

WRITTEN QUESTION DATA SHEET

Question Number: 51

K/A: 076 K4.03

Service Water

Knowledge of SWS design feature(s) and/or interlock(s) which provide for the following: Automatic opening features associated with SWS isolation valves to CCW heat exchangers.

Tier: 2 RO Imp: 2.9 RO Exam: Yes Cognitive Level: LOW
 Group: 1 SRO Imp: 3.4 SRO Exam: Yes Source: WBN Bank

Applicable 10CFR55 Section: 41.7

Learning Objective: 3-OT-SYS067A, Objective 13: Given a loss of power, determine the correct response of the ERCW System including: a. "C" CCS Heat Exchanger outlet valves.

References: 3-OT-SYS067A, Rev. 10. 1-47W611-67-5, E-0 Appendix A. Rev. 27.

Question:

Reactor trip and safety injection signals have been manually initiated. Which ONE of the following describes the required positions for the listed ERCW valves in accordance with E-0, Appendix A, Equipment Verification?

	<u>0-FCV-67-144, "CCS Heat Exchanger 'C' Disch to Hdr A"</u>	<u>0-FCV-67-152, "CCS Heat Exchanger 'C' Alt Disch to Hdr B"</u>
A.	CLOSED	OPEN to Position A
B.	THROTTLED	CLOSED
C.	THROTTLED	OPEN to Position A
D.	OPEN	CLOSED

DISTRACTOR ANALYSIS

- CORRECT. Under normal conditions 0-FCV-67-152 is closed with power on the valve. Upon the receipt of an SI signal 0-FCV-67-152 strokes to the 35% position automatically. During performance of E-0, Appendix A the operator places the 0-FCV-67-152 handswitch for the valve in the Position A. 0-FCV-67-144 is normally open and is closed by manual operator action during performance of E-0, Appendix A.
- Incorrect. Plausible since the valve positions are reversed.
- Incorrect. Plausible since the operator may confuse listed valves with others with similar numbers.
- Incorrect. Plausible since the operator may confuse listed valves with others with similar numbers.

Question Number: 52

K/A: 076 A1.02

Service Water

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: 2 RO Imp: 2.6 RO Exam: Yes Cognitive Level: HIGH
Group: 1 SRO Imp: 2.6 SRO Exam: Yes Source: NEW

Applicable 10CFR55 Section: 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:

Given the following plant conditions:

- The plant is operating at 100% power with 1B CCP in service.
- The Control Room Operator shutdowns down the C-A ERCW pump in preparation for a test on the 2A 6.9 KV Shutdown Board.

Which ONE of the following describes the impact of shutting down the pump on the listed parameters?
(Assume no other operator action.)

	<u>1B CCP Oil Temperature</u>	<u>Seal Water Return Heat Exchanger Temperature</u>
A.	Rises	Rises
B.	Rises	Remains constant
C.	Remains constant	Rises
D.	Remains constant	Remains constant

DISTRACTOR ANALYSIS

- Incorrect. The C-A ERCW pump supplies flow to the A header. When the pump is stopped, flow to both the 1A and 2A ERCW headers is decreased. This causes a decrease in flow through the seal water heat exchangers. A reduction in flow to the 1A CCS heat exchanger will cause the A ESF header to heat up as well as the Reactor Building and Miscellaneous Equipment Headers to heat up. The 1A CCP which would normally be in service would show an increase in oil temperature. The Seal Water Heat Exchanger, supplied off the Miscellaneous Equipment Header would also heat up.
- Incorrect. Plausible, because oil temperature does rise, however, Seal Water Return Heat Exchanger temperature also rises.
- CORRECT. Seal Water Return Heat Exchanger temperature does rise, and CCP oil temperature remains constant.
- Incorrect. Plausible, since candidate incorrectly recalls cooling water supply to this component.

Question Number: 53

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: Yes Cognitive Level: HIGH
Group: 1 SRO Imp: 2.7 SRO Exam: Yes Source: NEW

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

Learning Objective: 3-OT-SYS032A, Objective 16: List the events and their corresponding set points that take place on decreasing control air pressure.

References: 1-47W611-32-2 rev 4, SOI-32.02 rev 19 Note on page 12.

Question:

Which ONE of the following identifies both of the following?

- (1) The **lowest** of the listed containment pressures that results in 1-FCV-32-80, Aux Air to Rx Bldg Train B, being automatically isolated, and
- (2) The **lowest** of the listed air pressures sensed downstream of the valve that allows the valve to REMAIN OPEN after the valve was opened and the control switch on 1-M-15 placed to A-Auto after the isolation signal was reset.

	<u>(1)</u>	<u>(2)</u>
A.	2.0 psid	68 psig
B.	2.0 psid	78 psig
C.	3.0 psid	68 psig
D.	3.0 psid	78 psig

DISTRACTOR ANALYSIS

- a. Incorrect. Containment pressure is not high enough to cause the isolation and the sensor downstream of the valve will not allow the valve to remain open with the pressure at 68psig, but plausible because with the containment pressure above 1.5, a Phase A isolation would have occurred and many paths would have isolated.
- b. Incorrect. Containment pressure is not high enough to cause the isolation, but since it is above 1.5, then a Phase A isolation would have occurred and many paths would have isolated and the downstream pressure is high enough to allow, but plausible because with the containment pressure above 1.5 then a Phase A isolation would have occurred and many paths would have isolated and 78 psig is high enough for the downstream sensor to allow air to open the valve.
- c. Incorrect. Containment pressure is high enough to cause the isolation, but the pressure sensed downstream of the valve is not high enough to allow operating air pressure to maintain the valve open after the switch is placed in A-Auto, but plausible because with the containment pressure above 3.0 psig then a Phase B isolation would have occurred causing isolation of the valve.
- d. CORRECT. With containment pressure greater than 2.8 psig, a phase B isolation will automatically occur, and the sensor downstream of the isolation valve must detect greater than 75 psig to allow the valve to remain open after the control switch was placed to the A-Auto position.

Question Number: 54

K/A: 103 A2.05

Containment

Ability to (a) predict the impacts of the following malfunctions or operations on the containment system-and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Emergency containment entry.

Tier:	2	RO Imp:	2.9	RO Exam:	Yes	Cognitive Level:	HIGH
Group:	1	SRO Imp:	3.9	SRO Exam:	Yes	Source:	NEW

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

Learning Objective: 3-OT -SYS088A, Objective 10: Describe the containment and penetration testing required and the acceptance criteria.

References: 3-OT -SYS088A, Technical Specification 3.6.1., 1-SI-88-24, rev 7, TI-1207A, Rev. 0.

Question:

Given the following plant conditions:

- Plant is in Mode 4.
- Lower containment air lock is broken and inner door is jammed and will not open.

If conditions were to require an emergency entry into lower containment by opening the sub-hatch, which ONE of the following is REQUIRED to be contacted prior to opening the sub-hatch, and what action is required as a result of the sub-hatch being opened?

- Shift Manager;
Perform 1-SI-88-24, Containment Divider Barrier Personnel Access Hatches & Equipment Hatches, within one (1) hour.
- Shift Manager;
Perform 1-SI-88-24, Containment Divider Barrier Personnel Access Hatches & Equipment Hatches, prior to Mode 3 entry.
- Work Week Manager;
Perform 1-SI-88-24, Containment Divider Barrier Personnel Access Hatches & Equipment Hatches, within one (1) hour.
- Work Week Manager;
Perform 1-SI-88-24, Containment Divider Barrier Personnel Access Hatches & Equipment Hatches, prior to Mode 3 entry.

DISTRACTOR ANALYSIS

- CORRECT. The sign on the sub-hatch requires the Shift Manager to be notified and the SI must be completed within one hour, with the plant in Mode 4.
 - Incorrect. While the sign on the sub-hatch requires the Shift Manager to be notified, the SI must also be completed with the plant is in Mode 4. Plausible because the notification is correct and the candidate could conclude the SI is not required until Mode 3.
 - Incorrect. Plausible since TI-1207A, Containment Access for Modes 1-4, does mention Work Week Manager as a consultant source only, not as a required notification.
 - Incorrect. Plausible since TI-1207A, Containment Access for Modes 1-4, does mention Work Week Manager as a consultant source only, not as a required notification.
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WRITTEN QUESTION DATA SHEET

Question Number: 55

K/A: 103 A4.09

Containment

Ability to manually operate and/or monitor in the control room: Containment vacuum system.

Tier:	2	RO Imp:	3.1	RO Exam:	Yes	Cognitive Level:	HIGH
Group:	1	SRO Imp:	3.7	SRO Exam:	Yes	Source:	NEW

Applicable 10CFR55 Section: 41.7/45.5 to 45.8

Learning Objective: 3-OT-SYS065A, Objective 5: Describe how the EGTS and Annulus Vacuum Systems maintain annulus pressure.

References: SOI-65.01, Annulus Vacuum System, Rev. 18.

Question:

Which ONE of the following identifies the NORMAL pressure band controlled by the Containment Annulus Vacuum System and the required method of controlling pressure if 1-M-27B Window 232-B, ANNULUS ΔP LO/DAMPER SWAPOVER is LIT?

	<u>Annulus Pressure Band</u>	<u>Method of Controlling Pressure</u>
A.	-6.0 to -6.2" WC	Dispatch a NAUO to RESET the dampers locally.
B.	-6.0 to -6.2" WC	Swap the dampers using handwipes on 1-M-27B.
C.	-4.3 to -4.5" WC	Dispatch a NAUO to RESET the dampers locally.
D.	-4.3 to -4.5" WC	Swap the dampers using handwipes on 1-M-27B.

DISTRACTOR ANALYSIS

- CORRECT. The correct pressure band of -6.0 to -6.2 "WC is provided and the correct response to Window 232-B is provided.
- Incorrect. Plausible, since the correct pressure band of -6.0 to -6.2 "WC is provided but incorrect actions to restore alignment are stated.
- Incorrect. Plausible since the 4.3 to -4.5 "WC range is associated with the swapover of the dampers and the correct response to Window 232-B is provided.
- Incorrect. Incorrect damper sequence, and the local action of the NAUO is described correctly.

Question Number: 56

K/A: 014 A2.02

Rod Position Indication

Ability to (a) predict the impacts of the following malfunctions or operations on the RPIS; and (b) based on those on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of power to the RPIS.

Tier:	2	RO Imp:	3.1	RO Exam:	Yes	Cognitive Level:	HIGH
Group:	2	SRO Imp:	3.6	SRO Exam:	Yes	Source:	NEW

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

Learning Objective: 3-OT-SYS085A, Objective 25: Explain the bases, input, alarms, and operator actions relative to the rod insertion limits.

References: 3-OT-SYS085A, Attachment 7 Engineering Evaluation of Westinghouse Information Regarding Computer Enhanced Rod Position Indication (CERPI) Displays.

Question:

Given the following plant conditions:

- The unit is at 100% power.
- 1-M-1B, Window 17-D, 120 AC VITAL PWR BD 1-I UV/CKT TRIP, is LIT.

Which ONE of the following describes the impact on the Computer Enhanced Rod Position Indication (CERPI) System and what is required to ensure that Tech Spec Rod Group Alignment Limits are met?

<u>Rod position indication</u>	<u>Actions Required for Rod Group alignment</u>
A. Available	Use the "ALL RODS" function on the operating display.
B. NOT Available	Flux map is required to confirm rod position.
C. Available	Flux map is required to confirm rod position.
D. NOT Available	Use the "ALL RODS" function on the operating display.

DISTRACTOR ANALYSIS

- CORRECT. The power loss described in the stem results in only the left side CERPI display going dark. The right side CERPI display remains powered, and the operator can select "All Rods" on the display to determine positions.
- Incorrect. The right hand display remains powered, with capability to monitor all rods. No flux map is required.
- Incorrect. The power loss described in the stem results in only the left side CERPI display going dark. The right side CERPI display remains powered, and the operator can select "All Rods" on the display to determine positions. No flux map is required.
- Incorrect. The right hand display remains powered, with capability to monitor all rods. No flux map is required.

Question Number: 57

K/A: 028 A1.02

Hydrogen Recombiner and Purge Control

Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating the HRPS controls including: Containment pressure.

Tier:	2	RO Imp:3.4	RO Exam:	Yes	Cognitive Level:	LOW
Group:	2	SRO Imp:3.7	SRO Exam:	Yes	Source:	NEW

Applicable 10CFR55 Section: 41.5/45.5

Learning Objective: 3-OT-SYS083A, Objective 8: Describe the major components and operating principle of the Hydrogen Recombiners.

References: Ref: SOI-83.01 Rev 15, TI-83.01 Rev 1, and TS 3.6.7 Basis.

Question:

Which ONE identifies BOTH of the following for Hydrogen Recombiner operations?

(1) The MAXIMUM Hydrogen Recombiner temperature allowed when operating?

AND

(2) The HIGHEST of the listed containment hydrogen concentrations allowed when placing the recombinder in service?

	<u>(1) Maximum Temperature</u>	<u>(2) H2 Concentration</u>
A.	1150°F	6%
B.	1150°F	4%
C.	1400°F	6%
D.	1400°F	4%

DISTRACTOR ANALYSIS

- Incorrect. Plausible due to 1150°F is the temperature above which the Hydrogen Recombiners will remove hydrogen, and greater than 6% is the limit (without taking into account instrument accuracy) where Hydrogen Recombiners shall NOT be placed in service IAW SOI-83.01.
- Incorrect. Plausible due to 1150°F is the temperature above which the Hydrogen Recombiners will remove hydrogen. The hydrogen concentration is correct.
- Incorrect: The maximum temperature value is correct. Plausible due to greater than 6% is the limit (without taking into account instrument accuracy) where Hydrogen Recombiners shall NOT be placed in service IAW SOI-83.01.
- CORRECT. The maximum temperature value is correct, and 4% is the correct hydrogen concentration, per the given reference.

Question Number: 58

K/A: 033 G2.2.36

Spent Fuel Pool Cooling

Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.

Tier:	2	RO Imp:	3.1	RO Exam:	Yes	Cognitive Level:	HIGH
Group:	2	SRO Imp:	3.2	SRO Exam:	Yes	Source:	NEW

Applicable 10CFR55 Section: 41.10/43.2/45.13

Learning Objective: 3-OT-SYS078A, Objective 8: Describe the Spent Fuel Pit pumps including: c. Power supplies; Objective 4: Given plant conditions and parameters, correctly determine the Conditions for Operation or Technical Requirements for various components listed in Section 7 of Tech. Specs.

References: SOI-78.01, Spent Fuel Pool Cooling and Cleaning System, Rev. 52.

