 Section: 41.7, 41.10, 43.1, 45.13

Learning Objective: 3-OT-T/S0304, Objective 4: Given plant conditions and parameters correctly determine the applicable Limiting Conditions for Operations or Technical Requirements for the various components of the RCS.

References: WBN Tech Spec 3.4.16.

Question:

Unit 1 is at 100% power. Which ONE of the following is the HIGHEST of the below listed values for Dose Equivalent Iodine -131 (I-131) without requiring entry into the Action Statement for LCO 3.4.16, RCS Specific Activity?

A. 0.1 µCi/gm.

B. 0.2 µCi/gm.

C. 0.3 µCi/gm.

D. 0.4 µCi/gm.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since the value is less than the limit, but is not the highest value as required by the stem.
b. CORRECT. Activity level must return to below the limit of 0.265 µCi/gm to meet the LCO without relying on the action statement.
c. Incorrect. A continuance of the numerical sequence (1,2,3,4) maintains the low cognitive level of the question. This forces the candidate to recognize the correct value.
d. Incorrect. A continuance of the numerical sequence (1,2,3,4) maintains the low cognitive level of the question. This forces the candidate to recognize the correct value.

Question Number: 26

K/A: W/E02 EK3.2
Knowledge of the reasons for the following responses as they apply to the (SI Termination): Normal, abnormal and emergency operating procedures associated with (SI Termination).

Tier:	**1**	**RO Imp: 3.3**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**2**	**SRO Imp: 3.8**	**SRO Exam:**	**Yes**	**Source:**	**VC SUMMER**

Applicable 10CFR55 Section: 41.5/41.10/45.6/45.13

Learning Objective: 3-OT-EOP0100, Objective 10: Determine the correct procedure transition if during the SI termination steps of ES-1.1 it is determined that PZR level cannot be maintained using the normal charging flowpath.

References: ES-1.1, Rev. 15, WOG Background Document ES-1.1.

Question:

Given the following plant conditions:

- The Unit was at full power when a Small Break LOCA occurred.
- The crew has transitioned to ES-1.1, "SI TERMINATION."
- The crew has just stopped one of the charging pumps.

What is the reason for checking RCS pressure stable or rising at this point in ES-1.1?

A. To determine if the residual heat removal (RHR) pumps should be secured.

B. To confirm that a secondary heat sink is required.

C. To confirm that flow from one charging pump is adequate to maintain pressure.

D. To determine if the safety injection (SI) pumps should be secured.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since a later step in ES-1.1 evaluates RHR pump status.
b. Incorrect. RCS pressure increases if the heat sink is lost with or without the charging pump in service.
c. CORRECT. Per the WOG ES-1.1 Background Document "RCS pressure stable or increasing confirms that SI flow is adequate for the operator to maintain control using one charging/SI pump. The operator will then be ready to align the charging /SI pump to the normal charging flowpath. If RCS pressure is decreasing, then the operator will go to ES-1.2, Post LOCA Cooldown and Depressurization for further actions."
d. Incorrect. Plausible, since a later step in ES-1.1 evaluates SI pump status.

WRITTEN QUESTION DATA SHEET

Question Number: 27

K/A: W/E13 EK2.1
Knowledge of the interrelations between the (Steam Generator Overpressure) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Tier:	**1**	**RO Imp: 3.0**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**2**	**SRO Imp: 3.1**	**SRO Exam:**	**Yes**	**Source:**	**INPO BANK W 2 LOOP MODIFIED**

Applicable 10CFR55 Section: 41.7/45.7

Learning Objective: 3-OT-FRH0001, Objective 22: Explain the purpose for and basis of each step in FR-H.1, FR-H.2, FR-H.3, FR-H.4 and FR-H.5.

References: FR-H.2, Rev. 5.

Question:

Given the following plant conditions:

- A reactor trip concurrent with a loss of offsite power has occurred.
- The crew has entered FR-H.2, Steam Generator Overpressure based on a YELLOW condition on the Heat Sink CSF Status Tree.
- #2 SG pressure is 1230 psig.
- #1, #3, and #4 SG pressures are at 1210 psig.
- #2 SG level is 85% and slowly rising.
- #1, #3, and #4 SG levels are 65% and slowly rising.

Which ONE of the following actions will mitigate the SG overpressure condition?

A. Initiate blowdown flow from #2 SG.

B. Open the condenser steam dumps.

C. Open the steam supply to the Turbine Driven AFW pump.

D. Initiate minimum AFW flow to #2 SG.

DISTRACTOR ANALYSIS

a. CORRECT. Step 4 of FR-H.2 directs use of SG blowdown as a method for reducing SG pressure.
b. Incorrect. Plausible, since this action would reduce SG pressure, however, due to the loss of vacuum, the condenser dumps are unavailable.
c. Incorrect. Plausible since direction is given in FR-H.2 to depressurize the affected SGs, and opening the steam supply to the TDAFW pump is a listed action. This action is applicable to only the #1 and #4 SGs.
d. Incorrect. Plausible, since the addition of cool AFW could aid in depressurizing the SG. FR-H.2 isolates both main and AFW flow to the affected SG to eliminate these systems as the cause of the overpressure condition.

Question Number: 28

K/A: 003 K3.04
Reactor Coolant Pump
Knowledge of the effect that a loss or malfunction of the RCPS will have on the following: RPS.

Tier:	**2**	**RO Imp: 3.9**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 4.2**	**SRO Exam:**	**Yes**	**Source:**	**SQN BANK**

Applicable 10CFR55 Section: 41.7/45.6

Learning Objective: 3-OT-SYS099A Objective 17: Identify the reactor trips and give setpoints and list logic required for the reactor trips.

References: System Description N3-99-4003, Rev. 21, Page 87 of 106.

Question:

Which ONE of the following failures associated with RCS flow transmitters causes a reactor trip signal?

A. A single high pressure tap fails when operating at 50% reactor power.

B. A single low pressure tap fails when operating at 50% reactor power.

C. Two high pressure taps fail when operating at 5% reactor power.

D. Two low pressure taps fail when operating at 5% reactor power.

DISTRACTOR ANALYSIS

a. CORRECT. With power above the P-8 Permissive setpoint of 48%, 2 of 3 detectors on 1 of 4 loops will cause a reactor trip. The failure results in 3 of 3 detectors indicating low flow.
b. Incorrect. Plausible, since a low flow condition on 2 of 4 loops between P-7 and P-8 causes a reactor trip. Low flow logic is not met by 1 of 3 flow transmitters.
c. Incorrect. Plausible, since a low flow condition on 2 of 4 loops between P-7 and P-8 causes a reactor trip. Power is less than P-7, so no low flow trips are enabled.
d. Incorrect. Plausible, since a low flow condition on 2 of 4 loops above P-8 causes a reactor trip.

