INITIAL SUBMITTAL OF THE WRITTEN EXAMINATION

FOR THE D. C. COOK EXAMINATION - NOV/DEC 2002

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1. 001 002/SRO/001/AOP1CAOP7.5~1/000001 - AA2.03///3H/MASTER - MODIFIED

When Rod Control was placed in AUTO during a Unit 2 power escalation the following conditions were noted:

- Nuclear Instrumentation Power Range Channels 15% and rising
- Power Range Low Power Trip NOT Blocked
- Intermediate Range Trip NOT Blocked
- Control rods withdrawing at 64 steps per minute

Which ONE of the following actions are required in accordance with 02-OHP-4022-012-003, Continuous Control Bank Movement?

a. Trip the reactor if rods do not automatically stop at the 20% Low Power Rod Stop.

b. Trip the turbine and initiate emergency boration.

c. Trip the turbine and verify automatic reactor trip.

d.✓ Trip the reactor if rod motion continues when Rod Control is placed in MANUAL.

ANSWER: D - Per 02-OHP-4022-012-003, Continuous Control Bank Movement, the reactor should be tripped if movement continues after rods are placed in Manual.

A - Incorrect - Rod stop is at 16% power and it has already failed.
B and C - Incorrect - The turbine is not tripped before a reactor trip is attempted.

Lesson Plan/Obj: RO-C-AOP-7 / #5

Reference: 02-OHP-4022-012-003, Continuous Control Bank Movement

Continuous Rod Withdrawal
- Ability to determine and interpret the following as they apply to the Continuous Rod Withdrawal: Proper actions to be taken if automatic safety functions have not taken place

Exam Level:	SRO	Outline Number:	001
Question#_old:	AOP1CAOP7.5~1	KA:	000001 - AA2.03
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	MASTER - MODIFIED

2. 002 002/BOTH/002/NEW/000005 - AK2.02///3H/NEW

The following plant conditions exist:

- Rod H-8 in Control Bank D is at 200 steps.
- The remaining Control Bank D rods are at 219 steps.
- Reactor power is 73%
- A faulty card has been replaced.
- Reactor Engineering has directed that Control Bank D be aligned to Rod H-8.

Which ONE of the following states the action(s) to be taken to perform this recovery?

Open disconnect switch for...

a. rod H-8, select Control Bank D on rod control, set Group Demand Counters to 200 steps, and reposition Control Bank D.

b.✓ rod H-8, select Manual on rod control, and repositon Control Bank D. Group Demand Counters do not need to be changed.

c. Control Bank D rods except H-8, select Bank D on rod control, set Group Demand Counters to 200 steps, and reposition rod H-8.

d. Control Bank D rods except H-8, select Manual on rod control, and repositon rod H-8. Group Demand Counters do not need to be changed.

ANSWER: B - To align Control Bank to the rod, the disconnect for the rod is opened and the rods are aligned in Manual. The Group Demand Counters are correct for the bank and track the rods so they do not need to be reset.

A - Incorrect - Selecting the Bank and resetting the Group Demand Counters is only necessary when restoring the rod to the bank.
C - Incorrect - This will reposition the rod vs. the bank.
D - Incorrect - This will reposition the rod vs. the bank.

Lesson Plan/Obj: RO-C-AOP-6 / #20

Reference: OHP-4022-012-005, Dropped Or Misaligned Rod, Attachment A.

Inoperable/Stuck Control Rod
- Knowledge of the interrelations between the Inoperable/Stuck Control Rod and the following: Breakers, relays, disconnects, and control room switches

Exam Level:	BOTH	Outline Number:	002
Question#_old:	NEW	KA:	000005 - AK2.02
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

3. 003 003/SRO/003/10827/000015 - AA2.02///4H/INPO-MODIFIED

A Component Cooling water leak inside containment has caused reduced flow to the RCPs. The following conditions exist:

- Unit 1 is at 100% power.
- **Temperatures /RCP #**

Temperatures /RCP #	11	12	13	14
Motor Bearing	196°F	178°F	189°F	173°F
Lower Bearing Water	195°F	184°F	201°F	184°F
Seal Leakoff	187°F	176°F	177°F	179°F

- Ann 107 Drop 52, RCP Vibration High - NOT LIT

Which ONE of the following set of actions must be taken?

a.✓ Immediately Trip the Reactor, then trip RCP#11.

b. Open QRV-150, No. 1 Seal Bypass Valve.

c. Perform a rapid Plant Shutdown and stop RCP#13 within 30 minutes.

d. Immediately Trip the Reactor, then trip RCP#13.

Answer: A - Limits for RCPs are Motor Bearing temp <200°F, Lower Bearing Water Temperature <225°F, Seal Leakoff Temperature <185°F. RCP #11 Seal Leakoff Temp is >185°F.

B - Incorrect - Seal Bypass is for low seal leakoff conditions only.
C and D - Incorrect - RCP #13 temps are in spec.

Lesson Plan/Obj: RO-C-AOP-11 / #19

Reference: 01-OHP-4022-016-001, Malfunction Of The CCW System; 01-OHP-4022-002-001, Malfunction Of A Reactor Coolant Pump

Reactor Coolant Pump (RCP) Malfunctions
- Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions: Abnormalities in RCP air vent flow paths and/or oil cooling system

Exam Level:	SRO	Outline Number:	003
Question#_old:	10827	KA:	000015 - AA2.02
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	INPO-MODIFIED

4. 004 006/BOTH/004/NEW/000024 - AK1.01///2H/NEW

Following a rapid power reduction from 80% power due to a Feedwater pump trip, the following plant conditions exist on Unit 1:

- Reactor power is 59%.
- Turbine Power is 620 Mwe.
- Rod Control is in MANUAL.
- All other controls in AUTO.
- Feedwater and Steam Flows are equal.
- An Emergency Boration is being performed per 01-OHP-4021-005-007, Operation Of Emergency Boration Flow Paths, due to the ROD BANK D LOW-LOW (Rod Insertion Limit) alarm being lit.

The procedure states "Check for indication of negative reactivity addition."

Given these conditions, which ONE of the following would be used to verify that negative reactivity is being added?

a. Tref lowering

b.✓ Tavg lowering

c. ROD BANK D LOW-LOW alarm clearing

d. A flow of 44 gpm indicated on QFI-410

Answer: B - Rods are in manual so a lowering Tavg indicates that negative reactivity is being added.

A - Incorrect - Tref is derived from Turbine Impulse pressure. This could lower due to closing the turbine control valves and is not a positive indication of negative reactivity addition.
C - Incorrect - Rod insertion limit alarm clearing is not a positive indication of negative reactivity. Withdrawing rods could also clear the alarm.
D - Incorrect - A flow of 44 gpm is expected through the emergency boration line but it is not a positive indication that negative reactivity is being added to the core. (It could be water or the flow could only be going to the CCP suct but not be injected into core.)

Lesson Plan/Obj: RO-C-AOP-3 / #15

Reference: 01-OHP-4021-005-007, Operation Of Emergency Boration Flow Paths

Emergency Boration
- Knowledge of the operational implications of the following concepts as they apply to Emergency Boration: Relationship between boron addition and change in T-ave

Exam Level:	BOTH	Outline Number:	004
Question#_old:	NEW	KA:	000024 - AK1.01
RO#:		SRO#:	
Difficulty/Level:	2H	Bank:	NEW

5. 005 001/BOTH/005/01EC0C1XX~5/000026 - AA1.07///3F/DEV - DIRECT

The Emergency Remote Shutdown Procedure 2-OHP-4025-R-3-5, Sharing 1E CCW, limits total CCW flow to the CCW Heat Exchangers in BOTH units to no greater than 9,000 GPM, if only one CCW pump is in operation and supplying both units.

This limitation...

a. ensures sufficient CCW capacity to the UNAFFECTED unit.

b.✓ precludes placing BOTH units in jeopardy by overloading the operating CCW pump.

c. minimizes thermal transients on the AFFECTED unit's equipment.

d. precludes exceeding the design flow limits through BOTH unit's CCW Heat Exchangers.

ANSWER: B - Per 2-OHP-4021-016-003, Operation Of CCW System During System Startup and Power Operations, flow for a single CCW pump (continous operation) must be limited to 9,000 gpm for pump runout (overload) concerns.

A - Incorrect - The limitation given (9,000 gpm) is a maximum limit, NOT a minimum limit to ensure flow to the unaffected unit.
C - Incorrect - Maximum flow limit is NOT associated with thermal transients.
D - Incorrect - Maximum flow limit specifically applies to the CCW pumps, NOT the CCW heat exchangers.

Lesson Plan/Obj: RO-C-01600 / #11

Reference: 2-OHP-4025-R-3-5, Sharing 1E CCW; 2-OHP-4021-016-003, Operation Of CCW System During System Startup and Power Operations

Loss of Component Cooling Water (CCW)
- Ability to operate and/or monitor the following as they apply to the Loss of Component Cooling Water: Flow rates to the components and systems that are serviced by the CCWS; interactions among the componenents as they apply to a loss of CCW

Exam Level:	BOTH	Outline Number:	005
Question#_old:	01EC0C1XX~5	KA:	000026 - AA1.07
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	DEV - DIRECT

6. 006 007/BOTH/006/16187/000029 - EA1.13///3H/INPO - MODIFIED
The Unit 2 reactor failed to automatically trip when the reactor coolant pumps tripped.

The following conditions exist after a MANUAL Turbine Trip is attempted per 2-OHP-4023-FR-S-1, Response to Nuclear Power Generation/ATWS step 3.

- Turbine Stop Valve Closed Status Lights - 1 and 3 Lit
- Turbine Stop Valve Closed Status Lights - 2 and 4 NOT Lit
- MAIN TURBINE STOP VALVE CLOSED alarm - Lit
- AMSAC INITIATED alarm - Lit

Which ONE of the following is the NEXT action the operator is required to take?

a.✓ Manually reduce turbine load.

b. Shut the Main Steam Stop Valves.

c. Verify AFW Pumps running.

d. Manually actuate AMSAC.

Answer: A - The turbine is verified tripped by checking all 4 status lights closed. The alarms are lit based on 1 stop valve closed and the AMSAC initiated. Since the turbine is not tripped, 2-OHP-4023-FR-S-1 requires that load be manually reduced.

B- Incorrect -Closing the Main Steam Stop valves is only performed if a manual load reduction does not work.
C- Incorrect - Checking the AFW Pumps running is step 4 but not the next action since the turbine trip has not been verified.
D - Incorrect - Step 2 of 2-OHP-4023-FR-S-1 actuates AMSAC. This is NOT performed in the turbine trip verification step as it is in the 2-OHP-4023-E-0, Reactor Trip or Safety Injection, procedure.

Lesson Plan/Obj: RO-C-EOP04 / #14

Reference: 2-OHP-4023-FR-S-1, Response to Nuclear Power Generation/ATWS

Anticipated Transient Without Scram (ATWS)
- Ability to operate and/or monitor the following as they apply to a ATWS: Manual trip of main turbine

Exam Level:	BOTH	Outline Number:	006
Question#_old:	16187	KA:	000029 - EA1.13
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO - MODIFIED

7. 007 009/BOTH/007/11138/000029 - EK3.10///2F/INPO - DIRECT

Upon entry into OHP-4023-FR-S-1, Response to Nuclear Power Generation/ATWS, which ONE of the following is the fastest method of adding negative reactivity to the core prior to locally opening the Reactor Trip breakers?

a.✓ Manual insertion of control rods

b. Initiation of Emergency Boration

c. Manual actuation of Safety Injection

d. Initiation of maximum AFW flow to the SGs

Answer: A - Control Rods step at 48 Steps/Min in Manual with about 5 pcm/step = 240 pcm/minute.

B - Incorrect - Emergency Boration of 40-50 gpm ~ 1-2 ppm/minute @ 10-15 pcm/ppm = 10-30 pcm/minute with emergency boration.
C - Incorrect - Actuation of SI flow would result in about the same boration rate as emergency boration.
D - Incorrect - Injecting Cold AFW into SGs would cool down the RCS and add Positive Reactivity.

Lesson Plan/Obj: RO-C-EOP04 / #14

Reference: OHP-4023-FR-S-1, Response to Nuclear Power Generation/ATWS

Anticipated Transient Without Scram (ATWS)
- Knowledge of the reasons for the following responses as they apply to the ATWS: Manual rod insertion

Exam Level:	BOTH	Outline Number:	007
Question#_old:	11138	KA:	000029 - EK3.10
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	INPO - DIRECT

8. 008 001/SRO/008/01EOPC0709~1/000040 - 2.4.18///3F/MASTER - DIRECT

During a secondary side fault, following completion of Steam Generator blow down, it is important to minimize and control the amount of RCS heatup in OHP-4023-ES-1-1, SI Termination, to prevent:

a. PRZ overfill and water relief through the PZR PORVs and avoid exceeding tech spec heatup limits.

b. exceeding minimum DNBR limits and limit the ΔP across the faulted SG tubes.

c. exceeding minimum DNBR limits and avoid exceeding tech spec heatup limits.

d.✓ PRZ overfill and water relief through the PZR PORVs and limit the ΔP across the tubes of the faulted SG.

ANSWER: D - In addition to the mass introduced from ECCS injection flow, a heatup of the RCS would cause an expansion of the primary inventory and subsequent refilling of the pressurizer. With NO operator action to control RCS temperature, Tavg will return to No Load conditions (547°F), the Pressurizer will go solid, and the following concerns arise:
- Pressurizer overfill and water relief through the PORVs.
- Excessive Delta P across the faulted SG tubes (limit 1600 psig)

A - Incorrect - Exceeding Tech Spec heatup limits are NOT of concern.
B - Incorrect - Exceeding minimum DNBR limits are NOT of concern.
C - Incorrect - Exceeding minimum DNBR limits and Tech Spec heatup limits are NOT of concern.

Lesson Plan/Obj: RO-C-EOP07 / #9

Reference: RO-C-EOP07, Secondary Side Breaks, E-2 Series EOPs, and Background Information

Steam Line Rupture
- Knowledge of the specific bases for EOPs.

Exam Level:	SRO	Outline Number:	008
Question#_old:	01EOPC0709~1	KA:	000040 - 2.4.18
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	MASTER - DIRECT

9. 009 001/RO/009/MCGUIRE-#92/000055 - EA2.05///4H/DIRECT

A station emergency battery is supplying DC bus loads without a battery charger online. If the equipment on the DC bus does NOT change, which ONE of the following statements describes a vital battery's discharge rate (amps) as the battery is expended?

a. The discharge rate will be fairly constant until the design battery capacity (amp-hours) is exhausted and then will rapidly decrease.

b.✓ The discharge rate will increase steadily until the design battery capacity is exhausted.

c. The discharge rate will decrease steadily until the design battery capacity is exhausted.

d. The discharge rate will initially decrease until approximately 50% design capacity had been expended and then increase until the battery has been exhausted.

ANSWER: B - Recall that Power=Voltage x Current. As the battery discharges the voltage will drop. To maintain a constant power output the current (discharge rate) must increase.

A - Incorrect - The discharge rate increases. This is a typical response for many design systems.
C - Incorrect - The discharge rate increases. The effect of decreasing voltage on discharge rate has been reversed.
D - Incorrect - The discharge rate increases. Incorrect battery theory.

Lesson Plan/Obj: RO-C-ES01 / #3

Reference: RO-C-ES01, Basic DC Circuits

Loss of Offsite and Onsite Power (Station Blackout)
- Ability to determine and interpret the following as they apply to a Station Blackout: When battery is approaching fully discharged

Exam Level:	RO	Outline Number:	009
Question#_old:	MCGUIRE-#92	KA:	000055 - EA2.05
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	DIRECT

10. 010 012/BOTH/010/5132/000055 - EK1.02///3F/INPO - DIRECT

Given the following Unit 1 plant conditions:

- 1-OHP-4023-ECA-0-0, Loss of All AC Power, is in effect.
- Depressurization of Unit 1 steam generators is in progress.

1-OHP-4023-ECA-0-0, step 19 requires the depressurization to be stopped if at least one SG narrow range level cannot be maintained greater than 8%.

Which ONE of the following is the concern behind this requirement?

a.✓ Loss of adequate heat sink due to reduced heat transfer area

b. PTS due to excessive cooldown

c. RCS voiding due to rapid depressurization

d. Loss of natural circulation due to accumulator nitrogen injection

ANSWER: A - If SG levels are allowed to reduce too low, the top of the U-tubes may become uncovered and reduce the heat transfer area.

B - Incorrect - Valid concern based on rate and amount of cooldown not on level in SG.
C - Incorrect - Cooling down the RCS should help reduce voiding in RCS. While the head will still to hot and subject to voiding this concern is not tied to the low SG level.
D - Incorrect - Valid concern but related to the depth of depressurization not the SG level. Depressurization is stopped at 190 psig to ensure RCS pressure stays above that which would allow N2 to inject.

Lesson Plan/Obj: RO-C-EOP14 / #9

Reference: 12-OHP-4023-ECA-0-0, Loss of All AC Power Background

Loss of Offsite and Onsite Power (Station Blackout)
- Knowledge of the operational implications of the following concepts as they apply to the Station Blackout: Natural circulation cooling

Exam Level:	BOTH	Outline Number:	010
Question#_old:	5132	KA:	000055 - EK1.02
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	INPO - DIRECT

11. 011 001/BOTH/011/01051C0010~4/000059 - AK3.01///3F/DEV - DIRECT

Given the following:

- Unit 2 is operating at full power.
- A HIGH alarm is received on R-19, SG Blowdown Sample Radiation monitor.

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

a.✓ Blowdown discharge isolation (DRV 350) trips closed, Blowdown Sample Isolation valves (DCR 301 - 304) trip closed.

b. Blowdown discharge isolation (DRV 350) trips closed, Blowdown Sample Isolation valves (DCR 301 - 304) remain open.

c. Blowdown treatment pump trips, Blowdown Containment Isolation valves (DCR 310 - 340) trip closed.

d. Blowdown treatment pump trips, Blowdown Containment Isolation valves (DCR 310 - 340) remain open.

ANSWER: A - High alarm on R-19 closes DRV 350, DCR-310, 320, 330, & 340 as well as Sample valves DCR-301, 302, 303, & 304

B - Incorrect - DCR 301-304 do NOT remain open.
C - Incorrect - Blowdown treatment pump does NOT trip from R-19.
D - Incorrect - Blowdown treatment pump does NOT trip from R-19.

Note : R-24 (Located downstream at the demineralizers) SG Blowdown Treatment high alarm will close the same valves and also trip the treatment pump.

Lesson Plan/Obj: RO-C-05100 / #13

Reference: 02-OHP-4024-238, Annunciator #238 Response: RMS Electro-Larm, Drop 12

Accidental Liquid Radwaste Release
- Knowledge of the reasons for the following responses as they apply to the Accidental Liquid Radwaste Release: Termination of a release of radioactive liquid

Exam Level:	BOTH	Outline Number:	011
Question#_old:	01051C0010~4	KA:	000059 - AK3.01
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	DEV - DIRECT

12. 012 001/BOTH/012/AOP1CAOP5.17~2/000062 - 2.4.24///4F/DEV - DIRECT

Which ONE of the following describes a procedural requirement of 02-OHP-4022-019-001, ESW System Loss / Rupture, in the event that ESW cannot be IMMEDIATELY restored?

a.✓ Open the doors to the Motor Driven Auxiliary Feedwater Pump rooms.

b. Stop all Upper Containment Ventilation fans.

c. Place both CTS Pumps in Pull-to-lock.

d. Stop all Control Room Air Conditioning Units and place system in ISOLATE.

ANSWER: A - The doors are opened to the Motor Driven AFW pump to provide room cooling if ESW is lost.

B - Incorrect - Upper Containment Ventilation fans are cooled by NESW.
C - Incorrect - CTS pumps are not placed in Pull-to-lock. ESW to the CTS heat exchangers may be affected but it is procedurally isolated.
D - Incorrect - Affected Control Room Air Conditioning Units may be stopped and ESW isolated but the system is NOT placed in ISOLATE as this would increase the heatup rate for the control room.

Lesson Plan/Obj: RO-C-AOP-5 / #17

Reference: 02-OHP-4022-019-001, ESW System Loss / Rupture

Loss of Nuclear Service Water
- Emergency Procedures/Plan
- Knowledge of loss of cooling water procedures.

Exam Level:	BOTH	Outline Number:	012
Question#_old:	AOP1CAOP5.17~2	KA:	000062 - 2.4.24
RO#:		SRO#:	
Difficulty/Level:	4F	Bank:	DEV - DIRECT

13. 013 017/BOTH/013/6023/000067 - AA1.09///3H/INPO - DIRECT

While operating at full power, the operators in Unit 1 Control Room respond to the following:

- Annunciator Panel 101 / Drop 41, 'FIRE' alarm.
- Annunciator Panel 101 / Drop 94, 'REACTOR COOLANT PUMP FIRE OR ABN' alarm.
- Below the #11 RCP control switch, the operators note the following status lights LIT:
  - (White) OPEN/LEAK
  - (Red) FIRE

Which ONE of the following describes the status of the #11 RCP fire protection system?

a. NESW water is being sprayed on #11 RCP.

b.✓ #11 RCP fire protection system is ready for manual initiation.

c. Fire Suppression System water is being sprayed on #11 RCP.

d. #11 RCP fire protection system will automatically initiate spray water to the RCP approximately 2 minutes after the red and white lights both illuminate.

ANSWER: B - RCP Fire Protection Spray is manually initiated after verification.

A - Incorrect - NESW is only supplied after Manual actuation.
C - Incorrect - Fire Suppresion System water is not used for RCPs
D - Incorrect - Fire suppression will spray for 1 minute after it is actuated manually.

Lesson Plan/Obj: RO-C-AS17 / #4

Reference: 01-OHP-4024-101, Annunciator #101 Response: Plant Fire System, Drops 41 and 94; 01-OHP-4022.66.001, RCP Fire Protection System Actuation; RO-C-AS17, Water Fire Protection

Plant Fire on Site
- Ability to operate and/or monitor the following as they apply to the Plant Fire on Site: Plant fire zone panel (including detector location)

Exam Level:	BOTH	Outline Number:	013
Question#_old:	6023	KA:	000067 - AA1.09
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO - DIRECT

14. 014 022/SRO/014//000067 - AA2.07///4H/NEW

Given the following:

- Unit 1 is in Mode 5.
- The U-1 AB EDG is available.
- The U-1 CD EDG is available.
- The U-1 East Motor Driven AFW pump is available.
- The U-1 West Motor Driven AFW pump is Tagged Out

- Unit 2 is in Mode 1.
- The U-2 East AFW Pump is Tagged Out for discharge valve replacement.

- All other equipment is operable.

Maintenance requests to tag out the U-1 CD EDG for a Governor replacement.

Without any compensating measures (fire watches), would this be allowed or disallowed per the requirements of 01-OHP-4030-066-4025, Unit 1 Appendix R and Ventilation Requirements for Unit 2 surveillance and why?

a. Allowed, because either U-1 EDG is acceptable per the Appendix R Surveillance.

b. Allowed, because NO U-1 EDG power is required as long as an AFW pump from each train is available (U-2 West and U-1 East).

c.✓ Disallowed, because the U-1 CD EDG is required to support the U-1 East AFW pump availability to U-2 since a U-2 fire could cause a loss of Unit 1 Offsite power.

d. Disallowed, because the U-1 CD EDG is required to support the U-1 East AFW pump availability to U-2 whenever the U-2 East AFW pump is inoperable.

ANSWER: C - DG power is required for the U-1 Equipment Supporting Unit 2 per the Appendix R Surveillance 01-OHP-4030-066-4025. Per the Background Document - Assumptions page 44 an unresolved question concerning cable routing poses the potential for an Appendix R fire at U-2 to cause a loss of Offsite power at U-1. The CD DG is required to support the East AFW Pump.

A - Incorrect - the DG corresponding to the East AFW pump is required since the U-1 West AFW pump is OOS.
B - Incorrect - a U1 DG is required to support Appendix R equipment whenever Unit 2 is in Modes 1-4.
D - Incorrect - the CD DG is required regardless of the U-2 AFW Pump Status.

Lesson Plan/Obj: RO-C-05600 / #20

Reference: 01-OHP-4030-066-4025, U-1 Appendix R and Ventilation Requirements for U-2, Attachment 17 page 44

Plant Fire on Site
- Ability to determine and interpret the following as they apply to the Plant Fire on Site: Whether malfunction is due to common-mode electrical failures

Exam Level:	SRO	Outline Number:	014
Question#_old:		KA:	000067 - AA2.07
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	NEW

15. 015 001/BOTH/015/01EOPC1307~2/000069 - AK1.01///3F/MASTER - DIRECT

The operators are performing OHP-4023-FR-Z-1, Response to High Containment Pressure, in response to containment pressure of 4.6 psig during an accident.

The operators are required to check if feedwater should be isolated to any SG in order to:

a. prevent possible SG overfill from over pressurizing the steamlines.

b. raise containment integrity by reducing the number of open penetrations.

c.✓ minimize containment pressure rise due to faulted SG(s).

d. reduce the potential for causing a feedline break due to thermal stresses.

ANSWER: C - The procedure only checks for Faulted SGs. It performs actions that will limit the pressure rise in Containment.

A - Incorrect - SG overfill would not overpressurize the Steam Lines. SG Safeties will limit SG Steam Line Pressures to Less than SG Hydro pressures.
B- Incorrect - AFW lines to the SGs are designed for accident conditions and should not cause a significant concern.
D - Incorrect - AFW line design takes into account thermal stresses.

Lesson Plan/Obj: RO-C-EOP13 / #07

Reference: 12-OHP-4023-FR-Z-1, Response to High Containment Pressure Background

Loss of Containment Integrity
- Knowledge of the operational implications of the following concepts as they apply to Loss of Containment Integrity: Effect of pressure on leak rate

Exam Level:	BOTH	Outline Number:	015
Question#_old:	01EOPC1307~2	KA:	000069 - AK1.01
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	MASTER - DIRECT

16. 016 001/BOTH/016/TS~38/000069 - AK2.03///2F/DEV - MODIFIED

Which ONE of the following conditions represents a LOSS of CONTAINMENT INTEGRITY in accordance with Technical Specification 3.6.1.1, Containment Integrity?

a. While in MODE 1, an electrician opens the outer airlock door at the lower containment access without prior approval.

b.✓ While in MODE 3, during an inspection of an equipment hatch, it is determined that the equipment hatch is NOT sealed.

c. While in MODE 4, Containment internal pressure is found to be -0.5 psig prior to placing Containment Purge in service.

d. While in MODE 5, during performance of the Overall Integrated Containment Leakage Rate Test, Containment leakage exceeds the maximum allowable Technical Specification leakage rates.

ANSWER: B - All equipment hatches are required to be closed and sealed in Modes 1 - 4 per Tech. Spec. 1.8.2.

A - Incorrect - One airlock door may be opened for normal entry / exit while in Modes 1 - 4 per T.S. 3.6.1.3.
C - Incorrect - Containment pressure limits are -1.5 to +0.3 psig during Modes 1 - 4 per T.S. 3.6.1.4.
D - Incorrect - Overall Containment leakrate only applies in Moder 1 - 4 per T.S. 3.6.1.2.

Lesson Plan/Obj: RO-C-TS01 / #12

Reference: Tech Spec 1.8.2

Loss of Containment Integrity
- Knowledge of the interrelations between the Loss of Containment Integrity and the following: Personnel access hatch and emergency access hatch

Exam Level:	BOTH	Outline Number:	016
Question#_old:	TS~38	KA:	000069 - AK2.03
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	DEV - MODIFIED

17. 017 001/SRO/017/NEW/000074 - 2.4.29///3H/NEW

Given the following:

- A 800 gpm LOCA has occurred on Unit 1.
- A number of failures occurred with ECCS equipment which resulted in Core Exit Temperatures reaching 1255°F 20 minutes ago.
- Restoration efforts have been ineffective so far.
- Containment radiation level is 2.37 R/Hr.
- Containment Pressure is 4.6 psig.
- DAP is inoperable.

Which ONE of the following represents the correct Emergency Plan Classification and impact to the fission product barriers? (PMP-2080-EPP-101, Emergency Classification, attached)

a. Alert due to LOSS of RCS. Cladding and Containment are INTACT.

b. Site Area Emergency due to LOSS of RCS and POTENTIAL LOSS of Cladding. Containment is INTACT.

c. General Emergency due to POTENTIAL LOSS of RCS, LOSS of Cladding, and LOSS of Containment.

d.✓ General Emergency due to LOSS of RCS, LOSS of Cladding, and POTENTIAL LOSS of Containment.

