

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	055 G2.2.38	
	Importance Rating	3.6	

(K&A Statement) Station Blackout – Knowledge of conditions and limitations in the facility license
RO Question #1

Plant conditions:

- At 0500 this morning, a plant trip AND a loss of all AC power occurred

Which one of the following times is the longest time that the Station Batteries would continue to supply expected shutdown loads with an adequate battery terminal voltage?

- A. 0700 today
- B. 0900 today
- C. 1300 today
- D. 0500 tomorrow

Proposed Answer: B

Explanation:

- A. Plausible as the TS Basis assumption for the minimum of 2 hours of decay heat removal capability via the TDAFW pump.
- B. CORRECT. Per B 3.8.4 and 3.8.6, each battery is designed/expected to carry its expected shutdown loads for 4 hrs following a plant trip and loss of all AC power before battery terminal voltage falls below 108.6V, after accounting for line losses between the battery terminals and the load devices.
- C. Plausible because a student lacking detailed knowledge of the battery discharge basis could confuse the actual design basis with 8 hrs, which actually is the time limit required to establish the emergency backfeed procedure for the vital busses using the station unit transformer (11) as a backup to the EDGs.
- D. Plausible because a student lacking detailed knowledge of the battery discharge basis could confuse the actual design basis with 24 hrs, which for a station blackout event is the basis for the minimum permissible onsite diesel fuel inventory to allow the EDGs to operate at their design ratings for 24 hrs.

Technical Reference(s): TS Basis 3.8.6 (Attach if not previously provided)
FSAR 8.1.1.4,

Proposed references to be provided to applicants during examination: None

Learning Objective: REC00C 1.08 (As available)

Question Source: Bank # X
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 8
55.43

Comments: Meets K/A by requiring knowledge of a facility commitment described in the Technical Specification Basis. TS are a part of the facility license.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	003 K1.12	
	Importance Rating	3.0	

(K&A Statement) Reactor Coolant Pump System – Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: CCWS

RO Question #2

Given the following plant conditions:

- Plant is performing a cooldown per O-2.2, Plant Shutdown from Hot Shutdown to Cold Conditions
- RCS cold leg temperature is 280°F and lowering slowly
- RCS pressure is 320 psig and stable
- HCO reports that CCW surge tank level is lowering slowly

Which one of the following is the likely location of the leak?

- A. RCP oil coolers
- B. RHR heat exchanger
- C. Non-regenerative heat exchanger
- D. RCP thermal barrier heat exchanger

Proposed Answer: A

Explanation:

- A. CORRECT. RCP oil coolers are low pressure system, a CCW leak would be a loss of CCW
- B. Plausible because RHR cooling would be in service and a leak location is possible in the RHR heat exchanger, incorrect because RHR pressure is greater than CCW pressure.
- C. Plausible because the Non-regenerative heat exchanger is still in service and a possible leak location incorrect because Letdown pressure is greater than CCW pressure.
- D. Plausible because RCPs cooling would be in service and a leak location is possible in the RCP thermal barrier heat exchanger, incorrect because thermal barrier pressure is greater than CCW pressure.

Technical Reference(s): RAP03C, 1.02 and 2.01 (Attach if not previously provided)
R2801C, 1.03B and 1.04B

Proposed references to be provided to applicants during examination: None

Learning Objective: _____ (As available)

Question Source: Bank # C000.0980
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 3
55.43 _____

Comments: Meets K/A by requiring that the candidate demonstrate knowledge of the relative pressures associated with the CVCS, RCP oil pressure, RHR, and CCW systems in order to determine which components would result in in-leakage or out-leakage from the CCW system.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	011 EA1.07	
	Importance Rating	4.4	

(K&A Statement) Large Break LOCA – Ability to operate and monitor the following as they apply to a Large Break LOCA: Containment Isolation System

RO Question #3

Given the following sequence of events:

- Plant is at 100% power
- RCS pressure and PRZR level began lowering rapidly
- RCS pressure is now 900 psig and beginning to stabilize
- CNMT Sump B level is 113"
- The immediate actions of E-0, REACTOR TRIP OR SAFETY INJECTION, have been verified
- A-26, CONTAINMENT ISOLATION, is actuated

Which response describes (1) the status of A-26 and (2) the first required operator action to position any out-of-position Containment Isolation valve(s)?

- A. (1) Expected alarm;
(2) Instruct the AO to locally CLOSE the alternate isolation valve(s)
- B. (1) Expected alarm;
(2) Manually CLOSE from MCB
- C. (1) Not an expected alarm - it indicates that one or more valves are OPEN;
(2) Instruct the AO to locally CLOSE the alternate isolation valve(s)
- D. (1) Not an expected alarm - it indicates that one or more valves are OPEN;
(2) Manually CLOSE from MCB

Proposed Answer: B

Explanation:

- A. Plausible because the first part is correct. The second part would be correct if the MCB switch failed to close the valve. If that valve has an alternate isolation valve in the field vs. an alternate MCB isolation, then the AO would be directed to close the alternate isolation valve.
- B. CORRECT. Alarm A-26 means that a "T" Signal has been generated. A "T" Signal is generated on any automatic SI. Any out-of-position CIV light is DIM. In accordance with ATT. 27, the valve-specific controller is used to place the valve in the safeguards position regardless of whether (or not) SI and CI have been reset.
- C. Plausible if candidate does not know the source of the alarm. The second part would be correct if the MCB switch failed to close the valve. If that valve has an alternate isolation valve in the field vs. an alternate MCB isolation, then the AO would be directed to close the alternate isolation valve.
- D. Plausible if candidate does not know the source of the alarm. The second part is correct.

Technical Reference(s): ATT. 27, ATTACHMENT (Attach if not previously provided)
AUTOMATIC ACTION
VERIFICATION, Step 6
E-0, Step 6
AR-A-26

Proposed references to be provided to applicants during examination: None

Learning Objective: REP00C 2.01 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments: Meets K/A by requiring knowledge of the meaning of a CIV-related alarm actuating during a LBLOCA and the required action at the MCB.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	015/017	AK3.04
	Importance Rating	3.1	

(K&A Statement) RCP Malfunctions – Knowledge of the reasons for the following responses as they apply to the Reactor Coolant Pump (Loss of RC Flow) malfunctions: Reduction of power to below the steady state power-to-flow limit.

RO Question #4

Plant conditions:

- 30% power with all controllers in AUTO
- 'A' RCP breaker has just tripped

In response to this event, (1) what automatic or manual action should occur, and (2) what is the reason for this action?

- A. (1) Automatic reactor trip; (2) DNB concern
- B. (1) Manual reactor trip; (2) DNB concern
- C. (1) Automatic reactor trip; (2) kW/foot concern
- D. (1) Manual reactor trip; (2) kW/foot concern

Proposed Answer: A

Explanation:

- A. CORRECT. Power > P-8 (25%) will cause an automatic reactor trip signal if one (1) RCP is stopped. Both the single and total loss of flow trips are DNB limit concerns.
- B. Plausible because the r AR-D-17, REACTOR COOLANT PUMPS TRIPPED, alarm response would require a reactor trip for a single RCP trip if the reactor trip breakers are shut. However, it is NOT an immediate action and would only be done as directed by the AR procedure. The second response is correct. If less P-8 ITS 3.4.4 allows 6 hours to reduce power < 8.5%
- C. Plausible because the first statement is correct – an automatic reactor trip will occur. The second statement is incorrect – loss of RCP flow is a DNB concern.
- D. Plausible, but neither response is correct for reasons given above.

Technical Reference(s): ITS Basis: 3.4.4-1 (Attach if not previously provided)
ITS Basis: 3.3.1-17

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP14C, 2.01 (As available)

Question Source: Bank #
Modified Bank # X 2009 Turkey Point NRC
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 5, 10
55.43

Comments: Meets K/A by requiring knowledge of the reason for the reactor trip requirement for single loop loss of flow trip and the ITS basis for those trips.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	022 AA2.01	
	Importance Rating	3.2	

(K&A Statement) Loss of Reactor Coolant Makeup – Ability to determine and interpret the following as they apply to Loss of Reactor Coolant Makeup: Whether charging line leak exists

RO Question #5

Plant conditions:

- 100% power with all major controllers in AUTO
- Pressurizer Level is 56% and slowly lowering
- VCT Level is 30% and lowering slowly
- Charging Pump speed is slowly rising
- RCS Makeup controls are in AUTO
- Letdown Flow is stable at 40 GPM
- REGEN Heat Exchanger inlet temperature is normal
- REGEN Heat Exchanger outlet temperature is below the alarm setpoint, but higher than normal and slowly rising

Which one of the choices describes the reason for existing plant conditions?

- A. The Reactor Coolant Filter is blocked
- B. There is a leak in the letdown line, after the flow sensor
- C. LCV-112A, Letdown Diversion Valve, is partially open to the divert flowpath
- D. There is a leak in the charging line before HCV-142, Charging Flow Control Valve

Proposed Answer: D

Explanation:

- A. Plausible because the candidate could assume this would block the letdown flow path to the VCT, resulting in lowering VCT level, however relief V-209 would lift resulting in small changes if any to the VCT level
- B. Plausible because it would result in lowering VCT level and AUTO M/U response. However, charging pump speed would not be affected.
- C. Plausible because this would result in a lowering VCT level, but there would be no charging pump speed response.
- D. CORRECT. This would result in charging pump speed rising to maintain PZR level, lowering VCT level.

Technical Reference(s): AP-CVCS.1, Step 6 (Attach if not previously provided)Proposed references to be provided to applicants during examination: NoneLearning Objective: RAP05C 2.01 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments: Meets K/A by requiring diagnosis of plant conditions indicative of a charging line leak in the Aux. Bldg. All choices are CVCS-related (2 Charging and 2 Letdown) to cover the range of the abnormal procedure actions and all of them are inside the Auxiliary Building. Higher order because conditions must be properly analyzed to arrive at the correct answer.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	025 AK3.01	
	Importance Rating	3.1	

(K&A Statement) Loss of RHR System - Knowledge of the reasons for the following responses as they apply to the Loss of RHR System: Shift to alternate flowpath

RO Question #6

Given the following plant conditions:

- Plant is in Mode 5
- Bus 11B is de-energized for bus maintenance
- RCP 'A' is tagged out for maintenance
- Both Steam Generators are at 52% narrow range level
- Both RHR Pumps have tripped, and neither RHR Pump can be restarted
- The crew is performing AP-RHR.1, LOSS OF RHR
- RCS pressure is 320 PSIG and stable
- RCS temperatures are 220°F and slowly rising

Which of the following will be the action taken in AP-RHR.1 for these conditions?

- A. Continue efforts to restore RHR by venting the RHR system
- B. Start 'B' RCP and stabilize RCS temperatures by dumping steam
- C. Dump steam to establish natural circulation to stabilize RCS temperature
- D. Establish conditions to use the RCDT pump per ER-RHR.1, RCDT PUMP OPERATION FOR CORE COOLING

Proposed Answer: C

Explanation:

- A. Plausible because this is an action called for in the abnormal procedure, but is not performed if RHR temperature is $> 200^{\circ}\text{F}$.
- B. Plausible because the first priority action is to start a RCP in accordance with ATT. 15 and then maintain or lower RCS temperature, but with Bus 12B out of service the 'B' RCP is not available.
- C. CORRECT. With no RCPs available, dumping steam and establishing natural circulation is the alternate method for establishing cooling
- D. Plausible because the ER-RHR.1, RCDT PUMP OPERATION is correct if cooling cannot be establish using the S/Gs, however only used if RCS press is less than 100 psig.