Question Number: 29

K/A: 004 K4.14
Chemical and Volume Control
Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following: Control interlocks on letdown system (letdown tank bypass valve).

Tier:	**2**	**RO Imp: 2.8**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 3.2**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.7

Learning Objective: 3-OT-SYS062A, Objective 9: Explain the function and operation of the three way divert valve LCV-62-118.

References: 3-OT-SYS062A; 1-47W611-62-; ARI 109-A, Rev. 15.

Question:

On a rising VCT level the Divert Valve is designed to ...

A. fully open at 63% and fully close when level has lowered to 41%.

B. begin modulating open at 63% and if level continues to rise, will be fully open at 93%.

C. fully open at 93% and will begin modulating closed when level drops to 63%.

D. begin modulating open at 41% and will be fully open when level reaches 63%.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since 1-FCV-62-118 begins to open at 63% and an AUTOMATIC makeup to the VCT will STOP at 41%.
b. CORRECT. Per the logic, at 63% 1-FCV-62-118 will begin to open and will be fully at 93%.
c. Incorrect. Plausible since the values provided are accurate, but the actions are incorrect.
d. Incorrect. Plausible since the 41% value is associated with the AUTOMATIC MAKEUP circuit, and the 63% level is the point at which the divert valve would begin to open.

Question Number: 30

K/A: 005 K5.09
Residual Heat Removal
Knowledge of the operation implications of the following concepts as they apply (to) the RHRS: Dilution and boration considerations.

Tier:	**2**	**RO Imp: 3.2**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 3.4**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.5 / 45.7

Learning Objective: 3-OT-SYS074A, Objective 3: State the plant conditions including reactivity effects that must be met prior to placing the RHR System in service in accordance with SOI-74.01.

References: SOI-68.02, Reactor Coolant Pumps, Step 5, Rev 33.

Question:

Given the following plant conditions:

- The plant is on RHR cooling following a natural circulation cooldown.
- RCS temperature is 150°F.
- Pressurizer pressure is 340 psig.
- Pressurizer level is 25%.
- Preparations for returning to Mode 4 are in progress.

In accordance with SOI-68.02, Reactor Coolant Pumps, which ONE of the following requires an action plan to be developed with Reactor Engineering prior to starting the first RCP?

A. Shutdown and control rods have been withdrawn 5 steps to ensure no thermal binding.

B. Pressurizer boron concentration is 45 ppm less than RCS boron.

C. Steam Generator metal temperature is 105°F.

D. An RCS boration occurred during the cooldown.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since rods could be in this position, and candidate incorrectly applies a reactivity associated manipulation with this concern.
b. Incorrect. Plausible, since there is a limit associated with delta boron between PZR and RCS; however, the limit is 50 ppm.
c. Incorrect . Plausible, since there can be a concern with initiation of forced flow with a S/G significantly colder than RCS. However, in this case, the temperature is not of concern.
d. CORRECT. Per SOI-68.02, this is the correct condition which requires evaluation and a plan with Reactor Engineering.

Question Number: 31

K/A: 006 K6.02
Emergency Core Cooling
Knowledge of the effect of a loss or malfunction on the following will have on the ECCS: Core flood tanks (accumulators).

Tier:	**2**	**RO Imp:**	**3.4**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp:**	**3.9**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.7/45.7
Learning Objective: 3-OT-SYS063A Objective 24: Given a set of plant conditions, determine the correct response of the Emergency Core Cooling System.
References: 1-47W611-63-7, Rev 2.

Question:

Given the following plant conditions:

- Plant startup is in progress.
- During performance of GO-1, Unit Startup from Cold Shutdown to Hot Standby, the CLA isolation valves were left CLOSED with power on the valves as pressurizer pressure was raised from 900 psig to 1900 psig.
- A manual safety injection (SI) is initiated.

Which ONE of the following identifies the position of the CLA isolation valves before the SI is initiated and how the MANUAL Safety injection will affect the valves?

	Before SI	**Effect of the SI signal**
A.	Valves will have automatically opened.	An open signal will be generated to the valves.
B.	Valves will have automatically opened.	An open signal will NOT be generated to the valves.
C.	Valves will have remained closed.	An open signal will be generated to the valves.
D.	Valves will have remained closed.	An open signal will NOT be generated to the valves.

DISTRACTOR ANALYSIS

a. Incorrect. The valves would not have automatically opened prior to the SI because the P-11 permissive has not been made. However, an open signal would be generated by the SI. Plausible because the valves do automatically open if pressure is greater than P-11, and an SI would generate an open signal.
b. Incorrect. The valves would not have automatically opened prior to the SI because the P-11 permissive has not been made and an open signal would be generated by the SI. Plausible because the valves do automatically open if pressure is greater than P-11 and the candidate could conclude that since the valves are normally opened manually and power removed that the SI does not generate an open signal due to the CLAs being a passive sub-system in the ECCS.
c. CORRECT. The valves would be closed until the pressure rose above P-11 (1970 psig). When P-11 permissive was met the valves would then automatically open. With pressure at 1900 psig the valves would still be closed, but would open when the SI was actuated.
d. Incorrect. The valves would have remained closed because the P-11 permissive has not been made and an open signal would be generated by the SI. Plausible because the valves would remain closed with the pressure less than P-11 and the candidate could conclude that since the valves are normally opened manually and power removed that the SI does not generate an open signal due to the CLAs being a passive sub-system in the ECCS.

Question Number: 32

K/A: 007 A1.02
Pressurizer Relief/Quench Tank
Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Maintaining quench tank pressure.

Tier:	**2**	**RO Imp: 2.7**	**RO Exam:**	**Yes**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp: 2.9**	**SRO Exam:**	**Yes**	**Source:**	**INPO BANK QUESTION**

Applicable 10CFR55 Section: 41.5/45.5

Learning Objective: 3-OT-SYS068C, Objective 21: Describe the flow path of sources of supply, discharges, vents, drains, leakoff, and connections/penetrations that intertie this system to other systems.

References: ARI 88-C, Rev.19.

Question:

Given the following plant conditions:

- The plant is at 100% power.
- Annunciator 88C PRT PRESS HI is received.
- PRT pressure is 8.5 psig and RISING SLOWLY.
- PRT level is 67% and STABLE.

If allowed to continue, which ONE of the following describes (1) the LOWEST PRT pressure at which the rupture disc operates, AND (2) the action required to restore PRT pressure?