ANSWER: D - Core Exit Temperatures of 1255°F represent a Core Cooling Red Path. (Loss of Cladding) A Break of 800 gpm exceeds capacity of both CCPs. (Loss of RCS) Core Cooling Red Path with recovery efforts ineffective for >15 minutes. (Loss of Containment)

A - Incorrect Cladding and Containment Both at a LOSS level.
B - Incorrect Cladding and Containment Both at a LOSS level.
C - Incorrect RCS at a LOSS level.

Lesson Plan/Obj: RO-C-EOP10 / #22

Reference: PMP-2080-EPP-101, Emergency Classification

Inadequate Core Cooling
- Emergency Procedures/Plan
- Knowledge of the emergency plan.

NOTE: Attach selected pages from PMP-2080-EPP-101, Emergency Classification.

Exam Level:	SRO	Outline Number:	017
Question#_old:	NEW	KA:	000074 - 2.4.29
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

18. 018 002/SRO/018/NEW/000074 - EA2.05///4H/NEW

The following conditions exist:

- The Unit 1 reactor tripped 10 minutes ago and a LOCA is in progress.
- RCS wide range pressure is 1800 psig and slowly lowering.
- No CCPs are running.
- RCS Core Exit Temperatures are 755°F.
- Containment pressure is 3.5 psig and stable.
- PRZ level is 56% and rising.
- RWST level is 55% and lowering.

With these indications, PRZ level is ...

a. NOT a valid indication of RCS inventory and RWST level is as expected at this point in the accident.

b.✔ NOT a valid indication of RCS inventory and RWST level is lower than expected at this point in the accident.

c. a valid indication of RCS inventory but RWST level is lower than expected at this point in the accident.

d. a valid indication of RCS inventory and RWST level is as expected at this point in the accident.

ANSWER: B - When the RCS is at saturated conditions (RCS Core Exit Temperatures are 755°F) PRZ level is not a valid indication of level. The RWST level should indicate closer to 74% (Tech Spec min = 375,500 gallons, Capacity is 420,000 gallons - 375,000 gallons minus 64,000 gallons [2 CTS pumps @ 3200 gpm x 10 minutes] = 311,500 gallons/420,000 gallons = 74%) RCS pressure is too high for RHR & SI injection.

A - Incorrect - RWST level is too low.
C - Incorrect - PRZ level is NOT valid.
D - Incorrect - PRZ level is NOT valid and RWST level is too low.

Lesson Plan/Obj: RO-C-EOP09 / #15

Reference: SOD-00800-001, ECCS-Injection Phase; SOD-00901-001, Containment Spray System

Inadequate Core Cooling
- Ability to determine and interpret the following as they apply to an Inadequate Core Cooling: Trends in water levels of PZR and makeup storage tank caused by various sized leaks in the RCS

Exam Level:	SRO	Outline Number:	018
Question#_old:	NEW	KA:	000074 - EA2.05
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	NEW

19. 019 001/BOTH/019/01011C0018~3/00WE02 - EA1.1///3H/DEV - DIRECT

A Safety Injection (SI) occurred 20 minutes ago due to a large break LOCA, with a failure of reactor trip breaker "B" to open. Which ONE of the following describes the SI signal response after pushing both SI reset pushbuttons?

a.✓ "A" train SI is reset, and "B" train SI is NOT reset.

b. Both "A" train and "B" train SI's are reset.

c. Neither "A" train nor "B" train SI's is reset.

d. "B" train SI is reset, and "A" train SI is NOT reset.

ANSWER: A - With a failure of Train B reactor Trip Breaker to open a P-4 signal is not generated on Train B. With a Large Break LOCA the SI signal will still be present preventing Train B from being reset. The SI reset and P-4 block features are train specific.

B - Incorrect - Train B will not reset.
C - Incorrect - Train A will reset.
D - Incorrect - Train A will reset and Train B will not Reset.

Lesson Plan/Obj: RO-C-01100 / #6

Reference: SOD-1100-002, SSPS Hardware

SI Termination
- Ability to operate and/or monitor the following as they apply to the SI Termination: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Exam Level:	BOTH	Outline Number:	019
Question#_old:	01011C0018~3	KA:	00WE02 - EA1.1
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	DEV - DIRECT

20. 020 032/BOTH/020/NEW/00WE02 - EK2.2///3H/NEW

A steamline break has occurred on Unit 1 SG #11. The break was isolated and Safety Injection (SI) has just been terminated. The following plant conditions exist:

- East CCP aligned to VCT with normal charging and letdown in service
- SI and RHR pumps shutdown
- RCPs are stopped
- Pressurizer pressure = 1800 psig and rising
- Pressurizer level = 64% and rising
- RCS Core Exit temperature = 533°F and rising
- Containment pressure = 0.1 psi
- SG levels (NR) 0%(#11), 13%(#12), 20%(#13), 20%(#14)
- SG pressures (psig) 0(#11), 825(#12), 830(#13), 830(#14) and stable

Which ONE of the following actions are required for plant recovery and why?

a.✓ Raise AFW flow to stabilize the heatup to prevent pressurizer overfill.

b. Raise Charging flow to raise the Pressurizer level to 82% to enable RCP start.

c. Reinitiate High Head SI flow to stop the heatup.

d. Close SG PORVs to allow plant to return to normal temperature and pressure.

ANSWER: A - Increasing AFW flow will help to recover SG levels and stabilize the plant heatup.

B - Incorrect - Pressurizer Level is only increased to 82% for an RCP start in the case of RCS voiding. The RCS is adequately subcooled in this situation.
C - Incorrect - High head SI flow is not required to stabilize heatup. High Head SI flow will increase RCS Volume and contribute to the likelyhood of an overpressurization of the RCS.
D - Incorrect - Allowing Temperature and pressure to return to normal is undesireable given these conditions.

Lesson Plan/Obj: RO-C-EOP02 / #17

Reference : OHP-4023-ES-1-1, SI Termination Background

SI Termination
- Knowledge of the interrelations between the SI Termination and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation

Exam Level:	BOTH	Outline Number:	020
Question#_old:	NEW	KA:	00WE02 - EK2.2
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

21. 021 002/BOTH/021/EOP15~47/00WE06 - EK1.1///3H/DEV - MODIFIED

Given the following:

- The crew has entered OHP-4023-FR-C-2, Response to Degraded Core Cooling.
- RCS Hot Leg Temperatures are 300°F.
- RVLIS NR indication 37%.

Which ONE of the following would be most effective in restoring core cooling?

a. Depressurizing SGs to Atmospheric Pressure.

b. Aligning BIT flow from the Opposite Unit.

c.✓ Starting a Residual Heat Removal Pump.

d. Starting a Reactor Coolant Pump.

ANSWER: C - An RHR pump will provide the greatest injection flow to restore inventory and thus will restore core cooling. At this temperature with the RCS Saturated, pressure will be less than 60 psig resulting in ~3000 gpm from the RHR pump.

A - Incorrect - Further depressurization of the SGs will not significantly add to RCS cooling. With RCS hot leg temperatures at 300°F SG pressures would be ~52 psig. The RCS needs inventory makeup to restore cooling.
B - Incorrect - BIT flow from the opposite unit will be limited to ~ 50 gpm.
D - Incorrect - Without makeup to the RCS starting the RCPs will not significantly add to core cooling.

Lesson Plan/Obj: RO-C-EOP10 / #5

Reference: 12-OHP-4023-FR-C-2, Response to Degraded Core Cooling Background

Degraded Core Cooling
- Knowledge of the operational implications of the following concepts as they apply to the Degraded Core Cooling: Components, capacity, and function of emergency systems

Exam Level:	BOTH	Outline Number:	021
Question#_old:	EOP15~47	KA:	00WE06 - EK1.1
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	DEV - MODIFIED

22. 022 034/RO/022/10932/00WE09 - EA1.3///3F/INPO - DIRECT

The following conditions exist:

- Reactor has tripped from 100% power due to a loss of off-site power.
- Natural circulation has been verified.

Which ONE of the following describes the response of core Delta T if the plant remains in hot shutdown?

a.✔ Delta T will lower due to the smaller heat generation over time.

b. Delta T will rise as the water in the SGs heats up.

c. Delta T will rise due to lack of cooling to the upper vessel head.

d. Delta T will lower due to the the addition of cold AFW to the SGs.

ANSWER: A - Decay heat production lowers over time. Delta T across the core is determined by the temperature cold leg temperature and the temperature of the fluid exiting the core. Since the fluid exiting the core is subjected to less heating the DT will lower.

B - Incorrect - To maintain natural circulation heat is removed from the SGs so they would not be expected to heat up. Even if they did this would effect the temperature differential between the SG and RCS but not the Delta T across the core.
C - Incorrect - The Reactor vessel head will cool slower than the rest of the vessel due to lower flow. This will not affect the temperature of the water exiting the core (Core Exit Temps).
D - Incorrect - Delta T across the core is determined by the cold leg temperature and the temperature of the fluid exiting the core. The cold AFW may cause cooler water to enter the core but the Delta T is determined by the amount of heat the core adds.

Lesson Plan/Obj: RO-C-EOP03 / #7

Reference: RO-C-EOP03, Plant Trips, Diagnosing Accidents, Natural Circulation Cooldown, E-0 Series EOPs, and Background Information

Natural Circulation Operations
- Ability to operate and/or monitor the following as they apply to the Natural Circulation Operations: Desired operating results during abnormal and emergency situations

Exam Level:	RO	Outline Number:	022
Question#_old:	10932	KA:	00WE09 - EA1.3
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	INPO - DIRECT

23. 023 001/BOTH/023/01EOPC0315~5/00WE09 - EK3.2///3H/MASTER - DIRECT

Unit 2 operators are performing 2-OHP-4023-ES-0-2, Natural Circulation Cooldown.

- 2-OHP-4023-ES-0-2, Natural Circulation Cooldown, has been entered because offsite power had been lost.
- The EDGs started and energized the AC emergency buses.
- The CRDM cooling fans cannot be manually loaded onto the AC emergency buses.
- Condensate Storage Tank water inventory is adequate for the cooldown.

Which ONE of the following describes HOW the inoperability of the CRDM fans affects the cooldown and depressurization?

a. It has no effect because the amount of RCS heat removed by running the CRDM fans is insignificant compared to the heat removed by steaming the secondary plant.

b.✓ The total upper head area cooldown rate will be less, so greater subcooling must be maintained.

c. Transition to 2-OHP-4023-ES-0-3, Natural Circulation Cooldown with Steam Void in Vessel, will be required because cooldown and depressurization will cause formation of a void in the upper head area.

d. Less subcooling should be maintained to enhance the cooldown of the upper head area, which reduces the formation of voids.

ANSWER: B - 02-OHP-4023-ES-0-2, Natural Circulation Cooldown requires an RCS subcooling of 220°F in the event CRDM fans are NOT running to preclude void formation in the upper head. Normal natural circulation RCS subcooling is 86°F.

A - Incorrect - Does NOT address the issue of a reduced upper head cooldown rate.
C - Incorrect - Transition to 2-OHP-4023-ES-0-3, Natural Circulation Cooldown with Steam Void in Vessel, is NOT required given conditions which do NOT warrant an increased cooldown rate on natural circulation (i.e., CST inventory adequate for cooldown).
D - Incorrect - The absence of the CRDM fans requires a greater RCS subcooling.

Lesson Plan/Obj: RO-C-EOP03 / #8

Reference: 02-OHP-4023-ES-0-2, Natural Circulation Cooldown, step 14

Natural Circulation Operations
- Knowledge of the reasons for the following responses as they apply to the Natural Circulation Operations: Normal, abnormal and emergency operating procedures associated with Natural Circulation Operations

Exam Level:	BOTH	Outline Number:	023
Question#_old:	01EOPC0315~5	KA:	00WE09 - EK3.2
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	MASTER - DIRECT

24. 024 001/BOTH/024/12EOPC0315~2/00WE10 - EK2.2///3F/MASTER - DIRECT
The second step of OHP-4023-ES-0-3, Natural Circulation Cooldown With Steam Void in Vessel, directs the operator to try to start a Reactor Coolant Pump in accordance with OHP-4023-SUP-010, Starting Reactor Coolant Pump(s). Assuming that RVLIS indicates less than full, why is Pressurizer Level required to be raised to 82% prior to starting a RCP?

a. Ensure that the RCP will have sufficient Net Positive Suction Head for the given plant conditions.

b.✓ Ensure that when the RCP is started a subsequent decrease in Pressurizer Level will not uncover the heaters and/or result in a loss of pressure control.

c. Ensure that there is sufficient mass in the Pressurizer to fill the vessel head should a bubble form, to prevent allowing saturated fluid from entering the SG tubes.

d. Ensure that the Pressurizer will be able to maintain RCS pressure high enough to prevent Nitrogen injection from the Accumulators.

ANSWER: B - Per 02-OHP-4023-SUP-010, Starting Reactor Coolant Pump(s), Pressurizer level is raised to >82%, subcooling to at least 58°F, and Pressurizer heaters are energized to saturate the Pressurizer if the vessel is NOT full. This is done to prevent emptying the Pressurizer.

A - Incorrect - NPSH requirements for the RCP are met by verifying proper seal Delta P.
C - Incorrect - Based on OHP-4023-ES-0-3, , Natural Circulation Cooldown With Steam Void in Vessel, a void / steam bubble already exists in the vessel. With a RCP started, any saturated fluid will be quickly condensed.
D - Incorrect - Nitrogen from the Accumulators will NOT inject until RCS pressure is <140 psig and the liquid volume of the accumulators has been injected. This is below the pressure at which a RCP may be operated.

Lesson Plan/Obj: RO-C-EOP03 / #8

Reference: OHP-4023-ES-0-3, Natural Circulation Cooldown With Steam Void in Vessel; 02-OHP-4023-SUP-010, Starting Reactor Coolant Pump(s)

Natural Circulation with Steam Void in Vessel with/without RVLIS
- Knowledge of the interrelations between the Natural Circulation with Steam Void in Vessel with/without RVLIS and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems and relations between operation of these systems to operation of the facility.

Exam Level:	BOTH	Outline Number:	024
Question#_old:	12EOPC0315~2	KA:	00WE10 - EK2.2
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	MASTER - DIRECT

25. 025 012/SRO/025/NEW/00WE14 - 2.4.4///3H/NEW

Unit 2 is experiencing a LOCA and the STA monitoring the Critical Safety Functions notes the following indications:

- WR log power	0%
- WR startup rate	Negative
- Containment Pressure	13 psig
- CETC's 5 highest	760°F
- RVLIS Narrow Range	76%
- Pressurizer Level	0%
- RCS Pressure	480 psig
- AFW Flow	300 x10^3 pph

S/G	#21	#22	#23	#24
- Narrow Range S/G Levels	12%	15%	16%	12%

Given the conditions described above, to which ONE of the following procedures should the SRO transition?

a. 2-OHP-4023-FR-C-2, Response to Degraded Core Cooling

b. 2-OHP-4023-FR-I-2, Response to Low Pressurizer Level

c.✓ 2-OHP-4023-FR-Z-1, Response to High Containment Pressure

d. 2-OHP-4023-FR-H-1, Response to Loss of Secondary Heat Sink

ANSWER: C - Containment Pressure of >12 psig is a RED path requiring 2-OHP-4023-FR-Z-1.

A - Incorrect - 2-OHP-4023-FR-C-2 is identified by RCS Temp >752°F and RVLIS >46% but it is an ORANGE path so it has a lower priority.
B - Incorrect - 2-OHP-4023-FR-I-2 is indicated by Pressurizer level <17% but it is a YELLOW path so it has a lower priority.
D - Incorrect - 2-OHP-4023-FR-H-1 is not indicated. ALL SGs are <24% (adverse) but AFW flow is sufficient and so the only H series procedure would be a YELLOW path for 2-OHP-4023-FR-H-5.

Lesson Plan/Obj: RO-C-EOP01 / #23

Reference: OHI-4023, Abnormal /Emergency Procedure User's Guide; Critical Safety Function Status Trees

High Containment Pressure
- Emergency Procedures/Plan
- Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.

Exam Level:	SRO	Outline Number:	025
Question#_old:	NEW	KA:	00WE14 - 2.4.4
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

26. 026 001/BOTH/026/01EOPC1313~2/00WE14 - EK3.1///4H/MASTER - DIRECT

Given the following:

- A LOCA occurred on Unit 2 thirty minutes ago.
- The STA has just identified an orange path for Containment Pressure.
- The crew has transitioned to 2-OHP-4023-FR-Z-1, Response To High Containment Pressure, from 2-OHP-4023-E-1, Loss Of Reactor Or Secondary Coolant.
- ONLY one Train of ECCS pumps are operating.
- Operating RHR and CTS pump suctions are aligned to the recirculation sump.
- Step 4 of 2-OHP-4023-FR-Z-1 directs the crew to "Check if RHR Spray is Required".

Based on the indications above, which ONE of the following would best describe the required action and reason for the decision?

a. Place RHR spray in service since all of the requirements are met.

b.✓ Place RHR spray in service only after RHR has injected for 50 minutes to ensure adequate core cooling.

c. Do NOT place RHR spray in service because the RHR pump suction is not aligned to the RWST.

d. Do NOT place RHR spray in service because only one RHR pump is operating.

ANSWER: B - RHR May be required if only 1 CTS pump is operating. After RHR has injected for 50 minutes the core is sufficiently cooled to allow RHR to be diverted to support spray functions.

A - Incorrect - RHR has NOT injected for 50 minutes. (A LOCA occurred on Unit 2 thirty minutes ago.)
C - Incorrect - RHR spray is required 50 minutes after the accident. It is assumed that RHR will be on Recirculation at this time.
D - Incorrect - After RHR has injected for 50 minutes the core is sufficiently cooled to allow RHR to be diverted to support spray functions.

Lesson Plan/Obj: RO-C-EOP13 / #13

Reference: 12-OHP-4023-FR-Z-1, Response To High Containment Pressure Background

High Containment Pressure
- Knowledge of the reasons for the following responses as they apply to the High Containment Pressure: Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, reactivity changes, and operational limitations and the reasons for these operating characteristics.

Exam Level:	BOTH	Outline Number:	026
Question#_old:	01EOPC1313~2	KA:	00WE14 - EK3.1
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	MASTER - DIRECT

27. 027 042/SRO/027/NEW/000007 - 2.4.48///3H/NEW

Given the following:

- A Reactor trip from 100% power has occurred on Unit 1.
- 1-OHP-4023-E-0, Reactor Trip Or Safety Injection, is being implemented.
- Containment pressure is 0.6 psig and stable.
- SG NR Levels are offscale low.
- RCS pressure is 2150 psig and lowering.
- Control Rod H-8 is indicating 32 steps.
- All systems responded normally to actuation signals.

Which ONE of the following actions should be taken?

a.✓ Transition to 01-OHP-4023-ES-0-1, Reactor Trip Response, and initiate boration for the stuck rod.

b. Transition to 01-OHP-4023-ES-0-1, Reactor Trip Response. Rod H-8 condition is expected so boration is not required for a stuck rod.

c. Initiate Safety Injection and continue with 01-OHP-4023-E-0, Reactor Trip Or Safety Injection, as pressurizer pressure is too low.

d. Initiate Safety Injection and continue with 01-OHP-4023-E-0, Reactor Trip Or Safety Injection, as Steam Generator levels are too low.

ANSWER: A - Rod H-8 and all rods should be less than 10 steps. Plant conditions do not require a Safety Injection. Boration for the stuck rod is initiated in 01-OHP-4023-ES-0-1, Reactor Trip Response .

B - Incorrect - Rod H-8 is expected to be less than 10 steps on Unit 1. Unit 2 Rod H-8 is required to be less than 35 steps.
C - Incorrect - RCS pressure will decrease post trip it is still above the SI setpoint.
D - Incorrect - SG levels will decrease to offscale low post trip. AFW will recover levels.

Lesson Plan/Obj: RO-C-EOP03 / #24

Reference: 01-OHP-4023-E-0, Reactor Trip Or Safety Injection; 01-OHP-4023-ES-0-1, Reactor Trip Response

Reactor Trip
- Emergency Procedures/Plan
- Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions.

NOTE: Unit difference KA 2.2.3 (3.3 / 3.1) - If on Unit 2, correct answer would be "Transition to 02-OHP-4023-ES-0-1. Rod H-8 condition is expected so boration is not required for a stuck rod."

Exam Level:	SRO	Outline Number:	027
Question#_old:	NEW	KA:	000007 - 2.4.48
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

28. 028 003/BOTH/028/NEW/000007 - EA1.09///3F/NEW
Unit 2 has just tripped from 100% power.

Which ONE of the following would be the expected combination of INDICATIONS for CVCS and Pressurizer Level immediately following the trip?

	QFI-200 (Charging Flow)	PRZ Level Trend	QFI-301 (Letdown Flow)
a.✓	Lowering	Lowering	Same
b.	Rising	Rising	Lower
c.	Lowering	Rising	Same
d.	Same	Lowering	Lower

ANSWER: A - Pressurizer level program is determined by Tave. The Level program is 22% to 55%. After a trip, pressurizer level will decrease to the 0% value of 22%. Charging flow will initially decrease as level lowers to its new value.

B - Incorrect - Charging flow & Pressurizer level will not rise.
C - Incorrect - Pressurizer Level will not rise.
D - Incorrect - Letdown will not lower.

NOTE: Unit difference question. Although the answer would be the same the magnitude of the change on Unit 1 would be less. (Unit 1 Level program is 40% to 46%.)

Lesson Plan/Obj: RO-C-00202 / #2

Reference: SOD-00202-003, Pressurizer Level Control System; Tech Data Book, Figure 2-FIG-2-3, Pressurizer Water Level Program

Reactor Trip
- Ability to operate and/or monitor the following as they apply to a reactor trip: CVCS

Exam Level:	BOTH	Outline Number:	028
Question#_old:	NEW	KA:	000007 - EA1.09
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	NEW

29. 029 043/BOTH/029/1924/000027 - AK2.03///3F/INPO - MODIFIED

Given the following:

- The plant is at full power.
- Pressurizer pressure is being controlled in AUTOMATIC with the Pressurizer Pressure Control Selector to the Channel 1/2 position.
- I&C has just completed working on Channel 3 (NPP-153) and requests that control be transferred to Channel 3 to verify proper operation of the channel with the controler.
- Currently, NPP-153 indicates 2350 psig.

Which ONE of the following would be the immediate effect if the operator placed the Pressurizer Pressure Control Selector to the Channel 2/3 position under these conditions?

a. Pressurizer HI PRESS alarm would actuate. The Spray valves and heaters are NOT affected.

b. Spray valves would both fully OPEN and cycling heaters would ENERGIZE.

c.✓ Spray valves would both fully OPEN and cycling heaters would DE-ENERGIZE.

d. Pressurizer HI PRESS alarm would actuate. PORV NRV-153 would open.

ANSWER: C - Pressurizer Spray valves will fully open at 2310 psig. Cycling Heaters are full off at 2250 psig. Selecting Channel 2/3 places Channel 3 as the controlling channel. This will cause the spray valves to open and the heaters to de-energize.

A - Incorrect - The Pressurizer Pressure High Deviation alarm would come in but the spray valves and heaters would be affected.
B - Incorrect - The heaters would not energize.
D - Incorrect - A High Pressure alarm will actuate but PORV NRV-153 requires a controlling channel and a bistable channel to actuate.

Lesson Plan/Obj: RO-C-00202 / #4

Reference : SOD-00202-002, Presssurizer Pressure Control System

Pressurizer Pressure Control (PZR PCS) Malfunction
- Knowledge of the interrelations between the Pressurizer Pressure Control Malfunctions and the following: Controllers and positioners

Exam Level:	BOTH	Outline Number:	029
Question#_old:	1924	KA:	000027 - AK2.03
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	INPO - MODIFIED

30. 030 045/BOTH/030/NEW/000027 - AK3.01///3F/NEW

Given the following:

- A Group pressurizer heaters are out of service.
- A Heatup of the RCS (currently at 485°F) is in progress.
- Pressurizer pressure is currently at 700 psig with all C Group backup heaters ON and both pressurizer spray valves THROTTLED to 20% open.

A transformer fault causes a loss of power to the C Group pressurizer heaters.
What actions are required regarding the pressurizer spray valves and RCS Heatup?

Pressurizer Spray valves ...

a. may remain throttled. The heatup may continue because pressure will continue to rise with the RCS heatup.

b.✓ should be closed and the heatup stopped. Pressure will gradually lower due to the spray bypass and heat losses.

c. should be closed. The heatup may continue because pressure will continue to rise with the RCS heatup.

d. may remain throttled if pressurizer level is raised to maintain pressure. The heatup should be stopped because pressure can not be raised.

ANSWER: B - Leaving the sprays open will cause the pressurizer to cooldown and pressure to lower. Closing the spray valves will help to limit the depressurization. The heatup needs to be stopped to prevent losing RCS Subcooling.

A - Incorrect - If the sprays are left open, pressure will lower and subcooling will be lost.
C - Incorrect - RCS pressure will not rise with the heatup. While increasing temperature will cause some expansion, the cooling from spray bypass and ambient losses will cause a decrease in pressure.
D - Incorrect - Increasing pressurizer level will not dramatically increase pressure. The cooling from spray flow will cause a decrease in pressure and a loss of subcooling.

Lesson Plan/Obj: RO-C-00202 / #9

Reference: RO-C-00202, Pressurizer Pressure and Level Control Lesson Plan

Pressurizer Pressure Control (PZR PCS) Malfunction
- Knowledge of the reasons for the following responses as they apply to the Pressurizer Pressure Control Malfunctions: Isolation of PZR spray following loss of PZR heaters

Exam Level:	BOTH	Outline Number:	030
Question#_old:	NEW	KA:	000027 - AK3.01
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	NEW

31. 031 001/BOTH/031/3492/000032 - AK2.01///3H/INPO - DIRECT

Unit 2 is in MODE 3 with the following conditions:

- Tave 547°F
- Pressurizer pressure 2235 psig
- Reactor trip breakers CLOSED
- Source range counts 52 cps (N31) and 55 cps (N32)
- ALL Control Rod Banks are INSERTED

An MTI technician is troubleshooting power source problems with the NIS drawers that were noted a few days earlier following a reactor trip. During the troubleshooting activities, the following indications are received at the main control boards:

- Panel 210 Drop 46 REACTOR BREAKERS TRIP actuates.
- Panel 210 Drop 2 SOURCE RANGE DETECTOR VOLT FAILURE actuates.
- Panel 210 Drop 3 SOURCE RANGE HIGH FLUX AT SHUTDOWN actuates.
- Source range counts: 52 cps (N31), 0 cps(N32)
- Reactor Trip breakers indicate OPEN.

Which ONE of the following describes what the MTI technician did?

a.✓ pulled the CONTROL POWER fuses for N32 .

b. pulled the INSTRUMENT POWER fuses for N32 with the Level Trip switch in BYPASS.

c. activated the RPS input for the SOURCE RANGE BLOCK.

d. removed power simultaneously to TWO Power Range channels.

ANSWER: A - SR requires Control Power to block (Bypass) the trip signal to RPS. Pulling the Control Power fuses below P-6 will result in a High Flux Trip.

B - Incorrect - with the Level Trip Switch in BYPASS the trip signal will be blocked to RPS.
C - Incorrect - Activating the SR Block to RPS will prevent a trip signal.
D - Incorrect - Removing power to 2 PR channels would cause a loss of both SR channels. (P-10 de-energizes SR).

Lesson Plan/Obj: RO-C-01300 / #12

Reference: SOD-001300-004, Source Range Instrument

Loss of Source Range Nuclear Instrumentation
- Knowledge of the interrelations between the Loss of Source Range Nuclear Instrumentation and the following: Power supplies, including proper switch positions

Exam Level:	BOTH	Outline Number:	031
Question#_old:	3492	KA:	000032 - AK2.01
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO - DIRECT

32. 032 001/BOTH/032/GENERIC~123/000037 - AK1.02///4H/DEV - MODIFIED

During power operation, SG tube leakage was detected and estimated at 50 gpm when RCS pressure was 2200 psig and SG pressure was 800 psig. The plant was shutdown and a cooldown initiated.

Which ONE of the following is the approximate current leak rate if RCS pressure is 1700 psig and SG pressure is 1000 psig? Assume the break size has not changed.

a. 50% of the initial leak rate (~25 gpm)

b.✓ 70% of the initial leak rate (~35 gpm)

c. 141% of the initial leak rate (~70 gpm)

d. equal to the initial leak rate (~50 gpm)

Answer: B - Break flow is Proportional to the Square Root of the Pressure Differential.

