REACTOR OPERATOR

Question: 1

With the plant at 100% power, the following conditions are noted:

- 89-A PZR PORV LINE TEMP HI is LIT.
- 89-B PZR SAFETY LINE TEMP HI is LIT.
- 88-C PRT PRESS HI is LIT.
- Both PZR PORVs indicate CLOSED.
- PZR pressure indicates 2230 psig and is slowly lowering.

In accordance with the ARI 89-A, PZR PORV LINE TEMP HI, for these conditions, the Operator-at-the-Controls (OAC) will:

a. Request permission from the US to close one PORV block valve at a time (without cycling the associated PORV). Monitor PRT parameters to see if the leak is isolated.

b. Request permission from the US to close one PORV block valve at a time, cycle the associated PORV, then reopen the associated block valve. Monitor PRT parameters to see if the leak is isolated.

c. Set up an historical trend on the ICS computer to monitor PRT pressure, temperature, and level for a rise in the associated parameter to determine which valve is leaking.

d. Request permission from the US to take manual control of Pressurizer pressure and reduce pressure approximately 50 psi to attempt seating the leaking safety valve.

Question: 2

Given the following plant conditions:

- The plant was initially at full power, end of life conditions.
- A small break LOCA occurred.
- The operating crew determines that a safety injection is required.
- RCS pressure has stabilized at 1575 psig.
- Containment pressure is at 2.9 psig and slowly decreasing.

Which ONE of the following (at this time) identifies the available heat removal components for maintaining adequate core cooling?

a. Steam Generators and Safety Injection pumps.

b. Steam Generators and Centrifugal Charging pumps.

c. Reactor Coolant Pumps and Safety Injection pumps.

d. Reactor Coolant Pumps and Centrifugal Charging Pumps.

Question: 3

Given the following:

- A Safety Injection occurs on Unit 1 due to a large break LOCA.

Which ONE of the following describes:

1) how the Centrifugal Charging Pump suction swaps to the RWST when a Safety Injection is initiated

AND

2) when the swapover to the containment sump is completed in accordance with ES-1.3, "Transfer to Containment Sump," what position will the operators place handswitches for the RWST TO CHARGING PUMPS SUCTION valves?

	(1)	**(2)**
a.	The VCT valves will start to close after the RWST valves have traveled to the full open position.	A P-AUTO
b.	The VCT valves will start to close after the RWST valves have traveled to the full open position.	A-AUTO
c.	The VCT valves will start to close as soon as the RWST valves start to open.	A P-AUTO
d.	The VCT valves will start to close as soon as the RWST valves start to open.	A-AUTO

Question: 4

Given the following plant conditions:

- The unit is operating at 50% power.
- A reactor coolant pump (RCP) malfunction occurs.

Which ONE of the following (1) will provide positive indication for the operator to distinguish between a locked RCP rotor and a sheared RCP shaft and (2) will identify if an automatic reactor trip would occur directly due to RCP parameters resulting from the malfunction 30 seconds after the malfunction?
(Assume no operator action is taken.)

	Indication	**Automatic Reactor Trip**
a.	Loop flow	would occur.
b.	Loop flow	would **NOT** occur.
c.	RCP ammeter	would occur.
d.	RCP ammeter	would **NOT** occur.

Question: 5

Given the following plant conditions:

- The plant is in Mode 5.
- RCS temperature is 195°F and stable.
- RCS pressure is 325 psig and stable.
- Train "A" RHR is in service.
- Train "B" RHR is out of service for repairs to the “B” RHR pump seals.
- A loss of Train "A" RHR shutdown cooling occurs.
- All Steam Generator levels are at 38% narrow range.

For these conditions, which ONE of the following is the preferred method for heat removal in accordance with AOI-14, "Loss of RHR Shutdown Cooling?"

a. RWST gravity feed to RCS with bleed through the PZR PORVs.

b. SI Pump Hot Leg Injection with bleed through a 2-inch vent.

c. Natural circulation using feed from AFW and bleed through SGBD and SG PORVs.

d. Normal charging into RCS and bleed through the PZR PORVs.

Question: 6

A leak has developed on the #3 RCP thermal barrier. After performance of AOI-15, "Loss of Component Cooling Water (CCS)" Section 3.2, CCS flow will _____(1)_____ through the Miscellaneous Equipment Header, since _____(2)_____.

(1) (2)

a. Decrease only the flow to all RCPs' thermal barriers has been isolated.

b. Decrease the flow to all thermal barriers and RCP oil coolers has been isolated.

c. Increase only the flow to all RCPs' thermal barriers has been isolated.

d. Increase the flow to all thermal barriers and RCP oil coolers has been isolated.

Question: 7

With the plant initially at 100% power, 1-A MFP trips. The Pressurizer master pressure controller output signal fails AS IS at the same time as the MFP trip.

Which ONE of the following occurs in the Pressurizer (PZR) to help limit the magnitude of the initial pressure transient on the Reactor Coolant System (RCS)?

a. An outsurge shrinks the PZR liquid, increasing the steam space in the PZR, and causing some of the saturated liquid to flash to steam. This along with PZR heaters energizing will limit the resulting pressure drop in the RCS.

b. An outsurge shrinks the PZR liquid, increasing the steam space in the PZR, and causing some of the saturated liquid to flash to steam. This tends to limit the resulting pressure drop in the RCS but the PZR heaters are prevented from responding to the pressure change.

c. An insurge of hotter water compresses the steam space in the PZR. Steam is condensed which helps limit the pressure increase in the RCS.

d. An insurge of cooler water compresses the steam space in the PZR. Steam is condensed which helps limit the pressure increase in the RCS.

Question: 8

If the 480V Unit Board breakers to the MG sets are the ONLY breakers that can be opened following an ATWS, which ONE of the following describes:

1) approximately how long it takes for the control rods to be completely inserted

AND

2) the impact of the failure on feedwater isolation?

	Approximate Time	**Impact of Failure**
a.	2 seconds.	Feedwater isolation will NOT occur when low Tavg is reached.
b.	5 - 6 seconds.	Feedwater isolation will NOT occur when low Tavg is reached.
c.	2 seconds.	Feedwater isolation WILL occur when low Tavg is reached.
d.	5 - 6 seconds.	Feedwater isolation WILL occur when low Tavg is reached.

Question: 9

Why does the loss of reactor coolant pumps during a steam generator tube rupture increase the risk of voiding during the subsequent cooldown and depressurization?

a. The fluid temperature in the upper head region significantly lags the temperature in the RCS loops.

b. More ECCS flow is injected into the ruptured loop cold leg due to the reduced pressure, resulting in less flow to the core and less heat removal.

c. The RCS hot legs reach saturation temperature during the rapid depressurization from the tube rupture, causing the RCS to flash.

d. The isolation of the steam generator in the affected loop causes that loop to stagnate; therefore, insufficient heat removal capacity is available to cool the RCS.

Question: 10

Given the following:

- Unit 1 is operating at 100% power with the TDAFW pump tagged out for maintenance.
- Following a feedwater line break outside containment the crew encounters the following complications:
  - The reactor could not be tripped from the MCR and a local trip was required.
  - Both MDAFW pumps were steam bound.
- The operating crew responded in accordance with the Emergency Procedure network and has now entered FR-H.1, "Loss of Secondary Heat Sink."
- When checking if Bleed and Feed is required, the following is noted:
  - Both centrifugal charging pumps running.
  - RCS pressure peaked at 2690 psig and is currently 2260 psig.
  - S/G levels are:
    - S/G #1 - 24% wide range
    - S/G #2 - 25% wide range
    - S/G #3 - 27% wide range
    - S/G #4 - 28% wide range

Which ONE of the following identifies if the RCS Pressure Safety Limit has been violated and if Bleed and Feed is currently required?

	RCS Pressure Safety Limit has…	**Bleed and Feed is…**
a.	been violated	currently required
b.	been violated	**NOT** currently required
c.	**NOT** been violated	currently required
d.	**NOT** been violated	**NOT** currently required

Question: 11

A loss of 161kV offsite power has occurred and the reactor has tripped. A decision has been made to cooldown the plant by natural circulation. The highest available temperature indication for the RCS is 455°F.

To confirm that natural circulation is occurring, which ONE of the following is the MINIMUM RCS pressure allowed in accordance with ES-0.2, "Natural Circulation Cooldown?"

a. 1515 psig.

b. 948 psig.

c. 798 psig.

d. 435 psig.

Question: 12

Given the following plant conditions:

- The Unit is at 50% power.
- Pressurizer level channel 1-LT-68-335 (Channel II) was removed from service and the associated bistables have been tripped due to a problem during the previous shift.
- 120V AC Vital Instrument Power Board 1-I has just been lost.

Which ONE of the following is a consequence of the loss of 120V AC Vital Instrument Power Board 1-I?

a. Automatic control of #2 SG Main Feed Reg. Valve is lost. Manual control of #2 SG Main Feed Reg. Valve is needed in order to stabilize SG level.

b. Automatic rod insertion occurs due to loss of the T-ref signal. Rod withdrawal in manual rod control will be used to restore Tavg.

c. An automatic reactor trip is generated at the time of the failure. The TDAFW Pump is maintaining levels in SGs 1 and 2; 1B-B AFW Pump is maintaining SGs 3 and 4.

d. An automatic reactor trip is generated at the time of the failure. Steam dumps receive an arming signal and open.

Question: 13

The plant is at 100% power with all systems in normal alignment, when a failure of the fuse between 125V Vital Battery Board I and 120 VAC Vital Inverter 1-I occurs, causing the following alarm:

- ARI-17-B, 125 DC VITAL BATT BD I ABNORMAL CKTS ISOLATED

Which ONE of the following describes the effect on Vital Inverter 1-I, including operation of the static transfer switch, and which Tech. Spec. LCO(s) will be required to be entered?

	Static Transfer Switch Operation	**Required LCO Entry / Entries**
a.	Automatically bypasses the inverter in order to maintain a source of power to 120V AC Vital Instrument Power Board I.	LCO 3.8.7, "Inverters - Operating" and LCO 3.8.9, "Distribution System - Operating."
b.	Does NOT operate, and a source of power to 120V AC Vital Instrument Power Board will be maintained.	LCO 3.8.7, "Inverters - Operating" and LCO 3.8.9, "Distribution System - Operating."
c.	Automatically bypasses the inverter in order to maintain a source of power to 120V AC Vital Instrument Power Board I.	LCO 3.8.7, "Inverters - Operating" only.
d.	Does NOT operate, and a source of power to 120V AC Vital Instrument Power Board will be maintained.	LCO 3.8.7, "Inverters - Operating" only.

Question: 14

Given the following plant conditions:

- The Unit is at 100% power.
- ERCW is in normal alignment.
- ERCW header 2A is indicating high flow.

The following MCR alarms are LIT:

- M-15B Window 167-D, "TURB/AUX/RX BDLG FLOODED."
- M-27A Window 223-A, "ERCW HDR A SUP PRESS LO."
- M-27A Window 223-B, "ERCW PMP A-A Discharge Pressure Low."
- M-27A Window 226-B, "ERCW PMP D-A Discharge Pressure Low."
- NO OTHER alarms are lit associated with the ERCW system.

Which ONE of the following ERCW conditions accounts for the above indications?

a. A supply header has ruptured in the Auxiliary Building.

b. A discharge header has ruptured in the Auxiliary Building.

c. A rupture has occurred upstream of the 2A strainer.

d. A rupture has occurred between the IPS and Auxiliary Building.

Question: 15

The Unit is operating at 100% power when an air leak develops in the Turbine Building. The Turbine Building AUO reports that the leak is immediately upstream of the air operator for 1-FCV-2-35, Short Cycle Valve.

When the AUO isolates air to stop the leak 1-FCV-2-35 will _____(1)_____, causing main feedwater pump speed to _____(2)_____.

(Assume no actions taken by the Main Control Room Operator during the event.)

	(1)	(2)
a.	OPEN	RISE
b.	OPEN	DROP
c.	CLOSE	RISE
d.	CLOSE	DROP

Question: 16

Given the following plant conditions:

- A LOCA outside containment has resulted in RCS subcooling dropping to 0°F.
- The operating crew has entered ECA-1.2, "LOCA Outside Containment."

Assuming NO operator actions, which ONE of the following identifies the expected status of Containment Phase A Isolation, and the parameter used to verify that the LOCA has been isolated in accordance with ECA-1.2?

a. NOT actuated.
Pressurizer level rising.

b. NOT actuated.
RCS pressure rising.

c. Actuated.
Pressurizer level rising.

d. Actuated.
RCS pressure rising.

Question: 17

Given the following plant conditions:

- A Large Break LOCA is in progress on Unit 1.
- The 1A 6.9 KV Shutdown Board is damaged, resulting in the loss of power to all of its loads.
- After 40 minutes the crew observes the following annunciators and indications:

  126-C RWST LEVEL LOW RECIRC INTLK annunciator LIT.
  127-E CNTMT LEVEL HI RECIRC INTERLOCK annunciator LIT.
  1-FCV-74-3, RHR Pump A Suction indicating lights are DARK.
  1-FCV-74-21, RHR Pump B Suction RED light LIT.
  1-FCV-63-72, Containment Sump to RHR Pump A Suction indicating lights are DARK.
  1-FCV-63-73, Containment Sump to RHR Pump B Suction GREEN light LIT.

The OAC will place the handswitch for ____(1)_____ to OPEN, in accordance with _____(2)_____.

	(1)	**(2)**
a.	1-FCV-63-72	ECA-1.1 "Loss of RHR Sump Recirculation."
b.	1-FCV-63-73	ECA-1.1 "Loss of RHR Sump Recirculation."
c.	1-FCV-63-72	ES-1.3, "Transfer to Containment Sump."
d.	1-FCV-63-73	ES-1.3, "Transfer to Containment Sump."

Question: 18

Consider the following four full power plant conditions which involve corrective actions taken to mitigate an excessive heat transfer event. Which ONE of the following identifies conditions where both condition 1 and 2 would result in a Technical Specification LCO entry?

	Condition 1	**Condition 2**
a.	An AUO manually isolates one leaking steam dump valve.	An AUO manually isolates a leaking steam generator Atmospheric Relief valve.
b.	Maintenance "gags" closed one leaking safety valve on one steam generator.	An AUO manually isolates a leaking steam generator Atmospheric Relief valve.
c.	An AUO manually isolates one leaking steam dump valve.	A manual valve is closed to isolate a Feedwater Bypass Reg Valve.
d.	Maintenance "gags" closed one leaking safety valve on one steam generator.	A manual valve is closed to isolate a Feedwater Bypass Reg Valve.

Question: 19

Given the following plant conditions:

- Unit 1 is at 80% power with all systems aligned normal.
- 1-PT-1-73, Turbine Impulse Pressure, fails high.

For the above conditions, the control rods will be continuously ___(1)_____ . If the rods continue to move after controls are shifted to MANUAL the operator will initiate a reactor trip, and then confirm that the reactor is tripped by observing the _____(2)_____.

	(1)	(2)
a.	Inserting	Reactor Trip Breakers GREEN lights LIT, and the Bypass Breaker indicating lights DARK.
b.	Inserting	GREEN lights LIT on both the Reactor Trip Breakers and Bypass Breakers.
c.	Withdrawing	Reactor Trip Breakers GREEN lights LIT, and the Bypass Breaker indicating lights DARK.
d.	Withdrawing	GREEN lights LIT on both the Reactor Trip Breakers and Bypass Breakers.

Question: 20

Given the following plant conditions:

- With Unit 1 initially at full power, a Bank D Group 1 rod dropped fully into the core.
- AOI-2, "Malfunction of Reactor Control System," was entered and dropped rod recovery is in progress.
- The dropped rod has been withdrawn 150 steps, resulting in turbine load rising to 74%.
- To address the above conditions, operators have reconnected the lift coil(s) for the appropriate rod(s), per AOI-2.
- 86-A CONTROL ROD URGENT FAILURE has not been RESET.

Which control rods, if any, would move if the In-Hold-Out switch is placed to the IN position with 1-RBSS, Rod Bank Select in CBD position prior to resetting the Urgent Failure?

a. Group 1 rods, only.

b. Group 2 rods, only.

c. No rod motion will occur.

d. All Bank D rods.

Question: 21

With the plant at full power, a reference leg leak develops on the controlling PZR Level Transmitter.

As a result, the controlling PZR level channel will indicate slightly _____(1)_____ than actual level, and remain _____(2)_____ than the cold-calibrated PZR level instrument.

	(1)	(2)
a.	higher	lower
b.	lower	lower
c.	higher	higher
d.	lower	higher

Question: 22

Given the following plant conditions:

- A plant startup is in progress, with the reactor currently at 8% power.
- The instrument power fuse for Intermediate Range Monitor N136A opens (blows).

Assuming the plant was in its normal alignment at the time of the failure, which ONE of the following statements describes the impact of the Intermediate Range Monitor (IRM) failure on plant operation, and the effect, if any, of the failure on the Source Range Monitors (SRMs)?

	Impact of failure	**Effect on SRM**
a.	Reactor trip.	When the operable IRM indicates below 1.66×10^{-4}% power, the SRMs will automatically reinstate.
b.	Reactor trip.	When the operable IRM indicates below 1.66×10^{-4}% power, the operator will place both SR Trip RESET-BLOCK switches to RESET.
c.	Operation will continue.	When the operable IRM indicates below 1.66×10^{-4}% power, the SRMs will automatically reinstate.
d.	Operation will continue.	When the operable IRM indicates below 1.66×10^{-4}% power, the operator will place both SR Trip RESET-BLOCK switches to RESET.

Question: 23

Given the following plant conditions:

- Unit 1 is operating at 100% power.
- A containment purge is in progress.
- A small leak develops on 1-FCV-62-69, Letdown Isolation Valve, bonnet.

Which ONE of the following identifies the radiation monitor(s) that initiate(s) the Containment Vent Isolation (CVI) signal, and the expected radiation monitor(s) response after the CVI?

Note the following nomenclature: 1-RM-90-106, Lower Containment Radiation Monitor
1-RM-90-131, Containment Purge Radiation Monitor

	Radiation Monitor	**Radiation Monitor Readings after the CVI**
a.	1-RM-90-131 only.	Both 1-RM-90-106 and 1-RM-90-131 would decrease.
b.	1-RM-90-131 only.	Only 1-RM-90-131 would decrease.
c.	Both 1-RM-90-106 and 1-RM-90-131.	Both 1-RM-90-106 and 1-RM-90-131 would decrease.
d.	Both 1-RM-90-106 and 1-RM-90-131.	Only 1-RM-90-131 would decrease.

Question: 24

Unit 1 has tripped from 100% power. The operators transitioned from E-0, "Reactor Trip or Safety Injection" to ES-0.1, "Reactor Trip Response." There are indications of failed fuel based on the results of post-trip activity samples. AOI-28, "High Activity in Reactor Coolant" is being implemented.

Which ONE of the following describes the correct actions to take with the CVCS system, including the reason for the action?

a. Letdown is diverted to the CVCS Holdup Tank to limit radiation levels in the charging pump area.

b. Charging and Letdown flows are reduced to limit radiation levels in the Auxiliary Building.

c. The cation bed is placed in service at 120 gpm flow in order to reduce the amount of fission products in the reactor coolant system.

d. Charging and Letdown flows are increased, allowing increased flow through the mixed bed demineralizers to maximize clean up.

Question: 25

Given the following plant conditions:

- A Main Steam Line Break has occurred inside containment on Unit 1.
- Containment pressure is 2.9 psid.
- The crew has entered FR-P.1, "Pressurized Thermal Shock."
- An RCS pressure reduction is in progress.
- RCS subcooling is at 80°F.

Which ONE of the following describes the required action, in accordance with FR-P.1?

a. Continue with the depressurization of the RCS.

b. Dump steam from an intact S/G to raise subcooling.

c. Start #2 RCP to promote thermal mixing of RCS and ECCS fluids.

d. Close the PORV to stop RCS depressurization until subcooling is recovered.

Question: 26

Given the following plant conditions:

- The plant was initially at full power.
- A Main Steam Line break occurs in containment on SG #1.
- The operating crew is entering FR-Z.1, "High Containment Pressure."

Which ONE of the following identifies the status of the Containment Spray Pumps when FR-Z.1 is entered due to an ORANGE path on the FR-0 "Status Trees," and how feedwater flow to #1 SG is required to be controlled?

	Containment Spray Pumps	FR-Z.1 Feedwater flow requirement
a.	Only one pump in service	remain isolated
b.	Only one pump in service	established at minimum detectable
c.	Neither pump in service	remain isolated
d.	Neither pump in service	established at minimum detectable

Question: 27

Given the following plant conditions:

- A large break LOCA has occurred.
- Accumulators have discharged and are isolated.
- ES-1.3, "Transfer to Containment Sump" has been completed.
- Containment sump level is now at 84% and slowly rising.
- The SM directs performance of FR-Z.2, "Containment Flooding."
- FR-Z.2 requires that the containment sump be sampled.

Which ONE of the following describes (1) where the sample is taken from and (2) the reason for sampling the sump?

	(1)	(2)
a.	RHR System	To determine the level of activity, to allow the TSC to determine if excess sump water can be transferred to tanks outside of containment.
b.	Containment Sump	To determine the level of activity, to allow the TSC to determine if excess sump water can be transferred to tanks outside of containment.
c.	RHR System	To ensure shutdown margin is being maintained, since non-borated water has entered the containment sump.
d.	Containment Sump	To ensure shutdown margin is being maintained, since non-borated water has entered the containment sump.

Question: 28

Which ONE of the following describes which 480 V SD Boards are the NORMAL and the ALTERNATE power supplies to C-S CCS pump?

	NORMAL	ALTERNATE
a.	1A1-A	2B2-B
b.	1B1-B	2A1-A
c.	2B2-B	1A2-A
d.	1A2-A	2B1-B

Question: 29

Given the following plant conditions:

- The Unit is operating at 100%.
- The following alarms and indications are noted for #2 RCP:
  - RCP 2 #1 SEAL LEAKOFF FLOW HI.
  - RCP 2 STANDPIPE LEVEL HI/LO.
  - RCP 2 #1 seal leak-off flow recorder indicates off-scale high.
- Charging flow has risen 40 gpm to maintain pressurizer level.

Based on these indications the _____(1)_____ on #2 RCP has failed, and the operator will trip the reactor, then trip #2 RCP, and after 3-5 minutes close _____(2)_____.

	(1)	**(2)**
a.	#1 seal	1-FCV-62-61 and 1-FCV-62-63, Seal Water Return Isolation Valves.
b.	#2 seal	1-FCV-62-61 and 1-FCV-62-63, Seal Water Return Isolation Valves.
c.	#1 seal	1-FCV-62-22, RCP 2 Seal Return Valve.
d.	#2 seal	1-FCV-62-22, RCP 2 Seal Return Valve.

Question: 30

A dilution to critical is being performed. Initial counts are 10 cps on both Source Range Channels N132 and N133. The first batch of primary water results in count rate changing from 10 cps to 20 cps. If the count rate is doubled again, the volume of primary water required for the doubling will be _____(1)_____ than the first batch, and as a result the reactor will then be _____(2)_____.

	(1)	(2)
a.	greater than	subcritical.
b.	less than	subcritical.
c.	greater than	critical.
d.	less than	critical.

Question: 31

Which ONE of the following conditions will prevent RHR Spray from being placed in service to control containment pressure after a large break LOCA?

a. 1B SI pump trips on instantaneous overcurrent.

b. 1A CCP pump trips on instantaneous overcurrent.

c. 1-FCV-74-41, RHR SPRAY HDR B ISOLATION, will NOT OPEN.

d. 1-FCV-74-33 AND 1-FCV-74-35, RHR Crosstie Valves, CANNOT be CLOSED.

Question: 32

Given the following plant conditions:

- Safety Injection (SI) is actuated.
- RWST level is 32%.
- Containment sump level is 18%.

Based on these conditions, it is expected that sump swapover will _____.

a. NOT occur since containment sump level is too low.

b. NOT occur because an SI signal is still present to the RHR sump valves.

c. NOT occur since RWST level is too high.

d. occur, since all required conditions have been met.

Question: 33

Given the following:

- Unit is at 100% power with all components in a normal alignment.
- Annunciator 88-D, PRT TEMP HI alarms.

Which ONE of the choices completes the following two statements?

The PRT is cooled by dispersing primary water into the PRT _____ the water level.

If a high water level occurs in the PRT during cooling, 1-FCV-68-310, PRT Drain to RCDT, is manually opened and the RCDT pump B _____.

a. above
will automatically start when the valve is fully open.

b. above
is manually started after the valve is fully open.

c. below
will automatically start when the valve is fully open.

d. below
is manually started after the valve is fully open.

Question: 34

The pressurizer (PZR) cold cal level is at 40% with a nitrogen blanket present.

Which ONE of the following choices completes the statement below?

When establishing a steam bubble, in accordance with GO-1, "Unit Startup From Cold Shutdown To Hot Standby," the first indication of steaming from the PZR to the Pressurizer Relief Tank is verified by observing a rise in ____(1)_____ and a steam bubble is first confirmed when _____(2)_____.

	(1)	(2)
a.	relief line temperature.	Letdown flow exceeds charging flow.
b.	Pressurizer Relief Tank level.	Letdown flow exceeds charging flow.
c.	relief line temperature.	PZR Liquid Temperature reaches 235°F.
d.	Pressurizer Relief Tank level.	PZR Liquid Temperature reaches 235°F.

Question: 35

Which ONE of the following conditions would result in implementation of E-0, "Reactor Trip or Safety Injection?"

a. Thermal barrier heat exchanger flow path isolates due to high differential flow.

b. The level on the “B” side of the CCS Surge tank drops to 10%.

c. ERCW flow is lost to CCS Heat Exchanger A.

d. Loss of the C-S CCS pump while the 1B-B CCS pump is tagged.

Question: 36

Unit 1 is operating at 100% power when the following sequence of events occurs:

- PZR Power Operated Relief Valve (PORV) 1-PCV-68-334 opens and sticks open.
- PZR PORV Block valve, 1-FCV-68-332 cannot be closed.
- Pressurizer Relief Tank (PRT) is at 43 psig and continues to rise.

Which ONE of the following completes the following statement?

The PRT rupture disc will blow when pressure reaches _____ psig, at which point Pressurizer Power Operated Relief Valve tailpipe temperature will _____.

	PRT Rupture Disc Setpoint	**PORV Tailpipe Temperature**
a.	85 psig	Remain the same.
b.	85 psig	Lower
c.	100 psig	Remain the same.
d.	100 psig	Lower

Question: 37

With the plant operating at 90% power, what is the impact of the BISTABLES in NIS Power Range Channel N41 drawer failing to the tripped condition, and what actions will be directed by procedures in response to this condition?

	Impact of Failed Bistable	Actions per Procedure
a.	Control Rods insert at maximum speed and a 2/4 SSPS trip is processed.	AOI-4, "Nuclear Instrumentation Malfunctions," directs placing rod control in MANUAL, and then to slowly restore rods to pre-event position.
b.	Rod withdrawal is blocked and a 1/4 SSPS trip is processed.	AOI-2, "Malfunction of Reactor Control System," directs placing rod control in MANUAL and then reducing turbine load to match Tavg and Tref.
c.	Control Rods insert at maximum speed and a 2/4 SSPS trip is processed.	AOI-2 directs placing rod control in MANUAL and then reducing turbine load to match Tavg and Tref.
d.	Rod withdrawal is blocked and a 1/4 SSPS trip is processed.	AOI-4 directs placing rod control in MANUAL and defeating the rod withdrawal block to permit AUTO and MANUAL rod withdrawal.

Question: 38

Which ONE of the following describes how the Operator-at-the-Controls will determine the TRAIN of SI that failed to RESET, and the next local action that will be required if the SI signal can NOT be reset from the Main Control Room after both of the 48V breakers in the Local SSPS Panel have been opened?

	Indication of SI train that failed to RESET	**Local Operator Actions**
a.	ICS points SD9000, SI ACT TRAIN A and/or SD9001, SI ACT TRAIN B will display ACT in RED letters on the train that failed to reset.	Place SSPS output mode switch S602 in the TEST position in 1-R-48 or 1-R-51.
b.	ICS points SD9000, SI ACT TRAIN A and/or SD9001, SI ACT TRAIN B will display ACT in RED letters on the train that failed to reset.	Place Safeguards Test Cabinet Reset switch S821 to reset and release in 1-R-52 or 1-R-53.
c.	SI ACTUATED permissive will be LIT, AUTO SI BLOCKED permissive will be DARK.	Place SSPS output mode switch S602 in the TEST position in 1-R-48 or 1-R-51.
d.	SI ACTUATED permissive will be LIT, AUTO SI BLOCKED permissive will be DARK.	Place Safeguards Test Cabinet Reset switch S821 to reset and release in 1-R-52 or 1-R-53.

Question: 39

Given the following plant conditions:

- The operating crew is responding to a reactor trip due to a loss of 120V AC Vital Instrument Power Board I-I.
- PZR pressure transmitter 68-334 (Channel II) fails LOW.

Which ONE of the following describes the plant response?

a. Both trains of SSPS SI master relays would actuate AND both trains of ECCS equipment auto start.

b. Both trains of SSPS SI master relays would actuate BUT only "B" train ECCS equipment auto starts.

c. Only the "B" train SSPS SI master relays would actuate BUT both trains of ECCS equipment auto start.

d. Only the "B" train SSPS SI master relays would actuate AND only "B" train ECCS equipment auto starts.

Question: 40

Given the following plant conditions:

- A reactor trip and Safety Injection occurred at 0340 due to a LOCA inside containment.
- Phase B Containment Isolation actuated at 0347.

Which ONE of the following describes the status of the Containment Air Return System backdraft dampers at 0354 and the reason?

a. OPEN to allow air to bypass the Ice Condenser.

b. OPEN to prevent air from bypassing the Ice Condenser.

c. CLOSED to allow air to bypass the Ice Condenser.

d. CLOSED to prevent air from bypassing the Ice Condenser.

Question: 41

Which ONE of the following conditions will directly cause the refrigerant system to be isolated from the glycol piping in the floor of the Ice Condenser?

a. Containment Phase A actuation only.

b. Containment Phase B actuation only.

c. A valid GLYCOL EXP TNK LEVEL HI-HI or a Containment Phase A actuation.

d. A valid GLYCOL EXP TNK LEVEL HI-HI or a Containment Phase B actuation.

Question: 42

Which ONE of the following lists two conditions that will directly cause a glycol circulating pump to trip?

a. Low expansion tank level, Low glycol temperature.

b. Low expansion tank level, High discharge pressure.

c. Low suction pressure, High discharge pressure.

d. Low suction pressure, Low glycol temperature.

Question: 43

Given the following conditions:

- A large break LOCA occurred.
- Containment pressure is 3.5 psid.
- RWST level is 7%.
- The Containment Spray Pumps are being aligned to the containment sump in accordance with ES-1.3, "Transfer to RHR Containment Sump."

Which ONE of the following identifies the interlock(s) that must be met before 1-FCV-72-45, Containment Spray Pump 1B Sump Suction, can be opened?

a. 1-FCV-72-21, Containment Spray Pump 1B RWST Suction must be closed, only.

b. Both 1-FCV-72-21, Containment Spray Pump 1B, and 1-FCV-72-2, Containment Header Isolation Valve, must be closed.

c. Both 1-FCV-72-13, Containment Spray Pump Mini Flow Valve, and 1-FCV-72-2, Containment Header Isolation Valve, must be closed.

d. 1-FCV-72-13, Containment Spray Pump Mini Flow Valve must be closed, only.

Question: 44

Given the following plant conditions:

- A reactor heatup is in progress, per GO-1, "Unit Startup From Cold Shutdown To Hot Standby Reactor Startup."
- RCS pressure is stable at 1600 psig.

Which ONE of the following will automatically close the main steam isolation valves (MSIVs)?

a. Steam line pressure has lowered to 675 psig.

b. Containment pressure 2.6 psid on 2/4 channels.

c. Containment pressure 1.6 psid on 2/3 channels.

d. A rapid steam line pressure drop of 100 psig in 5 seconds.

Question: 45

Given the following plant conditions:

- The plant is at 70% power.
- Main Steam header pressure transmitter 1-PT-1-33 fails full scale high.

Based on this failure, the steam generators (SGs) will be_____(1)_____, and the crew will take manual control of _____(2)_____ to mitigate the consequences of the transient.

	(1)	**(2)**
a.	overfed	main feedwater regulating valve (MFRV) and reduce flow
b.	overfed	main feed pump speed control and reduce flow
c.	underfed	main feedwater regulating valve (MFRV) and raise flow
d.	underfed	main feed pump speed control and raise flow

Question: 46

Given the following plant conditions:

- A plant startup is in progress.
- 1A and 1B Auxiliary feedwater (AFW) pumps are supplying each of the steam generators at 100 gpm.
- The air supply to 1-PCV-3-122, 1A AFW Pump Backpressure Control Valve, has been lost.

Comparing the response of the 1A AFW Pump to the 1B AFW Pump, which ONE of the following describes the effect of the air supply failure on motor amps and discharge pressure?

	Motor Amps	**Pump Discharge Pressure**
a.	1A Pump greater than 1B Pump	1A Pump greater than 1B Pump
b.	1A Pump greater than 1B Pump	1B Pump greater than 1A Pump
c.	1B Pump greater than 1A Pump	1A Pump greater than 1B Pump
d.	1B Pump greater than 1A Pump	1B Pump greater than 1A Pump

Question: 47

Given the following plant conditions:

- Unit 1 is operating at 50% power, with all systems aligned normally with Train A CCP and CCS pumps in service.
- A loss of 1A-A 6.9KV Shutdown Board due a differential relay operation occurs.
- The OAC observes RCP Seal Water Injection flow to all RCPs to be "0."
- The Control Building AUO reports extensive damage to the 1A-A 6.9 KV Shutdown Board bus bars.
- The crew implements AOI-43.01, "Loss of Unit Train A Shutdown Boards."

Under these conditions, RCP seal cooling is _____(1)_____ and in accordance with AOI-43.01, the crew will _____(2)_____.

	(1)	**(2)**
a.	available	Isolate letdown prior to starting CCP 1B-B.
b.	unavailable	Isolate letdown prior to starting CCP 1B-B.
c.	available	Start CCP 1B-B prior to isolating letdown.
d.	unavailable	Start CCP 1B-B prior to isolating letdown.

Question: 48

Which ONE of the following identifies the times the Vital Batteries are designed to have adequate capacity to supply the loading conditions listed below?

In the event of a loss of all AC power, with an accident coincident with a single failure, the vital batteries have adequate capacity to provide for the required load continuously for at least _____(1)_____.

If DC load shedding is performed such that the loading on the battery is reduced, the battery will be available to supply the remaining loads for at least _____(2)_____.

	(1)	(2)
a.	30 minutes	8 hours
b.	30 minutes	4 hours
c.	2 hours	8 hours
d.	2 hours	4 hours

Question: 49

Given the following plant conditions:

- The unit is at 100% power.
- The Control Room Operator is responding to 195-C, DG START AIR PRESS LO annunciator.
- The Outside AUO reports from the 1A Diesel Generator that both of the local low start air pressure alarms are lit, due to an air leak on an individual start air receiver.

Based on these conditions, the 1A Diesel Generator is _____.

a. INOPERABLE until the local LOW START AIR PRESSURE TANK alarm (200 psig) is cleared.

b. INOPERABLE until the local LOW START AIR PRESSURE ENGINE INLET alarm (160 psig) is cleared.

c. OPERABLE if Start Air Header pressure indicates at least 165 psig.

d. OPERABLE if Start Air Receiver pressure indicates at least 180 psig.

Question: 50

If the DG Day Tank level is unexpectedly decreasing, which ONE of the following is the LOWEST of the listed quantities of fuel oil remaining in the Day Tank that will maintain the DG OPERABLE?

a. 275 gallons.

b. 250 gallons.

c. 200 gallons.

d. 175 gallons.

Question: 51

Which ONE of the following Process Radiation Monitors will cause an isolation of a release path when the radiation monitor fails?

a. 1-RE-90-106, Lower Containment Monitor.

b. 0-RE-90-122, Waste Disposal System Liquid Release Monitor.

c. 0-RE-90-212, Station Sump Discharge Monitor.

d. 0-RE-90-132, Service Building Vent Radiation Monitor.

Question: 52

Given the following plant conditions:

- The plant is in MODE 4 with both trains of RHR in service.
- Spent Fuel Pool Cooling is aligned using the 'B' Spent Fuel Pool Cooling System pump and heat exchanger.
- Four ERCW pumps, (A-A, C-A, F-B, & H-B), are in service.

Which ONE of the following describes the impact of the A-A ERCW pump tripping on the listed parameters?
(Assume no operator action.)