Technical Reference(s): AP-RHR.1, Steps 15 - 17 (Attach if not previously provided)Proposed references to be provided to applicants during examination: NoneLearning Objective: RAP18C 2.01 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments: Meets K/A by requiring knowledge that establishing heat removal and diagnosing that adequate heat removal has resulted is the reason for the LO RHR procedural actions. Higher order determination is based on prioritizing the procedure path when the initial conditions are met for performing either path.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	026 AA1.06	
	Importance Rating	2.9	

(K&A Statement) Loss of Component Cooling Water – Ability to operate and/or monitor the following as they apply to the Loss of Component Cooling Water: Control of flow rates to components cooled by the CCWS

RO Question #7

Plant conditions:

- 100% power
- Component Cooling Water (CCW) Surge Tank level began to lower
- The operating crew entered AP-CCW.2, LOSS OF CCW DURING POWER OPERATION
- CCW Surge Tank Level has stabilized using the normal makeup supply from RMW
- An AO dispatched has reported that Seal Water Return Heat Exchanger flows and temperatures are outside of normal readings
- MOV-313, SEAL/EXCESS LTDN RTN ISO, remains OPEN
- The Seal Water Return Heat Exchanger has been bypassed and isolated

Which of the following describes the expected response of:

- (1) Volume Control Tank (VCT) temperature; and
- (2) Pressurizer Relief Tank (PRT) level

- A. (1) Rises; (2) Rises
- B. (1) Rises; (2) Remains the same
- C. (1) Remains the same; (2) Rises
- D. (1) Remains the same; (2) Remains the same

Proposed Answer: B

Explanation :

- A. Plausible because the first part is correct. The second part would be correct if the seal water heat exchanger was not bypassed and the return flow path was through relief V-314 while the leak location diagnosis is in progress.
- B. CORRECT. Seal Water return flow is going directly to the VCT (without cooling) but, since MOV-313 remains open, then the relief in the return line will not be opening to the PRT.
- C. Plausible because this would be correct if the seal water heat exchanger was not bypassed and the return flow path was through relief V-314 .
- D. Plausible if candidate thinks that seal water return flow will discharge to another tank (e.g., RCDT) thru relief V-314

Technical Reference(s): AP-CCW.2, Steps 6 & 7 (Attach if not previously provided)Proposed references to be provided to applicants during examination: NoneLearning Objective: RAP02C 2.01 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments: Meets K/A by monitoring condition of related parameters while CCW flow is secured to a component that it serves. Higher order because there is a procedural option to isolate rather than bypass the Seal Water HX and the answer is different for each option.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	029 EK2.06	
	Importance Rating	2.9	

**(K&A Statement) ATWS – Knowledge of the interrelations between the ATWS and the following:
Breakers, relays and disconnects**

RO Question #8

Plant conditions:

- Reactor Trip Breaker testing is in progress on Train "A".
- "A" Reactor Trip Breaker is open.
- "A" Reactor Trip Bypass Breaker is closed.
- A transient occurs initiating an AUTOMATIC Reactor Trip signal.
- The Reactor does NOT trip from the AUTOMATIC signal.

Which of the following describes the condition that has contributed to the Reactor Trip failure?

Reactor Trip...

- A. Breaker "B" Undervoltage Trip coil failed to energize.
- B. Bypass Breaker "A" Undervoltage Trip coil failed to deenergize.
- C. Bypass Breaker "A" Shunt Trip coil failed to energize.
- D. Breaker "B" Shunt Trip coil failed to deenergize.

Proposed Answer: B

Explanation:

- A. Plausible because Breaker "B" is equipped with an undervoltage trip coil, however, trip coils are normally energized and deenergize on a trip signal.
- B. CORRECT. Given the conditions listed, the Bypass Breaker Undervoltage Trip coil failed to deenergize.
- C. Plausible because the Shunt Trip coil is designed to energize and trip open the breaker, however, Bypass Breaker Shunt Trip only energizes on a Manual reactor trip.
- D. Plausible because Breaker "B" is equipped with a Shunt Trip coil, however, it energizes to trip.

Technical Reference(s): FR-S.1, Step 7 (Attach if not previously provided)
FSAR 7.2.2.1.5, FIG 7.2-20

Proposed references to be provided to applicants during examination: None

Learning Objective: RFRS1C 2.01, R3501C 1.02 (As available)

Question Source: Bank # X Comanche Peak 2011 NRC
Modified Bank #
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 6
55.43

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	038 G2.4.1	
	Importance Rating	4.6	

(K&A Statement) Steam Generator Tube Rupture: Knowledge of EOP entry conditions and immediate action steps

RO Question #9:

Plant conditions:

- A small-break LOCA has occurred
- The crew is performing ES-1.2, POST-LOCA COOLDOWN AND DEPRESSURIZATION
- All SI pumps have been secured
- All available charging pumps are running at maximum speed
- The CO reports 'A' S/G level is rising in an uncontrolled manner
- RCS Pressure is 1800 PSIG and lowering
- Pressurizer Level is 7% and lowering

Which response describes: (1) operator action required per the FOLDOUT page and (2) the required procedure transition?

- A. (1) Manually start SI Pumps;
(2) go to E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1
- B. (1) Manually start SI Pumps;
(2) go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1
- C. (1) Manually actuate SI and CI
(2) go to E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1
- D. (1) Manually actuate SI and CI
(2) go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1

Proposed Answer: B

Explanation:

- A. Plausible because the first part is correct and the second part would be correct for the foldout page actions if ES-0.1 was being performed. Other EOP series procedures direct the crew to stay in the procedure (E-1, ES-1.1), but E-3 has its own transition on the ES-1.2.FOLDOUT page.
- B. CORRECT. The foldout page for ES-1.2 directs the operator to start SI Pumps as necessary then go to E-3, Step 1 on symptoms of S/G level rising uncontrollably or develops abnormal radiation.
- C. Plausible because this would be the expected operator action (in most procedures) when an SI setpoint (PRZR Pressure) is rapidly approaching. However, ES-1.2 specifically directs deliberate manual action to start SI pumps as necessary and a transition to E-3.
- D. Plausible because this would be the expected operator action (in most procedures) when an SI setpoint (PRZR Pressure) is rapidly approaching. The second part is correct.

Technical Reference(s): ES-1.2, FOLDOUT PAGE (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RES12C 1.04 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments: Meets K/A by requiring knowledge of the correct use of the EOP's for a S/G Tube Rupture while another EOP is in progress. There are no specific immediate actions for a S/G Tube Rupture. Higher order because the candidate must evaluate the initial conditions and apply the specific requirements of ES-1.2 whereas the usual action for an SI signal after the E-0 immediate actions have been completed is to return to E-0, Step 1 ('A' S/G level increasing in an uncontrolled manner, SI pumps secured); making "B" correct.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	027 AK2.03	
	Importance Rating	2.6	

(K&A Statement) Pressurizer Pressure Control System (PZR PCS) Malfunction - Knowledge of the interrelations between the Pressurizer Pressure Control Malfunctions and the following: Controllers and positioners.

RO Question #10

Plant conditions:

- 100% power with all major controllers in AUTO
- PRZR Backup Heaters are ON
- Normal controlling channel input selected for 431K, PRZR PRESS CONTROLLER
- RCS Pressure Channels (PT-420 & PT-420A) are 2260 psig and rising

Assuming no operator action is taken, which ONE of the following identifies the failed channel, AND includes the system response to this failure?

- A. PT-429 failed; the PRZR spray valves will modulate open
- B. PT-429 failed; one PRZR PORV will open
- C. PT-449 failed; the PRZR spray valves will modulate open
- D. PT-449 failed; one PRZR PORV will open.

Proposed Answer: D

Explanation:

- A. Plausible since there are two control channels and the candidate who lacks detailed knowledge may confuse the purpose of PT-429. PT-429 is a control channel but is not the normally selected controlling channel. Spray valves will not open due to the controlling channel failure LOW.
- B. As noted above, the candidate who lacks detailed systems knowledge may confuse their functions; PT-429 is not the normally selected controlling channel.
- C. Plausible because PT449 has failed low to turn on heaters, and sprays would not operate due to low pressure signal from 431K
- D. CORRECT. Due to the malfunction, spray valves will not respond to the pressure increase, due to the controlling channel failing low. However, 429 and 430 will open PORV-430 when pressure rises to 2335 psig.

Technical Reference(s): P-10, STEP 5.2.C.3 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RIC02C 1.06 (As available)

Question Source: Bank # _____

Modified Bank # 2010 NA (Note changes or attach parent)

NRC _____

New _____

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____

Comprehension or Analysis X _____

10 CFR Part 55 Content: 55.41 7 _____

55.43 _____

Comments: Meets K/A by requiring evaluation of various Pressurizer Pressure sensors to determine the input/output of Master Pressure controller. Higher order because analysis and comparison of conditions is required to answer correctly.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	054 AK1.02	
	Importance Rating	3.6	

(K&A Statement) Loss of Main Feedwater – Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): Effects of feedwater introduction on dry S/G

RO Question #11

Plant conditions:

- The crew is performing FR-H.5, RESPONSE TO STEAM GENERATOR LOW LEVEL, for "A" S/G
- "A" S/G wide range level is 20 inches
- Containment Pressure is 0.5 psig

Which of the following choices accurately completes the following statements:

A S/G is considered "dry" when Wide Range Level indicates less than (1) inches.

Feed flow is NOT established to a "dry" S/G because (2).

- A. (1) 50;
(2) significant thermal stresses could be caused on S/G components when the relatively cold feedwater flow is reinitiated
- B. (1) 50;
(2) feedwater introduction could result in an uncontrolled RCS cooldown and reduction in shutdown margin
- C. (1) 120;
(2) significant thermal stresses could be caused on S/G components when the relatively cold feedwater flow is reinitiated
- D. (1) 120;
(2) feedwater introduction could result in an uncontrolled RCS cooldown and reduction in shutdown margin

Proposed Answer: A

Explanation:

- A. CORRECT. Setpoint as indicated in FR-H.5. Affected SG is not fed because the thermal stresses caused by cold water introduction could cause internal failures. YELLOW Path procedure because one SG is available for heat removal. If both SG's were "dry" then FR-H.1 would be in effect.
- B. Plausible because the setpoint is correct. The basis statement is one of the reasons for isolating feed to a faulted SG but is not correct for a dry SG.
- C. Plausible because the setpoint is used in FR-H.1 for initiation of feed and bleed but that is when both SG's are below 120" with containment pressure less than 4 PSIG. The basis statement is correct.
- D. Plausible because the setpoint is used in FR-H.1 for initiation of feed and bleed but that is when both SG's are below 120" with containment pressure less than 4 PSIG. The basis statement is one of the reasons for isolating feed to a faulted SG but is not correct for a dry SG.

Technical Reference(s): FR-H.5, Step 4 (Attach if not previously provided)
RFRH5C, C.8

Proposed references to be provided to applicants during examination: None

Learning Objective: RFRH5C 1.02 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments: Meets K/A by requiring knowledge of the facility definition for a "dry SG" and the basis for requiring an engineering evaluation prior to feeding.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	008 AK2.02	
	Importance Rating	2.7	

(K&A Statement) Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) – Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: Sensors and Detectors

RO Question #12

Plant conditions:

- 100% power
- Alarm F-19, PRZR PORV OUTLET HI TEMP 145°F, actuated
- PORV 431C indicates open and cannot be closed
- MOV-515, PORV 431C BLOCK VLV, cannot be closed
- RCS pressure is 2035 psig and lowering
- PRT pressure is 5 psig and rising

The HCO is monitoring TI-438 (PZR PORV Outlet Temperature)

Based on current plant conditions the indicated reading on TI-438 will be (1) and (2) until the PRT rupture disc ruptures.

- A. (1) 230 °F
(2) rises as PRT pressure rises
- B. (1) 230 °F
(2) lowers as RCS pressure lowers
- C. (1) 639 °F
(2) lowers as RCS pressure lowers
- D. (1) 639 °F
(2) rises as PRT pressure rises

Proposed Answer: A

Explanation:

- A. CORRECT. Isenthalpic process and, for the stated conditions, moving up the curve on the Mollier diagram.
- B. Plausible because the first part is correct. The second part would be correct if applicant believes that the indicator will track with PRZR temperature/pressure.
- C. Plausible if applicant believes that the indicator approximates PRZR steam space temperature. The second part is correct if applicant believes that the indicator will track with PRZR temperature/pressure.
- D. Plausible if applicant believes that the indicator will track with PRZR temperature(s). The second part would be correct

Technical Reference(s): Steam Tables (Attach if not previously provided)
AR-F-19

Proposed references to be provided to applicants during examination: Steam Tables

Learning Objective: REP01C 1.03 (As available)

Question Source: Bank # _____
Modified Bank # C330.0245 (attach parent)
New _____

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments: Meets K/A by requiring prediction of the response of a related sensor/detector during the specified accident. Higher order because it requires analysis of the conditions and proper application of the stated reference.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	056 G2.1.28	
	Importance Rating	4.1	

(K&A Statement) Loss of Off-site Power – Knowledge of the purpose and function of major system components

RO Question #13

Plant conditions:

- 100% power
- A loss of offsite circuits 767 and 7T has occurred
- 'A' D/G is running and loaded at 1700 KW
- 'B' D/G did not start
- Pressurizer pressure is 2200 psig and slowly lowering
- The crew is preparing to energize PRZR heaters

Which choice accurately completes the following statements?

In this alignment, power is available to the (1) Group of pressurizer heaters. When the pressurizer heaters are energized, then D/G "A" loading would initially be within the (2) load rating.

- A. (1) Backup; (2) continuous
- B. (1) Backup; (2) two-hour
- C. (1) Proportional; (2) continuous
- D. (1) Proportional; (2) two-hour

Proposed Answer: D

Explanation:

- A. Plausible because the backup heaters are powered from a vital bus but they would be fed from D/G B. The backup and proportional group heaters are both rated at about 400 KW and, for the stated conditions, would exceed the 1950 continuous rating.
- B. Plausible because the backup heaters are powered from a vital bus but they would be fed from D/G B. The second part is correct with load exceeding 1950 KW but less than the 2 hours rating of 2250 KW.
- C. Plausible because the first part is correct in that the proportional heaters can be energized from Bus 14 via D/G A. The backup and proportional group heaters are both rated at about 400 KW and, for the stated conditions, would exceed the 1950 continuous rating.
- D. CORRECT. The proportional heaters can be energized from Bus 14 via D/G A. The second part is correct with load exceeding the 1950 KW continuous rating but less than the 2 hours rating of 2250 KW.