$Flow_{int} \propto \sqrt{(2200-800}$

$Flow_{final} \propto \sqrt{(1700-1000)}$

$Flow = \sqrt{(1700-1000)/(2200-800)} \text{ x } 50 = .707 \text{ x } 50 \cong 35.5$

Flow is ~70% of initial or 35 gpm

A - Incorrect - Differential pressure is 1/2 of original but break flow should be proportional to the square root of DP.
C - Incorrect - This swaps the order of the pressures 1400/700 = 2 and the square root of 2 is 1.41.
D - Incorrect - This is original value. The DP changed and so does break flow.

Lesson Plan/Obj: RO-C-GF27 / #10

Reference: RO-C-EOP05, SI Termination, ECCS Flow Reduction, and SI Reinitiation and Actuation; RO-C-GF27, Sensors and Detectors

Steam Generator (S/G) Tube Leak
- Knowledge of the operational implications of the following concepts as they apply to Steam Generator Tube Leak: Leak rate vs. pressure drop

Exam Level:	BOTH	Outline Number:	032
Question#_old:	GENERIC~123	KA:	000037 - AK1.02
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	DEV - MODIFIED

33. 033 001/BOTH/033/NEW/000037 - AK3.02///3F/NEW

Annunciator Panel 139 (Response: Radiation) Drop # 8 Steam Jet Air Ejector Monitor 1900 has the operator plot the reading from Channel SRA-1905 in the event of a HIGH or ALERT alarm.

Which ONE of the following is the reason for plotting the radiation monitor readings?

a. This channel does not get automatically recorded so it must be manually plotted whenever it is in alarm.

b. If the plot shows no change after the initial rise then adjust sample flow rate to sepoint.

c. If the plot is a straight line it is confirmation that the monitor has been contaminated and leakage does not exist.

d.✔ If the plot shows a high rate of change in leakrate, a rapid shutdown will be performed in an attempt to limit the leakage.

ANSWER: D - The readings are plotted to monitor for a growth rate of the leak. If it is too high or the leak is large a shutdown is commenced in a timely manner to limit leakage as per EPRI guidelines.

A - Incorrect - This channel feeds the Radiation Monitoring computer the same as the other channels. Plotting and graphing can be performed on the computer but this chart has trend lines and estimated leak rate values.
B - Incorrect - There are NO provisions to adjust sample flow rate in the annunciator response.
C - Incorrect - A straight line on the plot indicates that the leak rate has stabilized and the frequency may be reduced.

Lesson Plan/Obj: RO-C-AOP-7 / #18

Reference 12-OHP-4024-139, Annunciator #139 Response: Radiation, Drop #8

Steam Generator (S/G) Tube Leak
- Knowledge of the reasons for the following responses as they apply to the Steam Generator Tube Leak: Reset and check of Condensate air ejector exhaust monitor

Exam Level:	BOTH	Outline Number:	033
Question#_old:	NEW	KA:	000037 - AK3.02
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	NEW

34. 034 002/BOTH/034/01EOPC13XX~1/000038 - EA1.16///2F/DEV - DIRECT

Unit 2 control room operators are responding to the symptoms of a SGTR. The ruptured SG PORV controller setpoint is adjusted to 1040 psig to...

a.✓ minimize atmospheric releases and prevent lifting of the code safety valves.

b. prevent unmonitored releases by keeping the SG PORV from lifting.

c. prevent steam generator overpressurization due to overfilling of ruptured steam generator.

d. stabilize ruptured SG pressure and level to prevent an uncontrolled cooldown of the RCS.

ANSWER: A - The setpoint on the ruptured SG PORV is increased to 1040 psig from 1025 psig. This helps to ensure that this PORV will remain closed to prevent releases. The PORV is maintained available so that it can lift prior to the safety valve lifting.

B - Incorrect - The PORV lines are monitored by radiation monitors.
C - Incorrect - The SG will not overpressurize since the SG safeties are set lower than design limits. The PORV setpoint is raised to keep it closed.
D - Incorrect - The SG is isolated and PORV reset to stabilize SG pressure and limit break flow. It will not contribute to an RCS cooldown unless it is faulted.

Lesson Plan/Obj: RO-C-EOP08 / #18

Reference: ERG-HP Background; 12-OHP-4023-E-3, Steam Generator Tube Rupture Background; 2-OHP-4023- E-3, Steam Generator Tube Rupture

Steam Generator Tube Rupture (SGTR)
- Ability to operate and/or monitor the following as they apply to a SGTR: S/G atmospheric relief valve and secondary PORV controllers and indicators

Exam Level:	BOTH	Outline Number:	034
Question#_old:	01EOPC13XX~1	KA:	000038 - EA1.16
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	DEV - DIRECT

35. 035 050/BOTH/035/4184/000038 - EK1.03///3H/INPO - MODIFIED

The control room operators are responding to a SGTR. They have identified and isolated the ruptured S/G.

During the briefing for the initial RCS cooldown, the SRO states that the RCPs should be stopped and natural circulation should be established prior to the cooldown.

The RO states that the RCPs should remain running and forced reactor coolant circulation should be used during the cooldown.

Which ONE of the following identifies which crew member is correct and why?

a. The RO -- because with a SG tube rupture, natural circulation conditions will be difficult to establish.

b.✓ The RO -- because forced circulation will reduce susceptibility to pressurized thermal shock and minimize boron dilution concerns.

c. The SRO -- because once natural circulation is established the ruptured SG will not cooldown and depressurize thereby limiting the total amount of leakage.

d. The SRO -- because natural circulation will preclude any damage to the RCP's and minimize RCS pressure perturbations.

ANSWER: B - Forced circulation will provide better mixing and and a unifrom RCS cooldown rate. If the RCPs are stopped the loop flows on natural circulation will be greatly reduced and cold SI water being injected near the isolated SG may collect near the vessel downcomber and lead to a pressurized thermal shock condition.

A - Incorrect - Natural circulation can be established during a SGTR and is the case used for most design analysis (loss of offsite power).
C - Incorrect - The cooldown and depressurization of the ruptured SG will be slightly less with natural circulation but it will take longer so the total leakage will be greater.
D - Incorrect - Damage to the RCPs is not a concern until depressurization and then only if the RCS is severely depressurized. The RCPs operating will provide a more balanced cooldown and pressure control.

Lesson Plan/Obj: RO-C-EOP08 / #10

Reference: RO-C-EOP08, SGTRs, E-3 Series EOPs, and Background Information

Steam Generator Tube Rupture (SGTR)
- Knowledge of the operational implications of the following concepts as they apply to the SGTR: Natural circulation

Exam Level:	BOTH	Outline Number:	035
Question#_old:	4184	KA:	000038 - EK1.03
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO - MODIFIED

36. 036 001/BOTH/036/NEW/000054 - AA1.02///3H/NEW

Unit 1 Reactor is at 4% power in preparation for Turbine startup with the following conditions:

- West Main Feedwater pump is tripped.
- East Main Feedwater pump is operating.
- AFW pumps are shutdown and aligned for automatic operation.
- AMSAC is aligned in NORMAL.
- Narrow range steam generator levels are now 44%.
- Steam Dumps indicate 8% open.

Which ONE of the following statements correctly describes the AFW pump status immediately after the East Main Feedwater Pump trips?

a. The Motor Driven and Turbine Driven AFW pumps must be manually started.

b.✓ The Motor Driven AFW Pumps have auto started but the Turbine Driven AFW pump must be manually started.

c. The Turbine Driven AFW Pump has auto started but the Motor Driven AFW pumps must be manually started.

d. The Motor Driven and Turbine Driven AFW pumps have auto started.

ANSWER: B - The Motor Driven AFW pumps will auto start on the loss of both Main FW pumps but the Turbine driven AFW pump will not.

A - Incorrect - Motor driven pumps start on loss of Main FW.
C - Incorrect - Turbine driven AFW will only start on Lo-Lo SG level, AMSAC, and RCP Bus UV and Motor Driven will start on these plus loss of Main FW, Blackout, & SI.
D - Incorrect - Turbine driven AFW will not auto start. AMSAC will not ARM until power has been raised to >40%.

Lesson Plan/Obj: RO-C-05600 / #15

Reference: 01-OHP-4022-055-001, Loss of Main FW Pump; 01-OHP-4021-001-006, Power Escalation; SOD -05600-001, Auxiliary Feed System

Loss of Main Feedwater (MFW)
- Ability to operate and/or monitor the following as they apply to the Loss of Main Feedwater (MFW): Manual startup of electric and steam-driven AFW pumps

Exam Level:	BOTH	Outline Number:	036
Question#_old:	NEW	KA:	000054 - AA1.02
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

37. 037 001/RO/037/AS07~15/000060 - 2.3.10///2F/DEV - DIRECT

Which ONE of the following statements is the reason for suspending additions to a Waste Gas Decay Tank when it contains >43,800 curies noble gas?

a.✓ To prevent an uncontrolled release of the tank contents from exceeding 500 mrem whole body dose at the site boundary.

b. To prevent an uncontrolled release of the tank contents from exposing the plant operators to greater than 100 DAC - Hours.

c. To ensure the radioactive gas concentration does not exceed the 10CFR20 Federal Storage Limits.

d. To ensure the radioactive gas concentration does not exceed the tank instrumentation calibration limitations.

ANSWER: A - Tech Spec 3.11.2.2 Bases for Gas Storage Tanks states, "provides assurance that in the tevent of an uncontrolled release of the tank's contents, the resulting total body exposure to an individual at the nearest site boundary will not exceed 0.5 rem." Action statement directs suspending all additions to the tank if limits are exceeded.

B - Incorrect - DAC-Hours is a measurement used by RP to estimate internal dose from airborne sources for onsite radiation workers.
C - Incorrect - 10CFR20 contains occupational dose limits for radiation workers on site.
D - Incorrect - Waste gas decay tanks do NOT have instrumentation calibration limits for radioactive concentration.

Lesson Plan/Obj: RO-C-02300 / #11

Reference: Tech Spec Bases 3.11.2.2

Accidental Gaseous Radwaste Release
- Radiological Controls
- Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.

Exam Level:	RO	Outline Number:	037
Question#_old:	AS07~15	KA:	000060 - 2.3.10
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	DEV - DIRECT

38. 038 001/BOTH/038/12EPPC0702~1/000060 - AK1.04///2F/MASTER - DIRECT

A gaseous release from the auxiliary building is indicated on the same channel of both unit vent monitors.

Which ONE of the following describes the flow rate that should be input into the Dose Assessment Program in order to predict the resulting radiological exposure?

a. Sample flow rate of the highest reading vent monitor.

b. Vent flow rate of the highest reading vent monitor.

c.✓ Vent flow rate of each vent monitor.

d. Sum of the vent flow rates being monitored.

ANSWER: C - To provide an accurate dose assessment, the Dose Assessment Program has provision to input the flow rate of each unit vent as well as the activity associated with that vent. The unit source of the activity can be identified when the opposite unit vent is affected.

A - Incorrect - The sample flow indicates proper monitor flow and not the release flow. Additionally, both stacks must be used.
B - Incorrect - Flow is from both stacks and so using just the highest would result in under calculating the release.
D - Incorrect - Differences in vent activity must also be accounted for to provide an accurate dose assessment.

Lesson Plan/Obj: ST-C-EP07 / #2

Reference: PMP-2080-EPP-108, Initial Dose Assessment; ST-C-EP07, Initial Dose Assessment

Accidental Gaseous Radwaste Release
- Knowledge of the operational implications of the following concepts as they apply to Accidental Gaseous Radwaste Release: Calculation of offsite doses due to a release from the power plant

Exam Level:	BOTH	Outline Number:	038
Question#_old:	12EPPC0702~1	KA:	000060 - AK1.04
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	MASTER - DIRECT

39. 039 001/SRO/039/NEW/000061 - AA2.03///4H/NEW

In Unit 2 Control Room during normal at power operations, the Reactor Operator notices that the Control Room Ventilation System has automatically re-aligned, although no alarms were received. He reports that the following conditons exist:

2-HV-ACRDA-1:	Outside Air AHU Damper	CLOSED
2-HV-ACRDA-1A:	Outside Air AHU Damper	CLOSED
2-HV-ACRDA-2:	Outside Air to Przn Fltr Damper	PARTIALLY OPEN
2-HV-ACRDA-3:	CR Air to Przn Filter Recirc Damper	OPEN
2-HV-ACRDA-2A:	Outside Air to Przn Fltr Damper	CLOSED
2-HV-ACRF-1:	Control Rm Przn Fan	RUNNING
2-HV-ACRF-2:	Control Rm Przn Fan	RUNNING

Which ONE of the following areas should be the focus of troubleshooting the lack of alarms?

a. Toxic Gas Control Room Ventilation Isolation actuation

b.✓ HIGH Radiation alarm on ERA-8401, Unit 2 Control Room Local Area Monitor

c. Control Room Cable Vault Halon or CO_2 actuation

d. HIGH Radiation alarm on VRS-2500, Unit Vent Effluent Monitor

ANSWER: B - High radiation on the control room area monitor causing the Control Room ventilation to align as shown with the pressurization fans running, the filter in service and the recirc damper open.

A - Incorrect - Placing ventilation in toxic gas isolation is a manual operation and requires the recirc damper to be closed.
C - Incorrect - On a CO_2 Actuation the recirc damper will remain closed.
D - Incorrect - Control Room Ventilation will not automatically align from VRS-2500.

Lesson Plan/Obj: RO-C-2801A / #8

Reference: 12-OHP-4024-139, Annunciator #139 Response: Eberline Radiation, Drop 15

Area Radiation Monitoring (ARM) System Alarms
- Ability to determine and interpret the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: Setpoints for alert and high alarms

Exam Level:	SRO	Outline Number:	039
Question#_old:	NEW	KA:	000061 - AA2.03
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	NEW

40. 040 002/SRO/040/2640~7/000065 - 2.1.7///3F/MASTER - MODIFIED

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

The SI referred to in this caution may be caused by:

a. high containment pressure due to a rupture of the PRT from operation of the PORVs.

b. high containment pressure due to a loss of ventilation.

c.✓ steamline differential pressure due to uneven cooling of the Steam Generators.

d. low RCS pressure due to loss of Pressurizer pressure control.

ANSWER: C - If Steam line pressure in any SG becomes >100 psig less than the others a SI signal will be generated.

A - Incorrect - Use of the PORVs should be limited so PRT pressure will be controllable.
B - Incorrect - Loss of air should not significantly impact containment ventilation.
D - Incorrect - RCS pressure can be controlled through use of backup heaters and PORVs.

Lesson Plan/Obj: RO-C-AOP-8 / #18

Reference: OHP-4022-064-002, Loss Of Control Air Recovery

Loss of Instrument Air
- Conduct of Operations
- Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Exam Level:	SRO	Outline Number:	040
Question#_old:	2640~7	KA:	000065 - 2.1.7
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	MASTER - MODIFIED

41. 041 001/SRO/041/01064C01XX~4/000065 - AA2.03///3H/MASTER - DIRECT

The MUP operator reports a large air leak on the Plant Air Header south of PRV-11 (Unit 1 Ring Header Isolation valve) AND North of PRV-21 (Unit 2 Ring Header Isolation valve). The Unit-1 Plant Air Compressor (PAC) is running with the Unit-2 PAC in standby.

Which ONE of the following conditions will result? Assume NO operator action taken and NO other equipment failed.

a. The Unit 2 PAC starts and even though the ring header isolation valves close, both units control air headers continue to be supplied by the PACs.

b.✓ The ring header isolation valves will close, and both units Control Air Compressors start and supply their respective units' control air headers.

c. The ring header isolation valves will close, but will NOT isolate the unit control air systems from the leak and both reactors must be manually tripped.

d. The Unit 1 ring header isolation valves close isolating the leak so that the Unit 1 PAC can continue to supply Unit 1 control air. The Unit 2 PAC starts to supply Unit 2 control air.

ANSWER: B - On decreasing air pressure of 85 psig, PRV-10, 11, 20, and 21 will close separating the Units Plant air headers. This also isolates the Plant air tie to the Control air systems (both units). At 90 psig in the Control air systems the Control air compressors start to supply their respective units.

A - Incorrect - Control air headers are isolated from PAC air headers.
C - Incorrect - Control air headers are isolated from the leak by check valves in the line connecting them to the PAC system.
D - Incorrect - The leak location is between U-1 and U-2 ring headers and so both units isolation valves must close to isolate the leak and the CAC headers.

Lesson Plan/Obj: RO-C-06401 / #12

Reference: SOD-06401-002, Plant Air System

Loss of Instrument Air
- Ability to determine and interpret the following as they apply to the Loss of Instrument Air: Location and isolation of leaks

Exam Level:	SRO	Outline Number:	041
Question#_old:	01064C01XX~4	KA:	000065 - AA2.03
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	MASTER - DIRECT

42. 042 058/BOTH/042/NEW/00WE11 - EA2.2///3H/NEW

A LOCA is in progress and both recirculation sump suction valves (ICM 305 and ICM 306) failed to open while transferring to cold leg recirculation. The crew is currently at step 12.b. RNO of OHP-4023-ECA-1-1, Loss of Emergency Coolant Recirculation.

This step directs the crew to establish minimum ECCS flow to remove decay heat per Figure 1. This is to be accomplished by manually aligning ECCS pumps and throttling BIT discharge to cold leg valves as necessary.

Given the following:

- RWST level is 18% and lowering.
- East CCP, South SI & West RHR pumps are running.
- RCS Pressure is 340 psig.
- Minimum ECCS Flow Required per Figure 1 is 280 gpm.

Which ONE of the following describes how this flow will be established?

a. Shutdown RHR Pumps and throttle BIT to 280 gpm of combined CCP and SI pump flow.

b. Shutdown CCP and SI Pumps. RHR pump flow should be about 280 gpm at this pressure.

c. Shutdown SI and RHR Pumps. CCP flow should be about 280 gpm at this pressure without throttling the BIT.

d.✓ Shutdown SI and RHR Pumps and throttle BIT to 280 gpm of CCP flow.

ANSWER: D - The RHR is shutdown because it is not expected to be delivering flow at this pressure. The SI pump is shutdown because its flow at this pressure would be about 700 gpm. CCP flow at this pressure would be about 550 gpm and so the BIT Valves must be throttled.

A - Incorrect - SI pumps do not flow through the BIT lines so they would be injecting ~ 700gpm.
B - Incorrect - RHR Pumps are not expected to inject at this pressure. CCP would be required.
C - Incorrect - CCP flow is expected to be ~ 550 gpm at this pressure.

Lesson Plan/Obj: RO-C-EOP05 / #8

Reference: OHP-4023-ECA-1-1, Loss of Emergency Coolant Recirculation; UFSAR Table 6.2-5 Design Parameters - ECCS pumps; SOD-00800-001, Emergency Core Cooling System - Injection Phase

Loss of Emergency Coolant Recirculation
- Ability to determine and interpret the following as they apply to the Loss of Emergency Coolant Recirculation: Adherence to appropriate procedures and operation within the limitations in the facility's license

Exam Level:	BOTH	Outline Number:	042
Question#_old:	NEW	KA:	00WE11 - EA2.2
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

43. 043 004/RO/043/01EOPC09XX~10/00WE16 - EA2.2///3H/DEV - MODIFIED
Given the following:

- A LOCA that resulted in significant core damage occurred 1.5 hours ago.
- Containment radiation levels rose to a peak of 950,000 R/hr at 20 minutes and have just decreased to 90,000 R/hr.
- Peak containment pressure was 6.2 psig and has been lowering since the peak to the current value of 4.0 psig.

Which ONE of the following describes the effect of containment parameters on implementation of the EOP's?

Adverse containment conditions ...

a. exist due to the current containment radiation dose rate.

b.✓ previously existed because of containment radiation levels and pressure. Adverse values must be used until the integrated dose has been evaluated for lasting effects.

c. previously existed because of containment radiation levels and pressure. Adverse values are no longer required because of the limited integrated dose and pressure reduction.

d. exist due to the current containment pressure.

ANSWER: B - Adverse contianment values are required to be used when containment pressure is >5psig or >10^5 R/Hr. When pressure lowers to <5 psig normal values may be used as long as the integrated dose is <10^6 R. At the levels specified here the integrated dose is above 10^6 R (9.5R/Hr x10^5 for 70 minutes) and so the instruments must be evaluated for lasting effects of the radiation.

A - Incorrect - The current Dose Rate is <10^5R/Hr.
C - Incorrect - The integrated dose is too high to allow normal values to be used.
D - Incorrect - Pressure is <5 psig.

Lesson Plan/Obj: RO-C-EOP01 / #9

Reference: OHI-4023, Abnormal / Emergency Procedure User's Guide, Attachment 2

High Containment Radiation
- Ability to determine and interpret the following as they apply to the High Containment Radiation: Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments

Exam Level:	RO	Outline Number:	043
Question#_old:	01EOPC09XX~10	KA:	00WE16 - EA2.2
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	DEV - MODIFIED

44. 044 001/BOTH/044/01013C5003~3/00WE16 - EK2.1///2F/MASTER - DIRECT

Which ONE of the following will result in the generation of a Containment Ventilation Isolation (CVI) signal on a HIGH Alarm?

a.✔ Upper containment area radiation monitors, VRS-1101/1201

b. Unit vent effluent high range noble gas radiation monitor, VRS-1509

c. Lower Containment high range area monitors, VRA-1310/1410

d. Unit vent effluent low range noble gas radiation monitor, VRS-1505

ANSWER: A - Upper containment area monitors, VRS1101/1201, cause a Containment Ventilation Isolation.

B - Incorrect - VRS-1509 is AB Vent monitor which opens 1-VRV-317 and closes 1-VRV-318.
C - Incorrect - VRA1310/1410 are indication/alarm only. Other channels of the 1300/1400 monitors actuate Containment Ventilation Isolation on Lower Containment Radiation.
D - Incorrect - VRS-1505 isolates 12-RRV-306 waste gas release.

Lesson Plan/Obj: RO-C-01350 / #3

Reference: 12-OHP-4021-013-006, Operation of the Eberline Radiation Monitoring System Control Terminal; SD-01350-001, Radiation Monitor System Details

High Containment Radiation
- Knowledge of the interrelations between the High Containment Radiation and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Exam Level:	BOTH	Outline Number:	044
Question#_old:	01013C5003~3	KA:	00WE16 - EK2.1
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	MASTER - DIRECT

45. 045 001/SRO/045/5314/000028 - 2.2.22///3H/INPO - DIRECT

Given the following plant conditions:

- The plant is operating at 6% power preparing for Turbine roll.
- PRZ level channel (1) NLP-151 failed 4 hours ago. The bistables have been tripped and all actions are complete as per 01-OHP-4022-013-010, Pressurizer Level Instrument Malfunction.
- PRZ level is currently 25% on channel (2) NLP-152 and (3) NLP-153.

Which ONE of the following describes the effects on the plant if PRZ level channel (3) NLP-153 fails high? Assume NO operator actions.

a. A Reactor Trip due to high pressurizer level.

b. A Reactor Trip and Safety injection due to a loss of pressurizer level.

c. The Reactor will not trip, continue with the plant startup.

d.✓ The Reactor will not trip, however the plant must be placed in hot shutdown.

ANSWER: D - With Channel 1 NLP-151 in the tripped condition the High level Rx Trip signal will be made up for 1 channel (1/2 coincidence on remaining channels). The level control selector switch for the pressurizer is in the 2/3 position with channel 3 NLP-153 as the controlling channel. When it fails high a High Level Rx Trip signal is generated but it is blocked by P-7 (Reactor and Turbine power both below 10%).
Plant Shutdown is required due to Tech Spec 3.3.1 (3.0.3).

A - Incorrect - A High Level trip signal is generated from the channel failure (and an actual high level would occur - charging lowers, letdown isolates, pressurizer fills from seal injection) but it is blocked by P-7.
B - Incorrect - A trip & SI will not occur due to loss of level.
C - Incorrect - Startup can not continue due to Tech Specs and a trip if power is increased to >10%.

Lesson Plan/Obj: RO-C-00202 / #27

Reference: SOD-00202-003, Pressurizer Level Control

Pressurizer (PZR) Level Control Malfunction
- Equipment Control
- Knowledge of limiting conditions for operations and safety limits.

Exam Level:	SRO	Outline Number:	045
Question#_old:	5314	KA:	000028 - 2.2.22
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO - DIRECT

46. 046 001/RO/046/NEW/000056 - AA1.37///4H/NEW

Given the following:

- Unit 2 Plant Air Compressor (PAC) is operating with Unit 1 PAC in Standby.
- Both Units are operating at 100% when a tornado causes a Loss of All Offsite Power.
- Both Units EDGs started and are supplying there respective buses.

Which ONE of the following describes the impact to the Unit 1 Plant & Control Air Systems due to the loss of power with NO operator action?

a. Plant Air Compressor is locked out on load shed signal.
Control Air Compressor is locked out on load shed signal.

b.✓ Plant Air Compressor is locked out on load shed signal.
Control Air Compressor will auto start if pressure lowers below auto start setpoint.

c. Plant Air Compressor will start and load.
Control Air Compressor is locked out on load shed signal.

d. Plant Air Compressor will start but NOT auto load.
Control Air Compressor will auto start if pressure lowers below auto start setpoint.

ANSWER: B - The Plant Air Compressor (PAC) receives a load shed (lockout) signal on an undervoltage condition, during the LOOP, and will NOT automatically restart. The Control Air Compressor (CAC) does NOT receive a load shed signal and will have power available when the Vital 600v block loads are re-energized from the CD EDG. The CAC will auto start on low pressure if pressure lowers below the auto start setpoint.

A - Incorrect - The Control Air Compressor does NOT receive a load shed (lockout) signal.
C - Incorrect - The Plant Air Compressor (PAC) will NOT start due to a load shed (lockout) signal. Additionally, the unloader valve on the Standby PAC is maintained in MANUAL therefore the compressor will NOT auto load. The Control Air Compressor does NOT receive a load shed (lockout) signal.
D - Incorrect - The Plant Air Compressor (PAC) will NOT start due to a load shed (lockout) signal.
Lesson Plan/Obj: RO-C-06401 / #6

Reference: RO-C-06401, Compressed Air System, page 28

Loss of Offsite Power
- Ability to operate and/or monitor the following as they apply to the Loss of Offsite Power: Instrument air

Exam Level:	RO	Outline Number:	046
Question#_old:	NEW	KA:	000056 - AA1.37
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	NEW

47. 047 001/BOTH/047/01EOPC0306~1/000056 - AK1.03///3H/MASTER - MODIFIED
Given the following:

- A reactor trip occurred 20 minutes ago due to a Loss of Offsite Power.
- RCS Pressure is 1250 psig.

Which ONE of the following sets of indications show that Natural Circulation conditions exist?

	RCS Core Exit Temp	SG Pressure	RCS CL Temp
a.	536°F	665 psig	498°F
b.	549°F	539 psig	462°F
c.	436°F	870 psig	422°F
d.	543°F	280 psig	434°F

ANSWER: A - RCS Pressure = 1265 psia = 574°F therefore 38°F subcooling and SG saturation temperature is approximately equal to the RCS cold leg temperature.

B- Incorrect - Subcooling is <36°F (25°F)
C- Incorrect - Subcooling is >36°F (138°F) but colder than SG saturation temp of 529°F
D- Incorrect - Subcooling is <36°F (31°F)

Lesson Plan/Obj: RO-C-EOP03 / #6;

Reference: 02-OHP-4023-SUP-011, Natural Circulation Verification

Loss of Offsite Power
- Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: Definition of subcooling: use of steam tables to determine it

NOTE: Provide Steam Tables to answer question.

Exam Level:	BOTH	Outline Number:	047
Question#_old:	01EOPC0306~1	KA:	000056 - AK1.03
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	MASTER - MODIFIED

48. 048 002/SRO/048/NEW/00WE15 - EA2.2///3F/NEW

02-OHP-4023-FR-Z-2, Response to Containment Flooding, addresses flooding in containment as an Orange path.

Which ONE of the following describes why this condition is considered a severe challenge to the critical safety function.

a. Spillover of water to low points away from the recirculation sump may reduce the usable inventory for long term cooling.

b. An unidentified break in containment may jeopardize systems shared with the other unit.

c. Cold water surrounding the outside of the reactor vessel may pose integrity concerns.

d.✓ Critical components necessary for plant recovery may fail if submerged.

ANSWER: D - The Components and instrumentation in containment that are required to operate for long term core cooling have been designed at a height to prevent submerging them when the water level in containment reaches its design level. If the water level is higher than this the continued operation of these components and their ability to support long term cooling is questionable.

A - Incorrect - Water would not be lost due to spillover. The sump and containment is designed to route most of the water to the sump for recirc. If extra fluid were added the level would still be adequate.
B - Incorrect - Loss of water from a shared system would be a concern but the primary focus is on loss of long term cooling.
C - Incorrect - Reactor vessel integrity is NOT of primary concern during implementation of OHP-4023-FR-Z-2, Response to Containment Flooding.