	CCS temperature on CCS Heat Exchanger 'C' outlet	**Control and Station Air Compressor 'D' Oil Temperature**
a.	Rises	Rises
b.	Rises	Remains constant
c.	Remains constant	Rises
d.	Remains constant	Remains constant

Question: 53

Which ONE of the following completes the sentence below for a lowering control air system pressure?

The setpoint at which the Auxiliary Air Compressors start is __(1)__ psig. If pressure continues to lower to ___(2)___ psig, air to the Reactor Building will automatically isolate.

	(1)	(2)
a.	83	75
b.	83	70
c.	79.5	75
d.	79.5	70

Question: 54

Given the following plant conditions:

- A reactor trip from 35% power has just occurred.
- The steam dumps are modulating to maintain temperature at 557°F.
- Subsequently, the Turbine Building AUO reports that an air leak has developed on the supply to FM-1-103, Main Steam Dump VLV CNTL, that requires the instrument air to be isolated.

Which ONE of the following identifies how RCS Tavg will then be controlled for these conditions after the air is isolated?

a. Steam dumps will be operating in Tavg mode using Load Rejection Controller.

b. Steam dumps will be modulating in Steam Pressure mode.

c. SG PORVs will be operating on the high pressure bistable.

d. SG PORVs will be modulating on the pressure controller.

Question: 55

Which ONE of the following identifies the effect on the Containment Cooling System as containment pressure starts to rise during a LOCA?

A Phase A isolation will trip the _____.

a. Incore Instrument Room Coolers only.

b. Incore Instrument Room Coolers and the Lower Compartment Coolers.

c. Lower Compartment Coolers only.

d. Lower Compartment Coolers and the CRDM coolers.

Question: 56

Given the following conditions:

- Initial power level at 40%.
- An automatic reactor trip occurs.
- Train A reactor trip breaker fails to open.

Which ONE of the following describes the effect of this failure?

a. The main feedwater pumps will NOT automatically trip.

b. The steam dumps will NOT automatically open.

c. Two feedwater isolation valves will NOT automatically close.

d. The main turbine will NOT automatically trip.

Question: 57

With the plant in Mode 1, which ONE of the following conditions is expected to cause a small leak of Reactor Coolant directly into containment?

a. 1-FCV-62-77, Letdown Isolation Valve, fails closed, resulting in lifting of the relief valve on the letdown line in containment.

b. 1-PCV-77-158, RCDT N2 PRESS CONTROL malfunctions, resulting in Reactor Coolant Drain Tank pressure at 9 psig.

c. Due to leakage past the reactor head inner seal ring, 88-A, RX VESSEL FLNG LEAKOFF TEMP HI alarm annunciates.

d. Due to valve leakage, 88-E, RX HEAD VENT TEMP HI alarm annunciates.

Question: 58

A short circuit occurs internally on the Master Pressurizer Pressure Controller (1-PIC-68-340).

The short circuit will _____.

a. feed back into the protection circuit, causing the associated channel to trip.

b. NOT feed back into the protection circuit, due to the use of isolation amplifiers.

c. feed back into the protection circuit, preventing the associated channel from tripping.

d. NOT feed back into the protection circuit, since completely separate pressure transmitters are used.

Question: 59

Which ONE of the following completes the statement below?

If a calculated analog input point quality code of BAD is assigned to INCORE TCs HI QUAD, then a reverse video ___(1)____ will be displayed next to the new value of ____(2)____ on the RVLIS-ICCM Plasma Display.

	(1)	(2)
a.	“B”	“BBB”
b.	“D”	“BBB”
c.	“B”	“XXX”
d.	“D”	“XXX”

Question: 60

Given the following conditions:

- Unit 1 is in Mode 3 when a Safety Injection occurs.
- Following the Safety Injection, both the 1A-A Shutdown Board and the 2B-B 6.9 KV Shutdown Boards trip on differential.
- All other systems and components respond per design.

Which ONE of the following describes the status of the EGTS system?

a. Both trains EGTS fans are running.

b. Only EGTS train A fan is running.

c. Only EGTS train B fan is running.

d. Neither EGTS fans are running.

Question: 61

Given the following;

- The discharge header ruptures on the operating Spent Fuel Pit (SFP) Pump.
- In addition to aligning normal makeup to the SFP, the operating crew places a hose connected to the Demin Water Tank into the SFP in accordance with AOI-45, “Loss of Spent Fuel Pit Level or Cooling.”

Which ONE of the following describes how far the SFP level would drop before the SFP cooling pump lost suction and how the hose discharge will be arranged when placed in the SFP?

	The level would drop approximately…	The hose would be arranged with the end…
a.	4'	above the water level
b.	4'	below the water level
c.	10' 10"	above the water level
d.	10' 10"	below the water level

Question: 62

Given the following plant conditions:

- Core load is in progress.
- A failure of the Reactor Cavity Seal occurred.
- Reactor cavity level is at el. 748' and dropping slowly.

Which ONE of the following actions is required per AOI-29, "Dropped or Damaged Fuel or Refueling Cavity Seal Failure?"

a. Start one SI pump in the cold leg injection flowpath for cavity makeup.

b. Align CCP suction to RWST and discharge to the RCS through normal charging.

c. Align RHR suction to the RWST and discharge to the RCS through the hot legs.

d. Align Refueling Water Purification pumps suction to RWST and discharge directly to refueling cavity.

Question: 63

Given the following plant conditions:

- The unit is at 62% power during a load increase.
- 1-PS-47-74, Turbine Auto Stop Oil Pressure transmitter, fails low.

Which ONE of the following is a description of the expected alarm(s) to be LIT as a result of this failure and the availability of the Turbine Trip function for the Reactor Protection System?

	Alarms	Availability of Turbine Trip Function
a.	121-D TURB AUTO STOP OIL PRESS LO 71-A AUTO STOP OIL PRESS LO 76-B TURBINE TRIP	Available
b.	121-D TURB AUTO STOP OIL PRESS LO	Available
c.	121-D TURB AUTO STOP OIL PRESS LO 71-A AUTO STOP OIL PRESS LO 76-B TURBINE TRIP	Not Available
d.	121-D TURB AUTO STOP OIL PRESS LO	Not Available

Question: 64

Given the following plant conditions:

- Unit 1 is operating at 100% power.
- A planned release of the Monitor Tank is in progress.
- Power is lost to the rate meter associated with 0-RM-90-122A Waste Disposal System Release Line Radiation Monitor.

Which ONE of the following describes the effect of the failure on the release in progress, and which of the main control room alarms in addition to 161-F 0-L-2 listed below are expected?

Main Control Room Alarms

1 - 161-F 0-L-2 RAD WASTE PNL TROUBLE
2 - 181-A WDS RELEASE LINE 0-RM-122 LIQ RAD HI
3 - 181-C WDS RELEASE LINE 0-RM-122 INSTR MALF

	Effect on Release	Expected Alarms
a.	Will be AUTOMATICALLY terminated.	2 and 3
b.	Will be AUTOMATICALLY terminated.	2 only
c.	Must be MANUALLY terminated.	2 and 3
d.	Must be MANUALLY terminated.	2 only

Question: 65

Given the following plant conditions:

- The unit is operating at 100% power.
- 174-B, 1-RR-90-1 AREA RAD HI, is LIT.
- 174-E, 1-RR-90-1 AREA MONITORS INSTR MALF, is LIT.
- The GREEN indicating light on 1-RM-90-8, AFW Pumps is NOT LIT.

Which ONE of the following describes (1) the cause of the alarm, and (2) the actions (in part) required to be taken in response to the problem in accordance with the Alarm Response Instructions?

	(1)	(2)
a.	High radiation in the AFW pump area.	Enter AOI-31, “Abnormal Release of Radioactive Material,” and evaluate the release using ICS EFF1 screen.
b.	High radiation in the AFW pump area.	Since the GREEN indicating light is NOT lit, check counts indicating on the readout module. If no counts are indicated, then perform a source check on 1-RM-90-8. Contact Radiation Protection to evaluate compensatory actions.
c.	Failure of 1-RM-90-8.	Enter AOI-31, “Abnormal Release of Radioactive Material,” and evaluate the release using ICS EFF1 screen.
d.	Failure of 1-RM-90-8.	Since the GREEN indicating light is NOT lit, check counts indicating on the readout module. If no counts are indicated, then perform a source check on 1-RM-90-8. Contact Radiation Protection to evaluate compensatory actions.

Question: 66

Given the following plant conditions:

- The plant is in Mode 4.
- A cooldown to Mode 5 has been initiated.

What is the difference in staffing requirements for the minimum on-duty shift complement per OPDP-1, "Conduct of Operations," when Mode 5 is achieved?

a. The number of Unit Operators required is reduced.
The STA is NOT required.

b. The number of AUOs required remains the same.
The number of Unit Operators required is reduced.

c. The number of AUOs required is reduced.
The number of Unit Operators required remains the same.

d. The number of AUOs required is reduced.
The STA is required.

Question: 67

Per FHI-7, "Fuel Handling and Movement," what is the MAXIMUM number of IRRADIATED fuel assemblies allowed outside of approved storage (all areas combined)?

a. 3

b. 4

c. 5

d. 6

Question: 68

Given the following plant conditions:

- Unit 1 is at 100% power.
- The CRO notices that SG Blowdown Valve 1-FCV-1-15 has no indicating lights.
- The Control Building AUO reports that a fuse has blown in the valve's control circuit.

Which ONE of the following describes how troubleshooting for this condition is performed, including attempts at replacing the fuse?

a. One attempt may be made to replace the fuse.
If the fuse blows a second time, a Work Order must be written for the purpose of initiating troubleshooting on the circuit PRIOR to any further attempt at fuse replacement.

b. One attempt may be made to replace the fuse.
If the fuse blows a second time, Electrical Maintenance must be contacted to determine the exact cause of the problem.
Once a cause is identified, a Work Order is then written to perform needed repairs identified by the troubleshooting.

c. Write a Work Order to have Electrical Maintenance perform troubleshooting PRIOR to any attempt at replacing the fuse.
If they determine the cause was a faulty fuse, replace it.
No additional Work Order is needed.

d. Electrical Maintenance must be contacted to determine the exact cause of the blown fuse PRIOR to any attempt at replacing the fuse.
If they determine the cause was a faulty fuse, replace it.
Document the condition by writing a Work Order.

Question: 69

Given the following conditions:

- Unit 1 is in Mode 1.
- Maintenance has replaced the breaker for 1B-B Safety Injection (SI) Pump as a PM activity.
- The handswitch is placed to STOP, PULL-TO-LOCK.
- The breaker has been racked up using the guidelines of GOI-7, "Generic Equipment Operating Guidelines."

Which of the following actions is/are the MINIMUM requirement(s) per approved post-maintenance work activities for restoring 1B-B SI Pump to operable status?

1. Perform 1-SI-63-901-B, "Safety Injection Pump 1B-B Quarterly Performance Test."
2. Perform an end device test.
3. Bump start to check rotation.
4. Place the handswitch to auto.

a. 1 only.

b. 1, 2, and 3 only.

c. 2, 3, and 4 only.

d. 4 only.

Question: 70

In addition to a thermoluminescent dosimeter (TLD), which ONE of the following describes the acceptable monitoring method for personnel entering a “Very High Radiation Area” and the MINIMUM level of radiation protection coverage for the entry?

1) Electronic Alarming Dosimeter that continuously integrates the radiation dose rates in the area and alarms when the dose rate or dose alarm setpoints are reached.

2) Electronic Alarming Dosimeter that continuously transmits dose rate and cumulative dose to a remote receiver monitored by RP personnel.

3) Continuous surveillance by an individual qualified in radiation protection procedures, via a closed circuit television.

4) Continuously accompanied by, and in direct communications with, a qualified RP technician equipped with a radiation monitoring device that continuously displays the dose rate in the area.

a. 1 only

b. 1 and 4

c. 2 and 3

d. 2 only

Question: 71

Which ONE of the following conditions or evolutions REQUIRES contacting Radiological Protection? (Consider the effects of the described action only.)

a. Reestablishing letdown flow using AOI-20, Attachment 1, "Alignment of Charging and Letdown."

b. 1A Safety Injection (SI) pump is started to perform a Technical Specification surveillance test.

c. Increasing spent fuel pool (SFP) CCS cooling flow during spent fuel pool fuel moves.

d. Shifting from 1A to 1B Charging Pump.

Question: 72

Which ONE of the following describes the expected response of Unit 1 and Unit 2 CCS Surge Tanks Vents upon receipt of the following alarm:

- 188-A "CCS HX B OUTLET 2-RM-123 LIQ RAD HI"

a. Both Unit 1 and Unit 2 CCS Surge Tank Vents will CLOSE.

b. Both Unit 1 and Unit 2 CCS Surge Tank Vents will remain OPEN.

c. Unit 1 CCS Surge Tank Vent will remain OPEN.
Unit 2 CCS Surge Tank Vent will CLOSE.

d. Unit 1 CCS Surge Tank Vent will CLOSE.
Unit 2 CCS Surge Tank Vent will remain OPEN.

Question: 73

Given the following initial conditions:

- Unit 1 reactor is shutdown.
- RCS in solid water operation.
- All RCS temperatures are approximately 160°F.
- Pressure is 330 psig.
- RHR Train A is in service.

Subsequently:

- RCS pressure increases to 600 psig.

Which ONE of the following describes:

1) the effect the pressure increase would have on the PORVs,

AND

2) the <u>first</u> action(s) which is/are directed to be taken in accordance with AOI-14, "Loss of RHR Shutdown Cooling?"

	(1)	**(2)**
a.	Only ONE PORV OPENS.	Stop the Charging pump.
b.	Only ONE PORV OPENS.	Stop A Train RHR Pump and ensure RHR suction valves are closed.
c.	BOTH PORVS OPEN.	Stop Charging Pump.
d.	BOTH PORVS OPEN.	Stop A Train RHR Pump and ensure RHR suction valves are closed.

Question: 74

How are Emergency Operating Instruction (EOI) sub-steps designated if they must be performed in the order in which they are listed?

a. A Note precedes the step(s).

b. Substeps are designated by bullets.

c. The major step is designated with a double asterisk.

d. Substeps are designated by alpha-numeric characters.

Question: 75

After controls are transferred per AOI-30.2, "Fire Safe Shutdown," RCS temperature is controlled using ____(1)____ and RCS pressure is controlled using ____(2)_____.

	(1)	(2)
a.	Atmospheric Relief valves, only	PZR back-up heater groups A-A and B-B.
b.	Atmospheric Relief valves, only	PZR back-up heater group C.
c.	Condenser steam dumps or Atmospheric Relief valves	PZR back-up heater groups A-A and B-B.
d.	Condenser steam dumps or Atmospheric Relief valves	PZR back-up heater group C.

WRITTEN QUESTION DATA SHEET

Question Number: 1

K/A: 000008 G2.2.20
Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)
Knowledge of the process for managing troubleshooting activities.

Tier:	**1**	**RO Imp:**	**2.6**	**RO Exam:**	**1**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**1**	**Source:**	**New**

Applicable 10CFR55 Section: 41.10 / 43.5 / 45.13

Learning Objective: 3-OT-SYS068C, Rev. 7, Objective 11, Describe the indication an operator has that a PORV is open or leaking through.

References: AOI-18, "Malfunction of Pressurizer Pressure Control System," Rev. 21; ARI-88-94, Rev 19; GO-1, "Unit Startup from Cold Shutdown to Hot Standby," Rev. 60.

Question: 1

With the plant at 100% power, the following conditions are noted:

- 89-A PZR PORV LINE TEMP HI is LIT.
- 89-B PZR SAFETY LINE TEMP HI is LIT.
- 88-C PRT PRESS HI is LIT.
- Both PZR PORVs indicate CLOSED.
- PZR pressure indicates 2230 psig and is slowly lowering.

In accordance with the ARI 89-A, PZR PORV LINE TEMP HI, for these conditions, the Operator-at-the-Controls (OAC) will:

a. Request permission from the US to close <u>one</u> PORV block valve at a time (without cycling the associated PORV). Monitor PRT parameters to see if the leak is isolated.

b. Request permission from the US to close <u>one</u> PORV block valve at a time, cycle the associated PORV, then reopen the associated block valve. Monitor PRT parameters to see if the leak is isolated.

c. Set up an historical trend on the ICS computer to monitor PRT pressure, temperature, and level for a rise in the associated parameter to determine which valve is leaking.

d. Request permission from the US to take manual control of Pressurizer pressure and reduce pressure approximately 50 psi to attempt seating the leaking safety valve.

DISTRACTOR ANALYSIS

a. CORRECT. These actions are taken from ARI 89-A Corrective Actions.
b. Incorrect. Plausible, since cycling a leaking valve could result in reseating the valve.
c. Incorrect. Plausible, since trending PRT data does provide partial information required to troubleshoot the valve failure. PRT parameter changes could be indicative of other problems (letdown relief, etc.).
d. Incorrect. Plausible, since similar actions are performed under plant conditions (during plant heatup) to reseat a leaking PZR safety valve, per GO-1, Unit Startup from Cold Shutdown to Hot Standby. With the plant at full power a 50 psi pressure reduction requires LCO 3.4.1 entry.

K/A Applicability:
Question addresses how troubleshooting is performed (in this case, it is directed by the Alarm Response Instruction), specifically a pressurizer component associated with the vapor space (a relief valve which sticks open).

Question Number: 2

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

Tier:	**1**	**RO Imp:**	**3.0**	**RO Exam:**	**2**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**2**	**Source:**	**Mod from INPO Bank**

Applicable 10CFR55 Section: (CFR 41.7 / 45.7)

Learning Objective: 3-OT-EOP0001, Rev. 11, Objective 12, Discuss the purpose of ES-1.2, Post LOCA Cooldown and Depressurization.

References: ES-1.2, "Post LOCA Cooldown and Depressurization," Rev. 14. WOG Background Document ES-1.2, Rev 2.

Question: 2

Given the following plant conditions:

- The plant was initially at full power, end of life conditions.
- A small break LOCA occurred.
- The operating crew determines that a safety injection is required.
- RCS pressure has stabilized at 1575 psig.
- Containment pressure is at 2.9 psig and slowly decreasing.

Which ONE of the following (at this time) identifies the available heat removal components for maintaining adequate core cooling?

a. Steam Generators and Safety Injection pumps.

b. Steam Generators and Centrifugal Charging pumps.

c. Reactor Coolant Pumps and Safety Injection pumps.

d. Reactor Coolant Pumps and Centrifugal Charging Pumps.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the Steam Generators are a component designed to provide cooling during a small break LOCA and the safety injection pumps would be running. However, with the given RCS pressure compared to SI pump shutoff head, only minimal flow, if any, is provided.
b. CORRECT. During the small break LOCA, the cooling from ECCS injection is not sufficient to remove decay heat. Applicant must determine from the conditions in the stem that the RCS pressure, though lower than ECCS injection pressure, does not allow adequate injection flow for cooling. The steam generators become the critical components to ensure core damage does not occur.
c. Incorrect. Plausible, since the safety injection pumps are operating and the containment pressure is above the pressure requiring RCPs to be tripped.
d. Incorrect. Plausible, since the centrifugal charging pumps are required and the RCPs do provide cooling but the containment pressure is above the pressure requiring RCPs to be tripped.

K/A Applicability:
Stem conditions are for a small break LOCA. Question tests understanding of the relationship between this event and the steam generators, in the context of adequate core cooling.

Question Number: 3

K/A: 000011 EA1.05
Ability to operate and monitor the following as they apply to a Large Break LOCA:
Manual and/or automatic transfer of suction of charging pumps to borated source

Tier:	**1**	**RO Imp:**	**4.3**	**RO Exam:**	**3**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**3**	**Source:**	**NEW**

Applicable 10CFR55 Section: (CFR 41.7 / 45.5 / 45.6)

Learning Objective: 3-OT-EOP0000, Obj 15: Explain the purpose for and basis of each step in E-0, ES-0.0, ES-0.1, ES-0.2, ES-0.3, and ES-0.4.

References: 1-47W611-62-2 R8, 1-47W611-62-3 R9, ES-1.3, "Transfer to Containment Sump" Rev 17

Question: 3
Given the following:

- A Safety Injection occurs on Unit 1 due to a large break LOCA.

Which ONE of the following describes:

1) how the Centrifugal Charging Pump suction swaps to the RWST when a Safety Injection is initiated

AND

2) when the swapover to the containment sump is completed in accordance with ES-1.3, "Transfer to Containment Sump," what position will the operators place handswitches for the RWST TO CHARGING PUMPS SUCTION valves?

	(1)	**(2)**
a.	The VCT valves will start to close after the RWST valves have traveled to the full open position.	A P-AUTO
b.	The VCT valves will start to close after the RWST valves have traveled to the full open position.	A-AUTO
c.	The VCT valves will start to close as soon as the RWST valves start to open.	A P-AUTO
d.	The VCT valves will start to close as soon as the RWST valves start to open.	A-AUTO

DISTRACTOR ANALYSIS

A. Incorrect. Plausible, since the valves from the VCT starting to close when the valves from the RWST get fully open is correct and the normal position for the handswitches is A-P Auto.
B. CORRECT. The valves from the VCT will start to close when the valves from the RWST get fully open and after transfer to the containment sump the valves are placed in the A-Auto position.
C. Incorrect. Plausible, because the ECCS valves used to swapover to the containment sump do travel together during the transfer as described in column (1). Handswitches positions is plausible since that is the normal position for the switches.
D. Incorrect. Plausible, because the ECCS valves used to swapover to the containment sump do travel together during the transfer as described in column (1) and the handswitches being in A Auto position is correct.

K/A Applicability: Stem conditions include a large break LOCA, and the question tests understanding of charging pump suction alignment during the event.

Question Number: 4

K/A: 000015/017 AK2.10
Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: RCP indicators and controls

Tier:	**1**	**RO Imp:**	**2.8**	**RO Exam:**	**4**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**4**	**Source:**	**Mod from GFE Bank**

Applicable 10CFR55 Section: (CFR 41.7 / 45.7)

Learning Objective: 3-OT-AOI2400, Obj. 10, Given a set of plant conditions, use AOI-24 to correctly: a. Recognize Entry Conditions; b. Identify Required Actions; c. Respond to Contingencies (RNO); d. Observe and Interpret Cautions and Notes.

References: AOI-24, "RCP Malfunctions During Pump Operation," Rev. 28.

Question: 4

Given the following plant conditions:

- The unit is operating at 50% power.
- A reactor coolant pump (RCP) malfunction occurs.

Which ONE of the following (1) will provide positive indication for the operator to distinguish between a locked RCP rotor and a sheared RCP shaft and (2) will identify if an automatic reactor trip would occur directly due to RCP parameters resulting from the malfunction 30 seconds after the malfunction? (Assume no operator action is taken.)

	Indication	**Automatic Reactor Trip**
a.	Loop flow	would occur.
b.	Loop flow	would **NOT** occur.
c.	RCP ammeter	would occur.
d.	RCP ammeter	would **NOT** occur.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since loop flow indications will be affected and the reactor will be tripped.
b. Incorrect. Plausible, since loop flow indications will be affected and if the power had been below P-8 (48%) an automatic trip would not have occurred due to RCP parameters.
c. CORRECT. A locked rotor does result in high amps initially, but when the breaker trips on overcurrent the ammeter indicates 0 amps. A sheared shaft results in low amps until operation action is taken to trip the pump. An automatic reactor trip would occur due to the low flow.
d. Incorrect. Plausible, since the ammeter is the indication that would provide the positive indication and if the power had been below P-8 (48%) an automatic trip would not have occurred due to RCP parameters.

K/A Applicability:
Question stem presents a loss of RC flow condition caused by an RCP malfunction, and applicant is tested on which indication is used to diagnose the type of malfunction. The correct answer involves an RCP indication.

WRITTEN QUESTION DATA SHEET

Question Number: 5

K/A: 000025 AK3.01
Knowledge of the reasons for the following responses as they apply to the Loss of Residual Heat Removal System: Shift to alternate flowpath

Tier:	**1**	**RO Imp:**	**3.1**	**RO Exam:**	**5**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**5**	**Source:**	**INPO Bank**

Applicable 10CFR55 Section: (CFR 41.5,41.10 / 45.6 / 45.13)

Learning Objective: 3-OT-AOI1400, Obj. 5, Explain Alternate RHR Cooling methods.

References: AOI-14, "Loss of RHR Shutdown Cooling," Rev. 35

Question: 5

Given the following plant conditions:

- The plant is in Mode 5.
- RCS temperature is 195°F and stable.
- RCS pressure is 325 psig and stable.
- Train "A" RHR is in service.
- Train "B" RHR is out of service for repairs to the “B” RHR pump seals.
- A loss of Train "A" RHR shutdown cooling occurs.
- All Steam Generator levels are at 38% narrow range.

For these conditions, which ONE of the following is the preferred method for heat removal in accordance with AOI-14, "Loss of RHR Shutdown Cooling?"

a. RWST gravity feed to RCS with bleed through the PZR PORVs.

b. SI Pump Hot Leg Injection with bleed through a 2-inch vent.

c. Natural circulation using feed from AFW and bleed through SGBD and SG PORVs.

d. Normal charging into RCS and bleed through the PZR PORVs.

.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since gravity feed is a method for cooling the core. The conditions described in the stem do not support gravity feed, since RCS pressure is at 325 psig.
b. Incorrect. Plausible, since the SI pump could inject into the RCS with the conditions given in the stem. However, for the given conditions, Cold Overpressure Protection is in service, and the SI pumps are therefore disabled.
c. CORRECT. Since the RCS is intact and full, the use of the S/Gs as a heat sink with either forced or natural circulation flow is the preferred method for cooling.
d. Incorrect. Plausible, since the CCP could inject into the RCS with the conditions given in the stem. Normal charging into RCS and removal of water via manual Pressurizer PORV control is a viable method for heat removal.

K/A Applicability:
Stem includes a loss of RHR event, and the question tests knowledge of which alternate method (alternate method of flow through the core and cooling) will provide adequate heat removal.

WRITTEN QUESTION DATA SHEET

Question Number: 6

K/A: 000026 AK3.04
Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: Effect on the CCW flow header of a loss of CCW

Tier:	**1**	**RO Imp:**	**3.5**	**RO Exam:**	**6**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**6**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR 41.5,41.10 / 45.6 / 45.13)

Learning Objective: 3-OT-AOI1500, Obj. 7, Determine Action for Loss of an ESF Equipment header.

References: AOI-15, "Loss of Component Cooling Water (CCS)", Rev. 31; ARI 226-E ERCW/CCS MOTOR TRIPOUT; 1-47W611-70-1, Logic Diagram Component Cooling System, Rev. 9.

Question: 6

A leak has developed on the #3 RCP thermal barrier. After performance of AOI-15, "Loss of Component Cooling Water (CCS)" Section 3.2, CCS flow will _____(1)_____ through the Miscellaneous Equipment Header, since _____(2)_____.

	(1)	(2)
a.	Decrease	only the flow to all RCPs' thermal barriers has been isolated.
b.	Decrease	the flow to all thermal barriers and RCP oil coolers has been isolated.
c.	Increase	only the flow to all RCPs' thermal barriers has been isolated.
d.	Increase	the flow to all thermal barriers and RCP oil coolers has been isolated.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the isolation of the leak results in a complete isolation of the thermal barrier flowpath, and requires stopping the thermal barrier booster pumps. This causes the overall flow through the Reactor Building Header to drop and provides more flow to the Miscellaneous Equipment Header.
b. Incorrect. Plausible, since the isolation of the leak results in a complete isolation of the thermal barrier flowpath, and requires stopping the thermal barrier booster pumps. RCP oil coolers will not be isolated. This causes the overall flow through the Reactor Building Header to drop and provide more flow to the Miscellaneous Equipment Header.
c. CORRECT. The isolation of the flow to all RCP thermal barriers results in an overall drop in Reactor Building header flow, and a corresponding rise in Miscellaneous Equipment header flow.
d. Incorrect. Plausible, since the isolation of the flow to all RCP thermal barriers results in an overall drop in Reactor Building header flow, and a corresponding rise in Miscellaneous Equipment header flow. RCP oil cooler flow is not isolated for the thermal barrier leak.

K/A Applicability:
Stem conditions include a loss of component cooling through a thermal barrier on an RCP. Question tests understanding of the effect of this loss on other parts (Misc. Equipment Header) of the component cooling system.

Question Number: 7

K/A: 000027 AK1.03
Knowledge of the operational implications of the following concepts as they apply to Pressurizer Pressure Control Malfunctions: Latent heat of vaporization/condensation.

Tier:	**1**	**RO Imp:**	**2.6**	**RO Exam:**	**7**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**7**	**Source:**	**Modified Indian Point 2007**

Applicable 10CFR55 Section: (CFR 41.8 / 41.10 / 45.3)

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

References: System Description, N3-68-4001, Reactor Coolant System, Rev. 25

Question: 7

With the plant initially at 100% power, 1-A MFP trips. The Pressurizer master pressure controller output signal fails AS IS at the same time as the MFP trip.

Which ONE of the following occurs in the Pressurizer (PZR) to help limit the magnitude of the initial pressure transient on the Reactor Coolant System (RCS)?

a. An outsurge shrinks the PZR liquid, increasing the steam space in the PZR, and causing some of the saturated liquid to flash to steam. This along with PZR heaters energizing will limit the resulting pressure drop in the RCS.

b. An outsurge shrinks the PZR liquid, increasing the steam space in the PZR, and causing some of the saturated liquid to flash to steam. This tends to limit the resulting pressure drop in the RCS but the PZR heaters are prevented from responding to the pressure change.

c. An insurge of hotter water compresses the steam space in the PZR. Steam is condensed which helps limit the pressure increase in the RCS.

d. An insurge of cooler water compresses the steam space in the PZR. Steam is condensed which helps limit the pressure increase in the RCS.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible because the liquid flashing to steam occurs during an outsurge and the flashing along with heaters would limit a pressure drop, but in this case the transient is an insurge, not an outsurge.
b. Incorrect. Plausible because the liquid flashing to steam occurs during an outsurge and the flashing would limit a pressure drop, but in this case the transient is an insurge, not an outsurge and the heaters being unavailable is correct.
c. Incorrect. Plausible because an insurge does occur and causes the pressure to rise, condensing some steam to limit the pressure increase. However, it is an insurge of cooler water, not hotter water.
d. CORRECT. RCS temperature rises and causes an insurge into the PZR and an increase in pressure. Since the pressure control system is failed as is, spray will not respond, leaving only condensation of steam in the vapor space which has been compressed.

K/A Applicability:
Question tests understanding of the operational implications and effects of an expected Pressurizer insurge following a transient.

Question Number: 8

K/A: 000029 EA1.12
Ability to operate and monitor the following as they apply to a ATWS: M/G set power supply and reactor trip breakers.

Tier:	**1**	**RO Imp:**	**4.1**	**RO Exam:**	**8**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**8**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR 41.7 / 45.5 / 45.6)

Learning Objective: 3-OT-SYS085B, Obj 9, Explain how to locally trip the reactor in the event of an ATWS.

References: FR-S.1, "Nuclear Power Generation/ATWS," Rev. 19; SR 3.1.5.3, "Rod Group Alignment Limits."

Question: 8

If the 480V Unit Board breakers to the MG sets are the ONLY breakers that can be opened following an ATWS, which ONE of the following describes:

1) approximately how long it takes for the control rods to be <u>completely</u> inserted

AND

2) the impact of the failure on feedwater isolation?

	<u>Approximate Time</u>	**<u>Impact of Failure</u>**
a.	2 seconds.	Feedwater isolation will NOT occur when low Tavg is reached.
b.	5 - 6 seconds.	Feedwater isolation will NOT occur when low Tavg is reached.
c.	2 seconds.	Feedwater isolation WILL occur when low Tavg is reached.
d.	5 - 6 seconds.	Feedwater isolation WILL occur when low Tavg is reached.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the applicant may believe that opening the MG set supply breakers causes rods to insert immediately. Opening the MG set supply breakers causes the MG set speed to decrease, and rods will insert after the voltage decays to a point where rod holding coils deenergize. With the reactor trip breakers closed, the feedwater isolation will NOT occur when low Tavg is reached.
b. CORRECT. Opening the MG set supply breakers causes the MG set speed to decrease, and rods insert after the voltage decays to a point where rod holding coils deenergize. With the reactor trip breakers closed, the feedwater isolation will NOT occur when low Tavg is reached.
c. Incorrect. Plausible, since the applicant may believe opening the MG set supply breakers causes rods to insert immediately. With the reactor trip breakers closed, the feedwater isolation will NOT occur when low Tavg is reached.
d. Incorrect. Opening the MG set supply breakers causes the MG set speed to decrease, and rods will insert after the voltage decays to a point where rod holding coils deenergize. With the reactor trip breakers closed, the feedwater isolation will NOT occur when low Tavg is reached.

K/A Applicability:
The question addresses the difference between opening rod drive MG set breakers and reactor trip breakers after an ATWS condition. It specifically tests the applicants understanding of how deenergizing the MG set differs in response to simply opening the reactor trip breakers during an ATWS event. The question also tests the impact of P-4 contacts NOT being repositioned, since the reactor trip breakers are still in the CLOSED position.

Question Number: 9

K/A: 000038 EK1.03
Knowledge of the operational implications of the following concepts as they apply to the SGTR:
Natural circulation.

Tier:	**1**	**RO Imp:**	**3.9**	**RO Exam:**	**9**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**9**	**Source:**	**INPO Bank**

Applicable 10CFR55 Section: (CFR 41.8 / 41.10 / 45.3)

Learning Objective: 3-OT-EOP0300, Obj. 8, Given a set of plant conditions, evaluate the conditions to determine if natural circulation exists and take appropriate action to initiate, restore, or maintain natural circulation.

References: E-3, "Steam Generator Tube Rupture," Rev. 22; WOG Background Document E-3, Rev. 2.

Question: 9

Why does the loss of reactor coolant pumps during a steam generator tube rupture increase the risk of voiding during the subsequent cooldown and depressurization?

a. The fluid temperature in the upper head region significantly lags the temperature in the RCS loops.

b. More ECCS flow is injected into the ruptured loop cold leg due to the reduced pressure, resulting in less flow to the core and less heat removal.

c. The RCS hot legs reach saturation temperature during the rapid depressurization from the tube rupture, causing the RCS to flash.

d. The isolation of the steam generator in the affected loop causes that loop to stagnate; therefore, insufficient heat removal capacity is available to cool the RCS.

DISTRACTOR ANALYSIS

a. CORRECT. Under natural circulation conditions, the upper head region receives limited cooling flow. If the plant is depressurized rapidly, the risk of voiding is increased.
b. Incorrect. Plausible, since SGTR is a type of small break LOCA. ECCS design, specifically the flow balancing valves in the injection lines, limits the amount of flow out of the break.
c. Incorrect. Plausible, but the bulk RCS fluid is not susceptible to flashing; only the upper head region is susceptible.
d. Incorrect. Plausible, since isolation of the S/G does cause a stagnant loop condition. This results in an increase in the potential for a PTS event, not upper head voiding.

K/A Applicability:
In the context of a SGTR, applicant is tested on how mitigation of that event (risk of voiding) is affected by having to use natural circulation.

Question Number: 10

K/A: 000054 G2.2.22
Knowledge of limiting conditions for operations and safety limits.

Tier:	**1**	**RO Imp:**	**4.0**	**RO Exam:**	**10**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**10**	**Source:**	**Modified INPO Bank**

Applicable 10CFR55 Section: (CFR: 41.5 / 43.2 / 45.2)

Learning Objective: 3-OT-T/S0200, Obj. 3, Given a set of plant conditions, determine if a Safety Limit has been exceeded.

References: Technical Specifications, Section 2.0 Safety Limits. Figure 2.1.1-1, Reactor Core Safety Limits. FR-H.1, "Loss of Secondary Heat Sink," Rev 17

Question: 10

Given the following:

- Unit 1 is operating at 100% power with the TDAFW pump tagged out for maintenance.
- Following a feedwater line break outside containment the crew encounters the following complications:
  - The reactor could not be tripped from the MCR and a local trip was required.
  - Both MDAFW pumps were steam bound.
- The operating crew responded in accordance with the Emergency Procedure network and has now entered FR-H.1, "Loss of Secondary Heat Sink."
- When checking if Bleed and Feed is required, the following is noted:
  - Both centrifugal charging pumps running.
  - RCS pressure peaked at 2690 psig and is currently 2260 psig.
  - S/G levels are:
    - S/G #1 - 24% wide range
    - S/G #2 - 25% wide range
    - S/G #3 - 27% wide range
    - S/G #4 - 28% wide range

Which ONE of the following identifies if the RCS Pressure Safety Limit has been violated and if Bleed and Feed is currently required?