Question:

Following a refueling outage, the following conditions exist:

- Unit 1 is in Mode 3 preparing for Mode 2 entry.
- Fuel shuffles are being conducted in the Spent Fuel Pit.
- Spent Fuel Pool Cooling pump A is the only Spent Fuel Pool Cooling pump in service.
- The 2A-A Shutdown Board normal feeder breaker is inadvertently opened during testing.
- The DG starts and reenergizes the shutdown board.

Which ONE of the following describes the initial effect on the Spent Fuel Pool Cooling system, and the required action, if any, per Spent Fuel Pool Tech Specs?

- A. The Spent Fuel Cooling Pump strips from the board, and then sequences back on to the shutdown board.
Spent Fuel Pool Tech Specs requires that movement of irradiated fuel assemblies in the fuel storage pool be immediately suspended.
- B. The Spent Fuel Cooling Pump strips from the board, and then sequences back on to the shutdown board.
Spent Fuel Pool Tech Specs does **NOT** require that movement of irradiated fuel assemblies in the fuel storage pool be suspended.
- C. The Spent Fuel Cooling Pump strips from the board, and remains off.
Spent Fuel Pool Tech Specs requires that movement of irradiated fuel assemblies in the fuel storage pool be immediately suspended.
- D. The Spent Fuel Cooling Pump strips from the board, and remains off.
Spent Fuel Pool Tech Specs does **NOT** require that movement of irradiated fuel assemblies in the fuel storage pool be suspended.

DISTRACTOR ANALYSIS

- a. Incorrect. While it is correct that the pump strips from the board due to the blackout relays, the pump is not sequenced back on after the diesel generator recovers the board. It is also correct that no action is required to immediately suspend the movement of radiation fuel. Plausible because the pump could be confused with other pumps that do sequence back on.
- b. Incorrect. While it is correct that the pump strips from the board due to the blackout relays, the pump is not sequenced back on after the diesel generator recovers the board and there is no requirement to suspend the movement of radiation fuel. Plausible because the pump could be confused with other pumps that do sequence back on and because the immediate suspension of irradiated fuel movement is required for other conditions associated with the spent fuel pit/cooling system.

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- c. Incorrect. While it is correct that the pump strips from the board due to the blackout relays and not sequenced back on after the diesel generator recovers the board, there is no action required to immediately suspend the movement of radiation fuel. Plausible because the immediate suspension of irradiated fuel movement is required for other conditions associated with the spent fuel pit/cooling system.
 - d. CORRECT. The SFP pump A normal supply is from 480V Shutdown Board 2A2-A. The pump strips from the board due to the blackout relays and does not sequence back on when the diesel generator recovers the board. It is also correct that no action is required to immediately suspend the movement of radiation fuel.
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Question Number: 59

K/A: 045 K5.17

Main Turbine Generator

Knowledge of the operational implications of the following concepts as they apply to the MT/B(G) System:
Relationship between moderator temperature coefficient and boron concentration in RCS as T/G load increases.

Tier:	2	RO Imp:	2.5	RO Exam:	Yes	Cognitive Level:	HIGH
Group:	2	SRO Imp:	2.7	SRO Exam:	Yes	Source:	SNQ BANK

Applicable 10CFR55 Section: 41.5/45.7

Learning Objective: 3-OT-GO0400, Objective 6: Explain the average coolant temperature (Tavg) program utilized during power increase or decrease. Objective 7: Explain why reactor would "follow" the turbine up in power during a load increase.

References: Nuclear Parameter and Operations Package (NuPOP) Cycle 9.

Question:

Which ONE of the following identifies (a) how main steam header pressure responds as turbine load is raised from 25% to 65%, and (b) which method of maintaining Tavg matched with Tref results in the value for MTC being the MOST negative as turbine load is raised?

- A. (a) Main steam header pressure lowers.
(b) Rods are withdrawn to maintain Tavg on program, with Boron concentration held constant.
- B. (a) Main steam header pressure rises.
(b) Rods are withdrawn to maintain Tavg on program, with Boron concentration held constant.
- C. (a) Main steam header pressure lowers.
(b) Rod position is held constant, while Boron concentration is lowered to maintain Tavg on program.
- D. (a) Main steam header pressure rises.
(b) Rod position is held constant, while Boron concentration is lowered to maintain Tavg on program.

DISTRACTOR ANALYSIS

- a. Incorrect. Main Steam Header pressure lowers as turbine load is raised. Plausible since candidate could conclude that withdrawing rods makes MTC more negative. It actually makes it less negative. However a competing effect of Tavg rising has a negative effect on MTC.
- b. Incorrect. Main Steam Header pressure lowers as turbine load is raised. Plausible since candidate could conclude that withdrawing rods makes MTC more negative. It actually makes it less negative. However, a competing effect of Tavg rising has a negative effect on MTC.
- c. CORRECT. Main Steam Header pressure lowers as turbine load is raised. Reduction of boron concentration results in more negative MTC. Tavg rising has a negative effect on MTC. This additive negative effect is the most negative of all choices given.
- d. Incorrect. Main Steam Header pressure lowers as turbine load is raised. Reduction of boron concentration results in more negative MTC. Tavg rising has a negative effect on MTC. This additive negative effect is the most negative of all choices given.

Question Number: 60

K/A: 055 G2.4.3

Condenser Air Removal

Ability to identify post-accident instrumentation.

Tier:	2	RO Imp:	3.7	RO Exam:	Yes	Cognitive Level:	LOW
Group:	2	SRO Imp:	3.9	SRO Exam:	Yes	Source:	NEW

Applicable 10CFR55 Section: 41.6/45.4

Learning Objective: 3-OT-SYS090A, Objective 16: Identify where Post Accident Monitors are used & read out.

References: SOI-90.05, POST-ACCIDENT RAD MONITORS, Rev 12; 1-47W610-90-5 R40.

Question:

Which ONE of the following identifies monitors associated with Condenser Vacuum Pump discharge which are Post Accident Monitors (PAM), in accordance with SOI-90.05, Post Accident Radiation Monitors?

- A. Both 1-RM-90-119 and 1-RM-90-404.
 - B. Neither 1-RM-90-119 nor 1-RM-90-404.
 - C. 1-RM-90-119 is a PAM, but 1-RM-90-404 is NOT.
 - D. 1-RM-90-404 is a PAM, but 1-RM-90-119 is NOT.
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DISTRACTOR ANALYSIS

- a. Incorrect. SOI-90.05 identifies 1-RM-90-404 as a Post Accident Rad Monitor, but 1-RM-90-119 is NOT identified as a Post Accident Rad Monitor. Both being Post Accident Rad Monitors is plausible because 1-RM-90-119 is used during a SGTR event as an indication of the accident.
 - b. Incorrect. SOI-90.05 identifies 1-RM-90-404 as a Post Accident Rad Monitor, but 1-RM-90-119 is NOT identified as a Post Accident Rad Monitor. Neither being Post Accident Rad Monitors is plausible because neither is listed in the Tech Spec for Accident Monitoring Instrumentation.
 - c. Incorrect. SOI-90.05 identifies 1-RM-90-404 as a Post Accident Rad Monitor, but 1-RM-90-119 is NOT identified as a Post Accident Rad Monitor. Plausible because the 1-RM-90-119 is used during a SGTR event as an indication of the accident and the candidate may know one of the monitoring is a Post Accident Rad Monitor.
 - d. CORRECT. 1-RM-90-404 is identified in SOI-90.05 as a Post Accident Rad Monitor, but 1-RM-90-119 is NOT identified as a Post Accident Rad Monitor.
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Question Number: 61

K/A: 056 K1.03

Condensate

Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: MFW.

Tier:	2	RO Imp:	2.6	RO Exam:	Yes	Cognitive Level:	LOW
Group:	2	SRO Imp:	2.6	SRO Exam:	Yes	Source:	NEW

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

Learning Objective: 3-OT-SYS002A Objective 16: List the conditions which will cause the main feed pump turbine condenser valves to automatically close.

References: 1-47W611-2-1; AOI-16, Rev. 30.

Question:

Which ONE of the following occurs automatically if the "B" MFP trips due to thrust bearing wear with the plant initially at 100% power? (Assume no other equipment failures.)

- A. The motor driven AFW Pumps start.
 - B. The Condensate DI pumps trip if feedwater flow drops to <80%.
 - C. The "B" MFPT condenser condensate inlet and outlet valves go closed.
 - D. The short cycle valve, 1-FCV-2-35, modulates open to dump excessive condensate flow.
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DISTRACTOR ANALYSIS

- a. Incorrect. The AFW pumps start on the loss of both MFPs and other conditions that are not described in the stem of the question. Loss of one MFP at the stated power level starts the standby MFP. Further plausibility is added due to some Westinghouse plants are designed this way.
 - b. Incorrect. Suction pressure <20 psig causes the Condensate DI pumps to trip.
 - c. CORRECT. Since MFW flow is greater than 40%, the condensate inlet and outlet valves for the MFP turbine condensers go closed.
 - d. Incorrect. Plausible since a differential pressure is developed across a flow element (FE-2-35). This ΔP is converted to a flow signal which is used to control Short Cycle Valve (FCV-2-35) to ensure a minimum of 5500 gpm condensate flow.
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WRITTEN QUESTION DATA SHEET

Question Number: 62

K/A: 068 K6.10

Liquid Radwaste

Knowledge of the effect of a loss or malfunction on the following will have on the Liquid Radwaste System:
Radiation monitors.

Tier:	2	RO Imp:	2.5	RO Exam:	Yes	Cognitive Level:	HIGH
Group:	2	SRO Imp:	2.9	SRO Exam:	Yes	Source:	NEW

Applicable 10CFR55 Section: 41.7 / 45.7

Learning Objective: 3-OT-SYS090A, Objective 7: Determine Interlocks and/or cause-effect relationships between the Rad Monitoring Systems (ARM & Process) and the areas they monitor. Include HVAC systems and area isolations.

References: 1-47W611-77-2 R5, ARI-180-187 Rev 30.

Question:

Which ONE of the following identifies a condition that causes an instrument malfunction alarm on 0-RM-90-122, WDS Liquid release radiation monitor, and the effect the instrument malfunction alarm has on valve 0-RCV-77-43, CT BLDN LN RAD RELEASE CNTL?

	<u>Cause of the alarm</u>	<u>Effect on 0-RCV-77-43</u>
A.	Loss of signal from detector	Auto closes 0-RCV-77-43 if the valve was open.
B.	Loss of signal from detector	Prevents 0-RCV-77-43 from opening if the valve's local control handswitch was placed to OPEN.
C.	Loss of flow through the monitor	Auto closes 0-RCV-77-43 if the valve was open.
D.	Loss of flow through the monitor	Prevents 0-RCV-77-43 from opening if the valve's local control handswitch was placed to OPEN.

DISTRACTOR ANALYSIS

- CORRECT. As identified in ARI-181-C, a loss of signal from the detector would cause an Instrument Malfunction alarm and if 0-RCV-77-43 was open it would be automatically closed as identified on 1-47W611-77-2.
- Incorrect. As identified in ARI-181-C, a loss of signal from the detector would cause an Instrument Malfunction alarm and if 0-RCV-77-43 handswitch was placed to open the valve would open but would reclose when the switch was released as identified on 1-47W611-77-2.
- Incorrect. A loss of flow through the detector is not identified in ARI-181-C as a condition that would cause an Instrument Malfunction alarm but if 0-RCV-77-43 handswitch was open it would be automatically closed due to the low flow condition as identified on 1-47W611-77-2.
- Incorrect. A loss of flow through the detector is not identified in ARI-181-C as a condition that would cause an Instrument Malfunction alarm and if 0-RCV-77-43 handswitch was placed to open the valve would open but would reclose when the switch was released as identified on 1-47W611-77-2.

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Question Number: 63

K/A: 075 K1.02

Circulating Water

Knowledge of the physical connections and/or cause-effect relationships between the circulating water system and the following systems: Liquid radwaste discharge.

Tier:	2	RO Imp:	2.9	RO Exam:	Yes	Cognitive Level:	LOW
Group:	2	SRO Imp:	3.1	SRO Exam:	Yes	Source:	WBN BANK

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

Learning Objective: 3-OT-SYS0077A, Objective 20: Correctly locate the local and MCR controls for the Liquid Radwaste System; 3-OT-SYS027A, Objective 16: Explain the minimum cooling tower blowdown flow rate interlock with Radwaste, S/G Blowdown, and Cond Demin discharge valves.

References: SOI-77.01, Liquid Waste Disposal, Rev 57.

Question:

A release of the Monitor Tank is in progress through the Liquid Radwaste System. Which ONE of the following conditions directly results in automatic closure of 0-FCV-77-43, Liquid Radwaste Release Flow Control Valve?

- A. High radiation signal on 0-RM-90-225, Condensate Demineralizer Release Liquid Radiation Monitor.
- B. River flow drops to less than 3500 cfs after a 1 minute time delay.
- C. Cooling Tower Blowdown flow drops below 25,000 gpm.
- D. SG Blowdown flow exceeds 150 gpm.

DISTRACTOR ANALYSIS

- a. Incorrect. Plausible, since the candidate may believe that this high radiation condition causes termination of a release. If aligned for a release from the Condensate Demineralizer, this radiation Monitor would in fact terminate the release.
- b. Incorrect. Plausible, since river flow dropping to less than 3500 cfs after a 1 minute time delay closes the diffuser valves, causing the release to be discharged to the 35 acre pond, but will not close.
- c. CORRECT. Per SOI-77.01, this condition causes automatic closure of 0-FCV-77-43.
- d. Incorrect. Plausible, since SG Blowdown flow exceeding 150 gpm extends the time by 1.5 to 2 hours for a release due to increased backpressure on the release line.

WRITTEN QUESTION DATA SHEET

Question Number: 64

K/A: 079 A4.01

Station Air

Ability to manually operate and/or monitor in the control room: Cross-tie valves with IAS.

Tier:	2	RO Imp:	2.7	RO Exam:	Yes	Cognitive Level:	HIGH
Group:	2	SRO Imp:	27	SRO Exam:	Yes	Source:	WBN BANK

Applicable 10CFR55 Section: 41.7 / 45.5 to 45.8

Learning Objective: 3-OT-SYS032A, Objective 2: Describe Auto Actions for Loss of Control Air per AOI-10.

References: ARI-36-42, Heaters, Turb Seal, & Air, Rev 16.

Question:

Given the following plant conditions:

- Unit 1 is operating at power when control air pressure starts to drop.
- Annunciator 42-F, SERVICE AIR PCV-33-4 CLOSED, alarms.
- The CRO responds in accordance with the Annunciator Response Instruction (ARI).