Technical Reference(s): AP-ELEC.1, Step 16 (Attach if not previously provided)
P-12, 4.4.3

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP07C 1.06 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments: Meets K/A by requiring knowledge of the capabilities and limitations of the D/G during a loss of off-site power. Higher order because the candidate must determine which heaters have power available, their load rating, and apply that to the current loading.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	058 AA2.03	
	Importance Rating	3.5	

(K&A Statement) Loss of DC Power – Ability to determine and interpret the following as they apply to the Loss of DC Power: DC loads lost; impact on ability to operate and monitor plant systems

RO Question #14

Plant conditions:

- 100% power
- 'A' 125V DC Bus is de-energized due to a ground
- The Rx tripped when the "A" 125V DC bus de-energized
- A small break LOCA occurs after the reactor trip
- RCP trip criteria is met

Which of the following describes:

- (1) SI equipment response; AND
 - (2) The necessary action(s) regarding RCP operation to mitigate the event?
-
- A. (1) All SI equipment starts automatically
(2) 'A' RCP cannot be tripped until DC control power is transferred
 - B. (1) All SI equipment starts automatically
(2) Both RCPs can be tripped from the Control Room
 - C. (1) 'B' SI Train equipment starts automatically; manually start 'A' Train SI equipment
(2) 'A' RCP cannot be tripped until DC control power is transferred
 - D. (1) 'B' SI Train equipment starts automatically; manually start 'A' Train SI equipment
(2) Both RCPs can be tripped from the Control Room

Proposed Answer: C.

Explanation :

- A. AUTO and MANUAL SI are disabled. Plausible, some DC control power will automatically shift (480 volt buses) but the automatic equipment start of "A" train loads will not occur, manual start of those "A" train motors is required. RCPs action is correct DC control power has to be locally transferred.
- B. Plausible, some DC control power will automatically shift (480 volt buses) but the automatic equipment start of "A" train loads will not occur. 4160-RCPS DC control power has to be locally transferred.
- C. CORRECT. "A" train loads must be manually started, 4160-RCPS DC control power has to be locally transferred.
- D. First response is correct "A" train loads must be manually started. Second response is plausible due to 480v motor DC control power automatically shifting. 4160-RCPS DC control power has to be locally transferred second response is not correct.

Technical Reference(s): ER-ELEC.2, step 6.1 (Attach if not previously provided)
AR-L4 & L31

Proposed references to be provided to applicants during examination: None

Learning Objective: RER07C 2.0 (As available)

Question Source: Bank # C000.1290
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments: Meets K/A by considering the implications of a DC-related alarm on operator response if an accident were to occur. Higher order because the conditions must be properly evaluated..

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	062 AA1.07	
	Importance Rating	2.9	

(K&A Statement) Loss of Nuclear Service Water - Ability to operate and/or monitor the following as they apply to the Loss of Nuclear Service Water (SWS): Flow rates to the components and systems that are serviced by SWS; interactions among components

RO Question #15

Initial plant conditions:

- The plant is at 100% power
- 'B', 'C' and 'D' Service Water Pumps are in service
- SW Loop 'A' Header Pressure is 72 psig
- SW Loop 'B' Header Pressure is 77 psig
- Crew is swapping 'A' and 'B' SW pumps

After starting 'A' SW pump and stopping 'B' SW pump:

- PPCS-P2160, SERVICE WATER PUMPS A & B HEADER, actuates
- SW Loop 'A' Header Pressure is 45 psig
- SW Loop 'B' Header Pressure is 78 psig
- After being directed, the AO reports the following pump discharge pressures:
 - SW Pump 'A', PI-2098 = 42 psig
 - SW Pump 'B', PI-2099 = 40 psig
 - SW Pump 'C', PI-2100 = 78 psig
 - SW Pump 'D', PI-2101 = 77 psig

Based upon these indications, which of the following would explain the low pressure conditions on the 'A' SW loop?

- A. New running pump configuration
- B. SW Leak has developed on the 'A' train
- C. 'A' SW pump discharge check valve 4601 is open
- D. 'B' SW pump discharge check valve 4602 is open

Proposed Answer: D

Explanation:

- A. Plausible because for a three SW pump configuration the, loop header pressures are normally slightly skewed with a single pump in operation in a header, thus the candidate may not recognize that the pressures and indications given are based on a Discharge check valve sticking open and believe that a lower header pressure is due to pump operating characteristics and the one pump operating in Loop 'A. . .
- B. Plausible because the candidate may believe that a leak has developed contributing to the lower SW Loop 'A header pressure and the PPCS alarm P2160. This is not consistent with the SW pump pressures locally reported by the AO which indicate a stuck open check valve. .
- C. Plausible because the candidate may recognize that a stuck open discharge check valve condition exists by the indications given, believing that this may be due to the problem being associated with the SW Pump A which has just been started.
- D. CORRECT. These indications are consistent with a stuck open Discharge check valve. AP-SW.1 addresses this situation with a note, ahead of step 3, discusses an abnormally low pressure in either SW Loop may indicate that the idle pump check valve is open. The AO's report of pressure indicated on PI-2099 (idle pump), is a sign that the check valve is sticking open. The pressure instrument taps off between the pump and the discharge check valve and would indicate approximately zero if the check valve were closed.

Technical Reference(s): AP-SW.1, Step 3 Note and Step 6 (Attach if not previously provided)

AR-PPCS-P2160

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP33C 2.01 (As available)

Question Source: Bank #
Modified Bank # C076.0032 (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	W/E04 EK1.2	
	Importance Rating	3.5	

(K&A Statement) LOCA Outside Containment – Knowledge of the operational implications of the following concepts as they apply to the LOCA Outside Containment: Normal, abnormal and emergency operating procedures associated with LOCA Outside Containment

RO Question #16

Plant Conditions:

- A LOCA has been identified outside Containment
- The crew transitioned from E-0 to ECA-1.2, LOCA OUTSIDE CONTAINMENT
- The crew isolated the LOCA and has reached the exit point of ECA-1.2

From the above information, what procedure would be entered NEXT upon exiting ECA-1.2?

- A. E-0, REACTOR TRIP OR SAFETY INJECTION, at the step in effect
- B. ES-1.2, POST-LOCA COOLDOWN AND DEPRESSURIZATION
- C. E-1, LOSS OF REACTOR OR SECONDARY COOLANT
- D. ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION

Proposed Answer: C

Explanation:

- A. Plausible because this is a frequent direction in the EOP network.
- B. Plausible because the candidate may believe that having been in a LOCA procedure, the subsequent plant cooldown should be performed using the guidance in ES-1.2, the POST-LOCA cooldown procedure.
- C. CORRECT. E-1 is the only transition directed in ECA-1.2, after RCS pressure rises. This ensures that nothing else is in progress before terminating SI.
- D. Plausible because ECA-1.1 is the procedure that is transitioned to IF the LOCA outside CNMT cannot be isolated in ECA-1.2.

Technical Reference(s): ECA-1.2, Step 8.b (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: REC12C 2.01 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments: Meets K/A by requiring knowledge of next procedure to be implemented after successful completion of ECA-1.2.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	W/E05 EK1.1	
	Importance Rating	3.8	

(K&A Statement) Loss of Secondary Heat Sink – Knowledge of the operational implications of the following concepts as they apply to the Loss of Secondary Heat Sink: Components, capacity, and function of emergency systems.

RO Question #17

Plant Conditions:

- Unit tripped from 100% power
- Crew is implementing FR-H.1, Response to Loss of Secondary Heat Sink, due to a loss of the TDAFW pump and both MDAFW pumps
- Both S/G WR levels are 200 inches
- RCS Loop Temperatures are stable at 490 °F
- CNMT pressure is 0.3 psig and stable

Given the above conditions:

- (1) What is the next option for restoring feedwater, as directed by FR-H.1?
- (2) What is the feed flow requirement per ATT-22.0, RESTORING FEEDWATER FLOW?

- (1) SAFW
(2) Fill as necessary to restore level
- (1) SAFW
(2) 100 gpm
- (1) MFW
(2) Fill as necessary to restore level
- (1) MFW
(2) 100 gpm

Proposed Answer: A

Explanation:

- A. CORRECT. As per FR-H.1 Steps 5- 10, lists the order as SAFW, MFW, Condensate. A restriction on feedwater flow is not needed because RCS Loop Temperatures are less than 550 °F, when restrictions do apply.
- B. Plausible, SAFW is correct, feed restriction is not correct.
- C. Plausible, MFW is not correct, feed restriction is correct.
- D. Plausible because prior to the uprate the desired order was MFW, SAFW, Condensate on flow restoration. The Feed break loss of feedwater assumes SAFW is restored within 14.5 min. 100 gpm is the restriction if S/G level is <50" [100"].

Technical Reference(s): FR-H.1, Step 6-8 & Background (Attach if not previously provided)
ATT-22.0

Proposed references to be provided to applicants during examination: None

Learning Objective: RFRH1C 1.05 (As available)

Question Source: Bank #
Modified Bank # C000.1261 Feed and Bleed option removed,
Flow restriction added
New

Question History: Last NRC Exam 2008 #18

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	W/E11 EK3.2	
	Importance Rating	3.5	

(K&A Statement) Loss of Emergency Coolant Recirculation – Knowledge of the reasons for the following responses as they apply to the Loss of Emergency Coolant Recirculation: Normal, abnormal and emergency operating procedures associated with the Loss of Emergency Coolant Recirculation

RO Question #18

Plant Conditions:

- The plant was initially at 100% power when a LOCA occurred.
- When attempting to swap over to cold leg recirculation, the crew was unable to provide a flow path from the CNMT sump to the RCS.
- The crew entered ECA-1.1, Loss of Emergency Coolant Recirculation, and is preparing to cool down the RCS.
- Technical Support Center reports that emergency coolant recirculation capability has been restored via the "B" RHR pump.
- The crew has verified emergency coolant recirculation capability using the "B" RHR pump

What action should the crew take?

- A. Transition to ES-1.3, Transfer to Cold Leg Recirculation.
- B. Transition to ES-1.2, Post LOCA Cooldown and Depressurization.
- C. Complete ECA-1.1 and then transition to ES-1.3.
- D. Commence the cooldown of the RCS per ECA-1.1, and then transition to ES-1.3.

Proposed Answer: A

Explanation:

- A. CORRECT. Prior to step1 is a CAUTION to return to ES-1.3, Transfer to Cold Leg Recirculation, when recirculation capability is restored.
- B. Plausible because ES-1.2, Post LOCA Cooldown and Depressurization, could be used for LOCA cooldown when the break is not large enough. If the break is large enough, remain in E-1, wait for RWST level to lower 28%, and do NOT transition to ES-1.2.
- C. Plausible because ECA-1.1 is continued if the recirculation path is not regained, one of the major action categories..
- D. Plausible because this is a mix of the incorrect portions of B and C.

Technical Reference(s): ECA-1.1, Step 1and CAUTION (Attach if not previously provided)
prior to Step 1Proposed references to be provided to applicants during examination: NoneLearning Objective: REC11C 2.01 (As available)Question Source: Bank # B000.1032
Modified Bank # (Note changes or attach parent)
New Question History: Last NRC Exam Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X10 CFR Part 55 Content: 55.41 10
55.43

Comments: Meets K/A by requiring knowledge of TRANSITIONS monitored in the procedure and the reason.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	051 AA1.04	
	Importance Rating	2.5	

(K&A Statement) Loss of Condenser Vacuum – Ability to operate and/or monitor the following as they apply to Loss of Condenser Vacuum: Rod position

RO Question #19

Plant conditions:

- Reactor power is 45% and stable
- Preparations are being made to start a second Main Feed Pump
- Control Bank "D" is at 160 steps with the Rod Control Bank Selector switch in AUTO
- EHC controls are in OPER-PAN, IMP-OUT
- Condenser Vacuum is lowering slowly
- The crew has entered AP-TURB.4, Loss of Condenser Vacuum
- Condenser back pressure is in the "AVOID" region of FIG-13.0, Figure BACK PRESSURE

Which choice describes:

- (1) The expected response of Control Bank "D" before any actions are implemented by the crew, AND
- (2) The subsequent actions required by AP-TURB.4 with respect to condenser pressure?