Lesson Plan/Obj: RO-C-EOP13 / #3

Reference: 02-OHP-4023-F-0-5, Containment; 12-OHP-4023-FR-Z-2, Response to Containment Flooding Background

Containment Flooding
- Ability to determine and interpret the following as they apply to the Containment Flooding: Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

Exam Level:	SRO	Outline Number:	048
Question#_old:	NEW	KA:	00WE15 - EA2.2
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	NEW

49. 049 001/RO/049/19553/00WE15 - EK2.2///3F/INPO - MODIFIED

02-OHP-4023-FR-Z-2, Response to Containment Flooding, step #1 states: "Try to identify unexpected source of water to containment.'"

This is based on a water level greater than the design basis flood level as provided by water from the SI Accumulators, RWST, RCS and what other sources?

a.✓ Ice bed melt and steamline break

b. Primary Water and Component Cooling Water

c. Non-Essential Service Water and Fire Protection

d. Essential Service Water and Ice Condenser Refrigeration Glycol

ANSWER: A - Containment design basis flood level takes into account the entire water contents of the RCS, RWST, Ice condenser ice bed melt, and SI accumulators, plus the added mass of a LOCA and a steam line or feedline break inside containment.

B - Incorrect - Primary Water and CCW could be major contributors to a level of > than flood level but are not included in the the design basis flood level.
C - Incorrect - Non Essential Service Water could be a major contributor to a level of > than flood level but are not included in the the design basis flood level.
D - Incorrect - Essential Service Water (from CTS HX leak) and Glycol could be major contributors to a level of greater than flood level but are not included in the the design basis flood level.

Lesson Plan/Obj: RO-C-EOP13 / #10

Reference: 12-OHP-4023-FR-Z-2, Response to Containment Flooding Background; RO-C-EOP13, Containment CSFST, FR-Z Series EOPs and Background Information

Containment Flooding
- Knowledge of the interrelations between the Containment Flooding and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to operation of the facility.

Exam Level:	RO	Outline Number:	049
Question#_old:	19553	KA:	00WE15 - EK2.2
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	INPO - MODIFIED

50. 050 001/BOTH/050/20152/001000 - A2.19///3H/INPO - DIRECT

The following conditions exist on Unit 1:

- Unit 1 is in Mode 1 at 75% power.
- Rod control is in AUTO.
- Control Bank D is at 195 steps.
- Control rods continously withdraw for NO apparent reason.
- Operators place rod control in MANUAL and rod motion stops.
- Operators determine that Control Bank D rods have withdrawn a total of 10 steps.

Which ONE of the following conditions would exist?

a.✓ Axial Flux Difference (AFD) would become more positive / less negative.

b. Overpower Delta Temperature trip (OPDT) setpoint would rise.

c. Nuclear Enthalpy Rise Hot Channel Factor (HCF) would lower.

d. Quadrant Power Tilt Ratio (QPTR) would rise.

ANSWER: A - At higher reactor power levels with rods significantly withdrawn, axial flux will shift positive upon a rod withdrawal.

B - Incorrect - OPDT trip setpoint would decrease as Tavg / Delta T rises.
C - Incorrect - Nuclear Enthalpy Rise HCF would rise as total integrated power along the rod with the highest power rises.
D - Incorrect - QPTR would remain essentially unchanged - no radial flux changes.

Lesson Plan/Obj: RO-C-GF06 / #14

Reference: RO-C-GF06, Control Rods

Control Rod Drive System
- Ability to (a) predict the impacts of the following malfunctions or operations on the CRDS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Axial Flux Difference

Exam Level:	BOTH	Outline Number:	050
Question#_old:	20152	KA:	001000 - A2.19
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO - DIRECT

51. 051 001/RO/051/NEW/001000 - A4.05///4H/NEW

The following Unit 1 plant conditions exist:

A feedwater pump trip causes the plant to runback from 80% power equilibrium conditions to 60% power. The crew immediately reduces reactor power another 15% to 45%.

It is desired to maintain Tavg on program and reactor power constant over the next 5 hours. It is also desired to borate in order to withdraw rods to 210 steps by the end of the 5 hours.

Given:

- Current RCS boron is 500 ppm.
- Current Burnup is 12 GWD/MTU.
- Control Rods are currently at 105 steps on Bank D.
- The Reactor Engineer estimates that Xenon will rise to -2988 pcm from the previous equilibrium value of -2638 pcm over the next five hours.
- Boric Acid Storage Tank Concentration = 6700 ppm
- Differential Boron Worth = -9.4 pcm/ppm

Which ONE of the following is the approximate amount of boric acid that will be need to be added over the next 5 hours? (Figures 3.9, 3.10, and 7.5.1 attached.)

a. 40 gallons

b.✓ 180 gallons

c. 260 gallons

d. 400 gallons

ANSWER: B - Rods @ 105 Steps = -542 pcm and Rods @ 210 Steps = -36 pcm for a rod change of +506 pcm. Xenon changes -350 pcm for a net change of +156 pcm (+506-350). 156pcm/9.4 pcm/ppm = 16.6 ppm (rounded to 17).
Gallons = 66981.3*ln(6700ppm-500ppm/6700-517ppm) = 183.9 gallons
Formula from 1-Figure 7.5.1 Gallons = Constant x ln(BAST-Initial RCSppm/BAST-Final RCSppm)

A - Incorrect - Uses Rod reactivity change of 36 pcm for total change required (3.8 ppm).
C - Incorrect - Uses Rod reactivity of 542 + 36 pcm minus xenon of 350 for a 228 pcm (24 ppm) change.
D - Incorrect - Uses xenon reactivity of 350 pcm (37 ppm) change.

Lesson Plan/Obj: RO-C-NOP01 / #2

Reference: Tech Data Book Figures 3.9, 3.10, and 7.5.1

Control Rod Drive System
- Ability to manually operate and/or monitor in the control room: Determination of the amount of boron needed to back the rods out of the core, including xenon effects if equilibrium is not yet achieved.

NOTE: Attach Figures 3.9, 3.10, and 7.5.1 of Tech Data Book

Exam Level:	RO	Outline Number:	051
Question#_old:	NEW	KA:	001000 - A4.05
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	NEW

52. 052 001/BOTH/052/20154/003000 - K2.02///2F/INPO - DIRECT

Simultaneous faults on BOTH T11A & T11D Buses at 100% Power requires an immediate...

a.✔ reactor trip because the RCP motors will overheat without Component Cooling flow.

b. reactor trip because there is NO charging flow to replace letdown.

c. controlled shutdown because the Charging pump will overheat without Component Cooling flow.

d. controlled shutdown because the RCP seals will overheat without charging flow.

ANSWER: A - Per Loss of CCW procedure, Trip Reactor and Then trip RCPs.

B - Incorrect - Letdown is isolated but to conserve level, a trip is not required.
C - Incorrect - CCPs must be shutdown within 1-2 minutes so a controlled Shutdown is not warranted.
D - Incorrect - RCP seals will oveheat when charging is stopped. An attempt is made to crosstie to the opposite unit. The concern with RCP motor bearings is more severve and requires immediate trip.

Lesson Plan/Obj: RO-C-01600 / #9

Reference:01-OHP-4022-016-004, Loss of Component Cooling Water.

Reactor Coolant Pump System (RCPS)
- Knowledge of bus power supplies to the following: CCW pumps

Exam Level:	BOTH	Outline Number:	052
Question#_old:	20154	KA:	003000 - K2.02
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	INPO - DIRECT

53. 053 001/BOTH/053/GENERIC~66/003000 - K3.04///3H/DEV - MODIFIED

With Unit 2 operating at 20% power level, a fault on the Unit Aux Transformer 2CD causes bus 2C and 2D frequency to drop to 57.8 Hz.

Which ONE of the following best describes the expected plant response?

a. The turbine will runback.

b. RCP's #22 and #23 will trip while RCP's #21 and #24 remain running. A reactor trip will not occur since power is below P-8.

c.✔ All RCPs will trip and a reactor trip will occur.

d. RCP's #22 and #23 will trip while RCP's #21 and #24 remain running. A reactor trip will occur.

ANSWER: C - When Frequency drops below 58.2 Hz a trip signal is sent to all RCPs. This will also cause a Reactor Trip (2/4 RCP bus UF).

A - Incorrect - The Turbine will not runback.
B - Incorrect - RCPs A and B will not remain running. A Reactor Trip will occur.
D - Incorrect - RCPs A and B will not remain running.

Lesson Plan/Obj: RO-C-01100 / #6

Reference: 02-OHP-4024-207, Annunciator #207 Response: Reactor Coolant, Drop 10

Reactor Coolant Pump System (RCPS)
- Knowledge of the effect that a loss or malfunction of the RCPS will have on the following: RPS

Exam Level:	BOTH	Outline Number:	053
Question#_old:	GENERIC~66	KA:	003000 - K3.04
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	DEV - MODIFIED

54. 054 001/BOTH/054/3923/004000 - A1.04///3F/INPO - DIRECT

Given the following plant conditions on Unit 1:

- Reactor power - 50%
- PZR level at program level
- QRV-251 Charging Flow Controller is in MANUAL
- Charging and letdown are balanced

Which ONE of the following describes the effect on the plant if QRV-251 Charging Flow Controller remains in MANUAL and power is increased to 100%?

a.✓ PZR level will RISE.

b. Mass of coolant in the RCS will RISE.

c. Charging flow will LOWER.

d. VCT level will LOWER.

ANSWER: A - With QRV-251 Charging Flow Controller in Manual Charging flow will remain constant since RCS pressure is constant. As the RCS heats up the Pressurizer Level will rise as the water expands.

B - Incorrect - With QRV-251 Charging Flow Controller in Manual Charging flow will remain constant. Since charging and letdown are balanced RCS mass is constant.
C - Incorrect - With QRV-251 Charging Flow Controller in Manual Charging flow will remain constant.
D - Incorrect - With QRV-251 Charging Flow Controller in Manual Charging flow will remain constant. Since charging and letdown are balanced VCT level is constant.

Lesson Plan/Obj: RO-C-00202 / #8

Reference : SOD-0202-003, Pressurizer Level Control

Chemical and Volume Control System (CVCS)
- Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CVCS controls including: PZR pressure and level

Exam Level:	BOTH	Outline Number:	054
Question#_old:	3923	KA:	004000 - A1.04
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	INPO - DIRECT

55. 055 001/RO/055/NEW/004000 - K6.13///3H/NEW

Given the following:

- A manual makeup to the VCT is being performed.
- The Makeup Mode Selector switch is in MANUAL.
- Primary Water (PW) makeup controller QFC-412 is in auto.
- Boric Acid (BA) controller QFC-411 is set at 10 gpm.
- BA flow totalizer is set to 40.0.
- PW flow totalizer is accidently set to 2800 instead of 280.

Manual makeup is started but due to an internal failure the BA flow totalizer fails to count.

Which ONE of the following will occur if the Operator fails to notice the failure?

a. The Boric Acid flow deviation alarm actuates and STOPS all makeup flow after 50 seconds.

b. Primary Water and Boric Acid flow will both start and then STOP almost immediately since the BA flow totalizer is not counting.

c. Primary Water flow will continue for 36 minutes after the Boric Acid flow has stopped leading to a dilution of the RCS.

d.✓ Primary Water and Boric Acid flow will both continue for 36 minutes after they should have stopped, adding more makeup than planned.

ANSWER: D - Flow will continue from both Boric Acid and Primary Water for an additonal 36 minutes over what was planned. PW flow is set to 70gpm in Auto. At 10gpm BA flow & 70 gpm PW for 4 minutes = 40 gallons BA and 280 gallons of PW. Since the PW toatalizer was set for 40 minutes of flow (2800 gallons/70 gpm) and the BA totalizer didn't count, flow will continue until 2800 gallons of PW have been added. BA Flow will continue during this time.

A - Incorrect - The deviation alarm is based on the flow rate and not the totalizer. A flow deviation alarm would stop all flow after 50 seconds.
B - Incorrect - The flow will continue until it is stopped by the PW totalizer.
C - Incorrect - Boric Acid flow will continue along with PW flow since its totalizer is not counting up.

Lesson Plan/Obj: RO-C-00300 / #12

Reference: 02-OHP-4021-005-001, Boron Makeup System Operation and Attachment 7; SOD-00300-002, VCT and CVCS Makeup Systems

Chemical and Volume Control System (CVCS)
- Knowledge of the effect of a loss or malfunction on the following CVCS components: Purpose and function of the boration/dilution batch controller

Exam Level:	RO	Outline Number:	055
Question#_old:	NEW	KA:	004000 - K6.13
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

56. 056 001/BOTH/056/NEW/013000 - A2.04///4H/NEW

Given the following conditions:

- A small break LOCA has occurred.
- CRID 1 Instrument Bus tripped off just before the reactor trip.
- The RO turned both SI Actuation switches to actuate on the Pressurizer Panel.

Concerning the CCP Leak-off valves, which ONE of the following is correct for this situation?

QMO-225 Safety Injection Signal light will ...

a. be lit since a manual SI has been performed.

b. NOT be lit. The RO must manually actuate SI from the Safety Injection Panel switches to cause the light to illuminate and the valve to cycle with pressure.

c.✓ NOT be lit. The RO must manually close QMO-225 if RCS pressure lowers below 1825 psig.

d. NOT be lit. QMO-225 will cycle with pressure since QMO-226 has the Safety Injection Signal light lit.

ANSWER: C - Since CRID 1 is lost, Train A SSPS output relays will not actuate. This is true regardless of which manual switch is turned. Since the relays do not energize, QMO-225 will not receive the SI signal and will not close on SI with low RCS pressure.

A - Incorrect - SSPS output relays have lost power preventing the relay/light from energizing.
B - Incorrect - SSPS output relays have lost power preventing the relay/light from energizing. The SI switches on the SIS panel do not change the status.
D - Incorrect - The relay & associated functions are train Independant. Train A (QMO-225) will not operate with Train B (QMO-226)

Lesson Plan/Obj: RO-C-01101 / #6

Reference: 02-OHP-4023-E-0, Reactor Trip Or Safety Injection; SOD-0300-001, Charging and Letdown System; SOD-1100-002, RPS/ESFAS Signals; SOD-1101-002, SSPS Hardware

Engineered Safety Features Actuation System (ESFAS)
- Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or Operations: Loss of instrument bus

Exam Level:	BOTH	Outline Number:	056
Question#_old:	NEW	KA:	013000 - A2.04
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	NEW

57. 057 002/BOTH/057/01ER0C809~1/013000 - K2.01///3H/DEV - DIRECT

Given the following:

- Offsite power is lost during preparations to establish charging flow per Step 5 of OHP-4023-ES-1-1, SI Termination.
- The DGs start and supply the T-bus loads.
- Thirty seconds later, the STA observes that the SI pumps are no longer running. They were running before the loss of offsite power.

Should the SI pumps have restarted automatically by this point in time and why?

a. Yes. The DG Safety Injection timers should have started the SI pumps.

b. Yes. The DG Blackout timers should have started the SI pumps.

c.✓ No. The DG Safety Injection timers did not actuate because the SI signal has been reset.

d. No. The DG Safety Injection timers will not start the pumps for another 7 seconds.

ANSWER: C - The SI pumps should not have started since the SI has been reset. Once SI is reset it is blocked as long as the reactor trip breakers are open.

A - Incorrect - Safety Injection Pumps will start on an SI with a Blackout, but the SI signal has been reset so only the Blackout loads will start. The SI pumps are not part of the Blackout Sequenced equipment.
B - Incorrect - The SI pumps are not part of the Blackout Sequenced equipment.
D - Incorrrect - Safety Injection Pumps will start on an SI with a Blackout, but the SI signal has been reset so only the Blackout loads will start. The SI pumps are not part of the Blackout Sequenced equipment.

Lesson Plan/Obj: RO-C-EOP09 / #23

Reference: ERG-HP/LP Background; 12-OHP-4023-ES-1-1, SI Termination Background; 1-OHP-4023-ES-1-1, SI Termination

Engineered Safety Features Actuation System (ESFAS)
- Knowledge of bus power supplies to the following: ESFAS/safeguards equipment control

Exam Level:	BOTH	Outline Number:	057
Question#_old:	01ER0C809~1	KA:	013000 - K2.01
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	DEV - DIRECT

58. 058 001/BOTH/058/01012C0012~1/014000 - A4.01///3F/MASTER - DIRECT

After receipt of an urgent failure on a power cabinet, rod motion can occur for rods on unaffected power cabinets with the bank selector switch in:

a. the automatic position.

b. the manual position.

c.✓ individual bank positions for rods in unaffected power cabinets.

d. either manual position or the individual bank positions for rods in unaffected power cabinets.

ANSWER: C - With bank selector switch in the individual bank position rod motion is allowed in unaffected power cabinets.

A - Incorrect - Auto position will not allow rod movement as the bank required to move may be in the power cabinet with the urgent failure. All rods in the cabinet with the urgent failure are prevented from moving.
B - Incorrect - Manual position will not allow rod movement as the bank required to move may be in the power cabinet with the urgent failure. All rods in the cabinet with the urgent failure are prevented from moving.
D - Incorrect - Manual position will not allow rod movement as the bank required to move may be in the power cabinet with the urgent failure. All rods in the cabinet with the urgent failure are prevented from moving.

Lesson Plan/Obj: RO-C-01200 / #9

Reference: 02-OHP-4024-210, Annuciator #210 Response: Flux Rod, Drop 26 Rod Control Urgent Failure

Rod Position Indication System (RPIS)
- Ability to manually operate and/or monitor in the control room: Rod selection control

Exam Level:	BOTH	Outline Number:	058
Question#_old:	01012C0012~1	KA:	014000 - A4.01
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	MASTER - DIRECT

59. 059 001/RO/059/19428/015000 - 2.1.18///3H/INPO - DIRECT

During the performance of an NIS power range heat balance at 100% power, an operator uses a feedwater temperature 30°F lower than actual.

Would the calculated value of power be HIGHER or LOWER than actual power, and would an adjustment of the NIS power range channels, based on this value, be CONSERVATIVE or NON-CONSERVATIVE with respect to protection setpoints?

a.✔ Higher / conservative

b. Higher / non-conservative

c. Lower / conservative

d. Lower / non-conservative

ANSWER : A - A Lower FW temperature means more energy must be added to the FW to produce Steam. This will make it look like a higher reactor power and setting NI's at a higher value would be conservative (Lead to an earlier trip and/or require the plant to operate at a lower thermal power).

B - Incorrrect - Calculated power would be higher but setting the NI's to a higher value is conservative with respect to protection setpoints.
C - Incorrect - Calculated power would be higher.
D - Incorrect - Calculated power would be higher.

Lesson Plan/Obj: RO-C-GF19 / #14

Reference: RO-C-GF19, Heat Transfer

Nuclear Instrumentation System
- Conduct of Operations
- Ability to make accurate, clear and concise logs, records, status boards, and reports.

Exam Level:	RO	Outline Number:	059
Question#_old:	19428	KA:	015000 - 2.1.18
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO - DIRECT

60. 060 001/BOTH/060/02AOPS1117~1/015000 - A4.03///3H/DEV - MODIFIED

Given the following:

- Turbine is being prepared for loading.
- Reactor is critical at 8% power.
- The following annunciators alarm:
  INTMED RANGE DETECTORS VOLT FAILURE (Annun. 110, drop 7)
  INTMED RANGE COMPENSATE VOLT FAILURE (Annun. 110, drop 8)
- All lights and indicators on the N36 drawer are dark or pegged low.

Which ONE of the following actions are required?

a. Place the N36 LEVEL TRIP switch in the BYPASS position, and continue power operation.

b. Place the N36 LEVEL TRIP switch in the BYPASS position, and reduce power to less than 5%.

c.✓ Perform immediate actions required by 02-OHP-4023-E-0 Reactor Trip Or Safety Injection.

d. Remove Instrument Power fuses from Source Range Channel N32 to de-energize it's detector.

ANSWER: C - Based on the indications given, all power has been lost to the Intermediate range drawer. This causes a reactor trip since power is <P-10 and the IR trip is not blocked.

A - Incorrect - The reactor will trip. The IR channels are not required to be operable at >P-10 and a reactor trip would NOT occur.
B - Incorrect - The reactor will trip. If power was >P-10, power would NOTneed to be reduced to <5%. Also, if power was less than 5% then a mode change would NOT be allowed and power would have to remain <5%.
D - SR32 will not re-energize on the loss of a single IR channel. Both IR channels must be below P-6 to re-energize SR.

Lesson Plan/Obj: RO-C-01300 / #12

Reference: Technical Specification 3.3.1, Table 3.3-1, Item 5 and Action 3.c; 1-OHP-4022-013-003 Intermediate Range Malfunction

Nuclear Instrumentation System
- Ability to manually operate and/or monitor in the control room: Trip bypasses

Exam Level:	BOTH	Outline Number:	060
Question#_old:	02AOPS1117~1	KA:	015000 - A4.03
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	DEV - MODIFIED

61. 061 001/RO/061/NEW/017000 - A4.01///2F/NEW

Which ONE of the following sets of RCS temperature indications are available on the Mid Loop Monitoring Carts A and B?

a. Hot Leg Wide Range RTDs (NTR-110 and NTR-130)

b. Cold Leg Wide Range RTDs (NTR-210 and NTR-230)

c. RVLIS Strap-on RTDs (NTQ-110A and NTQ-110B)

d.✓ Core Exit Thermocouples (NTI-100 and NTI-101)

ANSWER: D - Only two Core Exit Thermocouples (NTI-100 and NTI-101) are used for RCS temperature indication on the Mid Loop Monitoring Carts. Other Mid Loop Monitoring Cart temperature indications include RHR heat exchanger outlet and RHR return.

A - Incorrect - Hot leg wide range RTD's only provide indication to the control boards and Plant Process Computer (PPC).
B - Incorrect - Cold leg wide range RTD's only provide indication to the control boards and Plant Process Computer (PPC).
C - Incorrect - RVLIS strap-on RTD's provide temperature input for vessel level density compensation.

Lesson Plan/Obj: RO-C-01301 / #2

Reference: SOD-01301-002, Incore Detectors; 12-OHP-4024-142, Annunciator #142 Response: Mid Loop Monitoring System Cart A; 12-OHP-4024-143, Annunciator #143 Response: Mid Loop Monitoring System Cart B

In-Core Temperature Monitor (ITM) System
- Ability to manually operate and/or monitor in the control room: Actual in-core temperatures

Exam Level:	RO	Outline Number:	061
Question#_old:	NEW	KA:	017000 - A4.01
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	NEW

62. 062 001/BOTH/062/NEW/017000 - K4.02///3F/NEW

Which ONE of the following describes the design arrangment of the Core Exit Thermocouples (TC's)?

The Core Exit Thermocouples are ...

a. divided into Trains "A" , "B", "C", and "D" with each train having TC's in only one of the core quadrants.

   (For example: Quadrant 1, Detector 1 feeds Train A; Quadrant 2, Detector 2 feeds Train B; Quadrant 3, Detector 3 feeds Train C; Quadrant 4, Detector 4 feeds Train D; etc.)

b. divided into Trains "A" and "B" with each train sharing TC's in each one of the core quadrants.

   (For example: Quadrant 1, Detector 1 feeds Train A and B; Quadrant 2, Detector 2 feeds Trains A and B; etc.)

c. divided into Trains "A" and "B". Train "A" has TC's in quadrants 1 and 3 only and Train "B" has TC's in quadrants 2 and 4 only.

   (For example: Quadrant 1, Detector 1 feeds Train A; Quadrant 2, Detector 2 feeds Train B; Quadrant 3, Detector 3 feeds Train A; Quadrant 4, Detector 4 feeds Train B; etc.)

d.✓ divided into Trains "A" and "B" with each train having separate TC's in each one of the core quadrants.

   (For example: Quadrant 1, Detector 1 feeds Train A; Quadrant 1, Detector 31 feeds Train B; Quad 2, Det. 2 feeds Train A; Quadrant 2, Detector 32 feeds Train B; etc.)

ANSWER: D - The CETCs are divided into Trains "A" & "B" with each train having 5-7 TC's in each one of the core quadrants. The detectors are not shared between trains.

A - Incorrect - There are not 4 trains.
B - Incorrect - Detectors are not shared by the trains.
C - Incorrect - Each Train has detectors in each of the four quadrants.

Lesson Plan/Obj: RO-C-01301 / #2

Reference: 02-OHP-4030-214-031, Operations Weekly Surveillance Checks

In-Core Temperature Monitor (ITM) System
- Knowledge of ITM System design feature(s) and/or interlock(s) which provide for the following: Sensing and determination of location core hot spots

Exam Level: BOTH
Question#_old: NEW
RO#:
Difficulty/Level: 3F

Outline Number: 062
KA: 017000 - K4.02
SRO#:
Bank: NEW

63. 063 001/RO/063/9082/022000 - 2.1.31///3F/INPO - MODIFIED

The operator notes a white lamp indication above the fan control switches for the following fans:

- Pressure Relief Exhaust Fan
- Instrument Room Ventilation Fans
- Hot Sleeve Ventilation Fans
- Upper Containmet Ventilation
- Lower Containment Pressurizer Enclosure Fans
- Lower Containment Reactor Cavity Supply Fans

Which ONE of the following describes what this indication represents and what impact it will have on operation of the fans?

a. Load Conservation signal has been actuated, none of the fans can be started until offsite power is restored for at least 75 seconds.

b.✓ Load Conservation signal has been actuated, some of the fans can be started after 75 seconds.

c. Containment Isolation Phase A signal has been actuated, all of the fans have received an Auto Start signal.

d. Containment Isolation Phase A signal has been actuated, none of the fans can be started until Phase A is reset.

ANSWER: B - Load Conservation will actuate with a EDG suppling the bus and a SI or CTS signal. Loads may not be restarted until 75 seconds have elapsed or after the SI signal has been reset.

A - Incorrect - The fans can be restarted after the 75 second time delay or after SI is reset. If offsite power was restored the fans would be able to be started immediately.
C - Incorrect - The light does not directly indicate a Phase A has actuated. Some of the fans receive a trip signal from the Phase A or Containment Vent signal.
D - Incorrect - The light does not directly indicate a Phase A has actuated. Some of the fans receive a trip signal from the Phase A or Containment Vent signal.

Lesson Plan/Obj: RO-C-02800 / #10

Reference: SOD-02800-001 and 002, Containment Ventilation; SOD-08201-001, Emergency Electrical Distribution

Containment Cooling System (CCS)
- Conduct of Operations
- Ability to locate control room switches, controls and indications and to determine that they are correctly reflecting the desired plant lineup.

Exam Level:	RO	Outline Number:	063
Question#_old:	9082	KA:	022000 - 2.1.31
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	INPO - MODIFIED

64. 064 001/RO/064/NEW/025000 - A3.01///4H/NEW

Given the following conditions concerning the Ice Condenser Cooling System:

Aligned to Unit 1 - Glycol Pumps 1 and 2 running with #3 in Auto.
Refrigeration Chiller Units 1 in SEQUENCE MODE
Refrigeration Chiller Units 7 and 8 in BASE LOAD

Aligned to Unit 2 - Glycol Pumps 5 and 6 running with #4 in Auto.
Refrigeration Chiller Units 3 in SEQUENCE MODE
Refrigeration Chiller Units 4, 5, and 6 in BASE LOAD

The NESW piping to the #5 and #6 Chillers starts leaking which causes a loss of NESW flow to both chillers.(NESW flow to the all other chillers is not significantly impacted) This also causes a trip of Glycol Pump #2 due to water spraying on the motor.

Which ONE of the following decribes the resulting status of the Ice Condenser Cooling System? Assume NO operator action.

a. U1 - Chiller Units 7 and 8 tripped, Chiller Unit 1 picks up cooling load for U1, Glycol pump #1 alone supplies required flow.
U2 - Chiller Units 5 and 6 tripped, Chiller Unit 3 picks up cooling load for U2.

b. U1 - Chiller Units 7 and 8 operating, Glycol pump #3 starts.
U2 - Chiller Units 3, 4, 5, and 6 tripped, U2 Containment Isolation Glycol valves closed.

c. U1 - Chiller Units 7 and 8 operating, U2 Crossties open, Glycol pump #3 starts.
U2 - Chiller Units 5 and 6 tripped, Chiller Units 1 and 3 pick up cooling load for U2, Glycol pump #4 starts.

d.✓ U1 - Chiller Units 7 and 8 operating, Glycol pump #3 starts.
U2 - Chiller Units 5 and 6 tripped, Chiller Unit 3 picks up cooling load for U2.

ANSWER: D - Loss of NESW flow will cause the associated Chiller to trip. The Standby pump will auto start if the operating pump trips. In Sequence Mode the chillers will increase load based on cooling requirements.