Which ONE of the following identifies the decreasing Control Air system pressure that causes this alarm to occur and whether the Auxiliary Air compressors would have started if the air pressure dropped low enough to cause the alarm, but then recovered without dropping any lower?

	<u>Pressure to Cause Alarm</u>	<u>Aux Air Compressors</u>
A.	83 psig	Will have started
B.	83 psig	Will NOT have started
C.	80 psig	Will have started
D.	80 psig	Will NOT have started

DISTRACTOR ANALYSIS

- Incorrect. The isolation pressure is 80 psig not 83 psig. Plausible because 83 psig is the pressure where the aux air compressors start, which makes the second part of the distractor correct. This pressure setpoint could be misapplied to the station service air isolation pressure.
- Incorrect. The isolation pressure is 80 psig not 83 psig. Plausible because the 83 psig setpoint could be misapplied to the station service air isolation pressure and for the aux air compressor start, the candidate recalls the pressure at which the aux air compressors load (79.5 psig) and applies this pressure as the starting pressure.
- CORRECT. The service air isolates at 80 psig and the aux air compressors would have started at 83 psig.
- Incorrect. The isolation pressure is correct, but the aux air compressors would have started. Plausible if the candidate recalls the pressure at which the aux air compressors load which is 79.5 psig and applies this pressure as the starting pressure.

Question Number: 65

K/A: 086 K3.01

Fire Protection

Knowledge of the effect that a loss or malfunction of the Fire Protection System will have on the following:
Shutdown capability with redundant equipment.

Tier:	2	RO Imp:	2.7	RO Exam:	Yes	Cognitive Level:	High
Group:	2	SRO Imp:	3.2	SRO Exam:	Yes	Source:	Bank, modified

Applicable 10CFR55 Section: 41.7 / 45.6

Learning Objective: 3-OT-AOI3000 Objective 10: State the two primary limiting safety conditions which must be maintained following a postulated Appendix R fire as specified in AOI-30.2.

References: AOI-30.2, Safe Shutdown, rev 27.

Question:

Given the following plant conditions:

- Unit 1 is currently at 100%.
- A fire occurs in the Cable Spreading Room.
- The crew was unable to start the HPPF pumps.
- The incident Commander also reports that due to multiple fire damper failures the fire is spreading quickly.
- The crew has entered AOI-30.2, Fire Safe Shutdown.

In accordance with AOI-30.2, which ONE of the following failures results in a loss of a Control Function required to place the Plant in Hot Standby?

REFERENCE PROVIDED

- A. Motor Driven AFW Pumps will not start.
- B. RCS Thermal Barrier Booster Pumps trip.
- C. One Main Steam Isolation Valve fails to close.
- D. Letdown Isolation Valve 1-FCV-62-69 fails closed.

DISTRACTOR ANALYSIS

- a. Incorrect. The TD AFW Pump is required for the Safe Shutdown. Plausible since the candidate may incorrectly assume that ALL AFW pumps are required.
- b. Incorrect. The trip of the thermal barrier booster pumps does not impact the Safe Shutdown capabilities of the plant. Plausible if the candidate assumes that forced circulation is a concern.
- c. Incorrect. Per the Safe Shutdown Logic Diagram, the failure of the MSIV does not impact the ability to place the plant in Hot Standby. Plausible, if the candidate misapplied the diagram.
- d. CORRECT. Letdown is required by the Safe Shutdown Logic Diagram to place the plant in Hot Standby.

NOTE: This question requires the candidate to use the following reference:
AOI-30.2 Section 4.5, Safe Shutdown Logic Diagram

WRITTEN QUESTION DATA SHEET

Question Number: 66

K/A: G2.1.5

Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.

Tier:	3	RO Imp:	2.9	RO Exam:	Yes	Cognitive Level:	HIGH
Group:		SRO Imp:	3.9	SRO Exam:	Yes	Source:	Bank Mod

Applicable 10CFR55 Section: 41.10/43.5/45.12

Learning Objective: 3-OT-SPP1000, Objective 6: Describe shift staffing requirements.

References: OPDP-1 CONDUCT OF OPERATIONS, Section 3.1.3; Tech Spec 5.2.2 Shift Staffing.

Question:

For Mode 1 operation, which ONE of the following describes the MINIMUM number of Licensed Operator positions to man a shift, AND the MAXIMUM time requirement to restore if the minimum shift manning for Licensed Operators is not met per OPDP-1, Conduct of Operations and Tech Spec 5.2.2, Unit Staff?

	<u>Minimum Shift Manning</u>	<u>Time Requirement</u>
A.	2 ROs, 2 SROs	Restore within 2 hours
B.	2 ROs, 1 SRO	Restore within 1 hour
C.	2 ROs, 1 SRO	Restore within 2 hours
D.	2 ROs, 2 SROs	Restore within 1 hour

DISTRACTOR ANALYSIS

- CORRECT. Per OPDP-1 and TS 5.2.2, 2 ROs are required with a 2 Hour time limit per TS 5.2.2.
- Incorrect. 2 ROs required is correct. 1 hour time limit is incorrect. Plausible since TS does have one hour time requirements and if minimum shift manning is not met student may conclude this is important enough for a 1 hour time requirement.
- Incorrect. 1 RO is incorrect. Plausible due to in modes 5 and 6 the minimum requirement is only 1 RO. The 2 hour time requirement is correct.
- Incorrect. 1 RO is incorrect. Plausible due to in modes 5 and 6 the minimum requirement is only 1 RO. Second part is also incorrect. Plausible due to TS does have one hour time requirements and if minimum shift manning is not met student may conclude this is important enough for a 1 hour time requirement.

WRITTEN QUESTION DATA SHEET

Question Number: 67

K/A: G2.1.28

Knowledge of the purpose and function of major system components and controls.

Tier:	3	RO Imp:	4.1	RO Exam:	Yes	Cognitive Level:	LOW
Group:		SRO Imp:	4.1	SRO Exam:	Yes	Source:	WBN Bank

Applicable 10CFR55 Section: 41.7

Learning Objective: 3-OT-SYS001B, Objective 9: Identify which controller is in service when Tavg is selected with the unit at power.

References: 1-47W611-1-2.

Question:

With the Steam Dump Mode switch in the Tavg mode, what determines whether the load rejection controller or the Rx trip controller will be in service?

- A. Loss of Load (C-7) Interlock.
- B. LO-LO Tavg Interlock (550°F).
- C. "A" Train Reactor Trip breaker position.
- D. "B" Train Reactor Trip breaker position.

DISTRACTOR ANALYSIS

- a. Incorrect. Plausible, since the Loss of Load interlock will arm the steam dumps, but does not determine which controller output will position the dump valves.
 - b. Incorrect. Plausible, since the LO-LO Tavg Interlock will close all of the steam dumps if temperature drops to below 550°F
 - c. Incorrect. The A train Reactor Trip breaker is used to ARM the steam dumps on a reactor trip.
 - d. CORRECT. The B train reactor trip breaker is used to select the controller in service. With NO reactor trip, the Load Rejection Controller is selected. Once the B train reactor trip breaker opens, the Reactor Trip controller is selected.
-

Question Number: 68

K/A: G2.1.36

Knowledge of procedures and limitations involved in core alterations.

Tier:	3	RO Imp:	3.0	RO Exam:	Yes	Cognitive Level:	LOW
Group:		SRO Imp:	4.1	SRO Exam:	Yes	Source:	SQN BANK
	SIG						MOD

Applicable 10CFR55 Section: 41.10/43.7

Learning Objective: 3-OT-GO0700, Objective 5: Describe the major steps that the operator must take when unloading fuel per this instruction.

References: FHI-7, Rev. 31.

Question:

Given the following plant conditions:

- Unit is in Mode 6.
- 15 fuel assemblies have been reloaded after a complete core off-load.
- Source Range N-131 indicates 10 cps and is selected for audible count rate indication.
- Source Range N-132 indicates 5 cps.

In accordance with FHI-7, "Fuel Handling and Movement", which ONE of the following unanticipated changes in count rate requires suspension of core alterations?

- A. N131 indicates 25 cps and N132 indicates 8 cps.
 - B. N131 indicates 15 cps and N132 indicates 20 cps.
 - C. N131 indicates 40 cps and N132 indicates 8 cps.
 - D. N131 indicates 20 cps and N132 indicates 15 cps.
-

DISTRACTOR ANALYSIS

- a. Incorrect. Plausible since N131 has increased by greater than a factor of 2, but N132 has not changed by a factor of 2.
 - b. Incorrect. Plausible since N131 has not increased by greater than a factor of 2, but N132 has changed by a factor of 4 but has not exceeded the factor of 5 which would require suspension of core alterations.
 - c. Incorrect. Plausible, since N131 has increased by a factor of 4, but has not exceeded the factor of 5 which would require suspension of core alterations.
 - d. CORRECT. Both source range channels have doubled, which would require suspension of core alterations.
-

WRITTEN QUESTION DATA SHEET**Question Number:** 69**K/A:** G2.2.12

Knowledge of surveillance procedures.

Tier:	3	RO Imp:	3.7	RO Exam:	Yes	Cognitive Level:	LOW
Group:		SRO Imp:	4.1	SRO Exam:	Yes	Source:	WBN Bank

Applicable 10CFR55 Section: 41.10/45.13**Learning Objective:** 3-OT-SPP0802, Objective 2: Explain the difference between the surveillance due date and the WBN extension date for both Tech Spec and Non Tech Spec surveillances.**References:** SPP-8.2, Rev. 3.**Question:**

A Power Range channel has failed requiring the crew to implement AOI-4, NIS Malfunctions. The US has entered the appropriate Technical Specifications and states that a flux map will be required per Surveillance Requirement 3.2.4.2.

SR 3.2.4.2 directs the operators to verify QPTR is within limits using moveable incore detectors once within 12 hours and every 12 hours thereafter.

What is the maximum time for the initial performance of the flux map and the maximum time for subsequent performances?

	Initial Performance	Subsequent Performances
A.	12 hours	12 hours
B.	15 hours	12 hours
C.	12 hours	15 hours
D.	15 hours	15 hours

DISTRACTOR ANALYSIS

- Incorrect. Plausible since the first performance must be accomplished within the specified time with NO extension. An extension is allowed for subsequent performances.
- Incorrect. Plausible since an extension is allowed for subsequent performances, but the first performance must be accomplished within the specified time with NO extension.
- CORRECT.** There is no extension allowed for the first performance, and an extension of 25% of the allowed time may be granted for subsequent performances.
- Incorrect. Plausible since an extension is allowed for subsequent performances, but the first performance must be accomplished within the specified time with NO extension.

Question Number: 70

K/A: 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: 3 RO Imp: 4.2 RO Exam: Yes Cognitive Level: HIGH
Group: SRO Imp: 4.4 SRO Exam: Yes Source: NEW

Applicable 10CFR55 Section: 41.5/43.5/45.12

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; SOI-3.02, Auxiliary Feedwater System, Section 8.5.1.

Question:

Given the following conditions:

- Unit 1 shutdown is on progress.
- Reactor power is 14% and decreasing.
- Intermediate Range NI-36 fails HIGH.

Which ONE of the following identifies how the failure of the NI will effect the reactor trip system and the effect the failure will have on the Source Range NIs?

Reactor Trip System	Effect on Source Range NIs
A. Reactor trip will occur at the time of failure.	Source Range NIs will have to be MANUALLY reinstated.
B. Reactor trip will occur at the time of failure.	Source Range NIs will AUTOMATICALLY reinstate.
C. Reactor trip will occur if power reduction is continued.	Source Range NIs will have to be MANUALLY reinstated.
D. Reactor trip will occur if power reduction is continued.	Source Range NIs will AUTOMATICALLY reinstate.

DISTRACTOR ANALYSIS

- a. Incorrect. Plausible, since power is greater than 10%, the P-10 blocks are active. This would prevent an immediate reactor trip at the time of the failure. The SR NIs WOULD have to be manually reinstated since the P-6 permissive requires both IR channels to be below the setpoint to automatically reinstate.
- b. Incorrect. Plausible, since power is greater than 10%, the P-10 blocks are active. This would prevent an immediate reactor trip at the time of the failure. The SR NIs WOULD have to be manually reinstated since the P-6 permissive requires both IR channels to be below the setpoint to automatically reinstate.
- c. CORRECT. Power is greater than 10%, initially and the P-10 blocks are active. This would prevent an immediate reactor trip at the time of the failure. If the power reduction continues to a point less than 10% on 3/4 PR channels, P-10 would be unblocked and the 1/2 IR trip would occur. The SR NIs WOULD have to be manually reinstated since the P-6 permissive requires both IR channels to be below the setpoint to automatically reinstate.
- d. Incorrect. Plausible since power is greater than 10% initially, and the P-10 blocks are active. This would prevent an immediate reactor trip at the time of the failure. If the power reduction continues to a

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point less than 10% on 3/4 PR channels, P-10 would be unblocked and the 1/2 IR trip would occur. The SR NIs would have to be manually reinstated since the P-6 permissive requires both IR channels to be below the setpoint to automatically reinstate.

WRITTEN QUESTION DATA SHEET

Question Number: 71**K/A:** G2.3.7

Ability to comply with radiation work permit requirements during normal or abnormal conditions.

Tier:	3	RO Imp:	3.5	RO Exam:	Yes	Cognitive Level:	LOW
Group:		SRO Imp:	3.6	SRO Exam:	Yes	Source:	NEW

Applicable 10CFR55 Section: 41.12 / 45.10**Learning Objective:** 3-OT-RAD0003, Objective 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-153, Radiation Work Permits (RWPs) Rev 0000; RCI-100, Control of Radiological Work, Rev 32.

Question:

An individual enters a Radiological Controlled Area (RCA) covered by a General RWP to perform equipment inspections.

Which ONE of the following identifies an area within the RCA where a Job Specific RWP is required before entry is allowed, in accordance with RCI-153, Radiation Work Permits?

- A. Area where whole body dose rates exceeds 100 mrem/hr.
- B. Area posted as Hot Particle Area.
- C. Area with general contamination levels greater than 200 dpm/100cm².
- D. Area where total expected dose is greater than 5 mrem.

DISTRACTOR ANALYSIS

- a. Incorrect. Required if >1,000mrem/hr.
 - b. CORRECT. Required for area posted as Hot Particle Area.
 - c. Incorrect. Required if > 50,000 dpm/100cm².
 - d. Incorrect. Required if total expected dose exceeds 50 mrem.
-

WRITTEN QUESTION DATA SHEET

Question Number: 72

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:	Yes	Cognitive Level:	LOW
Group:		SRO Imp:	3.8	SRO Exam:	Yes	Source:	NEW

Applicable 10CFR55 Section: 41.12 / 43.4 / 45.10

Learning Objective: 3-OT-SYS031A, Objective 3: Describe the ventilation flow path provided by the control building ventilation system during normal and emergency operation.