A. (1) 50 psig.
(2) Vent the PRT to the Waste Gas Header.

B. (1) 85 psig.
(2) Vent the PRT to the Waste Gas Header.

C. (1) 50 psig.
(2) Drain the PRT to the RCDT to reduce level and pressure.

D. (1) 85 psig.
(2) Drain the PRT to the RCDT to reduce level and pressure.

DISTRACTOR ANALYSIS

a. Incorrect. Wrong value for rupture disc. Plausible since the action to reduce pressure is consistent with corrective actions in the ARI.
b. CORRECT. Rupture disc fails at 85 psig, and the action to reduce pressure is consistent with corrective actions in the ARI.
c. Incorrect. Wrong value for rupture disc. Wrong action to reduce pressure, since level is in the normal (67-80%) range.
d. Incorrect. Plausible since rupture disc fails at 85 psig. Wrong action to reduce pressure, since level is in the normal (67-80%) range.

Question Number: 33

K/A: 008 A2.02
Component Cooling Water
Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: High/low surge tank level.

Tier:	**2**	**RO Imp: 3.2**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 3.5**	**SRO Exam:**	**Yes**	**Source:**	**WBN BANK**

Applicable 10CFR55 Section: 41.5/43.5/45.3/45.13

Learning Objective: 3-OT-AOI15000, Objective 10: Give 3 sources of potential In-leakage to the CCS.

References: Reference AOI-15, Rev. 31.

Question:

Given the following plant conditions:

- The Unit is at 100% power.
- 1-M-27C, Annunciator 249A "U1 SURGE TANK LEVEL HI/LO" is in alarm.
- The CRO reports that Surge Tank level is 73% on both 1-LI-70-63A and 1-LI-70-99A and level is rising.
- The CRO reports that 1-LCV-70-63, U1 SURGE TANK MAKEUP LCV, is closed.
- 1-FCV-70-66A U1 Surge Tank Vent is closed.
- 1-PT-70-24A, CCS HX A SUP PRESS, indicates 100 psig and stable.
- All systems are in normal operational alignment.

For the above conditions, a leak in which ONE of the following components accounts for the above conditions, and what is the effect of isolating that component?

A. RCS Sample heat exchanger.
Suspension of RCS sampling which leads to the inability to determine if RCS chemistry limits are met.

B. RCP seal water return heat exchanger.
Manual isolation of RCP seal return line results in lifting of the seal return relief valve to the PRT.

C. CVCS letdown heat exchanger.
Manual isolation of normal letdown flow results in loss of cleanup and leads to exceeding RCS chemistry limits.

D. RCP thermal barrier.
Manual isolation of the thermal barrier heat exchangers results in lifting of the relief valve.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the RCS sample heat exchanger is cooled by CCS. Conditions stated in the stem would lead to out leakage at the sample heat exchanger.
b. Incorrect. RCP seal return pressure is less than the CCS pressure of 100 psig stated in the stem. Plausible, since isolation of the flow path causes the relief valve to lift.
c. CORRECT. Letdown is in service and at a pressure greater than the CCS pressure of 100 psig stated in the stem.
d. Incorrect. The thermal barrier automatically isolates on differential flow, and will not cause a continuous rise in CCS Surge Tank level.

Question Number: 34

K/A: 010 A3.01
Pressurizer Pressure Control
Ability to monitor automatic operation of the PZR PCS, including: PRT temperature and pressure during PORV testing.

Tier:	**2**	**RO Imp: 3.0**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 3.2**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.7 / 45.5

Learning Objective: 3-OT-SYS068C Objective 11: Describe the indication an operator has that a PORV is open or leaking through.

References: 1-SI-68-901-A, Valve Full Stroke Exercising During Plant Operation: Reactor Coolant A-Train, Rev 7.

Question:

Given the following plant conditions:

- Unit 1 at 100% power.
- 1-SI-68-901-A, Valve Full Stroke Exercising During Plant Operation: Reactor Coolant A-Train, is in progress.
- 1-FCV-68-333A, Block Valve for PORV 340A, has been closed and the stroke time recorded.
- When the block valve is reopened, an increase is seen in PRT pressure and temperature.

Which ONE of the following identifies a condition that will cause the change in PRT conditions and the action required in accordance with 1-SI-68-901-A?

A. A PORV opened due to the rapid pressure RISE between the PORV and the block valve when the block valve was reopened;

   Place the PORV control handswitch to CLOSE prior to opening the block valve, then return to AUTO after the block valve has been opened.

B. A PORV opened due to the rapid pressure RISE between the PORV and the block valve when the block valve was reopened;

   Place the PORV Block Valve control handswitch to CLOSE.

C. The PORV opened due to the pressure REDUCTION which occurred between the PORV and the block valve while the block valve was closed;

   Place the PORV control handswitch to CLOSE prior to opening the block valve, then return to AUTO after the block valve has been opened.

D. The PORV opened due to the pressure REDUCTION which occurred between the PORV and the block valve while the block valve was closed;

   Place the PORV Block Valve control handswitch to CLOSE.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible because the first part of the distractor is correct and the second part details taking an action to prevent the valve from opening by placing the control switch in closed then returning it to automatic.
b. CORRECT. The Precautions and Limitations B of 1-SI-68-901-A. state "Closing a PORV block valve could allow pressure between the PORV and block valve to decrease due to small acceptable leaks across the PORV. When the block valve is opened, the sudden pressure rise

could force open the PORV and make it stick." Precautions and Limitations c states "A sudden rise in the Pressurizer Relief tank (PRT) temperature and pressure or PORV tailpipe temperature would indicate a PORV has opened and requires closing of the associated block valve."

c. Incorrect. Plausible because the drop in pressure while the block valve is closed is what allows the rapid rise in pressure to open the valve when the block valve is opened, but the PORV does not come open while the block valve is closed and the second part details taking an action to prevent the valve from opening by placing the control switch in closed then returning it to automatic.

d. Incorrect. Plausible because the drop in pressure while the block valve is closed is what allows the rapid rise in pressure to open the valve when the block valve is opened, but the PORV does not come open while the block valve is closed and the second part is correct.

Question Number: 35

K/A: 010 K1.08
Pressurizer Pressure Control
Knowledge of the physical connections and/or cause-effect relationships between the PZR PCS and the following systems: PZR LCS.

Tier:	**2**	**RO Imp:3.2**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp:3.5**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.2 to 41.9/45.7 to 45.8

Learning Objective: 3-OT-SYS068C, Objective 12: Identify the program setpoints, and describe any automatic actions relative to the pressurizer level program.

References: 1-47W611-68-2, -3. AOI-20, MALFUNCTION OF PRESSURIZER LEVELCONTROL SYSTEM, Rev. 29.