- (1) Control Bank 'D' rods stepping IN;
(2) Trip the Main Turbine and go to AP-TURB.1, Turbine Trip Without Reactor Trip Required
- (1) Control Bank 'D' rods stepping IN;
(2) Adjust turbine load to restore back pressure to the "SATISFACTORY OPERATING" region of Fig-13.0
- (1) Control Bank 'D' rods stepping OUT;
(2) Trip the Main Turbine and go to AP-TURB.1, Turbine Trip Without Reactor Trip Required
- (1) Control Bank 'D' rods stepping OUT;
(2) Adjust turbine load to restore back pressure to the "SATISFACTORY OPERATING" region of Fig-13.0

Proposed Answer: B

Explanation:

- A. Plausible because the control rods are moving in the correct direction (IN) , and this action would be required if the condenser back pressure was in the "DO NOT OPERATE" region of Fig-13.0.
- B. CORRECT. Control Bank 'D' rods will respond in a manner similar to an auto turbine runback, since Tavg will be rising as steam flow lowers. A turbine load change is required to restore turbine back pressure to the "SATISFACTORY OPERATING" region of Fig-13.0
- C. Plausible if candidate does not recall Auto OUT rod motion is disabled. The second part would be the required action if condenser back pressure was in the "DO NOT OPERATE" region of Fig-13.0.
- D. Plausible if candidate does not recall Auto OUT rod motion is disabled. The second part is correct

Technical Reference(s): AP-TURB.4 Step *2 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP23C 2.01 (As available)

Question Source: Bank # _____

Modified Bank # _____ (Note changes or attach parent)

New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7

55.43 _____

Comments: Meets K/A by predicting Control Rod "Control Bank D" directional response to a reduction in condenser vacuum. Higher order since the answer would be different if the condenser back pressure and/or the reactor power level were changed.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	060 AK3.02	
	Importance Rating	3.3	

(K&A Statement) Accidental Gaseous Radwaste Release – Knowledge of the reasons for the following responses as they apply to Accidental Gaseous Radwaste Release: Isolation of the auxiliary building ventilation

RO Question #20

Plant conditions:

- 90 days following completion of a refueling outage
- Fuel movement in the Aux Building is in progress
- A fuel assembly is dropped in the Spent Fuel Pool
- Visible gas bubbles are rising from the dropped assembly

Which of the following is required to minimize the release of radioactive Iodine to the environment?

- A. Continuous operation of the Spent Fuel Pool demineralizer
- B. Aligning the SFP charcoal filters during the fuel movement
- C. Automatic trip of Aux Building exhaust fans without charcoal filters
- D. Maintenance of minimum water level above lower SFP suction line

Proposed Answer: C

Explanation:

- A. Plausible because while the SFP demineralizer is normally aligned, its purpose is corrosion and fission product filtration and it provides no protection against gaseous/Iodine releases.
- B. Plausible because the Charcoal Adsorber system is designed to ensure offsite dose rates are maintained within 10CFR 50.67 limits during the movement of fuel which has decayed less than 60 days.
- C. CORRECT. With the charcoal filters not aligned (>60 days irradiated), an Alarm condition on RMS channels R-13. Plant Vent Particulate, or R-14, Plant Vent Gas, will automatically trip all AB Exhaust fans *without HEPA or charcoal filters* to stop the release of any radioactive gases.
- D. Plausible because per ITS, the maintenance of a minimum SFP water level > 23' above the top of irradiated assemblies ensures adequate iodine decontamination factors. Normal SFP suction is on the UPPER suction line.

Technical Reference(s): RF-8.4, ATT. 1 and 2 (Attach if not previously provided)
AR-RMS-14, RMS-13

Proposed references to be provided to applicants during examination: None

Learning Objective: R2201C, 6.03 (As available)

Question Source: Bank # _____
Modified Bank # B034.0016 (Note changes or attach parent)
New _____

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	061 AK3.02	
	Importance Rating	3.4	3.6

(K&A Statement) Area Radiation Monitoring (ARM) System alarms – Knowledge of the reasons for the following responses as they apply to the ARM System alarms: Guidance contained in alarm response for ARM system

RO Question # 21

Plant conditions:

- Reactor at 98% power
- NIS Channel N-44 is out of service
- Reactor Engineering has briefed the control room and is performing a flux map to determine QPTR
- Annunciator E-24, RMS AREA MONITOR HIGH ACTIVITY, activates
- R-7, INCORE DETECTION AREA MONITOR, is in alarm
- All other RMS channels indicate normal readings

Which one of the following describes the correct response to these conditions?

- A. This is an expected alarm
- B. Request a Containment air sample
- C. Implement AP-RCS.1, Reactor Coolant Leak
- D. Make preparations for a Containment entry

Proposed Answer: A

Explanation:

- A. CORRECT. Expected alarm during flux map due to location of R-7
- B. Plausible. If leak in Containment is expected RP, is directed to sample Containment. If there were a leak in CNMT, then other CNMT radiation monitors would be elevated
- C. Plausible. If R-7 alarms due to a leak at the seal table, AR would direct further actions using AP-RCS.1. If there were a leak in CNMT, then other CNMT radiation monitors would be elevated.
- D. Plausible. If leak in Containment is expected the SM may direct CNMT entry. If there were a leak in CNMT, then other CNMT radiation monitors would be elevated.

Technical Reference(s): AR-RMS-R7 (Attach if not previously provided)
RE-10.1, FLUX MAPPING

Proposed references to be provided to applicants during examination: NoneLearning Objective: R3901C 1.09 (As available)

Question Source: Bank # C072.0024
Modified Bank #
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	074 EK2.03	
	Importance Rating	4.0	

(K&A Statement) Inadequate Core Cooling – Knowledge of the interrelations between the AFW Pump and Inadequate Core Cooling

RO Question #22

Plant conditions:

- A reactor trip from 100% power was accompanied by a loss of offsite power
- A Pressurizer Safety Valve failed open during the subsequent transient
- RCS Pressure is 500 PSIG and stable
- CETs are 1210°F
- Containment Pressure is 11 PSIG
- SI flow has NOT been able to be established
- Both Steam Generators (SG) are intact
- 'A' MDAFW Pump is the only operating AFW pump, feeding 170 gpm to only 'A' SG
- 'A' S/G narrow range (NR) level is 15%
- 'B' S/G level is below the NR indication range

Which choice accurately completes the following statements?

At this time, the means of core heat removal is flow through the pressurizer safety valve and (1). The secondary heat sink is (2).

- A. (1) reflux boiling; 2) adequate
- B. (1) reflux boiling; (2) NOT adequate
- C. (1) natural circulation; (2) adequate
- D. (1) natural circulation; (2) NOT adequate

Proposed Answer: B

Explanation:

- A. Plausible because the first part is correct and the second part would be correct if it was NOT adverse containment conditions.
- B. CORRECT. Steam flow from the core is condensing in the U tubes and flowing back to the core. The heat sink is inadequate because "A" SG level is below the adverse containment value of 25%.
- C. Plausible because this is the usual means of heat removal during a loss of offsite power. However, being in FR-C.1, 1210°F indicates that the RCS is highly voided. The second part would be correct if it was NOT adverse containment conditions.
- D. Plausible because this is the usual means of heat removal during a loss of offsite power. However, being in FR-C.1, 1210°F indicates that the RCS is highly voided. The second part is correct.

Technical Reference(s): FR-C.1, Step *13 (Attach if not previously provided)
FR-C.1 BKGD, Pg. 3 and 30

Proposed references to be provided to applicants during examination: None

Learning Objective: RFRC1C 2.01 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments: There is no direct tie between the AFW pumps and FR-C.1. All steps are based on AFW flow and/or SG level. Meets K/A by requiring analysis of the adequacy of the secondary heat sink with one AFW Pump running and level in one SG in the NR. Added means of core heat removal to the question to make 4 plausible choices. Higher order because the conditions must be evaluated properly. The answer could be made different by raising the SG level and/or lowering containment pressure.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	076 G2.4.45	
	Importance Rating	4.1	

(K&A Statement) High Reactor Coolant Activity – Ability to prioritize and interpret the significance of each annunciator and alarm

RO Question #23

Plant conditions:

- 100% power
- Alarm E-24, RMS AREA MONITOR HIGH ACTIVITY, has actuated
- R-9, LETDOWN LINE MONITOR, is alarming

Which choice identifies (1) the FIRST abnormal procedure to be implemented following the alarm response procedure, AND (2) how the R-9 alarm is validated?

- A. (1) AP-RCS-1, Reactor Coolant Leak;
(2) RCS sample indicates greater than normal activity
- B. (1) AP-RCS-1, Reactor Coolant Leak;
(2) Comparison with other Aux Building radiation monitors
- C. (1) AP-RCS-3, High Reactor Coolant Activity;
(2) RCS sample indicates greater than normal activity
- D. (1) AP-RCS-3, High Reactor Coolant Activity;
(2) Comparison with other Aux Building radiation monitors

Proposed Answer: C

Explanation:

- A. Plausible because many Aux. Bldg. RMS channel alarms are entry conditions for AP-RCS-1. However, R-9 is on the line and is therefore less likely to respond to leakage in the Auxiliary Building.
- B. Plausible because many Aux. Bldg. RMS channel alarms are entry conditions for AP-RCS-1. R-4 would likely respond to higher activity in the RCS. It is checked in AP-RCS.3 (along with other Aux. Bldg. alarms) but it could also be indicative of an RCS leak.
- C. CORRECT. AR-RMS-9 specifies direct entry into AP-RCS.3. The first action in AP-RCS.3 is to direct an RCS activity sample; unlike others where a channel comparison is considered when validating an alarm.
- D. Plausible because the first part is correct. R-4 would likely respond to higher activity in the RCS. Aux. Bldg radiation is checked in AP-RCS.3 but it could also be indicative of an RCS leak.

Technical Reference(s): AR-RMS-9 (Attach if not previously provided)
AP-RCS.3

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP17C 1.02 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 10,
11
55.43 _____

Comments: Meets K/A by identifying the procedure to be entered and the validating action when the possibility that RCS activity is rising becomes evident to the control room crew.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	W/E02 EK3.1	
	Importance Rating	3.3	

(K&A Statement) SI Termination – Knowledge of the reasons for the following responses as they apply to the SI Termination:: Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics

RO Question #24

Plant conditions:

- SI actuated due to a faulted Steam Generator outside containment
- Both Main Steam Isolation Valves are closed
- RCS temperature is 545°F, rising
- RCS Pressure is 1850 PSIG, rising
- The operating crew is performing ES-1.1, SI TERMINATION
- The SI and RHR Pumps have been stopped
- MRPI indicates Shutdown Bank Rod C-5 indicates fully withdrawn

Which choice completes the following statement?

Before any compensatory action is taken for the stuck rod, Shutdown Margin (SDM) is _____.

- A. ADEQUATE and STABLE because the SI Pumps are stopped
- B. ADEQUATE and RISING because at least one Charging Pump is running
- C. INADEQUATE and STABLE because boration for the stuck rod has not started
- D. INADEQUATE and RISING because Xenon concentration is building in

Proposed Answer: B

Explanation:

- A. Plausible because, by itself, it is correct. RCS Pressure is above the shutoff head of the SI Pumps and/or they've been stopped. However, the Charging Pump suction is aligned to the RWST so negative reactivity continues to be added.
- B. CORRECT. Per TS Basis, the minimum TS SDM requirement is met when rods are maintained above the RIL during power operation; even if the most reactive rod is stuck out on a reactor trip. Early in ES-1.1, the Charging Pump suction is aligned to the RWST before any ECCS pumps are stopped. Later in ES-1.1, when the Charging Pump suction is realigned to the VCT, the controls are set for a high boron concentration.
- C. Plausible if candidate believes that minimum SDM requirements are compromised by a stuck rod. However, accident analyses and TS Bases assume one rod stuck out. The second part, by itself, is correct but RCS boron concentration is rising due to the Charging Pump alignment.
- D. Plausible if candidate believes that minimum SDM requirements are compromised by a stuck rod. However, accident analyses and TS Bases assume one rod stuck out. The second part, by itself is correct because Xe buildup will add negative reactivity for approximately 9 hours after a full power trip.

Technical Reference(s): ES-1.1, Step 5 (Attach if not previously provided)
TSB 3.1.1-1 (Pg. 31/604)

Proposed references to be provided to applicants during examination: None

Learning Objective: RES11C 2.01 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 5
55.43 _____

Comments: Meets K/A by requiring knowledge of the reactivity status of the core and the reason for it with ES-1.1 in progress.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	W/E03 EA2.2	
	Importance Rating	3.5	

(K&A Statement) LOCA Cooldown-Depressurization – Ability to determine and interpret the following as they apply to the LOCA Cooldown-Depressurization: Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments

RO Question #25

Plant conditions:

- The plant was at 100% power when RCS Pressure began to lower
- Containment Pressure and radiation levels were rising
- The crew initiated a MANUAL Reactor Trip and SI at 0200 hours
- ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION, was entered at 0300 hours
- An RCS cooldown is in progress

Which choice fills in the blanks regarding the ES-1.2 cooldown rate and the latest time that meets the GINNA commitment for establishing RHR injection flow?

The cooldown rate in ES-1.2 is (1) , and RHR injection flow must be established by no later than (2) .