References: ARI-180-187 rev 30, 1-47W866-4 R39.

Question:

Given the following plant conditions:

- Following an accident, both Trains of Control Room Isolation have been initiated.
- Several Auxiliary Building Area Radiation Monitors rise to the alarm setpoint.

Which ONE of the following MCR air intake radiation monitors will detect and alert the crew of a radiation hazard entering the control room and what actions the ARI will direct the crew to perform?

- A. 0-RM-90-125, Stop MCR Emergency Pressurization Fans.
 - B. 0-RM-90-125, Align Emergency Pressurization Fan suction to alternate source.
 - C. 0-RM-90-205, Stop MCR Emergency Pressurization Fans.
 - D. 0-RM-90-205, Align Emergency Pressurization Fan suction to alternate source.
-

DISTRACTOR ANALYSIS

- a. Incorrect. 0-RM-90-125 is in an isolated flow path due to the CRI. Plausible because the rad monitor is the incorrect monitor. It would be in the flow path after the supply was realigned and stopping the fans would be a way of stopping the intake of radiation.
 - b. Incorrect. 0-RM-90-125 is in an isolated flow path due to the CRI. Plausible because the rad monitor is the incorrect monitor. It would be in the flow path after the supply was realigned and Annunciator 187-A directs the action to align the Emergency Pressurization Fan suction to alternate source.
 - c. Incorrect. 0-RM-90-205 will cause annunciator 187-A to alarm and the ARI directs the action to ALIGN Emergency Pressurization Fan suction to alternate source, not to stop the Emergency Pressurization Fan. Plausible because the rad monitor is the correct monitor and stopping the fans would be a way of stopping the intake of radiation.
 - d. CORRECT. 0-RM-90-205 will cause annunciator 187-A to alarm. 0-RM-90-125 is in an isolated flow path due to the CRI. Annunciator 187-A directs the action to align the Emergency Pressurization Fan suction to alternate source.
-

WRITTEN QUESTION DATA SHEET

Question Number: 73

K/A: G2.4.13

Knowledge of crew roles and responsibilities during EOP usage.

Tier:	3	RO Imp:	4.0	RO Exam:	Yes	Cognitive Level:	LOW
Group:		SRO Imp:	4.6	SRO Exam:	Yes	Source:	SQN BANK

Applicable 10CFR55 Section: 41.10/45.12

Learning Objective: 3-OT-TI1204, Objective 13: Apply the 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, Rev. 7, Page 31 thru 34.

Question:

The Operator-at-the-Controls (OAC) is responding to an accident. He recognizes that he must take actions which are NOT contained in the emergency operating procedure in effect and are NOT covered by prudent operator actions. Which ONE of the following describes the proper action to be taken?

- A. The OAC shall take no action until a procedure is developed or revised.
- B. The OAC shall obtain approval from a licensed SRO prior to taking action.
- C. The OAC should obtain concurrence from another licensed RO prior to taking action.
- D. The OAC should immediately take appropriate actions necessary and inform the SRO when time permits.

DISTRACTOR ANALYSIS

- a. Incorrect. Plausible, since under normal circumstances, the operator would stop a task in progress and wait until a new procedure was written before taking any additional actions. The operator must stop actions long enough to get approval from the SRO. The SRO would have to address the situation using 10CFR50.54(x) criteria.
 - b. CORRECT. The operator must stop actions long enough to get approval from the SRO. The SRO would have to address the situation using 10CFR50.54(x) criteria.
 - c. Incorrect. Plausible if the candidate confuses the actions required by a PEER CHECK with actions in b.
 - d. Incorrect. Plausible, since Prudent Operator Actions do allow the RO to take manual compensatory actions which are within the guidelines of an existing procedure.
-

WRITTEN QUESTION DATA SHEET

Question Number: 74

K/A: G2.4.37

Knowledge of the lines of authority during implementation of the emergency plan.

Tier:	3	RO Imp:	3.0	RO Exam:	Yes	Cognitive Level:	LOW
Group:		SRO Imp:	4.1	SRO Exam:	Yes	Source:	WBN Bank

Applicable 10CFR55 Section: 41.10 / 45.13

Learning Objective: 3-OT-RAD0003, Objective 6: List the extreme emergency exposure guidelines.

References: EPIP15, Emergency Exposure Guidelines, Rev 13.

Question:

Given the following:

- A Site Area Emergency (SAE) has been declared on Unit 1.
- Two hours after the SAE declaration, an individual is to be authorized to receive an Emergency Exposure radiation dose above the TVA whole body dose limit during the mitigation of the emergency situation.

In accordance with EPIP-15, Emergency Exposure Guidelines, whose approval is required for the individual to receive the dose?

- A. TSC Radcon Manager.
- B. Onshift Shift Manager.
- C. Site Emergency Director.
- D. Site Vice President.

DISTRACTOR ANALYSIS

- a. Incorrect. Per EPIP-15, the Radiation Protection group is responsible for completing necessary paperwork and obtaining SED's approval
 - b. Incorrect. Plausible, if the Shift Manager was in the role of the SED. The 2 hour time frame stated in the stem allows for the TSC to be manned and therefore the SED duties would have been assumed from the Shift Manager.
 - c. CORRECT. The SED is the ONLY individual responsible for authorizing emergency dose limits.
 - d. Incorrect. Plausible, since the Site VP may be acting as the SED. However the Site VP by title does not have responsibility for authorizing emergency dose limits.
-

WRITTEN QUESTION DATA SHEET

Question Number: 75

K/A: G2.4.42

Knowledge of emergency response facilities.

Tier:	3	RO Imp:	2.6	RO Exam:	Yes	Cognitive Level:	LOW
Group:		SRO Imp:	3.8	SRO Exam:	Yes	Source:	NEW

Applicable 10CFR55 Section: 41.10 / 45.11**Learning Objective:** 3-OT-PDC-048C, Objective 20: Use the Satellite Phone to make calls during emergencies.**References:** SOI-100.01, rev 22.

Question:

Which ONE of the following identifies where a Portable Satellite Telephone, available for use during an emergency, is located?

- A. Main Control Room
 - B. Technical Support Center
 - C. Joint Information Center
 - D. Operations Support Center
-

DISTRACTOR ANALYSIS

- a. Incorrect. Plausible because the Main Control Room does have Satellite phone capabilities, however the capability is to selected phones via the Stationary Satellite Telephone (SST) system.
 - b. CORRECT. The Portable Satellite Telephone (PST) is located in a cabinet in the Technical Support Center.
 - c. Incorrect. Plausible because the other 3 locations do have selected phones that can be connected to the Stationary Satellite Telephone (SST) system, and the JIC does not that capability.
 - d. Incorrect. Plausible because the Operations support Center does have Satellite phone capabilities, however, the capability is to selected phones via the Stationary Satellite Telephone (SST) system.
-

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

Please note: The following 29 pages are the Master Examination copy for the SRO portion of the examination, including the answer key and distractor analysis data.

WRITTEN QUESTION DATA SHEETQuestion Number: *X 76*

K/A: 000007 EA2.05

Reactor Trip - Stabilization - Recovery

Ability to determine or interpret the following as they apply to a reactor trip: Reactor trip first-out indication.

Tier:	1	RO Imp:	RO Exam:	Cognitive Level:	High
Group:	1	SRO Imp:	3.9 SRO Exam: Yes	Source:	New

Applicable 10CFR55 Section: 41.7 / 45.5 / 45.6**Learning Objective:** 3-OT-SYS099A, Objective 13: Describe the causes of "General Warning" on SSPS. Objective 14: Identify where "General Warning" indications can be found.**References:** SPP-3.5, Rev. 19; 1-SI-99-10B, Rev. 42.**Question:**

Given the following conditions:

Unit 1 is at 100% power. Solid State Protection System (SSPS) Train 'B' Actuation Logic testing is being performed using 1-SI-99-10B with:

- Train 'B' SSPS Mode Selector switch in the 'TEST' position.
- Train 'B' SSPS Input Error Inhibit switch in the "INHIBIT" position.

A unit trip occurs due to the loss of one of the two 48v DC power supplies on TRAIN 'A' SSPS. The following "First Out" annunciators are lit:

1-XA-55-4C, Turbine Trip First

Window 73C - "RX TRIP BKRS RTA & BYA OPEN"

Window 74C - "RX TRIP BKRS RTB & BYB OPEN"

Window 74B - "MFPT A&B TRIPPED"

1-XA-55-4D Reactor Trip First Out

Window 76B "TURBINE TRIP"

Which ONE of the following identifies both the sequence of events of the unit trip, and the time allowed to make the required NRC 50.72 notification?

Sequence of Events	NRC Notification Required Within
A. Turbine trip caused the Reactor trip.	Four Hours
B. Turbine trip caused the Reactor trip.	Eight Hours
C. Reactor trip caused the Turbine trip.	Four Hours
D. Reactor trip caused the Turbine trip.	Eight Hours

DISTRACTOR ANALYSIS

- Incorrect. The conditions stated in the stem result in a general warning on both trains of the SSPS which causes the reactor trip and bypass breakers to open (but no reactor first out annunciator will be lit). Thus the turbine trips as a result of the reactor trip. The four hour notification to NRC for a reactor trip is correct. Plausible due to the notification time being correct and no other reactor trip first out annunciator will be lit except the turbine first out annunciator.
- Incorrect. The conditions stated in the stem result in a general warning on both trains of the SSPS which causes the reactor trip and bypass breakers to open (but no reactor first out annunciator will be lit), thus the turbine trips as a result of the reactor tripping. The notification to NRC for a reactor trip is a four hour notification, not an eight hour notification. Plausible due to the notification time being correct and no other reactor trip first out annunciator lit except the turbine first out annunciator; and that the notification time could be misapplied since the ESF actuation required time is 8 hours and an ESF actuation of AFW does occur on a reactor trip.
- CORRECT.** The conditions stated in the stem result in a general warning on both trains of the SSPS which causes the reactor trip and bypass breakers to open (but no reactor first out annunciator will be lit), thus the reactor trip causing the turbine trip is correct. The four hour notification to NRC for a reactor trip is correct.

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- d. Incorrect. The conditions stated in the stem result in a general warning on both trains of the SSPS which causes the reactor trip and bypass breakers to open (but no reactor first out annunciator will be lit), thus the reactor trip causing the turbine trip is correct. The notification to NRC for a reactor trip is a four hour notification, not an eight hour notification. Plausible because the notification time could be misapplied since an ESF actuation requires an 8 hour notification and an ESF actuation of AFW does occur on the reactor trip.
-
-

Question Number: 277

K/A: 000022 G2.1.7

Loss of Reactor Coolant Makeup

Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Tier:	1	RO Imp:	RO Exam:	Cognitive Level:	High
Group:	1	SRO Imp: 4.7	SRO Exam: Yes	Source:	NEW

Applicable 10CFR55 Section: 41.5, 43.5

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

References: SOI-62.02, Rev. 47; ARI-109-115, rev. 16, SPP-10.4, 5.0, rev. 5.

Question:

Given the following plant conditions:

- Core burnup is 1200 MWD/MTU.
- Indicated reactor power is stable at 100%.
- VCT low level alarm annunciates.
- Auto makeup has failed.
- Actual VCT level had lowered to 5% before the crew completed the appropriate corrective action.
- Reactor power has stabilized at approximately 97% power.

If this event had occurred with core burnup at 16600 MWD/MTU, the magnitude of the change in reactor power would be _____ (1) _____, and the Significance Level of the Reactivity Management Event classification would be recorded on the PER (Problem Evaluation Report) by _____ (2) _____.

- | | (1) | (2) |
|----|---------|----------------------------------|
| A. | less | Reactor Engineering. |
| B. | greater | Reactor Engineering. |
| C. | less | the Management Review Committee. |
| D. | greater | the Management Review Committee. |

DISTRACTOR ANALYSIS

- Incorrect. Plausible if candidate confuses the change in boron worth with time in core life to be less, instead of more. In this case, candidate incorrectly concludes that the power change response is at a lower magnitude. Correctly recognizes that Reactor Engineering records the significance level of the event on the PER.
- CORRECT. Since boron worth is greater at EOL, injection of RWST inventory results in a higher magnitude of change in reactor power. Per the appropriate references, Reactor Engineering records the significance level of the reactivity event on the PER.
- Incorrect. Plausible if candidate confuses the change in boron worth with time in core life to be less, instead of more. In this case, candidate incorrectly concludes that the power change response is at a lower magnitude. Further plausible, since Management Review Committee (MRC) is involved with plant PERs, but assigning the reactivity significance level is not a function of the MRC.
- Incorrect. Plausible, since the candidate correctly recognizes EOL conditions, and applies the knowledge that boron worth is higher. Further plausible, since Management Review Committee (MRC) is involved with plant PERs, but assigning the reactivity significance level is not a function of the MRC.

Question Number: 270

K/A: 000025 AA2.01

Loss of RHR System

Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System:
Proper amperage of running LPI/decay heat removal/RHR pump(s).

Tier: 1 RO Imp: RO Exam: Cognitive Level: High
Group: 1 SRO Imp: 2.9 SRO Exam: Yes Source: NEW

Applicable 10CFR55 Section: 43.5 / 45.13

Learning Objective: 3-OT-AOI1400, Rev. 6, Objective 7: Demonstrate ability/knowledge of AOI, to correctly: a. Recognize entry conditions, b. Respond to Action steps, c. Respond to Contingencies, d. Respond to Notes and Cautions. 3-OT-GO1000, Rev. 5, Objective 5: Identify the procedure to which the operator is referred if Residual Heat Removal cooling is lost while in during Reduced Inventory/Mid-Loop operations. (SOER 88-3 & SOER 85-4).

References: GO-10, Rev. 37.

Question:

Given the following:

- Unit 1 is in Mode 5 following a refueling outage.
- RHR pump 1A-A is in service.
- The operating crew is drawing vacuum on the Reactor Coolant System.
- The RHR pump begins to show signs of cavitation.

Which ONE of the following identifies both how the RHR pump motor amps are affected when the pump is cavitating, and the mitigating strategy that will be implemented if the cavitation cannot be terminated?