Question:

Given the following plant conditions:

- The unit is at 100% power.
- Pressurizer Level Control is selected to 1-LT-68-339/335 on 1-XS-68-339E.

If 1-LT-68-335 fails low, what is the impact on the Pressurizer Pressure/Level Control System?

A. Pressurizer Heaters de-energize and Letdown isolates.

B. Pressurizer Heaters de-energize and Letdown does **NOT** isolate.

C. Pressurizer Heaters remain available and Letdown isolates.

D. Pressurizer Heaters remain available and Letdown does **NOT** isolate.

DISTRACTOR ANALYSIS

a. CORRECT. 1-LT-68-339/335 position identifies 339 as the controlling channel with 335 as the backup. Even though 335 is the backup failing low would deenergize pressurizer heaters and close selected CVCS letdown isolation valves thus isolating letdown.
b. Incorrect. First part correct. Second part plausible if the student believes only 339 (selected) channel failing low causes letdown to isolate and since 335 was the failing channel, letdown would remain in service.
c. Incorrect. First part incorrect. Plausible if the student believes only 339 (selected) channel failing low would cause heaters to deenergize and since 335 was the failing channel, heaters would remain in service. Second part correct.
d. Incorrect. Both parts incorrect. Plausible if the student believes only 339 (selected) channel failing low would cause heaters to deenergize and letdown to isolate and since 335 was the failing channel, heaters and letdown would remain in service.

Question Number: 36

K/A: 012 G2.4.31
Reactor Protection System
Knowledge of annunciator alarms, indications, or response procedures.

Tier:	**2**	**RO Imp: 4.2**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 4.1**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.10/45.3

Learning Objective: 3-OT-SYS099A Objective 18: Given the condition/status of the Reactor Protection system/component and the appropriate sections of Tech Specs, determine if operability requirements are met and what actions, if any, are required.

References: WBN Tech Specs. Table 3.3.1-1, ARI 114-A.

Question:

Given the following plant conditions:

- The plant is operating at 100% power.
- Annunciator 114-A, SSPA-A GENERAL WARNING is LIT.

Which ONE of the following (1) lists a condition that will cause the alarm and (2) describes what indication the operator dispatched locally will use to determine the cause of the alarm, in accordance with the ARI?

	(1)	(2)
A.	Reactor Trip Bypass Breaker A is racked in.	Board-edge LED lights on the Semi-Automatic Tester.
B.	Blown Ground Return Fuse.	Board-edge LED lights on the Semi-Automatic. Tester.
C.	Reactor Trip Bypass Breaker A is racked in.	Status Lights on the outside of the Local Panels.
D.	Blown Ground Return Fuse.	Status Lights on the outside of the Local Panels.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the local action is correct. Racking in the Train A bypass breaker causes a separate alarm.
b. CORRECT. LED lights are used to determine cause of alarm, and a blown ground return fuse is a specific cause of the GENERAL WARNING ALARM.
c. Incorrect. Plausible, since the local action is associated with determining the cause of a ROD URGENT FAILURE alarm. Racking in the Train A bypass breaker causes a separate alarm.
d. Incorrect. Plausible, since the local action is associated with determining the cause of a ROD URGENT FAILURE alarm, a blown ground return fuse is a specific cause of the GENERAL WARNING ALARM.

Question Number: 37

K/A: 013 A4.02
Engineered Safety Features Actuation
Ability to manually operate and/or monitor in the control room: Reset of ESFAS channels.

Tier:	**2**	**RO Imp: 4.3**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 4.4**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.7/45.5 to 45.8

Learning Objective: 3-OT-SYS063A, Objective 23: Identify each system that is automatically activated from a safety injection signal; Objective 25: Describe how to reset the safety injection signal, include P-4 interlock, also how and when to block the SI signal; 3-OT-SYS001A, Objective 21: List the automatic closure signals for the MSIVs.

References: 1-47W611-63-1; 1-47W611-1-1.

Question:

Given the following plant conditions:

- An inadvertent Safety Injection (SI) has occurred on Unit 1, and the crew is terminating the Safety Injection.
- The OAC has pressed the SI Reset pushbuttons.

Assuming no additional operator action, what is the status of the following ESF signals?

	Automatic SI	Low Steam Line Pressure Main Steam Isolation Signal
A.	Enabled	Disabled
B.	Disabled	Enabled
C.	Disabled	Disabled
D.	Enabled	Enabled

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the automatic SI is not enabled until the reactor trip breakers are closed. The low steam line pressure MSIV closure signal is disabled (blocked).
b. CORRECT. The automatic SI is not enabled until the reactor trip breakers are closed. The low steam line pressure MSIV closure signal is not blocked by the reset function (refer to 1-47W611-63-1).
c. Incorrect. The automatic SI is not enabled until the reactor trip breakers are closed. Plausible since the low steam line pressure MSIV closure signal is not blocked by the SI reset.
d. Incorrect. The automatic SI is disabled until the reactor trip breakers are closed. Plausible since the low steam line pressure MSIV closure signal is not blocked by the SI reset.

Question Number: 38

K/A: 022 A3.01
Containment Cooling
Ability to monitor automatic operation of the CCS, including: Initiation of safeguards mode of operation.

Tier:	**2**	**RO Imp: 4.1**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 4.3**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.7/45.5

Learning Objective: 3-OT-SYS030C, Containment Air Cooling, Purge, & Continuous Vent Systems 6/8. Describe the Lower/Upper Compartment Air Cooling system including: c. Automatic starts of the fans; d. Fan trips; e. Number of fans required for normal operation.

References: System Description N3-30RB-4002, REACTOR BUILDING VENTILATION SYSTEM
WBN Logic Diagrams 1-47W611-30-3, -4.

Question:

Given the following plant conditions:

- A main steam line rupture has occurred inside containment.
- Containment pressure peaked at 3.6 psig.
- All engineered safety features have actuated per design.

What is the expected status of the containment Upper Compartment Cooling Fans (UCCF) and Lower Compartment Cooling Fans (LCCF) 10 minutes after the event?

	UCCF	LCCF
A.	Running	Tripped
B.	Tripped	Running
C.	Running	Running
D.	Tripped	Tripped

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since upper compartment fans trip on a Phase B containment isolation signal. The candidate may confuse the air return fans, which start approximately 9 minutes after a Phase B signal, with the upper compartment fans.
b. Incorrect. Plausible, since lower compartment fans are required to be manually started between 1.5 and 4 hours after a main steam line break to ensure that no localized hot spots develop which would interfere with PAM instrumentation response.
c. Incorrect. Plausible if candidate does not recall Phase B impact on both the upper and lower compartment cooling fans.
d. CORRECT. The Phase B isolation causes all fans to trip and ERCW flow to related coolers to isolate. Candidates may believe that the lower compartment cooling fans must be restarted this soon after a main steam line break and discount the answer as incorrect.