- A. (1) between 80-100 °F/hr
(2) 0830
- B. (1) between 80-100 °F/hr
(2) 0930
- C. (1) unlimited, but not at a rate which would cause an Orange or Red path challenge to vessel integrity (PTS)
(2) 0830
- D. (1) unlimited, but not at a rate which would cause an Orange or Red path challenge to vessel integrity (PTS)
(2) 0930

Proposed Answer: A

Explanation:

- A. CORRECT. ES-1.2 rate is between 80-100°F/hour. The committed time limit to establish RHR injection is 6.5 hours from the event initiation because the concern is boron precipitation over that time period.
- B. Plausible because the first part is correct but the second part would be 6.5 hours after ES-1.2 is entered but 7.5 hours after the event started.
- C. Plausible because (typically) the TS do not apply when performing actions in the EOP network. However, ES-1.2 specifies the cooldown rate. The second part is correct. The clock starts with the event because the concern is boron precipitation over time.
- D. Plausible because (typically) the TS do not apply when performing actions in the EOP network. The second part would be 6.5 hours after ES-1.2 is entered but 7.5 hours after the event started.

Technical Reference(s): ES-1.2, Steps 20.b, 20.c (Attach if not previously provided)
ES-1.2 BKGD, Pages 6,7,59

Proposed references to be provided to applicants during examination: None

Learning Objective: RES12C 1.02 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments: Meets K/A by requiring knowledge of the cooldown rate limits from ES-1.2 and the facility time commitment to RHR injection following a SBLOCA. Higher order because the time commitment must be properly applied or the accident assumptions will be invalid.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	W/E08 EA2.1	
	Importance Rating	3.4	

(K&A Statement) RCS Overcooling-PTS – Ability to determine and interpret the following as they apply to the RCS Overcooling-PTS: Facility conditions and selection of appropriate procedures during abnormal and emergency operations

RO Question #26

Plant conditions:

- 25 minutes ago, the Reactor was at 100% power when a faulted 'A' S/G caused an automatic reactor trip and safety injection on lowering RCS pressure
- There was a delay in isolating AFW flow to 'A' S/G
- 'A' S/G is completely isolated
- 'A' S/G WR level has just reached 0 inches
- CNMT Pressure peaked at 30 PSIG but is now 26 PSIG
- Pressurizer Level is reading 0%
- RCPs were lost due to loss of off-site power at reactor trip
- Loop "A" Hot Leg Temperature is 365 °F
- Loop "A" Cold Leg Temperature is 280 °F
- Loop "B" Hot Leg Temperature is 385 °F
- Loop "B" Cold Leg Temperature is 305 °F
- The crew has entered E-1, LOSS OF REACTOR OR SECONDARY COOLANT

What procedure should be implemented under these conditions?

- A. E-1, LOSS OF REACTOR OR SECONDARY COOLANT.
- B. FR-I.2, RESPONSE TO LOW PRESSURIZER LEVEL.
- C. FR-P.1, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITION.
- D. FR-Z.1, RESPONSE TO HIGH CONTAINMENT PRESSURE

Proposed Answer: C

Explanation:

- A. Plausible because the CSFST conditions all are improving and cleared except FR-P.1 conditions due to the cooldown. YELLOW Path is a parallel action, not "GO to"
- B. Plausible because the CSFST condition (less than 13%) for Pressurizer Level is met but it is a YELLOW Path. YELLOW Path implementation is parallel action not "GO to" and is at CRS discretion and would not take precedence over implementation of E-1.
- C. CORRECT. The RED Path conditions for F-0.4, INTEGRITY, were met by the greater than 100°F T_{cold} cooldown in both loops and Loop "A" dropping below 284°F. The procedure would be entered and, even though some of the conditions have now cleared, completed.
- D. Plausible because it is was an ORANGE Path and cleared, but wrong because CONTAINMENT is a lower priority than INTEGRITY.

Technical Reference(s): F-0.4 (Attach if not previously provided)
FR-P.1, Step 28

Proposed references to be provided to applicants during examination: NoneLearning Objective: RFRP1C R1.02 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments: Meets K/A by requiring evaluation of a set of conditions and determining that performance of an FR-P has the highest priority. Higher order because the conditions must be properly evaluated to answer correctly.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	W/E10 EK1.1	
	Importance Rating	3.3	

(K&A Statement) Natural Circulation With Steam Void in Vessel with/without RVLIS – Knowledge of the operational implications of the following concepts as they apply to Natural Circulation With Steam Void in Vessel with/without RVLIS: Components, capacity, and function of emergency systems

RO Question #27

Plant conditions:

- A loss of off-site power resulted in a reactor trip
- The crew has elected to enter ES-0.3, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL, from ES-0.2, NATURAL CIRCULATION COOLDOWN, in order to perform a more rapid cooldown to COLD SHUTDOWN (CSD) conditions

Which choice completes the following statement?

The Safety Injection pumps must remain aligned in accordance with S-16A, SAFETY INJECTION SYSTEM ALIGNMENT, until _____.

- A. both Tcolds are less than 350°F
- B. RCS Pressure is less than 1500 PSIG
- C. all MANUAL SI block actions have been completed
- D. the RCS is verified borated to the CSD, Xenon-free condition

Proposed Answer: A

Explanation:

- A. CORRECT. Per ES-0.3 - Step 12, SI cannot be placed in the normal shutdown alignment until both Tcolds are less than 350°F. This coincides with the TS requirement for SI operability in Modes 1, 2, 3.
- B. Plausible because this coincides with the point at which the SI Accumulators can be isolated. However, the SI System must remain OPERABLE until Mode 4 (going down) is entered.
- C. Plausible because manual blocks of certain SI signals occur during the procedure. However, the AUTO SI on Containment Pressure is NOT blocked so the SI System must remain OPERABLE until Mode 4 (going down) is entered.
- D. Plausible as a benchmark point in ES-0.2 where the cooldown can commence and the SDM is such that the reactor will remain shutdown (without SI) under accident conditions. However, the SI System must remain OPERABLE until Mode 4 (going down) is entered.

Technical Reference(s): ES-0.3, Step 12 (Attach if not previously provided)
ES-0.3 BKGD, page 33
TS 3.5.2

Proposed references to be provided to applicants during examination: None

Learning Objective: RES02C 1.02 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments: Meets K/A by requiring knowledge of the status of the ECCS with ES-0.3, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL, in progress. While the step is performed somewhat late in the procedure, the associated knowledge is based on the TS Mode operability requirement and therefore should be recall knowledge. GINNA does not have a natural circulation EOP that differentiates between with/without RVLIS.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	009 EA2.36	
	Importance Rating	4.2	

(K&A Statement) Small Break LOCA – Ability to determine or interpret the following as they apply to a small break LOCA: Difference between overcooling and LOCA indications

RO Question #28

Plant conditions:

- With the unit at 100% power, the operating crew initiated a reactor trip when pressurizer level could not be maintained
- An automatic SI actuated with E-0, REACTOR TRIP OR SAFETY INJECTION, in progress
- The operating crew is presently performing the subsequent actions of E-0

What two parameters will be assessed to determine whether the crew procedurally transitions to:

- E-1, LOSS OF REACTOR OR SECONDARY COOLANT
- or
- E-2, FAULTED STEAM GENERATOR ISOLATION

- A. S/G Level and CNMT Area Radiation Monitors
- B. S/G Level and RCS Pressure
- C. S/G Pressure and CNMT Area Radiation Monitors
- D. S/G Pressure and RCS Pressure

Proposed Answer: C

Explanation:

- A. Plausible because S/G Level would lower on a faulted S/G but it would not lower if a SBLOCA was in progress. The second part is correct per E-0.
- B. Plausible because S/G Level would lower on a faulted S/G, but S/G pressure response is a more reliable indicator of faulted conditions. RCS Pressure would not be used to differentiate because it would lower in both cases until the faulted S/G dried out.
- C. CORRECT. Each of those parameters would respond specifically for the stated accident.
- D. Plausible because the first part is correct but RCS Pressure would not be used to differentiate because it would lower in both cases until the faulted S/G dried out.

Technical Reference(s): E-0, Steps 15 and 17 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: REP00C 2.01 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X _____

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X _____
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 10 _____
55.43 _____

Comments: Meets K/A by requiring recall of parameters used by the E-0 to differentiate between an overcooling event and a SBLOCA. Developed as a memory item to avoid providing a set of conditions with CNMT radiation rising; a "dead giveaway" for any size LOCA.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	003 A3.05	
	Importance Rating	2.7	

(K&A Statement) Reactor Coolant Pump System – Ability to monitor automatic operation of the RCPS, including: RCP lube oil and bearing lift pumps

RO Question #29

Plant conditions:

- The crew is performing S-2.1, REACTOR COOLANT PUMP OPERATION, to start 'A' RCP

Which choice accurately completes the following statements?

The purpose for running the RCP Oil Lift Pump prior to an RCP start is to ensure that the
(1) . An illuminated WHITE light above the RCP Lift Oil Pump control switch means that the
(2) interlock in the 'A' RCP starting circuit is satisfied.

- A. (1) lower RCP radial bearing is provided proper lubrication
(2) 500 PSIG oil pressure
- B. (1) lower RCP radial bearing is provided proper lubrication
(2) two minute oil lift pump run timer
- C. (1) thrust bearing shoes are lifted off of the thrust runner
(2) 500 PSIG oil pressure
- D. (1) thrust bearing shoes are lifted off of the thrust runner
(2) two minute oil lift pump run timer

Proposed Answer: C

Explanation:

- A. Plausible because the oil lift pump supplies bearing oil cooling, except the oil is supplied to the upper thrust bearing. The second part is correct.
- B. Plausible because the oil lift pump supplies bearing oil cooling, except the oil is supplied to the upper thrust bearing. The second part is an administrative requirement in the procedure, not an interlock.
- C. CORRECT. The oil pressure physically moves the shoes off of the thrust runner to prevent metal-to-metal contact while oil pressure is building up in the system during the pump start. There is a 500 PSIG oil pressure interlock in the starting circuit that must be satisfied in order to start an RCP.
- D. Plausible because the first part is correct and the second part is an administrative requirement in the procedure not an interlock

Technical Reference(s): S-2.1, Step 6.2.3 (Attach if not previously provided)
R1301C, B.5.b(1)(3)
SYS13 SD, Pgs. 18-19

Proposed references to be provided to applicants during examination: None

Learning Objective: R1301C 1.07 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments: The lift pump must be started by the operator and then the oil system operates per internal design after the RCP is started. Meets K/A by requiring knowledge of the only RCP oil system-related interlock in the RCP control circuit. Added the purpose of the Lift Oil Pump to make 4 relevant choices.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	004K2.05	
	Importance Rating	2.7	

(K&A Statement) Chemical and Volume Control System – Knowledge of bus power supplies to the following: MOVs

RO Question #30

Plant conditions:

- An AUTO SI actuated on lowering steam line pressure
- Offsite power was lost in coincidence with the SI
- Emergency Diesel Generator “A” failed to start
- Emergency Diesel Generator “B” is running and all equipment on the respective busses has operated per design

Based on the conditions above, which choice describes the actual position and the status of the power supply for MOV-313, Seal/Excess Letdown Return Isolation Valve?

- A. OPEN but NO power available
- B. OPEN and power available
- C. CLOSED but NO power available
- D. CLOSED and power available

Proposed Answer: A

Explanation:

- A. CORRECT. Under these conditions, MCC "C" would be fed via ED/G "A" (Bus 14) and therefore has no power. MCC "C" is the power supply for MOV-313; a CIV. MOV-313 is open during normal operation and MOVs fail AS-IS.
- B. Plausible since the first part regarding the position is correct and if the candidate did not know the correct power supply to 313 (MCC-C is not available).
- C. Plausible if candidate believes that MOV-313 failed closed in response to the CI signal prior to the loss of power. The second part is correct.
- D. Plausible if candidate has the power supplies reversed. MOV-313 would have closed on CI

Technical Reference(s): P-12, ATT. 24, Pg. 3/3 (Attach if not previously provided)
P-12, ATT. 2
ATT-3.0, CI/CVI, page 1

Proposed references to be provided to applicants during examination: None

Learning Objective: R2701C 1.05 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	005 K1.09	
	Importance Rating	3.6	

(K&A Statement) Residual Heat Removal System - Knowledge of the physical connections and/or cause-effect relationships between the RHRS and the following systems: RCS

RO Question #31

Plant conditions:

- The RCS is solid with RHR Loop "B" in service for heat removal
- Low Pressure Letdown Control Valve PCV-135 has failed and RCS Pressure is rising
- F-22, RCS LO PRESS 410 PSI, has just cleared

Which choice describes (1) the RHR flowpath, AND (2) the automatic action(s) that will occur?