A - Incorrect - Chiller Units 7 and 8 won't trip on the loss of a single pump, standy pump #3 will start.
B - Incorrect - Chiller units 3 and 4 won't trip. Containment Isolation valves close on Lo-2 glycol tank level and Containment Isolation Signals but not on chiller or pump trips.
C - Incorrect - Unit crossties do not automatically open. Glycol Pump 4 would not auto start.

Lesson Plan/Obj: RO-C-01000 / #13

Reference: SD-01000, Ice Condenser System

Ice Condenser System
- Ability to monitor automatic operation of the Ice Condenser System, including:
Refrigerant system

Exam Level:	RO	Outline Number:	064
Question#_old:	NEW	KA:	025000 - A3.01
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	NEW

65. 065 001/BOTH/065/NEW/025000 - K4.02///3F/NEW

Which ONE of the following correctly describes operation of the Ice Condenser Air Handling Unit Fans?

The Air Handling Unit fans are ...

a. manually stopped before a defrost cycle but will automatically trip when DIS is placed in service.

b. automatically stopped by a defrost cycle and when DIS is placed in service.

c. manually stopped before a defrost cycle and when DIS is placed in service.

d.✓ automatically stopped by a defrost cycle but must be manually stopped when DIS is placed in service.

ANSWER: D - On a Defrost Cycle one group of AHUs will go into defrost and AHU's fans turn off automatically. The fans are manually stopped when DIS is placed in service to reduce potential ignition sources (defrost units).

A - Incorrect - Fans stop automatically on defrost and manually prior to DIS.
B - Incorrect - Fans must be manually stopped prior to DIS.
C - Incorrect - Fans will automatically stopped prior to defrost cycle.

Lesson Plan/Obj: RO-C-01000 / #12

Reference: RO-C-01000, Ice Condenser System

Ice Condenser System
- Knowledge of Ice Condenser System design feature(s) and/or interlock(s) which provide for the following: System control

Exam Level:	BOTH	Outline Number:	065
Question#_old:	NEW	KA:	025000 - K4.02
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	NEW

66. 066 001/BOTH/066/01009C0008~1/026000 - A1.05///2F/MASTER - DIRECT

Which ONE of the following describes how nitrogen induction into the suction headers of the Containment Spray pumps is prevented?

a.✓ IMO-202 and IMO-204, Spray Additive Tank isolation valves, are automatically closed on a Spray Additive Tank Low-Low level.

b. A close permissive on a Low-Low Spray Additive Tank level allows the operator to shut IMO-212 and IMO-222, Eductor supply valves.

c. IMO-212 and IMO-222, Eductor supply valves, are automatically closed on a Spray Additive Tank outlet Low-Low flow.

d. A close permissive on a Low-Low Spray Additive Tank flow allows the operator to shut IMO-202 and IMO-204, Spray Additive Tank isolation valves.

ANSWER: A - IMO-202 & IMO-204 receive close signals at 589' 9" level.

B - Incorrect - There is not a close permissive associated with the Spray Add Tank.
C - Incorrect - IMO-212 & IMO-222 do not receive low flow signals.
D - Incorrect - There is not a close permissive associated with the Spray Add Tank.

Lesson Plan/Obj: RO-C-00900 / #17

Reference: OHP-4024-105, Annunciator #105 Response: Containment Spray, Drop 3; T.S 3.6.2.2

Containment Spray System (CSS)
- Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: Chemical additive tank level and concentration

Exam Level:	BOTH	Outline Number:	066
Question#_old:	01009C0008~1	KA:	026000 - A1.05
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	MASTER - DIRECT

67. 067 002/BOTH/067/GENERIC 13/026000 - A3.01///3H/DEV- DIRECT

The following plant conditions exist:

- A U-2 LOCA is in progress.
- Containment Pressure is 8.5 psig.
- IMO-210/211/220/221 (CTS Pump Discharge Valves) are Open.
- IMO-202/204 (SAT Outlet Valves) are Open.
- IMO-212/222 (SAT Eductor Valves) are Open.
- East CTS Pump is Running.
- West CTS Pump is NOT Running.
- Both RHR Pumps are Running.
- All MSIV's are Closed.
- Panel 205 Drop 5, "CONTAINMENT SPRAY ACTUATED" alarm actuated.
- Panel 205 Drop 10 "CONTAINMENT ISOLATION PHASE B" alarm actuated.

Which ONE of the following failures would result in the above listed conditions?

a. Failure of Train A, Containment Isolation Phase B relay to actuate.

b. Failure of Train B, Containment Isolation Phase B relay to actuate.

c. Failure of Train A, Containment Spray (CTS) relay to actuate.

d. Failure of Train B, Containment Spray (CTS) relay to actuate.

ANSWER: B - The Train B CTS pump is the West CTS Pump. The CTS pumps are actuated from the respective train Phase B signal while the associated valves reposition based on the CTS signal.

A - Incorrect - Failure of Train A, Containment Isolation Phase B relay to actuate would have prevented the East CTS pump from starting.
C - Incorrect - Failure of Train A, Containment Spray (CTS) relay to actuate would have prevented the IMO-202, 210, 211, and 212 valves from opening.
D - Incorrect - Failure of Train B, Containment Spray (CTS) relay to actuate would have prevented the IMO-204, 220, 221, and 222 valves from opening.

Lesson Plan/Obj: RO-C-00900 / #17

Reference: RO-C-00900, Containment Spray and Hydrogen Recombiner

Containment Spray System (CSS)
-Ability to monitor automatic operation of the CSS, including: Pump starts and correct MOV positioning.

Exam Level:	BOTH	Outline Number:	067
Question#_old:	GENERIC 13	KA:	026000 - A3.01
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	DEV- DIRECT

68. 068 001/BOTH/068/NEW/056000 - K1.03///3H/NEW

Given the following conditions:

- North & South Hotwell Pumps running.
- North & Middle Condensate Booster Pumps running.
- Unit 2 Reactor Power is 75%.
- Low Pressure Heater String "A" (HTRs 2A, 3A, & 4A) is isolated for a tube leak repair on the 2A HTR.
- The Low Pressure Heater Bypass valve, CRV-224 is open.

An electrical fault causes CMO-220 "B" Low Pressure Heater String (HTRs 2B, 3B, & 4B) Inlet Isolation to CLOSE.

Which ONE of the following describes the plant impact of this failure?

a.✓ Feedwater Pumps Trip on Low Suction Pressure.

b. Middle Hotwell pump starts to restore FW Pump Suction Pressure.

c. South Condensate Booster starts to restore FW Pump Suction Pressure.

d. Reactor Power will increase due to the lack of FW preheating.

ANSWER: A - The bypass line will only allow 20% flow and the heater string will allow 80% flow. Closing off the only inservice heater string will cause a low pressure on the FW pump suction. The FW pumps will trip on a low suction pressure.

B - Incorrect - Hotwell pump will only auto start on a low Hotwell pump discharge header pressure. Pressure will be high on it's discharge header.
C - Incorrect - Condensate Booster pump will only auto start on a low Condensate Booster pump discharge header pressure. Pressure will be high on it's discharge header.
D - Incorrect - Reactor Power would increase due to the cooler FW but the loss of the FW pumps will cause a reactor trip.

Lesson Plan/Obj: RO-C-05500 / #7

Reference: SOD-05400-001 and 002, Condensate System; SOD-05500-001, Feedwater System Overview

Condensate System
- Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: MFW

Exam Level:	BOTH	Outline Number:	068
Question#_old:	NEW	KA:	056000 - K1.03
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

69. 069 001/RO/069/01055C00XX~79/059000 - A1.03///2F/MASTER - DIRECT
Given the following plant conditions:

- Unit 1 is at 58% power.
- All control systems are in AUTOMATIC.

Which ONE of the following describes the plant response to a trip of the East Main Feed Pump? Assume NO operator action and NO plant trip occurs.

As SG water levels start lowering, the Feedwater Regulating Valves open further,

a. the West MFP speed rises, and the Standby Hotwell Pump and Condensate Booster Pump start due to low Condensate System pressure.

b. the West MFP speed rises but will not maintain SG level. Both the Steam-driven and Motor-driven Auxiliary Feedwater Pumps start when SG levels reach the Low-Low level setpoint.

c. the feedwater header pressure lowers, causing the West MFP speed to rise until it trips on overspeed. Both the Steam-driven and Motor-driven Auxiliary Feedwater Pumps start when SG levels reach the Low-Low level setpoint.

d.✓ the feedwater header pressure lowers, causing the West MFP speed to rise. NO automatic pump starts occur.

ANSWER: D - On the loss of the East Main FW Pump, reduced flow will cause the FW regulating valves will open further as the SGs try to maintain normal level & FW flow matched to steam flow. FW Pump Discharge pressure will decrease and the FW pp vs. Steam pressure Delta P will cause the West FW pump speed to increase to restore programmed Delta Pressure.

A - Incorrect - The Hotwell and Condensate Booster pumps will not start as Condensate system pressure will not significantly decrease since the total amount of FW flow required does not change.
B - Incorrect - The Main FW pumps can supply 60% flow and so a Low-Low level would not be reached and AFW will not start.
C - Incorrect - The Main FW pumps can supply 60% flow and so the West FW pump would not trip on overspeed.

Lesson Plan/Obj: RO-C-AOP-3 / #15

Reference: 01-OHP-4022-055-001, Loss Of One Main Feed Pump

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

Exam Level:	RO	Outline Number:	069
Question#_old:	01055C00XX~79	KA:	059000 - A1.03
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	MASTER - DIRECT

70. 070 001/BOTH/070/NEW/059000 - A3.03///3H/NEW

Unit 1 is operating at 75% power with the following Secondary System Pumps running:

- East and West Main FW Pumps
- North and South HD Pumps
- North and Middle Condensate Booster Pumps
- North and South Hotwell Pumps

A level transmitter fails on Heater 5B resulting in an invalid high-high level signal causing the Bleed Steam & Heater Drain Inputs to isolate and Condenser Alternate Drains to open.

Which ONE of the following would be an expected response to this failure?

a. North and South Heater Drain Pumps trip.

b.✓ Low Pressure Heater String Bypass CRV-224 opens.

c. High Pressure Heater String "B" (5B and 6B) Feedwater Inlet isolates and Bypass FMO-260 opens.

d. North Heater Drain Pump trips and Middle Heater Drain Pump auto starts.

ANSWER: B - With the Inputs isolated, a Low-Low level will quickly be reached causing the South Heater Drain pump to trip. This will cause a Low Main FW Pump Suction Pressure which automatically opens the Low Pressure Heater String Bypass CRV-224.

A - Incorrect - The North Heater Drain Pump is fed by the "A" heater string and is unaffected.
C - Incorrect - The FW side will not isolate on a High-High level. The Bypass will not automatically open.
D - Incorrect - The North Heater Drain Pump is fed by the "A" heater string and is unaffected.

Lesson Plan/Obj: RO-C-AOP-6 / #6

Reference: SOD-05400-001, Condensate System; SOD-05500-001, Feedwater System Overview; SOD-06000-001, Bleed Steam & Feedwater Heater Drains

Main Feedwater (MFW) System
- Ability to monitor automatic operation of the MFW System, including: Feedwater pump suction flow pressure

Exam Level:	BOTH	Outline Number:	070
Question#_old:	NEW	KA:	059000 - A3.03
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

71. 071 001/BOTH/071/01056C0007~6/061000 - 2.2.22///3F/MASTER - MODIFIED

In accordance with Technical Specifications, which ONE of the following is the highest power during a plant shutdown at which the Auxiliary Feedwater System is allowed to be placed in continuous service? Assume a 2 MW/Min ramp down.

a. Once power is below 40% and the AMSAC timers have counted out.

b. Once power is below 50% and one Main Feedwater Pump has been shut down.

c.✓ Once power has been reduced to less than or equal to 10%.

d. Once the unit is in Mode 2.

ANSWER: C - Per Technical Specification 3.7.1.2 surveillance requirement 4.7.1.2.d all automatic valves in the flow path must be in the fully open position when above 10% power. Per the surveillance AFW valves may be used to intermittently control SG level.

A - Incorrect - At this slow of a ramp rate, control would need to be > "intermittently" prior to reaching 10% (`3 hours)
B - Incorrect - At this slow of a ramp rate, control would need to be > "intermittently" prior to reaching 10% (`4 hours)
D - Incorrect - Mode 2 is <5% power and AFW may be used at less than 10%.

Lesson Plan/Obj: RO-C-05600 / #18

References: Technical Specification 3.7.1.2 surveillance requirement 4.7.1.2.d

Auxiliary / Emergency Feedwater (AFW) System
- Equipment Control
- Knowledge of limiting conditions for operations and safety limits.

Exam Level:	BOTH	Outline Number:	071
Question#_old:	01056C0007~6	KA:	061000 - 2.2.22
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	MASTER - MODIFIED

72. 072 001/RO/072/NEW/061000 - K1.01///2H/NEW

Given the following conditions:

- Steam Generator (S/G) #1 on Unit 1 is faulted and completely depressurized.
- Unit 1 East Motor Driven AFW pump failed to start on the resultant SI.
- No operator action has been taken.

Based on current plant conditions, AFW flow to #4 S/G...

a. would be reduced to 0 PPH because SG #1 is completely depressurized.

b. will be higher than SG #1 flow because flow retention will isolate AFW flow to SG #1.

c. will be higher than SG #1 flow because SG #4 is being fed by the West MDAFW & TDAFW pumps.

d.✓ will be less than SG #1 but will be maintained due to flow retention.

ANSWER: D - The loss of pressure in SG #1 will cause the flow retention to acuate and throttle closed on the Turbine Driven AFW Pump valves to each of the SGs. This will help prevent pump runout and will ensure that some AFW flow is provided to each SG.

A - Incorrect - The Flow Retention will limit the flow to SG #1 and ensure that the other SGs still receive some flow.
B - Incorrect - Flow retention does NOT completely isolate flow to a faulted SG.
C - Incorrect - SG # 4 is not fed by the West MDAFW pump. SG#1&4 share the east MDAFW pump.

Lesson Plan/Obj: RO-C-05600 / #14

Reference: SOD-05600-001, Auxiliary Feedwater System

Auxiliary / Emergency Feedwater (AFW) System
- Knowledge of the physical connections and/or cause-effect relationships between the AFW System and the following systems: S/G system

Exam Level:	RO	Outline Number:	072
Question#_old:	NEW	KA:	061000 - K1.01
RO#:		SRO#:	
Difficulty/Level:	2H	Bank:	NEW

73. 073 002/BOTH/073/12EOPC0708-005/016000 - K5.01///3H/MASTER - DIRECT
An uncontrolled depressurization of all steam generators is in progress. The Unit Supervisor has implemented OHP-4023-ECA-2-1, Uncontrolled Depressurization Of All Steam Generators.

The following plant conditions exist:

- As procedurally directed, the BOP has reduced AFW flow to minimize a cooldown which exceeded 100°F in an hour.
- The TDAFP has been stopped.
- Both MDAFPs are running.
- All Steam generator wide range levels have lowered to 20%.
- Containment pressure is 3.5 psig.
- The steam generators have now essentially depressurized and hot leg temperatures have begun to rise.

Based on the above conditions, which ONE of the following is the required action regarding AFW flow?

a. Continue at the same flow rate of 25,000 PPH per steam generator.

b. Raise flow rate to a minimum of 60,000 PPH to each steam generator to satisfy heat sink requirements.

c.✓ Raise flow rate to each steam generator until hot leg temperatures are stable or lowering.

d. Raise flow rate to a maximum of 50,000 PPH per steam generator to satisfy dry steam generator requirements .

ANSWER: C - AFW flow is reduced in Step 2 of OHP-4023-ECA-2-1 to control RCS cooldown. As the SGs depressurize, the heat removal from the RCS is reduced so AFW flow may need to be increased to stabilize temperatures. Stabilizing temperatures helps minimize any furthur thermal stresses.

A - Incorrect - This is the minimum readable value of AFW flow which was selected to reduce the cooldown on the RCS while still maintaining flow to keep the SG tubes wetted. Flow must be raised to stabilize temperatures.
B - Incorrect - AFW flow only needs to be controlled to limit RCS temperatures since all the SGs are faulted.
D - The 50,000 PPH limit from the 02-OHP-4023-H-1, Response To Loss Of Secondary Heat Sink foldout page, only applies if the SG Wide Range Levels are <15% (24% Adverse). WR levels are 20% and Containment is NOT adverse (<5psig).

Lesson Plan/Obj: RO-C-EOP07 / #8

Reference: 12-OHP-4023-ECA-2-1, Uncontrolled Depressurization of All Steam Generators Background

Auxiliary / Emergency Feedwater (AFW) System
- Knowledge of the operational implications of the following concepts as they apply to the AFW system: Relationship between AFW flow and RCS heat transfer.

Exam Level:	BOTH	Outline Number:	073
Question#_old:	12EOPC0708-005	KA:	016000 - K5.01
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	MASTER - DIRECT

74. 074 002/SRO/074/19502/063000 - K1.02///3F/INPO - DIRECT

The following plant conditions exist:

- Unit 2 was operating at about 100% power when a Complete Loss of Onsite and Offsite AC power occurred 2 hours and 55 minutes ago.
- Unit 2 dispatched operators after 30 minutes to shed the large Non-Essential DC loads.
- Power has just been restored from Emergency Power.
- The crew transitioned to OHP-4023-ECA-0-0, Loss Of All AC Power, Step 28 and stabilzed SG pressures.
- While performing Step 29, the SRO missed the page that restored the battery chargers to the N train, 2AB and 2CD 250VDC buses. (The actions of step 29 to restore 600V AC Busses, Control Room Cooling, and CRID inverters were sucessfully performed.)

Which ONE of the following describes the Impact of failing to restore the battery chargers?

When the Batteries completely discharge...

a. all AFW flow will be lost when the AFW pump discharge valves fail closed

b.✓ the ability to start and stop ECCS pumps from the control room will be lost.

c. the Emergency Power feed breaker will trip open resulting in another Loss of AC.

d. all vital instrumentation will be lost.

ANSWER: B - A loss of DC control power will prevent breaker operations with the control switch (and trip functions).

A - Incorrect -The TDAFW Pump Valves will fail as is while the MDAFW valves may be operated
C - Incorrect - This breaker will not open from a loss of DC - it must receive a trip signal (overload).
D - Incorrect - The (CRIDs) vital instruments will remain powered from AC backup sources.

Lesson Plan/Obj: RO-C-08201 / #6

Reference: RO-C-8200, Balance Of Plant Electrical System; RO-C-08201, Engineered Safety System Electrical Distribution System; RO-C-08204, 250VDC Distribution System

D.C. Electrical Distribution System
- Knowledge of the physical connections and/or cause-effect relationships between the D.C. Electrical System and the following systems: AC electrical system

Exam Level:	SRO	Outline Number:	074
Question#_old:	19502	KA:	063000 - K1.02
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	INPO - DIRECT

75. 075 001/BOTH/075/7052/068000 - K6.10///2F/INPO - MODIFIED

Which ONE of the following will AUTOMATICALLY stop the selected Monitor Tank pump during a liquid release to the U-2 Circulating Water System?

a.✓ HIGH flow alarm on Liquid Waste Sample Flow channel RFS-1010.

b. ALERT alarm on Liquid Waste Effluent channel RRS-1001.

c. Loss of all Unit 2 Circulating Water pumps.

d. HIGH alarm on Liquid Waste Local Area channel RRA-1003.

ANSWER: A - HIGH or LOW sample flow on RFS-1010 will cause the monitor tank pumps to trip. Channel Failure on RRS-1001 or RRR-1002 or a high radiation alarm on RRS-1001 will also cause the pumps to trip.

B - Incorrect - An "Alert" alarm will NOT cause the pumps to trip.
C - Incorrect - A loss of all CW will NOT automatically cause the pumps to trip, but 2-RRV-286, Liquid Waste Effluent to Unit 2 CW Discharge valve will auto close.
D - Incorrect - High local area alarm will NOT cause the monitor tank pumps to trip.

Lesson Plan/Obj: RO-C-02200 / #8

Reference: 12-OHP-4024-139, Annunciator #139 Response: Eberline Radiation, # 16 Radioactive Liquid Effleuent Monitor RRS-1000

Liquid Radwaste System (LRS)
- Knowledge of the effect of a loss or malfunction of the following will have on the Liquid Radwaste System: Radiation monitors

Exam Level:	BOTH	Outline Number:	075
Question#_old:	7052	KA:	068000 - K6.10
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	INPO - MODIFIED

76. 076 001/RO/076/19434/071000 - 2.4.46///3H/INPO-DIRECT

The in-service gas decay tank is being switched to another tank.

At the Waste Disposal System (WDS) panel you receive the Panel 128 Drop 28 'AUTO GAS ANALYZER ALARM.'

A few minutes later you receive the following two alarms:
- Panel 128 Drop 10 'WASTE GAS ANALYZER OXYGEN HIGH'
- Panel 128 Drop 15 'WASTE GAS ANALYZER O2 EXT HIGH'

Why have these alarms occurred in this sequence?

a.✓ Drop 28 occurred during the GDT tank transfer and Drop 15 and Drop 10, the O_2 alarms, occurred because there is high O_2 in the inservice tank.

b. Drop 28 occurred because the analyzer is removed from service before the tanks are switched and Drop 15 and Drop 10, the O_2 alarms, occurred when the analyzer was placed back in service.

c. Drop 28 occurred during the GDT tank transfer and Drop 15 and Drop 10, the O_2 alarms, occurred when the analyzer was placed back in service.

d. Drop 28 occurred because the analyzer is removed from service before the tanks are switched Drop 15 and Drop 10, the O_2 alarms, occurred because there is high O_2 in the inservice tank.

ANSWER A - Per Panel 128 Drop 28 alarm response this alarm is expected during component position changes such as switching in-service GDTs. Drop 10 and Drop 15 will alarm when high O_2 is sensed in the in-service GDT which has been aligned per 12-OHP-4021-023-001, Operation of the Waste Gas System.

B - Incorrect - The gas analyzer is not removed from service prior to switching tanks.
C - Incorrect - The gas analyzer is not removed from service prior to switching tanks.
D - Incorrect - The gas analyzer is not removed from service prior to switching tanks.

Lesson Plan/Obj: RO-C-02300 / #3

Reference: 12-OHP-4021-023-001, Operation of the Waste Gas System;
12-OHP-4024-128, Annunciator #128 Response: Boron Recycle and Gas Waste, Drops 10, 15, and 28

Waste Gas Disposal System (WGDS)
- Emergency Procedures/Plan
- Ability to verify that the alarms are consistent with the plant conditions.

Exam Level:	RO	Outline Number:	076
Question#_old:	19434	KA:	071000 - 2.4.46
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO-DIRECT

77. 077 001/BOTH/077/9239/072000 - K3.02///3F/INPO - MODIFIED

As a fuel assembly is being lifted with the Spent Fuel Handling Crane, R5, Spent Fuel Pool Fuel Handling Building area radiation monitor goes into HIGH alarm.

Which ONE of the following describes the automatic actions associated with this alarm?

a.✓ Fuel Handling Area Supply Fans 12-HV-AFS-1, 2, 3, 4 - TRIP
AFX Filter Bypass Dampers - CLOSE
AFX Filter Outlet Damper s - OPEN

b. Fuel Handling Area Supply Fans 12-HV-AFS-1, 2, 3, 4 - START
AFX Filter Bypass Dampers - OPEN
AFX Filter Outlet Damper s - OPEN

c. Spent Fuel Handling Crane upward motion is BLOCKED.

d. Control Room A/C Intake Dampers HV-ACRDA-1, 1A - CLOSE
Control Room Pressurization Outside Air Intake Dampers HV-ACRDA-2, 2A - OPEN
Control Room Pressurization Recirc Damper HV-ACRDA-3 - OPEN

ANSWER: A - On HIGH Alarm, R-5 will cause the Fuel Handling Supply fans to trip and the Charcoal Filter to align (Bypass closes, Outlet opens).

B - Incorrect - The Supply fans trip on a high alarm. Exhaust air is drawn through the filters.
C - Incorrect - Spent Fuel Handling Crane movement is not blocked. Motion would be procedurally stopped.
D - Incorrect - Control Ventialtion does not realign from Spent fuel monitor.

Lesson Plan/Obj: RO-C-02801B / #8

Reference: 12-OHP-4021-013-006, Operation Of The Eberline Radiation Monitoring System Terminal, Attachment 8; 01-OHP-4024-138, Annunciator #138 Response: Electro-Larm, Drop #5

Area Radiation Monitoring (ARM) System
- Knowledge of the effect that a loss or malfunction of the ARM system will have on the following: Fuel handling operations

Exam Level:	BOTH	Outline Number:	077
Question#_old:	9239	KA:	072000 - K3.02
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	INPO - MODIFIED

78. 078 001/BOTH/078/NEW/006000 - K3.01///3F/NEW

Given the following:

- Both Units were at 100% rated power.
- A Loss of All AC Power occurred.
- Operators on both units have implemented OHP-4023-ECA-0-0, Loss Of All AC Power.
- The Shift Manager appoints an extra SRO to work with engineering and Saint Joseph Line division to restore power in 4 hours.

Which ONE of the following is the primary concern with restoring power within 4 hours?

a. E-Plan classification upgrade to Site Area Emergency will be required since DC Cook is a 4 hour coping plant.

b. Loss of Heat Sink may result as the TDAFP discharge valves close when the N-Train Battery becomes depleted.

c. Loss of Heat Sink may result due to limited CST supply.

d.✓ Loss of ECCS makeup capability may result in core uncovery.

ANSWER: D - The primary concern with a loss of offsite power is the loss of makeup capability may lead to core uncovery (through RCP seal leakage).

A - Incorrect - Loss of power for greater than 4 hours warrants General Emergency classification.
B - Incorrect - While the TDAFP discharge valves get their power from the N-Train battery they will not fail closed.
C - Incorrect - CST is sized to provide at least 9 hours at hot standby.

Lesson Plan/Obj: RO-C-EOP14 / #3

Reference: RO-C-EOP14, Loss Of All AC Power Series Procedures

Emergency Core Cooling System (ECCS)
- Knowledge of the effect that a loss or malfunction of the ECCS will have on the following: RCS

Exam Level:	BOTH	Outline Number:	078
Question#_old:	NEW	KA:	006000 - K3.01
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	NEW

79. 079 002/BOTH/079/01008C0014~1/006000 - K5.05///3H/MASTER - DIRECT

During a normal Unit 1 plant heatup and pressurization from Mode 5, the following conditions exists:

- RCS T_{cold} is 150°F.
- RCS pressure is 350 psig.
- RCS heatup rate is 40°F per hour.
- All reactor coolant loops are operable, but only one RCP is running.
- The RHR system is aligned for core cooling with both RHR pumps running.
- One SI pump and one CCP are OPERABLE.
- The operable CCP is running to provide normal charging flow.

The conditions described are IMPROPER because:

a.✓ If the SI pump were to start, it might overpressurize the RCS.

b. Running one RCP and two RHR pumps produces non-uniform core cooling.

c. The number of ECCS pumps available to provide injection is inadequate.

d. The heatup rate is too high for the RCS temperature and pressure.

ANSWER: A - Tech Specs require all SI pumps to be locked out at <152°F to prevent an overpressure concern.

B - Incorrect - Running a RCP will provide adequate loop flows to evenly cool the RCS.
C - Incorrect - At these low temperatures, The SI pumps and one CCP are required to be incapable of injection.
D - Incorrect - The heatup rate is 40°F per hour which is acceptable for all modes of operation.

Lesson Plan/Obj: RO-C-00800 / #14

Reference: Unit 1 Technical Specifications, Bases for LCO's 3.5.2 and 3.5.3; PMP-4100-SDR-001, Plant Shutdown Safety and Risk Management, Attachment 2, Step 1.6 RCS Injection Capability

Emergency Core Cooling System (ECCS)
- Knowledge of the operational implications of the following concepts as they apply to the ECCS: Effects of pressure on a solid system

Exam Level:	BOTH	Outline Number:	079
Question#_old:	01008C0014~1	KA:	006000 - K5.05
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	MASTER - DIRECT

80. 080 001/BOTH/080/19458/010000 - A2.02///3H/INPO - MODIFIED

Given the following:

- Unit 2 reactor power is 12%.
- RCS pressure is 2075 psig and slowly lowering.
- All Pressurizer heaters are energized.
- You notice that NRV-163 (PZR spray) is failed OPEN.
- When placed in manual NRV-163 will NOT close.

Which ONE of the following is the proper sequence of actions to stop the pressure reduction?

a. Trip RCP #23.
The RCP trip will NOT cause a reactor trip at this power.
Dispatch an AEO to locally isolate Spray Valve NRV-163.

b. Reduce Power to 8% so a RCP trip will NOT cause a reactor trip.
Trip RCP #23.
Dispatch an AEO to locally isolate Spray Valve NRV-163.

c. Trip RCP #23.
The reactor will trip when the RCP is tripped.
Go to 02-OHP-4023-E-0, Reactor Trip Or Safety Injection.

d.✓ Manually trip the reactor.
Go to 02-OHP-4023-E-0, Reactor Trip Or Safety Injection.
Trip RCP #23.