<u>Motor Amps</u>	<u>Mitigating Strategy</u>
A. Unstable and fluctuating.	Break vacuum per GO-10, Reactor Coolant System Drain and Fill Operations, then enter AOI-14, Loss of RHR Shutdown Cooling.
B. Unstable and fluctuating.	<u>Immediately</u> enter AOI-14, Loss of RHR Shutdown Cooling. Break vacuum as directed by the AOI.
C. Stable but reduced.	Break vacuum per GO-10, Reactor Coolant System Drain and Fill Operations, then enter AOI-14, Loss of RHR Shutdown Cooling.
D. Stable but reduced.	<u>Immediately</u> enter AOI-14, Loss of RHR Shutdown Cooling. Break vacuum as directed by the AOI.

DISTRACTOR ANALYSIS

- CORRECT. GO-10 describes cavitation and amps being unsteady and directs the breaking of vacuum prior to implementing AOI-14.
- Incorrect. While GO-10 describes cavitation and amps as stated in the distractor, the GO requires the vacuum break prior to the transition to AOI-14.
- Incorrect. Amps will not be "stable but reduced" if the pump was cavitating; however the mitigating strategy is correct.
- Incorrect. Amps will not be "stable but reduced" if the pump was cavitating. The GO requires the vacuum break prior to the transition to AOI-14.

Question Number: *A79*

K/A: 000027 G2.4.6

Pressurizer Pressure Control System Malfunction
Knowledge of EOP mitigation strategies.

Tier: 1	RO Imp:	RO Exam:	Cognitive Level: High
Group: 1	SRO Imp: 4.7	SRO Exam: Yes	Source: BANK

Applicable 10CFR55 Section: 41.10 / 43.5 / 45.13

Learning Objective: 3-OT-AOI1800; Objective 5: Explain the operator actions for dropping RCS pressure.

References: E-0, Rev.27, Drawing 47W813-1, AOI-18, Rev. 21.

Question:

Given the following conditions:

- The plant is operating at 100% power steady state conditions.
- All systems are aligned normally.
- A failure of the Pressurizer Spray Valve PCV-68-340D causes it to go full OPEN.
- The OAC has attempted to take manual control of the Spray Valve, but is unable to close it.
- Pressurizer pressure continues to LOWER.

What is the appropriate mitigation strategy and which procedure(s) will be used to implement the strategy?

- A. Enter AOI-18, Malfunction of Pressurizer Pressure Control System, initiate a Reactor Trip, trip RCP #1, then enter E-0, Reactor Trip or Safety Injection.
- B. Refer to ARI-90-B, PZR PRESS LO DEVN BACKUP HTRS ON, isolate Train B Essential Air to Containment to fail the Pressurizer Spray Valve closed, and then enter AOI-18.
- C. Refer to ARI 90-B, PZR PRESS LO-DEVN BACKUP HTRS ON, isolate Train A Essential Air to Containment to fail the Pressurizer Spray Valve closed, and then enter AOI-18.
- D. Enter AOI-18, Malfunction of Pressurizer Pressure Control ^{System} Malfunctions, initiate a Reactor Trip AND SI, trip RCP #1, then enter E-0, Reactor Trip or Safety Injection.

DISTRACTOR ANALYSIS

- a. Incorrect. Guidance is given in AOI-18 for tripping the reactor if the Pressurizer spray valves cannot be closed. This requires entry into E-0. Candidate must recognize that a Reactor trip AND an SI is required.
- b. Incorrect. Plausible, since isolation of Essential Air to Containment causes the spray valve to fail closed.
- c. Incorrect. Plausible, since isolation of Essential Air to Containment causes the spray valve to fail closed.
- d. CORRECT. Guidance is given in AOI-18 for tripping the reactor AND an SI if the Pressurizer spray valves cannot be closed. This requires entry into E-0.

WRITTEN QUESTION DATA SHEET

Question Number: 580

K/A: 000058 AA2.01

Loss of DC Power

Ability to determine and interpret the following as they apply to the Loss of DC Power: That a loss of dc power has occurred; verification that substitute power sources have come on line

Tier:	1	RO Imp:	RO Exam:	Cognitive Level:	High
Group:	1	SRO Imp: 3.1	SRO Exam: Yes	Source:	New

Applicable 10CFR55 Section: 43.5

Learning Objective: 3-OT-SYS057P, Objective 6: Explain how the operator can tell if the 125v Vital Charger or the 125v Vital Battery is supplying power to the 125v Vital Battery Boards.

References: Tech Spec 3.8.4 Bases, page B 3.8-57, Rev 87

Question:

Given the following:

- The plant is operating at 100% power.
- The 125 V DC VITAL CHGR III fails and its output breaker opens.
- A report is received that there is arcing occurring on Vital Battery III.
- The Shift Manager directs that 0-BKR-236-3/109 125V Vital Battery III Breaker, between Vital Battery III and Vital Battery Board III be opened.
- The Unit Supervisor has determined that power to Vital Battery Board III will be restored using Vital Battery V, in conjunction with the Spare Battery Charger.
- Vital Battery V is currently in service to Battery Board V.

Which ONE of the following describes the expected indication on 1-EI-57-94, Vital Batt BD III AMPS which will confirm that power has been restored to Battery Board III, AND what is the operability status of Vital Battery Board III?

<u>1-EI-57-94 (Batt BD III Amps) Indication</u>	<u>Operability Status of Vital Batt. BD III</u>
A. Indicating UPSCALE from zero.	Can NOT be considered operable with both Vital Battery V and the spare charger connected concurrently.
B. Indicating DOWNSCALE from zero.	Can NOT be considered operable with both Vital Battery V and the spare charger connected concurrently.
C. Indicating UPSCALE from zero.	Operable with the spare charger and Vital Battery V connected to the Battery Board and with all applicable surveillances on Vital Battery V satisfied.
D. Indicating DOWNSCALE from zero.	Operable with the spare charger and Vital Battery V connected to the Battery Board and with all applicable surveillances on Vital Battery V satisfied.

DISTRACTOR ANALYSIS

- a. Incorrect. Upscale is the incorrect indication if a battery charger is in service providing power to the loads. The battery board is operable with the spare charger and Battery V connected as identified in SOI-236.03, therefore using them concurrently is not an operability concern.
- b. Incorrect. Downscale is the correct indication since a battery charger is providing power to the loads, even though a different battery is connected to the Vital Board III. The battery board is operable with the spare charger and Battery V connected as identified in SOI-236.03, therefore using them concurrently is not an operability concern.

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- c. Incorrect. Upscale is the incorrect indication if a battery charger is in service providing power to the loads. The Battery Board is operable with the spare charger and Battery V connected provided all applicable surveillances on Vital Battery V are satisfied.
- d. CORRECT. Downscale is the correct indication when a battery charger is providing power to the loads, even though a different battery is connected to the Vital Board III. The SOI has the spare charger placed in service prior to Battery V being connected. The battery board is operable with the spare charger and Battery V (if operable) connected as identified in SOI-236.05. Per Tech. Spec Basis 3.8.4, page B 3.8-57, the Vital Battery V can be considered operable after it is connected to a board and all applicable SRs have been verified satisfactorily.
-
-

Question Number: 821

K/A: W/E11 G2.2.22

Loss of Emergency Coolant Recirc.

Knowledge of limiting conditions for operations and safety limits.

Tier:	1	RO Imp:	RO Exam:	Cognitive Level:	High
Group:	1	SRO Imp: 4.7	SRO Exam: Yes	Source:	NEW

Applicable 10CFR55 Section: 41.5, 43.2

Learning Objective: 3-OT-SYS063A, Rev. 10, Objective 30: Given the condition/status of the Emergency Core Cooling system/component and the appropriate sections of Tech Specs, determine if operability requirements are met and what actions, if any, are required.

References: LCO 3.3.2, Action K, including basis.

Question:

With the plant at full power, and during the Shift Turnover for the 1900 shift, the Unit Supervisor is informed of the following:

- 1-LS-63-50A (RWST Low Level) was declared inoperable at 1000 that day.
- It was placed in the configuration required by Technical Specifications at 1400, and is expected to remain inoperable until 2300.
- A required surveillance instruction on 1-LS-63-51A (RWST Low Level) must be completed by 2330 today to prevent being out of frequency due to exceeding the NRC late date.
- The surveillance involves having 1-LS-63-51A in the required configuration for 2 hours.

If the surveillance is completed by 2330, which ONE of the following describes the expected effect on the automatic switchover to containment sump function while ~~1-LS-63-51A~~ ^{LS 63-51A} is out of service?

- Functional. Even though two level switches are TRIPPED and are inoperable, the remaining operable level switches are sufficient for switchover to be functional.
- Functional. Even though two level switches are BYPASSED, the remaining level switches are sufficient for switchover to be functional.
- Not functional, because two level switches are TRIPPED and at least three level switches are required for switchover to be functional.
- Not functional, because two level switches are BYPASSED, and at least three level switches are required for switchover to be functional.

DISTRACTOR ANALYSIS

- Incorrect. Plausible, since there are other components in the plant that are placed to trip when discovered inoperable. However, candidate fails to recognize that when one of these level switches is inoperable, it is bypassed, not tripped. Further plausibility is added by the conditions given; i.e., there TWO switches affected, and the remaining two are sufficient for actuation capability.
- CORRECT. Per LCO 3.3.2, Action K, one inoperable channel of "Automatic Switchover to Containment Sump" must be bypassed within 6 hours. Another channel may also be bypassed for surveillance testing, leaving only two channels. However, the remaining two channels are sufficient for functionality of actuation.
- Incorrect. Candidate incorrectly believes that these conditions require tripping of the two channels, and uses that incorrect information to conclude that actuation capability is rendered not functional. Plausible, since candidate may believe at least three channels are required to be operable at all times, for Mode 1.
- Incorrect. Candidate correctly recognizes that these conditions require bypassing the two channels. However, candidate fails to realize that this does not disable emergency coolant recirculation actuation capability. Plausible, since some plant equipment requires at least three of four channels to be operable; however, the candidate misapplies that concept for these conditions.

Question Number: 782

K/A: 000059 AA2.03

Accidental Liquid RadWaste Rel.

Ability to determine and interpret the following as they apply to the Accidental Liquid Radwaste Release:
Failure modes, their symptoms, and the causes of misleading indications on a radioactive-liquid monitor.

Tier:	1	RO Imp:	RO Exam:	Cognitive Level:	Low
Group:	2	SRO Imp: 3.6	SRO Exam: Yes	Source:	NEW

Applicable 10CFR55 Section: 43.5, 45.13

Learning Objective: 3-OT-SYS077A, Objective 19: Discuss how processed water is released.

References: SOI-77.01, Rev. 0058; ARI 180-187, Rev. 30;
0-ODI-90-1, Liquid Radwaste Tank Release, Rev. 0028.

Question:

Given the following:

- The unit is at 100% power and all equipment is available.
- A planned Cask Decontamination Collector Tank (CDCT) release is in progress when the following occurs:
 - Annunciator 181-A "WDS RELEASE LINE 0-RM-90-122 LIQ RAD HI" alarms.
 - The Monitor Tank level is 70% and lowering.

Which ONE of the following identifies whether the release permit was violated and the release permit requirements to allow the CDCT release to continue, in accordance with SOI-77.01, Liquid Waste Disposal?

Permit Violated	Release of CDCT
A. The release permit would be violated because the liquid released was not sampled prior to the release.	The same release permit can be used following independent verification of correct valve lineup.
B. The release permit would be violated because the liquid released was not sampled prior to the release.	A new release permit must be generated.
C. The release permit was NOT violated because the release was terminated by the high rad signal.	The same release permit can be used following independent verification of correct valve lineup.
D. The release permit was NOT violated because the release was terminated by the high rad signal.	A new release permit must be generated.

DISTRACTOR ANALYSIS

- a. Incorrect. The release permit would be violated because liquid released from the Monitor Tank was not sampled and the same release permit cannot be used to continue the release. Plausible because the release permit did sample the CDCT liquid intended to be released, and independent verification of the valve line-up is something required if the rad monitor is inoperable.
- b. CORRECT. The release permit would be violated because liquid released from the Monitor Tank was not sampled and a new release permit is required to continue the release due to the release being terminated by a High Rad signal as identified in SOI-77.01. The release permit did sample the CDCT liquid intended to be released, and a new release permit is required in order to continue the release.
- c. Incorrect. The termination of the release by the radiation monitor does not prevent a violation of the permit. The release permit would be violated because liquid released from the Monitor Tank was not sampled and the same release permit cannot be used to continue the release. Plausible because the

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release permit did sample the CDCT liquid intended to be released; the rad monitor did terminate the release and independent verification of valve line-up is something required if the rad monitor is inoperable.

- d. Incorrect. The termination of release by the radiation monitor does not prevent a violation of the permit. The release permit would be violated because liquid released from the Monitor Tank was not sampled. A new release permit is required in order to continue the release. Plausible because the release permit did sample the CDCT liquid intended to be released; the rad monitor did terminate the release and a new release permit is required.

WRITTEN QUESTION DATA SHEET

Question Number: 8 83

K/A: 000068 G2.4.8

Control Room Evac.

Knowledge of how abnormal operating procedures are used in conjunction with EOPs.

Tier:	1	RO Imp:	RO Exam:	Cognitive Level:	High
Group:	2	SRO Imp: 4.5	SRO Exam: Yes	Source:	SN Bank MODIFIED

Applicable 10CFR55 Section: 43.b (5)

Learning Objective: 3-OT-AOI3000, 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, Fire Safe Shutdown, Rev 27; Note at beginning of Section 3.0, page 5.

Question:

Given the following plant conditions:

- Unit 1 was at 100% power when a Main Control Room (MCR) evacuation was required.
- The crew entered AOI-27, Main Control Room Inaccessibility.
- The crew performed ES-0.1, Reactor Trip Response, prior to leaving the MCR.
- While performing actions from the ACR a Safety Injection occurs.

Which ONE of the following will be the status of the MSIVs when the crew establishes control from the Aux Control Room and describes the correct procedure usage?

	<u>MSIV Status</u>	<u>Procedure Usage</u>
A.	Open	AOI-27 will be the controlling procedure because it is written with mitigating actions to respond to a Safety Injection.
B.	Open	E-0, Reactor Trip or Safety Injection, would be used because AOI-27 is written assuming no other accident is occurring.
C.	Closed	AOI-27 will be the controlling procedure because it is written with mitigating actions to respond to a Safety Injection.
D.	Closed	E-0, Reactor Trip or Safety Injection, would be used because AOI-27 is written assuming no other accident is occurring.