- A. (1) From Loop 'A' Hot Leg to Loop 'B' Cold Leg
(2) LTOP Actuation
- B. (1) From Loop 'B' Hot Leg to Loop 'A' Cold Leg
(2) LTOP Actuation
- C. (1) From Loop 'A' Hot Leg to Loop 'B' Cold Leg
(2) LTOP Actuation and closure of MOV-700 and MOV-721 (RCS-RHR Suction and Return valves)
- D. (1) From Loop 'B' Hot Leg to Loop 'A' Cold Leg
(2) LTOP Actuation and closure of MOV-700 and MOV-721 (RCS-RHR Suction and Return valves)

Proposed Answer: A

Explanation:

- A. CORRECT. Suction valves MOV-700 and MOV-701 are "hard-piped" to Loop "A" Hot Leg and MOV-720 and MOV-721 are "hard-piped" to Loop "B" Cold Leg. LTOP will actuate at 410 PSIG but MOV-700 and MOV-721 will not close. The <410 PSIG interlock on MOV-700 and MOV-721 is only an opening permissive.
- B. Plausible as the opposite or as an RHR-RCS Loop "B" alignment. However, the RHR-RCS suction and discharge is "hard-piped" with flow from Loop "A" Thot to Loop "B" Tcold. The second part is correct.
- C. Plausible because the first part and LTOP actuation is correct. However, the <410 PSIG interlock on MOV-700 and MOV-721 is only an opening permissive.
- D. Plausible as the opposite or as an RHR-RCS Loop "B" alignment. However, the RHR-RCS suction and discharge is "hard-piped" with flow from Loop "A" Thot to Loop "B" Tcold. The 410 PSIG interlock on MOV-700 and MOV-721 is only an opening permissive.

Technical Reference(s): 33013-1247 (Attach if not previously provided)
AR-F-22,
TRB 3.3.5-1

Proposed references to be provided to applicants during examination: None

Learning Objective: R2501C 1.03, 1.07 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments: Meets K/A by requiring knowledge of RHR to RCS flowpath and the consequences of rising RCS pressure with an RHR alignment.

Tier #	2	
Group #	1	
K/A #	006 K4.10	
Importance Rating	3.3	

(K&A Statement) Emergency Core Cooling - Knowledge of design feature(s) and/or interlock(s) which provide for the following: Redundant pressure meters

RO Question #32

Given the following conditions:

- A small break LOCA has occurred, concurrent with a loss of off-site power
- All equipment functioned as designed
- The crew is performing the actions of ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION
- CET's are lowering
- RCS pressure is 1350 psig and stable
- Pressurizer level indicates 38% and rising

Which of the following Pressure channel combinations should be used to determine RCS subcooling during SI flow reduction?

- A. PRZR Pressure PT-429 or PT-449
- B. PRZR Pressure PT-430 or PT-431
- C. RCS pressure PT-450 or PT-451
- D. RCS Pressure PT-420 or PT-420A

Proposed Answer: D

Explanation:

- A. Plausible because PRZR PRESSURE PT-429 or PT-449 are the normal pressure instruments used for controlling pressure channels, however they only narrow range limited to > 1700 psig, and PI-449 is de-energized
- B. Plausible because PRZR PRESSURE PT-430 and PT-431 are the normal pressure instruments used for interlock channels for the PRZR PORVs, however they only narrow range limited to > 1700 psig.
- C. Plausible because RCS loop pressure instruments PT-450 and PT-451 are the normal pressure instruments used during shutdown conditions for low temperature overpressure protection and the candidate may recall that these instruments are also part of the PAMS instrumentation and incorrectly link them to subcooling calculations.
- D. CORRECT, RCS PRESSURE PT-420 or PT-420A, are wide range from 0-3000 psig and, per ITS Post-Accident Monitoring (PAM), are used for the subcooling determination.

Technical Reference(s): ITS basis 3.3.3 (Attach if not previously provided)
Pg 3, 3.3-5

Proposed references to be provided to applicants during examination: None

Learning Objective: R1901C 1.02, 1.07 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments: Meets K/A by considering design and redundancy of WR pressure instrumentation that is widely used for making both direct (pressure) and indirect (Subcooling) ECCS operational decisions while in the EOP network.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	007 K3.10	
	Importance Rating	3.3	

(K&A Statement) Pressurizer Relief/Quench Tank - Knowledge of the effect that a loss or malfunction of the Pressurizer Relief/Quench Tank will have on the following: Containment

RO Question #33

Which of the following describes the adverse effects of not maintaining the Pressurizer Relief Tank (PRT) within its design level band?

- A. If the level is too HIGH, the tank will overflow to the CNMT sump, causing false indications of RCS leakage to CNMT
- B. If the level is too HIGH, the available Nitrogen volume will result in an initial pressure which, on a design discharge of PRZR safeties, would exceed the PRT design pressure
- C. If the level is too LOW, the radioactive gases that leak from the top of the PRZR would not be adequately scrubbed, causing elevated gaseous activity inside CNMT
- D. If the level is too LOW, there would be insufficient water volume to absorb and condense a design discharge of PRZR safeties, resulting in exceeding the PRT design pressure

Proposed Answer: D

Explanation:

- A. Plausible because most tanks do have overflow connections, and if the PRT did, it would likely overflow to the CNMT sump and result in potentially erroneous indications of an RCS leak. The PRT, however, relies upon operator parameter monitoring (level and pressure band) and overpressure protection (and eventual rupture disk failure) to protect from rising level.
- B. Plausible because excessive water level would reduce the available N2 volume and raise the initial tank pressure. Normal water level and operating pressure of 3 psig ensures the resulting pressure from the discharge of both PRZR safeties into the PRT will not exceed 50 psig, so there is a conservative margin (100%) before exceeding the design limit of 100 psig.
- C. Plausible because while this is a likely concern, the contents of the tank are periodically analyzed and the release of radioactive isotopes during PRZR safety valve actuation is not one of the PRT design concerns. Any gaseous activity released into the CNMT are considered in the design of the CNMT Ventilation system.
- D. CORRECT. Per FSAR, the design level and pressure of the PRT ensures that the energy of both PRZR safety valves can be absorbed without exceeding the design pressure (100 psig) of the PRT.

Technical Reference(s): FSAR Section 5.4.8.1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R1401C, 1.04 (As available)

Question Source: Bank # C000.1265
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 3
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	008 G2.4.34	
	Importance Rating	4.2	

(K&A Statement) Component Cooling Water: Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.

RO Question #34

Plant conditions:

- A control complex fire has resulted in a control room evacuation
- The crew is performing ER-FIRE.1, ALTERNATE SHUTDOWN FOR CONTROL COMPLEX FIRE
- The Control Operator has completed the steps of ER-FIRE.1, Attachment 4 – CONTROL OPERATOR (CO), to isolate Bus 14
- The Shift Manager has directed cooling down to MODE 5 in accordance with ER-FIRE.1

Which choice accurately completes the following statement regarding the status of the breaker for Component Cooling Water Pump 'A'?

The breaker for Component Cooling Water Pump 'A' is ____ (1) ____ and will remain in that condition until steps are in progress to establish ____ (2) ____.

- A. (1) tripped ONLY;
(2) letdown flow
- B. (1) tripped ONLY;
(2) RHR cooling
- C. (1) tripped with control power fuses removed;
(2) letdown flow
- D. (1) tripped with control power fuses removed;
(2) RHR cooling

Proposed Answer: D

Explanation:

- A. Plausible because the first part is partially correct and the second part would be correct but there are no actions for restoring letdown in ER-FIRE.1. Charging is restored by Attachment 4 and manually controlled to control PZR level. Letdown would be restored by a normal operating procedure to provide a means of RCS pressure control during solid plant operations.
- B. Plausible because the first part is partially correct and the second part is correct.
- C. Plausible because the first part is correct and the second part would be correct but there are no actions for restoring letdown in ER-FIRE.1. Charging is restored by Attachment 4 and manually controlled to control PZR level. Letdown would be restored by a normal operating procedure to provide a means of RCS pressure control during solid plant operations.
- D. CORRECT. Control power fuses are removed to ensure that fire damage in the control circuit will not result in an uncontrolled component response. All of the breakers on Bus 14 are tripped and then individually operated to control EDG loading. ER-FIRE.1 starts CCW Pump 'A' just prior to initiating RHR cooling on Train "A".

Technical Reference(s): ER-FIRE.1, Step 6.7.1.3.a (6) (Attach if not previously provided)
ER-FIRE.1, Attachment 4, Step 1

Proposed references to be provided to applicants during examination: None

Learning Objective: RER22C 1.04 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments: Meets K/A by requiring knowledge of a CCW Pump breaker status following the RO action(s) with the alternate shutdown procedure in effect. Added when the status would change to make 4 relevant choices.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	008 A2.05	
	Importance Rating	3.3	

(K&A Statement) Component Cooling Water - Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations: Effect of loss of instrument and control air on the position of the CCW valves that are air operated

RO Question #35

Given the following initial plant conditions:

- Plant is operating at 100% power
- Earlier in the shift the crew closed AOV-754A, RCP A THERMAL BARRIER RETURN, to isolate a leak in the CCW system

Subsequently, an automatic SI actuation occurs:

- R-2, Containment area monitor, is in alarm
- R-7, Incore Detector area monitor, is in alarm

Which of the following accurately completes the following statements?

While in this alignment, CCW Surge Tank level will (1). WHEN Instrument Air pressure to CNMT is restored in (2).

- A. (1) remain stable; (2) E-1, CCW surge tank level remains stable.
- B. (1) remain stable; (2) E-0, CCW surge tank level remains stable.
- C. (1) start to rise; (2) E-1, CCW surge tank level stabilizes at a higher value
- D. (1) start to rise; (2) E-0, CCW surge tank level stabilizes at a higher value

Proposed Answer: C

Explanation:

- A. Plausible if applicant believes that AOV-754A fails closed or the line is isolated on CI and, like CIV's, remains in that position when IA is restored. Part 2 is plausible because IA is restored in E-1, and if the candidate believes that the valve fails closed and does not change position on IA restoration. Incorrect because the valve fails OPEN.
- B. Plausible if if applicant believes that AOV-754A fails closed or the line is isolated on CI and, like CIV's, remains in that position when IA is restored. Part 2 is plausible if the candidate believes that E-0 restores IA to CNMT. Incorrect because the valve fails OPEN.
- C. CORRECT. AOV-754A valves fail open on a loss of IA. IA is lost whenever there is an SI but then is restored early in the E-1 procedure implemented after E-0. AOV-754 will remain-as such until IA is restored. Restoration of IA will result in the ability to re-isolate 754A, but until that isolation takes place, the leak is re-established and CCW surge tank level will rise, then stabilize after reclosure of the valve.
- D. Plausible because both parts of the answer are correct, but the restoration of IA does not occur in E-0 in this particular LOCA condition – it occurs in E-1.

Technical Reference(s): E-1, Step 9d, e, & f (Attach if not previously provided)
ATT-11.0, page 1

Proposed references to be provided to applicants during examination: None

Learning Objective: R4701C 1.06 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments: Meets K/A by requiring specific knowledge of the effects of loss of IA on CCW valves

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	010 K3.03	
	Importance Rating	4.0	

(K&A Statement) Pressurizer Pressure Control - Knowledge of the effect that a loss or malfunction of the Pressurizer Pressure Control system will have on the following: ESFAS

RO Question #36

Which of the following describes the expected plant response to a controlling pressurizer pressure channel failure HIGH while operating at 100% power? Assume no operator action.

- A. Actual pressure will LOWER after plant trip on high pressure due to 431K output
- B. Actual pressure will LOWER until low pressure reactor trip and SI, then it will stabilize
- C. Actual pressure will LOWER until low pressure reactor trip, and then slowly rise back to program
- D. Actual pressure will LOWER until the other control channel actuates heaters, then will stabilize below program but above trip setpoint

Proposed Answer: B

Explanation:

- A. Plausible if the candidate believes that a controlling channel failure results in 431K controlling pressure high, causing a high pressure trip to occur. Pressure would lower from the resulting reactor trip and Tavg returning to no load Tavg.
- B. CORRECT. Failure of the controlling channel HIGH will result in maximum output signal from pressure controller 431K, which will result in both spray valves opening fully. This will continuously lower actual RCS pressure until auto reactor Low Pressure trip and then SI signals are actuated. With CI accompanying the SI, AOV-5392, IA to CNMT, closes and removes air from the PRZR spray valves and RCS pressure stabilizes.
- C. Plausible because the first part of the answer is correct. If the candidate doesn't realize that the failure will also cause an SI which will trip the heaters, he will believe RCS pressure will stabilize like a normal reactor trip.
- D. Plausible because if the candidate believes the heaters have multiple channel inputs like the PORVs and pressure alarms, the other controlling channel will energize heaters to stabilize pressure.

Technical Reference(s): P-10, pp 15, 71, 72 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RIC02C 1.06 (As available)

Question Source: Bank # C010.0037
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments: Meets K/A by requiring knowledge of the impact of a failed pressurizer pressure channel on integrated plant response, including ESFAS actuation.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	012 K6.11	
	Importance Rating	2.9	2.9

(K&A Statement) Reactor Protection System – Knowledge of the effect of a loss or malfunction of the following will have on the RPS: Trip setpoint calculators

RO Question #37

Pressurizer Pressure Controller HC-431K OUTPUT has failed to MINIMUM (0% on the output meter).

Assuming NO operator action, which one of the following describes the effect on the Reactor Protection system?