	RCS Pressure Safety Limit has…	**Bleed and Feed is…**
a.	been violated	currently required
b.	been violated	**NOT** currently required
c.	**NOT** been violated	currently required
d.	**NOT** been violated	**NOT** currently required

DISTRACTOR ANALYSIS

a. Incorrect. The RCS pressure did not get high enough to violate the safety limit and Bleed and Feed is not currently required. Plausible because the RCS pressure peaking at 2690 is close to the 2735 psig safety limit and the SG levels are below the minimum, but it takes 3 below 26% wide range to require Bleed and Feed and the RCS pressure had been above the value requiring Bleed and Feed but is below the value when being checked.

b. Incorrect. The RCS pressure did not get high enough to violate the safety limit and Bleed and Feed is not currently required. Plausible because the RCS pressure peaking at 2690 is close to the 2735 psig Safety limit and Bleed and Feed being not currently required is correct.

c. Incorrect. The safety limit not being violated is correct and since only 2 of the SG side range levels are below 26%, Bleed and Feed required is not correct. Plausible because the safety limits not being violated is correct and two of the SG levels are below the criteria for requiring Bleed and Feed, but it takes 3 out of 4 being below to meet the requirement and the RCS pressure had been above the value requiring Bleed and Feed but is below the value when being checked.
d. CORRECT. The RCS pressure for the Safety Limit is 2735 psig and the Bleed and Feed criteria for S/G level are 3 out of 4 levels less than or equal to 26% wide range.

K/A Applicability:
This question matches the K/A since it requires knowledge of the RCS Pressure Safety Limit and the knowledge of Bleed and Feed criteria due to a loss of feedwater event.

Question Number: 11

K/A: 000056 AK1.04
Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: Definition of saturation conditions, implication for the systems.

Tier:	**1**	**RO Imp:**	**3.1**	**RO Exam:**	**11**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**11**	**Source:**	**Bank Mod.**

Applicable 10CFR55 Section: CFR 41.8 / 41.10 / 45.3)

Learning Objective: 3-OT-EOP0000, Obj. 10, Given a set of plant conditions, determine if natural circulation is occurring in the RCS and identify actions required to establish natural circulation per ES-0.2.

References: ES-0.2, "Natural Circulation Cooldown," Rev. 20, WOG Background Doc., ES-0.2, Rev 2.

Question: 11

A loss of 161kV offsite power has occurred and the reactor has tripped. A decision has been made to cooldown the plant by natural circulation. The highest available temperature indication for the RCS is 455°F.

To confirm that natural circulation is occurring, which ONE of the following is the MINIMUM RCS pressure allowed in accordance with ES-0.2, "Natural Circulation Cooldown?"

a. 1515 psig.

b. 948 psig.

c. 798 psig.

d. 435 psig.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since a cooldown to 550°F is accomplished followed by a depressurization. Later in ES-0.2, there is guidance to support the further depressurization; i.e., the subcooling margin is increased to 144°F from the initial value of 65°F. To calculate the required temperature/pressure, add 144°F + 455°F = 599°F. This equates to a saturation pressure of approximately 1530 psia, per the Steam Tables.
b. Incorrect. Plausible since applicant may incorrectly use required subcooling value as 85° (the value if containment conditions were adverse).
c. CORRECT. ES-0.2 requires at least 65° subcooling. Saturation pressure for 455°F = 444.33 psia. To obtain the minimum required subcooling (65°) add 65° + 455° = 520°. This equates to a saturation pressure of 812.53 psia per Steam Tables. The conversion from psia to psig (i.e., 812.53 - 14.7 = 798 psig) results in the correct answer.
d. Incorrect. Plausible if the value used is slightly above saturation for the given RCS temperature.

K/A Applicability:
Applicant is tested on interpreting saturation conditions, including calculating a pressure from a given temperature, applying which amount of subcooling applies, and then determining the implications of this; i.e., the minimum pressure that the Reactor Coolant System can be reduced to.

Question Number: 12

K/A: 000057 AA2.19
Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus:
The plant automatic actions that will occur on the loss of a vital ac electrical instrument bus

Tier:	**1**	**RO Imp:**	**4.0**	**RO Exam:**	**12**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**12**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 43.5 / 45.13)

Learning Objective: 3-OT-AOI2500, Obj. 1, Demonstrate ability to recognize a loss of any 120V AC Vital Power Board, including effects on equipment and controls (SOER 81-02).

References: AOI-25.01, "Loss of 120V AC Vital Instrument Power Boards 1-I and 2-I," Rev. 27.

Question: 12

Given the following plant conditions:

- The Unit is at 50% power.
- Pressurizer level channel 1-LT-68-335 (Channel II) was removed from service and the associated bistables have been tripped due to a problem during the previous shift.
- 120V AC Vital Instrument Power Board 1-I has just been lost.

Which ONE of the following is a consequence of the loss of 120V AC Vital Instrument Power Board 1-I?

a. Automatic control of #2 SG Main Feed Reg. Valve is lost. Manual control of #2 SG Main Feed Reg. Valve is needed in order to stabilize SG level.

b. Automatic rod insertion occurs due to loss of the T-ref signal. Rod withdrawal in manual rod control will be used to restore Tavg.

c. An automatic reactor trip is generated at the time of the failure. The TDAFW Pump is maintaining levels in SGs 1 and 2; 1B-B AFW Pump is maintaining SGs 3 and 4.

d. An automatic reactor trip is generated at the time of the failure. Steam dumps receive an arming signal and open.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the failure does affect one of the Main Feed Reg. Valve controllers, but it does not affect #2, it affects #1.
b. Incorrect. Plausible, since the Tref signal will be lost and rods will insert, but rod withdrawal is blocked by the failure of NIS Channel 1 functions.
c. CORRECT. With the Channel II bistables already tripped, the board loss results in the Channel I PZR level trip and satisfies the coincidence for an automatic reactor trip. The board loss renders 1A AFW train inoperable (1-PDIC-3-122A, AFW pump A-A Discharge PCV is inoperable).
d. Incorrect. Plausible, since the steam dumps normally operate on a reactor trip. However, the steam dump arming circuit is disabled and NO arming signal occurs. This renders the steam dumps inoperable in both Tavg and Steam Pressure modes.

K/A Applicability:
Stem conditions involve a loss of a vital ac electrical instrument bus, and then tests applicant's ability to determine the effects of the loss, and then interpret the significance from an operational perspective.

Question Number: 13

K/A: 000058 AA1.02
Ability to operate and / or monitor the following as they apply to the Loss of DC Power:
Static inverter dc input breaker, frequency meter, ac output breaker, and ground fault detector.

Tier:	**1**	**RO Imp:**	**3.1**	**RO Exam:**	**13**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**13**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR 41.7 / 45.5 / 45.6)

Learning Objective: 3-OT-SYS235A Obj. 3, Describe the Low Voltage System in terms of: a. Purpose (Feeds), b. Description (Number of boards, their location, and their power supplies),c. Board or feed protection.

References: Drawing 1-45W700-1, rev. 24; ARI 15-21.

Question: 13

The plant is at 100% power with all systems in normal alignment, when a failure of the fuse between 125V Vital Battery Board I and 120 VAC Vital Inverter 1-I occurs, causing the following alarm:

- ARI-17-B, 125 DC VITAL BATT BD I ABNORMAL CKTS ISOLATED

Which ONE of the following describes the effect on Vital Inverter 1-I, including operation of the static transfer switch, and which Tech. Spec. LCO(s) will be required to be entered?

	Static Transfer Switch Operation	**Required LCO Entry / Entries**
a.	Automatically bypasses the inverter in order to maintain a source of power to 120V AC Vital Instrument Power Board I.	LCO 3.8.7, "Inverters -Operating" and LCO 3.8.9, "Distribution System - Operating"
b.	Does NOT operate, and a source of power to 120V AC Vital Instrument Power Board will be maintained.	LCO 3.8.7, "Inverters -Operating" and LCO 3.8.9, "Distribution System - Operating"
c.	Automatically bypasses the inverter in order to maintain a source of power to 120V AC Vital Instrument Power Board I.	LCO 3.8.7, "Inverters -Operating" only
d.	Does NOT operate, and a source of power to 120V AC Vital Instrument Power Board will be maintained.	LCO 3.8.7, "Inverters -Operating" only

DISTRACTOR ANALYSIS

a. Incorrect. The inverter is not automatically bypassed during this condition to maintain a source of power. LCO 3.8.7 would be entered but LCO 3.8.9 entry would not be required. Plausible because other failures could cause the bypass actuation and both TS LCOs do involve the 120v AC system.
b. Incorrect. Loss of DC input to the inverter is not a condition that causes actuation of the static transfer switch and board voltage will be maintained. LCO 3.8.7 would be entered but 3.8.9 entry would not be required. Plausible because the static switch not operating is correct and both TS LCOs do involve the 120v AC system.
c. Incorrect. The inverter is not automatically bypassed during this condition to maintain a source of power and entering only LCO 3.8.7 is correct. Plausible because other failures could cause the bypass and entering only LCO 3.8.7 is correct.
d. CORRECT. Loss of DC input to the inverter is not a condition that causes actuation of the static transfer switch, since the normal AC input (480V Shutdown Board) to the inverter remains intact. However, losing any power source input to a vital inverter renders the inverter inoperable, and requires LCO 3.8.7 entry to ensure the condition is corrected.

K/A Applicability:

Stem involves a loss of DC power, and question tests applicant's understanding of what this means in the context of which component is either expected to actuate (to compensate for the loss), or NOT actuate. In this case, since power is maintained to the board, no automatic actuation occurs. Further testing of the "monitor" aspect of this K/A is in the form of testing knowledge of HOW this affects the component; i.e., is it operable, and therefore, what LCO entry(ies) is/are required.

Question Number: 14

K/A: 000062 AA2.01
Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water:
Location of a leak in the SWS

Tier:	**1**	**RO Imp:**	**2.9**	**RO Exam:**	**14**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**14**	**Source:**	**Bank**

Applicable 10CFR55 Section: (CFR: 43.5 / 45.13)

Learning Objective: 3-OT-AOI1300, Obj. 3, Determine the general location of a rupture, given a supply header Hi flow and TURB/AUX/RX BLDG FLOODED alarm.

References: AOI-13, "Loss Of Essential Raw Cooling Water," Section 3.1, Rev. 36.

Question: 14

Given the following plant conditions:

- The Unit is at 100% power.
- ERCW is in normal alignment.
- ERCW header 2A is indicating high flow.

The following MCR alarms are LIT:

- M-15B Window 167-D, "TURB/AUX/RX BDLG FLOODED."
- M-27A Window 223-A, "ERCW HDR A SUP PRESS LO."
- M-27A Window 223-B, "ERCW PMP A-A Discharge Pressure Low."
- M-27A Window 226-B, "ERCW PMP D-A Discharge Pressure Low."
- NO OTHER alarms are lit associated with the ERCW system.

Which ONE of the following ERCW conditions accounts for the above indications?

a. A supply header has ruptured in the Auxiliary Building.

b. A discharge header has ruptured in the Auxiliary Building.

c. A rupture has occurred upstream of the 2A strainer.

d. A rupture has occurred between the IPS and Auxiliary Building.

DISTRACTOR ANALYSIS

a. CORRECT. The diagnostic section (Section 3.1) of AOI-13, "Loss of Essential Raw Cooling Water," uses the annunciators and indications listed in the stem to indicate that a supply header has ruptured in the Auxiliary Building.
b. Incorrect. Plausible, since the flooding alarm also indicates a discharge header rupture; however, the diagnostics section of AOI-13 indicates that ERCW flow will be normal for a discharge header rupture.
c. Incorrect. Plausible since low header pressure is a symptom of a supply header rupture at this location, but the IPS, not the Auxiliary Building, will be flooded.
d. Incorrect. Plausible since low header pressure is a symptom of a supply header rupture at this location, however, the strainer D/P alarm will be lit and the building flooded alarm is not expected. The building flooded alarm is possible, if the leak caused flow from the break to enter the auxiliary building through the concrete conduit.

K/A Applicability:
Stem conditions are given for a leak in the Emergency Raw Cooling Water System, and applicant is then tested on interpreting the indications to determine the location of the leak.

Question Number: 15

K/A: 000065 AK3.03
Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air:
Knowing effects on plant operation of isolating certain equipment from instrument air

Tier:	**1**	**RO Imp:**	**2.9**	**RO Exam:**	**15**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**15**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR 41.5, 41.10 / 45.6 / 45.13)

Learning Objective: 3-OT-SYS002A, Obj. 19, State the purpose of the Short Cycle Valve (FCV-2-35) and describe how it is controlled.

References: AOI-10, "Loss of Control Air," Rev. 38, Appendix A Page 3 of 6, Non-Essential Air Components, System 2,

Question: 15

The Unit is operating at 100% power when an air leak develops in the Turbine Building. The Turbine Building AUO reports that the leak is immediately upstream of the air operator for 1-FCV-2-35, Short Cycle Valve.

When the AUO isolates air to stop the leak 1-FCV-2-35 will _____(1)_____, causing main feedwater pump speed to _____(2)_____.

(Assume no actions taken by the Main Control Room Operator during the event.)

	(1)	(2)
a.	OPEN	RISE
b.	OPEN	DROP
c.	CLOSE	RISE
d.	CLOSE	DROP

DISTRACTOR ANALYSIS

a. CORRECT. 1-FCV-2-35 fails open on loss of air. As 1-FCV-2-35 opens, less flow will be supplied to the condensate and feedwater systems. Overall system flow requirements remain unchanged, so the main feedwater pump speed must increase to compensate for the valve repositioning.
b. Incorrect. Plausible, since 1-FCV-2-35 does fail open on loss of air. Applicant confuses the effect of the response on feed pump speed.
c. Incorrect. Plausible, since the response of the main feedwater pump is correct. Applicant may confuse valve failure mode with somehow reducing feed flow, thereby requiring the feed pump speed to compensate by rising.
d. Incorrect. Plausible, since the failure mode for many valves in the plant is CLOSED. If the applicant believes the failure response is correct, then the response of the main feedwater pump is also correct.

K/A Applicability:
Question stem lists conditions involving a loss of instrument air to a valve which affects feedwater. Applicant is tested on why and how that loss affects plant operation.

Question Number: 16

K/A: E04 EK2.1
Knowledge of the interrelations between the (LOCA Outside Containment) and the following: Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Tier:	**1**	**RO Imp:**	**3.5**	**RO Exam:**	**16**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**16**	**Source:**	**SQN exam bank**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.7)

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

References: ECA-1.2, "LOCA Outside Containment," Rev. 4

Question: 16

Given the following plant conditions:

- A LOCA outside containment has resulted in RCS subcooling dropping to 0°F.
- The operating crew has entered ECA-1.2, "LOCA Outside Containment."

Assuming NO operator actions, which ONE of the following identifies the expected status of Containment Phase A Isolation, and the parameter used to verify that the LOCA has been isolated in accordance with ECA-1.2?

a. NOT actuated.
Pressurizer level rising.

b. NOT actuated.
RCS pressure rising.

c. Actuated.
Pressurizer level rising.

d. Actuated.
RCS pressure rising.

DISTRACTOR ANALYSIS

A. Incorrect. Pressurizer level rising is plausible since the student could reason that it may be rising if the leak was isolated. The procedure directs the use of RCS pressure increasing as the method used to indicate the leak has been isolated. Phase A not being actuated is plausible if applicant misapplies the fact that the LOCA was outside of containment, and therefore containment pressure does NOT rise to 1.5 psig. 1.5 psig is the containment pressure setpoint for Safety Injection. Since Phase A isolates certain components of containment, and since this LOCA is outside containment, it is plausible that the applicant would believe that a Phase A is not needed.
B. Incorrect. Plausible since the procedure does direct the use of RCS pressure increasing as the method for determining the leak is isolated.
C. Incorrect. Plausible since a Phase A has been actuated, due to the Safety Injection signal. Pressurizer level rising is plausible since the student could reason that it may be rising if the leak was isolated.
D. CORRECT. The procedure directs the use of RCS pressure increasing as the method used to indicate the leak has been isolated. A Phase A has actuated, since a Safety Injection was initiated due to low RCS pressure resulting from the LOCA.

K/A Applicability:
Applicant is presented with conditions involving a LOCA outside containment, and must then apply knowledge of the procedure, and of automatic features and actuation setpoints for Phase A and Safety Injection.

Question Number: 17

K/A: E11 EA2.1
Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

Tier:	**1**	**RO Imp:**	**3.4**	**RO Exam:**	**17**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**17**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 43.5 / 45.13)

Learning Objective: 3-OT-EOP0100, Rev.11, Objective 20, Discuss and justify the priority of usage given to procedure ES-1.3, "Transfer to RHR Containment Sump".

References: ES-1.3, "Transfer to Containment Sump," Rev. 17

Question: 17

Given the following plant conditions:

- A Large Break LOCA is in progress on Unit 1.
- The 1A 6.9 KV Shutdown Board is damaged, resulting in the loss of power to all of its loads.
- After 40 minutes the crew observes the following annunciators and indications:

  126-C RWST LEVEL LOW RECIRC INTLK annunciator LIT.
  127-E CNTMT LEVEL HI RECIRC INTERLOCK annunciator LIT.
  1-FCV-74-3, RHR Pump A Suction indicating lights are DARK.
  1-FCV-74-21, RHR Pump B Suction RED light LIT.
  1-FCV-63-72, Containment Sump to RHR Pump A Suction indicating lights are DARK.
  1-FCV-63-73, Containment Sump to RHR Pump B Suction GREEN light LIT.

The OAC will place the handswitch for ____(1)_____ to OPEN, in accordance with _____(2)_____.

	(1)	**(2)**
a.	1-FCV-63-72	ECA-1.1 "Loss of RHR Sump Recirculation."
b.	1-FCV-63-73	ECA-1.1 "Loss of RHR Sump Recirculation."
c.	1-FCV-63-72	ES-1.3, "Transfer to Containment Sump."
d.	1-FCV-63-73	ES-1.3, "Transfer to Containment Sump."

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, if applicant fails to recognize that 1-FCV-63-73 has power available and could be opened. Use of ECA-1.1 is plausible since sump swapover has not occurred; however, applicant fails to realize that ES-1.3 contains guidance for manual alignment of sump suction valves if automatic function fails.
b. Incorrect. Plausible, since the valve to be opened is correct; however, with the valve open, entry into ECA-1.1 is not required nor appropriate.
c. Incorrect. Plausible, because if 1-FCV-63-72 had power available, the OAC would open it per ES-1.3.
d. CORRECT. Since 1A 6.9kV SD Board is deenergized 1-FCV-63-72 MOV has NO power. Opening 1-FCV-63-73 per ES-1.3 will provide suction to B RHR Pump from the containment sump.

K/A Applicability:
Applicant must <u>determine</u> that a loss of coolant recirculation has occurred, and then <u>interpret</u> other conditions to then make a decision on which valve manipulation will correct the condition, and which procedure is in effect.

Question Number: 18

K/A: E12 G2.2.36 Excessive Heat Transfer
Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations**.**

Tier:	**1**	**RO Imp:**	**3.1**	**RO Exam:**	**18**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**18**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.2 / 45.13)

Learning Objective: 3-OT-T/S0307, Rev. 3, Obj. 3, Given plant conditions and parameters, correctly determine the OPERABILITY of components associated with different Plant Systems in Section 7 of Technical Specifications.

References: T.S. 3.7.1, "Main Steam Safety Valves," Action A.
T.S. 3.7.3, "Main Feed Water Isolation Valves (MFIVs) Valves and Main Feedwater Regulation Valves (MFRVs) and Associated Bypass Valves," T.S. 3.7.4, "Atmospheric Dump Valves (ADVs)," Amendment 55

Question: 18

Consider the following four full power plant conditions which involve corrective actions taken to mitigate an excessive heat transfer event. Which ONE of the following identifies conditions where both condition 1 and 2 would result in a Technical Specification LCO entry?

	Condition 1	**Condition 2**
a.	An AUO manually isolates one leaking steam dump valve.	An AUO manually isolates a leaking steam generator Atmospheric Relief valve.
b.	Maintenance "gags" closed one leaking safety valve on one steam generator.	An AUO manually isolates a leaking steam generator Atmospheric Relief valve.
c.	An AUO manually isolates one leaking steam dump valve.	A manual valve is closed to isolate a Feedwater Bypass Reg Valve.
d.	Maintenance "gags" closed one leaking safety valve on one steam generator.	A manual valve is closed to isolate a Feedwater Bypass Reg Valve.

DISTRACTOR ANALYSIS

a. Incorrect. Condition 2 is correct and adds plausibility to the distractor. Condition 1 is plausible since applicant may believe that since the steam dump valves perform a similar function as the Atmospheric Reliefs, they are therefore controlled by Technical Specifications.
b. CORRECT. Any one inoperable SG code safety valve requires entry into T.S. 3.7.1, Action A. Any inoperable Atmospheric Relief Valve requires entry into T.S. 3.7.4.
c. Incorrect. Condition 1 is plausible since applicant may believe that since the steam dump valves perform a similar function as the Atmospheric Reliefs, they are therefore controlled by Technical Specifications. Also plausible since there are Tech. Specs. associated with FW Bypass Reg. valves, but manual control does not require LCO entry. Per Tech. Spec. 3.7.3, when the valves are closed and de-activated or isolated by a closed manual valve, they are already performing their safety function.
d. Incorrect. Plausible since Condition 1 does require LCO entry; however, Condition 2 does not, but is plausible for the reasons described in "C" distractor analysis.

K/A Applicability:
In the context of an excessive heat transfer event, the applicant must be able to analyze each set of conditions, any of which could be needed during this event, and then determine which set identifies two separate conditions where each would require an LCO entry.

Question Number: 19

K/A: 000001 AA2.01
Ability to determine and interpret the following as they apply to the Continuous Rod Withdrawal: Determine/interpret reactor tripped brkr indicator.

Tier:	**1**	**RO Imp:**	**4.2**	**RO Exam:**	**19**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**19**	**Source:**	**WBN Bank Mod**

Applicable 10CFR55 Section: (CFR: 43.5 / 45.13)

Learning Objective: 3-OT-AOI0200, Obj. 3, Describe Initial Actions for Continuous Rod Withdrawal.

References: AOI-2, "Malfunction of Reactor Control System," Rev. 37

Question: 19

Given the following plant conditions:

- Unit 1 is at 80% power with all systems aligned normal.
- 1-PT-1-73, Turbine Impulse Pressure, fails high.

For the above conditions, the control rods will be continuously ___(1)_____ . If the rods continue to move after controls are shifted to MANUAL the operator will initiate a reactor trip, and then confirm that the reactor is tripped by observing the _____(2)_____.

	(1)	(2)
a.	Inserting	Reactor Trip Breakers GREEN lights LIT, and the Bypass Breaker indicating lights DARK.
b.	Inserting	GREEN lights LIT on both the Reactor Trip Breakers and Bypass Breakers.
c.	Withdrawing	Reactor Trip Breakers GREEN lights LIT, and the Bypass Breaker indicating lights DARK.
d.	Withdrawing	GREEN lights LIT on both the Reactor Trip Breakers and Bypass Breakers.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since Column 2 is correct. Column 1 is plausible if applicant reverses the expected response of Turbine Impulse Pressure instrument failing high and believes this equates to a power level which requires rods to insert to maintain Tavg.
b. Incorrect. Plausible if applicant reverses the expected response of Turbine Impulse Pressure instrument failing high and believes this equates to a power level which requires rods to insert to maintain Tavg. Column 2 is plausible if applicant fails to recall that the Bypass Breakers are normally racked out.
c. CORRECT. The rods would be withdrawing due to the rate circuit detecting turbine power changing at a greater rate than reactor power and because the Tref is greater than actual Tavg. With all systems normal the bypass breakers would be racked out with no control power connected and when the reactor was tripped there would be green indicating lights LIT for each breaker.
d. Incorrect. Plausible since rods would be withdrawing. Column 2 is plausible if applicant fails to recall that the Bypass Breakers are normally racked out.

K/A Applicability:
Applicant must <u>determine</u> that a continuous rod withdrawal is occurring, and after taking the appropriate action (which is to trip the reactor), must <u>interpret</u> indications for the reactor trip breakers.

Question Number: 20

K/A:000003 G2.2.44
Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions**.**

Tier:	**1**	**RO Imp:**	**2.9**	**RO Exam:**	**20**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**20**	**Source:**	**Modified**

Applicable 10CFR55 Section: 41.5 / 43.5 / 45.12

Learning Objective: 3-OT-AOI0200, Obj. 05, Discuss the Symptoms of a Dropped RCCA.

References: AOI-2, "Malfunction of Reactor Control System," N3-85-4003, Control Rod Drive System.

Question: 20

Given the following plant conditions:

- With Unit 1 initially at full power, a Bank D Group 1 rod dropped fully into the core.
- AOI-2, "Malfunction of Reactor Control System," was entered and dropped rod recovery is in progress.
- The dropped rod has been withdrawn 150 steps, resulting in turbine load rising to 74%.
- To address the above conditions, operators have reconnected the lift coil(s) for the appropriate rod(s), per AOI-2.
- 86-A CONTROL ROD URGENT FAILURE has <u>not</u> been RESET.

Which control rods, if any, would move if the In-Hold-Out switch is placed to the IN position with 1-RBSS, Rod Bank Select in CBD position prior to resetting the Urgent Failure?

a. Group 1 rods, only.

b. Group 2 rods, only.

c. No rod motion will occur.

d. All Bank D rods.

DISTRACTOR ANALYSIS

a. CORRECT. When the rod was being recovered an Urgent Failure was generated in Bank D Group 2 because motion was demanded, and with all Group 2 lift coils disconnected no motion was sensed. Thus, after reconnecting the lift coils, the Urgent Failure is still present and prevents rod motion in Group 2.
b. Incorrect. In Individual Bank Select for Bank D, Group 2 rods are NOT capable of motion, since the Control Rod Urgent Failure alarm affected Power Cabinet 1BD (the power cabinet for Group 2 rods). The Control Rod Urgent Failure alarm originated from the 1BD power cabinet. With all of the Group 2 lift coils disconnected, the 1BD sensed an Urgent Failure when the Group 1 rod was withdrawn. Reconnecting the lift coils will not reset the Control Rod Urgent Failure alarm on Power Cabinet 1BD.
c. Incorrect. Plausible, since the Control Rod Urgent Failure alarm <u>does</u> block rod movement for one of the groups in Bank D (Group 2), but Group 1 Control Bank D rods will move on demand.
d. Incorrect. Plausible, since applicant may fail to recall that the effect of the standing Control Rod Urgent Failure alarm is group specific - until this alarm is reset Group 2 rods are blocked from movement. Group 1 rods WILL move, since they are on a separate power cabinet. An URGENT FAILURE exists on the 1BD power cabinet due to the previous rod withdrawal.

K/A Applicability:
Stem conditions involve a dropped control rod, and applicant must <u>interpret</u> various given conditions, including a key fact that an alarm has NOT been reset, and then determine how the subsequent <u>operator action</u> of moving rod control to IN <u>affects</u> the rods.

Question Number: 21

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

Tier:	**1**	**RO Imp:**	**2.8**	**RO Exam:**	**21**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**21**	**Source:**	**Bank**

Applicable 10CFR55 Section: (CFR 41.8 / 41.10 / 45.3)

Learning Objective: 3-OT-AOI2000, Obj 2, Discuss the Result of specific PZR Level Channel failures.

References: AOI-20, "Malfunction of Pressurizer Level Control System," Rev. 31.

Question: 21

With the plant at full power, a reference leg leak develops on the controlling PZR Level Transmitter.

As a result, the controlling PZR level channel will indicate slightly _____(1)_____ than actual level, and remain _____(2)_____ than the cold-calibrated PZR level instrument.

	(1)	(2)
a.	higher	lower
b.	lower	lower
c.	higher	higher
d.	lower	higher

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the response of the controlling channel is correct. The cold calibrated level will indicate higher than the hot calibrated channel.
b. Incorrect. Plausible if the applicant confuses the response of a variable leg leak on the controlling channel. The cold calibrated level will indicate higher than the hot calibrated channel.
c. CORRECT. The cold calibrated pressurizer level instrument is calibrated for temperatures far lower than normal operating temperatures and will indicate lower. When the containment atmospheric temperature rises, the pressurizer reference leg heats up, causing density to decrease, and exerting less pressure on the reference leg side of the transmitter. This results in an increase in indicated level.
d. Incorrect. Plausible, since the response of the controlling channel is incorrect, but the response of the cold calibrated channel is correct.

K/A Applicability:
Stem conditions are given for a leak in the PZR reference leg. Applicant must then determine the operational implication of the result, specifically effect on level indications.

Question Number: 22

K/A:000033 AA2.01 Loss of Intermediate Range Nuclear Instrumentation
Determine/interpret equivalency between source range, intermediate range, and power range channel readings.

Tier:	**1**	**RO Imp:**	**3.0**	**RO Exam:**	**22**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**22**	**Source:**	**New**

Applicable 10CFR55 Section: 43.5 / 45.13

Learning Objective: 3-OT-SYS092A, Obj. 7, Discuss how each set of detectors overlap readings.

References: Watts Bar System Description, N3-92-4003, Neutron Monitoring System, Rev. 8, Page 50

Question: 22

Given the following plant conditions:

- A plant startup is in progress, with the reactor currently at 8% power.
- The instrument power fuse for Intermediate Range Monitor N136A opens (blows).

Assuming the plant was in its normal alignment at the time of the failure, which ONE of the following statements describes the impact of the Intermediate Range Monitor (IRM) failure on plant operation, and the effect, if any, of the failure on the Source Range Monitors (SRMs)?

	Impact of failure	**Effect on SRM**
a.	Reactor trip.	When the operable IRM indicates below 1.66 x 10^{-4}% power, the SRMs will automatically reinstate.
b.	Reactor trip.	When the operable IRM indicates below 1.66 x 10^{-4}% power, the operator will place both SR Trip RESET-BLOCK switches to RESET.
c.	Operation will continue.	When the operable IRM indicates below 1.66 x 10^{-4}% power, the SRMs will automatically reinstate.
d.	Operation will continue.	When the operable IRM indicates below 1.66 x 10^{-4}% power, the operator will place both SR Trip RESET-BLOCK switches to RESET.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since a reactor trip occurs when the instrument power fuse opens, as long as the bypass switch is in the Normal position. The SRMs do NOT reenergize automatically when power drops below 1.66 x 10^{-4}% power.
b. CORRECT. A reactor trip signal is generated, and manual actions are required to reinstate the SRMs after power drops below 1.66 x 10^{-4}% power.
c. Incorrect. Plausible, since an instrument power fuse failure WITH the channel bypassed does NOT result in a reactor trip. The SRMs do NOT reenergize automatically when power drops below 1.66 x 10^{-4}% power.
d. Incorrect. Plausible, since an instrument power fuse failure WITH the channel bypassed does NOT result in a reactor trip, but manual actions are required in order to reinstate the SRMs after power drops below 1.66 x 10^{-4}% power.

K/A Applicability:
Stem conditions involve a loss of the intermediate Range NI. The Gamma Metrics Intermediate Range fully overlaps the Power Range monitors, and reads out in % power, so there is no “equivalency” associated with the Intermediate Range and Power Range.

Question Number: 23

K/A: 000059 AK2.02
Knowledge of the interrelations between the Accidental Liquid Radwaste Release and the following: Interrelations with radioactive gas monitors.

Tier:	**3**	**RO Imp:**	**2.7**	**RO Exam:**	**23**	**Cognitive Level:**	**High**
Group:	**n/a**	**SRO Imp:**	**n/a**	**SRO Exam:**	**23**	**Source:**	**Sig. WBN Bank Mod**

Applicable 10CFR55 Section: (CFR: 41.12 / 43.4 / 45.9)

Learning Objective: 3-OT-SYS090A, Obj. 27, Describe the Design Basis of the Process Radiation Monitoring System per FSAR 11.4.1.

References: 3-OT-SYS090A, Radiation Monitoring System.

Question: 23

Given the following plant conditions:

- Unit 1 is operating at 100% power.
- A containment purge is in progress.
- A small leak develops on 1-FCV-62-69, Letdown Isolation Valve, bonnet.

Which ONE of the following identifies the radiation monitor(s) that initiate(s) the Containment Vent Isolation (CVI) signal, and the expected radiation monitor(s) response after the CVI?

Note the following nomenclature: 1-RM-90-106, Lower Containment Radiation Monitor
1-RM-90-131, Containment Purge Radiation Monitor

	Radiation Monitor	**Radiation Monitor Readings after the CVI**
a.	1-RM-90-131 only.	Both 1-RM-90-106 and 1-RM-90-131 would decrease.
b.	1-RM-90-131 only.	Only 1-RM-90-131 would decrease.
c.	Both 1-RM-90-106 and 1-RM-90-131.	Both 1-RM-90-106 and 1-RM-90-131 would decrease.
d.	Both 1-RM-90-106 and 1-RM-90-131.	Only 1-RM-90-131 would decrease.

DISTRACTOR ANALYSIS

a. CORRECT. The HI RAD condition sensed by the Containment Purge Rad Monitor 1-RM-90-131 will result in the containment vent isolation. The containment vent isolation causes the 1-RM-90-106 flowpath to isolate. With both radiation monitors isolated from the containment atmosphere, the reading on both will start dropping.

b. Incorrect. The HI RAD condition sensed by the Containment Purge Rad Monitors will result in the containment vent isolation but the reading on both monitors will decrease because both will be isolated from the containment atmosphere. Plausible, because the Containment Purge Radiation Monitor will cause the containment vent isolation, and 1-RM-90-106 reading would increase if it had not been isolated by the signal. The applicant must relate the isolation of 1-RM-90-106 to the event.

c. Incorrect. A HI RAD condition sensed by the 1-RM-90-106, Lower Containment Radiation Monitor will not result in the containment vent isolation and the reading on both monitors will decrease because both will be isolated from the containment atmosphere. Plausible, because the Lower Containment Radiation Monitor did cause a containment vent isolation in the past (but a plant modification removed the signal) and both radiation monitors decreasing is correct because both monitors are isolated from the containment atmosphere by the event.

d. Incorrect. A HI RAD condition sensed by the 1-RM-90-106, Lower Containment Radiation Monitor will not result in the containment vent isolation and the reading on both monitors will decrease because both will be isolated from the containment atmosphere. Plausible, because the Lower Containment Radiation Monitor did cause a containment vent isolation in the past (but a plant modification removed

the signal) and 1-RM-90-106 reading would increase if it had not been isolated by the signal. The applicant must relate the isolation of 1-RM-90-106 to the event.

K/A Applicability:
An Accidental Liquid Radwaste Release is occurring due to the leak on the letdown isolation valve. Applicant is then tested on not only what automatic action is initiated by the radiation monitor's response, but also on the effect (or the interrelationship between the monitor and the release) on the monitor itself.

Question Number: 24

K/A: 000076 AK3.05
Knowledge of the reasons for the following responses as they apply to the High Reactor Coolant Activity : Corrective actions as a result of high fission-product radioactivity level in the RCS.

Tier:	**1**	**RO Imp:**	**2.9**	**RO Exam:**	**24**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**24**	**Source:**	**Bank**

Applicable 10CFR55 Section: (CFR 41.5,41.10 / 45.6 / 45.13)

Learning Objective: 3-OT-AOI2800, Obj. 4, Explain how activity is reduced if activated corrosion/erosion products are the reason for Hi activity.

References: AOI-28, "High Activity in Reactor Coolant," Rev. 21.

Question: 24

Unit 1 has tripped from 100% power. The operators transitioned from E-0, "Reactor Trip or Safety Injection" to ES-0.1, "Reactor Trip Response." There are indications of failed fuel based on the results of post-trip activity samples. AOI-28, "High Activity in Reactor Coolant" is being implemented.

Which ONE of the following describes the correct actions to take with the CVCS system, including the reason for the action?

a. Letdown is diverted to the CVCS Holdup Tank to limit radiation levels in the charging pump area.

b. Charging and Letdown flows are reduced to limit radiation levels in the Auxiliary Building.

c. The cation bed is placed in service at 120 gpm flow in order to reduce the amount of fission products in the reactor coolant system.

d. Charging and Letdown flows are increased, allowing increased flow through the mixed bed demineralizers to maximize clean up.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since diverting to the Holdup Tank tends to contain the radioactive materials. This however causes an increase in the amount of liquid radioactive waste required to be processed, and would not be performed.
b. Incorrect. Plausible, since reducing charging and letdown flow would reduce the flowrate of RCS fluid exiting containment; however, applicant fails to apply knowledge of the function of the mixed bed demineralizer.
c. Incorrect. Plausible, since the cation bed is used to remove the listed elements/isotopes, but the maximum flow is limited to 75 gpm by design. 120 gpm is also plausible, since this is the design flow for the CVCS mixed bed.
d. CORRECT. AOI-28 directs the operators to place the CVCS mixed-bed demineralizer in service at 120 gpm flow. Both charging and letdown flows have to be increased to accomplish this.