ANSWER: D - Three loop operation is not allowed. The RCP#3 must be stopped to stop the spray flow. Therfore the Reactor must be manually tripped and then the RCP tripped.

A - Incorrect - Three loop operation is not allowed per the license, the reactor would not trip at this power on the loss of a single RCP.
B - Incorrect - Three loop operation is not allowed per the license.
C - Incorrect - Per operating practices, the Reactor is tripped first and then the RCP.

Lesson Plan/Obj: RO-C-00202 / #29

Reference: 02-OHP-4024-207, Annunciator #207 Response: Reactor Coolant, Drop 61; 02-OHP-4021-002-003, Reactor Coolant Pump Operation; 02-OHP-4023-ES-0-1, Reactor Trip Response

Pressurizer Pressure Control System (PZR PCS)
- Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Spray valve failures

Exam Level:	BOTH	Outline Number:	080
Question#_old:	19458	KA:	010000 - A2.02
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO - MODIFIED

81. 081 001/BOTH/081/01002C0209~1/011000 - K2.02///3F/MASTER - MODIFIED

During a loss of off-site power condition, design features are installed to provide power to the pressurizer heaters.

Which ONE of the following correctly describes this design arrangement?

a. Group A1, A2, and A3 from the 2AB Emergency DG via bus T21B.

b.✓ Group C1, C2, and C3 from the 2CD Emergency DG via bus T21D.

c. Group A1, A2, and A3 from the 21BD bus crosstie.

d. Group C1, C2, and C3 from the 21AC bus crosstie.

ANSWER: B - Group C heaters are supplied from the 21PHC transformer which is tied to the 2CD EDG via bus T21D.

A - Incorrect - Group A heaters are tied to 2AB EDG via Bus T11A.
C - Incorrect - Group A heaters do not connect to 21BD bus.
D - Incorrect - Group C heaters do not connect to 21AC bus.

Lesson Plan/Obj: RO-C-00202 / #23

Reference: SOD-08201-001, Emergency Electrical Distribution

Pressurizer Level Control System (PZR LCS)
- Knowledge of bus power supplies to the following: PZR heaters

Exam Level:	BOTH	Outline Number:	081
Question#_old:	01002C0209~1	KA:	011000 - K2.02
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	MASTER - MODIFIED

82. 082 001/BOTH/082/01NOPC5XX~1/011000 - K6.05///3H/MASTER - MODIFIED

Given the following plant conditions:

- The RCS is being cooled and depressurized following a SG Tube Rupture in accordance with 02-OHP-4023-ES-3-1, Post SGTR Cooldown Using Backfill, and 02-OHP-4021-001-004, Plant Cooldown From Hot Standby To Cold Shutdown.
- RCS Temperature is currently 250°F.
- RHR is in service providing RCS cooling and letdown.
- A steam bubble is being maintained in the pressurizer to equalized RCS and SG pressure.

Will the Pressurizer heater cutoff interlock (17%) protect the heaters from damage under the present plant conditions and why?

a. Yes, indicated 17% on the hot calibrated level detector is >17% actual level in the Pressurizer, and the interlock is able to protect the heaters before they are uncovered.

b. Yes, indicated 17% on the cold calibrated level detector is approximately 17% actual level in the Pressurizer, and the interlock is swapped to the cold calibrated channel during the cooldown making it available to protect the heaters.

c.✓ No, indicated 17% on the hot calibrated level detector is <17% actual level in the Pressurizer, and the interlock is unable to protect the heaters before they are uncovered.

d. No, indicated 17% on the cold calibrated level detector is inaccurate at the present plant conditions and the heaters may become uncovered even though the interlock has been swapped to the cold calibrated channel.

ANSWER: C - As temperature is reduced the density of the water in the pressurizer is greater. Therefore there is more "weight" on the Pressurizer side of the Level detector than it was calibrated for. This will make it indicate higher than actual level in the pressurizer.

A - Incorrect - The water in the pressurizer is more dense and so the indicator reads high not low.
B - Incorrect - The interlock can not be swapped over to the Cold Calibrated channel.
D - Incorrect - Cold Calibrated is fairly accurate at this temperature and the interlock is not tied to it.

Lesson Plan/Obj: RO-C-NOP5 / #5

Reference: 02-OHP-4021-001-004, Plant Cooldown From Hot Standby To Cold Shutdown

Pressurizer Level Control System (PZR LCS)
- Knowledge of the effect of a loss or malfunction of the following will have on the PZR LCS: Function of PZR level gauges as postaccident monitors

Exam Level:	BOTH	Outline Number:	082
Question#_old:	01NOPC5XX~1	KA:	011000 - K6.05
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	MASTER - MODIFIED

83. 083 110/RO/083/01052C0004-001/016000 - A2.01///3H/MASTER - DIRECT

Unit 2 is at 100% power when Loop 3 NR T_{hot} fails HIGH. Prior to any operator action, a reactor trip occurs.

Which ONE of the following describes steam dump system response to this event?

a. Steam dump valves in Group I (3 valves) will throttle open to reduce T_{avg} to 547°F.

b. Steam dumps will not sense a Tavg error, and will therefore not respond to the trip.

c. Steam dump valves in Groups I and II (6 valves) will actuate to reduce T_{avg} to 547°F, and then will modulate closed as Tavg is reduced.

d. Steam dump valves in Groups I and II (6 valves) will actuate to reduce T_{avg} to 547°F, and will then be closed at 541°F by the P-12 interlock.

ANSWER: D - Loop 3 NR T_{hot} fails high which causes a high Autioneered High Tavg input to the Steam Dump Turbine Trip Controller. Subsequently, the reator trips (from 100% power) generating a turbine trip C-8 condition which arms groups 1 and 2 Steam Dump valves. The maximum temperature deviation between Auctioneered High Tavg and No-Load Tavg (547°F) generates a full open demand on groups 1 and 2 Steam Dump valves. These valves continue to stay open (Auctioneered High Tavg does NOT change) until 2/4 loops Tavg are <541°F which blocks all the Steam Dump valves closed.

A - Incorrect - Both groups 1 and 2 valves are armed and Tavg will continue to lower below 547°F.
B - Incorrect - A Tavg error will result as Auctioneered High Tavg is an input to the Turbine Trip Controller.
C - Incorrect - Groups 1 and 2 valves will NOT modulate closed as Auctioneered High Tavg will NOT lower due to the Loop 3 NR T_{hot} failure.

Lesson Plan/Obj: RO-C-05200 / #13

Reference: SD-05200-001, Steam Dump System

Non-Nuclear Instrumentation System (NNIS)
- Ability to (a) predict the impacts of the following malfunctions or operations on the NNIS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Detector failure

Exam Level:	RO	Outline Number:	083
Question#_old:	01052C0004-001	KA:	016000 - A2.01
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	MASTER - DIRECT

84. 084 002/BOTH/084//016000 - K5.01///2F/NEW

Which ONE of the following explains the purpose of the Isolation Amplifier associated with the Pressurizer Pressure Transmitter?

a. Amplifies the pressure output signal between containment and the instrument racks.

b. Isolates the pressure transmitter from the impacts of changing containment pressures.

c. Protects the control signal from perturbation due to backfeed from a disturbance in the Reactor Protection System.

d.✓ Protects the Reactor Protection signal from a perturbation due to backfeed from a disturbance in the control circuit.

ANSWER: D - The isolation amplifier prevents the perturbation of the protection signal due to a disturbance of the output signal external to the protection racks.

A - Incorrect - This is the function of a pre-amplifier (i.e., used for Source Range NIs).
B - Incorrect - Pressurizer pressure transmitters do NOT use an isolation feature linked to containment pressure. Pressurizer pressure instruments are NOT required to be environmentally qualified.
C - Incorrect - This is the inverse of the correct answer. It does NOT protect the control signal from a disturbance in the Reactor Protective System.

Lesson Plan/Obj: RO-C-01100 / #9

Reference: UFSAR, Chapter 7, Page 2 and 3, Electrical Isolation

Non-Nuclear Instrumentation
- Knowledge of operational implications of separation of control and protective circuits.

Exam Level:	BOTH	Outline Number:	084
Question#_old:		KA:	016000 - K5.01
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	NEW

85. 085 001/BOTH/085/19585/028000 - A2.03///3F/INPO - MODIFIED

A reactor trip and safety injection occurred due to a LOCA. There are several ECCS system failures. The following plant conditions exist:

- Containment pressure is 7.2 psig and rising.
- Containment (PACHMS) hydrogen concentration is 5.8% and rising.

Which ONE of the following describes the correct mitigating strategy for hydrogen control?

a. A hydrogen recombiner should be placed in service if 6 hours have elapsed since the start of the LOCA.

b. Both hydrogen recombiners should be started immediately.

c. Contact the Plant Evaluation Team to evaluate PACHMS for failed analyzers because containment hydrogen is never expected to exceed 5% during any accident.

d.✓ Contact the Plant Evaluation Team to evaluate the condition because operation of the hydrogen recombiners may cause an explosion.

ANSWER: D - The hydrogen recombiners are used if the indicated hydrogen is <4% which would be equivalent to 6% in a moist environment. With concentrations higher than this an evalaution must be performed because starting the recombiners could cause an explosion and potential damage to equipment.

A - Incorrect - If Hydrogen concentration is between 0.5% and 4%, then a check would be made to place the recombiners in service if 6 hours had elapsed.
B - Incorrect - Hydrogen Recombiners should NOT be started at this concentration.
C - Incorrect - Hydrogen concentration may reach 10-12 % during an accident.

Lesson Plan/Obj: RO-C-EOP09 / #22

Reference: 12-OHP-4023-E-1, Loss Of Reactor Or Secondary Coolant Background, Step 17

Hydrogen Recombiner and Purge Control System (HRPS)
- Ability to (a) predict the impacts of the following malfunctions or operations on the HRPS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: The hydrogen air concentration in excess of the limit flame propagation or detonation with resulting equipment damage in containment.

Exam Level:	BOTH	Outline Number:	085
Question#_old:	19585	KA:	028000 - A2.03
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	INPO - MODIFIED

86. 086 001/RO/086/NEW/029000 - 2.1.33///3H/NEW

Given the following:

- Unit 1 is in Mode 4.
- The Containment Purge System was aligned for full flow purge operation with the following lineup:

  Purge Supply Fan HV-CPS-1 - RUNNING
  Purge Exhaust Fan HV-CPX-2 - RUNNING
  Purge Supply to Upper Containment VCR-105 and VCR-205 OPEN
  Purge Exhaust from Upper Containment VCR-106 and VCR-206 OPEN

- Following a HIGH alarm on ERS-1305, Lower Containment Radiation Monitor, the Containment Purge System is aligned as follows:

  Purge Supply Fan HV-CPS-1 - RUNNING
  Purge Exhaust Fan HV-CPX-2 - RUNNING
  Purge Supply to Upper Containment VCR-105 and VCR-205 OPEN
  Purge Exhaust from Upper Containment VCR-206 OPEN
  Purge Exhaust from Upper Containment VCR-106 CLOSED

Which ONE of the following decribes the required operator actions?

Stop HV-CPS-1 and HV-CPX-2, Close VCR-105, 205, and 206 and ...

a.✓ declare VCR-105 inoperable.

b. declare VCR - 206 and HV-CPX-2 inoperable.

c. log completion of the purge. Containment Ventilation Isolation is NOT required to be operable in this mode.

d. initiate an eSAT to investigate why VCR-106 incorrectly closed from Lower Containment Radiation.

ANSWER: A - ERS-1305 closes the Inside Containment Isolation Valves VCR-101 through VCR-107 and trips the Instrument room purge supply (CIPS) fans. These dampers are rquired to close in modes 1-4.

B - Incorrect - VCR-206 and HV-CPX-2 are closed by the ERS-1400 channels.
C - Incorrect - Purge Isolation and Vent Isolation are required in Mode 4.
D - Incorrect - VCR-106 should close from a high rad signal on ERS-1305.

Lesson Plan/Obj: RO-C-02800 / #14

Reference: SOD-1350-001, Radiation Monitoring System; Tech Spec 3.6.1.7 and 3.6.3

Containment Purge System (CPS)
- Conduct of Operations
- Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.

Exam Level:	RO	Outline Number:	086
Question#_old:	NEW	KA:	029000 - 2.1.33
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

87. 087 001/SRO/087/19496/029000 - 2.2.29///3F/INPO - DIRECT

During refueling operations, the divider barrier and missile blocks between the reactor well and refueling canal are removed. As a result of this removal, higher flow rates in the containment purge exhaust system will . . .

a.✓ prevent the formation of vapor clouds on the water.

b. allow shutdown of the containment pressure relief system

c. clear the interlock for containment purge supply fan operation.

d. minimize the formation of stagnant air pockets that may contain hydrogen.

ANSWER: A - The higher flow rates with the Purge system supplying flow around the refueling cavity will reduce the amount of vapor/fog present from the water.

B - Incorrect - The pressure relief system would not be required in a shutdown condition even if the higher flowrates did not exist.
C - Incorrect - There is no interlock with the supply fans. Starting the exhaust fans is administratively controlled based on containment pressure.
D - Incorrect - Hydrogen pockets will not be formed during a routine shutdown. The RCS is degassed prior to opening it up.

Lesson Plan/Obj: RO-C-02800 / #4

Reference: SOD-02800-002, Containment Ventilation

Containment Purge System (CPS)
- Equipment Control
- Knowledge of SRO fuel handling responsibilities.

Exam Level:	SRO	Outline Number:	087
Question#_old:	19496	KA:	029000 - 2.2.29
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	INPO - DIRECT

88. 088 001/BOTH/088/01018C0008~1/033000 - A3.01///3H/MASTER - MODIFIED

Given the following conditions:

- South Spent Fuel Pit pump and heat exchanger in service.
- Unit 1 and Unit 2 Operating at 100% Power following back-to-back refuelings.
- Unit 1 experiences a loss of offsite AC Power.
- Unit 2 experiences an Inadvertant Phase A Containment Isolation.
- The diesel generators have reenergized the Unit 1 - 4KV and 600volt busses.

Which ONE fo the following correctly describes the impact of this accident on the Spent Fuel Pit (SFP) conditions?

SFP temperature would be:

a. lowering due to the North Spent Fuel Pit pump starting on Blackout sequence.

b. lowering due to the Unit 1 standby CCW pump starting on Blackout sequence.

c.✓ rising due to isolation of Spent Fuel Heat Exchanger CCW flow.

d. rising due to Load Shed of the South Spent Fuel Pit pump.

ANSWER: C - Phase A will cause the CCW valve 2-CRV-445 to isolate stopping CCW flow to the South Spent Fuel Pit Heat Exchanger causing the temperature to rise.

A - Incorrect - Spent Fuel Pit pumps are load shed and do not auto start.
B - Incorrect - Starting of the Unit 1 CCW pumps will not affect CCW flow through the South SFP HX.
C - Incorrect - The South SFP pump is supplied from U2 and will not load shed.

Lesson Plan/Obj: RO-C-01800 / #6;

Reference: 02-OHP-4023-SUP-003, Phase A Isolation Checklist (page 5 of 6)

Spent Fuel Pool Cooling System (SFPCS)
- Ability to monitor automatic operation of the Spent Fuel Pool Cooling System, including: Temperature control valves

Exam Level:	BOTH	Outline Number:	088
Question#_old:	01018C0008~1	KA:	033000 - A3.01
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	MASTER - MODIFIED

89. 089 001/BOTH/089/NEW/035000 - A4.06///3H/NEW

Given the following:

- A tube rupture has occurred in the #23 Steam Generator (SG).
- A Manual Reactor Trip and Safety Injection were performed.
- On the reactor trip, the #21 and #22 SG Pressure channels failed low resulting in an automatic Steam Line Isolation.
- RCS Pressure is currently 2035 psig.
- RCS Tave is 549°F.
- The #23 SG is being isolated in accordance with procedure 2-OHP-4023-E-3, Steam Generator Tube Rupture.
- You notice that both MSIV dump valves for the #23 SG are open allowing an unmonitored radioactive release to the atmosphere.

Which ONE of the following is the action that should be taken to close the MSIV dump valves?

a. Select BLOCK on both Steamline Isolation Block/Reset Switches.

b. Select RESET on both Steamline Isolation Block/Reset Switches.

c.✓ Place both MSIV dump valve control switches to LOCKOUT.

d. Place both MSIV dump valve control switches to TRIP/RESET.

ANSWER: C - Placing the MSIV switches to the LOCKOUT position will close the dump valves.

A - Incorrect - The Steam Line Isolation signal can not be blocked until Tave is < P-12 (541°F). The Block/Reset switch does NOT lockout Steamline Isolation signal to the dump valves.
B - Incorrect - The Block/Reset switch does NOT lockout Steamline Isolation signal to the dump valves.
D - Incorrect - Placing the switches to Trip/Reset will cause the valves to stay open.

Lesson Plan/Obj: RO-C-05103 / #3

Reference: SD-05103 Main Steam System Page 20 & 21; OP-1/2-98538, SGSV Dump Valves MRV-231 and 232

System (S/GS)
- Ability to manually operate and/or monitor in the control room: S/G isolation on steam leak or tube rupture/leak

Exam Level:	BOTH	Outline Number:	089
Question#_old:	NEW	KA:	035000 - A4.06
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

90. 090 001/BOTH/090/01051C0009~2/035000 - K4.01///2H/MASTER - DIRECT

Given the following plant conditions:

- Unit 1 is at 100% power and stable.
- Steam Generator Level Controls are in AUTOMATIC.
- Steam Generator #12 Steam Flow Channel 1, 1-MFC-121, is selected to the Steam Generator Level Control System.

An unidentified calibration error results in Steam Generator #12 Steam Flow Channel 2, 1-MFC-120, indicating 10% low (indicates 90% vs 100% Steam Flow). When requested by MTI, operators switch the controlling Steam Flow channel to 1-MFC-120.

Which ONE of the following conditions will occur when the operator switches the controlling channel?

The Steam Generator Level Control system will:

a. initially lower feed flow, then control #12 SG level approximately 10% below program level.

b. not change feed flow to the #12 SG, but Feedwater delta-P program will be lowered to the 90% power value.

c. initially raise feed flow to #12 SG, then return level to program. The Feedwater delta-P program will be lowered to the 90% power value.

d.✓ initially lower feed flow, then control #12 SG level at approximately program level.

ANSWER: D - SG FW flow will initially lower to match the lower Steam Flow, As a level deviation error builds in it will raise FW flow to restore level to the desired SG Level Setpoint. (Level Error is added to Steam Flow)

A - Incorrect - SG level setpoint is fixed and is not impacted by the SF channel.
B - Incorrect - SG FW flow will be affected & FW DP program will only be affected ~2.5% power since all 4 channels are summed.
C - Incorrect - FW flow will not raise and FW DP program will only be affected ~2.5% power since all 4 channels are summed.

Lesson Plan/Obj: RO-C-05100 / #9

Reference: SOD-05100-003, Steam Generator Water Level Control

Steam Generator System (S/GS)
- Knowledge of S/G design feature(s) and/or interlock(s) which provide for the following: S/G level control

Exam Level:	BOTH	Outline Number:	090
Question#_old:	01051C0009~2	KA:	035000 - K4.01
RO#:		SRO#:	
Difficulty/Level:	2H	Bank:	MASTER - DIRECT

91. 091 001/BOTH/091/NEW/039000 - A1.03///3H/NEW

During the final stages of an RCS heatup, the Steam Dump System is set to automatically contol RCS temperature at No-Load conditions.

Which ONE of the following is the correct Steam Dump Pressure Controller setpoint required to maintain RCS temperature at approximately No-Load Tavg?

a. 955 psig

b. 985 psig

c.✓ 1005 psig

d. 1025 psig

ANSWER: C - No-Load Tavg is 547°F. 1005 psig is Psat for 547°F.
A - Incorrect - 955 psig is Psat for 541°F.
B - Incorrect - 985 psig is Psat for 545°F.
D - Incorrect - 1025 psig is Psat for 549°F.

Lesson Plan/Obj: RO-C-05200 / #13

Reference: Steam Tables; 02-OHP-4021-001-001, Plant Heatup From Cold Shutdown To Hot Standby; 02-OHP-4021-052-001, Steam Dump Control System Operation; SOD-05200-001, Steam Dump System

Main & Reheat Steam System (MRSS)
- Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MRSS controls including: Primary system temperature indications, and required values during main steam system warmup.

Exam Level:	BOTH	Outline Number:	091
Question#_old:	NEW	KA:	039000 - A1.03
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

92. 092 001/BOTH/092/7062/039000 - K3.04///3H/INPO - DIRECT

The following conditions exist:

- Unit 2 is at 100% power after recently completing a startup.
- Both Main Feed Pumps are running on Reheat Steam.
- The setpoint for ARV-11 and ARV-12, Main Steam to FPT, have been left at 45 psig.

Which ONE of the following can occur from this error during a sudden loss of turbine load to 80% power?

a.✓ Reactor trip on Low SG Level.

b. Feed pump trip on overspeed.

c. Overfeeding the steam generators.

d. Low suction pressure feed pump trip.

ANSWER: A - Desired Main Steam Pressure is 78-80 psig. When a loss of load occurs, Reheat steam is lost and the FW pumps will require the use of Main Steam through regulating valves. With the Vales set at 45 psig the pressure will be insuffcent to maintain FW pump speed and flow.

B - Incorrect - At this pressure the FW pumps will slow down.
C - Incorrect - At this pressure the FW pumps will slow down and reduce pressure/flow.
D - Incorrect - At this pressure the FW pumps will slow down, deliver less flow and so require lower suction pressure.

Lesson Plan/Obj: RO-C-05500 / #7

Reference: SD-05500 Main FW System Description

Main and Reheat Steam System (MRSS)
- Knowledge of the effect that a loss or malfunction of the MRSS will have on the following: MFW pumps

Exam Level:	BOTH	Outline Number:	092
Question#_old:	7062	KA:	039000 - K3.04
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO - DIRECT

93. 093 001/RO/093/NEW/062000 - K2.01///3H/NEW

Unit 2 was operating with a normal 100% power lineup when a reactor trip occurred.

The following conditions currently exist:

- 2CD Emergency Diesel Generator running
- #23 RCP, #21 CW, North Hotwell, North Condensate, and North Heater Drain Pumps all tripped
- West CCP, CCW, ESW, NESW and MDAFW Pumps are all running
- East CCW, ESW, NESW and MDAFW Pumps are all running

Which ONE of the following failures is the cause?

a.✓ RCP Bus 2D tripped

b. RCP Bus 2C tripped

c. Loss of ALL power to 250V DC Bus 2CD

d. RCP Bus 2C and 2D Underfrequency

ANSWER: A - When RCP Bus 2D trips it de-energizes the #23 RCP, #21 CW, North Hotwell, North Condensate, and North Heater Drain Pumps as well as the T21D bus. This will start the 2CD EDG and energize the Blackout Sequencer Loads - East CCW, ESW, NESW and MDAFW Pumps

B - Incorrect - The T21D Bus loads would not be operating and the #23 RCP, #21 CW, North Hotwell, North Condensate, and North Heater Drain Pumps would not be tripped.
C - Incorrect - Loss of DC would prevent T21D loads from energizing.
D - Incorrect - RCP underfrequency would trip all RCPs.

Lesson Plan/Obj: RO-C-08200 / #2

Reference: 02-OHP-2110-BKM-001, Control Of Operations Department Unit 2 Breaker Cleaning Maps, Figure 12 page 22; SOD-08201-001, Emergency Electrical Distribution

A.C. Electrical Distribution System
- Knowledge of bus power supplies to the following: Major system loads

Exam Level:	RO	Outline Number:	093
Question#_old:	NEW	KA:	062000 - K2.01
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

94. 094 001/RO/094/01082C0109~1/062000 - K4.03///2F/MASTER - DIRECT

Given the following:

- Unit 2 is in a Refueling Outage with no fuel in the vessel (defueled).
- All four vital 600V AC busses are energized by their normal feeder breakers.
- To permit maintenance work on Transformer 21B, it is necessary to crosstie 600V AC busses 21B and 21D and de-energize Transformer 21B.
- The BOP operator attempts to close 600V AC crosstie breaker 21BD.
- Breaker 21BD will NOT close.

Which ONE of the following conditions must be met to allow closure of breaker 21BD?

a. Emergency Power Transformer 12EPI must be feeding Bus 21D.

b. Transformer Differential HEA on Transformer 21B must be reset.

c.✔ Normal feeder breaker to bus 21B must be open.

d. Diesel Generator 2CD must be connected to bus 21D.

ANSWER: C - Breaker 21BD can not be closed unless Bus 21B or 21D feed breakers are open. This prevents crosstieing EDGs or causing electrical system circulating current.

A - Incorrect - The normal bus feed breaker for bus 21B must be open to close 21BD.
B - Incorrect - The normal bus feed breaker for bus 21B must be open to close 21BD.
D - Incorrect - The normal bus feed breaker for bus 21B must be open to close 21BD.

Lesson Plan/Obj: RO-C-08201 / #9

Reference: SOD-08201-001, Emergency Electrical Distribution

A.C. Electrical Distribution System
- Knowledge of A.C. Distribution System design feature(s) and/or interlock(s) which provide for the following: Interlocks between automatic bus transfer and breakers

Exam Level:	RO	Outline Number:	094
Question#_old:	01082C0109~1	KA:	062000 - K4.03
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	MASTER - DIRECT

95. 095 001/BOTH/095/NEW/064000 - K1.02///3H/NEW

Given the following sequence of events:

- Unit 1 and Unit 2 were operating at 100% power.
- Unit 1 and Unit 2 East Essential Service Water (ESW) pumps were operating with the Unit Crossties open.

- Unit 2 tripped due to a turbine Electro-Hydraulic Control oil leak.
- Unit 1 remained on line.
- The Unit 2 Reserve Transformers are unavailable.
- Both Unit 2 Emergency Diesel Generators (EDGs) started and loaded; however, Bus T21D failed to energize.

Assuming NO operator actions, which ONE of the following describes the ESW cooling water status for the Unit 2 EDGs?

a. 2CD EDG must be tripped immediately as ESW cooling has been lost.

b. 2CD EDG has ESW cooling supplied by the Unit 2 West ESW Pump.

c. 2AB EDG must be tripped immediately as ESW cooling has been lost.

d.✓ 2CD EDG has ESW cooling supplied by the Unit 1 West ESW Pump.

ANSWER: D - When bus T21D is lost the Unit 2 East ESW Pump Trips, this will cause a low header pressure condition and automatically start the Unit 1 West ESW pump to Supply 2CD EDG with ESW cooling.

A - Incorrect - The Unit 1 West ESW pump will supply ESW Cooling water.
B - Incorrect - The 2CD Diesel Generator could be supplied if the alternate ESW supply was manually opened (recent change).
C - Incorrrect - Diesel Generator 2AB has cooling from the auto start of the Unit 2 West ESW Pump (Would also have cooling from the Unit 1 East ESW).

Lesson Plan/Obj: RO-C-03200 / #8

Reference:SOD-01900-001, Essential Service Water

Emergency Diesel Generator (ED/G) System
- Knowledge of the physical connections and/or cause-effect relationships between the ED/G System and the following systems: ED/G cooling water system

Exam Level:	BOTH	Outline Number:	095
Question#_old:	NEW	KA:	064000 - K1.02
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

96. 096 001/BOTH/096/19512/064000 - K6.07///2F/INPO - DIRECT

Given the following:

- One of the air receivers for the 1CD Emergency Diesel Generator (EDG) has been tagged out for maintenance for the last 8 hours.
- Two hours ago the 1CD EDG was started to verify operability.

Which ONE of the following is the minimum number of starts currently available on the 1CD EDG?

a. 1 start

b.✓ 2 starts

c. 3 starts

d. 4 starts

ANSWER: B - Each EDG air receiver is sized to provide 2 Starts. Starting the EDG two hours ago would have used 1 of the starts but sufficient time has passed to recharge the receiver.

A - Incorrect - The receiver should be fully charged after two hours.
C - Incorrect - Only 2 starts are assured based on design with one air receiver isolated.
D - Incorrect - Only 2 starts are assured based on design with one air receiver isolated.