DISTRACTOR ANALYSIS

- Incorrect. AOI-27 directs the closure of the MSIVs prior to leaving MCR and is written to assume no other accident is occurring. Plausible because if the MSIVs were open, steam dump valves would be available and the AOI used for abandoning the MCR during an Appendix R fire is written for assuming a spurious SI occurs. (The Appendix R AOI is the controlling procedure during Appendix R fire).
- Incorrect. AOI-27 directs the closure of the MSIVs prior to leaving MCR and is written to assume no other accident is occurring. If an accident is occurring then the emergency procedure network would be used. Plausible because if the MSIVs were open, steam dump valves would be available and the emergency procedure network would be used because the AOI is written assuming no other accidents.
- Incorrect. AOI-27 directs the closure of the MSIVs prior to leaving MCR however and the AOI is written to assume no other accident is occurring. Plausible because the MSIVS are directed to be closed prior to leaving the MCR and the AOI used for abandoning the MCR during an Appendix R fire is written assuming a spurious SI occurs. (The Appendix R AOI is the controlling procedure during Appendix R fire).
- CORRECT. AOI-27 directs the MSIVs to be closed prior to leaving the MCR. The discussion section of the AOI states the MCR inaccessibility is not considered to occur with or subsequently with another accident.

Question Number: 884

K/A: W/E13 EA2. 1

Steam Generator Over-pressure

Ability to determine and interpret the following as they apply to the (Steam Generator Overpressure) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

Tier:	1	RO Imp:	RO Exam:	Cognitive Level:	High
Group:	2	SRO Imp: 3.4	SRO Exam: Yes	Source:	NEW

Applicable 10CFR55 Section: 43.5 / 45.13

Learning Objective: 3-OT-TI1204, Rev. 1, Objective 25: Describe when a Function Restoration Instruction can be exited or transitioned out of.

References: FR-H.2, Steam Generator Overpressure, Rev 5 page 3.
FR-H.3, Steam Generator High Level, Rev 6 page 3.**Question:**

Given the following:

- The crew is performing FR-H.2, Steam Generator Overpressure, for an overpressure condition on SG #2.
- When the step is addressed to check affected SGs NR level it is noted that the SG #2 level is indicating 94% narrow range.

Which ONE of the following identifies the correct crew actions as a result of the SG level indicating 94%?

- Continue in FR-H.2, but do not initiate any steam release until TSC evaluation is complete.
- Continue in FR-H.2, steam release may continue until NR level indicates 100%.
- Transition to FR-H.3, Steam Generator High Level, but do not initiate any steam release until TSC evaluation is complete.
- Transition to FR-H.3, Steam Generator High Level, steam release may continue until NR level indicates 100%.

DISTRACTOR ANALYSIS

- Incorrect. Plausible since the release of steam is prohibited with a high level (> 93%) condition until after a TSC evaluation is complete. Transition to FR-H.3 is directed from FR-H.2 at Step 3.
- Incorrect. The transition to FR-H.3 is required, however candidate may correctly conclude that FR-H.3 is lower in priority on the FR-H status tree and not recall the transition. Plausible since even when NR level indicates 100%, there is still significant volume before the steam generator fills with water.
- CORRECT. The RNO for the step directs the transition to FR-H.3 and FR-H.3 restricts the release of steam until a TSC evaluation is complete.
- Incorrect. The RNO for the step directs the transition to FR-H.3 and the release of steam is restricted until a TSC evaluation is complete if the level exceeds 93%, therefore with the level at 100%, the release will be restricted. Plausible since even when narrow range SG level indicates 100%, there is still significant volume before the steam generator fills with water.

Question Number: 10 85

K/A: W/E08 G2.4.18
 RCS Overcooling - PTS
 Knowledge of the specific bases for EOPs.

Tier:	1	RO Imp:	RO Exam:	Cognitive Level:	High
Group:	2	SRO Imp: 4.0	SRO Exam: Yes	Source:	NEW

Applicable 10CFR55 Section: 41.10 / 43.1 / 45.13

Learning Objective: 3-OT-FRP0001, Rev 10, Objective 9: Explain the basis for returning to the instruction in effect after identifying that RCS pressure \leq 150 psig and RHR is delivering flow when performing step 1 of FR-P.1.

References: FR-P.1, Pressurized Thermal Shock, Rev 14; TI-12.04, Users Guide for Abnormal and Emergency Instructions, Rev.0007.

Question:

Given the following:

- Unit 1 experienced a Reactor Trip and Safety Injection.
- The crew transitioned to FR-Z.1, High Containment Pressure, from E-1, Loss of Reactor or Secondary Coolant.
- While FR-Z.1 was being performed, the crew transitioned to FR-P.1, Pressurized Thermal Shock.
- The STA reports the containment pressure has dropped and the containment status tree is GREEN and that no other RED or ORANGE paths exist.

Which ONE of the following identifies the basis of the FR-P.1 step for checking RCS pressure greater than 150 psig, and the procedure the crew will implement if a transition is made from FR-P.1 during performance of the step?

- A. To preclude the need to perform FR-P.1 actions, since pressurized thermal shock is not a serious concern for a large-break LOCA;
Transition is made back to E-1.
- B. To preclude the need to perform FR-P.1 actions, since pressurized thermal shock is not a serious concern for a large-break LOCA;
Transition is made back to FR-Z.1.
- C. To avoid delays caused by unnecessary soak periods required by FR-P.1.
Transition is made back to E-1.
- D. To avoid delays caused by unnecessary soak periods required by FR-P.1.
Transition is made back to FR-Z.1.

DISTRACTOR ANALYSIS

- a. Incorrect. While a pressurized thermal shock is not a serious concern for a large-break LOCA, the transition will be back to FR-Z.1, not to E-1. Plausible, since basis is correct, and with the FR-Z.1 status green the candidate could conclude the return to E-1 will be required.
- b. CORRECT. A pressurized thermal shock is not a serious concern for a large-break LOCA because the system cannot repressurize with a large break LOCA. The step RNO will transition back to instruction in effect, which is FR-Z.1 even though the status tree for it is now green.
- c. Incorrect. The bases is not to prevent the soak periods, but the transition to E-1 is correct. Plausible because the procedure does contain modified SI termination criteria and SI will be terminated in the procedure which does reduce cooling to the core and the transition is correct.
- d. Incorrect. The bases is not to prevent the soak periods, and the transition to FR-Z.1 is not correct. Plausible because the procedure does contain modified SI termination criteria and SI will be terminated in the procedure which does reduce cooling to the core and with the FR-Z.1 status green the candidate could conclude the return to FR-Z.1 will be required.

WRITTEN QUESTION DATA SHEET**Question Number:** 11 & 6

K/A: 003 A2.05

Reactor Coolant Pump

Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Effects of VCT pressure on RCP seal leakoff flows.

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

Applicable 10CFR55 Section: 41.5 / 43.5 / 45.3 / 45/13**Learning Objective:** 3-OT-EOP0000, Objective 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:** ES-0.2, Natural Circulation Cooldown, Rev 20; SOI-68.02, Reactor Coolant Pumps, Rev 33.**Question:**

Given the following:

- Unit 1 was in Mode 2 with startup in progress when a loss of off-site power occurred.
- The decision was made to place the plant in Mode 5.
- The crew implemented ES-0.2, Natural Circulation Cooldown, and started cooling the plant down.
- Four (4) hours after the cooldown was initiated both trains of offsite power were restored to the plant.
- The crew determines all criteria to restart the RCPs are met except for the #1 seal leakoff flow on RCP #2 which is lower than the normal operating band.

Which ONE of the following identifies a change that causes an increase in the # 2 RCP seal leakoff flow and the actions to be taken and procedure to be used if the seal leakoff flow cannot be established within the normal operating band?

- A. Lower PRT pressure;
Start RCP #1, continue performing ES-0.2 until all RCS temperatures are less than 200°F, then transition to GO-6, Unit Shutdown From Hot Standby To Cold Shutdown.
- B. Lower PRT pressure;
Start the other 3 RCPs and immediately transition from ES-0.2 to GO-6, Unit Shutdown From Hot Standby To Cold Shutdown.
- C. Lower VCT pressure;
Start RCP #1, continue performing ES-0.2 until all RCS temperatures are less than 200°F, then transition to GO-6, Unit Shutdown From Hot Standby To Cold Shutdown.
- D. Lower VCT pressure;
Start the other 3 RCPs and immediately transition from ES-0.2 to GO-6, Unit Shutdown From Hot Standby To Cold Shutdown.

DISTRACTOR ANALYSIS

- a. Incorrect. Lowering the PRT pressure affects the #1 seal leakoff flow, but only if the leakoff flow path, which is routed to the VCT, is isolated. Plausible because starting an RCP provides forced circulation, and some spray flow correct and if ES-0.2 was continued until the end of the procedure, a transition to GO-6 would be made.
- b. Incorrect. Lowering the PRT pressure affects the #1 seal leakoff flow, but only if the leakoff flow path, which is routed to the VCT, is isolated. Plausible because starting the other 3 RCPs and transitioning to GO-6 after starting the RCPS is correct.
- c. Incorrect. Lowering the VCT pressure would allow increased seal leakoff flow, but ES-0.2 would not be continued after the RCP was started (a transition would be made to GO-6 when the pump was started.) Plausible because lowering the VCT pressure is correct and if ES-0.2 was continued until the end of the procedure, a transition to GO-6 would be made.
- d. CORRECT. Lowering the VCT pressure would allow increased seal leakoff flow and the other 3 RCPs are directed to be started if RCP #2 cannot be started.

Question Number: 1287

K/A: 012 G2.2.44

Reactor Protection

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: 2 RO Imp: RO Exam: Cognitive Level: High
 Group: 1 SRO Imp: 4.4 SRO Exam: Yes Source: NEW

Applicable 10CFR55 Section: 41.5 / 43.5 / 45.12

Learning Objective: 3-OT-AOI2100, Objective 7: Describe significance of loss of dc to Protection and Control systems (SOER 83-5, Rec 9)].

References: AOI-21.01, Loss of 125v DC Vital Battery Bd I, Rev 21; 45W600-99-1 R6; LCO 3.3.2.

Question:

Given the following:

- Unit 1 is at 100% power.
- 1-SI-99-10-B, 31 Day Functional Test of SSPS Train B and Reactor Trip Breaker B, is in progress with Reactor Trip bypass breaker (BYB) closed.
- Appendix F, Reactor Breaker Replacement, of 1-SI-99-10-B is in progress with Reactor Trip Breaker B (RTB) racked out.
- A feedwater transient occurs due to an electrical power loss, resulting in the MCR operator MANUALLY tripping the reactor.

When Tavg, Pressurizer Pressure, and SG levels are stabilized post trip, the following conditions are observed:

- All 4 Diesel Generators running but NOT connected to the shutdown boards.
- All Reactor Trip Breaker and Reactor Trip Bypass breaker indicating lights on 1-M-4 are DARK except for the GREEN light on the Reactor Trip Bypass Breaker B (BYB) which is LIT.

Which ONE of the following identifies both the position of Reactor Trip Breaker A (RTA) and the correct SRO decision relative to completing 1-SI-99-10-B following the stabilization of the plant and the electrical power restoration?

	<u>RTA Position</u>	<u>1-SI-99-10-B Status</u>
A.	Closed	The surveillance is required to be completed.
B.	Closed	The surveillance is NOT required to be completed with the plant in this Mode.
C.	Tripped	The surveillance is required to be completed.
D.	Tripped	The surveillance is NOT required to be completed with the plant in this Mode.

DISTRACTOR ANALYSIS

- Incorrect. RTA will be tripped by the UV coil. Plausible, if candidate does not correctly apply the function of the reactor trip breaker UV coil trip function but does realize the need complete the SI which is required even with the plant in MODE 3.
- Incorrect. RTA will be tripped by the UV coil and the SI is still required with the plant in Mode 3. Plausible, if candidate does not correctly apply function of the reactor trip breaker UV coil trip function and determines the SI would not be required to be completed because the plant is now in Mode 3.
- CORRECT. RTB and BYA will have no indicating lights lit because the breakers are racked out of the cubicles, BYB will be open and have green light lit; RTA will have no light lit due to a loss of 125v DC

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- control power, however, the UV coil on RTA will cause the breaker to open. The SI is required with the plant in MODE 3.
- d. Incorrect. The UV coil on RTA will cause the breaker to open, however will be isolated by closing 1-FCV-62-90 and 91 in accordance with the AOI. Plausible if the candidate correctly determines correctly the RTA position is correct but incorrectly determines SI would not be required to be completed because the plant is now in Mode 3.
-
-

Question Number: 43 

K/A: 061 A2.09

Auxiliary/Emergency Feedwater

Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Total loss of feedwater.

Tier: 2 RO Imp: RO Exam: Cognitive Level: High

Group: 1 SRO Imp: TBD SRO Exam: Yes Source: NEW

Applicable 10CFR55 Section: 41.5, 43.5

Learning Objective: 3-OT-SYS003B Auxiliary Feedwater System, Objective 26. Identify the steps to gain local control of the Turbine-Driven Auxiliary Feedwater pump and SG levels.

References: FRH.1, rev. 17.

Question:

Given the following:

- Following a reactor trip the plant experienced a total loss of feedwater.
- The condition caused the crew to initiate RCS bleed and feed.
- Subsequently the TDAFW pump was restored to service and the crew is ready to establish AFW flow to the selected steam generator.
- Other plant conditions include:
 - Selected SG Wide Range level is 4%.
 - RCS loop hot leg temperature at 558°F.
 - Core exit thermocouple temperatures are RISING.

In accordance with FR-H.1, Loss of Secondary Heat Sink, feedwater flow will be re-established to the selected SG at ...

- A. the minimum detectable flow gpm.
- B. less than 100 gpm until WR level >15%.
- C. a rate that causes wide range level to rise and RCS hot leg to drop.
- D. a maximum rate.

DISTRACTOR ANALYSIS

- a. Incorrect. Plausible, since the feedwater flow would be correct for the conditions where a steam generator was being fed to prevent dryout.
- b. Incorrect. Plausible, since the feedwater flow would be correct for the condition which meets the "hot, dry" conditions and core exit thermocouples are not rising.
- c. Incorrect. Plausible, since the feedwater flow would be correct for the condition where Core Exit thermocouples were stable or lowering.
- d. CORRECT. The maximum flow rate is only used if the steam generator meets the wide range level is <15% and RCS temperature is >550°F and core exit thermocouples are rising.

Question Number: 1489

K/A: 064 G2.2.37

Emergency Diesel Generator

Ability to determine operability and/or availability of safety related equipment.

Tier: 2 RO Imp: RO Exam: Cognitive Level: High
Group: 1 SRO Imp: 4.6 SRO Exam: Yes Source: NEW

Applicable 10CFR55 Section: 41.7, 43.5

Learning Objective: 3-OT-SYS082A, Obj. 13: State the Technical Specification requirements associated with AC Sources & DG Support Systems.