Question Number: 39

K/A: 025 A2.05
Ice Condenser
Ability to (a) predict the impacts of the following malfunctions or operations on the ice condenser system; correct, control, or mitigate the consequences of those malfunctions or operations: Abnormal glycol expansion tank level.

Tier:	**2**	**RO Imp: 2.5**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 2.7**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.5 / 43.5 / 45.3 / 45.13

Learning Objective: 3-OT- SYS061A., Objective 18: Discuss what provisions have been made for glycol expansion after the glycol system is isolated from the containment.

References: ARI-138-144, Rev 18; 1-47W611-61-1, Rev. 4; 1-47W611-61-2, Rev 6; SOI-61.01, Rev. 27.

Question:

Which ONE of the following Glycol Expansion Tank levels causes the containment glycol supply and return valves 1-FCV-61-191, GLYCOL SUPPLY TO AHUs CONTAINMENT ISOLATION, and 1-FCV-61-193, GLYCOL RETURN AUX BUILDING ISOLATION to AUTO CLOSE, and after the isolation how are the Glycol Pumps and Chillers affected?

	Tank Level	After the isolation
A.	Lo-Lo level	Glycol Circ Pumps and Chillers TRIP.
B.	Lo-Lo level	Glycol Circ Pumps and Chillers continue to RUN.
C.	Hi-Hi level	Glycol Circ Pumps and Chillers TRIP.
D.	Hi-Hi level	Glycol Circ Pumps and Chillers continue to RUN.

DISTRACTOR ANALYSIS

a. CORRECT. Lo-Lo Expansion tank level causes the isolation, and then the circ pumps trip (on low suction pressure or high discharge pressure) and the chillers then trip as identified in ARI- 143-B.
b. Incorrect. Lo-Lo Expansion tank level causes the isolation, and then the circ pumps trip (on low suction pressure or high discharge pressure) and the chillers then trip as identified in ARI-143-B. Lo-Lo level being the condition that causes the isolation and that a containment flow path still exists for the floor cooling system makes leaving the circ pumps running plausible.
c. Incorrect. Hi-Hi Expansion tank level does NOT cause the isolation, but the circ pumps trip (on low suction pressure or high discharge pressure) and the chillers then trip as identified in ARI-143-B if the containment supply and return valves are isolated. Plausible because the circ pumps and chiller trip following the containment supply and return valve isolation and if the level were going high the isolation is plausible to prevent overflowing the tank inside containment.
d. Incorrect. Hi-Hi Expansion tank level does NOT cause the isolation, but the circ pumps trip (on low suction pressure or high discharge pressure) and the chillers then trip as identified in ARI-143-B. Plausible because if the level were going high, the isolation would prevent overflowing the tank inside containment and a containment flow path still exists for the floor cooling system, making leaving the circ pumps running plausible.

Question Number: 40

K/A: 026 A1.03
Containment Spray
Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: Containment sump level.

Tier:	**2**	**RO Imp: 3.5**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 3.5**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.5/43.5/45.3/45.13

Learning Objective: 3-OT-SYS072A, Objective 16: Given a set of plant conditions, determine the correct response of the Containment Spray System.

References: ES-1.3, Rev. 17; ECA-1.1, Rev. 11.

Question:

While performing ES-1.3 Transfer to Containment Sump, the Containment Spray Pump handswitches are required to be placed in Stop-PULL-TO-LOCK at which ONE of the following setpoints?

A. Containment Sump level rises to 83%.

B. Containment Sump level rises to 34%.

C. Refueling Water Storage Tank level drops to 16.1%.

D. Refueling Water Storage Tank level drops to 8%.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since the candidate may believe that stopping the containment spray pumps will reduce containment flooding.
b. Incorrect. Plausible since the value provided is related to RWST level for sump swapover.
c. Incorrect. Plausible since the value provided is related to containment sump level for swapover.
d. CORRECT. When RWST level is less than 8% the containment spray pumps will be placed in Stop-PULL-TO-LOCK position regardless of containment pressure. The suction will be aligned to the containment sump and then the pumps will be restarted.

Question Number: 41

K/A: 039 K5.08
Main and Reheat Steam
Knowledge of the operational implications of the following concepts as the(y) apply to the MRSS: Effect of steam removal on reactivity.

Tier:	**2**	**RO Imp: 3.6**	**RO Exam:**	**Yes**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp: 3.6**	**SRO Exam:**	**Yes**	**Source:**	**Braidwood 2001 Sig Mod.**

Applicable 10CFR55 Section: 41.5/45.7

Learning Objective: 3-OT-GO0200, Objective 8: Given conditions indicative of an erroneous Estimated Critical Position (ECP) calculation during the initial pull to critical, describe what steps should be taken by the operator and why. 3-OT-SIP1100, Objective 2: Describe the six variables which affect the Estimated Critical Condition.

References: 3-OT-GO0200, Rev. 6; 1-SI-0-11 Rev. 12.

Question:

Given the following plant conditions:

- At EOL, a reactor startup is in progress following a 6-day outage.
- The Reactor Engineer has provided an ECP which predicts the reactor going critical at 120 steps on Control Bank D.

Which ONE of the following conditions will result in the critical rod height being HIGHER than the value predicted by the ECP?

A. A dilution of 500 gallons is performed.

B. Feedwater flow is increased to all SGs due to a controller malfunction.

C. Steam Dump Controller 1-PIC-1-33 fails, resulting in a pressure decrease of 50 psig.

D. An improperly performed step in the Post Maintenance Test procedure results in the closure of all MSIVs.

DISTRACTOR ANALYSIS

a. Incorrect. A dilution results in a positive reactivity addition. This causes the critical rod height to be lower than the ECP.
b. Incorrect. An increase in feedwater flow results in a drop in RCS temperature. The drop in RCS temperature results in a positive reactivity addition. This causes critical rod height to be lower than the ECP.
c. Incorrect. A drop in pressure resulting from the failure of 1-PIC-1-33 causes a drop in RCS temperature. The drop in RCS temperature results in a positive reactivity addition. This causes critical rod height to be lower than the ECP.
d. CORRECT. The closure of the MSIVs results in an increase in steam pressure, and causes the SG PORVs to lift. This results in an increase in RCS temperature, which results in a negative reactivity addition. This causes critical rod height to be HIGHER than the ECP.