Lesson Plan/Obj: RO-C-03200 / #7

Reference: UFSAR Chapter 8 section 8.4 page 12

Emergency Diesel Generator (ED/G) System
- Knowledge of the effect of a loss or malfunction of the following will have on the ED/G System: Air receivers

Exam Level:	BOTH	Outline Number:	096
Question#_old:	19512	KA:	064000 - K6.07
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	INPO - DIRECT

97. 097 001/SRO/097/NEW/079000 - 2.4.34///3H/NEW

Given the following:

- A small fire has damaged the Plant Services Panel in the Unit 2 Control Room.
- The fire has been extinguished and the reactor tripped.
- The Plant Air Header Crosstie Isolation Valves PRV-10, 11, 20, and 21 are all closed.
- Unit 1 is at 100% power with normal Plant and Control Air pressures.
- The Unit 2 Plant Air Compressor and Control Air Compressor control switches are damaged.
- An extra RO has been assigned to help restore Unit 2 Control Air.

Which ONE of the following actions would be the fastest method to have the RO restore Unit 2 Control Air?

a. Open PRV-20 and PRV-21 using the Unit 2 Main Control Room switches.

b.✓ Start the Unit 2 Control Air Compressor from the Unit 2 Hot Shutdown Panel.

c. Open PRV-10 and PRV-11 using the Unit 1 Main Control Room switches.

d. Start the Backup Plant Air Compressor from the local control panel.

ANSWER: B - To start the Control Air Compressor from the Hot Shutdown Panel switch the RO must go to the Hot Shutdown Panel in U1 Control Room, select local and start the Control Air Compressor.

A - Incorrect - With the Unit 1 PRV-10 and 11 valves closed the Plant Air header is depressurized, so opening PRV-20 and 21 will not restore air.
C - Incorrect - With the Unit 2 PRV-20 and 21 valves closed the Plant Air header is depressurized, so opening PRV-10 and 11 will not restore air.
D - Incorrect - The RO would need to manually align the Backup Air Compressor and start it from the Unit 1 Aux Building Roof.

Lesson Plan/Obj: RO-C-06401 / #12

Reference: 02-OHP-4030-STP-049, Hot Shutdown Panel Operability Test

Station Air System (SAS)
- Emergency Procedures/Plan
- Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications.

Exam Level:	SRO	Outline Number:	097
Question#_old:	NEW	KA:	079000 - 2.4.34
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

98. 098 001/BOTH/098/NEW/103000 - A4.04///3H/MASTER -MODIFIED

Given the following:

- Unit 2 was at 100% power, all systems normal alignment.
- During SSPS surveillance testing, a test error caused an inadvertent SI signal.
- A Safety Injection, Phase A, and Reactor Trip occurred.
- All systems operated as designed during the event.

Which ONE of the following describes the Upper and Lower Containment Ventilation Fan status immediately upon the Phase A reset?

a. Upper ventilation fans restart. Lower ventilation fans restart.

b.✓ Upper ventilation fans restart. Lower ventilation fans remain running.

c. Upper ventilation fans are tripped. Lower ventilation fans remain running.

d. Upper ventilation fans are tripped. Lower ventilation fans are tripped.

ANSWER: B - Containment Upper Ventilation fans will restart when the Phase A is reset. Lower Ventilation Fans do NOT trip on a Phase A but trip on a Phase B signal.

A - Incorrect - Lower Fans did NOT trip.
C - Incorrect - Upper fans restart.
D - Incorrect - Upper fans restart and lower fans will NOT trip.

Lesson Plan/Obj: RO-C-AOP-8 / #12

Reference: 02-OHP-4022-034-003, Recovery From Inadvertent Containment Isolation Phase A; 02-OHP-4021-028-001, Containment Ventilation; SOD-02800-002, Containment Ventilation

Containment System
- Ability to manually operate and/or monitor in the control room: Phase A and phase B resets

Exam Level:	BOTH	Outline Number:	098
Question#_old:	NEW	KA:	103000 - A4.04
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	MASTER -MODIFIED

99. 099 001/BOTH/099/AOP1CAOP1.1~5/007000 - A1.01///2F/DEV - DIRECT

Which ONE of the following describes the adverse affects of NO operator action with a leaking pressurizer PORV?

a. There are NO adverse affects. The PRT is designed to handle continuous in-leakage.

b. The cyclic temperature stresses in combination with inner wall erosion on the PORV tailpipe may lead to premature piping failure.

c.✓ The PRT rupture disc may break with subsequent elevated radiation, temperature and pressure indications in containment.

d. Mechanical breakdown of the PORV seating surface may cause the PORV to fail when needed for overpressure protection.

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

A - Incorrect - The PRT is not designed for continuous input without any actions to cool and drain.
B - Incorrect - With a constant leak the temperatures will not be cycling, PORV seat cutting/erosion may be a concern but not inner wall erosion.
D - Incorrect - The PORV seating may erode but it would be available for overpressure protection.

Lesson Plan/Obj: RO-C-AOP-1 / #19

Reference: UFSAR Chapter: 4 Page 18

Pressurizer Relief Tank/Quench Tank System (PRTS)
- Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Maintaining quench tank water level within limits

Exam Level:	BOTH	Outline Number:	099
Question#_old:	AOP1CAOP1.1~5	KA:	007000 - A1.01
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	DEV - DIRECT

100. 100 001/RO/100/NEW/007000 - A2.03///3H/NEW

Given the following:

- Unit 1 was operating at 100% power when the turbine tripped.
- The reactor failed to automatically trip but was manually tripped.
- All other systems operated as expected.
- The Emergency procedures have been performed and the plant stabilized.
- It was noted that on the transient RCS pressure reached 2370 psig.

Which ONE of the following represents the expected status of the PRT and the actions that must be taken to restore it to normal limits?

a. PRT Temperature - 100°F, Level - 15%, and Pressure - 14 psig
Open the Vent to depressurize and add water to cool the tank.

b.✓ PRT Temperature - 140°F, Level - 84%, and Pressure - 12 psig
Reduce level and add water to cool & depressurize the tank

c. PRT Temperature - 280°F, Level - 82%, and Pressure - 34 psig
Open the Vent to depressurize and add water to cool the tank.

d. PRT Temperature - 240°F, Level - 95%, and Pressure - 3 psig
Reduce level and add water to cool & depressurize the tank.

ANSWER: B - PRT temperature is normally at Containment Temperature of ~100-110°F with level 80-84% and pressure of ~ 2-3 psig. With the RCS pressure given the PORVs would have lifted causing an elevated PRT temperature, Pressure and Level. This would be reduced by draining and cooling the tank.

A - Incorrect - The tank temperature and level are too low and the pressure is too high. The Vent will not open at this pressure.
C - Incorrect - Given this temperature and pressure the tank would be saturated. This is not expected to occur from a single discharge of the PORV. The vent will not open at this pressure.
D - Incorrect - At this temperature pressure would need to be 10 psig. Level would not be expected to increase this much.

Lesson Plan/Obj: RO-C-AOP-1 / #19

Reference: 01-OHP-4022-002-009, Leaking Pressurizer Power Operated Relief Valve; 01-OHP-4021-002-006, Pressurizer Relief Tank Operation

Pressurizer Relief Tank/Quench Tank System (PRTS)
- Ability to (a) predict the impacts of the following malfunctions or operations on the PRTS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Overpressurization of the pressurizer

Exam Level:	RO	Outline Number:	100
Question#_old:	NEW	KA:	007000 - A2.03
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

101. 101 001/RO/101/NEW/008000 - A3.01///3H/NEW

Given the following:

- Unit 2 is in Mode 4 with the West CCW pump operating.
- Repairs were just completed on the West RHR heat echanger.
- CCW had previously been isolated and drained on the West RHR heat exchanger.
- The Crew restoring the clearance on the West RHR heat exchanger was unaware that the CCW side had previously been drained.
- When the CCW Inlet to the RHR Heat exchanger is opened, CCW system pressure and surge tank level lowers causing the following alarms to annunciate on Panel 204:

Drop 88 - West CCW Surge Tank LVL HI OR LOW
Drop 89 - East CCW Pump Low Pressure Start-up
Drop 94 - West CCW pump Discharge Pressure Low
Drop 98 - East CCW Surge Tank LVL HI OR LOW

Which ONE of the following is the expected status of the CCW pumps and Make-up valves? Assume NO operator actions.

	East Pump	West Pump	CRV 410	CRV 411
a.	Running	Stopped	Closed	Closed
b.	Stopped	Stopped	Open	Open
c.✓	Running	Running	Closed	Closed
d.	Stopped	Running	Open	Open

ANSWER: C - The Standby CCW pump will start when pressure is lowered to < 80 psig. CCW makeup must be aligned manually. The Pumps will not trip on Low Surge tank level.

Drop 88 - West CCW Surge Tank LVL HI OR LOW------657' 0"
Drop 89 - East CCW Pump Low Pressure Start-up--------80psig
Drop 94 - West CCW pump Discharge Pressure Low ----85psig
Drop 98 - East CCW Surge Tank LVL HI OR LOW ------657' 0"

A - Incorrect - The West CCW pump would not have tripped.
B - Incorrect - The West CCW pump would not have tripped and the makeup valves must be manually opened.
D - Incorrect - The East CCW pump would have started on Low pressure and the makeup valve must be manually opened.

Lesson Plan/Obj: RO-C-01600 / #9

Reference: 02-OHP-4024-204, Annunciator #204 Response: Essential Service Water And Component Cooling, Drops 88, 89, 94, and 98

Component Cooling Water System (CCWS)
- Ability to monitor automatic operation of the CCWS, including: Setpoints on instrument signal levels for normal operations, warnings, and trips that are applicable to the CCWS.

Exam Level:	RO	Outline Number:	101
Question#_old:	NEW	KA:	008000 - A3.01
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

102. 102 001/SRO/102/NEW/045000 - 2.2.24///3H/NEW

Given the following:

- Maintenance is required on the Unit 2 Main Turbine Stop Valve #3 limit switches.
- The maintenance will involve removal of the limit switch assemblies.
- This activity is expected to take 8 hours.

This activity is acceptable provided...

a. leads are lifted to prevent Turbine Stop Valve closure from the valve test circuit.

b. only ONE other Turbine Stop Valve limit switch is inoperable.

c. another method is provided to the Main Control Room to verify a Turbine Trip per 2-OHP-4023-E-0, Reactor Trip Or Safety Injection.

d.✓ a signal is inserted to indicate the Turbine Stop Valve is closed to the SSPS cabinets.

ANSWER: D - Tech Spec 3.3.1.1 Reactor Trip Instumentation Item 18 requires 4 channels to be operable with less than 4 channels (4 Stop Valve Limit Switches) the inoperable channel must be placed in the trip condition within 1 hour (Signal indicating that the valve is closed).

A - Incorrect - The Stop valve will not close from the test circuit unless a close signal is actuated.
B - Incorrect - An Inoperable channel may be Bypassed for up to 2 hours for Surveillance testing. Two Channels my not be inoperable and the expected duration is 8 hours.
C - Incorrect - Another method is not required to be provided to the Control Room 2-OHP-4023-E-0, Reactor Trip Or Safety Injection, provides contingency actions in case all 4 valves do not indicate closed.

Lesson Plan/Obj: RO-C-05002 / #12

Reference: Tech Spec 3.3.1.1 Reactor Trip Instumentation Item 18 action 6

Main Turbine Generator (MT/G) System
- Equipment Control
- Ability to analyze the affect of maintenance activities on LCO status.

Exam Level:	SRO	Outline Number:	102
Question#_old:	NEW	KA:	045000 - 2.2.24
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

103. 103 001/BOTH/103/NEW/045000 - K1.06///4F/NEW

Which ONE of the following describes the reason for placing the First Stage Pressure Feedback Loop in service during the functional test of the Unit 1 Main Turbine Governor Valves?

a. Prevents a turbine trip when testing #1 Control Valve with the Exhaust Hood Temperature High alarm is lit.

b. Prevents a load rise of 50 MW when closing the Control Valve.

c.✓ Maintains a constant turbine load to prevent reactor temperature changes.

d. Maintains the Control Valves not being tested at their current position to prevent generator load swings.

ANSWER: C - Placing the feedback loop in service will cause the Control Valves not being tested to position to maintain a constant First Stage pressure. This will maintain turbine load steady and prevent transients on the primary.

A - Incorrect - Per a Procedure Caution, the turbine will trip when the #1 Control Valve is closed with the Exhaust Hood Temperature High alarm even if in First Stage Pressure Feedback.
B - Incorrect - A 50 MW increase may occur when removing the Feedback loop from service.
D - Incorrect - The feedback loop will change the position of the Control Valves to maintain a constant load.

Lesson Plan/Obj: RO-C-05001 / #47

Reference: SD-05001, Unit 1 Main Turbine and Control, Main Turbine Lube Oil, Steam Seal and Exhaust

Main Turbine Generator (MT/G) System

- Knowledge of the physical connections and/or cause-effect relationships between the MT/G System and the following systems: RCS, during steam valve test

Exam Level:	BOTH	Outline Number:	103
Question#_old:	NEW	KA:	045000 - K1.06
RO#:		SRO#:	
Difficulty/Level:	4F	Bank:	NEW

104. 104 001/RO/104/NEW/078000 K.301///3H/NEW

Given the following:

- Unit 1 has experienced a Reactor Trip.
- The Pressurizer PORV, NRV-151, opened and did not reclose.
- A Safety Injection was actuated.
- Subsequently, the PORV Isolation NMO-151 was closed.
- The Crew has reset SI and Phase A Containment Isolation and attempted to restore Control Air to Containment.
- The Control Air Containment Isolation Valves failed to open.

Which ONE of the following describes the current status of the plant?

a. RCS pressure control has been lost (PORVs and Sprays won't open).

b.✓ RCS Charging is available but Letdown can NOT be restored.

c. RCP Seal Injection is available but Seal Return can NOT be restored.

d. RCP CCW cooling water can NOT be restored.

ANSWER: B - The Letdown line is isolated by air inside containment operated valves QRV-111, 112, 160, 161, and 162. QRV-61 and 62 (charging to Loops 1 and 4) are fail open valves.

A - Incorrect - The Pressurizer PORVs, NRV-152 and NRV-153, have backup Air Supplies.
C - Incorrect - RCP Seal Injection is not isolated and Seal Return QCM-250 and QCM-350 are motor operated valves. RCP Seal Leakoff valves QRV-10, 20, 30, and 40 are fail open.
D - CCW valves to RCPs CCM-458 and CCM-459 would not have isolated and these are motor operated valves. CCW from RCPs CCM-451, 452, 453, and 454 are motor operated valves closed by Phase B.

Lesson Plan/Obj: RO-C-AOP-8 / #17

Reference: 01-OHP-4022-064-002, Loss Of Control Air Recovery, Attachments B-1, 2, and 6

Instrument Air System (IAS)
- Knowledge of the effect that a loss or malfunction of the IAS will have on the following: Containment Air System

Exam Level:	RO	Outline Number:	104
Question#_old:	NEW	KA:	078000 K.301
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

105. 105 002/BOTH/105/19538/078000-K4.02///3F/INPO-MODIFIED

Which ONE of the following is the correct sequence of events that automatically occur in the Control and Plant Air Systems as air pressure lowers?

a.✔ 95 psig at PPS-10 (20) — Standby PAC starts
90 psig CAS wet receiver pressure — CAC starts
85 psig at PPS-11 (21) — Plant air header isolates

b. 100 psig at PPS-10 (20) — Standby PAC starts
95 psig CAS wet receiver pressure — CAC starts
90 psig at PPS-11 (21) — Plant air header isolates

c. 100 psig CAS wet receiver pressure — CAC starts
95 psig at PPS-10 (20) — Standby PAC starts
90 psig at PPS-11 (21) — Plant air header isolates

d. 95 psig at PPS-10 (20) — CAC starts
90 psig at PPS-11 (21) — Standby PAC starts
85 psig CAS wet receiver pressure — Plant air header isolates

ANSWER: A - Per SOD-06401-002, Plant Air System, the following are the Plant/Control Air Pressure Setpoints:

Air Header Pressure:
125 Safeties open
106 CAC unloads
104 PAC surge unloader opens
100 CAC unloads
98 PA header unisolates
97 PA alarm 'PAC fail/low press'
95 STANBYBY PAC starts
95 CA low press alarm
90 CAC auto start
85 Plant air header isolates
80 Manual reactor trip

B - Incorrect Setpoints
C - Incorrect Setpoints and Order
D - Incorrect Setpoints and Order

Lesson Plan/Obj: RO-C-06401 / #12

Reference: SOD-06401-002, Plant Air System

Instrument Air System (IAS)
- Knowledge of IAS design feature(s) and/or interlock(s) which provide for the following: Cross-over to other air systems

Exam Level:	BOTH	Outline Number:	105
Question#_old:	19538	KA:	078000-K4.02
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	INPO-MODIFIED

106. 106 001/SRO/106/NEW/194001 - 2.1.10///3H/NEW

Given the following:

- You are the Unit Supervisor
- A Loss of offsite power has occurred.
- All Emergency Diesel Generators started and energized the busses as required.
- An RCS Leak inside containment has damaged the RHR pump suction from Loop 2 hot leg valve ICM-129.
- The plant is being cooled down to Cold Shutdown per the Electrical Power and RCS leakage Tech Spec Action Statements.
- Tech Spec 3.4.1.3, Hot Shutdown, requires 2 RCS loops to be operable and 1 in operation for Mode 4 Operation.
- The STA states that you should stabilize the plant at 375°F and NOT enter Mode 4.

Do you agree or disagree and why?

a. Agree, Tech Spec 3.0.4 prohibits mode changes if all applicable tech specs for that mode are not met.

b. Agree, without RCPs operating and no RHR for cooldown it will not be possible to maintain RCS temperature less than 350°F on SG PORVs.

c. Disagree, a standing Notice of Enforcement Discretion is in place to allow the plants to continue to lower modes even if they don't meet all Tech Specs.

d.✓ Disagree, Tech Spec 3.0.4 allows you to pass through modes without meeting all conditions if you are complying with a required action statement of another Tech Spec.

ANSWER: D - Tech Spec 3.0.4 allows you to pass through modes without meeting all conditions if you are complying with a required action statement of another Tech Spec.

A - Incorrect - Tech Spec 3.0.4 allows you to pass through modes without meeting all conditions if you are complying with a required action statement of another Tech Spec.
B - Incorrect - It is possible to cooldown and maintain temperature on Natural Circulation using SG PORVs.
C - Incorrect - A standing Notice of Enforcement Discretion does NOT exist.

Lesson Plan/Obj: RO-C-TS01 / #12

Reference: Tech Spec 3.0.4

Generic
- Conduct of Operations
- Knowledge of conditions and limitations in the facility license.

Exam Level:	SRO	Outline Number:	106
Question#_old:	NEW	KA:	194001 - 2.1.10
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

107. 107 001/RO/107/NEW/194001 - 2.1.16///3F/NEW

The Unit 1 operator noted that the Control Room Radio Console has gone into transmit lockout because an inplant radio had the transmit button depressed for greater than one minute (it was placed in an operator's pocket).

Which ONE of the following would restore radio communications with all of the inplant operators?

a. Broadcast over the Unit 1 Control Room Radio Console using the emergency transmit button to have all operators state their name and location without keying their radio. The operator who broadcasts is the one with the stuck button.

b.✓ Broadcast over the Page to have all operators switch to an alternate channel and switch the main console to that channel. Have all portable radio users contact the Control Room to search for the keyed radio.

c. Broadcast over the Unit 2 Control Room Console to have all operators state their name and location without keying their radio. The operator who broadcasts is the one with the stuck button.

d. Broadcast over the Page to have all operators select the emergency channel. The emergency channel does NOT have a transmit lockout.

ANSWER: B - The Control Room must broadcast over the Page and select an alternate channel.

A - Incorrect - There is not an emergency transmit button.
C - Incorrect - Both Control Room Consoles share the same channels. (U1, U2, and Emergency).
D - Incorrect - The transmit lockout exists on all channels.

Lesson Plan/Obj: RO-C-ADM14 / #6

Reference: PMP-4010-COM-001, Verbal Communications Section 3.8

Generic
- Conduct of Operations
- Ability to operate plant phone, paging system, and two-way radio.

Exam Level:	RO	Outline Number:	107
Question#_old:	NEW	KA:	194001 - 2.1.16
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	NEW

108. 108 001/BOTH/108/NEW/194001 - 2.1.23///4H/NEW

Given the following:

- Unit 1 has operated at 75% power for the last 10 days.
- Prior to this the Unit was at 90% power for 1 month.
- A FW Heater has just been returned to Service following tube repairs.
- Preparations are under way for a power ascension when the System Load Coordinator requests that power be raised to 90% as quickly as possible due to the loss of other units.
- 01-OHP-4021-001-006, Power Escalation, Precautions and Limitations, ATTACHED

Which ONE of the following is the shortest time it will take to reach 90% power without exceeding the procedural requirements of 01-OHP-4021-001-006, Power Escalation. Assume all required surveillances and approvals are satisfied and the Power Escalation Briefing is complete.

a. 15 minutes

b.✓ 1.5 hours

c. 2 hours 10 minutes

d. 5 hours

ANSWER: B - The Fuel is conditioned to 90% power (72 hours over the last 30 days). The ramp is limited to 10%/hour up to 90%. 15%/10% per hour = 1.5 hours.

A - Incorrect - This would be 1% per minute which exceeds the ramp limits.
C - Incorrect - This is a 7% per hour.
D - Incorrect - This is the 3% per hour unconditioned limit.

Lesson Plan/Obj: RO-C-NOP07 / #1

Reference: 01-OHP-4021-001-006, Power Escalation, section 3.7

Generic
- Conduct of Operations
- Ability to perform specific system and integrated plant procedures during all modes of plant operation.

NOTE: ATTACH 01-OHP-4021-001-006, Power Escalation, Precautions and Limitations

Exam Level:	BOTH	Outline Number:	108
Question#_old:	NEW	KA:	194001 - 2.1.23
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	NEW

109. 109 001/RO/109/NEW/194001 - 2.1.3///2H/NEW

You have reported for duty as the Unit 2 Reactor Operator on Sunday November 10. Your previous duty stations and days off are shown below:

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
11/3	11/4	11/5	11/6	11/7	11/8	11/9
Unit 1	Unit 2	Unit 2	Unit 1	Extra RO	Off	Off

Prior to accepting the watch, you must review certain documents per the turnover procedure.

Which ONE of the following correctly identifies how far back you must review the listed documents?

	Unit 2 CR Log	Standing Orders	Unit 1 CR Log
a.	Thursday 11/7	Thursday 11/7	Not Required
b.	Saturday 11/9	Saturday 11/9	Saturday 11/9
c.	Sunday 11/3	Not Required	Sunday 11/3
d.✓	Tuesday 11/5	Thursday 11/7	Not Required

ANSWER: D - The unit operator must review the Associated unit log back to the last time he held that position or 7 days whichever is shorter. The Standing orders must be reviewed back to the last time on shift or 7 days which ever is shorter.

A - Incorrect - The Unit 2 log must be reviewed back to Tuesday 11/5.
B - Incorrect - The Unit 2 log must be reviewed back to Tuesday 11/5 and the Standing order back to 11/7.
C - Incorrect - The Standing Orders must be reviewed back to 11/7.

Lesson Plan/Obj: RO-C-ADM08 / #4

Reference: OHI-4012, Watch Station Turnover

Generic
- Conduct of Operations
- Knowledge of shift turnover practices.

Exam Level:	RO	Outline Number:	109
Question#_old:	NEW	KA:	194001 - 2.1.3
RO#:		SRO#:	
Difficulty/Level:	2H	Bank:	NEW

110. 110 001/SRO/110/NEW/194001 - 2.1.34///4H/NEW

Chemistry has been continuously monitoring Unit 2 SG chemistry levels for the last 5 days since identifying elevated Sodium and Chloride readings.
The following sample results have been obtained: (Assume values made step changes at the time sampled)

Day/Time	Power Level	Sodium (ppb)	Chloride (ppb)	Sulfate (ppb)
Tuesday 10am	100%	25	57	6
Tuesday 10 pm	28%	22	58	3
Wednesday 10am	28%	22	58	3
Wednesday 10pm	28%	22	58	3
Thursday 10am	28%	29	58	3
Thursday 10pm	28%	32	47	3
Friday 10am	28%	44	44	3
Friday 10pm	28%	52	33	3
Saturday 10am	28%	52	34	3

Which ONE of the following actions are required? (Refer to 12-THP-6020-CHM-201, Steam Generator Chemistry attached.)

a. Restore Sodium to <50ppb by Monday at 10 PM or shutdown the plant.

b. Restore Sodium to <10ppb and Chloride to <10ppb by Tuesday 10 AM or shutdown the plant.

c.✓ Shutdown as quickly as possible and clean up by feed and bleed or drain and refill.

d. Maintain current power levels. Shutdown is not required for the current conditions.

ANSWER: C - Chloride entered Action Level 2 at 10 am Tuesday and power was reduced to <30% within 8 hours as required. The Plant should be shutdown immediately as per Action Level 3 because Chlorides have not been returned to <10 ppb (Action level 1) within 100 hours.

A - Incorrect - Chloride has exceeded the allowed time in Action Level 2. This is 72 hours for Sodium.
B - Incorrect - Chloride has exceeded the allowed time in Action Level 2. This time would be 7 days from the first excursion.
D - Incorrect - Shutdown is required since Chloride has exceeded the allowed time in Action Level 2.

Lesson Plan/Obj: RO-C-AOP-3 / #5

Reference: 12-THP-6020-CHM-201, Steam Generator Chemistry

Generic
- Conduct of Operations
- Ability to maintain primary and secondary plant chemistry within allowable limits.

NOTE: Attach selected pages from 12-THP-6020-CHM-201, Steam Generator Chemistry.

Exam Level:	SRO	Outline Number:	110
Question#_old:	NEW	KA:	194001 - 2.1.34
RO#:		SRO#:	
Difficulty/Level:	4H	Bank:	NEW

111. 111 001/SRO/111/20651/194001 - 2.1.7///2H/INPO - MODIFIED

Given the following:

- You have just assumed the watch on Unit 2.
- The Unit reached 100% power 2 hours ago.
- Rod control is in MANUAL due to rising Xenon.
- Shortly after assuming the watch, you observe the following abnormal plant indicators:
  - Reactor Coolant System Temperature has rapidly lowered approximately 3°F.
  - S/G Level Deviation annunciators are illuminated.
  - Charging Flow Control Valve position is rising.

Which ONE of the following events is the most likely cause of these indications?

a.✔ Excessive load rise

b. Dropped control rod

c. Turbine Control Valve shut

d. Rising Xenon

ANSWER: A - An excessive load increase would trigger the runback. With rods in manual they would not step in causing the RCS to cooldown as more energy is removed from the secondary.

B - Incorrect - SG Level deviations would NOT be expected.
C - Incorrect - This would raise RCS Temperature
D - Incorrect - This would be a slow transient and would NOT rapidly lower temperature.

Lesson Plan/Obj: RO0S-AOP-2 / #1

Reference: 02-OHP-4024-211, Annunciator #211 Response: Delta T, Drop 20 Tavg Low Tavg<Tref

Generic
- Conduct of Operations
- Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Exam Level:	SRO	Outline Number:	111
Question#_old:	20651	KA:	194001 - 2.1.7
RO#:		SRO#:	
Difficulty/Level:	2H	Bank:	INPO - MODIFIED

112. 112 001/BOTH/112/01TS0C112~4/194001 - 2.2.12///3H/DEV - MODIFIED

Given the following:

- On your shift, a monthly surveillance item is discovered overdue.
- Required due date was November 25th.
- Assume today is November 30 and the performance of the Surveillance Test has begun.
- The previous surveillance tests for this component/system were Due and Completed as shown below.

Due Date	Completed Date
September 8	September 7
October 5	October 2
October 30	October 28

Which ONE of the following statements describes the status of the component/system and the justification for that status?

a. The surveillance test has been missed and the component/system must be declared INOPERABLE until the test is verified completed satisfactorily.

b.✓ The component/system is OPERABLE because the Technical Specifications allow a time extension which has not been exceeded.

c. The component/system is INOPERABLE because 3.25 times the time interval for three consecutive test has been exceeded.

d. The component/system is OPERABLE because the Technical Specifications allow time from previous early performances to be carried forward.

ANSWER: B Tech Specs allows a grace period of 25%. For a Monthly surveillance (Monthly = 31 days) this would be 7 days. The time extension of 7 days has not been exceeded. Additionally T.S. 4.0.3 allows for a delay when discovering a surveillance NOT performed within it's specified interval.

A - Incorrect - A time extension is allowed.
C - Incorrect - 3.25 times has not been exceeded for the last three times.
D - Incorrect - Time may not be carried over from previous performances.

Lesson Plan/Obj: RO-C-TS01 / #12;

Reference: Technical Specification - Section 4; PMP-4030-EXE-001, Conduct Of Surveillance Testing

Generic
- Equipment Control
- Knowledge of surveillance procedures.