References: LCO 3.8.4, DC Sources Operating, including Basis. LCO 3.8.6, Table 3.8.6-1, incl. Basis.

Question:

Given the following conditions:

- The plant is shutdown In Mode 4 with all safety related equipment operable.
- During the performance of surveillance 0-SI-215-21-A, DIESEL GENERATOR 1A-A BATTERY QUARTERLY INSPECTION, it is reported that the Float Voltage values for three (3) connected cells are as follows:
 - Cell 17 = 2.09 v
 - Cell 34 = 2.06 v
 - Cell 39 = 2.12 v
- ALL other connected cells have Float Voltage values greater than 2.13 v.
- ALL other parameters measured during the above surveillance are normal.

Which ONE of the following describes the status of D/G 1A-A battery AND of the D/G 1A-A?

REFERENCE PROVIDED

<u>Status of Battery</u>	<u>Status of D/G 1A-A</u>
A. Battery is degraded but it can be considered operable for 31 days.	NO Tech Spec or tracking only entry required for DG.
B. Battery is degraded but it can be considered operable for 31 days.	Tech Spec tracking only entry required for DG.
C. Battery is inoperable.	DG is inoperable and Tech Spec tracking only entry is required.
D. Battery is inoperable.	DG is inoperable and Tech Spec entry is required.

DISTRACTOR ANALYSIS

- a. Incorrect. Plausible, since if cell voltages had been below Category B limits, but above Category C allowable limits, battery could be considered operable for 31 days.
- b. Incorrect. Plausible, since if cell voltages had been below Category B limits, but above Category C allowable limits, battery could be considered operable for 31 days.
- c. ~~Incorrect~~ → CORRECT. Per LCO 3.8.6, since Cell 34 voltage is less than 2.07v, it does not satisfy Category C requirements, which is Condition B of LCO 3.8.6. The battery is therefore inoperable. It is true the D/G is also inoperable, however, in Mode 4, only one train of D/Gs is required. The one inoperable D/G status would be tracked per Tech Spec tracking only.
- d. Correct → Incorrect. Plausible, since first part of distractor is true; however, candidate fails to recognize and apply knowledge that in the current plant mode, the one inoperable D/G only requires Tech Spec tracking, and NOT

Provide only the pages of LCO 3.8.6.

Handwritten notes: "Incorrect" with arrow to c, "Correct" with arrow to d, and a signature.

Per Post Exam Comment:
Diesel Required to be operable in Mode 4.

Question Number: 15 ⁴⁰

K/A: 076 A2.01

Service Water

Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of SWS.

Tier: 2 RO Imp: RO Exam: Cognitive Level: High
 Group: 1 SRO Imp: 3.7 SRO Exam: Yes Source: NEW

Learning Objective: 3-OT-AOI1300, Objective 4: Identify the general location of a rupture given a Hi strainer ΔP and low flow in the same hdr. 3-OT-TI1240, Objective 4: Describe the four "risk" levels used in the Equipment to Plant Risk Matrix and the significance of each level.

References: TI-124, Equipment To Plant Risk Matrix, Rev 14.
 AOI-13, Loss of Essential Raw Cooling Water, Rev 35.

Question:

Given the following conditions:

- Unit 1 is operating at 100% power.
- ERCW strainer 2B-B plugs.
- It is determined that the strainer must be isolated.

Which ONE of the following identifies the action directed by AOI-13, Loss of Essential Raw Cooling Water, to mitigate the isolation of the 2B strainer and the PSA risk status the plant will be in due to the strainer isolation?

<u>AOI-13 actions</u>	<u>PSA risk</u>
A. Realign cooling water to the A train diesel generators.	Orange
B. Crosstie the 2B header with the 1A header until strainer is repaired.	Orange
C. Realign cooling water to the A train diesel generators.	Red
D. Crosstie the 2B header with the 1A header until strainer is repaired.	Red

DISTRACTOR ANALYSIS

- a. Incorrect. The PSA risk is Red (high) not Orange for the isolation of the ERCW header. Plausible, since the action listed involves realignment of cooling water. The cooling water supply for the A train DGs will not be affected as a result of isolating the strainer and no DG cooling water alignment would be required.
- b. Incorrect. The PSA risk is Red (high) not Orange for the isolation of the ERCW header. Plausible, since crosstie of the headers would be performed in accordance with AOI-13.
- c. Incorrect. Plausible, since PSA risk is correct, and the action listed involves realignment of cooling water. The cooling water supply for the A train DGs will not be affected as a result of isolating the strainer and no DG cooling water alignment would be required.
- d. CORRECT. The 2B ERCW header will be crosstied with the 1A ERCW header during performance of AOI-13 and the PSA risk would be RED as identified in TI-124.

Question Number: 1691

K/A: 011 G2.1.32

Pressurizer Level Control

Ability to explain and apply system limits and precautions.

Tier:	2	RO Imp:	RO Exam:	Cognitive Level:	High
Group:	2	SRO Imp:	4.0	SRO Exam:	Yes
Applicable 10CFR55 Section:	41.10, 43.2				
Learning Objective:	3-OT-T-S0304, Objective 4: Given plant conditions and parameters correctly determine the applicable Limiting Conditions for Operations or Technical Requirements for the various components of the RCS.				
References:	LCO 3.4.9				

Question:

Given the following plant conditions:

- During a startup, the plant is in Mode 4.
- GO-1, Appendix C, Mode 4-to-Mode 3 Review and Approval, has been completed up to the last step, Operations Superintendent Hold Point, for granting approval to enter Mode 3.
- During scaffolding removal activities, a worker contacts the air line to 1-FCV-62-93, Charging Flow Control Valve, resulting in pulling the air line loose from the valve operator, such that the air system remains intact, due to crimping of the line on the air supply side of the break.

Which procedures will the Unit Supervisor use to respond to this event and the basis for taking quick action to limit the effects?

- A. The Unit Supervisor will use AOI-10, Loss of Control Air to direct actions to prevent Pressurizer level from exceeding 92% in order to maintain the presence of a steam bubble in the pressurizer.
- B. The Unit Supervisor will use AOI-10, Loss of Control Air, and direct actions to prevent the level decrease to less than 17% to ensure subcooling margin can be maintained.
- C. The Unit Supervisor will use SOI-62.01, CVCS-Charging and Letdown and direct actions to prevent the level decrease to less than 17% to ensure subcooling margin can be maintained.
- D. The Unit Supervisor will use SOI-62.01, CVCS-Charging and Letdown, to direct actions to prevent Pressurizer level from exceeding 92% in order to maintain the presence of a steam bubble in the pressurizer.

DISTRACTOR ANALYSIS

- a. Incorrect. Plausible, if a failed open charging flow control valve condition is not mitigated PZR level would increase to the point where the desired steam bubble would not be maintained.
- b. Incorrect. Plausible since it contains the correct procedure. Candidate incorrectly concludes that when 1-FCV-62-93, Charging Flow Control Valve, loses air it fails CLOSED. Using this incorrect conclusion, it is logical to see why a candidate would then conclude that Pressurizer level will lower. Candidate correctly recalls that there is a lower limit for Pressurizer level of 17%, and applies it to arrive at the concern for losing all banks of Pressurizer heaters resulting in a potential loss of desired subcooling.
- c. Incorrect. Plausible since it contains a procedure with a title similar to the conditions given in the stem. Candidate incorrectly concludes that when 1-FCV-62-93, Charging Flow Control Valve loses air it fails CLOSED. Using this incorrect conclusion, it is logical to see why a candidate would then conclude that Pressurizer level will lower. Candidate correctly recalls that there is a lower limit for Pressurizer level of 17%, and applies it to arrive at the concern for losing all banks of Pressurizer heaters resulting in a potential loss of desired subcooling.
- d. CORRECT. When 1-FCV-62-93 loses operating air, it fails OPEN, resulting in significantly more charging flow. If this is allowed to continue, Pressurizer level will exceed 92%, which could result PZR level increasing to the point where the desired steam bubble would not be maintained.. SOI-62.01 contains detailed action steps for isolating and bypassing 1-FCV-62-93, which will restore charging flow control to the control room, even with the normal flow control valve failed open.

Question Number: 1792

K/A: 075 A2.03

Circulating Water

Ability to (a) predict the impacts of the following malfunctions or operations on the circulating water system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Safety features and relationship between condenser vacuum, turbine trip, and steam dump.

Tier: 2 RO Imp: RO Exam: Cognitive Level: Low
 Group: 2 SRO Imp: 2.7 SRO Exam: Yes Source: NEW

Applicable 10CFR55 Section: 41.5, 43.5

Learning Objective: 3-OT-SYS027A, Objective 11: Describe the main condenser. 3-OT-AOI1700, Objective 1: Demonstrate knowledge of the Purpose/Goal of AOI, Rev. 9.

References: AOI-11, Loss of Condenser Vacuum, Rev. 27.

Question:

Given the following:

- Unit 1 was operating in Mode 1 at 14% reactor power.
- A loss of condenser vacuum occurs resulting in an automatic turbine trip.
- The operating crew stabilizes the plant.

Which ONE of the following identifies both how the condenser circulating water box ΔT s will be affected and the notifications required due to the turbine trip in accordance with SPP-3.5, Regulatory Reporting Requirements?

	<u>Water Box ΔT</u>	<u>Notifications required</u>
A.	Rises	Internal TVA notifications only
B.	Rises	NRC and Internal TVA notifications
C.	Lowers	Internal TVA notifications only
D.	Lowers	NRC and Internal TVA notifications

DISTRACTOR ANALYSIS

- Incorrect. Steam dumps are prevented from opening due to loss of vacuum. Therefore, no steam is entering the condenser, and water box ΔT will drop. The notifications required by SPP-3.5 are internal only. Plausible if candidate fails to recall the condenser vacuum interlock with steam dump operation but correctly identifies the required notifications.
- Incorrect. Steam dumps are prevented from opening due to loss of vacuum. Therefore, no steam is entering the condenser and water box ΔT will drop. The notification required by SPP-3.5 are internal only, no notification to the NRC is required. Plausible if candidate fails to recall the condenser vacuum interlock with steam dump operation and incorrectly identifies the required notifications.
- CORRECT. With a loss of condenser vacuum, steam dump operation is blocked. Therefore, no steam is entering the condenser, resulting in a lower ΔT across the condenser waterboxes. SPP-3.5 requires internal TVA notification be made due to the turbine trip.
- Incorrect. No steam is entering the condenser, resulting in a lower ΔT across the condenser waterboxes. The notification required by SPP-3.5 are internal only, no notification to the NRC is required. Plausible because the waterbox ΔT response is correct and candidate may incorrectly identify the required notifications.

Question Number: ~~48~~93

K/A: 086 G2.4.9

Fire Protection

Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.

Tier:	2	RO Imp:	RO Exam:	Cognitive Level:	High
Group:	2	SRO Imp: 4.2	SRO Exam: Yes	Source:	NEW

Applicable 10CFR55 Section: 45.5

Learning Objective: 3-OT-AOI-700, Rev. 10: Explain the 2 modes of maintaining the core cool & stable during flood mode operation.

References: AOI-7.01, Rev. 16.

Question:

Given the following:

- At 0100 Unit 1 entered Mode 3 during shutdown for a refueling outage.
- At 0200 AOI-7.01, Maximum Probable Flood, was implemented due to extremely heavy rainfall in the upstream watershed.
- At 1100 The plant is in Mode 4 on RHR with cooldown in progress with the RCS pressure 320 psig and temperature 220° F.
- At 1200 River System Operations (RSO) confirms the flood level at the plant is predicted to crest at El. 730' within the next 36 hours.

Which ONE of the following identifies both the Flood Stage Preparation level(s) that is/are required to be completed, and how the cooling of the core will be maintained in accordance with AOI-7 after the preparations are complete?

- Only the procedure for Stage 1 Preparations is required to be completed. Core cooling will be maintained by the steam generators with water being supplied by high pressure fire protection with the RHR system removed from service.
- Only the procedure for Stage 1 Preparations is required to be completed. Core cooling will be maintained by the Spent Fuel Pool cooling system crosstied with the RHR system.
- Both Stage 1 and Stage II Preparations procedures are required to be completed. Core cooling will be maintained by the steam generators with water being supplied by high pressure fire protection with the RHR system removed from service.
- Both Stage 1 and Stage II Preparations procedures are required to be completed. Core cooling will be maintained by the Spent Fuel Pool cooling system crosstied with the RHR system.

DISTRACTOR ANALYSIS

- Incorrect. Plausible, since method of maintaining core cooling is correct.
- Incorrect. Plausible, since Stage 1 preparation is part of the correct action. AOI-7.01, Attachment 2 Step 15 refers the operator to Appendix E, which will cross connect the RHR and SFPC systems if in open mode cooling configuration.
- CORRECT. Per given reference.
- Incorrect. Plausible, since the first part is correct. AOI-7.01, Attachment 2, Step 15 refers the operator to Appendix E, which will cross connect the RHR and SFPC systems if in open mode cooling configuration.

WRITTEN QUESTION DATA SHEET

Question Number: 1504

K/A: G2.1.23

Ability to perform specific system and integrated plant procedures during all modes of plant operation.

Tier:	3	RO Imp:	RO Exam:	Cognitive Level:	Low
Group:		SRO Imp: 4.4	SRO Exam: Yes	Source:	NEW

Applicable 10CFR55 Section: 41.10, 43.5

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 0034.

Question:Which ONE of the following satisfies the requirement of FHI-7 for the maximum number of fuel assemblies allowed outside of approved storage?

- A. Two unirradiated assemblies within the fuel-handling area.
- B. Two irradiated assemblies within the spent fuel storage pool boundary.
- C. One assembly in the transfer cart, two assemblies in the RCCA fixture and one assembly in the refueling machine mast over its proper location in the reactor vessel.
- D. One assembly in the transfer cart, two assemblies in the RCCA fixture and one assembly in the refueling machine mast over the reactor side upender.

DISTRACTOR ANALYSIS

- a. Incorrect. Only one unirradiated assembly can be outside of approved storage within the fuel -handling area.
 - b. Incorrect. Only one irradiated assembly can be outside of approved storage within the spent fuel storage pool boundary.
 - c. CORRECT. Per FHI-7, the assembly in the mast and over its proper location in the reactor vessel is allowed beyond the three allowed within the refueling canal; i.e., this answer specifies that three assemblies are within the refueling canal, two can be in the RCCA change fixture and one in the transfer cart.
 - d. Incorrect. The assembly in the refueling mast over the upender must be included in the 3 assemblies allowed within the refuel canal which would result in 4 assemblies outside approved storage in the refuel canal, thus exceeding the three allowed in the refueling canal area.
-

WRITTEN QUESTION DATA SHEET

Question Number: 2095

K/A: G2.1.34

Knowledge of primary and secondary plant chemistry limits.