Question Number: 42

K/A: 039 A2.03
Main and Reheat Steam
Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Indications and alarms for main steam and area radiation monitors (during SGTR).

Tier:	**2**	**RO Imp:**	**3.4**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp:**	**3.7**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.5/43.5/45.3/45.13

Learning Objective: 3-OT-SYS090A, Objective 14: State the purpose of the Main Steam Line Radiation Monitors.
References: 3-OT-SYS090A, Rev.13; AOI-33 Rev 32.

Question:

Given the following plant conditions:

- The unit is at 100% power.
- Unidentified leakage is 0.03 gpm.
- Steam Generator #3 has a 17 gpd tube leak.
- AOI-33, Steam Generator Tube Leakage, Appendix A for Steam Generator Tube Leak Monitoring, is in progress.
- Subsequently, the activity in the RCS increased significantly due to fuel failures.

NOTE: Radiation Monitor Identification Numbers:
1-RM-90-106 - Lower Containment Radiation Monitor
1-RM-90-119 - Condenser Vacuum Pump Exhaust
1-RM-90-423 - #3 Steam Line Radiation Monitor

Which ONE of the following describes how 1-RM-90-106 and 1-RM-90-423 will respond as a result of the failed fuel without a change in the amount of steam generator tube leakage and the action directed in AOI-33, Appendix A, for using radiation monitors to quantify tube leakage?

	RAD Monitor Response	**Action to Quantify**
A.	1-RM-90-106 and 1-RM-90-423 increase.	Recalculate values for correlating 1-RM-90-119 to SG tube leakage.
B.	1-RM-90-106 and 1-RM-90-423 increase.	Stop using 1-RM-90-119 as the preferred indication for SG tube leak rate monitoring.
C.	1-RM-90-106 remains constant. 1-RM-90-423 increases.	Recalculate values for correlating 1-RM-90-119 to SG tube leakage.
D.	1-RM-90-106 remains constant. 1-RM-90-423 increases.	Stop using 1-RM-90-119 as the preferred indication for SG tube leak rate monitoring.

DISTRACTOR ANALYSIS

a. CORRECT. As identified in caution in AOI-33, lower containment rad monitor rising concurrently with secondary rad monitors may indicate a developing fuel defect, which could give an indication of a SGTL. The threshold values for correlating RM-90-119 count rate to SG tube leakage must be recalculated if RCS activity has changed significantly. A note in the AOI identifies 1-RM-90-119 as the preferred indication for leak rate monitoring and other secondary rad monitors should be used for confirmation.

b. Incorrect. The rad monitor response is correct, but use of 1-RM-90-119 would not be stopped. Plausible because the first part is correct and 1-RM-90-423 could be used to confirm, but use of 1-RM-90-119 would not be stopped, its threshold values would be calculated.
c. Incorrect. The rad monitor response is NOT correct, but the actions required are correct. Plausible because recalculating 1-RM-90-119 threshold values is correct and candidate may NOT relate a rise in the lower containment background activity due to the increased activity in the RCS.
d. Incorrect. The rad monitor response is NOT correct and the use of 1-RM-90-119 would not be stopped. Plausible because the candidate may NOT relate a rise in the lower containment background activity due to the increased activity in the RCS and may determine that the main steam line radiation monitor would be used to calculate the leak rate.

Question Number: 43

K/A: 059 K4.05
Main Feedwater
Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following: Control of speed of MFW pump turbine.

Tier:	**2**	**RO Imp: 2.5**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 2.8**	**SRO Exam:**	**Yes**	**Source:**	**WBN BANK**

Applicable 10CFR55 Section: 41.7

Learning Objective: 3-OT-SYS0003D, Objective 10: For a given input parameter failure to the steam generators level control system, determine the effect on steam generator level; Objective 14: For a given input parameter failure to the Main Feedwater Pump speed control, determine the effect on main feed pump speed.

References: 1-47W611-3-2, Rev. 20.

Question:

Given the following plant conditions:

- The Unit is at 50% load, steady state.
- All Feedwater valves/pumps are in automatic.
- Both Main Feedwater Pumps are running.
- Standby Feed Pump is off with its control handswitch in "auto".
- The controlling steam flow (SF) transmitter on #1 S/G fails LOW.

Which ONE of the following describes the response of the Feedwater Control System to the given conditions?

A. MFP speed RISES; #1 S/G Feedwater regulating valve closes initially to match feedwater flow to the failed SF input.

B. MFP speed RISES; #1 S/G Feedwater regulating valve closes initially due to the level error signal present.

C. MFP speed LOWERS; #1 S/G Feedwater regulating valve closes initially to match feedwater flow to the failed SF input.

D. MFP speed LOWERS; #1 S/G Feedwater regulating valve closes initially due to the level error signal present.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since the failure of the controlling steam flow transmitter low causes an immediate steam flow-feed flow mismatch. This causes the feed reg valve to close. The failure of the steam flow from one SG causes the DP program to change, reducing the DP required. This causes MFP speed to decrease.

b. Incorrect. Plausible since the level error portion of the SGWLC circuit is providing feedback to position the MFRV. The level error signal would not be the dominant signal however. Additionally, the failure of the steam flow from one SG causes the DP program to change, reducing the DP required. This causes MFP speed to decrease.

c. CORRECT. The failure of the controlling steam flow transmitter low causes an immediate steam flow-feed flow mismatch. This causes the feed reg valve to close, but not to prevent overfill. The failure of the steam flow from one SG causes the DP program to change, reducing the DP required. This causes MFP speed to decrease.

d. Incorrect. Plausible since the level error portion of the SGWLC circuit would be providing feedback to position the MFRV. The level error signal would not be the dominant signal however. Additionally, the failure of the steam flow from one SG causes the DP program to change, reducing the DP required. This causes MFP speed to lower.

Question Number: 44

K/A: 061 K3.02
Auxiliary/Emergency Feedwater
Knowledge of the effect that a loss or malfunction of the AFW will have on the following: S/G.

Tier:	**2**	**RO Imp: 4.2**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 4.4**	**SRO Exam:**	**Yes**	**Source:**	**WBN BANK**

Applicable 10CFR55 Section: 41.7/45.6

Learning Objective: 3-OT-SYS003B, Objective 4: Identify the steam generators that each AFW pump supplies. Objective 11: Describe the automatic actuations that occur when an AFW pump is started.

References: 1-47W611-3-3 Rev. 10, -4 Rev. 17; 1-47W611-1-3, Rev. 9

Question:

Given the following plant conditions:

- The unit is at 100% power.
- The TD AFW pump is out of service to repair the Trip-and-Throttle valve linkage.
- 6.9 KV Shutdown Board 1B trips due to a differential relay actuation.
- An inadvertent Safety Injection occurs.