K/A Applicability:
Applicant is presented with a high reactor coolant activity condition, and asked for what is the corrective action AND what is the reason for it.

Question Number: 25

K/A: E08 EA1.3
Ability to operate and / or monitor the following as they apply to the (Pressurized Thermal Shock) Desired operating results during abnormal and emergency situations.

Tier:	**1**	**RO Imp:**	**3.6**	**RO Exam:**	**25**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**25**	**Source:**	**INPO Bank**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.5 / 45.6)

Learning Objective: 3-OT-FRP0001, Obj. 6, Given a set of plant conditions, use procedure FR-P.1 or P.2 to identify any applicable cooldown and/or pressure limitations.

References: FR-P.1 "Pressurized Thermal Shock," WOG Background Document FR-P.1, Rev. 2.

Question: 25

Given the following plant conditions:

- A Main Steam Line Break has occurred inside containment on Unit 1.
- Containment pressure is 2.9 psid.
- The crew has entered FR-P.1, "Pressurized Thermal Shock."
- An RCS pressure reduction is in progress.
- RCS subcooling is at 80°F.

Which ONE of the following describes the required action, in accordance with FR-P.1?

a. Continue with the depressurization of the RCS.

b. Dump steam from an intact S/G to raise subcooling.

c. Start #2 RCP to promote thermal mixing of RCS and ECCS fluids.

d. Close the PORV to stop RCS depressurization until subcooling is recovered.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since 75° subcooling is the value associated with normal containment conditions. However, conditions given in the stem are adverse containment values, and 95°F subcooling is the correct value for minimum required subcooling.
b. Incorrect. A large cooldown has already occurred, and no further cooldown is allowed until after a soak has taken place. Plausible, since dumping steam would improve the subcooling, but restrictions to further cooldown apply.
c. Incorrect. Plausible, since this action would be taken if the safety injection termination conditions could not be met. Since a depressurization is in progress, the SI termination has already been accomplished.
d. CORRECT. The step for RCS depressurization provides criteria for stopping the depressurization. The subcooling requirement for stopping the depressurization is <95°F subcooling (adverse containment values).

K/A Applicability:
Stem conditions include implementation of the procedure for Presssurized Thermal Shock. Applicant must evaluate these conditions and determine which of the listed choices will result in the desired operating result for mitigation of the PTS concern.

Question Number: 26

K/A: E14 EK2.1
Knowledge of the interrelations between the (High Containment Pressure) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Tier:	**1**	**RO Imp:**	**3.4**	**RO Exam:**	**26**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**26**	**Source:**	**Modified WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.7)

Learning Objective: 3-OT-SYS063A, Obj. 25, Describe how to reset the safety injection signal, include P-4 interlock, also how and when to block the SI signal.

References: 1-47W611-63-1, Logic Diagram

Question: 26

Given the following plant conditions:

- The plant was initially at full power.
- A Main Steam Line break occurs in containment on SG #1.
- The operating crew is entering FR-Z.1, "High Containment Pressure."

Which ONE of the following identifies the status of the Containment Spray Pumps when FR-Z.1 is entered due to an ORANGE path on the FR-0 "Status Trees," and how feedwater flow to #1 SG is required to be controlled?

	Containment Spray Pumps	**FR-Z.1 Feedwater flow requirement**
a.	Only one pump in service	remain isolated
b.	Only one pump in service	established at minimum detectable
c.	Neither pump in service	remain isolated
d.	Neither pump in service	established at minimum detectable

DISTRACTOR ANALYSIS

a. Incorrect. Only one spray pump running is incorrect. If one was running FR-Z.1 path would not be orange. Plausible because FR-Z.1 could be entered due to a yellow path with one spray pump running and the feedwater flow being isolated is correct.
b. Incorrect. Only one spray pump running is incorrect. If one was running FR-Z.1 path would not be orange. Plausible because FR-Z.1 could be entered due to a yellow path with one spray pump running and minimum detectable flow would be established if all SGs were faulted.
c. CORRECT. To enter FR-Z.1 due to an orange path would require that neither Containment Spray Pump was in service and with the other 3 SGs intact and available, the feedwater would remain isolated.
d. Incorrect. Entering FR-Z.1 due to an orange path would mean that neither Containment Spray Pump was in service. Minimum detectable flow would not be established because the other SGs are intact and available. Plausible since neither spray pump running is correct and minimum detectable flow would be established if all SGs were faulted.

K/A Applicability:
Knowledge of the interrelations between the (High Containment Pressure) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

A high containment pressure condition is given in the stem. Applicant must then evaluate numerous parameters involving signals, interlocks, and automatic features, to exhibit knowledge of the interrelations between these conditions and the high containment pressure, to determine the status of the Containment Spray Pumps and how feedwater flow will be controlled to the SG #1.

Question Number: 27

K/A: E15 EK1.2
Knowledge of the operational implications of the following concepts as they apply to the (Containment Flooding): Normal, abnormal and emergency operating procedures associated with (Containment Flooding).

Tier:	**1**	**RO Imp:**	**2.7**	**RO Exam:**	**27**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**27**	**Source:**	**Mod INPO Bank**

Applicable 10CFR55 Section: (CFR: 41.8 / 41.10, 45.3)

Learning Objective: 3-OT-FRZ0001, Obj. 7, Identify all sources of water to the containment which might cause containment flooding.

References: FR-Z.2, "Containment Flooding," WOG Background Doc. FR-Z.2 "Containment Flooding" Page 2; WBN-OSG4-188, Rev 21, EOP SETPOINTS VERIFICATION DOCUMENT. Page 141.

Question: 27

Given the following plant conditions:

- A large break LOCA has occurred.
- Accumulators have discharged and are isolated.
- ES-1.3, "Transfer to Containment Sump" has been completed.
- Containment sump level is now at 84% and slowly rising.
- The SM directs performance of FR-Z.2, "Containment Flooding."
- FR-Z.2 requires that the containment sump be sampled.

Which ONE of the following describes (1) where the sample is taken from and (2) the reason for sampling the sump?

	(1)	**(2)**
a.	RHR System	To determine the level of activity, to allow the TSC to determine if excess sump water can be transferred to tanks outside of containment.
b.	Containment Sump	To determine the level of activity, to allow the TSC to determine if excess sump water can be transferred to tanks outside of containment.
c.	RHR System	To ensure shutdown margin is being maintained, since non-borated water has entered the containment sump.
d.	Containment Sump	To ensure shutdown margin is being maintained, since non-borated water has entered the containment sump.

DISTRACTOR ANALYSIS

From FR-Z.2, “WOG Background Document,” 2. DESCRIPTION, Page 2:

> “The maximum level of water in the containment following a major accident generally is based upon the entire water contents of the reactor coolant system, refueling water storage tank, condensate storage tank, and SI accumulators. This water volume approximates the maximum water volume introduced into the containment following a LOCA plus a steamline or feedline break inside containment.
> An indicated water level in the containment greater than the maximum expected volume (design basis flood level) is an indication that water volumes other than those represented by the above noted volumes have been introduced into the containment. Also, the high water level provides an indication that potential flooding of critical systems and components needed for plant recovery may occur.”

a. CORRECT. Since sump swapover has occurred, FR-Z.2 directs obtaining a sample from the RHR system to aid in determining if activity levels will allow transferring water to locations outside containment, to alleviate containment flooding.
b. Incorrect. Plausible, since containment sump would be the correct sample point if sump swapover had NOT been completed. Further plausibility is added because the reason given is correct.
c. Incorrect. Plausible, since sampling the sump is an action directed by FR-Z.2. Also, per the above excerpt from the WOG Background Document, if the crew is in FR-Z.2, then non-borated water has entered containment, and it is plausible that shutdown margin would be a concern.
d. Incorrect. Plausible, since containment sump would be the correct sample point if sump swapover had NOT been completed. If the crew is in FR-Z.2, then non-borated water has entered containment, and it is plausible that shutdown margin would be a concern.

K/A Applicability:
With a containment flooding condition, the applicant is tested on procedural requirements for what sample must be drawn, and how it is used from an operational implication perspective; i.e., what is the operational concern (transferring water vs. shutdown margin considerations).

Question Number: 28

K/A: 003 K2.02
Knowledge of bus power supplies to the following: CCW pumps

Tier:	**1**	**RO Imp:**	**2.5**	**RO Exam:**	**28**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**28**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7)

Learning Objective: 3-OT-SYS068B, Obj. 13, List and Explain the limitation for RCP operation without Component Cooling Water (CCS) aligned.

References: System Description, N3-68-4001, Reactor Coolant System,; AOI-15, "Loss of Component Cooling Water (CCS);" SOI-70.01 "Component Cooling Water (CCS) System," Checklist 1.

Question: 28

Which ONE of the following describes which 480 V SD Boards are the NORMAL and the ALTERNATE power supplies to C-S CCS pump?

	NORMAL	ALTERNATE
a.	1A1-A	2B2-B
b.	1B1-B	2A1-A
c.	2B2-B	1A2-A
d.	1A2-A	2B1-B

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the alternate source listed is one of the potential power supplies, but it is the NORMAL supply, not the alternate.
b. Incorrect. Plausible, since the two listed sources have similar symmetrical separation as the correct answer, but train sources and unit sources are incorrect.
c. CORRECT. Both listed sources are correct, per SOI-70.01, "Electrical Checklists."
d. Incorrect. Plausible, since both sources are actual sources available, but they are reversed (normal, alternate).

K/A Applicability:
Question tests in a straightforward manner, what are the power supplies to the pumps.

Question Number: 29

K/A: 004 A2.05
Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: RCP seal failures

Tier:	**2**	**RO Imp:**	**4.0**	**RO Exam:**	**29**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**29**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.5/ 43/5 / 45/3 / 45/5)

Learning Objective: 3-OT-SYS062A, Obj. 2, Explain the functions of the following subsystems of the CVCS system: Charging, letdown and seal injection water.

References: AOI-24, "RCP Malfunctions During Pump Operation," Rev. 28.

Question: 29

Given the following plant conditions:

- The Unit is operating at 100%.
- The following alarms and indications are noted for #2 RCP:
  - RCP 2 #1 SEAL LEAKOFF FLOW HI.
  - RCP 2 STANDPIPE LEVEL HI/LO.
  - RCP 2 #1 seal leak-off flow recorder indicates off-scale high.
- Charging flow has risen 40 gpm to maintain pressurizer level.

Based on these indications the _____(1)_____ on #2 RCP has failed, and the operator will trip the reactor, then trip #2 RCP, and after 3-5 minutes close _____(2)_____.

	(1)	**(2)**
a.	#1 seal	1-FCV-62-61 and 1-FCV-62-63, Seal Water Return Isolation Valves.
b.	#2 seal	1-FCV-62-61 and 1-FCV-62-63, Seal Water Return Isolation Valves.
c.	#1 seal	1-FCV-62-22, RCP 2 Seal Return Valve.
d.	#2 seal	1-FCV-62-22, RCP 2 Seal Return Valve.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since the correct seal failure is included, but the compensatory action is incorrect. The compensatory actions are plausible since the closure of the listed valves does isolate seal return.
b. Incorrect. Plausible, since the applicant must determine which seal has failed from the indications provided. The compensatory actions are plausible since the closure of the listed valves does isolate seal return.
c. CORRECT. Indications listed are associated with a failure of the #1 seal, and the action listed is taken from AOI-24.
d. Incorrect. Plausible, since the applicant must determine which seal has failed from the indications provided. The action listed is taken from AOI-24, "RCP Malfunctions during Pump Operation."

K/A Applicability:
Applicant must determine which RCP seal has failed and then by recalling which procedure is in effect, determine which action is appropriate to mitigate the consequences.

Question Number: 30

K/A: 004 K5.08 Chemical and Volume Control System
Knowledge of the operational implications of the following concepts as they apply to the CVCS:
Estimation of subcritical multiplication factor (Keff) by means other than the 6-factor formula: relationship of count rate changes to reactivity changes

Tier:	**1**	**RO Imp:**	**2.6**	**RO Exam:**	**30**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**30**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.5/ 45.7)

Learning Objective: 3-OT-GO0200, Obj. 1, Identify the reason for each prerequisite and precaution discussed in this lesson or provided in GO-2.

References: GO-2, "Reactor Startup," 3.2.E.

Question: 30

A dilution to critical is being performed. Initial counts are 10 cps on both Source Range Channels N132 and N133. The first batch of primary water results in count rate changing from 10 cps to 20 cps. If the count rate is doubled again, the volume of primary water required for the doubling will be _____(1)_____ than the first batch, and as a result the reactor will then be _____(2)_____.

	(1)	(2)
a.	greater than	subcritical.
b.	less than	subcritical.
c.	greater than	critical.
d.	less than	critical.

DISTRACTOR ANALYSIS

Assume initial K_{eff} is 0.98.
Using equations $((CR_1)(1-K_{eff\,1})) = ((CR_2)(1-K_{eff2}))$ and $\rho = 1-K_{eff}/K_{eff}$
$((CR_1)(1-K_{eff\,1})) = ((CR_2)(1-K_{eff2}))$
$K_{eff2} = 1- ((10)(1-0.98))/20 = 0.99$
After the first batch of primary water was added, K_{eff} was increased to 0.99.
Change in reactivity from 0.98 to 0.99 was +0.010307 $\Delta K/K$

Assessing the second batch:
$((CR_1)(1-K_{eff\,1})) = ((CR_2)(1-K_{eff2}))$
$K_{eff2} = 1- ((20)(1-0.99))/40 = 0.995$
After the second batch of primary water was added, K_{eff} was increased to 0.995
Change in reactivity from 0.99 to 0.995 was +0.005076 $\Delta K/K$

Assume initial boron concentration of 1900 ppm. Use TI-59, "Boron Tables for Temperature of 557°F."

To change from 0.98 to 0.99 requires +0.010307 $\Delta K/K$, which equates to 1030 pcm. Using a boron worth thumb rule of 10 pcm/ppm, this is a concentration change of 103 ppm. To dilute from 1900 ppm to 1800 ppm (rounded for illustrative purposes) requires 3361 gallons of primary water.

The second change, from 0.99 to 0.995 requires +0.005076$\Delta K/K$, which equates to 508 pcm. Using a boron worth thumb rule of 10 pcm/ppm, this is a concentration change of 50 ppm. To dilute from 1800 ppm to 1750 ppm requires 1751 gallons of primary water.

The amount of reactivity to achieve the second doubling was less than the amount of reactivity to achieve the first doubling, and since K_{eff2} is 0.995, the reactor remains subcritical.

The amount of primary water to dilute to accomplish the second doubling was less than the amount of primary water to accomplish the first doubling.

a. Incorrect. See proof above. Plausible if the applicant does not properly recall the relationship between count rate and the change in $K_{eff.}$
b. CORRECT. See proof above.
c. Incorrect. See proof above. Plausible, since the applicant may confuse the concept of count rate doubling, where after a doubling occurs, if the SAME AMOUNT OF REACTIVITY IS ADDED AGAIN, THE REACTOR WILL BE CRITICAL.
d. Incorrect. See proof above. Plausible, since the applicant may confuse the concept of count rate doubling, where after a doubling occurs, if the SAME AMOUNT OF REACTIVITY IS ADDED AGAIN, THE REACTOR WILL BE CRITICAL.

K/A Applicability:
The core of the concept being tested is generic fundamentals in nature. However, the K/A also asks for the operational implications of the concept. This is addressed in the question by, 1.) having the applicant evaluate how much dilution is needed, and 2.) what is the effect on the reactor.

Question Number: 31

K/A:005 K3.06
Knowledge of the effect that a loss or malfunction of the RHRS will have on the following: CSS (containment spray system)

Tier:	**2**	**RO Imp:**	**3.1**	**RO Exam:**	**31**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**31**	**Source:**	**Bank**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.6)

Learning Objective: 3-OT-SYS072A, Obj. 19, Identify the basis, requirements and interlocks required to place the RHR spray in service.

References: E-1, "Loss of Reactor or Secondary Coolant."

Question: 31

Which ONE of the following conditions will prevent RHR Spray from being placed in service to control containment pressure after a large break LOCA?

a. 1B SI pump trips on instantaneous overcurrent.

b. 1A CCP pump trips on instantaneous overcurrent.

c. 1-FCV-74-41, RHR SPRAY HDR B ISOLATION, will NOT OPEN.

d. 1-FCV-74-33 AND 1-FCV-74-35, RHR Crosstie Valves, CANNOT be CLOSED.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the conditions required to be satisfied for placing RHR spray in service require at least 1 charging and 1 SI pump running. With no additional information provided the applicant should assume all other pumps are running.
b. Incorrect. Plausible, since the conditions required to be satisfied for placing RHR spray in service require at least 1 charging and 1 SI pump running. With no additional information provided the applicant should assume all other pumps are running.
c. Incorrect. Plausible, since this renders the 1B RHR train incapable of spray flow. This would NOT prevent alignment of the 1A RHR train to supply spray flow, assuming all other conditions were satisfied.
d. CORRECT. With the RHR trains incapable of being split, ES-1.3, "Transfer to RHR Containment Sump," actions would not be complete. This means that RHR suction is not aligned to the containment sump, one of the conditions for placing RHR spray in service. If only ONE cross-connect valve had failed, the other RHR train could be aligned.

K/A Applicability:
The correct answer involves a malfunction of RHR components. Applicant must then understand the effect of that malfunction on the containment spray aspect of RHR design.

Question Number: 32

K/A: 006 A4.05
Ability to manually operate and/or monitor in the control room: Transfer of ECCS flowpaths prior to recirculation

Tier:	**2**	**RO Imp:**	**3.9**	**RO Exam:**	**32**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**32**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.5 to 45.8)

Learning Objective: 3-OT-SYS063A, Obj. 8, Explain the RHR suction valve logic from the RWST.

References: ES-1.3, "Transfer to Containment Sump," Rev. 17; 1-47W611-63-2, 63-5 ECCS Logic Diagrams.

Question: 32

Given the following plant conditions:

- Safety Injection (SI) is actuated.
- RWST level is 32%.
- Containment sump level is 18%.

Based on these conditions, it is expected that sump swapover will _____.

a. NOT occur since containment sump level is too low.

b. NOT occur because an SI signal is still present to the RHR sump valves.

c. NOT occur since RWST level is too high.

d. occur, since all required conditions have been met.

DISTRACTOR ANALYSIS

a. Incorrect. Containment sump level is greater than the required 16.1% to satisfy the logic for swapover. Level given in stem is plausible since it is a relatively low number and near the setpoint.
b. Incorrect. Plausible, since an SI signal is in the logic for the automatic swapover and the SI reset and the swapover reset due to SI are separate.
c. Incorrect. RWST level is less than the required 34.63% to satisfy the logic for swapover.
d. CORRECT. RWST level, containment sump level and the presence of the SI signal satisfy all conditions for the swapover signal to occur.

Question Number: 33

K/A:007 K4.01
Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following: Quench tank cooling

Tier:	**2**	**RO Imp:**	**2.6**	**RO Exam:**	**33**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**33**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7)

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

References: System Description N3-68-4001, Reactor Coolant System, Rev. 25.
1-47W813-1 R41, 1-47W611-68-1 R10.

Question: 33

Given the following:

- Unit is at 100% power with all components in a normal alignment.
- Annunciator 88-D, PRT TEMP HI alarms.

Which ONE of the choices completes the following two statements?

The PRT is cooled by dispersing primary water into the PRT _____ the water level.

If a high water level occurs in the PRT during cooling, 1-FCV-68-310, PRT Drain to RCDT, is manually opened and the RCDT pump B _____.

a. above
will automatically start when the valve is fully open.

b. above
is manually started after the valve is fully open.

c. below
will automatically start when the valve is fully open.

d. below
is manually started after the valve is fully open.

DISTRACTOR ANALYSIS

a. CORRECT. The Primary Water for cooling is dispersed through a spray header above the water level and if draining of the PRT is required to lower the level, 1-FCV-68-310, PRT Drain to RCDT is opened by the OAC. When the valves gets fully open the RCDT B pump will automatically start.
b. Incorrect. Plausible because the Primary Water is dispersed above the water level but the RCDT tank pump B will not require a manual start (it automatically starts when 1-FCV-68-310 gets fully open.)
c. Incorrect. Plausible because there is a dispersion header below the water level (sparging header) to disperse steam entering the PRT and the RCDT tank pump B automatically starting when 1-FCV-68-310 gets fully open is correct.
d. Incorrect. Plausible because there is a dispersion header below the water level (sparging header) to disperse steam entering the PRT and the RCDT tank pump B will not require a manual start (it automatically starts when 1-FCV-68-310 gets fully open.)

K/A Applicability:
Tests knowledge of PRT capacity design features for accomplishing one of its functions (maintain the tank cooled during a steam discharge).

Question Number: 34

K/A: 007 K5.02
Knowledge of the operational implications of the following concepts as they apply to PRTS: Method of forming a steam bubble in the PZR

Tier:	**2**	**RO Imp:**	**3.1**	**RO Exam:**	**34**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**34**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.5 / 45.7)

Learning Objective: 3-OT-GO0100, Obj. 5, Describe the basic steps necessary to establish a steam bubble in the Pressurizer (PZR) with or without a Nitrogen blanket.

References: GO-1, "Unit Startup From Cold Shutdown to Hot Standby," Rev. 60. pp. 140-144; SOI-68.01, "Reactor Coolant System Pressurizer Relief Tank Operations," Rev. 46.

Question: 34

The pressurizer (PZR) cold cal level is at 40% with a nitrogen blanket present.

Which ONE of the following choices completes the statement below?

When establishing a steam bubble, in accordance with GO-1, "Unit Startup From Cold Shutdown To Hot Standby," the first indication of steaming from the PZR to the Pressurizer Relief Tank is verified by observing a rise in ____(1)_____ and a steam bubble is first confirmed when _____(2)_____.

	(1)	(2)
a.	relief line temperature.	Letdown flow exceeds charging flow.
b.	Pressurizer Relief Tank level.	Letdown flow exceeds charging flow.
c.	relief line temperature.	PZR Liquid Temperature reaches 235°F.
d.	Pressurizer Relief Tank level.	PZR Liquid Temperature reaches 235°F.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since GO-1, Section 5.2 Note prior to Step [23.5] states "Pressurizer PORV flow should be verified by ACOUSTIC MONITORS, 1-XI-96-340A and 1-XI-68-334 [0-M-25]." The note prior to Step [21.9] states "When letdown flow is ABOVE charging flow, and RCS pressure is either stable or slowly rising, a PZR steam bubble is forming." This would apply during bubble formation from solid water conditions.

b Incorrect. Plausible, since the condensation of steam formed during the heatup of the pressurizer would result in condensation and a level rise in the PRT. The note prior to Step [21.9] states "When letdown flow is ABOVE charging flow, and RCS pressure is either stable or slowly rising, a PZR steam bubble is forming." This would apply during bubble formation from solid water conditions.

c. CORRECT. Section 5.2 Note prior to Step [23.5] states "Pressurizer PORV flow should be verified by ACOUSTIC MONITORS, 1-XI-96-340A and 1-XI-68-334 [0-M-25]." Step [23.8] states "When 1-TI-68-319, PZR LIQUID TEMP, reaches 230-240°F, then close PORVs, and place in P-AUTO.

d. Incorrect. Plausible, since the condensation of steam formed during the heatup of the pressurizer would result in condensation and a level rise in the PRT. The second column is associated with Step [23.8] which states "When 1-TI-68-319, PZR LIQUID TEMP, reaches 230-240°F, then close PORVs, and place in P-AUTO.

Question Number: 35

K/A: 008 G2.4.2 Component Cooling System
Knowledge of system setpoints, interlocks, auto actions associated with EOP entry conditions.

Tier:	**2**	**RO Imp:**		**RO Exam:**	**35**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**		**SRO Exam:**	**35**	**Source:**	**New**

Applicable 10CFR55 Section:

Learning Objective: 3-OT-SYS070A, Obj. 19, Given a set of plant conditions, determine the correct response of the CCS system.

References: AOI-15, "Loss of Component Cooling System (CCS)," Rev. 31.

Question: 35

Which ONE of the following conditions would result in implementation of E-0, "Reactor Trip or Safety Injection?"

a. Thermal barrier heat exchanger flow path isolates due to high differential flow.

b. The level on the “B” side of the CCS Surge tank drops to 10%.

c. ERCW flow is lost to CCS Heat Exchanger A.

d. Loss of the C-S CCS pump while the 1B-B CCS pump is tagged.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the isolation affects RCP parameters, but with seal injection still available, the plant can remain at power.
b. Incorrect. Plausible, because the “A” side of the CCS surge tank dropping to 10% would result in tripping all RCPs and the plant.
c. CORRECT. Per AOI-15, "Loss of Component Cooling Water," step 6, a loss of ERCW flow to CCS heat exchanger A requires the crew to trip the reactor (sub step 6.e.).
d. Incorrect. Plausible, since applicant may believe that a loss of two “B” train pumps requires a reactor trip. This condition does have significant consequence (results in the loss of the 1B ESF header, requiring the operators to lock out all of the “B” train safeguards pumps), but does not require EOP entry.

K/A Applicability:
Tests knowledge of which component cooling water system component parameter value (i.e., 0 gpm of cooling water flow) requires entry into E-0.

Question Number: 36

K/A: 010 K6.04
Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: PRT

Tier:	**2**	**RO Imp:**	**2.9**	**RO Exam:**	**36**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**36**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.7)

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

References: INPO Bank question; ARI 88-C, "PRT Press Hi."

Question: 36

Unit 1 is operating at 100% power when the following sequence of events occurs:

- PZR Power Operated Relief Valve (PORV) 1-PCV-68-334 opens and sticks open.
- PZR PORV Block valve, 1-FCV-68-332 cannot be closed.
- Pressurizer Relief Tank (PRT) is at 43 psig and continues to rise.

Which ONE of the following completes the following statement?

The PRT rupture disc will blow when pressure reaches _____ psig, at which point Pressurizer Power Operated Relief Valve tailpipe temperature will _____.

	PRT Rupture Disc Setpoint	**PORV Tailpipe Temperature**
a.	85 psig	Remain the same.
b.	85 psig	Lower
c.	100 psig	Remain the same.
d.	100 psig	Lower

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the rupture disc blows at 85 psig. The applicant misapplies the constant enthalpy process and concludes that PORV outlet temperature rises.
b. CORRECT. The rupture disc blows at 85 psig and per the TMI lessons learned, and basic thermodynamic principles, PORV outlet temperature will lower.
c. Incorrect. Plausible, since 100 PSIA is equivalent to 85 PSIG, and the applicant may recall inappropriate units. The applicant misapplies the constant enthalpy process and concludes that PORV outlet temperature rises.
d. Incorrect. Plausible, since 100 PSIA is equivalent to 85 PSIG, and the applicant may recall inappropriate units. Per the TMI lessons learned, and basic thermodynamic principles, PORV outlet temperature will lower.

Question Number: 37

K/A: 012 A2.01
Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Faulty bistable operation.

Tier:	**2**	**RO Imp:**	**3.1**	**RO Exam:**	**37**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**37**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.5 / 43.5 / 45.3 / 45.5)

Learning Objective: 3-OT-SYS099A, Rev. 6, Objective 8, Briefly discuss the input relays, Logic Section and Output Section of the SSPS.

References: Watts Bar System Description, N3-99-4003 Reactor Protection System, Rev. 21; AOI-44, "Eagle 21 Malfunctions," Rev. 1.

Question: 37

With the plant operating at 90% power, what is the impact of the BISTABLES in NIS Power Range Channel N41 drawer failing to the tripped condition, and what actions will be directed by procedures in response to this condition?

	Impact of Failed Bistable	Actions per Procedure
a.	Control Rods insert at maximum speed and a 2/4 SSPS trip is processed.	AOI-4, "Nuclear Instrumentation Malfunctions," directs placing rod control in MANUAL, and then to slowly restore rods to pre-event position.
b.	Rod withdrawal is blocked and a 1/4 SSPS trip is processed.	AOI-2, "Malfunction of Reactor Control System," directs placing rod control in MANUAL and then reducing turbine load to match Tavg and Tref.
c.	Control Rods insert at maximum speed and a 2/4 SSPS trip is processed.	AOI-2 directs placing rod control in MANUAL and then reducing turbine load to match Tavg and Tref.
d.	Rod withdrawal is blocked and a 1/4 SSPS trip is processed.	AOI-4 directs placing rod control in MANUAL and defeating the rod withdrawal block to permit AUTO and MANUAL rod withdrawal.

DISTRACTOR ANALYSIS

a. Incorrect. Although the high power level bistable will be tripped, there will be no high power signal sent to the rod control circuit. Plausible, since the control rods would insert at maximum speed for a power range channel failure, and rods would be taken to manual per AOI-4, Step 1. AOI-4 Step 8 supports the actions to match Tavg to Tref prior to returning rods to AUTO.
b. Incorrect. Plausible, since the applicant may believe that a high power condition exists. If it did, then these actions would be appropriate and accomplished using AOI-2.
c. Incorrect. Plausible, since the applicant may believe that a high power condition exists. If it did, then these actions would be appropriate and accomplished using AOI-2.
d. CORRECT. The Overpower Rod Stop bistable would be tripped, and since this is a ¼ coincidence, the rod stop would have to be defeated to regain the ability to withdraw rods. This action would be appropriate and accomplished using AOI-4, Attachment 1.

Question Number: 38

K/A: 012 G2.4.35
Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.

Tier:	**2**	**RO Imp:**	**3.8**	**RO Exam:**	**38**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**38**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.5 / 45.13)

Learning Objective: 3-OT-EOP0100, Obj 8, Given a set of plant conditions, use E-1, ES-1.1, ES-1.2, ES-1.3, and ES-1.4 to correctly diagnose and implement: Action Steps, RNOs, Foldout Pages, Notes, and Cautions.

References: ES-1.1, "SI Termination," Rev. 15; SEN 268, Invalid Safety Injection with Failure to Reset, 8/17/2007.

Question: 38

Which ONE of the following describes how the Operator-at-the-Controls will determine the TRAIN of SI that failed to RESET, and the next local action that will be required if the SI signal can NOT be reset from the Main Control Room after both of the 48V breakers in the Local SSPS Panel have been opened?

	Indication of SI train that failed to RESET	Local Operator Actions
a.	ICS points SD9000, SI ACT TRAIN A and/or SD9001, SI ACT TRAIN B will display ACT in RED letters on the train that failed to reset.	Place SSPS output mode switch S602 in the TEST position in 1-R-48 or 1-R-51.
b.	ICS points SD9000, SI ACT TRAIN A and/or SD9001, SI ACT TRAIN B will display ACT in RED letters on the train that failed to reset.	Place Safeguards Test Cabinet Reset switch S821 to reset and release in 1-R-52 or 1-R-53.
c.	SI ACTUATED permissive will be LIT, AUTO SI BLOCKED permissive will be DARK.	Place SSPS output mode switch S602 in the TEST position in 1-R-48 or 1-R-51.
d.	SI ACTUATED permissive will be LIT, AUTO SI BLOCKED permissive will be DARK.	Place Safeguards Test Cabinet Reset switch S821 to reset and release in 1-R-52 or 1-R-53.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the first half of the distractor is correct. Placing SSPS output mode switch S602 in the TEST position in 1-R-48 (Train A) or 1-R-51 (Train B) would be the action required if the SI did not reset after placing 1-R-52 or 1-R-53 Safeguards Test Cabinet RESET switch to RESET and releasing.
b. CORRECT. The ICS computer points listed are correct, and the red ACT on the computer informs the operator that the associated SI train is still actuated. Per Appendices G and H, placing the Safeguards Cabinet RESET switch to RESET (after the 48V breakers have been opened) should cause the SI ACTUATED annunciator to become DARK and the AUTO SI BLOCKED annunciator to be LIT.
c. Incorrect. Plausible, since the applicant may believe that the annunciators will allow diagnosis of the failed SI train. Placing SSPS output mode switch S602 in the TEST position in 1-R-48 (Train A) or 1-R-51 (Train B) would be the action required if the SI did not reset after placing 1-R-52 or 1-R-53 Safeguards Test Cabinet RESET switch to RESET and releasing.
d. Incorrect. Plausible, since the applicant may believe that the annunciators will allow diagnosis of the failed SI train. Per Appendices G and H, placing the Safeguards Cabinet RESET switch to RESET (after the 48V breakers have been opened) should cause the SI ACTUATED annunciator to become DARK and the AUTO SI BLOCKED annunciator to be LIT.

Question Number: 39

K/A: 013 K2.01
Knowledge of bus power supplies to the following: ESFAS/safeguards equipment control

Tier:	**2**	**RO Imp:**	**3. 6**	**RO Exam:**	**39**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**39**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.7)

Learning Objective: 3-OT-SYS063A, Rev, 10, Objective 21, Identify and explain the initiation signals to the ECCS, include setpoints.

References: 3-OT-SYS099A, Reactor Protection System. Rev. 6, Appendix C; N3-99-4003, Reactor Protection System, Rev. 21.

Question: 39

Given the following plant conditions:

- The operating crew is responding to a reactor trip due to a loss of 120V AC Vital Instrument Power Board I-I.
- PZR pressure transmitter 68-334 (Channel II) fails LOW.

Which ONE of the following describes the plant response?

a. Both trains of SSPS SI master relays would actuate AND both trains of ECCS equipment auto start.

b. Both trains of SSPS SI master relays would actuate BUT only "B" train ECCS equipment auto starts.

c. Only the "B" train SSPS SI master relays would actuate BUT both trains of ECCS equipment auto start.

d. Only the "B" train SSPS SI master relays would actuate AND only "B" train ECCS equipment auto starts.

DISTRACTOR ANALYSIS

a. Incorrect. Master relays would actuate since they are fed by the power supplies to the logic bay but slave relays for train A ECCS equipment cannot energize to actuate. Examinee may think the safeguards panel has redundant power supplies also.
b. CORRECT. Both trains of master relays will actuate since they are fed by the redundant power supplies of the logic bay, but A train ECCS will not start since only channel I supplies power to the safeguards panel to actuate A train slave relays.
c. Incorrect. Applicant may be confused as to which relays have redundant power supplies, and may think the master relays do not have redundant power supplies - the slave relays do.
d. Incorrect. Applicant may confuse the power supplies of master relays and think they are powered by the same power supply as the safeguards panel.

Question Number: 40

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

Tier:	**2**	**RO Imp:**	**4.1**	**RO Exam:**	**40**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**40**	**Source:**	**Mod WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.5)

Learning Objective: 3-OT-SYS030D, Obj. 3, Describe the automatic start signal for the air return fans.

References: 1-47W611-30-3 Logic Diagram.

Question: 40

Given the following plant conditions:

- A reactor trip and Safety Injection occurred at 0340 due to a LOCA inside containment.
- Phase B Containment Isolation actuated at 0347.

Which ONE of the following describes the status of the Containment Air Return System backdraft dampers at 0354 and the reason?

a. OPEN to allow air to bypass the Ice Condenser.

b. OPEN to prevent air from bypassing the Ice Condenser.

c. CLOSED to allow air to bypass the Ice Condenser.

d. CLOSED to prevent air from bypassing the Ice Condenser.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since a Phase B signal is present, but only 7 minutes have elapsed since the Phase B actuation and the logic circuit requires 9 minutes. Backdraft dampers would be open if the fan was running.
b. Incorrect. Plausible since a Phase B signal is present, but only 7 minutes have elapsed since the Phase B actuation and the logic circuit requires 9 minutes. Backdraft dampers being open would be correct if the fan was running.
c. Incorrect. Plausible, since insufficient time has elapsed to provide a start signal (9 minutes from Phase B actuation). Backdraft dampers will be closed under these conditions, but not to allow air to bypass the Ice Condenser. Being closed prevents bypassing the Ice Condenser.
d. CORRECT. Insufficient time has elapsed from Phase B actuation (only 7 minutes) AND the backdraft dampers are closed until the fans start and cause the dampers to come open.

Question Number: 41

K/A: 025 K1.02
Knowledge of the physical connections and/or cause/effect relationships between the ice condenser system and the following systems: Refrigerant systems

Tier:	**2**	**RO Imp:**		**RO Exam:**	**41**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**41**	**Source:**	**WBN Bank Mod**

Applicable 10CFR55 Section: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Learning Objective: 3-OT-SYS061A, Obj. 16, Describe the logic for the glycol containment isolation valves.

References: System Description N3-61-4001, Ice Condenser System, Section 3.1.