- A. OP Delta-T reactor trip setpoints RAISE
- B. OT Delta-T reactor trip setpoints RAISE
- C. OP Delta-T reactor trip setpoints LOWER
- D. OT Delta-T reactor trip setpoints LOWER

Proposed Answer: B

Explanation:

- A. Plausible because the reasoning is correct per the explanation in 'B', but the candidate may incorrectly believe that the OPΔT setpoint has an input from PRZR pressure parameters.
- B. CORRECT. Master pressure controller HC-431K output failed to minimum (0%) will call for full PRZR heaters. This will raise actual PRZR pressure and, since pressure is an input into the (DNB-based) OTΔT setpoint calculation, will RAISE the trip setpoint.
- C. Plausible because the candidate may misunderstand which of the two RPS circuits are affected by the failure, AND the effects of the direction of the failure, as explained in 'D'.
- D. Plausible because the candidate may understand the correct OTΔT circuit that is affected, but misunderstand whether the output failure to minimum will cause PRZR spray, and not heaters, to actuate, resulting in a reduction in pressure and a LOWERING of the setpoint.

Technical Reference(s): P-1, ATT. 1 (Attach if not previously provided)
ITS, LCO 3.3.1 Basis

Proposed references to be provided to applicants during examination: None

Learning Objective: R3501C, 4.16
RIC02C, 1.02

Question Source: Bank # E000.0010
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013 K6.01	
	Importance Rating	2.7	3.1

(K&A Statement) Engineered Safety Features - Knowledge of the effect of a loss or malfunction of the following will have on the ESFAS: Actuation Sensors and detectors

RO Question #38

Plant conditions:

- 100% power
- Steam Flow indication on FT-464 began slowly drifting low and was declared INOPERABLE
- FT-464 has been defeated in accordance with ER-INST.1, REACTOR PROTECTION BISTABLE DEFEAT AFTER INSTRUMENTATION LOOP FAILURE

After the failed channel defeat, what signal(s) are the minimum required to receive an automatic closure of the "A" MSIV?

- Safety Injection ONLY
- HI-HI Steam Flow on 'A' S/G steam flow transmitter FT-465 ONLY
- HI-HI Steam Flow on 'A' S/G steam flow transmitter FT-465 + Safety Injection
- HI Steam Flow on 'A' S/G steam flow transmitter FT-465 + 1/2 Tavg <545°F + Safety Injection

Proposed Answer: A

Explanation:

- A. CORRECT. With the HI-HI steam flow signal, the 1/2 logic is already satisfied. An SI signal in conjunction with this existing HI-HI steam flow signal will isolate the 'A' MSIV.
- B. Plausible if the candidate believes that a HI-HI steam flow with 2/2 logic will result in affected S/G isolation.
- C. Plausible if the candidate believes that the HI-HI + SI steam flow isolation requires 2/2 HI-HI flows in addition to the Safety Injection signal.
- D. Plausible if the candidate believes that the HI steam flow + Low Tavg + SI signal requires 2/2 steam flow signals (it does not). The HI steam flow component for this MSIV isolation is made up when PT-464A is tripped as part of the instrument defeat.

Technical Reference(s): P-1, ATT. 5 (Attach if not previously provided)
ER-INST.1, ATT. 36

Proposed references to be provided to applicants during examination: NoneLearning Objective: RIC04C 1.06 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments: Meets K/A by requiring knowledge of the ESFAS signals affected by the failure of a Steam Flow channel and the subsequent actions taken to defeat the channel.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	022 A2.01	
	Importance Rating	2.5	

(K&A Statement) Containment Cooling – Ability to (a) predict the impacts of the following malfunctions or operations on the Containment Cooling system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Fan motor over-current

RO Question #39

Plant conditions:

- A LOCA is in progress
- SI has actuated
- Offsite power was lost
- D/G 'A' tripped during startup
- D/G 'B' is running and loaded onto its respective Safeguards Busses
- CRFC 'B' has tripped (green and white light indications lit)

Which choice accurately completes the following statements?

When performing Attachment 27, Automatic Action Verification, the Operator (1) attempt to restart CRFC 'B'. With CRFC 'B' tripped, accident analysis assumptions for the number of running CRFCs (2) met.

- A. (1) may; (2) are
- B. (1) may; (2) are NOT
- C. (1) may NOT; (2) are
- D. (1) may NOT; (2) are NOT

Proposed Answer: B

Explanation:

- A. Plausible because part 1 is correct, and if the candidate does not consider that both a CS pump AND 'A' and 'D' CRFC's are OOS with the failure of 'A' EDG to start, he might believe that the minimum CNMT heat removal requirements are met with a single CS pump and single CRFC on the 'B' EDG.
- B. CORRECT, one restart allowed. In conjunction with the single CS pump powered from 'B' EDG, only 1 of the two CRFC's also required are met. This does NOT meet the minimum heat removal requirements of the accident analysis.
- C. Plausible because the candidate may believe that a restart of a tripped component is not allowed procedurally. Part 2 is plausible if the candidate does not consider that both a CS pump AND 'A' and 'D' CRFC's are OOS with the failure of 'A' EDG to start, he might believe that the minimum CNMT heat removal requirements are met with a single CS pump and single CRFC on the 'B' EDG.
- D. Plausible because the candidate may believe that a restart of a tripped component is not allowed procedurally. Part 2 is correct.

Technical Reference(s): ITS Bases 3.6.6-5 & 6 (Attach if not previously provided)
A-503.1 section 5.3.R.3
AR J-9

Proposed references to be provided to applicants during examination: None

Learning Objective: R2401C 1.05 (As available)
R2201C 1.06

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 5
55.43

Comments: Meets K/A by predicting impact of fan motor trip over-current on the number of running CRFC's. The second part of the K/A is harder to meet because the governing procedure simply verifies all 4 CRFC's running. Under the stated conditions, the interpretation would be to start all that are available. No more will become available until Bus 14 is recovered but, by answering the question correctly, the candidate demonstrates the knowledge that there is a

problem.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	026 K1.02	
	Importance Rating	4.1	4.1

(K&A Statement) Containment Spray – Knowledge of the physical connections and/or cause-effect relationships between the CSS and the following systems: Cooling water

RO Question #40

Given the following conditions:

- A loss of coolant accident (LOCA) has occurred
- Auto SI was accompanied by a loss of offsite power
- Containment pressure is 32 PSIG

Which of the following accurately completes the following statements?

- The system that provides cooling to the Containment Spray (CS) Pump Seal Heat Exchanger is (1), AND
- This cooling would be (2) during the Recirculation phase of the accident?

- A. (1) CCW; (2) Available
- B. (1) CCW; (2) NOT available
- C. (1) SW; (2) Available
- D. (1) SW; (2) NOT available

Proposed Answer: A

Explanation:

- A. CORRECT. CCW cooling is provided to the CS Pump Seal Heat Exchanger. CCW cooling is required during the Recirculation Phase of an accident.
- B. Plausible because the 1st part is correct for which system provides cooling. Candidate may believe that CCW is not available due to the SI+UV signal which locks out the CCW pumps. However, SI would be reset and CCW started for sump recirculation.
- C. Plausible because Service Water is provided for bearing cooling to ECCS pumps (SI), and the candidate may incorrectly assume that SW cools the CS Pump Seal Heat Exchanger also and not consider CCW. 2nd part is partially correct as Spray pump cooling is supplied from CCW when required during the Recirculation Phase of an accident.
- D. Plausible because Service Water is provided for bearing cooling to ECCS pumps (SI) and the candidate may incorrectly assume that SW cools the CS Pump Seal Heat Exchanger also and not consider CCW. 2nd part is incorrect but plausible as the candidate may believe that SW is not available due to a SW isolation signal (SI+UV). However, SI would be reset and SW isolation valves opened for sump recirculation.

Technical Reference(s): S-8A, ATT. 9 (Attach if not previously provided)
ES-1.3
FSAR 5.4.5.3.3
33013-1246,1
R2401C Powerpoint page

Proposed references to be provided to applicants during examination: None

Learning Objective: R2401C 1.04, (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 8
55.43

Comments: Meets K/A by requiring knowledge of the physical connection between the CS Pump and cooling water for the seal HX. Added second part of question to provide four plausible choices.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	039 K5.08	
	Importance Rating	3.6	

(K&A Statement) Main and Reheat Steam - Knowledge of the operational implications of the following concepts as they apply to the MRSS: Effect of steam removal on reactivity

RO Question #41

Plant conditions:

- A large steam line break outside of containment has occurred
- The Main Steam Isolation Valve on the faulted line will not close

Which set of initial conditions would result in the largest net reactivity addition?

- A. Beginning of Life (BOL) and 1% power
- B. Beginning of Life (BOL) and 100% power
- C. End of Life (EOL) and 1% power
- D. End of Life (EOL) and 100% power

Proposed Answer: C

Explanation:

- A. Plausible because the second part is correct as there is more mass in the SG to flash to steam. However, at BOL, MTC is at the lowest value therefore the reactivity addition will be less.
- B. Plausible because most accident analyses are most severe when starting from higher power levels. However, at BOL, MTC is at the lowest value therefore the reactivity addition will be less.
- C. CORRECT. MTC is at a higher value and therefore the reactivity addition will be greater than "A" or "B". At 1% power there is more mass in the SG to flash to steam as compared to 100% power.
- D. Plausible because the first part is correct and most accident analyses are most severe when starting from higher power levels.

Technical Reference(s): UFSAR 15.1.5 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RTA02C 1.03 (As available)

Question Source: Bank # X While the developer (jkl) did not work from a bank, he has written this (or a similar) question for examinations at other facilities.

Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43

Comments: Meets K/A by requiring knowledge of the initial conditions that will have the greatest effect on reactivity during a break in the MSS. Higher order because the candidate must determine which case has the greatest value for MTC and the most secondary coolant that will be converted to steam.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	059 A1.03	
	Importance Rating	2.7	2.9

(K&A Statement) Main Feedwater - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MFW system controls including: Power level restrictions for operation of MFW pumps and valves

RO Question #42

Plant conditions:

- A plant startup is in progress in accordance with O-1.2, PLANT STARTUP FROM HOT SHUTDOWN TO FULL LOAD
- Power is 2%, with both motor-driven AFW Pumps in service
- The crew will be raising power to roll the turbine

Which of the following accurately completes the statement below regarding power escalation?

Before power exceeds (1), one Main Feed Water Pump must be in service and feeding the steam generators. The operator verifies that AMSAC automatically (2) when 2/2 Turbine First Stage Pressures approximately 225 psig (~40% reactor power)

- A. (1) 3% (2) BLOCKS
- B. (1) 3% (2) UNBLOCKS
- C. (1) 8% (2) BLOCKS
- D. (1) 8% (2) UNBLOCKS

Proposed Answer: B

Explanation:

- A. Plausible because part 1 is correct and a candidate unfamiliar with the knowledge of how AMSAC operates might believe that the AMSAC trips are BLOCKED as power increases.
- B. CORRECT. AMSAC will automatically UNBLOCK (reinstating the turbine trip on low feed flow) when 2/2 turbine first stage pressures indicate approximately 225 psig (~40% reactor power) as indicated by the AMSAC AUTO BLOCK status light extinguishing. If first stage pressure should rise to the AMSAC unblock setpoint PRIOR to MFW flows indicating >25% of full power, then a turbine trip will result. O-1.2 requires MFP prior to going greater than 3%.
- C. Plausible because 8% is the maximum power from which recovery from a loss of both MFW Pumps is attempted in AP-FW.1 but, even then, power is immediately reduced to 2%. The second part is plausible if a candidate unfamiliar with the knowledge of how AMSAC operates believes that the AMSAC trips are BLOCKED as power increases.
- D. Plausible because 8% is the maximum power from which recovery from a loss of both MFW Pumps is attempted in AP-FW.1 but, even then, power is immediately reduced to 2%. Part 2 is correct.

Technical Reference(s): O-1.2, Step 6.6.5, 6.6.21, and 6.20 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: ROP01C 1.05 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X _____

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 5
55.43 _____

Comments: Meets K/A by requiring knowledge of when MFW must be in service before power reaches the AMSAC arming point.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	059 G2.2.22	
	Importance Rating	4.0	

(K&A Statement) Main Feedwater: Knowledge of limiting conditions for operations and safety limits.

RO Question #43

Plant conditions:

- A plant startup is in progress
- Power is 2% with both MDAFW pumps in service
- 'A' MFW pump has just been started
- Alarm PPCS-P3995, A MFW ISOLATION VALVE ACCUM LOW PRESSURE, just actuated

Which choice identifies (1) the current operability requirement and (2) the signal(s) that will automatically close AOV-3995, "A" MFW ISOLATION VALVE?