Which ONE of the following describes the SGs that are receiving AFW flow and which SG blowdown isolation valves are closed, as a result of the above conditions? (Assume no operator action.)

	SGs Receiving AFW flow	SG BLOWDOWN Isolated
A.	Only SG 1 and 2	ALL SGs
B.	Only SG 1 and 2	Only SG 1 and 3
C.	Only SG 1 and 3	Only SG 1 and 2
D.	Only SG 1 and 3	ALL SGs

DISTRACTOR ANALYSIS

a. CORRECT. The stem of the question describes a situation during which the 1A-A MDAFWP will start, but the 1B-B MDAFWP and the TDAFWP are unavailable. Only #1 and #2 SGs are receiving AFW flow from the 1A MDAFWP. The SI caused a Containment Phase A isolation signal, which in turn caused all of the SG blowdown isolation valves to close.
b. Incorrect. The 1A-A MDAFWP will feed the #1 and #2 SGs, and under a normal start sequence would cause the #1 and #3 SG blowdown valves to isolate.
c. Incorrect. Plausible, since the SGs receiving water from the 1A-A MDAFWP and the SG blowdown valves that isolate on a normal start are reversed.
d. Incorrect. Plausible, since the SGs receiving water from the 1A-A MDAFWP and the SG blowdown valves that close on a Containment Phase A isolation are reversed.

Question Number: 45

K/A: 062 K2.01
AC Electrical Distribution
Knowledge of bus power supplies to the following: Major system loads.

Tier:	**2**	**RO Imp: 3.3**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 3.4**	**SRO Exam:**		**Source:**	**NEW**

Applicable 10CFR55 Section: 41.7

Learning Objective: 3-OT-SYS002A, Objective 22: Describe the condensate booster pumps as to type, capacity, and power supply.

References: 1-45W760-2-1, Rev. 20, -2-2, Rev. 8; 1-45W760-3-2, Rev. 14; 1-47W760-6-1, Rev. 13.

Question:

Given the following plant conditions:

- The unit is at 100% power.
- All secondary condensate and feedwater pumps are in service.
- The 1D Unit Board develops a fault and trips due to relay operation.

Which ONE of the following pumps is lost as a result of this failure?

A. 1B Hotwell Pump.

B. 1A Condensate Booster Pump.

C. 1B #3 Heater Drain Tank Pump.

D. Standby Main Feed Pump.

DISTRACTOR ANALYSIS

a. Incorrect. The 1B Hotwell pump is powered from the 1C Unit Board.
b. Incorrect. The 1A Condensate Booster Pump is powered from the 1A Unit Board.
c. Incorrect. The 1B #3 HDT Pump is powered from the 1B Unit Board.
d. CORRECT. The Standby Main Feed pump is powered from 1D Unit Board.

Question Number: 46

K/A: 063 K1.02
DC Electrical Distribution
Knowledge of the physical connections and/or cause-effect relationships between the DC electrical system and the following systems: AC electrical system.

Tier:	**2**	**RO Imp: 2.7**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 3.2**	**SRO Exam:**		**Source:**	**WBN BANK**

Applicable 10CFR55 Section: 41.2 to 41.9/45.7 to 45.8

Learning Objective: 3-OT-SYS057C, Objective 3: Explain the 480V breaker in terms of the following:
b. Mechanical and electrical interlocks.

References: 1-45W760-63-1, Rev. 10.

Question:

Given the following plant conditions:

- 1A-A and 1B-B SI Pump breakers are "Racked Up".
- A fuse blows in the NORMAL DC Trip circuit for the 1A-A SI Pump.
- A safety injection (SI) actuation occurs.

Which ONE of the following describes the response of the SI Pumps to the SI signal?

A. 1B-B SI Pump will auto start, but 1A-A SI Pump will not auto start until the control power supply is transferred.

B. 1B-B SI Pump will auto start, but 1A-A SI Pump will not auto start and must be started from the MCR handswitch.

C. Both SI Pumps will auto start, but 1A-A SI Pump cannot be stopped from the MCR.

D. Both SI Pumps will auto start, but 1A-A SI Pump will immediately trip due to the blown fuse.

DISTRACTOR ANALYSIS

a. Incorrect. Candidate may believe that the pump will not start with fuse blown in the trip circuit. They may believe it is the same dc power as supplied to the pump start circuit.
b. Incorrect. Candidate may confuse the control power supplies to the pump and the start logic.
c. CORRECT. Both pumps start automatically, however with fuses blown in the trip circuit the pump breaker cannot be opened from any electrical control handswitch.
d. Incorrect. Both pumps start automatically. Candidate may believe that a blown fuse in the trip circuit causes the trip circuit to be made up and results in the 1A-A SI pump tripping.

Question Number: 47

K/A: 064 K2.02
Emergency Diesel Generator
Knowledge of bus power supplies to the following: Fuel oil pumps.

Tier:	**2**	**RO Imp: 2.8**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 3.1**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.7

Learning Objective: 3-OT-SYS-082A, Objective 5: Describe the Operation of the DG Support Systems.

References: 1-45W760-82-2B Rev. 8; 1-45W760-82-4B Rev. 6.

Question:

Which ONE of the following is the power supply for the 2A-A Diesel Generator Fuel Oil Priming pump?

A. 480v AC from Diesel Generator Auxiliary Board 2A1-A.

B. 480v AC from Diesel Generator Auxiliary Board 2A2-A.

C. 125v DC from the 125v DC Vital Battery Board 2-I.

D. 125v DC from the 125v DC 2A-A Diesel Battery Distribution Panel.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible because some of the 2A-A Diesel Generator auxiliary equipment is powered from this board.
b. Incorrect. Plausible because some of the 2A-A Diesel Generator auxiliary equipment is powered from this board.
c. Incorrect. Plausible because this board supplies power for the 2A-A DG output breaker control and for relays in its start circuit and the actual power supplies are from a supply feeding the control circuit on the DG.
d. CORRECT. The priming pump is powered from the 125v Diesel Generator battery system.

WRITTEN QUESTION DATA SHEET

Question Number: 48

K/A: 064 K4.05
Emergency Diesel Generator
Knowledge of ED/G system design feature(s) and/or interlock(s) which provide for the following:
Incomplete-start relay.

Tier:	**2**	**RO Imp: 2.8**	**RO Exam:**	**Yes**	**Cognitive Level:**	**HIGH**
Group:	**1**	**SRO Imp: 3.2**	**SRO Exam:**	**Yes**	**Source:**	**WBN BANK**

Applicable 10CFR55 Section: 41.7

Learning Objective: 3-OT-SYS082A, Objective 10: Given a set of plant conditions, determine the correct response of the Diesel Generator or Diesel Generator Support Systems.