Question: 41

Which ONE of the following conditions will directly cause the refrigerant system to be isolated from the glycol piping in the floor of the Ice Condenser?

a. Containment Phase A actuation only.

b. Containment Phase B actuation only.

c. A valid GLYCOL EXP TNK LEVEL HI-HI or a Containment Phase A actuation.

d. A valid GLYCOL EXP TNK LEVEL HI-HI or a Containment Phase B actuation.

DISTRACTOR ANALYSIS

a. CORRECT. Per System Design document, Containment Phase A actuation isolates 1-FCV-61-191, and 1-FCV-61-193 (Glycol inlet piping to Containment).
b. Incorrect. Plausible, since a Containment Phase B is another, more extensive containment isolation; however, Containment Phase A signal is the only isolation signal for the glycol valves.
c. Incorrect. Plausible, since there is an alarm condition associated with the Glycol Expansion Tank which does cause isolation of the glycol system from containment, but it is Glycol Expansion Tank LO LO level, not HI HI level and because the Containment Phase A actuation part is correct.
d. Incorrect. Plausible, since there is an alarm condition associated with the Glycol Expansion Tank which does cause isolation of the glycol system from containment, but it is Glycol Expansion Tank LO LO level, not HI HI level and because the Containment Phase B actuation part is a more extensive containment isolation.

Question Number: 42

K/A: 025 K4.02
Knowledge of ice condenser system design feature(s) and/or interlock(s) which provide for the following: System control

Tier:	**2**	**RO Imp:**	**2.8**	**RO Exam:**	**42**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**42**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.7)

Learning Objective: 3-OT-SYS061A, Rev, 2, Objective 15, Describe the glycol pumps, include power supply, logic and capacity.

References: 1-47W760-61-1.

Question: 42

Which ONE of the following lists two conditions that will directly cause a glycol circulating pump to trip?

a. Low expansion tank level, Low glycol temperature.

b. Low expansion tank level, High discharge pressure.

c. Low suction pressure, High discharge pressure.

d. Low suction pressure, Low glycol temperature.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since a low expansion tank level causes isolation of 1-FCV-61-191 and 1-FVC-61-193. The closure of these valves results in a trip of the glycol circ pumps and the chillers INDIRECTLY. Low glycol temperature trips the chillers DIRECTLY, and results in an INDIRECT trip of the glycol circ pumps due to high discharge pressure.
b. Incorrect. Plausible, since a low expansion tank level causes isolation of 1-FCV-61-191 and 1-FVC-61-193. High discharge pressure causes a DIRECT trip of the glycol circ pumps.
c. CORRECT. Both high discharge pressure and low suction pressure trip the pumps.
d. Incorrect. Low suction results in a DIRECT trip of the pumps, however low glycol temperature trips the chillers DIRECTLY, and results in an INDIRECT trip of the glycol circ pumps due to high discharge pressure.

Question Number: 43

K/A: 026 K4.09
Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: Prevention of path for escape of radioactivity from containment to the outside (interlock on RWST isolation after swapover)

Tier:	**2**	**RO Imp:**	**3.7**	**RO Exam:**	**43**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**43**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7)

Learning Objective: 3-OT-SYS072A, Rev. 7, Objective 8, Describe the logic (interlocks) on the Containment Spray suction, discharge header, and containment sump valves.

References: WBN System Description N3-72-4001, Rev. 18; 1-SI-72-901-B, "Containment Spray Pump 1b-B Quarterly Performance Test," Rev. 17.

Question: 43

Given the following conditions:

- A large break LOCA occurred.
- Containment pressure is 3.5 psid.
- RWST level is 7%.
- The Containment Spray Pumps are being aligned to the containment sump in accordance with ES-1.3, "Transfer to RHR Containment Sump."

Which ONE of the following identifies the interlock(s) that must be met before 1-FCV-72-45, Containment Spray Pump 1B Sump Suction, can be opened?

a. 1-FCV-72-21, Containment Spray Pump 1B RWST Suction must be closed, only.

b. Both 1-FCV-72-21, Containment Spray Pump 1B, and 1-FCV-72-2, Containment Header Isolation Valve, must be closed.

c. Both 1-FCV-72-13, Containment Spray Pump Mini Flow Valve, and 1-FCV-72-2, Containment Header Isolation Valve, must be closed.

d. 1-FCV-72-13, Containment Spray Pump Mini Flow Valve must be closed, only.

DISTRACTOR ANALYSIS

a. CORRECT. Per procedure, this is the correct operation.
b. Incorrect. Plausible since 1-FCV-72-21 closed is correct; however, 1-FCV-72-2 is directed to be opened whenever containment pressure is $\geq$ 2.8 psid starts the spray pump; i.e., when spray pump starts, the valve opens. This part is plausible because the valve is interlocked with pump operation, and since spray pumps are currently stopped, applicant may believe that 1-FCV-72-21 remains closed.
c. Incorrect. Plausible if applicant believes it is not desireable to spray containment using sump water. 1-FCV-72-13 being closed is plausible if applicant believes this valve should be closed to prevent putting sump water potentially into the RWST. Plausible if applicant believes this valve should be closed to prevent putting sump water potentially into the RWST. 1-FCV-72-2 is directed to be opened whenever containment pressure is $\geq$ 2.8 psid starts the spray pump; i.e., when spray pump starts, the valve opens. This part is plausible because the valve is interlocked with pump operation, and since spray pumps are currently stopped, applicant may believe that 1-FCV-72-21 remains closed.
d. Incorrect. Plausible if applicant believes this valve should be closed to prevent putting sump water potentially into the RWST.

Question Number: 44

K/A: 039 A3.02
Ability to monitor automatic operation of the MRSS, including: Isolation of the MRSS

Tier:	**2**	**RO Imp:**	**3.1**	**RO Exam:**	**44**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**44**	**Source:**	**INPO Bank**

Applicable 10CFR55 Section: (CFR: 41.5 / 45.5)

Learning Objective: 3-OT-SYS001A, Obj. 21, List the automatic closure signals for the MSIVs.

References: 1-47W611-1-1, 1-47W611-63-1 and 1-47W611-88-1 Logic Diagrams.

Question: 44

Given the following plant conditions:

- A reactor heatup is in progress, per GO-1, "Unit Startup From Cold Shutdown To Hot Standby Reactor Startup."
- RCS pressure is stable at 1600 psig.

Which ONE of the following will automatically close the main steam isolation valves (MSIVs)?

a. Steam line pressure has lowered to 675 psig.

b. Containment pressure 2.6 psid on 2/4 channels.

c. Containment pressure 1.6 psid on 2/3 channels.

d. A rapid steam line pressure drop of 100 psig in 5 seconds.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the logic and coincidence for the actuation of the Low Steam Header Pressure SI are correct, but since the plant is less than P-11 (1970 psig), this function is not enabled.
b. Incorrect. Plausible, since the measured parameter and coincidence logic are correct, but the given value is incorrect.
c. Incorrect. Plausible, since this is the correct setpoint and logic for the High Containment Pressure SI.
d. CORRECT. The plant is less than P-11, so the negative steamline pressure rate high is enabled.

Question Number: 45

K/A: 059 A2.03
Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Overfeeding event

Tier:	**2**	**RO Imp:**	**2.7**	**RO Exam:**	**45**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**45**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Learning Objective: 3-OT-SYS003A, Objective 6, Describe the MFPT Speed Control Program; 3-OT-SYS003D, Objective 10, For a given input parameter failure to the steam generators level control system, determine the effect on steam generator level.

References: AOI-16, "Loss of Normal Feedwater," Rev. 30.

Question: 45

Given the following plant conditions:

- The plant is at 70% power.
- Main Steam header pressure transmitter 1-PT-1-33 fails full scale high.

Based on this failure, the steam generators (SGs) will be_____(1)_____, and the crew will take manual control of _____(2)_____ to mitigate the consequences of the transient.

	(1)	**(2)**
a.	overfed	main feedwater regulating valve (MFRV) and reduce flow
b.	overfed	main feed pump speed control and reduce flow
c.	underfed	main feedwater regulating valve (MFRV) and raise flow
d.	underfed	main feed pump speed control and raise flow

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the event will result in the SGs being overfed, but the MFRVs will not be the cause of the increase in feedwater flow.
b. CORRECT. The failure of the steam header pressure transmitter high will cause the main feed pump speed control circuit to raise speed to compensate for an apparent drop in differential pressure.
c. Incorrect. Plausible, since the applicant may confuse the impact of the failure on the MFRVs.
d. Incorrect. Plausible, since the applicant may confuse the impact of the failure on feed pump speed control.

K/A Applicability:
The procedure aspect of the K/A is implied in the question, since the listed actions are procedurally directed.

Question Number: 46

K/A: 061 K5.03
Knowledge of the operational implications of the following concepts as they apply to the AFW:
Pump head effects when control valve is shut.

Tier:	**2**	**RO Imp:**	**2.6**	**RO Exam:**	**46**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**46**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.5 / 45.7)

Learning Objective: 3-OT-SYS003B, Objective 23, Using plant drawings, determine the effect of a loss of instrument air/control power on the following valves/components: a. MDAFWP regulating valve (main and bypass) b. TDAFWP regulating valve c. AFW pumps

References: AOI-10, "Loss of Control Air," Rev. 38.

Question: 46

Given the following plant conditions:

- A plant startup is in progress.
- 1A and 1B Auxiliary feedwater (AFW) pumps are supplying each of the steam generators at 100 gpm.
- The air supply to 1-PCV-3-122, 1A AFW Pump Backpressure Control Valve, has been lost.

Comparing the response of the 1A AFW Pump to the 1B AFW Pump, which ONE of the following describes the effect of the air supply failure on motor amps and discharge pressure?

	Motor Amps	Pump Discharge Pressure
a.	1A Pump greater than 1B Pump	1A Pump greater than 1B Pump
b.	1A Pump greater than 1B Pump	1B Pump greater than 1A Pump
c.	1B Pump greater than 1A Pump	1A Pump greater than 1B Pump
d.	1B Pump greater than 1A Pump	1B Pump greater than 1A Pump

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the pump discharge pressure response is correct, but the motor amp response is incorrect.
b. Incorrect. Plausible, since applicant may incorrectly recall the failure mode of 1-PCV-3-122 as failing open. In this case, 1A Pump motor amps would be higher.
c. CORRECT. The loss of air to 1-PCV-3-122 will cause the valve to close. This will result in 1A Pump discharge pressure rising. 1A Pump motor amps will lower.
d. Incorrect. Plausible, since the motor amp response is correct, but the pump discharge pressure response is incorrect.

Question Number: 47

K/A: 062 G2.4.11 A.C. Electrical Distribution
Knowledge of abnormal condition procedures.

Tier:	**2**	**RO Imp:**	**4.0**	**RO Exam:**	**47**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**47**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.5 / 45.13)

Learning Objective: 3-OT-AOI4300, Rev. 1, Objective 4, Demonstrate ability/knowledge of AOI, by: a. Recognizing Entry conditions b. Responding to Actions c. Responding to Contingencies (RNO) d. Responding to Notes/Cautions

References: AOI-43.01, "Loss of Unit 1 Train A Shutdown Boards," Rev. 6

Question: 47

Given the following plant conditions:

- Unit 1 is operating at 50% power, with all systems aligned normally with Train A CCP and CCS pumps in service.
- A loss of 1A-A 6.9KV Shutdown Board due a differential relay operation occurs.
- The OAC observes RCP Seal Water Injection flow to all RCPs to be “0.”
- The Control Building AUO reports extensive damage to the 1A-A 6.9 KV Shutdown Board bus bars.
- The crew implements AOI-43.01, “Loss of Unit Train A Shutdown Boards.”

Under these conditions, RCP seal cooling is _____(1)_____ and in accordance with AOI-43.01, the crew will _____(2)_____.

	(1)	(2)
a.	available	Isolate letdown prior to starting CCP 1B-B.
b.	unavailable	Isolate letdown prior to starting CCP 1B-B.
c.	available	Start CCP 1B-B prior to isolating letdown.
d.	unavailable	Start CCP 1B-B prior to isolating letdown.

DISTRACTOR ANALYSIS

a. CORRECT. The loss of the 1A-A 6.9KV Shutdown Board will cause a loss of the 1A Component Cooling Water pump, which will in turn cause an automatic start of the 1B-B Component Cooling Water Pump due to a low pressure and an automatic start of the TBBP 1B-B due to low flow. The Component Cooling Water flowing through the thermal barrier heat exchanger will cool the RCS water flowing into the seal prior to the manual start of the CCP 1B-B. The AOI will then have letdown isolated prior to the start of the CCP 1B-B.
b. Incorrect. RCP seal cooling would not be unavailable. Component Cooling Water flow through the thermal barrier heat exchanger would be supplying the cooling, but letdown would be isolated prior to starting the CCP 1B-B. Plausible, since the loss of the 1A-A 6.9KV Shutdown Board will cause a loss of the 1A Component Cooling Water pump, which would cause a loss of seal cooling if the Component Cooling Water pump 1B-B did not have an auto start generated and because isolating letdown prior to starting CCP 1B-B is correct.
c. Incorrect. Plausible, since seal cooling will be available as described in ‘B’ above. However the AOI will have letdown isolated before the CCP1B-B is manually started. Plausible because seal cooling being available is correct and the AOI would have started the CCP 1B-B prior to isolating letdown if the component cooling water flow through the thermal barrier heat exchanger had not been present.
d. Incorrect. RCP seal cooling would not be unavailable. Component Cooling Water flow through the thermal barrier heat exchanger would be supplying the cooling, and the CCP 1B-B would not be started

prior to isolating letdown. Plausible, since the loss of the 1A-A 6.9KV Shutdown Board will cause a loss of the 1A Component Cooling Water pump, which would cause a loss of seal cooling if the Component Cooling Water pump 1B-B did not have an auto start generated and the AOI would have started the CCP 1B-B prior to isolating letdown if the Component Cooling Water flow through the thermal barrier heat exchanger had not been present.

Question Number: 48

K/A: 063 A1.01
Ability to predict and/or monitor changes in parameters associated with operating the DC electrical system controls including: Battery capacity as it is affected by discharge rate

Tier:	**2**	**RO Imp:**	**2.5**	**RO Exam:**	**48**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**48**	**Source:**	**INPO Bank**

Applicable 10CFR55 Section: (CFR: 41.5 / 45.5)

Learning Objective: 3-OT-SYS057P, Rev.8, Objective 10, Given the condition/status of the 125V DC Vital system/component and the appropriate sections of Tech Specs, determine if operability requirements are met and what actions, if any, are required.

References: WB-DC-30-27 AC and DC Control Power Systems - (Unit 1/Unit 2), Rev. 28; Tech. Spec. Basis 3.8.4, "DC Sources - Operating."

Question: 48

Which ONE of the following identifies the times the Vital Batteries are designed to have adequate capacity to supply the loading conditions listed below?

In the event of a loss of all AC power, with an accident coincident with a single failure, the vital batteries have adequate capacity to provide for the required load continuously for at least _____(1)_____.

If DC load shedding is performed such that the loading on the battery is reduced, the battery will be available to supply the remaining loads for at least _____(2)_____.

	(1)	(2)
a.	30 minutes	8 hours
b.	30 minutes	4 hours
c.	2 hours	8 hours
d.	2 hours	4 hours

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since 30 minutes is the correct required load capacity.
b. CORRECT. Per system design, this is the correct required load capacity, and extended capacity if load shedding is performed.
c. Incorrect. Plausible, if applicant misapplies a common time in various plant design functions.
d. Incorrect. Plausible, since 4 hours is correct.

Question Number: 49

K/A: 064 K6.07
Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: Air receivers

Tier:	**2**	**RO Imp:**	**2.7**	**RO Exam:**	**49**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**49**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.7)

Learning Objective: 3-OT-SYS082D, Rev. 2, Objective 3, Identify the air pressure in the air receiver at which the DG start air pressure Lo alarm annunciates.

References: Tech Spec 3.8.3, Diesel Fuel Oil, Lube Oil, and Starting Air.

Question: 49

Given the following plant conditions:

- The unit is at 100% power.
- The Control Room Operator is responding to 195-C, DG START AIR PRESS LO annunciator.
- The Outside AUO reports from the 1A Diesel Generator that both of the local low start air pressure alarms are lit, due to an air leak on an individual start air receiver.

Based on these conditions, the 1A Diesel Generator is _____.

a. INOPERABLE until the local LOW START AIR PRESSURE TANK alarm (200 psig) is cleared.

b. INOPERABLE until the local LOW START AIR PRESSURE ENGINE INLET alarm (160 psig) is cleared.

c. OPERABLE if Start Air Header pressure indicates at least 165 psig.

d. OPERABLE if Start Air Receiver pressure indicates at least 180 psig.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the reset point for the alarm is 200 psig. At this point the DG is operable.
b. Incorrect. Plausible, since the reset point of the starting air header alarm is 160 psig. When this alarm is cleared, the DG is still INOPERABLE.
c. Incorrect. Plausible, since the reset point of the starting air header alarm is 160 psig. When this alarm is cleared, the DG is still INOPERABLE, because start air header pressure is less than the specification (170 psig).
d. CORRECT. The DG remains OPERABLE, as long as the locally read air receiver tank pressure is greater than 180 psig and recovered to greater than 200 psig in 48 hours.

Question Number: 50

K/A: 064 K6.08
Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system:
Fuel oil storage tanks

Tier:	**2**	**RO Imp:**	**3.2**	**RO Exam:**	**50**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**50**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.7)

Learning Objective: 3-OT-SYS082E, Rev.1, Objective 6, Identify the alarms associated with the Diesel Generator Fuel Oil System.

References: ARI-195-201, "1A-A Diesel Generator," Rev.12; System LP 082E.

Question: 50

If the DG Day Tank level is unexpectedly decreasing, which ONE of the following is the LOWEST of the listed quantities of fuel oil remaining in the Day Tank that will maintain the DG OPERABLE?

a. 275 gallons.

b. 250 gallons.

c. 200 gallons.

d. 175 gallons.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since this number is close to the mid range for acceptable lube oil inventory for a DG. LCO 3.8.3 requires greater than 267 and less than 287 gallons of lube oil inventory to declare a DG OPERABLE.
b. CORRECT. The minimum amount of fuel oil required in each skid mounted day tank is 218.5 gallons.
c. Incorrect. Plausible, since this level corresponds to the amount of fuel oil remaining in the day tank when the low level alarm is received (~ 3/8 full).
d. Incorrect. Plausible, since this value (175) is a value associated with certain DG parameters (175°F is the minimum lube oil temperature for normal operating range; 175 psig is a value associated with air receiver pressure). Applicant confuses the values and makes the incorrect selection here.

Question Number: 51

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

Tier:	**2**	**RO Imp:**	**3.6**	**RO Exam:**	**51**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**51**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.6)

Learning Objective: 3-OT-SYS077B, Obj 10, Describe the general procedure to make a gaseous release.

References: SOI-77.02, "Waste Gas Disposal System," Rev. 34.

Question: 51

Which ONE of the following Process Radiation Monitors will cause an isolation of a release path when the radiation monitor fails?

a. 1-RE-90-106, Lower Containment Monitor.

b. 0-RE-90-122, Waste Disposal System Liquid Release Monitor.

c. 0-RE-90-212, Station Sump Discharge Monitor.

d. 0-RE-90-132, Service Building Vent Radiation Monitor.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the isolation feature associated with 1-RM-90-106 has been disabled. This monitor used to cause a Containment Ventilation Isolation.
b. CORRECT. This is the only radiation monitor listed which causes an automatic isolation when the monitor fails.
c. Incorrect. Plausible, since the monitor is on a release path and if radiation is detected a realignment of the discharge is directed; however the alignment requires manual actions.
d. Incorrect. Plausible since the monitor is on a release path and actions are required if the monitor fails.

Question Number: 52

K/A: 076 A1.02
Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: Reactor and turbine building closed cooling water temperatures.

Tier:	**RO Imp:**	**RO Exam:**	**52**	**Cognitive Level:**	**High**
Group:	**SRO Imp:**	**SRO Exam:**	**52**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.5 / 45.5)

Learning Objective: 3-OT-SYS067A, Objective 8: State the ERCW System normal discharge path and given a failure of the path, discuss the alternate discharge paths.

References: AOI-13, "Loss of Essential Raw Cooling Water," Rev. 35.

Question: 52

Given the following plant conditions:

- The plant is in MODE 4 with both trains of RHR in service.
- Spent Fuel Pool Cooling is aligned using the 'B' Spent Fuel Pool Cooling System pump and heat exchanger.
- Four ERCW pumps, (A-A, C-A, F-B, & H-B), are in service.

Which ONE of the following describes the impact of the A-A ERCW pump tripping on the listed parameters? (Assume no operator action.)

	CCS temperature on CCS Heat Exchanger 'C' outlet	**Control and Station Air Compressor 'D' Oil Temperature**
a.	Rises	Rises
b.	Rises	Remains constant
c.	Remains constant	Rises
d.	Remains constant	Remains constant

DISTRACTOR ANALYSIS

a. Incorrect. CCS Heat Exchanger 'C' outlet temperature would increase (see explanation in B) but the 'D' oil compressor temperature would not rise. Plausible, since the applicant must recall the loads on the A, B and C CCS heat exchangers, and the loads on the A and B ERCW headers.
b. Incorrect. ERCW supply header 2B is the normal source of cooling to CCS Heat Exchanger 'C'. With a reduction in ERCW pressure due to the pump trip, the flow would drop causing the CCS temperature on the outlet to rise. The air compressors receive water from both 1A and 1B ERCW supply headers with check valves in each of the flow paths. If A-A pump tripped, the 1B ERCW Supply Header would continue to supply the compressors.
c. Incorrect. CCS Heat Exchanger 'C' outlet temperature would remain constant, but the Compressor 'D' Oil Temperature would not rise - it would remain constant. (See 'B' above). Plausible, since the applicant must recall the loads on the A, B and C CCS heat exchangers, and the loads on the A and B ERCW headers.
d. CORRECT. CCS Heat Exchanger 'C' outlet temperature would remain constant; and the Compressor 'D' Oil temperature also would remain constant.

K/A Applicability:
Applicant is presented with conditions involving the loss of an Essential Raw Cooling Water pump. Understanding how parameters should respond to the pump trip demonstrates the ability to monitor system and predict the impacts on a parameter associated with a closed cooling water system used to cool components in the Auxiliary Building (Component Cooling Water) and on an additional heat load in the Turbine Building cooled by the ERCW system.

Question Number: 53

K/A: 078 A4.01
Ability to manually operate and/or monitor in the control room: Pressure gauges

Tier:	**2**	**RO Imp:**		**RO Exam:**	**53**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**53**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.5 to 45.8)

Learning Objective: 3-OT-SYS032A, Obj. 16, List the events and their corresponding set points that take place on decreasing control air pressure.

References: AOI-10, "Loss of Control Air," Rev. 38

Question: 53

Which ONE of the following completes the sentence below for a lowering control air system pressure?

The setpoint at which the Auxiliary Air Compressors start is __(1)__ psig. If pressure continues to lower to ___(2)___ psig, air to the Reactor Building will automatically isolate.

	(1)	(2)
a.	83	75
b.	83	70
c.	79.5	75
d.	79.5	70

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since the Auxiliary Air Compressor starts at 83 psig, but the essential and non-essential air systems do not isolate at 75 psig. 75 psig is plausible since this is the required pressure for reopening air to containment valve.
b. CORRECT. Auxiliary Air Compressor starts at `83 psig, and the essential and non-essential air systems isolate at 70 psig.
c. Incorrect. Plausible since the auxiliary air system isolates at 79.5 psig, but the essential and non-essential air systems do not isolate at 75 psig. 75 psig is plausible since this is the required pressure for reopening air to containment valve.
d. Incorrect. Plausible since the auxiliary air system isolates at 79.5 psig, but the essential and non-essential air systems isolate at 70 psig.

Question Number: 54

K/A: 078 K1.01 Instrument Air
Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems: Sensor air

Tier:	**2**	**RO Imp:**	**2.8**	**RO Exam:**	**54**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**54**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Learning Objective: 3-OT-SYS001B, Rev.6, Objective 25, Given a steam dump instrument and failure mode, identify how the instrument will respond and what interlock(s) or control function(s) will be affected, including effects on system/component operation.

References: 1-47W611-1-2 Logic Diagram.

Question: 54

Given the following plant conditions:

- A reactor trip from 35% power has just occurred.
- The steam dumps are modulating to maintain temperature at 557°F.
- Subsequently, the Turbine Building AUO reports that an air leak has developed on the supply to FM-1-103, Main Steam Dump VLV CNTL, that requires the instrument air to be isolated.

Which ONE of the following identifies how RCS Tavg will then be controlled for these conditions after the air is isolated?

a. Steam dumps will be operating in Tavg mode using Load Rejection Controller.

b. Steam dumps will be modulating in Steam Pressure mode.

c. SG PORVs will be operating on the high pressure bistable.

d. SG PORVs will be modulating on the pressure controller.

DISTRACTOR ANALYSIS

a. Incorrect. The steam dumps would be prevented from opening. Plausible, since the operator must understand how the output of the I/P converter is applied to the steam dump valves. The Load Rejection controller uses the same I/P controller that the Reactor Trip controller uses. Thus, the steam dumps could not be operating in the Tavg mode using the Load Rejection Controller.
b. Incorrect. The steam dumps would be prevented from opening. Plausible, since the operator must understand how the output of the I/P converter is applied to the steam dump valves. The Steam Pressure controller uses the same I/P controller that the Reactor Trip controller uses. Thus the steam dumps could not be operating in the Steam Pressure mode.
c. Incorrect. The PORVs would be operating from the output of their pressure controllers, not due to the Hi pressure bistable signal. Plausible because with the Steam Dump valves unable to open, the PORVs will be opening to stabilize the plant. The Hi pressure bistable is a mode of controlling the PORVs but the valves would only be controlled from the bistable if the pressure controller failed.
d. CORRECT. A trip from 35% power will result in a Tavg-to-T no-load mismatch of approximately 12°F, and the steam dump valves will be unable to open due to the I/P controller failure. This will result in the SG pressures rising and being controlled by opening the SG PORVs due to the output of the controller increasing.

Question Number: 55

K/A: 103 K1.01
Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: CCS

Tier:	**2**	**RO Imp:**	**3.6**	**RO Exam:**	**55**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**n/a**	**SRO Exam:**	**55**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Learning Objective: 3-OT-SYS030C, Obj 6, Describe the Lower Compartment Air Cooling system including: a. General description of the fan/coil units b. Suction/discharge flow paths c. Automatic starts of the fans d. Fan trips e. Number of fans required for normal operation f. Points of control

References: N3-30RB-4002 Reactor Building Ventilation System Description

Question: 55

Which ONE of the following identifies the effect on the Containment Cooling System as containment pressure starts to rise during a LOCA?

A Phase A isolation will trip the _____.

a. Incore Instrument Room Coolers only.

b. Incore Instrument Room Coolers and the Lower Compartment Coolers.

c. Lower Compartment Coolers only.

d. Lower Compartment Coolers and the CRDM coolers.

DISTRACTOR ANALYSIS

a. CORRECT. Incore Instrument Room Coolers do isolate on a Phase A.
b. Incorrect. Plausible, since one of these components do isolate on a Phase A, and the other isolates on a Phase B.
c. Incorrect. Plausible, since these coolers do isolate on an isolation signal, but it is a Phase B, not Phase A.
d. Incorrect. Plausible, since both these components do isolate on an isolation signal, but it is a Phase B, not Phase A.

Question Number: 56

K/A: 001 K6.03
Knowledge of the effect of a loss or malfunction on the following CRDS components:
Reactor trip breakers, including controls.

Tier:	**2**	**RO Imp:**	**3.7**	**RO Exam:**	**56**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**56**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7/45.7)

Learning Objective: 3-OT-SYS085A, Objective 24, Explain how a normal reactor trip occurs and how to perform an emergency reactor trip from outside the main control room.

References: WOG Background Document, E-0, Rev 2.

Question: 56

Given the following conditions:

- Initial power level at 40%.
- An automatic reactor trip occurs.
- Train A reactor trip breaker fails to open.

Which ONE of the following describes the effect of this failure?

a. The main feedwater pumps will NOT automatically trip.

b. The steam dumps will NOT automatically open.

c. Two feedwater isolation valves will NOT automatically close.

d. The main turbine will NOT automatically trip.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the Train A functions are affected. The feedwater isolation signal from Train B P-4 causes the main feed pumps to be tripped.
b. Incorrect. Plausible since the Train A reactor trip breaker does “control” the reactor trip arming signal. Although it is true that the Train A P-4 contact failing to reposition properly, will prevent a reactor trip arming signal, the steam dumps will arm from the C-7 function. The steam dumps would receive a positioning signal from the reactor trip controller and dump steam to the condenser.
c. CORRECT. The A train breaker failure results in the failure of 2 of the 4 Feedwater Isolation valves to close when Tavg drops to the low Tavg setpoint.
d. Incorrect. Plausible, since the P-4 contacts are used by the turbine trip circuit to detect and respond to a reactor trip. With the Train A P-4 contact in the incorrect position, the applicant may believe that a manual trip is necessary.

Question Number: 57

K/A: 002 K3.03
Knowledge of the effect that a loss or malfunction of the RCS will have on the following: Containment

Tier:	**2**	**RO Imp:**	**4.2**	**RO Exam:**	**57**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**57**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7)

Learning Objective: 3-OT-AOI0600, Obj. 2, Identify 10 Alarms and/or Indications of a small RCS leak.

References: AOI-6, "Small Reactor Coolant System Leak," Rev. 32; ARI-88-94, "Reactor Coolant System," Rev 19; ARI-0-L-2D "Liquid Waste Panel," Rev. 7.

Question: 57

With the plant in Mode 1, which ONE of the following conditions is expected to cause a small leak of Reactor Coolant directly into containment?

a. 1-FCV-62-77, Letdown Isolation Valve, fails closed, resulting in lifting of the relief valve on the letdown line in containment.

b. 1-PCV-77-158, RCDT N2 PRESS CONTROL malfunctions, resulting in Reactor Coolant Drain Tank pressure at 9 psig.

c. Due to leakage past the reactor head inner seal ring, 88-A, RX VESSEL FLNG LEAKOFF TEMP HI alarm annunciates.

d. Due to valve leakage, 88-E, RX HEAD VENT TEMP HI alarm annunciates.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the effect of the isolation valve failure does result in lifting of the relief valve; however, the relief valve relieves to the PRT, not to containment.
b. CORRECT. SOI-77.01 and SOI-68.01 both contain a precaution that states “Allowing RCDT pressure to exceed 6 psig may allow RCP seals to divert to the Reactor Building floor.” The HI pressure alarm setpoint is 10 psig, so at 9 psig the RCP seals would be diverting to the Reactor Building floor.
c. Incorrect. Plausible, since leakage is indicated, but the leakage is being directed to a closed volume, specifically the RCDT and would not result in a release to the Reactor Building floor.
d. Incorrect. Plausible, since leakage is indicated, but the leakage is being directed to a closed volume, specifically the PRT and would not result in a release to the Reactor Building floor.

Question Number: 58

K/A: 016 K5.01
Knowledge of the operational implication of the following concepts as they apply to the NNIS:
Separation of control and protection circuits

Tier:	**2**	**RO Imp:**	**2.7**	**RO Exam:**	**58**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**58**	**Source:**	**INPO Bank**

Applicable 10CFR55 Section: (CFR: 41.5 / 45.7)

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

References: N3-69-4001, Reactor Coolant System, Rev. 25, Page 50.

Question: 58

A short circuit occurs internally on the Master Pressurizer Pressure Controller (1-PIC-68-340).

The short circuit will _____.

a. feed back into the protection circuit, causing the associated channel to trip.

b. NOT feed back into the protection circuit, due to the use of isolation amplifiers.

c. feed back into the protection circuit, preventing the associated channel from tripping.

d. NOT feed back into the protection circuit, since completely separate pressure transmitters are used.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible if the applicant does not know that an isolation amplifier is installed in the circuit to prevent this from occurring.
b. CORRECT. The circuit is provided with isolation amplifiers which ensure that the fault will not feed back to the protection circuit.
c. Incorrect. Plausible if the applicant does not know that an isolation amplifier is installed in the circuit to prevent this from occurring.
d. Incorrect. Plausible if the applicant believes that separate transmitters are used for protection and control, in a manner similar to the separate instrumentation used in the Auxiliary Control Room.

Question Number: 59

K/A: 017 K1.01
Knowledge of the physical connections and/or cause/effect relationships between the ITM system and the following systems: Plant computer

Tier:	**2**	**RO Imp:**	**3.2**	**RO Exam:**	**59**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**59**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Learning Objective: 3-OT-SYS068F, Rev. 4, Objective 6, Use the RVLIS indications on the ICCM and the FR-C status tree to diagnose core cooling conditions and direct implementation of the appropriate Function Restoration Instruction.

References: 3-OT-SYS068F, Reactor Vessel Level Instrumentation System, Rev. 4; Inadequate Core Cooling Monitor Remote Display Manual, Rev. 0.

Question: 59

Which ONE of the following completes the statement below?

If a calculated analog input point quality code of BAD is assigned to INCORE TCs HI QUAD, then a reverse video ___(1)____ will be displayed next to the new value of ____(2)____ on the RVLIS-ICCM Plasma Display.

	(1)	(2)
a.	"B"	"BBB"
b.	"D"	"BBB"
c.	"B"	"XXX"
d.	"D"	"XXX"

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since a reverse video "B" will be displayed for a BAD point, but the displayed value will be indicated with Xs, not Bs.
b. Incorrect. Plausible since a SUSPECT data point would be indicated by a value comprised of Ds.
c. CORRECT. The reverse video would indicate a B for "BAD" and apply a value comprised of Xs.
d. Incorrect. Plausible since a SUSPECT data point would be indicated by a value comprised of Ds.

Question Number: 60

K/A: 027 K2.01
Knowledge of bus power supplies to the following: Fans

Tier:	**2**	**RO Imp:**	**3.1**	**RO Exam:**	**60**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**60**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.7)

Learning Objective: 3-OT-SYS065A, Rev. 9, Objective 9, Describe the EGTS fans power supplies.

References: N3-65-4001, Emergency Gas Treatment System. Rev. 9, Table 1 EGTS Power Supplies.

Question: 60

Given the following conditions:

- Unit 1 is in Mode 3 when a Safety Injection occurs.
- Following the Safety Injection, both the 1A-A Shutdown Board and the 2B-B 6.9 KV Shutdown Boards trip on differential.
- All other systems and components respond per design.

Which ONE of the following describes the status of the EGTS system?

a. Both trains EGTS fans are running.

b. Only EGTS train A fan is running.

c. Only EGTS train B fan is running.

d. Neither EGTS fans are running.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since it is possible for both trains of EGTS to start on the Phase A isolation signal resulting from a Safety Injection signal.
b. Incorrect. Plausible, since the Train A equipment could be powered from Unit 2, like the ABGTS fans are.
c. CORRECT. EGTS Train B is supplied from Unit 1 1B Shutdown Power.
d. Incorrect. Plausible, if the applicant assumes that the EGTS equipment is COMMON and could have power for independent trains from each unit (i.e., Train A Unit 1 A Train, Train B Unit 2 B Train).

Question Number: 61

K/A: 033 K4.01
Knowledge of design feature(s) and/or interlock(s) which provide for the following:
Maintenance of spent fuel level

Tier:	**2**	**RO Imp:**	**2.9**	**RO Exam:**	**61**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**61**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.7)

Learning Objective: 3-OT-SYS078A, Obj. 6, State the design features of the Spent Fuel System which prevent dewatering.

References: N3-78-4001, Spent Fuel Pool Cooling and Cleaning System, Rev. 15, Page 23 of 68; AOI-45, "Loss of Spent Fuel Pit Level or Cooling."

Question: 61

Given the following;

- The discharge header ruptures on the operating Spent Fuel Pit (SFP) Pump.
- In addition to aligning normal makeup to the SFP, the operating crew places a hose connected to the Demin Water Tank into the SFP in accordance with AOI-45, “Loss of Spent Fuel Pit Level or Cooling.”

Which ONE of the following describes how far the SFP level would drop before the SFP cooling pump lost suction and how the hose discharge will be arranged when placed in the SFP?

	The level would drop approximately…	The hose would be arranged with the end…
a.	4'	above the water level
b.	4'	below the water level
c.	10' 10"	above the water level
d.	10' 10"	below the water level

DISTRACTOR ANALYSIS

a. CORRECT. The SFPCCS is designed and located to minimize the probability and effects of pipe ruptures. The suction for the SFPCCS is four feet below the normal SFP water level elevation to prevent draining of the SFP in the event of a suction line break. Placing the hose above the water level is another process that would prevent the potential for a siphon event, and is directed by AOI-45, "Loss of Spent Fuel Pit Level or Cooling," as a CAUTION.
b. Incorrect. Losing suction as the level drops approximately 4 feet is correct and placing the end of the hose below the water level would reduce the spray and splash of the water that could spread contamination.
c. Incorrect. Plausible, since a minimum of 10 feet of water level above the fuel is the requirement for radiation shielding and placing the end of the hose above the water level is correct.
d. Incorrect. Plausible, since a minimum of 10 feet of water level above the fuel is the requirement for radiation shielding and placing the end of the hose below the water level would reduce the spray and splash of the water that could spread contamination.