Tier:	3	RO Imp:	RO Exam:	Cognitive Level:	Low
Group:		SRO Imp: 3.5	SRO Exam: Yes	Source:	NEW

Applicable 10CFR55 Section: 41.10, 43.5

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

References: CM-3.01, "System Chemistry Specifications", Appendix A, pp. 1, 2, 25, and 26; rev 72. Tech Requirement 3.4.4, Chemistry.

Question:

With the plant at full power, the Chemistry Lab has just informed the Unit Supervisor that the RCS chloride level is 1650 ppb and that the SG chloride level is 200 ppb. The source of any impurity ingress has NOT yet been identified.

Based on the reported values, (1) what is the MOST restrictive Action Level that must be entered and (2) the impact on plant operations caused by the Action Level entry?

- | | <u>(1)</u> | <u>(2)</u> |
|--|------------|--|
| A. Action Level 3 for RCS chloride level | | Initiate actions to take the reactor sub-critical as quickly as practicable in a controlled manner and reduce RCS temperature to < 250° F. |
| B. Action Level 3 for SG chloride level | | Initiate actions to take the reactor sub-critical as quickly as practicable in a controlled manner and reduce RCS temperature to < 250° F. |
| C. Action Level 2 for RCS Chloride level | | Restore parameter to below Action Level 1 within 24 hours or reduce reactor power to less than 5%. |
| D. Action Level 2 for SG Chloride level | | Restore parameter to below Action Level 1 within 24 hours or reduce reactor power to less than 5%. |

DISTRACTOR ANALYSIS

- CORRECT. Action Level 3, which is the most restrictive (requiring plant shutdown), applies due to RCS chloride exceeding 1500 ppb.
- Incorrect. Candidate incorrectly believes that Action Level 3 applies for SG chloride levels, when it is actually Action Level 2 (SG chloride exceeds 50 ppb, but does not exceed 250 ppb. Plausible because the impact on plant operations of a chemistry parameter being out-of-specification is correct.
- Incorrect. Candidate fails to recognize Action Level 3 conditions for RCS chloride. However, the distractor has plausibility because there is similar impact on plant operations if there were Action Level 2 conditions for RCS chloride.
- Incorrect. Plausible, since the Action Level for the given SG chloride value is correct. Further plausibility is added since there is a time value given to restore the parameter. However, it differs from the correct time (within 100 hours) by a factor of 4. The requirement to be at less than 5% power is incorrect.

WRITTEN QUESTION DATA SHEET

Question Number: 2196

K/A: G2.2.40

Ability to apply Technical Specifications for a system.

Tier:	3	RO Imp:	RO Exam:	Cognitive Level:	High
Group:		SRO Imp: 4.7	SRO Exam: Yes	Source:	NEW

Applicable 10CFR55 Section: 41.10/43.2/43.5/45.3**Learning Objective:** 3-OT-TS0307, Rev 3, Objective 5: Given plant conditions and parameters, determine applicable Action Conditions, Required Actions, and Completion Times associated with different Plant Systems. Objective 2: Determine the Bases for each specification, as applicable, to Plant Systems.**References:** TS 3.7.5 and Bases.**Question:**

Given the following

- Unit 1 at 100% power.
- Diesel Generator (DG) 2A-A is to be removed from service for a maintenance outage with a planned out of service of 102 hours.

Which ONE of the following identifies Unit 1 equipment that is listed in Tech Spec 3.8.1, AC Sources Operating, Bases Contingency Actions, as equipment that is to remain in service concurrently during the DG 2A-A outage maintenance to be in compliance with the Tech Spec?

- Reactor trip breaker A (RTA).
- TDAFW pump.
- RHR Pump 1B-B.
- Any S/G AFW level control valve.

DISTRACTOR ANALYSIS

- CORRECT. Tech Spec 3.8.1 Bases Table 3.8.1-2, TS Action or Surveillance Table (SR) Contingency Actions, Item 4 states "Do not remove reactor trip breakers from service concurrently during planned DG outage maintenance".
- Incorrect. The Bases Table item 5 states "Do not remove the turbine-driven auxiliary feedwater (AFW) pump from service concurrently with a Unit 1 DG outage". Plausible if the candidate misapplies the item to the Unit 2 DG outage.
- Incorrect. The Bases Table item 7 states "Do not remove the opposite train residual heat removal (RHR) pump from service concurrently with a Unit 1 DG outage". Plausible if the candidate misapplies the item to the Unit 2 DG outage.
- Incorrect. The Bases Table item 6 states "Do not remove the auxiliary feedwater level control valves to the steam generators from service concurrently with a Unit 1 DG outage". Plausible if the candidate misapplies the item to the Unit 2 DG outage.

WRITTEN QUESTION DATA SHEET

Question Number: 2297

K/A: G2.3.6

Ability to approve release permits.

Tier: 3	RO Imp:	RO Exam:	Cognitive Level: Low
Group:	SRO Imp: 3.8	SRO Exam: Yes	Source: NEW

Applicable 10CFR55 Section: 41.13 / 43.4 / 45.10

Learning Objective: 3-OT-SYS077B, Objective 10: Describe the general procedure to make a gaseous release.

References: SOI-77.02, Waste Gas Disposal System, Rev 0034.

Question:

Which ONE of the following identifies BOTH the minimum decay time required to allow the contents of a Gas Decay tank to decay prior to release and who can waive the minimum time in accordance with SOI-77.02, Waste Gas Disposal system?

	<u>Decay Time Required</u>	<u>Who Can Waive</u>
A.	60 days	Chemistry Duty Manager
B.	60 days	Radiation Protection Manager
C.	8 days	Chemistry Duty Manager
D.	8 days	Radiation Protection Manager

DISTRACTOR ANALYSIS

- CORRECT. The procedure requires a 60 day decay time and does provide for waiving of the time by the Chemistry Duty Manager.
- Incorrect. The decay time required is 60 days but the Radiation Protection Manager is not the position that can waive the requirement if earlier release is required. Plausible because the required time is for radioactive decay which could be addressed by RadCon.
- Incorrect. The decay time required is 60 days, not 8 days, but the waiving of the requirement by the Chemistry Duty Manager is allowed by the procedure. Plausible because 8 days is identified in the ODCM for Gaseous Effluents as being the half life of certain radionuclides that set dose rate limits at and beyond the Unrestricted Area Boundary.
- Incorrect. The decay time required is 60 days, not 8 days and the waiving of the requirement by the Radiation Protection Manager is not allowed by the procedure. Plausible because 8 days is identified in the ODCM for Gaseous Effluents as being the half life of certain radionuclides that set dose rate limits at and beyond the Unrestricted Area Boundary and because the required time is for radioactive decay which could be addressed by RadCon.

Question Number: 2898

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:	RO Exam:	Cognitive Level:	High
Group:		SRO Imp: 3.1	SRO Exam: Yes	Source:	NEW

Applicable 10CFR55 Section: 41.12, 43.4

Learning Objective: 3-OT-SYS090A, Rev. 13, Objective 8: Regarding Technical Specifications and Technical Requirements for this system: Explain the Limiting Conditions for Operation, Applicability, and Bases.

References: SOI-90.04, Section 3.0.B, and Section 5.1.[3], Rev. 6.
LCO 3.3.8, Table 3.3.8-1, including Basis; Drawing 45N600-30-4.

Question:

Given the following plant conditions:

- Unit 1 is in Mode 4 with preparations being made for fuel moves.
- As part of performing the Channel Operational Test (COT) for 0-RM-90-102, Spent Fuel Pool Pit Area Monitor, a source check is to be performed.

What is the effect of performing the source check portion of this test, and what is the SRO's responsibility for Tech Spec/LCO Tracking Sheet entry?

- This will result in an automatic actuation of Train A of ABGTS. The SRO will make an entry on the LCO Tracking Sheet that Train A of ABGTS is inoperable.
- RM-90-102 output will be blocked during the source check, the SRO will make an entry on the LCO Tracking Sheet that Train A of ABGTS is inoperable.
- RM-90-102 output will be blocked during the source check, the SRO will make an entry on the LCO Tracking Sheet that RM-90-102 is inoperable.
- This will result in an automatic actuation of Train A of ABGTS. The SRO will make an entry on the LCO Tracking Sheet that RM-90-102 is inoperable.

DISTRACTOR ANALYSIS

- Incorrect. Both parts are incorrect, but plausible, because of the close link between ABGTS (Auxiliary Building Gas Treatment System) operation and RM-90-102 (causes actuation of ABGTS). However, candidate incorrectly believes that the COT causes an automatic actuation of ABGTS.
- Incorrect. Candidate correctly understands that the COT requires blocking of the output of RM-90-102, which prevents it from actuating ABGTS, and concludes therefore, that the associated train of ABGTS is inoperable. This adds to the plausibility of this distractor, but it is incorrect, since a different LCO (LCO 3.7.12) governs the operability of the ABGTS train itself.
- CORRECT. This test requires blocking of the output of RM-90-102, which prevents it from auto actuating the associated train of ABGTS. This is done on purpose, to prevent inadvertent/undesired actuation of ABGTS. Further, this blocking renders the RM-90-102 inoperable.
- Incorrect. Candidate correctly concludes that this test renders RM-90-102 inoperable, but for the wrong reason. It is plausible, since there are other components in the plant, that if running, or actuated, are considered inoperable. However, candidate incorrectly believes that this test causes an auto actuation of the associated train of ABGTS.

WRITTEN QUESTION DATA SHEETQuestion Number: ~~24~~ 49

K/A: G2.4.23

Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.

Tier: 3	RO Imp:	RO Exam:	Cognitive Level:	Low
Group:	SRO Imp:4.4	SRO Exam: Yes	Source:	Modified Bank

Applicable 10CFR55 Section: 41.10, 43.5, 45.13

Learning Objective: 3-OT-EOP0300 Objective 5: Given a set of plant conditions, use E-3, ES-3.1, ES-3.2, and ES-3.3 to correctly diagnose and implement: Action Steps, RNOs, Foldout Pages, Notes and Cautions; Objective 6. Explain the basis for cooling the RCS to a target incore temp prior to depressurization of the RCS.

References: E-3, Steam Generator Tube Rupture, Rev. 22.

Question:

Given the following:

- Unit 1 experiences a Safety Injection due to a steam generator tube rupture on SG #1.
- All Reactor Coolant Pumps were removed from service due to loss of support systems.
- RCS cooldown at maximum rate to target incore temperature is in progress.
- The STA reports that a RED path for FR-P.1, Pressurized Thermal Shock, exists on RCS Loop 1 on the FR-0, Status Trees.

Which ONE of the following identifies when the transition to FR-P.1 should be made?

- A. Immediately transition to FR-P.1 from E-3 because FR-P.1 provides actions to limit cooldown and repressurization of the RCS.
- B. Remain in E-3 until the cooldown is complete and then transition to FR-P.1 only if the RED path still exists because the cooldown is needed to allow depressurization of the RCS.
- C. Remain in E-3 until the cooldown is complete and then transition to FR-P.1 even if the RED path no longer exists because the cooldown is needed to allow depressurization of the RCS.
- D. Remain in E-3 until the safety injection is terminated, then transition to FR-P.1 only if the RED path still exists because FR-P.1 provides actions to limit cooldown and repressurization of the RCS.

DISTRACTOR ANALYSIS

- a. Incorrect. Plausible, since the normal rules of usage would require implementation of FR-P.1 as soon as the condition was confirmed to exist.
- b. Incorrect. Plausible since a stagnant loop condition will exist in the loop associated with the ruptured SG with the RCPs off. CAUTION prior to the cooldown step in E-3 states that the anticipated red or orange path on FR-P.1 does not require implementation until after SI termination has been accomplished.
- c. Incorrect. Plausible since a stagnant loop condition will exist in the loop associated with the ruptured SG with the RCPs off. CAUTION prior to the cooldown step in E-3 states that the anticipated red or orange path on FR-P.1 does not require implementation until after SI termination has been accomplished.
- d. CORRECT. A stagnant loop condition will exist in the loop associated with the ruptured SG with the RCPs off. CAUTION prior to the cooldown step in E-3 states that the anticipated red or orange path on FR-P.1 does not require implementation until after SI termination has been accomplished. E-3 Note prior to Step 43 directs the operator to begin reevaluating for PTS/Cold Overpressure conditions. An evaluation of PTS is delayed to this point since the active SI would contribute to the erroneous red/orange path.

Question Number: ~~25~~ 100

K/A: G2.4.29

Knowledge of the emergency plan.

Tier: 3 RO Imp: RO Exam: Cognitive Level: High

Group: SRO Imp: 4.4 SRO Exam: Yes Source: NEW

Applicable 10CFR55 Section: 43.5, 45.11

Learning Objective: 3-OT-PCD-048C, Objective 7: Identify Operation's responsibilities for the following emergency response positions: Site Emergency Director (who is initially the SM).

References: EPIP-1, 3.3.7, rev. 29, SPP-3.5, Appendix A, 3.1, Rev. 19.

Question:

Given the following conditions:

- The plant is at full power.
- A report was received of a tornado being sighted over the Watts Bar Training Center, moving in a northwest direction. The tornado continued to move across Highway 68 and then dissipated without touching down onsite.
- The MCR crew has just entered AOI-8, Tornado Watch or Warning.
- Confirmation was received that no visible damage had been received to any structures or equipment on site.
- The Shift Manager evaluates the Radiological Emergency Plan (REP) and determines the conditions for an NOUE were initially met but are now fully resolved.

Which ONE of the following identifies the ODS and NRC notification requirements in accordance with the REP?

	<u>ODS notification</u>	<u>NRC Notification required within:</u>
A.	Report but not declare the event.	15 minutes.
B.	Report but not declare the event.	1 hour.
C.	Declare and terminate the event at the same clock time.	15 minutes.
D.	Declare and terminate the event at the same clock time.	1 hour.

DISTRACTOR ANALYSIS

- Incorrect. Plausible, since a declaration is not made, and a report is required, but candidate incorrectly believes that it needs to be made within fifteen minutes.
- CORRECT. Per EPIP-1, for events that are totally resolved prior to declaration, no declaration shall be made; however, a report to the NRC within one hour is required.
- Incorrect. Plausible, since the NRC must be notified, and since candidate may fail to recognize conditions have totally resolved and therefore no declaration is to be made.
- Incorrect. Plausible, since the notification to the NRC time is correct. Candidate fails to recognize that these conditions have totally resolved prior to declaration, and therefore that NO declaration should be made.