References: 1-45W760-82-2 thru 6.

Question:

After a reactor trip and safety injection on Unit 1, the following conditions are observed for 1A-A Diesel Generator (DG):

- 1-M-26A, Window 198A, "DG START/RUN FAILURE" alarm - LIT.
- Green "DG Run" light - ON.
- Red "DG Run" light - OFF.
- Red "DG Above 40 rpm" light - ON.
- Diesel Generator 6.9 KV breaker - OPEN.
- Diesel Generator voltage - ZERO.

From the above indications, the operating crew knows that 1A-A Diesel Generator started and ...

A. shutdown after 10 seconds.

B. engine speed did not rise above 550 rpm.

C. engine speed exceeded 550 rpm but did not rise above 850 rpm.

D. shutdown due to insufficient air in the receiver.

DISTRACTOR ANALYSIS

a. Incorrect. Indicating lights show that the diesel is still running.
b. CORRECT. Based on the information provided, the engine is running but since there is no indication that the field flashed, it can be assumed that speed did not reach 550 rpm.
c. Incorrect. If DG speed had exceeded 550 rpm the generator field would have flashed. The information in the stem does not indicate that this has happened.
d. Incorrect. Plausible, since the D/G tried to start, which meant sufficient air to start. However, the stem states that an emergency start was generated, and the indicating lights show that the diesel attempted to start.

Question Number: 49

K/A: 073 K3.01
Process Radiation Monitoring
Knowledge of the effect that a loss or malfunction of the PRM system will have on the following: Radioactive effluent releases.

Tier:	**2**	**RO Imp: 3.6**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 4.2**	**SRO Exam:**	**Yes**	**Source:**	**WBN BANK**

Applicable 10CFR55 Section: 41.7/45.6

Learning Objective: 3-OT-SYS015A Objective 5: Describe the automatic response of the Steam Generator Blowdown System to a high radiation signal detected by the blowdown radiation monitor (RM-90-120, 121).

References: 1-47W611-15-1 Rev. 14, ARI-173-179 Rev 38.

Question:

The Turbine Building NAUO has placed 1-HS-15-44, SG Blowdown Disch to CTBD, (Cooling Tower Blowdown), in **OPEN** per SOI-15.01, in order to direct SGBD flow to CTBD.

Which ONE of the following will occur if radiation monitor 1-RM-90-120 loses flow through the monitor?

A. Blowdown will be isolated to the CTBD resulting in loss of blowdown flow.

B. Blowdown will be isolated to the CTBD and automatically be redirected to the condensate header.

C. Blowdown will continue to the CTBD but will isolate if 1-RM-90-121 reached the HI RAD setpoint.

D. Blowdown will continue to the CTBD and will NOT isolate if 1-RM-90-121 reached the HI RAD setpoint.

DISTRACTOR ANALYSIS

a. Incorrect. Blowdown flow path to the CTBD would not be isolated but an instrument malfunction alarm would be generated.
b. Incorrect. Blowdown flow path to the CTBD would not be isolated, thus redirection to the condensate header would not occur.
c. CORRECT. The loss of flow would cause an instrument malfunction alarm, but the flow to the CTBD would continue. If 1-RM-90-121 sensed a hi rad condition the CTBD flow path would be isolated and the SGBD redirected to the condensate header.
d. Incorrect. Blowdown flow path to the CTBD would continue however while it takes both blowdown radiation monitors normal to open the valve, either one in High RAD will cause isolation.

Question Number: 50

K/A: 073 G2.4.35
Process Radiation Monitoring
Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.

Tier:	**2**	**RO Imp: 3.8**	**RO Exam:**	**Yes**	**Cognitive Level:**	**LOW**
Group:	**1**	**SRO Imp: 4.0**	**SRO Exam:**	**Yes**	**Source:**	**NEW**

Applicable 10CFR55 Section: 41.10 / 43.5 / 45.13

Learning Objective: 3-OT-SYS088A, Objective 9: Given a set of plant conditions, determine the correct response of the Containment Isolation System.; 3-OT-SYS090A, Objective 7: Determine Interlocks and/or cause-effect relationships between the Rad Monitoring Systems (ARM & Process) and the areas they monitor. Include HVAC systems and area isolations.

References: SOI-90.02, Gaseous Process Radiation Monitors, Rev 45, Precaution C.
ARI-173-179, U-I Radiation Detectors, Rev 44.
SOI-88.01, Containment Isolation System, Rev 16.
1-47W611-88-1 r23.

Question:

Given the following plant conditions:

- Unit 1 experienced a Reactor Trip/Safety Injection due to a LOCA inside containment.
- When checking annunciators following the trip and SI, the CRO notes that the following annunciators are in alarm:
  - 173B, LWR CNTMT AIR 1-RM-106 RAD HI.
  - 173E, LWR CNTMT AIR 1-RM-106 INSTR MALF.

Assuming all components respond as designed, which ONE of the following actions will the NAUO take due to the above conditions?

A. Reopen the radiation monitor isolation valve which restores flow through the monitor to restore Tech Spec operability.

B. Restart the radiation monitor pump which restores flow through the monitor to restore Tech Spec operability.

C. Stop the radiation monitor pump to prevent damage to the pump due to the monitor being isolated as a result of the safety injection.

D. Close the radiation monitor isolation valves to isolate monitor due to the pump being tripped as a result of the safety injection.

DISTRACTOR ANALYSIS

a. Incorrect. The valves automatically isolated due to the CVI signal, however they should not be reopened. The pumps need to be stopped as identified in SOI-90.01 Precaution C and in ARI 173D to prevent damage to the pumps. Plausible because opening the valves restores flow and the monitor is a Tech Spec required monitor.
b. Incorrect. The pump will be running. The valves automatically isolated due to the CVI signal, however the pump does not auto stop. The pumps need to be manually stopped as identified in SOI-90.01 Precaution C and in ARI 173D to prevent damage to the pumps. Plausible, because if starting the pumps were to re-establish flow, the Tech Spec monitor could be restored.
c. CORRECT. The radiation monitor is isolated due to the CVI signal generated by the safety injection. The pumps do not stop and are running with no flow. The pumps need to be stopped as identified in SOI-90.01 Precaution C and in ARI 173D to prevent damage to the pumps.
d. Incorrect. The pumps need to be stopped as identified in SOI-90.01 Precaution C and in ARI 173D to prevent damage to the pumps. The valves automatically isolate due to the CVI signal.