Question Number: 62

K/A: 034 A1.02
Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the Fuel Handling System controls including: Water level in the refueling canal

Tier:	**2**	**RO Imp:**	**2.9**	**RO Exam:**	**62**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**62**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.5 / 45.5)

Learning Objective: 3-OT-SYS079A, Rev. 6, Objective 18, Describe the possible consequences of a reactor cavity seal failure during refueling**.**

References: N3-79-4001, Fuel Handling and Storage System, Rev. 16; AOI-29, Dropped Or Damaged Fuel Or Refueling Cavity Seal Failure, Rev 20.

Question: 62

Given the following plant conditions:

- Core load is in progress.
- A failure of the Reactor Cavity Seal occurred.
- Reactor cavity level is at el. 748' and dropping slowly.

Which ONE of the following actions is required per AOI-29, "Dropped or Damaged Fuel or Refueling Cavity Seal Failure?"

a. Start one SI pump in the cold leg injection flowpath for cavity makeup.

b. Align CCP suction to RWST and discharge to the RCS through normal charging.

c. Align RHR suction to the RWST and discharge to the RCS through the hot legs.

d. Align Refueling Water Purification pumps suction to RWST and discharge directly to refueling cavity.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the applicant may believe this is an acceptable make-up flowpath for loss of inventory events since it is viable in other plant instructions. This is plausible, but won't work because the SI pumps will be tagged out for given conditions.
b. CORRECT. CCP suction is aligned to the RWST with discharge to the normal charging flow path.
c. Incorrect. Plausible if applicant mistakes make-up through the hot legs with the cold legs since aligning RHR to the RWST through the cold legs is a correct flow path per AOI-29.
d. Incorrect. Plausible, since the applicant may believe this is an acceptable make-up flow path since the Refueling Water Purification pumps may be used to dewater the cavity and fill the transfer canal.

K/A Applicability:
Applicant is presented with conditions involving a loss of water level in the reactor cavity due to a failure of the cavity seal. At first glance, this may not appear to match the K/A, however, during this evolution, the reactor cavity and the refueling canal are connected, so that water level changes in the reactor cavity also result in water level changes in the refueling canal. Further, "operating the Fuel Handling System controls" aspect is met because the correct answer involves controlling one aspect of fuel handling; i.e., flow through the core.

Question Number: 63

K/A: 045 G2.2.37
For Main Turbine/Generator System: Ability to determine operability and/or availability of safety related equipment.

Tier:	**2**	**RO Imp:**	**3.6**	**RO Exam:**	**63**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**63**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7 / 43.5 / 45.12)

Learning Objective: 3-OT-SYS047A, Obj. 6, Identify turbine trip inputs to the SSPS.

References: 1-47W611-99-1 Reactor Protection System.

Question: 63

Given the following plant conditions:

- The unit is at 62% power during a load increase.
- 1-PS-47-74, Turbine Auto Stop Oil Pressure transmitter, fails low.

Which ONE of the following is a description of the expected alarm(s) to be LIT as a result of this failure and the availability of the Turbine Trip function for the Reactor Protection System?

	Alarms	**Availability of Turbine Trip Function**
a.	121-D TURB AUTO STOP OIL PRESS LO 71-A AUTO STOP OIL PRESS LO 76-B TURBINE TRIP	Available
b.	121-D TURB AUTO STOP OIL PRESS LO	Available
c.	121-D TURB AUTO STOP OIL PRESS LO 71-A AUTO STOP OIL PRESS LO 76-B TURBINE TRIP	Not Available
d.	121-D TURB AUTO STOP OIL PRESS LO	Not Available

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since the low auto stop oil pressure causes 121-D TURB AUTO STOP OIL PRESS LO to alarm. Since the trip is a 2/3 logic, no trip would occur. The turbine trip function is available.
b. CORRECT. 121-D TURB AUTO STOP OIL PRESS LO will be lit since the alarm is a 1/3 logic. Since the trip is a 2/3 logic, no trip occurs. The turbine trip function is available.
c. Incorrect. Plausible since the low auto stop oil pressure sensed would cause 121-D TURB AUTO STOP OIL PRESS LO to alarm. Since the trip is a 2/3 logic, no trip would occur. The turbine trip function is available.
d. Incorrect. Plausible, since 121-D TURB AUTO STOP OIL PRESS LO alarm is a 1/3 logic. Since the trip is a 2/3 logic, no trip would occur. The turbine trip function is available.

Question Number: 64

K/A: 068 A3.02
Ability to monitor automatic operation of the Liquid Radwaste System including: Automatic isolation.

Tier:	**2**	**RO Imp:**	**3.6**	**RO Exam:**	**64**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**64**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7 / 45.5)

Learning Objective: 3-OT-SYS077A, Obj 19, Discuss how processed water is released. 3-OT-SYS090A, Obj 7, Determine Interlocks and/or cause-effect relationships between the Rad Monitoring Systems (ARM & Process) and the areas they monitor. Include HVAC systems and area isolations.

References: ARI-159-165, Rev 34, Page 21 of 48; ARI-180-187, Rev. 30, Page 9 of 47; Page 11 of 47

Question: 64

Given the following plant conditions:

- Unit 1 is operating at 100% power.
- A planned release of the Monitor Tank is in progress.
- Power is lost to the rate meter associated with 0-RM-90-122A Waste Disposal System Release Line Radiation Monitor.

Which ONE of the following describes the effect of the failure on the release in progress, and which of the main control room alarms in addition to 161-F 0-L-2 listed below are expected?

Main Control Room Alarms

1 - 161-F 0-L-2 RAD WASTE PNL TROUBLE
2 - 181-A WDS RELEASE LINE 0-RM-122 LIQ RAD HI
3 - 181-C WDS RELEASE LINE 0-RM-122 INSTR MALF

	Effect on Release	Expected Alarms
a.	Will be AUTOMATICALLY terminated.	2 and 3
b.	Will be AUTOMATICALLY terminated.	2 only
c.	Must be MANUALLY terminated.	2 and 3
d.	Must be MANUALLY terminated.	2 only

DISTRACTOR ANALYSIS

a. CORRECT. Both 181-A WDS RELEASE LINE 0-RM-122 LIQ RAD HI and 181-A WDS RELEASE LINE 0-RM-122 INSTR MALF annunciators alarm when power is lost to the rate meter, resulting in the termination of the release.
b. Incorrect. Plausible, since the 181-A WDS RELEASE LINE 0-RM-122 LIQ RAD HI alarms on the loss of power to the rate meter. Release is terminated automatically.
c. Incorrect. Plausible, since the 181-C WDS RELEASE LINE 0-RM-122 INSTR MALF alarms on the loss of power to the rate meter. 161-F 0-L-2 RAD WASTE PNL TROUBLE alarms. The release will be terminated automatically, NOT manually.
d. Incorrect. Plausible, since the 181-C WDS RELEASE LINE 0-RM-122 INSTR MALF alarms on the loss of power to the rate meter. 161-F 0-L-2 RAD WASTE PNL TROUBLE alarms. The release will be terminated automatically, NOT manually.

Question Number: 65

K/A: 072 A2.01
Ability to (a) predict the impacts of the following malfunctions or operations on the ARM system- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Erratic or failed power supply

Tier:	**2**	**RO Imp:**	**2.7**	**RO Exam:**	**65**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**65**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.5 / 43.5 / 43.3 / 45.13)

Learning Objective: 3-OT-SYS090A, Obj. 9, Explain actions to take if an Area Rad Monitor alarms in a work area.

References: ARI 174-E, Rev.44; AOI-31, Abnormal Release of Radioactive Material, Rev. 22.

Question: 65

Given the following plant conditions:

- The unit is operating at 100% power.
- 174-B, 1-RR-90-1 AREA RAD HI, is LIT.
- 174-E, 1-RR-90-1 AREA MONITORS INSTR MALF, is LIT.
- The GREEN indicating light on 1-RM-90-8, AFW Pumps is NOT LIT.

Which ONE of the following describes (1) the cause of the alarm, and (2) the actions (in part) required to be taken in response to the problem in accordance with the Alarm Response Instructions?

	(1)	**(2)**
a.	High radiation in the AFW pump area.	Enter AOI-31, “Abnormal Release of Radioactive Material,” and evaluate the release using ICS EFF1 screen.
b.	High radiation in the AFW pump area.	Since the GREEN indicating light is NOT lit, check counts indicating on the readout module. If no counts are indicated, then perform a source check on 1-RM-90-8. Contact Radiation Protection to evaluate compensatory actions.
c.	Failure of 1-RM-90-8.	Enter AOI-31, “Abnormal Release of Radioactive Material,” and evaluate the release using ICS EFF1 screen.
d.	Failure of 1-RM-90-8.	Since the GREEN indicating light is NOT lit, check counts indicating on the readout module. If no counts are indicated, then perform a source check on 1-RM-90-8. Contact Radiation Protection to evaluate compensatory actions.

DISTRACTOR ANALYSIS

a. Incorrect. It is plausible to believe that an actual high radiation in a plant area would cause alarm actuation, however, with the malfunction alarm also in, applicant mistakenly applies it.
b. Incorrect. Plausible, since the second column is correct.
c. Incorrect. Plausible, since AOI-31 is related to an actual alarm condition.
d. CORRECT. ARI-174-B directs the operator to check 1-RR-90-1 and associated radiation monitors to determine the area that is affected. The ARI also directs the operator to determine if any loss of power has occurred. If a loss of power is indicated AND 174E annunciator is also LIT, the operator is directed to implement actions contained in ARI 174-E.

Question Number: 66

K/A: G2.1.4
Operator responsibilities for shift staffing.

Tier:	**3**	**RO Imp:**	**3.3**	**RO Exam:**	**66**	**Cognitive Level:**	**Low**
Group:	**n/a**	**SRO Imp:**	**n/a**	**SRO Exam:**	**66**	**Source:**	**INPO Bank**

Applicable 10CFR55 Section: (CFR 43.10/43.5/45.13)

Learning Objective: 3-OT-SPP1000, Rev. 9, Objective 6, Describe shift staffing requirements.

References: OPDP-1, Conduct of Operations, Rev.10

Question: 66

Given the following plant conditions:

- The plant is in Mode 4.
- A cooldown to Mode 5 has been initiated.

What is the difference in staffing requirements for the minimum on-duty shift complement per OPDP-1, "Conduct of Operations," when Mode 5 is achieved?

a. The number of Unit Operators required is reduced.
The STA is NOT required.

b. The number of AUOs required remains the same.
The number of Unit Operators required is reduced.

c. The number of AUOs required is reduced.
The number of Unit Operators required remains the same.

d. The number of AUOs required is reduced.
The STA is required.

DISTRACTOR ANALYSIS

a. CORRECT. Per the table in OPDP-1, during Mode 5 and 6 there is no requirement for the STA position to be manned. Additionally, the requirement for the number of Unit operators is reduced from 2 to 1.
b. Incorrect. Plausible, since the number of Unit Operators being required is reduced and the Fire Brigade still requires 5 members.
c. Incorrect. Plausible, since the number of AUOs may be reduced to 3, and the unit is normally staffed with 2 Unit Operators in Mode 5.
d. Incorrect. Plausible, since the number of AUOs may be reduced to 3, and the applicant may not recall the STA is not required.

Question Number: 67

K/A: G2.1.42
New and spent fuel movement procedures.

Tier:	**3**	**RO Imp:**		**RO Exam:**	**67**	**Cognitive Level:**	**Low**
Group:	**n/a**	**SRO Imp:**	**n/a**	**SRO Exam:**	**67**	**Source:**	**New**

Applicable 10CFR55 Section:

Learning Objective: 3-OT-SYS079A, Rev. 6, Objective 4, Identify the maximum quantity of fuel that shall be out of approved storage locations during fuel handling operations.

References: FHI-7 Fuel Handling and Movement, Rev. 31.

Question: 67

Per FHI-7, "Fuel Handling and Movement," what is the MAXIMUM number of IRRADIATED fuel assemblies allowed outside of approved storage (all areas combined)?

a. 3

b. 4

c. 5

d. 6

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since three fuel assemblies are allowed within the refueling canal. The refueling canal includes the fuel transfer tube boundary (including the transfer cart) and the rod cluster control changing fixture. This allows for two fuel assemblies to be in the rod cluster control changing fixture while the third fuel assembly is being transferred through the fuel transfer tube, is in the Upender, or is in transit to or from the reactor cavity.
b. Incorrect. Plausible, since the combination of assemblies allowed in the spent fuel storage pool; boundary and the refueling canal totals 4 assemblies. This is credible if the applicant does not recall the assembly allowed in the reactor vessel.
c. CORRECT. One allowed in the spent fuel storage pool + one in the reactor vessel + 3 in the refueling canal = 5 total.
d. Incorrect. Plausible if the applicant applies the 5 irradiated assembly and adds the one new fuel assembly to the total.

Question Number: 68

K/A: G2.2.20
Knowledge of the process for managing troubleshooting activities.

Tier:	**3**	**RO Imp:**	**2.6**	**RO Exam:**	**68**	**Cognitive Level:**	**Low**
Group:	**n/a**	**SRO Imp:**	**n/a**	**SRO Exam:**	**68**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.5 / 45.13)

Learning Objective: 3-OT-OPDP-7, Obj. 4, Describe the procedure for replacing blown fuses in safety related circuits.

References: OPDP-7, Fuse Control, Rev.3.

Question: 68

Given the following plant conditions:

- Unit 1 is at 100% power.
- The CRO notices that SG Blowdown Valve 1-FCV-1-15 has no indicating lights.
- The Control Building AUO reports that a fuse has blown in the valve's control circuit.

Which ONE of the following describes how troubleshooting for this condition is performed, including attempts at replacing the fuse?

a. One attempt may be made to replace the fuse.
If the fuse blows a second time, a Work Order must be written for the purpose of initiating troubleshooting on the circuit PRIOR to any further attempt at fuse replacement.

b. One attempt may be made to replace the fuse.
If the fuse blows a second time, Electrical Maintenance must be contacted to determine the exact cause of the problem.
Once a cause is identified, a Work Order is then written to perform needed repairs identified by the troubleshooting.

c. Write a Work Order to have Electrical Maintenance perform troubleshooting PRIOR to any attempt at replacing the fuse.
If they determine the cause was a faulty fuse, replace it.
No additional Work Order is needed.

d. Electrical Maintenance must be contacted to determine the exact cause of the blown fuse PRIOR to any attempt at replacing the fuse.
If they determine the cause was a faulty fuse, replace it.
Document the condition by writing a Work Order.

DISTRACTOR ANALYSIS

a. CORRECT. Whenever a fuse clears, (the first time a fuse clears it is not considered a condition adverse to quality) it may be replaced one time with the proper fuse as identified in accordance with this procedure. The operations personnel replacing the blown fuse shall prepare and submit a WO documenting the fuse replacement and any pertinent information associated with malfunction. For FLAS-5 fuses, include the circuit and the new fuse lot number for tracking. The proper verification (i.e., IV/2nd) shall be included on the WO. These WOs shall be sent to maintenance history. If the fuse should clear a second time in the same operational sequence a WO shall be initiated to troubleshoot the circuit before further fuse replacement. (In an emergency, SM may authorize further fuse replacement.). Forward all blown FLAS-5 fuses to NE-Electrical supervision for evaluation.

b. Incorrect. Plausible, since one attempt may be made to replace fuse; however, the given followup action is incorrect, but plausible since Electrical Maintenance does perform troubleshooting activities related to the components.

c. Incorrect. Plausible, since the action seems prudent, but this level of caution is not required since one attempt may be made to replace the fuse.

d. Incorrect. Plausible, due to frequent use of related terms for the condition; however, as a whole these actions are incorrect.

Question Number: 69

K/A: G2.2.21
Knowledge of pre- and post-maintenance operability requirements.

Tier:	**3**	**RO Imp:**	**2.9**	**RO Exam:**	**69**	**Cognitive Level:**	**Low**
Group:	**n/a**	**SRO Imp:**	**n/a**	**SRO Exam:**	**69**	**Source:**	**INPO Bank**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.2)

Learning Objective: 3-OT-SPP0801, Obj. 2, Identify the applicability of SPP-8.1 to other tests or instructions.

References: SPP-6.3, Pre-/Post-Maintenance Testing, Rev. 2; SPP-8.0, Testing Programs, Rev. 4; GOI-7, Generic Equipment Operating Guidelines, Rev. 33; MI-57.001, "6900V Circuit Breaker Inspection," 7.6.5 and 5.0.

Question: 69

Given the following conditions:

- Unit 1 is in Mode 1.
- Maintenance has replaced the breaker for 1B-B Safety Injection (SI) Pump as a PM activity.
- The handswitch is placed to STOP, PULL-TO-LOCK.
- The breaker has been racked up using the guidelines of GOI-7, "Generic Equipment Operating Guidelines."

Which of the following actions is/are the MINIMUM requirement(s) per approved post-maintenance work activities for restoring 1B-B SI Pump to operable status?

1. Perform 1-SI-63-901-B, "Safety Injection Pump 1B-B Quarterly Performance Test."
2. Perform an end device test.
3. Bump start to check rotation.
4. Place the handswitch to auto.

a. 1 only.

b. 1, 2, and 3 only.

c. 2, 3, and 4 only.

d. 4 only.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the given test is a detailed procedure which verifies that the pump is ready for service and can perform its design function. However, it is not required to be performed after the given maintenance, since only the handswitch restored to auto returns the pump to operable status.
b. Incorrect. Plausible, since items 1, 2, and 3 include numerous activities, all of which, would check the status of the pump to verify if it is ready for service; however, these activities are not required for restoring the pump to operable status.
c. Incorrect. Plausible, since these items include many activities which would check the status of the pump to verify if it is ready for service; however not all these activities are required. Further plausibility is due to the fact that one of these activities (placing handswitch to auto) is the correct answer, and is the only one required for restoring the pump to operable status.
d. CORRECT. Due to the extent of maintenance being ONLY the breaker, and not any components on the 1B-B pump itself, no testing of the pump is required, SPP-6.3. Since the breaker itself is bench tested, after the maintenance, and before it is reinstalled into the breaker cubicle, no further testing is required. Breaker manipulation is done in accordance with GOI-7. If these requirements are met, then no further testing (including end device testing) is required for this case.

Question Number: 70

K/A: G2.3.12
Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

Tier:	**3**	**RO Imp:**	**3.2**	**RO Exam:**	**70**	**Cognitive Level:**	**Low**
Group:	**n/a**	**SRO Imp:**	**n/a**	**SRO Exam:**	**70**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.12 / 45.9 / 45.10)

Learning Objective: 3-OT-RAD0003, Obj. 8.Identify the responsibilities of the following concerning the ALARA program: a. Radiation Protection Manager/Radiation Safety Officer b. TVA NPG Organization c. Employee

References: RCI-100, Control of Radiological Work, Rev. 35.

Question: 70

In addition to a thermoluminescent dosimeter (TLD), which ONE of the following describes the acceptable monitoring method for personnel entering a “Very High Radiation Area” and the MINIMUM level of radiation protection coverage for the entry?

1) Electronic Alarming Dosimeter that continuously integrates the radiation dose rates in the area and alarms when the dose rate or dose alarm setpoints are reached.

2) Electronic Alarming Dosimeter that continuously transmits dose rate and cumulative dose to a remote receiver monitored by RP personnel.

3) Continuous surveillance by an individual qualified in radiation protection procedures, via a closed circuit television.

4) Continuously accompanied by, and in direct communications with, a qualified RP technician equipped with a radiation monitoring device that continuously displays the dose rate in the area.

a. 1 only

b. 1 and 4

c. 2 and 3

d. 2 only

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since this equipment is used, but is only part of the actual requirement.
b. CORRECT. This combination is correct per the matrix in RCI-100 “Control of Radiological Work”.
c. Incorrect. Plausible since this combination of equipment and RP coverage is applicable for entry into a Locked High Radiation Area, per the "Requirement for Entry" matrix in RCI-100 “Control of Radiological Work”.
d. Incorrect. Plausible since this equipment is used for certain applications, but is incorrect for a Very High Radiation Area.

Question Number: 71

K/A: G2.3.14
Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.

Tier:	**3**	**RO Imp:**	**3.4**	**RO Exam:**	**71**	**Cognitive Level:**	**High**
Group:	**n/a**	**SRO Imp:**	**n/a**	**SRO Exam:**	**71**	**Source:**	**Bank**

Applicable 10CFR55 Section: (CFR: 41.12 / 43.4 / 45.10)

Learning Objective: 3-OT-RAD0003, Obj. 7, Explain the ALARA concept.

References: SOI-62.01, CVCS-Charging and Letdown, AOI-20, "Malfunction of Pressurizer Level Control System", Rev. 31; SOI-78.01**,** Spent Fuel Pool Cooling And Cleaning System, Rev. 56.

Question: 71

Which ONE of the following conditions or evolutions REQUIRES contacting Radiological Protection? (Consider the effects of the described action only.)

a. Reestablishing letdown flow using AOI-20, Attachment 1, "Alignment of Charging and Letdown."

b. 1A Safety Injection (SI) pump is started to perform a Technical Specification surveillance test.

c. Increasing spent fuel pool (SFP) CCS cooling flow during spent fuel pool fuel moves.

d. Shifting from 1A to 1B Charging Pump.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since the applicant may believe that AOI-20, Attachment 1 requires contacting Rad Pro when changing letdown flow.
b. Incorrect. Plausible, since shifting of CCPs does require Rad Pro support. The source of water to the safety injection pumps is the RWST, and during the injection phase there is no contaminated water recirculated from the containment sump.
c. Incorrect. Plausible, since the applicant may believe that raising SFP cooling flow will change radiological conditions in the plant and therefore require contacting Rad Pro.
d. CORRECT. Per SOI-62.01, Section 6.2, Swapping CCPs, NOTE prior to Step 1 states “Radiological Protection should be notified when starting or changing CCP alignment for ALARA concerns and to revise Radiological Protection postings.”

Question Number: 72

K/A: G 2.3.15
Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.

Tier:	**1**	**RO Imp:**	**2.7**	**RO Exam:**	**72**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**n/a**	**SRO Exam:**	**72**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR 41.7 / 45.7)

Learning Objective: 3-OT-SYS070A, Obj 12, Identify the automatic actions that occur upon detection of CCS high radiation.

References: 1-47W611-70-1, -2 Logic Diagrams.

Question: 72

Which ONE of the following describes the expected response of Unit 1 and Unit 2 CCS Surge Tanks Vents upon receipt of the following alarm:

- 188-A "CCS HX B OUTLET 2-RM-123 LIQ RAD HI"

a. Both Unit 1 and Unit 2 CCS Surge Tank Vents will CLOSE.

b. Both Unit 1 and Unit 2 CCS Surge Tank Vents will remain OPEN.

c. Unit 1 CCS Surge Tank Vent will remain OPEN.
Unit 2 CCS Surge Tank Vent will CLOSE.

d. Unit 1 CCS Surge Tank Vent will CLOSE.
Unit 2 CCS Surge Tank Vent will remain OPEN.

DISTRACTOR ANALYSIS

a. CORRECT. Vent valves 1-FCV-70-66 and 2-FCV-70-66 automatically close if radiation is detected on any of the 3 detectors (0-RM-90-123, 1-RM-90-123, or 2-RM-90-123).
b. Incorrect. Plausible, since the applicant may believe that a liquid process monitor signal will not close the vent valves.
c. Incorrect. Plausible, since the surge tanks are independent. A high radiation condition will cause both vent valves to close.
d. Incorrect. Plausible, since the surge tanks are independent. A high radiation condition will cause both vent valves to close.

Question Number: 73

K/A: G2.4.9
Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies**.**

Tier:	**3**	**RO Imp:**	**3.8**	**RO Exam:**	**73**	**Cognitive Level:**	**High**
Group:	**n/a**	**SRO Imp:**	**n/a**	**SRO Exam:**	**73**	**Source:**	**INPO Bank**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.5 / 45.13)

Learning Objective: 3-OT-AOI1400, Obj. 4, Describe 5 ways that RHR Cooling can be lost.

References: AOI-14, Loss of RHR Shutdown Cooling, Rev. 34; ARI 90-E, ARI-91E, ARI-113E.

Question: 73

Given the following initial conditions:

- Unit 1 reactor is shutdown.
- RCS in solid water operation.
- All RCS temperatures are approximately 160°F.
- Pressure is 330 psig.
- RHR Train A is in service.

Subsequently:

- RCS pressure increases to 600 psig.

Which ONE of the following describes:

1) the effect the pressure increase would have on the PORVs,

AND

2) the <u>first</u> action(s) which is/are directed to be taken in accordance with AOI-14, "Loss of RHR Shutdown Cooling?"

	(1)	**(2)**
a.	Only ONE PORV OPENS.	Stop the Charging pump.
b.	Only ONE PORV OPENS.	Stop A Train RHR Pump and ensure RHR suction valves are closed.
c.	BOTH PORVS OPEN.	Stop Charging Pump.
d.	BOTH PORVS OPEN.	Stop A Train RHR Pump and ensure RHR suction valves are closed.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, because COMS does have a staggered lift setpoint design feature (approximately 20 psi setpoint difference between the PORVS. Second column is correct.
b. Incorrect. Plausible, because COMS does have a staggered lift setpoint design feature (approximately 20 psi setpoint difference between the PORVS. Second column is plausible because this is an action prescribed by the AOI, but it is taken only if the RCS pressure remains high after the Charging Pump has been stopped.
c. CORRECT. Per COMS design, both PORVs lift for the given condition (when greater than 575 psig), and the AOI directs the Charging pump to be stopped.

d. Incorrect. Plausible, since the first column is correct. Second column is plausible because this is an action prescribed by the AOI, but it is taken only if the RCS pressure remains high after the Charging Pump has been stopped.

Question Number: 74

K/A: G2.4.19
EOP layout, symbols and icons.

Tier:	**3**	**RO Imp:**	**3.4**	**RO Exam:**	**74**	**Cognitive Level:**	**Low**
Group:	**n/a**	**SRO Imp:**	**n/a**	**SRO Exam:**	**74**	**Source:**	**INPO Bank**

Applicable 10CFR55 Section: (41.10/45.13)

Learning Objective: 3-OT-TI1204, 1, Obj 13: Apply rules of usage which relate to performing steps of an EOP in a specified sequence to determine when steps may/must be performed.

References: TI-12.04, User's Guide for Abnormal and Emergency Operating Instructions.

Question: 74

How are Emergency Operating Instruction (EOI) sub-steps designated if they must be performed in the order in which they are listed?

a. A Note precedes the step(s).

b. Substeps are designated by bullets.

c. The major step is designated with a double asterisk.

d. Substeps are designated by alpha-numeric characters.

DISTRACTOR ANALYSIS

A. Incorrect. Plausible, since Notes appear throughout the EOIs, but not for the purpose stated.
B. Incorrect. Plausible, since bullets are used if substeps may be completed in any order.
C. Incorrect. Plausible, since double asterisks are used to designate transition points in the EOPs.
D. CORRECT. Letters or numbers listed sequentially are used to identify procedure steps that MUST be performed in sequence.

Question Number: 75

K/A: G2.4.27
Knowledge of "fire in the plant" procedures.

Tier:	**3**	**RO Imp:**	**3.4**	**RO Exam:**	**75**	**Cognitive Level:**	**High**
Group:	**n/a**	**SRO Imp:**	**n/a**	**SRO Exam:**	**75**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.5 / 45.13)

Learning Objective: 3-OT-AOI3000, Obj 7, Identify the section of AOI-30.2 giving procedural guidance relative to each of the following: a. Location of component(s) within Auxiliary, Control, or Reactor buildings or Intake pumping station b. Control Air c. Ventilation Systems with failed fire dampers

References: AOI-30.2, Fire Safe Shutdown, Rev. 28

Question: 75

After controls are transferred per AOI-30.2, "Fire Safe Shutdown," RCS temperature is controlled using ____(1)____ and RCS pressure is controlled using ____(2)_____.

	(1)	(2)
a.	Atmospheric Relief valves, only	PZR back-up heater groups A-A and B-B.
b.	Atmospheric Relief valves, only	PZR back-up heater group C.
c.	Condenser steam dumps or Atmospheric Relief valves	PZR back-up heater groups A-A and B-B.
d.	Condenser steam dumps or Atmospheric Relief valves	PZR back-up heater group C.

DISTRACTOR ANALYSIS

a. CORRECT. Atmospheric dumps are only available since the MSIVs are closed. Loss of offsite power is assumed for Appendix R fire, thus credit is only taken for the A-A and B-B backup heaters.
b. Incorrect. Examinee must know that loss of offsite power is assumed for App. R fire, thus credit is only taken for the A-A and B-B backup heaters.
c. Incorrect. Examinee must know that the MSIVs are closed and condenser steam dumps are not available.
d. Incorrect. Examinee must know that the MSIVs are closed and condenser steam dumps are not available. Also should know that loss of offsite power is assumed for App. R fire, thus credit is only taken for the A-A and B-B backup heaters.

Question Number: 76

K/A: 000008 G2.1.20 Pressurizer Vapor Space Accident.
Ability to interpret and execute procedure steps.

Tier:	**1**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**4.6**	**SRO Exam:**	**76**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.5 / 45.12)

Learning Objective: 3-OT-EOP0100, Rev. 11, Objective 12, Discuss the purpose of ES-1.2 Post LOCA Cooldown and Depressurization.

References: LCO 3.4.10, Pressurizer Safety Valves, Action B

Question:

With the plant initially at 100% power, the following conditions are given:

- 89-B, "PZR Safety Line Temp HI" is received.
- A Pressurizer safety valve is leaking by.
- The leak rate is determined to be 0.9 gpm.
- One hour later, Engineering reports that a review of the lab data has determined that the lift setpoint of the safety valve had been set lower than the allowed Tech. Spec. limit, and the valve appears to be simmering.

The SRO enters AOI-6, "Small Reactor Coolant System Leak," and directs the crew to begin reducing power per GO-4, "Normal Power Operation," for compliance with Technical Specifications. When the plant is at 60% power, it is determined that the Pressurizer safety valve has RESEATED and remains closed.

What actions will the SRO direct and why?

a. Stop the power reduction since the safety valve is now closed. Request a functional evaluation of the safety valve from engineering.

b. Stop the power reduction, since RCS operational leakage is now within allowable limits. Request a functional evaluation of the safety valve from engineering.

c. Continue the plant shutdown to Mode 3 and then to Mode 4 due to the operability status of the safety valve.

d. Continue the plant shutdown to Mode 3 and then to Mode 5, due to having exceeded the specification for RCS operational leakage.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible if applicant misapplies LCO 3.0.2 applicability rule and believes the Required Action does not need to be completed if the valve has reclosed. The applicant may also believe because the valve was simmering, that it has failed in a "conservative direction"; i.e.; it is operating at a lower pressure than what is needed to protect the RCS integrity, and that this somehow supercedes the engineer's report. Believing this, it is plausible that a further evaluation is appropriate. Applicant fails to recognize that the most significant aspect of the conditions given in the stem is that the lift settings have been shown to be outside of acceptable limits, and the valve is therefore inoperable, requiring completion of the Required Action.

b. Incorrect. Plausible if applicant misapplies LCO 3.0.2 applicability rule and believes the Required Action does not need to be completed if the valve has reclosed, and that leakage limits (though incorrectly arrived at in the applicant's thought process) are now back to within limits. The applicant may also believe that because the valve was simmering, and has stopped, that an evaluation is appropriate, in order to determine the next course of action. Applicant fails to recognize that the most significant aspect of the conditions given in the stem is that the lift settings have been shown to be

outside of acceptable limits, and the valve is therefore inoperable, requiring completion of the Required Action.

c. CORRECT. LCO 3.4.10, "Pressurizer Safety Valves," requires a specific lift setting for operability, and allows 15 minutes (Action A) to restore the valve to operability. If that completion time is exceeded (as given in the stem), Action B requires the plant to be in Mode 3 within 6 hours and Mode 4 within 12 hours.

d. Incorrect. This distractor is plausible if applicant misapplies a common Required Action (go to Mode 5) that is found throughout Technical Specifications. The reason for continuing the plant shutdown is plausible if applicant misapplies leakage limits and leakage definitions, incorrectly believing this is pressure boundary leakage.

K/A Match and SRO only:

The conditions given represent a Pressurizer vapor space leak/accident, since a Pressurizer safety valve is spuriously simmering and passing inventory from the RCS. Further match with the "accident" aspect is that the SRO implements an abnormal operating instruction for an RCS leak.

"Executing" procedure steps is the determining which mitigating strategy (also the SRO aspect) to take, and the "interpreting" aspect is a combination of why the strategy is required, and any further action.

High Cognitive Level:
Applicant must apply knowledge from various aspects of plant operation, including definitions of types of leakages, significance of alarm conditions, diagnosing the type of event in progress, and Tech. Spec. required actions., and then apply this knowledge to determine the appropriate a course of action, and then to explain why the action is appropriate.

Question Number: 77

K/A: 000011 EA2.01
Ability to determine or interpret the following as they apply to a Large Break LOCA:
Actions to be taken, based on RCS temperature and pressure - saturated and superheated.

Tier:	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**SRO Imp:**	**4.7**	**SRO Exam:**	**77**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR 43.5 / 45.13)

Learning Objective: 3-OT-FRC0001, Rev. 7**,** 3, Given a set of plant conditions, use FR-C.1, C.2, and C.3 to correctly diagnose and implement Action Steps, RNOs, Foldout Pages, Notes and Cautions.

References: FR-C.1, "Inadequate Core Cooling," Rev. 15.

Question:

Given the following plant conditions:

- The RCPs were removed from service following a LOCA on Unit 1.
- Subsequently, a transition from E-1, "Loss of Reactor or Secondary Coolant," to FR-C.1, "Inadequate Core Cooling," was made.
- Attempts to establish ECCS flow have been unsuccessful.
- RVLIS level is 28% and dropping slowly.
- Core exit thermocouples are indicating 820°F and rising slowly.
- The crew has established level in all SGs at 40-45% narrow range.

Which ONE of the following statements describes the NEXT evolution to be performed to mitigate the core cooling challenge?

a. Depressurize all intact SGs using steam dumps or SG PORVs to depressurize the RCS and allow Cold Leg Accumulators and RHR pumps to inject.

b. Open available PZR PORVs to depressurize the RCS to allow Cold Leg Accumulators and RHR pumps to inject.

c. Immediately restart one RCP in a loop with an intact SG to provide forced two-phase flow for initiating RCS depressurization without establishing support conditions.

d. Establish support conditions, and then restart one RCP in a loop with an intact SG to provide forced two-phase flow for initiating RCS depressurization.

DISTRACTOR ANALYSIS

a. CORRECT. These actions are described in FR-C.1, PRIOR to those which address restarting RCPs.
b. Incorrect. Plausible, since this action would be accomplished if a transition to FR-P.1 "Pressurized Thermal Shock" were made.
c. Incorrect. Plausible, since this action is taken, but only if other more conservative actions are unsuccessful in reducing RCS temperature. Not establishing RCP support conditions is plausible because of emergency conditions.
d. Incorrect. Plausible, since this action is taken, but only if other more conservative actions are unsuccessful in reducing RCS temperature.

K/A Match:
SRO Only Perspective:
Requires applicant to evaluate Large Break LOCA conditions, and determine if conditions are saturated or superheated, and from the SRO only perspective, to diagnose the effective mitigation strategy, based on the diagnosed severity of the event.

Question Number: 78

K/A: 000025 AA2.06
Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: Existence of proper RHR overpressure protection.

Tier:	**1**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**3.4**	**SRO Exam:**	**78**	**Source:**	**New**

Reference to be provided - Tech. Spec. LCO 3.4.12 only

Applicable 10CFR55 Section: (CFR: 43.5 / 45.13)

Learning Objective: 3-OT-AOI1400, Rev. 7, Objective 7, Demonstrate ability/knowledge of AOI, to correctly: a. Recognize Entry conditions. b. Respond to Action steps. Respond to Contingencies (RNO column). d. Respond to Notes & Cautions.

References: AOI-14, "Loss of RHR Shutdown Cooling," Rev. 34; Tech Spec 3.4.12, "Cold Overpressure Mitigation System (COMS)"

Question:

Given the following plant conditions:

- The plant is in Mode 4 with RCS at 235°F.
- Pressurizer PORV 1-PCV-68-334 is INOPERABLE and ISOLATED by its block valve.
- The Reactor Trip Breakers are open.
- RHR Train A has been placed in service.
- All SG levels are at 38% Narrow Range.
- RCP #2 is in service and the other 3 RCPs are off but available.