Exam Level:	BOTH	Outline Number:	112
Question#_old:	01TS0C112~4	KA:	194001 - 2.2.12
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	DEV - MODIFIED

113. 113 001/SRO/113/NEW/194001 - 2.2.19///2H/NEW

Given the following:

- A packing leak has been identified on WCR-951, NESW to RCP Air Cooler.
- The WIN team supervisor states that his team can tighten the packing and stop the leak as Minor Maintenance .

Is this activity acceptable for the WIN team to perform <u>and</u> why/why not?

The activity is...

a. acceptable as long as a stroke test is performed post maintenance.

b. acceptable as long as they are accompanied by an AEO.

c.✓ NOT acceptable because Minor Maintenance is not allowed on Tech Spec equipment.

d. NOT acceptable because this valve can not be closed at power even for a short time.

ANSWER: C - Minor Maintenance is NOT allowed on equipment that would require or cause entry into a Tech Spec LCO action statement nor equipment that is in service.

A - Incorrect - Tech Spec equipment requires a full job order with a subsequent Post Maintenance test.
B - Incorrect - Tech Spec equipment requires a full job order with a subsequent Post Maintenance test.
D - Incorrect - This valve could be momentarily closed during power operation.

Lesson Plan/Obj: RO-C-ADM03 / #2

Reference: PMP-2291-INT-001, Work Control Activity Initiation Process

Generic
- Equipment Control
- Knowledge of maintenance work order requirements.

Exam Level:	SRO	Outline Number:	113
Question#_old:	NEW	KA:	194001 - 2.2.19
RO#:		SRO#:	
Difficulty/Level:	2H	Bank:	NEW

114. 114 001/RO/114/12ADMC1304~1/194001 - 2.2.26/103 K1.02//4H/MASTER - DIRECT

Given the following:

- Refueling is underway in Unit 2.
- Used fuel assemblies are being moved into the Spent Fuel Pit.
- The Equipment Hatch is installed with four bolts in place.
- Both upper containment airlock doors are open with cables running through the upper airlock.
- Quick disconnects are installed on each line running through the upper airlock and all procedural requirements for lines through the airlock are met.
- All containment penetrations directly to the outside atmosphere are isolated with a manual valve or are blind flanged.

Which ONE of the following describes the containment / refueling integrity status?

a. Containment Integrity exists; but refueling must be stopped.

b.✓ Refueling Integrity exists; refueling may continue.

c. Containment Closure capability does NOT exist; but refueling may continue.

d. Refueling Integrity does NOT exist; refueling must be stopped.

ANSWER: B - Refueling Intergrity requires only 1 isolation method be provided. Additionally, provisions are made for the air lock doors being open.

A - Incorrect - Containment integrity does not exist as it requires air locks and hatches closed and pressure tested.
C - Incorrect - Containment closure capability is met based on PMP-4100-SDR-001, Plant Shutdown Safety And Risk Management, requirements.
D - Incorrect - Refueling Integrity does exist.

Lesson Plan/Obj: RO-C-ADM13 / #3

Reference: T.S. 1.0, Definitions; T.S. 3.9.4, Containment Building Penetrations; PMP-4100-SDR-001, Plant Shutdown Safety And Risk Management, Attachment #2; 2-OHP-4030-STP-041, Refueling Integrity

Generic
- Equipment Control
- Knowledge of refueling administrative requirements

Exam Level:	RO	Outline Number:	114
Question#_old:	12ADMC1304~1	KA:	194001 - 2.2.26
RO#:	103 K1.02	SRO#:	
Difficulty/Level:	4H	Bank:	MASTER - DIRECT

115. 115 001/BOTH/115/NEW/194001 - 2.2.3///3F/NEW

Which ONE of the following describes the Mode 1 standby readiness alignment for the TDAFW pump discharge valves?

a. Both Units valves should be in the FULL OPEN position.

b. Both Units valves should be in the THROTTLED position.

c.✔ The Unit 1 valves should be in the THROTTLED position. The Unit 2 valves should be in the FULL OPEN position.

d. The Unit 1 valves should be in the FULL OPEN position. The Unit 2 valves should be in the THROTTLED position.

ANSWER: C - The Unit 1 valves should be THROTTLED due to SG overfill concerns. The Unit 2 valves should be FULL OPEN.

A - Incorrect - The Unit 1 valves should be THROTTLED due to SG overfill concerns.
B - Incorrect - The Unit 2 valves should be FULL OPEN.
D - Incorrect - The Unit 1 valves should be THROTTLED due to SG overfill concerns. The Unit 2 valves should be FULL OPEN.

Lesson Plan/Obj: RO-C-05600 / #15

Reference: 01(02)-OHP-4021-001-006, Power Escalation; 12-OHP-4023-ECA-0-0, Loss Of All AC Power

Generic
- Equipment Control
- (multi-unit) Knowledge of the design, procedural, and operational differences between units.

Exam Level:	BOTH	Outline Number:	115
Question#_old:	NEW	KA:	194001 - 2.2.3
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	NEW

116. 116 001/SRO/116/OPS ISSUE~9/194001 - 2.2.6///2F/MASTER - DIRECT

Which ONE of the following represents an Intent Change to a procedure?

a.✓ Changing the Acceptance Criteria for the Close stroke time of 1-FRV-240, #4 SG Feedwater Reg Valve, from 60 seconds to 90 seconds.

b. Deleting the steps to align ESW to a cooler when the Initial Conditions already require ESW to be aligned and operating.

c. Changing the referenced procedure from 1-OHP-4021.001.001, Plant Heatup to 1-OHP-4021-001-001, Plant Heatup From Cold Shutdown to Hot Standby.

d. Changing the position title from Operations Manager to Operations Director without changing responsibilities.

ANSWER: A - Changing the technical content of acceptance criteria represents a Change of Intent. (Questions 2 and 3 on PMP-2010-PRC-002, Procedure Correction, Change, and Review, Attachment 1)

B - Incorrect - This does not change what is accomplished by the procedure or the method used.
C - Incorrect - This does not change what is accomplished by the procedure or the method used.
D - Incorrect - This does not change what is accomplished by the procedure or the method used.

Lesson Plan/Obj: RO-C-ADM12 / #1

Reference: PMP-2010-PRC-002, Procedure Correction, Change, and Review, Attachment 1

Generic
- Equipment Control
- Knowledge of the process for making changes in procedures as described in the safety analysis report.

Exam Level:	SRO	Outline Number:	116
Question#_old:	OPS ISSUE~9	KA:	194001 - 2.2.6
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	MASTER - DIRECT

117. 117 001/SRO/117/NEW/194001 - 2.3.1///3H/NEW

Given the following:

- The # 11 Steam Generator is being drained through the Blowdown System for an inspection when the R-19, Steam Generator Blowdown Monitor, fails terminating the (batch) release.
- The DRS 3100, Steam Generator Blowdown Monitor, is out-of-service.

Which ONE of the following provides an acceptable method to recommence draining the Steam Generator per PMP-6010-OSD-001,' Off-site Dose Calculation Manual?

Draining may recommence provided...

a. grab samples have been analyzed and found to be <10 E^{-7} *u*Ci/gram Dose Equivalent I-131at least once per 30 days.

b. grab samples have been analyzed and found to be <0.01 *u*Ci/gram Dose Equivalent I-131 at least once per 24 hours.

c.✓ at least 2 independent samples have been analyzed and the discharge lineup has been independently verified by 2 AEOs.

d. the flow rate has been estimated using pump curves and valve settings.

ANSWER: C - PMP-6010-OSD-001, Off-site Dose Calculation Manual, Attachment 3.2 item 1.b provides for the use of the monitors as either batch or continuous release points (double **). If it is a batch release (as is draining SG per example) then Action 1 is applicable instead of Action 2.

A - Incorrect - This is the accuracy required for samples taken per action 2.
B - Incorrect - This is the requirement for Action 2.
D - Incorrect - This is the action required if a flow meter is not available per a single *.

Lesson Plan/Obj: RO-C-ADM10 / #5

Reference: PMP-6010-OSD-001, Off-site Dose Calculation Manual, Attachment 3.2 page 46-47.

Generic
- Radiological Controls
- Knowledge of 10 CFR 20 and related facility radiation control requirements.

Exam Level:	SRO	Outline Number:	117
Question#_old:	NEW	KA:	194001 - 2.3.1
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	NEW

118. 118 001/RO/118/19590/194001 - 2.3.11///2F/INPO - DIRECT

The control room operators are responding to a Steam Generator Tube Rupture. In order to cool down the RCS and establish required subcooling margin, the operators dump steam to the condenser using the intact SGs.

Which ONE of the following describes why this method of RCS cooldown is preferred over dumping steam through the PORVs of the intact SGs?

a.✓ Minimizes radiological releases.

b. Minimizes thermal shock to the reactor vessel.

c. Minimizes shrink experienced by the RCS.

d. Minimizes RCS subcooling requirements.

ANSWER: A - Dumping steam to the condenser will keep the radioactivity contained within the plant. Prior to the ruptured SG isolation, the leaking RCS would have mixed with the secondary and raised the activity levels of the intact SGs.

B - Incorrect - The magnitude of the cooldown will be the same with both the SG PORVs and the condenser. Using the condenser may actually cooldown the RCS faster.
C - Incorrect - The magnitude of the cooldown will be the same with both the SG PORVs and the condenser. This is directly related to the amount of RCS shrink.
D - Incorrect - RCS Subcooling requirements are the same.

Lesson Plan/Obj: RO-C-EOP08 / #12

Reference: 12-OHP-4023-E-3, Steam Generator Tube Rupture Background

Generic
- Radiological Controls
- Ability to control radiation releases.

Exam Level:	RO	Outline Number:	118
Question#_old:	19590	KA:	194001 - 2.3.11
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	INPO - DIRECT

119. 119 001/BOTH/119/19333/194001 - 2.3.2///3H/INPO - MODIFIED

A point source in containment is reading 500 mRem/hr at a distance of two (2) feet. Two options are available to complete a mandatory work assignment near this radiation source:

Option 1 - ONE operator can perform the assignment in forty (40) minutes working at a distance of three (3) feet from the source.

Option 2 - TWO operators, trained in the use of special extension tooling, can perform the assignment in seventy (70) minutes at a distance of six (6) feet from the source.

Which ONE of the following is the preferred option and resulting total dose when considering the total exposure based on the ALARA plan?

a. Option 2, which results in total exposure of 0.112 MAN-REM.

b. Option 2, which results in total exposure of 0.131 MAN-REM.

c. Option 1, which results in total exposure of 0.149 MAN-REM.

d. Option 1, which results in total exposure of 0.222 MAN-REM.

ANSWER: B - Point Source = 500mrem/hr x 2^{2} ft = 2000 mrem/hr

Option 1 = 2000/3^2 = 222 mrem/hr x .67 = .149 MAN-REM
Option 2 = 2000/6^2=56 mrem/hr x 1.17 hr x 2 workers = .131 MAN-REM

So Option 2 results in lower dose.

A - Incorrect - This is 2 workers at 6 ft for 1 hour (vs. 70 minutes)
C - Incorrect - This is the correct dose for Option 1 but it is higher than Option 2.
D - Incorrect - This is 1 worker at 3 feet for 1 hour.

Lesson Plan/Obj: RO-C-RP01 / #4

Reference: RO-C-RP01, Biological Effects and Radiation Dose

Generic
- Radiological Controls
- Knowledge of facility ALARA program.

Exam Level:	BOTH	Outline Number:	119
Question#_old:	19333	KA:	194001 - 2.3.2
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO - MODIFIED

120. 120 001/SRO/120/01RP02~16/194001 - 2.3.4///3H/DEV - MODIFIED

The following Cook Plant dose histories exist for four operators: (No dose has been received from other sites)

Operator	David	James	Lyle	Timothy
Deep Dose Equivalent (DDE)	1.897 rem	1.929 rem	1.888 rem	1.861 rem
Shallow Dose Equivalent (SDE)	23 mrem	118 mrem	39 mrem	120 mrem
Committed Dose Equivalent (CDE)	1.668 rem	1.845 rem	1.767 rem	1.819 rem
Committed Effective Dose Equivalent (CEDE)	64 mrem	17 mrem	69 mrem	89 mrem

An Activity in Containment requires 2 operators to work in an area with a dose rate of 140 mrem/hr for 20 minutes.

Which ONE of the following set operators would EXCEED their annual Administrative Dose Limit (ADL) for Total Effective Dose Equivalent (TEDE) if assigned to perform this activity?

a. David and James

b.✓ David and Lyle

c. James and Timothy

d. Lyle and Timothy

Answer: B - This activity would result in a dose of 47 mrem/operator.
The Cook ADL for TEDE is 2 rem/yr. This means that an operator with a current TEDE of >1.953 would exceed their limit. TEDE = DDE + CEDE
Current TEDEs are:

David: 1.897 + .064 = 1.961 Rem
James: 1.929 + .017 = 1.946 Rem
Lyle: 1.888 + .069 = 1.957 Rem
Timothy: 1.861 + .089 = 1.950 Rem

A - Incorrect - James would not exceed ADL.
C - Incorrect - James and Timothy would not exceed ADL.
D - Incorrect - Timothy would not exceed ADL.

Lesson Plan/Obj: RO-C-RP02 / #5

Reference: PMP-6010-RPP-100, Radiation Exposure Monitoring, Reporting, and Dose Control ; THP-6010-RPP-101, Preparation And Control Of Exposure Records And Reports

Generic
- Radiological Controls
- Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.

Exam Level:	SRO	Outline Number:	120
Question#_old:	01RP02~16	KA:	194001 - 2.3.4
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	DEV - MODIFIED

121. 121 001/SRO/121/AS07~17/194001 - 2.3.8///3F/MASTER - MODIFIED
Given the following:

- You are the Unit 1 Unit Supervisor.
- A release of the #7 Gas Decay Tank is in progress.
- The Auxiliary Building Exhaust Fan status is as follows:

1-HV-AX-1-Running
1-HV-AX-2-Off
2-HV-AX-1-Running
2-HV-AX-2-Running

- Auxiliary Building Exhaust Fan 1-HV-AX-1 Trips.

Which ONE of the following describes your response concerning the release due to 1-HV-AX-1 tripping?

a.✓ Notify the WDS operator to VERIFY that RRV-306, Waste Gas Decay Tank Release Valve has AUTOMATICALLY tripped closed.

b. Notify Unit 2 to monitor the release since it is all going out the Unit 2 Vent Stack through the 1-HV-AX-VD-3, Aux Building Ventilation Exhaust Plenum's Crosstie Damper.

c. Instruct the Unit 1 operator to close 1-HV-AX-VD-3, Aux Building Ventilation Exhaust Plenum's Crosstie Damper to direct the release through the Unit 2 Vent stack.

d. Notify the WDS operator that he must MANUALLY close RRV-306, Waste Gas Decay Tank Release Valve since dilution flow has been reduced.

ANSWER: A - Loss of all Unit 1 exhaust fans will cause a closure of RRV-306.

B - Incorrect - 1-HV-AX-VD-3, Aux Building Ventilation Exhaust Plenum's Crosstie Damper is required to be closed while a GDT release is in progress. The GDTs discharge to the Unit 1 Vent Stack.
C - Incorrect - 1-HV-AX-VD-3, Aux Building Ventilation Exhaust Plenum's Crosstie Damper is required to be closed while a GDT release is in progress. The GDTs discharge to the Unit 1 Vent Stack.
D - Incorrect - The RRV-306 is interlocked to Automatically close on a loss of Unit 1 exhaust fans.

Lesson Plan/Obj: RO-C-ADM01 / #22

Reference: 12-OHP-4021-023-002, Release Of Radioactive Waste From Gas Decay Tanks

Generic
- Radiological Controls
- Knowledge of the process for performing a planned gaseous radioactive release.

Exam Level:	SRO	Outline Number:	121
Question#_old:	AS07~17	KA:	194001 - 2.3.8
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	MASTER - MODIFIED

122. 122 001/BOTH/122/NEW/194001 - 2.3.9///2F/NEW

Prior to aligning the Containment Purge System for Clean-up operation, 01-OHP-4021-028-005, Operation Of The Containment Purge System, requires the Upper Containment Purge Supply dampers to be opened if Containment Pressure is less than 0 psig.

Which ONE of the following describes the basis for this step?

a. Technical Specifications require Containment pressure to be greater than 0 psig at all times.

b. Prevent a negative pressure from adversely affecting the radiation monitor readings.

c. Containment Exhaust Dampers are interlocked to close when containment pressure is less than 0 psig.

d.✓ Prevent Ice Condenser doors from opening when initiating containment purge.

ANSWER: D - A low pressure in upper containment with respect to lower containment will cause the Ice Condenser Doors to open. 01-OHP-4021-028-005 Attachment 1 step 4.6.4 is performed to raise upper containment pressure.

A - Incorrect - T.S. 3.6.1.4, Internal Pressure requires pressure to be -1.5 psig to .03 psig.
B - Incorrect - Negative pressure will not affect the radiation monitors - they monitor air are still able to provide accurate readings.
C - Incorrect - A low pressure interlock does not exist.

Lesson Plan/Obj: RO-C-01000 / #12

Reference: 01-OHP-4021-028-005, Operation Of The Containment Purge System, Attachment 1, step 1.1

Generic
- Radiological Controls
- Knowledge of the process for performing a containment purge.

Exam Level:	BOTH	Outline Number:	122
Question#_old:	NEW	KA:	194001 - 2.3.9
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	NEW

123. 123 002/SRO/123/ER01/194001 - 2.4.1///3H/MASTER-MODIFIED
The following plant conditions exist:

- A valid reactor trip signal has been received.
- The crew has entered OHP-4023-FR-S-1, Response to Nuclear Power Generation, from step 1 of OHP-4023-E-0, Reactor Trip Or Safety Injection.
- The main turbine is tripped.
- Emergency boration is in progress.
- The reactor has been tripped locally and the rods have inserted.
- All SG Narrow Range levels are 6% and lowering.
- NO AFW pumps are running.
- RCS pressure is 2285 psig.

Which ONE of the following is the required crew response to the above conditions?

a. Open Pressurizer PORVs to lower pressure to 2135 psig to enhance boration flow. Transition to OHP-4023-E-0 at the completion of OHP-4023-FR-S-1.

b. Perform the remainder of OHP-4023-FR-S-1 and then transition to OHP-4023-FR-H-1, Response to Loss of Secondary Heat Sink.

c. Immediately transition to OHP-4023-FR-H-1, Response to Loss of Secondary Heat Sink, since the reactor is now tripped.

d. Manually intiate Safety Injection and transition to OHP-4023-E-0.

ANSWER: B - When a Functional Restoration (FR) procedure is entered, it is required that the FR be implemented to completion unless a higher priority red path is identified. In this case, OHP-4023-FR-S-1, Response to Nuclear Power Generation, is the highest priority red path (OHP-4023-FR-H-1, Response to Loss of Secondary Heat Sink, is the third highest). Loss of all AFW with low SG levels warrants entry into OHP-4023-FR-H-1 following completion of OHP-4023-FR-S-1.

A - Incorrect - PORVs are only opened if Pressurizer pressure is >2335 psig and transition to OHP-4023-E-0, Reactor Trip Or Safety Injection is incorrect.
C - Incorrect - Must perform OHP-4023-FR-S-1, Response to Nuclear Power Generation, to completion before transitioning to OHP-4023-FR-H-1, Response to Loss of Secondary Heat Sink.
D - Incorrect - Conditions do NOT warrant SI actuation and transition to OHP-4023-E-0, Reactor Trip Or Safety Injection is incorrect.

Lesson Plan/Obj: RO-C-EOP01 / #17

Reference: OHI-4023, Abnormal / Emergency Procedure User's Guide, Attachment 5; 1/2-OHP-4023-F-0-3, Heat Sink CSF Status Tree

Generic
- Emergency Procedures/Plan
- Knowledge of EOP entry conditions and immediate action steps.

Exam Level: SRO
Question#_old: ER01
RO#:
Difficulty/Level: 3H

Outline Number: 123
KA: 194001 - 2.4.1
SRO#:
Bank: MASTER-MODIFIED

124. 124 001/BOTH/124/NEW/194001 - 2.4.10///2F/NEW

Given the following:

- A loss of offsite power has occurred on Unit 1.
- You are an extra Operator and are assigned to address the Annunciators on Panel 119, Station Auxiliary AB.

Which ONE of the following would you address FIRST based on the OHI-4024 Annunciator Priority system?

The Annunciator with ...

a. a Red C on the lens.

b.✔ a Red lens with a Purple slash.

c. a slash in the lower right corner of the lens.

d. an Orange dot on the lens.

ANSWER: B - The red lens is a first priority annunciator. Adding the purple slash means a condition that would not allow the EDG to start or deliver power.

A - Incorrect - These alarms mean that compensatory actions may be required.
C - Incorrect - These are seal-in alarms.
D - Incorrect - An Orange dot indicates a second priority lens.

Lesson Plan/Obj: RO-C-ADM02 / #5

Reference: OHI-4024, Annunciator Response

Generic
- Emergency Procedures/Plan
- Knowledge of annunciator response procedures.

Exam Level:	BOTH	Outline Number:	124
Question#_old:	NEW	KA:	194001 - 2.4.10
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	NEW

125. 125 001/RO/125/NEW/194001 - 2.4.19///2F/NEW

You are a Unit 2 BOP and have been assigned to restore Emergency Diesel Generator power per 02-OHP-4023-SUP-012, Restoring DG Power.

You are currently at step 12 and have determined that the 600 Volt Bus 21C is NOT energized. T21C is energized.

Step 12 reads as follows:

12. Check 600 Volt Bus 21C - ENERGIZED	Perform the following: a. IF T21C is energized, THEN perform the following: 1) Check Bus 21C NOT faulted by the following annunciators clear: • "TR21C Differential Operated" (Panel 220, Drop 88) • "TR21C 600V CB 21C1 Trip" (Panel 220, Drop 89) • "600V Bus 21C Ground" (Panel 220, Drop 90) 2) IF Bus 21C is NOT faulted, THEN close 21C1, Incoming Feed From Transformer TR21C.

Which ONE of the following is correct concerning the performance of this step?

Annunciator Panel 220 Drops 88, 89, and 90 ...

a. must be checked clear in the order given prior to closing 21C1.

b.✓ must be checked clear in any order given prior to closing 21C1.

c. are checked and if at least 1 is clear then breaker 21C1 may be closed.

d. are optional, and do NOT need to be checked prior to closing 21C1 if you know the bus is not faulted.

ANSWER: B - Per OHI-4023, Abnormal / Emergency Procedure User's Guide, if the order of substep performance is not important, they will be designated with a bullet (•) and an AND is implied between each bulleted action step.

A - Incorrect - Order is not required.
C - Incorrect - An AND is implied meaning all conditions must be met.
D - Incorrect - The steps must be performed.

Lesson Plan/Obj: RO-C-EOP01 / #11

Reference: OHI-4023, Abnormal / Emergency Procedure User's Guide, Attachment 1 Section 3

Generic
- Emergency Procedures/Plan
- Knowledge of EOP layout, symbols, and icons.

Exam Level:	RO	Outline Number:	125
Question#_old:	NEW	KA:	194001 - 2.4.19
RO#:		SRO#:	
Difficulty/Level:	2F	Bank:	NEW

126. 126 001/SRO/126/NEW/194001 - 2.4.26///3F/NEW

Work is required to be performed in an area protected by automatic CO_2 fire suppression. The job supervisor requests that the affected CO_2 system be isolated because of the location and nature of the work?

Which ONE of the following describes the minimum required actions per the Administrative Technical Requirements (ATRs)?

a.✔ The affected CO_2 system may be isolated provided fire detection in the zone is verified operable.

b. The affected CO_2 system may NOT be isolated. An escape route must be established to allow for a quick exit and barriers should be provided to prevent the work activities from actuating the detectors.

c. The affected CO_2 system may be isolated provided the fire brigade is stationed nearby with alternate suppresion equipment.

d. The affected CO_2 system may NOT be isolated. The associated detectors must be covered and a continuous fire watch provided.

ANSWER: A - Per ATR 1-FP-5, Low Pressure CO_2 Systems, Action A, automatic actuation may be disabled for personnel protection provided at least 1 zone of fire detectors is operable.

B - Incorrect - For personnel protection, CO_2 should be isolated. The detectors should not be blocked.
C - Incorrect - A fire brigrade is not required to be stationed nearby.
D - Incorrect - The detectors should not be made inoperable.

Lesson Plan/Obj: RO-C-ADM05 / #9

Reference: ATR 1-FP-5, Low Pressure CO_2 Systems, Action A.

Generic
- Emergency Procedures/Plan
- Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.

Exam Level:	SRO	Outline Number:	126
Question#_old:	NEW	KA:	194001 - 2.4.26
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	NEW

127. 127 001/SRO/127/2966/194001 - 2.4.49///3H/INPO - DIRECT

Given the following:

- A LOCA has occurred on Unit 1.
- 1-OHP-4023-E-0, Reactor Trip Or Safety Injection, is being implemented.
- South SI Pump was tagged out for Maintenance.
- West CCP tripped on overcurrent.
- Containment pressure is 3.6 psig.
- Power is lost to Bus T11A.
- RCS pressure is 1350 psig.
- All systems responded normally to actuation signals.

Which ONE of the following actions should be taken regarding Reactor Coolant Pump (RCP) trip criteria?

a.✔ The RCPs should be stopped because Phase B isolation has occurred.

b. The RCPs should be stopped to limit heat addition to the RCS.

c. The RCPs should NOT be stopped because no SI pumps or CCPs are running.

d. The RCPs should NOT be stopped because RCS pressure is above the foldout page trip criteria.

ANSWER: A - RCPs should be tripped whenever CCW is isolated as in a Phase B Isolation. Phase B isolation occurs at 2.9 psig in Containment.

B - Incorrect - RCP heat addition is minor in this case. AFW and associated heat removal capacity is well above minimum required with the East MDAFW pump and the Turbine Driven AFW pump (West Pump lost with Bus T11A).
C - Incorrect - RCPs are stopped on a loss of CCW even if SI & CCPs are lost. In this case the East CCP and North SI are available (powered from T11D).
D - Incorrect - CCW has been lost. Pressure is above the 1300 psig limit but Phase B has isolated CCW and so pumps must be tripped.

Lesson Plan/Obj: RO-C-EOP6 / #18

Reference: 01-OHP-4023-E-0, Reactor Trip Or Safety Injection, Foldout Page

Generic
- Emergency Procedures/Plan
- Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.

Exam Level:	SRO	Outline Number:	127
Question#_old:	2966	KA:	194001 - 2.4.49
RO#:		SRO#:	
Difficulty/Level:	3H	Bank:	INPO - DIRECT

128. 128 001/RO/128/AOP1CAOP9.13~2/194001 - 2.4.9///3F/MASTER - DIRECT

During performance of 02-OHP-4022-002-015, Mode 4 LOCA, the RHR Pumps are checked to see if they are aligned in the ECCS Mode.

If they are NOT, then RCS Hot Leg temperature is checked to see if it is greater than 185°F.

If the Hot Leg is greater than 185°F, then Attachment B, Cooling RHR Suction Piping, is performed before the RHR Pumps are aligned to the ECCS Mode.

Which ONE of the following is the reason it is important to cool the RHR Suction Piping before aligning the RHR Pumps to the ECCS Mode?

a. Prevent hot water injection into the core further degrading the core cooling situation.

b.✓ Prevent flashing in the RHR suction piping and possible RHR pump damage.

c. Avoid potential PTS concerns on the RCS cold leg injection piping.

d. Prevent flashing in the CCW side of the RHR Heat Exchanger and subsequent steam binding of the CCW System.

ANSWER: B - If the RHR pumps were aligned to the RCS for Shutdown cooling, the suction temperature could be up to 350°F. If the pumps were then aligned to the RWST, the hot water in the suction line could flash to steam due to the lower pressure.

A - Incorrect - In Mode 4, the RCS temperature would be 200-350°F. The RHR temprature could not be higher than this and the amount of warm water injected would be insignificant.
C - Incorrect - A PTS concern would come from high pressure condition. The RCS temperature would be equal to or greater than the RHR temperature. RHR would not be able to pressurize the RCS.
D - Incorrect - The CCW system will NOT flash with RHR temperatures up to 350°F.

Lesson Plan/Obj: RO-C-AOP-9 / #13

Reference: 02-OHP-4022-002-015, Mode 4 LOCA

Generic
- Emergency Procedures/Plan
- Knowledge of low power /shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.

Exam Level:	RO	Outline Number:	128
Question#_old:	AOP1CAOP9.13~2	KA:	194001 - 2.4.9
RO#:		SRO#:	
Difficulty/Level:	3F	Bank:	MASTER - DIRECT