Subsequently,

- Excessive leakage through the suction relief valve required the RHR system to be shutdown.
- 1-FCV-74-1 and 1-FCV-74-2, “Loop 4 Hot Leg to RHR Suction valves,” have been closed in accordance with AOI-14, "Loss of RHR Shutdown Cooling."

Which ONE of the following identifies actions required for Tech. Spec. (TS) compliance relating to the Reactor Coolant System?

Reference Provided

	LCO 3.4.6 RCS Loops- MODE 4	**LCO 3.4.12 Cold Overpressure Mitigation System (COMS)**
a.	Start an additional RCP.	Restore required relief valve to operable status within 8 hours.
b.	Start an additional RCP.	Restore required relief valve to operable status within 7 days.
c.	TS met without starting an additional RCP.	Restore required relief valve to operable status within 8 hours.
d.	TS met without starting an additional RCP.	Restore required relief valve to operable status within 7 days.

DISTRACTOR ANALYSIS

a. Incorrect. An additional RCP does not need to be started. The TS is met without starting an additional RCP. Mode 4 with the reactor trip breakers open (not capable of rod withdrawal) requires 2 loops (either RHR or RCPs) to be operable and at least one in operation. This condition is met with the current RCP status and SG levels. TS LCO 3.4.12 requires either both PORVs operable or 1 PORV and the RHR suction relief. The TS is met without relying on the LCO prior to the isolation of the RHR suction, but after the RHR suction is isolated, the LCO must be entered because only 1 relief path is operable. This requires compliance with Condition E with a 7 day completion time (Not an 8 hour completion time). Plausible because two loops are required to be in operation if the rod control system is capable of rod withdrawal and the 8 hour completion time would be correct if 2 required relief paths were inoperable in accordance with Condition G. Two paths are inoperable in the question but only one of the 2 is a required path.

b. Incorrect. An additional RCP does not need to be started. The TS is met without starting an additional RCP. Mode 4 with the reactor trip breakers open (not capable of rod withdrawal) requires 2 loops (either RHR or RCPs) to be operable and at least one in operation. This condition is met with the current RCP status and SG levels. TS LCO 3.4.12 requires either both PORVs operable or 1 PORV and the RHR suction relief. The TS is met without relying on the LCO prior to the isolation of the RHR suction, but after the RHR suction is isolated, the LCO must be entered because only 1 relief path is operable. This does require compliance with Condition E with a 7 day completion time. Plausible because two loops are required to be in operation if the rod control system is capable of rod and the 7 day completion time is correct with 1 required relief path inoperable. Two paths are inoperable in the question but only one of the 2 is a required path.

c. Incorrect. The TS is met without starting an additional RCP. Mode 4 with the reactor trip breakers open (not capable of rod withdrawal) requires 2 loops (either RHR or RCPs) to be operable and at least one in operation. This condition is met with the current RCP status and SG levels. TS LCO 3.4.12 requires either both PORVs operable or 1 PORV and the RHR suction relief. The TS is met without relying on the LCO prior to the isolation of the RHR suction, but after the RHR suction is isolated, the LCO must be entered because only 1 relief path is operable. This requires compliance with Condition E with a 7 day completion time (not an 8 hour completion time). Plausible because the first column is correct and the 8 hour completion time would be correct if 2 required relief paths were inoperable in accordance with Condition G. Two paths are inoperable in the question but only one of the 2 is a required path.

d. CORRECT. The TS is met without starting an additional RCP. Mode 4 with the reactor trip breakers open (not capable of rod withdrawal) requires 2 loops (either RHR or RCPs) to be operable and at least one in operation. This condition is met with the current RCP status and SG levels. TS LCO 3.4.12 requires either both PORVs operable or 1 PORV and the RHR suction relief. The TS is met without relying on the LCO prior to the isolation of the RHR suction, but after the RHR suction is isolated, the LCO must be entered because only 1 relief path is operable. This requires compliance with Condition E with a 7 day completion time.

K/A Match and SRO Only:
The applicant is presented with a plant condition involving various equipment that either has been out of service, or otherwise rendered incapable of its design function. It requires the recall of conditions for entering an LCO and the application of LCO required actions and time limits due to the failure of equipment.

Question Number: 79

K/A: 000056 G2.4.45 Loss of Offsite Power
Ability to prioritize and interpret the significance of each annunciator or alarm.

Tier:	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**SRO Imp:**	**4.3**	**SRO Exam:**	**Yes**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.5 / 45.3 / 45.12)

Learning Objective: 3-OT-AOI-3500, Rev. 7, Objective 8 - Given a set of plant conditions, use AOI-35 to correctly diagnose and implement: Action Steps, RNOs, Notes and Cautions.

References: ECA-0.0, "Loss of Shutdown Power," step 19; ARI 41-A, 41-B, 128-A.

Question:

With the plant initially at full power, the following conditions are given:

- A complete loss of all offsite power occurs.
- The plant has tripped.
- Due to various failures, NO diesel generators are currently available.
- Efforts to restore DG 1B-B have been initiated.
- Numerous alarms are in, including:
  * 41-B, "CST A LEVEL LO-LO"
  * 128-A, "SFP LEVEL HI/LO"
- CST "A" level indicates there is 5,000 gallons in the tank, and slowly dropping.
- SFP level indicates 1 foot below the low level alarm setpoint and slowly dropping.

Which ONE of the above alarm conditions will the SRO address first, and what procedure provides the needed guidance to address the condition?

	Highest Priority Alarm	**Procedure**
a.	41-B, "CST A LEVEL LO-LO"	SOI-2&3.01, "Condensate and Feedwater System"
b.	41-B, "CST A LEVEL LO-LO"	ECA-0.0, "Loss of Shutdown Power"
c.	128-A, "SFP LEVEL HI/LO"	ECA-0.0, "Loss of Shutdown Power"
d.	128-A, "SFP LEVEL HI/LO"	AOI-45, "Loss of Spent Fuel Pool Level or Cooling"

DISTRACTOR ANALYSIS

a. Incorrect. It is plausible to believe that the System Operating Instruction would provide guidance to refill a tank that has a low level. In fact, the Alarm Response Instruction for low level in this tank directs refilling the tank using the given SOI; however, in this case, with the level already so low, the ECA-0.0 takes precedence to promptly ensure AFW has a suction source.

b. CORRECT. The alarm setpoint for low-low level in the Condensate Storage Tank corresponds to 116,000 gallons in the tank. With the given inventory in the stem (5,000 gallons) the SRO must recognize that loss of suction to the turbine driven AFW pump (the only one available) is imminent. ECA-0.0 directs dispatching operators to manually transfer the suction source of AFW from CST to Emergency Raw Cooling Water.

c. Incorrect. It is plausible to believe that low level in the Spent Fuel Pool is a paramount concern, given the potential for radiological release due to loss of heating, combined with loss of inventory in the pool. Further urgency (and plausibility) is added to this distractor by stating that the level is continuing to drop. However, the drop is slow and there is plenty of inventory above the top of the fuel before

prompt action must be taken, in comparison to the imminent loss of AFW suction source. The procedure (ECA-0.0) is plausible, since that procedure will be in use by the crew.

d. Incorrect. It is plausible to believe that low level in the Spent Fuel Pool is a paramount concern, given the potential for radiological release due to loss of heating, combined with loss of inventory in the pool. Further urgency (and plausibility) is added to this distractor by stating that the level is continuing to drop. However, the drop is slow and there is plenty of inventory above the top of the fuel before prompt action must be taken, in comparison to the imminent loss of AFW suction source. The procedure (AOI-45) is correct, adding further plausibility to this distractor.

K/A Match and SRO Only:
Applicant is presented with two alarm conditions, both of which seem important, and then must recall and apply knowledge of design features of the Spent Fuel Pool and what approximate water level is effective for shielding, and how that may be affected by given conditions. Knowledge of Condensate Storage Tank level requirements must be applied, in conjunction with diagnosing the plant event and which procedure is in effect, and how that procedure's requirements impact strategies regarding maintenance of level in the Condensate Storage Tank.

High Cognitive Level:
Applicant must synthesize a multitude of plant conditions, understanding of system design features, diagnose the event in progress, and procedure usage, to arrive at a course of action based on assessment of priorities, including a final determination of which procedure guides these actions.

WRITTEN QUESTION DATA SHEET

Question Number: 80

K/A: 000065 AA2.03
Ability to determine and interpret the following as they apply to the Loss of Instrument Air:
Location and isolation of leaks.

Tier:	**1**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**2.9**	**SRO Exam:**	**80**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Learning Objective: 3-OT-SYS033A, Rev. 3, Objective 4, State the control air pressure at which service air isolates.

References: AOI-10, "Loss of Control Air," ARI-134-A; SOI-32.01, "Control Air System," Drawing 1-47848-9, Control Air.

Question:

Given the following conditions:

- Unit 1 is at 100% power.
- 134-A, "CL Accum 4 Level HI/LO" has annunciated.
- 1-LI-63-119, CL Accum Level (for CLA 4) is indicating 7610 gallons.
- An air leak has developed immediately upstream of 1-32-3531, the manual isolation valve for the air supply to FCV-63-70 (Makeup to CL Accum 4).
- 1-FCV-63-70 has gone to its failed position.
- The containment air supply isolation valve has auto closed due to low header pressure.

Which section of AOI-10, "Loss of Control Air" will the SRO use to address these conditions, and what action is required in accordance with Technical Specifications?

	AOI-10 Section	**Requirements when Air Leak is Isolated**
a.	Section 3.2, "Auxiliary Air is lost (one or both trains)."	If air is not restored to 1-FCV-63-70 in less than one hour, conditions will exist that require placing the plant in Mode 3 within 6 hours.
b.	Section 3.2, "Auxiliary Air is lost (one or both trains)."	Enter LCO 3.0.3 immediately, since more than one Cold Leg Accumulator is now inoperable.
c.	Section 3.3, "Nonessential Control Air is lost while in Mode 1,2 or 3."	If air is not restored to 1-FCV-63-70 in less than one hour, conditions will exist that require placing the plant in Mode 3 within 6 hours.
d.	Section 3.3, "Nonessential Control Air is lost while in Mode 1,2 or 3."	Enter LCO 3.0.3 immediately, since more than one Cold Leg Accumulator is now inoperable.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since maintaining Cold Leg Accumulator parameters is important, and the Auxiliary Air header provides control air to numerous safety-related (important) components. Applicant misapplies this however, and extends it to the CLAs, and associated makeup valves and vent valves, which are actually supplied by non-essential control air. Also plausible since the second part is correct.

b. Incorrect. Plausible, since maintaining Cold Leg Accumulator parameters is important, and the Auxiliary Air header provides control air to numerous safety-related (important) components. Applicant misapplies this however, and extends it to the CLAs, and associated makeup valves and vent valves,

which are actually supplied by non-essential control air. LCO 3.0.3 is plausible if applicant misapplies design of the system to be that all four CLAs receive operating air from only one header, and that isolating this air leak results in isolation of operating air for all four CLAs.

c. CORRECT. Per AOI-10, "Loss of Control Air," the appropriate section is Section 3.3, "Nonessential Control Air is lost while in Mode 1,2, or 3." LCO 3.5.1, "Accumulators," requires placing the plant in Mode 3 within 6 hours if an inoperable accumulator is not restored within one hour.

d. Incorrect. Plausible since the first part is correct. LCO 3.0.3 is plausible per description in paragraph immediately above this one.

K/A Match and SRO Only:
Applicant must determine the portion of the air system which has been lost, by applying SRO level ability and knowledge of the applicable procedure, and then predict the significance of this condition and its impact on Tech. Spec. requirements, including assessing the need for plant shutdown.

Higher Cognitive Level:
Application of plant design, Tech. Spec. requirements, and system response, including alarm conditions; and then to arrive at a conclusion on the overall effect on the plant, and which part of Tech. Specs. applies for deciding on required actions.

Question Number: 81

K/A: E04 G2.4.21 LOCA Outside Containment
Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.

Tier:	**1**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**4.6**	**SRO Exam:**	**81**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7 / 43.5 / 45.12)

Learning Objective: 3-OT-TI1204, Rev. 1, Objective 23 List the priority for evaluation and performance of the function restoration procedures (FR-S,C,H,P,Z,I); and 3-OT-FRC0001, Rev. 7, Objective 1, Given a set of plant conditions, use the FR-O Core Cooling Status Tree to identify and implement the correct procedure.

References: FR-0, "Status Trees," Rev. 13; WOG Background Document FR-0, Rev 2

Question:

Given the following plant conditions:

- The crew is responding to a LOCA outside containment per ECA-1.2, "LOCA Outside Containment."
- Attempts to isolate the leak have been unsuccessful.
- RWST level is 70% and dropping.
- RCS subcooling is 0°F.
- RCS pressure is 800 psig.
- RVLIS is 32% and increasing.

Based on the above conditions, which ONE of the following is the appropriate procedure to implement?

a. E-1, "Loss of Reactor or Secondary Coolant."

b. ECA-1.1, "Loss of RHR Sump Recirculation."

c. FR-C.1, "Inadequate Core Cooling."

d. FR-C.2, "Degraded Core Cooling."

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, because E-1 is one of the two potential transitions from ECA-1.2 when the procedure is completed. The other transition being to ECA-1.1. The ECA-1.2 transition to E-1 would be correct if the procedure were completed and the leak isolated.
b. Incorrect. Plausible, since a transition from ECA-1.2 to ECA-1.1 would normally be done in order to add inventory to the RWST to prolong core heat removal during the LOCA outside containment if the leak had not been isolated.
c. Incorrect. Plausible, since the applicant may assume that the pressure value provided is an indication used to determine core cooling status. Applicant must also realize that with RCS pressure at 800 psig, NO RCPs are running.
d. CORRECT. Subcooling is less than 65°F, RVLIS is less than 33% and it can be inferred that core exit temperatures are less than 727°F. The combination of parameter values require FR-C.2, "Degraded Core Cooling" to be implemented.

K/A Match:
The applicant is presented with numerous parameters for assessing the status of safety functions, including subcooling, steam generator levels, AFW flow, RCS pressure, and so forth. Further, there is at least one aspect of the "logic" mentioned in the K/A: at least one steam generator with level greater than 29% is a decision point for the SRO applicant to assess the safety function, and then to determine a success path.

SRO Only:
This K/A lends itself to SRO Only, and the question is written such that an extensive array of plant conditions is presented, which the applicant must evaluate, and apply various knowledges, such as procedure usage, flow of Status Tree procedure, and operating limits (subcooling, RCS pressure, etc.) to determine the appropriate effective course of accident mitigation.

Higher Cognitive Level:
The discussion in both "SRO Only" and "K/A Match" should explain most of this; however, a more detailed look may be desired. As discussed in the Distractor Analysis for the correct answer ("D"), the SRO applicant must use the given values for subcooling and RCS pressure to determine temperature, a key parameter which is then used for making a decision on which path is appropriate. In this same vein, the applicant must assess the given parameters for steam generators and also make a similar decision, and then blend these together to arrive at a final appropriate path through the procedures for mitigation of the event.

Question Number: 82

K/A: 028 AA2.01
Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: PZR level indicators and alarms

Tier:	**1**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**3.6**	**SRO Exam:**	**82**	**Source:**	**NEW**

Applicable 10CFR55 Section: (CFR: 43.5 / 45.13)

Learning Objective: 3-OT-AOI200, Rev. 7, Objective 6, Demonstrate ability to determine causes for pressurizer level malfunctions.

References: AOI-20, "Malfunction of Pressure Level Control System," Rev. 31; ARI 88-94, "REACTOR COOLANT SYSTEM," Rev. 19; LCO 3.4.9., "Pressurizer."

Question:

With the plant initially at steady state full power conditions, the following conditions are given:

- Selector Switch 1-XS-68-339E, PZR Level Control Channel Select, is selected to "1-68-339 & 335."
- A failure occurs of 1-LT-68-320, Pressurizer Level.

The OAC now reports the following indications for Pressurizer level:

1-LI-68-339A, Pressurizer Level, indicates 60%.
1-LI-68-335A, Pressurizer Level, indicates 60%.
1-LI-68-320, Pressurizer Level, indicates 100%.

The SRO has begun implementation of AOI-20, "Malfunction of Pressurizer Level Control System." Which ONE of the following describes what action the SRO will take, and what is the controlling document for it?

a. Direct the OAC to take manual control of the charging valve controller and restore Pressurizer level to program, using the guidance in SOI-62.01, "CVCS - Charging and Letdown."

b. Direct the OAC to ensure that letdown is in service and to maintain adequate RCP seal flow rates, using the guidance in SOI-62.01, "CVCS - Charging and Letdown."

c. Place the failed channel to TRIP within 72 hours, per LCO 3.3.1, "Reactor Trip System Instrumentation (RTS) Instrumentation."

d. Place the failed channel in BYPASS within 12 hours, per LCO 3.3.1, "Reactor Trip System Instrumentation (RTS) Instrumentation."

DISTRACTOR ANALYSIS

a. Incorrect. There are actions in AOI-20, "Malfunction of Pressurizer Level Control" to take manual control of charging, using the System Operating Instruction guidance, but only for certain failures, which makes this distractor plausible. If either of the controlling instruments had failed, depending on the failure mode, then this action may be appropriate. However, in this case, the failure was of the protection (reactor protection) channel. Its failure does not require manual actions to control charging or letdown, since neither of these is affected for the given failure.
b. Incorrect. There are steps in AOI-20, "Malfunction of Pressurizer Level Control" to ensure letdown is in service, and to check adequate RCP seal flows, using the System Operating Instruction guidance, making this distractor plausible. As detailed in "a" explanation above, the nature of the failure makes the choice incorrect.
c. CORRECT. LCO 3.3.1 contains a table of required instrumentation, one of which is the inputting instrument to the high pressurizer level reactor trip. If this instrument fails high, the LCO (Condition X) requires placing the associated channel to TRIP within 72 hours.

d. Incorrect. Applicant recognizes that this failure requires entry into an LCO, and is plausible that a applicant would make this selection. Bypassing a failed instrument is plausible, since this is the action for certain instrument failures, but this instrument is an input to the reactor protection function; a failure requires placing the channel to TRIP within a certain time frame. Further plausibility is provided in this distractor since bypassing for up to 12 hours is allowed, but only for testing of the other channels.

K/A Match:
The applicant is presented with 3 indicators associated with Pressurizer level control, and must determine which of these is of what significance in the context of their function, resulting effects on the plant, and of any required compensatory actions.

SRO Only:
Applicant must assess plant conditions involving a failure of one of the Pressurizer level instruments, and determine which written guidance applies, and what is the required action, including completion time.

Higher Cognitive Level:
Applicant must apply knowledge of various Pressurizer level instruments, including their function, and use that to make a decision on the effect of the failure (i.e., the failed instrument is an input to RPS, and means that it cannot be bypassed). Applicant must understand this effect on the RPS circuitry and conclude that placing it to trip is the only correct decision.

WRITTEN QUESTION DATA SHEET

Question Number: 83

K/A: 000076 AA2.02
Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity:
Corrective actions required for high fission product activity in RCS**.**

Tier:	**1**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**3.4**	**SRO Exam:**	**8**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 43.5 / 45.13)

Learning Objective: 3-OT-AOI2800, Rev. 8, Objective 7, Given a set of plant conditions, use the AOI to correctly: a. Recognize Entry Conditions. b. Identify Required Actions. c. Respond to Contingencies (RNO),d. Observe and Interpret Cautions and Notes.

References: AOI-28, "High Activity in Reactor Coolant," Rev. 21; Technical Specification 3.4.16, "RCS Specific Activity."

Question:

Which ONE of the following identifies the accident(s) the RCS Specific Activity Technical Specification limits is/are based on, and what action does the Shift Manager request from Reactor Engineering during implementation of AOI-28, "High Activity in Reactor Coolant?"

	Accident	**Reactor Engineering Action**
a.	Large Break LOCA	Implement TI-7.004, "Fuel Integrity Assessment Program."
b.	Main Steam Line Break or SGTR	Implement TI-7.004, "Fuel Integrity Assessment Program."
c.	Large Break LOCA	Perform TI-41, "Incore Flux Mapping."
d.	Main Steam Line Break or SGTR	Perform TI-41, "Incore Flux Mapping."

DISTRACTOR ANALYSIS

a. Incorrect. Plausible since the required Reactor Engineering action is correct, and since a LOCA releases fission products.
b. CORRECT. Per T.S. Basis 3.4.16 "RCS Activity," the steam generator tube rupture and main steam line breaks, each with concurrent loss of offsite power are used to establish the acceptable limits for RCS activity. AOI-28, "High Activity in Reactor Coolant" includes directions for the SRO to have Reactor Engineering perform a systematic assessment of fuel integrity, per TI-7.004.
c. Incorrect. Plausible since a LOCA releases fission products. Perform Incore Flux Mapping is plausible, since the incores are used to determine peak Kw/ft. and enthalpy rise hot channel factors. Exceeding either of these parameters could result in fuel damage. Further, this procedure checks for improperly loaded fuel assemblies, which could also result in fuel damage.
d. Incorrect. Plausible, since the steam generator tube rupture and main steam line breaks, each with concurrent loss of offsite power are used to establish the acceptable limits for RCS activity. Perform Incore Flux Mapping is plausible, since the incores are used to determine peak Kw/ft. and enthalpy rise hot channel factors. Exceeding either of these parameters could result in fuel damage. Further, this procedure checks for improperly loaded fuel assemblies, which could also result in fuel damage.

K/A Match and SRO Only:
Applicant is presented with procedures relating to high activity in the RCS and potential associated fuel damage and must determine which is the appropriate guidance to use. The "interpret" aspect is also related to the "SRO Only" aspect: the basis for the procedure guidance that applies for High Activity in Reactor Coolant, specifically the 10 CFR sections which apply.

Question Number: 84

K/A: W/E03 G2.4.30 LOCA Cooldown - Depressurization
Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.

Tier:	**1**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**4.1**	**SRO Exam:**	**84**	**Source:**	**NEW**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.5 / 45.11)

Learning Objective: 3-OT-SPP0305, Rev. 7, Obj 10, Given a set of normal or abnormal plant conditions, determine whether the event requires reporting to the NRC, the FAA, or TEMA.

References: SPP-3.5, "Regulatory Reporting Requirements," Rev 20; EPIP-1, "Emergency Plan Classification Flowchart," Rev. 29. ECM-8, "Spill Prevention and Countermeasure (SPCC) Plan," Rev 27.

Question:

During the performance of ES-1.2, "Post LOCA Cooldown and Depressurization," which ONE of the following is the minimum containment hydrogen concentration, which if exceeded, would require the SRO to notify the Technical Support Center (TSC), and why?

	Hydrogen Concentration	Reason
a.	3.0%	To evaluate and determine a hydrogen mitigation strategy.
b.	3.0%	To determine maximum allowable vessel venting time.
c.	5.0%	To evaluate and determine a hydrogen mitigation strategy.
d.	5.0%	To determine maximum allowable vessel venting time.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible because the 3.0% is the concentration used to determine "maximum allowable vessel venting time" in FR-1.3, "Voids in the Reactor Vessel," but the TSC is notified to calculate the time if hydrogen concentration is less than 3%, not to determine further actions.
b. Incorrect. Plausible because the 3.0% is the concentration used to determine "maximum allowable vessel venting time" in FR-1.3, "Voids in the Reactor Vessel," but the TSC is notified to calculate the time if hydrogen concentration is less than 3%.
c. CORRECT. If containment hydrogen concentration reaches or exceeds 5%, the SRO is directed to notify the TSC for additional guidance, per ES-1.2.
d. Incorrect. Plausible because the 5.0% is correct but it is not to determine "maximum allowable vessel venting time."

K/A Match:
Applicant is presented with a set of conditions, all of which are related to the given event in the K/A, and must recognize which one of these requires notification to an internal organization, the Technical Support Center, including the applicable operating parameter.

SRO Only and Lower Cognitive Level:
Though this is a recognition / recall level question, it is nevertheless the responsibility of the SRO to use the procedure guidance, and during implementation of it, to recognize plant conditions which require notifications, whether they be for assistance, or simply for transmitting information.

Question Number: 85

K/A: E10 G2.2.37
Natural Circulation with Steam Void in Vessel with/without RVLIS
Ability to determine operability and/or availability of safety related equipment.

Tier:	**2**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**4.6**	**SRO Exam:**	**85**	**Source:**	**WBN Bank Sig. Mod**

Applicable 10CFR55 Section: 41.7 / 43.5 / 45.12

Learning Objective: 3-OT-EOP0000, Rev. 14, Objective 16, Explain the purpose of procedures ES-0.3 and ES-0.4, including when their use might be required.

References: ES-0.2, "Natural Circulation Cooldown," Rev. 20; ES-0.3, "Natural Circulation Cooldown with Steam Voids in Vessel (With RVLIS)," Rev. 10; Tech. Spec. 3.7.6, "Condensate Storage Tank;" Step Description Table for ES-0.2 WOG Background Document.

Question:

Given the following plant conditions:

- A reactor trip has occurred.
- One (1) CRDM fan has lost power.
- ES-0.2, "Natural Circulation Cooldown" has been implemented.
- A cooldown rate of 24°F/hour has been established.
- RCS depressurization has been initiated while maintaining required subcooling.
- The OAC reports that the “A” Condensate Storage Tank level on 1-LI-2-230A is at 170,000 gallons and continues to drop.

Which ONE of the following describes (1) the status of the Condensate Storage Tank, and (2) the appropriate procedure to be used?

	(1) Status of Condensate Storage Tank	**(2)** Actions
a.	OPERABLE	Remain in ES-0.2.
b.	INOPERABLE	Remain in ES-0.2.
c.	OPERABLE	Transition to ES-0.3, "Natural Circulation Cooldown with Steam Voids in Vessel (With RVLIS)."
d.	INOPERABLE	Transition to ES-0.3, "Natural Circulation Cooldown with Steam Voids in Vessel (With RVLIS)."

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since ES-0.2 does contain direction on performing a natural circulation cooldown, but is not the correct one to use, since ES-0.3 contains the correct directions to address cooldown rate with a limited amount of condensate inventory for cooldown.
b. Incorrect. Plausible, since ES-0.2 does contain direction on performing a natural circulation cooldown, but is not the correct one to use, since ES-0.3 contains the correct directions to address cooldown rate with a limited amount of condensate inventory for cooldown. Also plausible since the condensate storage tank being inoperable is correct.
c. Incorrect. Loss of CST inventory is an appropriate condition to require transition to ES-0.3 since a more rapid cooldown rate is allowed while addressing voids in the RCS, but the condensate storage tank is not operable.

d. CORRECT. T.S. 3.7.6 requires a minimum of 200,000 for CST operability. Loss of CST inventory is an appropriate condition to require transition to ES-0.3 since a more rapid cooldown rate is allowed while addressing voids in the RCS.

K/A Match:
Applicant is presented with plant conditions involving a natural circulation cooldown, and must determine the operability of the Condensate Storage Tank by assessing given plant conditions and parameters.

SRO Only:
Applicant is presented with an array of plant conditions and tasked with making decisions, particularly regarding which procedure and mitigation strategy to implement.

Higher Cognitive Level:
One of the keys to this being a higher cognitive level question lies in making the determination on whether the cooldown rate should be raised or lowered, and, inherent to the question, why it should be raised or lowered. To answer this the applicant must assess the given parameters, including the significance of the Condensate Storage Tank level, and decide how the cooldown rate should be adjusted.

WRITTEN QUESTION DATA SHEET

Question Number: **86**

K/A: 005 A2.03
Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: RHR pump/motor malfunctions.

Tier:	**2**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**3.1**	**SRO Exam:**	**86**	**Source:**	**New**

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

Learning Objective: 3-OT-GOI0700, Rev. 9, Objective 14, State when a motor can be operated above "Red Line" amps.

References: GOI-7, "Generic Equipment Operating Guidelines," Rev. 33; ES-1.3, "Transfer to Containment Sump," Rev. 17; ECA-1.1, "Loss of RHR Sump Recirculation," Rev. 11; Alarm Response Instruction 113-D.

Question:

Given the following initial plant conditions:

- Unit 1 is at full power.
- 1B RHR Pump is tagged out for maintenance.

A Large Break LOCA then occurs, with the following conditions noted:

- Sump recirculation swapover has occurred, per ES-1.3, "Transfer to Containment Sump."
- 113-D RHR PUMP A/B MECH SEAL HX TEMP HI/HI-HI has just annunciated.

The crew observes the following indication on 1-EI-74-5A, and notes that the indicated value is slowly rising:

What is the impact of these conditions, and what procedural guidance will the Unit Supervisor use for mitigation?

a. Sump blockage is occurring. Remain in ES-1.3, and using Appendix D, "Monitoring for Containment Sump Blockage," request the TSC to evaluate these conditions and provide required actions.

b. 1A RHR Pump is in distress and should be tripped. Remain in ES-1.3, contact the TSC and recommend refilling the VCT in order to use charging pumps to continue core injection flow.

c. 1A RHR Pump is in distress and should be tripped. Enter ECA-1.1, "Loss of RHR Sump Recirculation," contact the TSC and recommend that the RWST be refilled.

d. Sump blockage is occurring. Enter ECA-1.1, "Loss of RHR Sump Recirculation," contact the TSC and recommend that the RWST be refilled.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since sump blockage conditions does affect pump amps, however applicant incorrectly believes sump blockage is occurring. Amps would indicate LOWER than normal, not HIGHER. Further, applicant fails to recognize conditions for imminent or actual loss of RHR sump recirculation due to the only available RHR pump being in distress.

b. Incorrect. Applicant correctly recognizes pump distress conditions, but incorrectly believes that ES-1.3 is the appropriate procedure for mitigation. Further plausibility is because the method is one method listed in ECA-1.1; i.e., applicant confuses which procedure contains the required method of ensuring core flow.

c. CORRECT. High amps in combination with high pump seal temperatures indicates a pump that is in distress, most likely due to thermal expansion and developing binding of the shaft. This represents a condition for imminent loss of RHR sump recirculation, since the RHR pump cannot be operated with the given conditions. ECA-1.1 is implemented, with further recommendation that the RWST be refilled using the method given.
d. Incorrect. Plausible, since sump blockage conditions does affect pump amps, however applicant incorrectly believes sump blockage is occurring. Also, plausible since ECA-1.1 is the correct procedure.

K/A Match and SRO Only:
Applicant is presented with a malfunction of the RHR pump/motor and must predict the impact on the RHRS, particularly in the context of this being the only available RHR pump. This K/A, being an A2 category, lends itself to the SRO Only aspect since the applicant must then apply this knowledge and assess the overall impact of plant conditions, including what is causing this malfunction, and how that affects implementation of the appropriate procedure for mitigation.

Higher Cognitive Level:
Applicant must understand the given indication on amps, and determine what is the problem, and also understand and apply the significance of the fact that sump swapover has occurred, and what that means for the importance of this only remaining (however in distress) pump.

Question Number: 87

K/A: 008G2.4.41
Knowledge of the emergency action level thresholds and classifications.

Tier:	**2**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**4.6**	**SRO Exam:**	**87**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.5 / 45.11)

Learning Objective: 3-OT-SYS070A, Rev. 10, Objective 19, Given a set of plant conditions, determine the correct response of the CCS system.

References: AOI-15, "Loss of Component Cooling Water (CCS);" AOI-14, "Loss of RHR Shutdown Cooling," Rev. 34; WBN EPIP-1, "Emergency Plan Classification Flowchart," Rev. 29.

Question:

Given the following plant conditions:

- Unit 1 is in Mode 5.
- RCS temperature is 175°F.
- RCS pressure is 325 psig.
- Train “A” RHR is in service.
- Train “B” RHR pump is tagged out for repairs due to motor winding damage.
- A large leak develops in Train “A” of the Component Cooling System.

If actions taken in response to the listed events are unsuccessful, which ONE of the following will require the Shift Manager to FIRST implement the Radiological Emergency Plan?

a. When Incore thermocouple temperatures rise above 200°F.

b. When RCS pressure rises to the Cold Overpressure Mitigating System setpoint.

c. When RHR capability has been lost for greater than 15 minutes.

d. When the large CCS leak was discovered.

DISTRACTOR ANALYSIS

a. CORRECT. Per EAL 6.1, "Loss of Shutdown Systems," an ALERT is declared if both RHR capability for core cooling is lost, AND RCS temperature is greater than 200°F.
b. Incorrect. Plausible, since the pressure would be rising as the temperature increases. If the COMs setpoint were reached, a PORV opening would result in identified leakage which is a classifiable condition in Mode 5 as well as Mode 4.
c. Incorrect. Plausible, since a loss of power for greater than 15 minutes requires entry into the Radiological Emergency Plan per EAL 6.2 "Loss of AC (Shutdown)."
d. Incorrect. Plausible, since the applicant may think the leak requires immediate and anticipatory implementation of the Radiological Emergency Plan before the consequences of the leak can cause RHR capability to degrade.

K/A Match:
In the context of RHR, the applicant must make a determination of applicability of the Radiological Emergency Plan.
SRO Only:
This topic lends itself to an SRO only question, and this question tests that knowledge, by requiring the applicant to assess a group of conditions relating to RHR and determining when implementation of the Radiological Emergency Plan should occur.
Higher Cognitive Level:
At first glance this question may seem to be a lower cognitive level (recognition of parameters, etc.); however, to discriminate at least two of the distractors (c and d) requires a higher cognitive thought process

by applying knowledge of plant operation to realize the effect of a large leak on the CCS, how that affects RHR, and what that means for REP implementation.

WRITTEN QUESTION DATA SHEET

Question Number: 88

K/A: 026 G2.2.38 Containment Spray.
Knowledge of conditions and limitations in the facility license**.**

Tier:	**2**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**Low**
Group:	**1**	**SRO Imp:**	**4.5**	**SRO Exam:**	**88**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.7 / 41.10 / 43.1 / 45.13)

Learning Objective: 3-OT-SYS072A, Rev. 7, Objective 1, Explain the design basis of the Containment Spray System in accordance with FSAR section 6.2.2.

References: N3-72-4001, “Containment Heat Removal Spray System,” Rev. 18, Page 67 of 105; N3-63-4001, “Safety Injection System,” Rev. Page 89 of 150; AOI-14, “Loss of RHR Shutdown Cooling,” Rev. 35, Page 43 of 79; E-1 WOG Background Document, page 60.

Question:

Given the following conditions:

- The Unit is in Mode 4 with RHR in service.
- A small break LOCA occurs.
- AOI-14, "Loss of RHR Shutdown Cooling" has been entered.
- Containment Spray has actuated.
- Containment pressure currently is 1.8 psid.

For these conditions, which ONE of the following describes the requirements for the containment spray system?

a. Containment spray flow will be terminated and the spray pump controls returned to A-AUTO.

b. Containment spray will continue to operate during the event until pressure drops to 1.5 psid.

c. Containment spray flow will be reduced by stopping one containment spray pump.

d. Containment spray flow will be terminated and the spray pump controls placed in STOP PULL-TO-LOCK.

DISTRACTOR ANALYSIS

a. CORRECT. N3-72-4001, Page 67, states “In the event of a Mode 4 LOCA, the CS pumps must be stopped to limit RWST drawdown rate.” This action is necessary to assure that adequate time exists for cooldown of the RHR suction piping prior to the initiation of the recirculation mode. N3-63-4001, Page 89 of 150 lists actions to mitigate a Shutdown LOCA. Item 2 states “The CS pumps must be stopped for a Mode 4 LOCA to limit the RWST drawdown rate.” AOI-14, Section 3.7, Step 18, monitors containment normal. If it is not, the RNO actions direct the operator to determine if containment spray is in service and if it is, to reset the spray signals, shutdown the spray pumps and place them in A-AUTO.

b. Incorrect. Plausible, since after entry is made into the E-series procedures, direction is given to shutdown the spray system when containment pressure drops below a certain value. However, applicant fails to realize that it is not 1.5 psid, but this is plausible since 1.5 is the setpoint for SI initiation.

c. Incorrect. Plausible, since this direction is contained in ECA-1.1, "Loss of RHR Sump Recirc." During a Mode 4 LOCA, peak containment pressure would not be approached, due to the lower temperature fluid escaping the RCS.

d. Incorrect. Plausible, since these actions are consistent with procedural guidance provided in ES-1.3, "Transfer to RHR Containment Sump."

K/A Match:
A specific limitation is placed on the containment spray system for the given plant condition. This question tests that knowledge.

SRO Only:
SRO applicant must assess the given plant conditions and decide not only what limitation of the spray system operation applies, per the procedure, but also the basis for it, in the context of accident analysis.

Lower Cognitive Level:
Applicant recalls/recognizes a specific basis and limitation placed on system operation and accident mitigation.

Question Number: 89

K/A: 062 A2.06 AC Electrical Distribution System
Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions of operations: Keeping the safeguards buses electrically separate.

Tier:	**2**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**3.9**	**SRO Exam:**	**89**	**Source:**	**New**

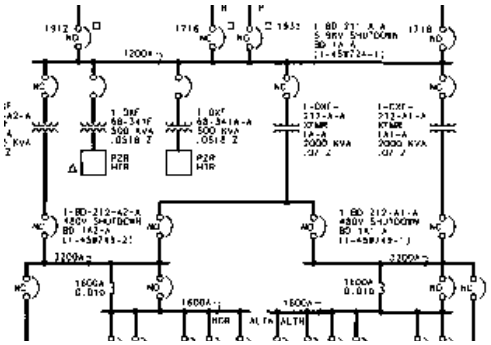
Applicable 10CFR55 Section: 41.5 / 43.5 / 45.3 / 45.13

Learning Objective: 3-OT-SYS203A, Rev. 7, Objective 17, Given the condition /status of a 480V ac Shutdown Power System/Component and the appropriate Tech Specs, determine if operability requirements are met and what actions are required.

References: SOI-212.01, "480V Shutdown Board 1A1-A," Precautions and Limitations Sect. 3.0.F.

Question:

During a forced outage, the plant is in Mode 3. A request has been made to provide alternate power to 480V Shutdown Board 1A2-A from its alternate feed, XFMR 1A-A. Refer to drawing excerpt on the next page.



Which ONE of the following describes TWO (2) procedural requirements which must BOTH be considered by the SRO prior to authorizing this operation?

a. 1) Establish hourly monitoring of loading on XFMR 1A-A.
   2) Maintain electrical separation and redundancy of the 480V Shutdown Boards by ensuring that any request to provide alternate power also to 480V Shutdown Board **1A1-A** does NOT receive authorization.

b. 1) Prevent overloading XFMR 1A-A by ensuring that any request to provide alternate power also to 480V Shutdown Board **1A1-A** does NOT receive authorization.
   2) Address Appendix R concerns for loads on 480V Shutdown Board 1A2-A by referring to the Fire Protection Report for potential compensatory actions.

c. 1) Maintain electrical separation and redundancy of the 480V Shutdown Boards by ensuring that any request to provide alternate power also to 480V Shutdown Board **1A1-A** does NOT receive authorization.
   2) Address Appendix R concerns for loads on 480V Shutdown Board 1A2-A by referring to the Fire Protection Report for potential compensatory actions.

d. 1) Establish hourly monitoring of loading on XFMR 1A-A.
   2) Prevent overloading XFMR 1A-A by ensuring that any request to provide alternate power also to 480V Shutdown Board **1A1-A** does NOT receive authorization.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since hourly monitoring of various equipment is one of several potential compensatory measures used when equipment is operated in out of normal configurations.
b. CORRECT. Per SOI-212.01, "480V Shutdown Board 1A1-A," there is a concern for overloading XFMR 1A-A if it is supplying alternate power to more than one Shutdown Board at the same time. The other Shutdown Board which could be aligned is the 480V Shutdown Board 1A2-A. Therefore, the transformer should not be aligned to 1A2-A at the same time it is providing alternate power to 1A1-A shutdown board. Further, when XFRM 1A-A is aligned to provide alternate power to one or the other of the above shutdown boards, it is not rated for Appendix R; therefore, the Fire Protection Report must be consulted to determine if any compensatory measures are required for the equipment powered by this alternate power source(that is not rated for Appendix R).
c. Incorrect. Plausible because the second half of the distractor is correct. The first half of the distractor, "Maintaining electrical separation and redundancy...." is plausible since that is a basic design feature of safety related electrical systems in the plant. However, in this case, applicant misapplies the concept and the concern for the incorrect reason (i.e., NOT to maintain electrical separation, but to protect the transformer from overloading conditions).
d. Incorrect. Plausible, since hourly monitoring of various equipment is one of several potential compensatory measures used when equipment is operated in out of normal configurations. Further plausible because the second half is correct.

K/A Match and SRO Only:
Applicant must assess the applicability of the concept of "safeguards buses electrically separate," and decide if that is the basis for the given restriction on providing alternate power, as detailed in the stem conditions.

This A2 K/A lends itself to an SRO Only. This question meets that by presenting the applicant with a situation involving a request to authorize an alternate power supply lineup. Applicant must not only determine whether to authorize it or not, but what the resulting impacts are on the ac distribution system. A further SRO Only aspect is in determining whether Appendix R requirements apply, and if that should be used when deciding whether to authorize the proposed lineup.

Higher Cognitive:
Applicant must recall knowledge of the system, including an examination of the provided drawing, and apply that to make a decision on whether the proposed lineup presents any issues with the various aspects of the distractors, and then make the decision on authorization.

Question Number: 90

K/A: 063 G2.2.37DC Electrical Distribution
Ability to determine operability and/or availability of safety related equipment**.**

Tier:	**2**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**1**	**SRO Imp:**	**4.5**	**SRO Exam:**	**90**	**Source:**	**NEW**

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

Learning Objective: 3-OT-SYS057P, Rev. 8, Objective 11, State the 125V DC Vital system parameters governed by TS.

References: LCO 3.8.4, "DC Sources - Operating;" SR 3.0.3.

Question:

At 1800 on May 13 SR 3.8.4.3 (verifies required vital battery charger alternate feeder breaker is open - specified frequency of 7 days) was performed satisfactorily.

On May 23 at 1700, it is discovered by the Shift Manager that SR 3.8.4.3 was last performed on May 13.

Which ONE of the following is correct regarding the status of the vital batteries and requirements for SR 3.8.4.3 performance?

The batteries are _____ .

a. inoperable because the delay period beyond the maximum extension time has been exceeded. SR 3.8.4.3 must be completed satisfactorily by May 23 at 1900.

b. inoperable if SR 3.8.4.3 is <u>not</u> completed satisfactorily by May 23 at 1900.

c. operable. If a risk evaluation is performed to determine risk impact, then SR 3.8.4.3 completion can be extended <u>at the latest</u>, to May 27 at 1800.

d. operable. If a risk evaluation is performed to determine risk impact, then SR 3.8.4.3 completion can be extended <u>at the latest</u>, to May 30 at 1700.

DISTRACTOR ANALYSIS

a. Incorrect. The SRO must consider the original specified frequency of 1.25 X 7 days = 8 days and 18 hours. That frequency has been exceeded, and the applicant incorrectly believes the batteries are now inoperable. Applicant may also mistakenly apply the LCO 3.8.4, Condition A Completion Time of 2 hours to the time of discovery and believe that the surveillance must be performed no later than time of discovery plus the 2 hours; i.e., discovered late on May 23 at 1700 plus two hours = May 23 at 1900.
b. Incorrect. While it is true that the batteries can be considered operable (as explained in "d" below), the SR completion can go past 24 hours providing a risk assessment is completed.
c. Incorrect. While it is true that the batteries can be considered operable (as explained in "d" below), and that a risk evaluation can allow a completion time extension of up to the specified frequency (7 days), the given completion is incorrect. Applicant incorrectly calculates the 7 day frequency from the original 7 day frequency expiration; i.e., May 13 + 7 days = May 20 + 7 days = May 27. The correct time is from the time of discovery, plus 7 days (specified frequency), per SR 3.0.3.
d. CORRECT. SR 3.0.3, "Surveillance Requirement Applicability," permits delaying the requirement to declare the LCO not met, from the time of discovery, up to 24 hours or up to the limit of the specified frequency, whichever is greater. However, if the surveillance is delayed greater than the 24 hour period, a risk impact must be performed to determine the scope of any risk. Since the SR was last performed on May 13 at 1800, it should have been performed by May 22 at 1200 (specified frequency = 7 days + .25 maximum extension time = 8 days and 18 hours). The discovery (29 hours later) that it had not been performed does not exceed the specified frequency of the surveillance if a risk

assessment is performed. The required completion time is calculated by adding the specified frequency (7 days) to the time of discovery; i.e., May 23 at 1700 + 7 days = May 30 at 1700.

K/A Match and SRO Only:
Applicant is presented with a plant condition involving an overdue surveillance and how that affects operability of the equipment.

The SRO Only aspect is in understanding and applying Tech. Spec. Completion Time Extension rules.

Higher Cognitive Level:
Applicant must recall a rule, and then apply it to make a determination on operability of equipment, and what action, including required time frame, is required.

Question Number: 91

K/A: 028 G2.4.49 Hydrogen Recombiner and Purge Control
Ability to perform without references to procedures those actions that require immediate operation of system components and controls.

Tier:	**2**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**4.4**	**SRO Exam:**	**91**	**Source:**	**New**

Applicable 10CFR55 Section: 41.10 / 43.2 / 45.6)

Learning Objective: State the major actions of AOI-30.1, "Plant Fires".

References: TI-12.04; SOI-13.01, "Fire Detection System"

Question:

Given the following conditions:

- Unit 1 is in Mode 1 with containment purge in progress when 1-RM-90-130, Containment Purge Radiation Monitor, fails low.
- The Unit Supervisor has JUST entered LCO 3.3.6, Containment Ventilation Isolation Instrumentation."

Which ONE of the following identifies the maximum allowed time before an Action Statement in LCO 3.6.3, "Containment Isolation Valves," is required to be entered and the REQUIRED actions?

a. Immediately enter LCO 3.6.3, and isolate the affected penetration within 4 hours.

b. After 4 hours, enter LCO 3.6.3, and isolate the affected penetration within the following 4 additional hours.

c. Immediately enter LCO 3.6.3, and isolate the affected penetration within 24 hours.

d. After 4 hours, enter LCO 3.6.3, and isolate the affected penetration within the following 24 additional hours.

DISTRACTOR ANALYSIS

a. Incorrect. The entry into LCO 3.6.3 is not required immediately. LCO 3.3.6 allows 4 hours prior to entering LCO 3.6.3. Plausible because an immediate entry into LCO 3.6.3 would be required if both radiation monitors had failed and the time allowed in LCO 3.6.3 is correct.
b. CORRECT. When 3.3.6 is entered due to the failed radiation monitor, Condition A allows a completion time of 4 hours to restore the affected channel. At the end of 4 hours Condition B is entered requiring an immediate entry into LCO 3.6.3 Condition C which allows 4 hours to have the penetration flow path isolated.
c. Incorrect. The entry into LCO 3.6.3 is not required immediately. LCO 3.3.6 allows 4 hours prior to entering LCO 3.6.3 and only 4 hours is allowed in LCO 3.6.3 to isolate the flow path (not 24 hours.) Plausible because an immediate entry into LCO 3.6.3 would be required if both radiation monitors had failed and the 24 hour time allowed in LCO 3.6.3 would be correct if the condition for purge valve leakage was applied instead of the correct condition.
d. Incorrect. The entry into LCO 3.6.3 is required after 4 hours, but only 4 hours is allowed in LCO 3.6.3 to isolate the flow path (not 24 hours.) Plausible because the 4 hours being allowed prior to an entry into LCO 3.6.3 being required is correct and the 24 hour time allowed in LCO 3.6.3 would be correct if the condition for purge valve leakage was applied instead of the correct condition.

K/A Match and SRO Only:
Applicant is presented with plant conditions involving Purge Control and must assess the given conditions to determine a course of action, including Tech. Spec. requirements and usage rules.

Lower Cognitive Level: Recognition of which procedure applies and recall of actions needed.

Question Number: 92

K/A: 055 G2.1.19 Condenser Air Removal.
Ability to use plant computers to evaluate system or component status.

Tier:	**2**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**Low**
Group:	**2**	**SRO Imp:**	**3.8**	**SRO Exam:**	**92**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.10 / 45.12)

Learning Objective:

References: EPIP-1, Table 7-1, "Effluent Radiation Monitor EALs;" AOI-33, "Steam Generator Tube Leak," Appendix A, Step 4; ARI-173-179, Appendix B (lists 1-RM-90-404 as a PAM Radiation Monitor).

Question:

With the plant at 100% power, the Unit Supervisor has just entered AOI-33, "Steam Generator Tube Leak." The following radiation monitors' number and nomenclature are given:

1-RM-90-119 Condenser Vacuum Pump Exhaust Radiation Monitor
1-RM-90-404 A/B U1 Condenser Vacuum Exhaust

Which ONE of the following identifies which radiation monitors are used:

1) to calculate the steam generator tube leak rate on the Integrated Computer System (ICS),

AND

2) in Effluent Radiation Monitor EALs for classifying an event?

	ICS	**Event Classification**
a.	1-RM-90-119	1-RM-90-404 A/B
b.	1-RM-90-119	1-RM-90-119
c.	1-RM-90-404 A/B	1-RM-90-119
d.	1-RM-90-404 A/B	1-RM-90-404 A/B

DISTRACTOR ANALYSIS

a. CORRECT. Per AOI-33, 1-RM-90-119 is the monitor to use for calculating and monitoring the steam generator tube leak rate for the Integrated Computer System. 1-RM-90-404A/B is a post-accident radiation monitor, and is specified in EPIP-1, "Emergency Plan Classification Flowchart" as the radiation monitor used for determining potential radiation releases during an event. There is a table in the back of the EPIP (Table 7-1) which identifies 1-RM-90-404A/B as the monitors to use for EAL determination.
b. Incorrect. ICS radiation monitor is correct, and it is plausible to believe that the data provided by radiation monitor which feeds into the computer used to calculate the actual leak rate, would also be qualified to use for classifying the event.
c. Incorrect. Both selections are plausible for either application, since each monitor is used (and qualified) for specific aspects of the event; i.e., calculating and monitoring the actual leak rate (which is then used for making decisions on appropriate operator actions per the procedure), and for providing an independent value to be used for a separate purpose (classifying the event). Both of these functions are important to mitigating the event. It is plausible that an applicant mistakenly switches the two, and in the process fails to recognize that the post-accident monitor (1-RM-90-404A/B) is the one used to classify the event.

d. Incorrect. Plausible since 1-RM-90-404 A/B is a post-accident monitor, and applicant incorrectly applies this knowledge in believing the post-accident monitor would be used during the tube leak to determine the leak rate. Applicant correctly recognizes that the monitor is used for event classification.

K/A Match and SRO Only:
Applicant is tested on knowledge of two radiation monitors which input to plant computers and how they are used to assess plant conditions, including the SRO level ability of which one is appropriate during event classification.

Lower Cognitive Level:
Recognition and recall of radiation monitors, and where they provide input.

Question Number: 93

K/A: 079 A2.01
Ability to (a) predict the impacts of the following malfunctions or operations on the SAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Cross-connection with IAS

Tier:	**2**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**2**	**SRO Imp:**	**2.9**	**SRO Exam:**	**93**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 43.5 / 45.13)

Learning Objective: 3-OT-AOI100, Rev. 7, Objective 7, Given a set of plant conditions, use AOI-10 to correctly: a. Recognize Entry Conditions. b. Identify Required Actions. c. Respond to Contingencies (RNO). d. Observe and Interpret Cautions and Notes.

References: AOI-10, "Loss of Control Air," Rev. 38; E-3, "Steam Generator Tube Rupture," Rev. 22.

Question:

Given the following plant conditions:

- A tube rupture has occurred on Steam Generator (SG) #4.
- While performing E-3, "Steam Generator Tube Rupture" cooldown actions, the #2 RCP developed a seal problem and had to be stopped.
- Due to an air leak, 136-B, AUX AIR TR-A PRESS LO annunciator is lit.

Which ONE of the following describes (1) how the required RCS depressurization will be performed and (2) the impact of the events on plant ventilation systems?

	RCS Depressurization	**Plant Ventilation System**
a.	Auxiliary Spray will be used to perform the RCS depressurization.	ABGTS and EGTS Train A must be manually shutdown 30 minutes after start to preserve a filter bank.
b.	Auxiliary Spray will be used to perform the RCS depressurization.	ABGTS and EGTS Train A fans must be de-energized manually to prevent operation with dampers isolated.
c.	One PZR PORV will be used to perform the RCS depressurization.	ABGTS and EGTS Train A must be manually shutdown 30 minutes after start to preserve a filter bank.
d.	One PZR PORV will be used to perform the RCS depressurization.	ABGTS and EGTS Train A fans must be de-energized manually to prevent operation with dampers isolated.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, since use of the Auxiliary Spray to reduce pressure is a viable method for depressurization per E-3, if the normal sprays AND neither PZR PORV is available. After the trip and SI, AOI-17, "Turbine Trip" directs that one train of both EGTS and ABGTS be shutdown after 30 minutes.
b. Incorrect. Plausible, since use of the Auxiliary Spray to reduce pressure is a viable method for depressurization per E-3, if the normal sprays AND neither PZR PORV is available. Per AOI-10, ABGTS and EGTS Train A fans must be shutdown to prevent operation with associated dampers closed.

c. Incorrect. Plausible, since use of one PZR PORV will be used to perform the RCS depressurization. After the trip and SI, AOI-17, "Turbine Trip" directs that one train of both EGTS and ABGTS be shutdown after 30 minutes.
d. CORRECT. One PZR PORV will be used to perform the RCS depressurization, since the normal sprays are not available, and the RNO directs use of the PORV before auxiliary spray. Per AOI-10, ABGTS and EGTS Train A fans must be shutdown to prevent operation with associated dampers closed.

K/A Match and SRO Only:
Applicant must assess plant conditions involving various events, including the impacts of auxiliary air connections, and how that affects pressurizer spray, and then determine the effect that has on mitigation. At WBN the IAS and the SAS are one in the same.

Higher Cognitive Level:
Application of knowledge of the effects of air system connections, and loss of air, for pressurizer spray, and on dampers, including implied knowledge of why that is important, and then determining the appropriate action.

Question Number: **94**

K/A: G2.1.8
Ability to coordinate personnel activities outside the control room.

Tier:	**3**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**n/a**	**SRO Imp:**	**4.1**	**SRO Exam:**	**94**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.10 / 45.5 / 45.12 / 45.13)

Learning Objective: 3-OT-AOI0800, Rev.6, Objective 7, Demonstrate ability/knowledge of AOI, by: a. Recognizing Entry conditions. b. Responding to Action steps. c. Responding to Contingencies (RNO), d. Responding to Notes/Cautions.

References: AOI-8, "Tornado Watch or Warning," Rev.44

Question:

Given the following:

- The outside air temperature (measured at 10 meters) is 58°F.
- The SRO has entered "AOI-8, Tornado Watch or Warning."

Which ONE of the following states the <u>minimum</u> requirements as stated in AOI-8?

During a Tornado ____(1)____, the SRO must direct the Outside AUO to _____(2)_____.

	(1)	**(2)**
a.	Warning	ensure all D/G Exhaust Fans are running.
b.	Watch	ensure all D/G Exhaust Fans are running.
c.	Warning	idle start the D/Gs.
d.	Watch	idle start the D/Gs.

DISTRACTOR ANALYSIS

a. CORRECT. This direction is in AOI-8, "Tornado Watch or Warning," Attachment 7. The SRO must ensure this is performed in order to prevent the possibility of a negative pressure on the D/G room during a tornado. The Outside AO is used to perform this function.
b. Incorrect. It is plausible to think this would be done during a tornado watch, and in fact, AOI-8 <u>allows</u> it, but does not <u>require</u> it. The question is clear in testing what MUST the SRO direct?
c. Incorrect. Plausible, since Tornado Warning is correct, and also because some plants consider it a prudent action to have D/Gs "at the ready" for a tornado event, due to the potential for loss of offsite power. However, this action is not allowed per the AOI-8, since outside air temperature must be below 52° F before the D/Gs are emergency started. The D/Gs are emergency started at colder conditions to prevent overcooling the room, and rendering the batteries inoperable. These conditions do NOT apply in the stem of this question since outside air temperature is given at 58°F.
d. Incorrect. Plausible for similar reasons as explanation for "c" above.

K/A Match and SRO Only:

Matches the K/A because the applicant must determine what direction to give the Outside AO when dispatching to the D/G building. SRO Only aspect is the usage of the given procedure to assess which action is required for the given condition (watch vs. warning).

Higher Cognitive Level:
Applicant must apply the given air temperature to the tornado condition(s) given (warning or watch) and make a conclusion about which action applies. In making this determination, there is more to it than recalling a fact; applicant must not only apply the given air temperature, but understand the basis for the action, in the context of the warning vs. watch, and for the air temperature.

Question Number: 95

K/A: G2.2.15
Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc.

Tier:	**3**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**Low**
Group:	**n/a**	**SRO Imp:**	**4.3**	**SRO Exam:**	**95**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.3 / 45.13)

Learning Objective: 3-OT-SPP1001, Rev. 3, Objective 8, Identify when EQUIPMENT ALIGNMENT CHECKLISTS are required.

References: SOI-30.07, "Shutdown Board Rooms HVAC el 757 & 772," Appendix A; Technical Requirement 3.7.5, "Area Temperature Monitoring."
Part II - Fire Protection Plan, Rev 34

Question:

With the unit at 100% power, 480V Shutdown Board Room A/C 1A-A has failed. The Unit Supervisor has made the determination to provide temporary room cooling in accordance with SOI-30.07, "Shutdown Board Rooms HVAC el 757 & 772, Appendix A."

How long can the temporary cooling remain in place, and is a breaching permit required for the door between 1A-A and 2A-A rooms?

	Maximum Temporary Cooling Time	**Breaching Permit Required for Door**
a.	14 days	YES, because the fire watch required during the breach is a roving fire watch.
b.	30 days	YES, because the temporary cooling will prevent the fire door from closing.
c.	14 days	NO, because a continuous fire watch is required during the breach.
d.	30 days	NO, because the breach is allowed by SOI-30.07.

DISTRACTOR ANALYSIS

a. Incorrect. 14 days is plausible, especially if applicant believes that the shorter time is more appropriate for a door being open between two trains of equipment. 14 days is also a Required Action completion time for ice condenser doors in Tech. Specs. Overall distractor is more plausible also because a door breach is required and some breaches allow roving fire watches.
b. CORRECT. SOI-30.07, Appendix A specifies a maximum time of 30 days for this temporary cooling to be in place, and requires a breaching permit for the door between the two rooms being blocked open.
c. Incorrect. 14 days is plausible, especially if applicant believes that the shorter time is more appropriate for a door being open between two trains of equipment. Breach permit not being required is also plausible since applicant may believe that having a continuous fire watch being required is an adequate control method for the door being open. 14 days is also a Required Action completion time for ice condenser doors in Tech. Specs.
d. Incorrect. Plausible since the 30 day limit is correct. Breach permit not being required is also plausible if applicant believes that since the breach is directed by an approved System Operating Instruction a permit would not be required.

K/A Match and SRO Only:
Applicant must evaluate the importance of a proposed lineups involving temporary room cooling, in the context of configuration control (whether a breaching permit is required, and why, for tracking the lineup). This is also the SRO only aspect of this question.
Lower Cognitive Level:
Recognition of conditions and recall of requirements.

Question Number: 96

K/A: G2.2.42
Ability to recognize system parameters that are entry-level conditions for Technical Specifications.

Tier:	**3**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**n/a**	**SRO Imp:**	**4.6**	**SRO Exam:**	**96**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.7 / 41.10 / 43.2 / 43.3 / 45.3)

Learning Objective: 3-OT-T-0305, Rev. 2, Objective 5, Given plant conditions and parameters determine applicable Action Conditions, Required Actions, and Completion Times associated with the ECCS.

References: LCO 3.5.4, "Refueling Water Storage Tank;" Tech Req. 3.1.5, "Borated Water Sources, Shutdown."

Question:

Given the following plant conditions:

- An RCS heatup is in progress on Unit 1 in preparation for a Mode change following refueling.
- Tavg is 195°F.
- Outside air temperature is 12°F.
- Only one train of RWST heaters is in service.
- RWST water temperature is 57°F.

Which ONE of the following identifies the status of the RWST and the actions relative to the upcoming Mode Change?

	Status of RWST	Actions Relative to Mode Change
a.	Below minimum temperature.	Heatup can continue. Mode change can be made if provisions of LCO 3.0.4.b are met.
b.	Below minimum temperature.	Heatup must be stopped. Mode change is prohibited until the RWST temperature is above limits. LCO 3.0.4.b is NOT applicable.
c.	Above minimum temperature.	Heatup can continue. Mode change can be made if provisions of LCO 3.0.4.b are met.
d.	Above minimum temperature.	Heatup must be stopped. Mode change is prohibited until the other train of heaters is repaired. LCO 3.0.4.b is NOT applicable.

DISTRACTOR ANALYSIS

a. CORRECT. Per LCO 3.5.4 the minimum required RWST temperature for operability is 60°F. LCO 3.5.4 is not one of the Tech. Specs. which are restricted from applying LCO 3.0.4.b, and therefore if these provisions are met, the mode change can be made.
b. Incorrect. Plausible, since the RWST status is correct (minimum required temperature per LCO 3.5.4 is 60°F). Stopping the heatup is also plausible if applicant fails to recognize that these conditions DO warrant LCO 3.0.4.b application, and that the heatup does not need to be stopped.
c. Incorrect. Plausible, if applicant believes the RWST minimum temperature required is 50°F, and that the temperature given in the stem conditions is above that. Also plausible since the second half is correct.
d. Incorrect. Plausible, if applicant believes the RWST minimum temperature required is 50°F, and that the temperature given in the stem conditions is above that. It is also plausible to believe that both trains

of RWST heaters need to be operable, since many ESF components are two channel design, with both channels being operable required prior to an upward mode change.

K/A Match and SRO Only:
Applicant is presented with a system parameter and then is to determine the effect of the resultant operability of whether the heatup may continue (SRO level knowledge, since it is application of Tech. Spec. rules for mode changes).

Higher Cognitive Level:
Application of operability parameter knowledge to arrive at a conclusion on operation of the plant.

Question Number: 97

K/A: G2.3.4
Knowledge of radiation exposure limits under normal or emergency conditions.

Tier:	**3**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**n/a**	**SRO Imp:**	**3.7**	**SRO Exam:**	**97**	**Source:**	**WBN Bank**

Applicable 10CFR55 Section: (CFR: 41.12 / 43.4 / 45.10)

Learning Objective: 3-OT-RAD0003, Rev.3, Obj 6, List the extreme emergency exposure guidelines.

References: SPP-5.1, "Radiological Controls," Rev. 6, Page 14 of 46, TABLE 1; Page 20 of 46, 3.4.2.B Emergency Exposure Guidance and Planned Special Exposures (PSE). EPIP-15, "Emergency Exposure Limits"' Rev. 13 Appendix D, DEFINITIONS.

Question:

Given the following plant conditions:

- A LOCA has occurred and a Site Area Emergency has been declared.
- The TSC and OSC have been activated.
- It is necessary to enter Safety Injection Pump Room 1A to prevent core damage.
- Projected dose rate in the pump room is 1.16E+5 mr/hr.
- Duration of the exposure is expected to be 3 minutes.

Which ONE of the following is the lowest authority (by title) who can authorize the exposure as specified in EPIP-15, "Emergency Exposure Guidelines?"

a. Radcon Manager

b. Site Emergency Director

c. Plant Manager

d. Site Vice President

DISTRACTOR ANALYSIS

A. Incorrect. Radcon Manager is not authorized to approve emergency dose exposures in accordance with EPIP-15, but is plausible since the Radcon Manager has authority over many functions of the Radiation Control group.
B. CORRECT. In accordance with EPIP-15, the site Emergency Director is the only individual who is authorized to approve emergency dose exposures and the authority cannot be delegated to anyone else.
C. Incorrect. Plant Manager is not authorized to approve emergency dose exposures in accordance with EPIP-15, but is plausible since the Plant Manager has authority over many functions relating to plant operations.
D. Incorrect. Site Vice President is not authorized to approve emergency dose exposures in accordance with EPIP-15, but is plausible since the Site Vice President has authority over many functions relating to plant and site operations.

K/A Match, SRO Only, High Cognitive Level:
Applicant must evaluate a condition involving a proposed radiation and apply knowledge of exposure limits to determine the category of exposure and who must authorize it.

Question Number: 98

K/A: G2.3.15
Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.

Tier:	**3**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**n/a**	**SRO Imp:**	**3.1**	**SRO Exam:**	**98**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.12 / 43.4 / 45.9)

Learning Objective: 3-OT-SYS014A, Rev. 4, Obj 4, Given plant conditions, determine if a radioactive release would be possible from the Cond Demin to the Cooling Tower blowdown**.**

References: EPIP-1, Section 1.3 "Containment Barrier," including Note 5.

Question:

Which ONE of the following identifies both:

1) how many of the fission product barriers in EPIP-1, "Emergency Plan Classification Flowchart," utilize 1-RE-90-273 and 274, Upper Containment Radiation Monitors in determining the barrier status.

AND

2) a condition that, for a short period of time, affects the radiation monitors' ability to provide reliable information?

	Fission Product Barriers	**Condition Affecting Upper Containment Radiation Monitors**
a.	1	Rapid change in containment temperature
b.	1	Rapid change in containment pressure
c.	2	Rapid change in containment temperature
d.	2	Rapid change in containment pressure

DISTRACTOR ANALYSIS

a. Incorrect. The monitors appear in 2 of the barriers, not just one. Plausible, because the containment radiation monitors are temperature sensitive, being affected by either a rapid increase or decrease in containment temperature. However, applicant fails to conclude that not only is the containment fission product barrier potentially affected, but also these monitors function to provide indication of failed fuel; a second fission product barrier.

b. Incorrect. The monitors appear in 2 of the barriers, not just one. Many sensors and instruments not only in containment, but throughout the plant, are affected by pressure in their environment. Plausible, if student thinks that containment pressure affects these monitors and does not recall that the monitors are in 2 barriers.

c. CORRECT. EPIP-1, "Emergency Plan Classification Flowchart," Section 1.3 "Containment Barrier" contains a note explaining the effect that containment temperature has on the containment radiation monitors. Further, these monitors are evaluated in the loss of fuel cladding barrier, and a potential loss of the containment fission product barrier.

d. Incorrect. Plausible because the given readings on these monitors is indicative of loss or potential loss of two fission product barriers (fuel cladding barrier, and containment fission product barrier). Second part is also plausible, but incorrect, because many sensors and instruments not only in containment, but throughout the plant, are affected by pressure in the environment they are in. Plausible, if student thinks that containment pressure affects these monitors.

K/A Match:
Applicant is tested on and must apply knowledge of the radiation monitors for containment.

SRO Only and High Cognitive Level:
Applicant must apply the knowledge of the radiation monitors on how they are used in the Emergency Plan Classification Flowchart when determining event classification. Higher cognitive level aspect is applying the knowledge of the effect of containment parameters on the monitors and concluding how that is used in the Emergency Plan Classification Flowchart.

Question Number: 99

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

Tier:	**3**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**High**
Group:	**n/a**	**SRO Imp:**	**4.0**	**SRO Exam:**	**99**	**Source:**	**New**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.5 / 45.13)

Learning Objective: 3-OT-AOI3000, Rev. 5, Objective 12, Demonstrate ability/knowledge of AOI-30.1 and 30.2 by: a. Recognizing entry conditions b. Responding to required actions of the AOI c. Responding to contingencies (RNO) d. Responding to Notes/Cautions

References: AOI-30.2, C.69, "Fire Safe Shutdown Control Bldg," Rev. 0, page 8, 10, and 35; Drawing 1-47W611-68-2, Rev. 7; Emergency Plan Implementing Procedure -1.

Question:

Given the following conditions:

- A fire has been reported in the Control Building.
- AOI-30.2, "Fire Safe Shutdown" has been implemented.
- The initial REP declaration for the fire has been made and reported.
- The Shift Manager orders a Control Room evacuation.
- The Auxiliary Control Room (ACR) is manned at 0200.
- Checklists have just been assigned to the Assistant Unit Operators.

With respect to performance of AOI-30.2 CHECKLIST 30.2-2 "Local Operator (AUO) #2 Actions,"

1) What is the impact on the Emergency Plan if CHECKLIST 30.2-2, Local Operator (AUO) #2 Actions, is NOT completed <u>until</u> 0220,

AND

2) What is the impact on pressurizer backup heaters 1A-A and 1-B-B control <u>after</u> CHECKLIST 30.2-2 is complete?

	(1)	(2)
a.	Upgrade from Notification of Unusual Event to Alert.	Only manual control is available.
b.	Upgrade from Alert to Site Area Emergency.	Only manual control is available.
c.	Upgrade from Notification of Unusual Event to Alert.	Both automatic and manual control is available.
d.	Upgrade from Alert to Site Area Emergency.	Both automatic and manual control is available.

DISTRACTOR ANALYSIS

a. Incorrect. Plausible, because some fires are classified as an Unusual Event, depending on location, duration, and the area affected. A fire can be classified as an Unusual Event, even if it <u>threatens</u> the Control Building. The automatic function of many components is lost when Aux mode is selected. However, the fire given in the stem is actually in the Control Building, and therefore must be classified as an Alert. Automatic cycling of A-A and B-B heaters is available between 2210 - 2218 psig.

b. Incorrect. Per Emergency Plan Implementing Procedure - 1, a fire in the Control Building is classified as an Alert. However, per the abnormal procedure for AOI-30.2, "Fire Safe Shutdown," Appendix C.69, "Control Building," if it takes more than 15 minutes to make the Auxiliary Control Room fully functional, then the existing REP call must be upgraded to a Site Area Emergency. The automatic function of many components is lost when Aux mode is selected.
c. Incorrect. Plausible, because some fires are classified as an Unusual Event, depending on location, duration, and the area affected and because both Manual and Auto control of the heaters is available. A fire can be classified as an Unusual Event, even if it threatens the Control Building. However, the fire given in the stem is actually IN the Control Building, and therefore must be classified as an Alert. Also plausible since heaters can be operated in either automatic or manual is correct.
d. CORRECT. Upgrade from an Alert to a Site Area Emergency is correct because the time required to establish control was greater than 15 minutes. Auxiliary control circuits allowing automatic control of the pressurizer backup heaters does exist. The cycling of the backup heater breakers can be controlled in either automatic or manual.

K/A Match and SRO Only:
Candidate is tested on the nature of auxiliary operator tasks when performing a checklist and resulting effects of that, not only on the plant itself, but on the implementation of the emergency plan (SRO aspect).

Higher Cognitive Level:
Candidate is required to apply understanding of operator actions during an emergency and then conclude the effect of that on the plant, in the higher level context of how much more significant this effect is (i.e., the effect on the emergency plan).

Question Number: 100

K/A: G2.4.38
Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required.

Tier:	**3**	**RO Imp:**	**n/a**	**RO Exam:**	**n/a**	**Cognitive Level:**	**Low**
Group:	**n/a**	**SRO Imp:**	**4.4**	**SRO Exam:**	**100**	**Source:**	**Palisades 2007**

Applicable 10CFR55 Section: (CFR: 41.10 / 43.5 / 45.11)

Learning Objective: 3-OT-PCD-048C, Rev. 11, Obj 7, Identify Operation's responsibilities for: Site Emergency Director (who is initially the SM)

References: "Radiological Emergency Plan," Rev. 86; EPIP-6, "Activation and Operation of the TSC," EPIP-8, "Personnel Accountability and Evacuation."

Question:

Given the following:

- A Site Area Emergency has been declared.
- Emergency Centers have NOT been activated.

Which ONE of the following identifies the limitations, if any, on the delegation of the Site Emergency Director responsibilities in accordance with the Emergency Plan Implementing Procedures?

	Escalation of the Emergency Classification Level	**Determination of Protective Action Recommendations**
a.	CANNOT be delegated	Can be delegated
b.	CANNOT be delegated	CANNOT be delegated
c.	Can be delegated	Can be delegated
d.	Can be delegated	CANNOT be delegated

DISTRACTOR ANALYSIS

a. Incorrect. Plausible because the classification level not being delegated is correct and the determination of Protective Actions Recommendations (PAR) could be delegated to the CECC director if the CECC were staffed and activated.
b. CORRECT. The classification level cannot be delegated and with the CECC not staffed and active, the PAR could not be delegated by the SED.
c. Incorrect. Plausible because the SED can delegate other responsibilities and if the CECC were staffed and activated the PAR could be delegated.
d. Incorrect. Plausible because the SED can delegate other responsibilities and with the CECC not being staffed, the PAR not being delegated is correct.

K/A Match and SRO Only:
The nature of this K/A lends itself to SRO only: knowledge of SED responsibilities, including execution of them (what cannot be delegated). K/A is matched also because the question tests what are the emergency coordinator's duties and actions.
Lower Cognitive Recall:
Recall of specific facts regarding SED duties and requirements for which of those cannot be delegated.