AOV-3995:

- A. (1) must be OPERABLE at this time. (2) SI signal
- B. (1) must be OPERABLE at this time. (2) Either an SI or a HIGH S/G Level signal
- C. (1) is NOT required to be OPERABLE at this time. (2) SI signal
- D. (1) is NOT required to be OPERABLE at this time. (2) Either an SI or a HIGH SG Level signal

Proposed Answer: A

Explanation:

- A. CORRECT. With the plant in Mode 2, AOV-3995 must be OPERABLE. The FWIV's close only on an SI signal.
- B. Plausible because the first part is correct. If the candidate is unsure then it would make sense that the FWIV would close on a HIGH SG LEVEL since the FWRV and associated bypass must be malfunctioning.
- C. Plausible because it would meet the LCO conditions for Mode 3 (both steam generators are isolated from both main feedwater pumps). The second part is correct.
- D. Plausible because it would meet the LCO conditions for Mode 3 (both steam generators are isolated from both main feedwater pumps). If the candidate is unsure then it would make sense that the FWIV would close on a HIGH SG LEVEL since the FWRV and associated bypass must be malfunctioning.

Technical Reference(s): TS 3.7.3 (Attach if not previously provided)
TS Basis 3.7.3-1 (Pg. 431/604)

Proposed references to be provided to applicants during examination: None

Learning Objective: (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 2

Comments: Meets K/A by requiring knowledge of the operability requirements for the only MFW-related components with a TS LCO. Written at RO level by requiring knowledge that a component might be inoperable because of an alarm. Added the isolation inputs to make 4 relevant choices. Higher order because the mode must be recognized and those requirements applied.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	061 K5.05	
	Importance Rating	2.7	

(K&A Statement) Auxiliary Feedwater System – Knowledge of the operational implications of the following concepts as they apply to the AFW: Feed line voiding and water hammer

RO Question #44

Given the following conditions:

- Plant is operating at 100% power
- The crew is responding to a Feedwater leak per AP-FW.2, Secondary Coolant Leak
- The leak has resulted in a Safety Injection
- CNMT pressure is 4 psig and slowly rising

Which of the following is a design feature that limits the operational implications of feed line water hammer?

- A. FRV closure on Low Tavg + Reactor Trip
- B. Steam Generator feed ring J-tubes
- C. Main Feed Pump trip on Safety Injection
- D. AFW start sequence on Safety Injection

Proposed Answer: B

Explanation:

- A. Plausible because the candidate may incorrectly assume that the auto closure of the FRVs is designed to prevent water hammer when in fact its purpose is to prevent an uncontrolled cooldown of the RCS.
- B. CORRECT. From UFSAR 3.9.1.1.6: Design of the feed ring piping, installation of J-tubes in the feed ring, and operating procedures minimize the possibility of water hammer. UFSAR 10.3.3.3: "Design Guidelines for Avoiding Water Hammers in Steam Generators," to minimize the potential and consequence of water hammer in the feedwater system, specifically, the BWI replacement S/Gs are designed to minimize the steam pocket formation in the feed header by using top-discharge J-tubes in the feed ring to eliminate the possibility of steam leakage into the feed ring through sleeve/header mechanical joints.
- C. Plausible because the MFW pumps trip on an SI signal, and a candidate may incorrectly assume that the reason for the trip is to avoid/mitigate water hammer.
- D. Plausible because AFW pumps will start on an SI and if a candidate does not fully understand the design basis, may have incorrect reasoning concerning the basis for the AFW starting sequence (it's actually EDG loading concern).

Technical Reference(s): USFAR, 3.9.1.1.6, 10.3.3.2 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R4001C 1.03, 1.07 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 5
55.43 _____

Comments:

component might be inoperable because of an alarm. Added the isolation inputs to make 4 relevant choices. Higher order because the mode must be recognized and those requirements applied.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	062 K4.05	
	Importance Rating	2.7	3.2

(K&A Statement) AC Electrical Distribution – Knowledge of the AC distribution system design feature(s) and/or interlock(s) which provide for the following : Paralleling of AC sources (synchroscope)

Question #45

Plant conditions:

- 18% power
- The crew is performing O-1.2, PLANT STARTUP FROM HOT SHUTDOWN TO FULL LOAD
- The main generator is ready to be synchronized to the grid
- The synchroscope is ON and rotating at approximately 8 RPM in the SLOW direction

Which choice identifies (1) the preferred breaker to be paralleled first that would be selected on the synchroscope selector switch, AND (2) what must be done to turbine speed to have the synchroscope rotating in accordance with the steps of O-1.2?

- A. (1) Breaker 9X13A72 (115kV); (2) lower turbine speed
- B. (1) Breaker 9X13A72 (115kV); (2) raise turbine speed
- C. (1) Breaker 1G13A72 (115kV); (2) lower turbine speed
- D. (1) Breaker 1G13A72 (115kV); (2) raise turbine speed

Proposed Answer: D

Explanation:

- A. Plausible because the breakers are in parallel but, to close 9X13A72 before 1G13A72, Electricians at, Station 13A, bypass 1G13A72 Reclosure Block Relay permissive in Circuit Breaker 9X13A72 close logic an auto reclosure must be blocked . The second part would make it run faster in the SLOW direction; the opposite of that which is desired.
- B. Plausible because the breakers are in parallel but, to close 9X13A72 before 1G13A72, Electricians at, Station 13A, bypass 1G13A72 Reclosure Block Relay permissive in Circuit Breaker 9X13A72 close logic. The second part is correct
- C. Plausible because the first part is correct. The second part would make it run faster in the SLOW direction; the opposite of that which is desired
- D. CORRECT. The breakers are in parallel but 1G13A72 is preferred breaker to parallel first because it doesn't have automatic reclosure. Turbine speed must be raised to get the synchroscope moving in the correct direction (FAST) and at the proper speed. It is desirable to have the main generator (INCOMING) frequency slightly higher than the grid (RUNNING) to ensure load control when the breaker is closed.

Technical Reference(s): O-1.2 , 6.13.3 NOTE (Attach if not previously provided)
P-12, Pg. 66/84

Proposed references to be provided to applicants during examination: None

Learning Objective: (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments: Meets K/A by requiring knowledge of an interlock that requires the order of breaker closure and the operator actions necessary to ensure breaker closure occurs within the parameters of the frequency and voltage monitoring circuit. Higher order because the operator must analyze the conditions and determine the action necessary to get the synchroscope moving slowly in the FAST direction.

Examination Outline Cross-reference:	Level	RO	SRO
	Group #	1	
	K/A #	063 A2.01	
	Importance Rating	2.5	

(K&A Statement) DC Electrical Distribution - Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations:
Grounds

RO Question #46

Plant conditions:

- Plant operating at 100% power
- J-23, BATTERY BANK GROUND, actuated
- The AO reports the following indication on Battery Charger A
 - + 40 Volts on the ground detector voltmeter
 - 135 Volts DC on Battery Charger A

Based upon the conditions given, which choice describes: (1) the adverse impact of the above indications and (2) what actions are required to be taken?

- A. (1) High battery voltage conditions will exist due to positive voltage ground
(2) Operations may continue while ground isolation efforts continue
- B. (1) High battery voltage conditions will exist due to positive voltage ground
(2) Swap to Battery charger A1 and commence load reduction within 2 hours
- C. (1) DC loads could be lost due to overcurrent trips of component supply breakers
(2) Operations may continue while ground isolation efforts continue
- D. (1) DC loads could be lost due to overcurrent trips of component supply breakers
(2) Swap to Battery charger A1 and commence load reduction within 2 hours

Proposed Answer: C

Explanation:

- A. Plausible because the candidate may conclude that the positive voltage ground will lead to a potential high voltage condition, the second response is correct
- B. Plausible because the candidate may conclude that the positive voltage ground will lead to a potential high voltage condition, the second response is the ITS 3.8.4 LCO time requirement to restore DC sources and not associated with ground
- C. CORRECT. Grounds faults can lead to overcurrent conditions, and the actions of AR J-23 require ground isolation efforts continue
- D. Plausible because the 1st part is correct the second response is the ITS 3.8.4 LCO time requirement to restore DC sources and not associated with ground

Technical Reference(s): AR-J-15 (Attach if not previously provided)
AR-J-23

Proposed references to be provided to applicants during examination: None

Learning Objective: RER07C, 1.03 and 1.04 (As available)

Question Source: Bank # B063.0007
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments:.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	063 K3.02	
	Importance Rating	3.5	

(K&A Statement) DC Electrical Distribution – Knowledge of the effect that a loss or malfunction of the DC electrical system will have on the following: Components using DC control power

RO Question #47

Plant conditions:

- 'A' DC Bus develops a fault, causing the bus to de-energize
- Subsequently, a loss of offsite power occurs

Which one of the following describes how the loss of the 'A' DC Bus will affect Emergency Diesel Generator operation?

- A. 'A' EDG will not start in response to an automatic signal
- B. 'A' EDG can only be started manually from the local panel
- C. Both EDGs will start in response to an automatic signal, but 'A' EDG will NOT tie to the safeguards buses
- D. Both EDGs will start in response to an automatic signal, but 'A' EDG will require local actions to cross-tie the fuel oil system for long-term operation

Proposed Answer: D

Explanation:

- A. Plausible because the candidate may believe that without DC control power, the 'A' EDG will not respond to automatic start signals.
- B. Plausible because the candidate may believe that without DC control power, remote start capability is lost but local controls are still functioning.
- C. Plausible if the candidate believed that with 'A' DC control power lost, the output breaker control power is also lost and the output breaker(s) will not close.
- D. CORRECT. Both EDG will start due to the DC starting circuits have two parallel circuits, one from each DC train, Day tank for EDG A needs to be filled by cross-tying the EDG fuel oil transfer pump and manually bypassing the DC fill solenoid

Technical Reference(s): P-12 (Attach if not previously provided)
ER-ELEC.2
TSB B-3.8.1-3
TSB B3.8.4-2

Proposed references to be provided to applicants during examination: None

Learning Objective: R0801C, 1.10 (As available)
RER07C, 2.0

Question Source: Bank #
Modified Bank # IP 2010 NRC Exam (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments: Meets K/A by considering the effect of loss of DC control power to a relay that provides the EDG start circuits.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	064 A1.02	
	Importance Rating	2.5	

(K&A Statement) Emergency Diesel Generator - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ED/G system controls including: Fuel consumption rate with load

RO Question #48

Which of the following sets of conditions will result in the greatest rate of fuel oil consumption by the Emergency Diesel Generators?

Assume that:

- Offsite power has been lost
 - Both Emergency Diesel Generators are running loaded
 - All equipment functioned as designed
- A. An unexplained reactor trip occurred immediately following the loss of offsite power. RCS pressure is 2000 psig and rising. CNMT pressure is 0.5 psig and stable.
- B. An automatic SI actuated on a steamline break downstream of the MSIVs. RCS Pressure is 1700 psig and rising. CNMT pressure is 0.5 psig and stable.
- C. An automatic SI actuated on a steamline break inside CNMT. RCS pressure has stabilized at 1000 psig. CNMT pressure is 50 psig and slowly lowering.
- D. A manual SI was initiated when pressurizer level could not be maintained following a reactor trip. RCS pressure is 1000 PSIG and rising. CNMT pressure is 8.0 psig and stable.

Proposed Answer: C

Explanation:

- A. Plausible because different loads are applied in the UV Mode without SI. The candidate may assume for a straight Reactor Trip without an SI that more loads remain on EDG's due to no 'stripping of loads' and believe that this would produce the highest fuel consumption. However, there are more rotating equipment loads in the SI + UV and thus this would be one of the lowest fuel consumption situations.
- B. Plausible because the candidate may believe due to all of the SI loads having started with a rising RCS pressure that the SI pumps would have to work harder to inject and reason that this would require a higher KW to do so and believe that this would produce the highest fuel consumption. Actually as SI flow lowers so does KW and the candidate may not recognize that RHR Pumps were stopped prior to ES-1.1 entry.
- C. CORRECT. The largest, and variable, electrical load on the EDGs are the CRFCs. The higher the pressure in CNMT, combined with all the other SI loads, the more loading there will be on the EDG'. Therefore this will be the highest fuel consumption
- D. Plausible because the RCS pressures in Choices "C", "D" are similar, The largest, and variable, electrical load on the EDGs are the CRFCs. The higher the pressure in CNMT, and the SI and RHR Pumps are not stopped until a few steps after the RCS depressurization steps have been completed.

Technical Reference(s): FSAR Table 8.3-2a (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R0801C 1.09 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43 _____

Comments: Meets K/A by considering fuel consumption rate vs. the expected loading for different situations and general points in emergency procedures. Indirectly deals with when a Diesel Fuel Oil Storage Tank limit will be reached and refill needed to remain within TSB. However it is difficult to get closer than indirect because, regardless of the rate, it is all "time-in-the procedure" dependent.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	064 G2.2.37	
	Importance Rating	3.6	4.6

(K&A Statement) Emergency Diesel Generator - Ability to determine operability and/or availability of safety related equipment.

RO Question #49

Plant conditions:

- 100% power
- STP-O-12.1, EMERGENCY DIESEL GENERATOR A, is in progress
- Emergency Diesel Generator "A" is running with 2000 KW load

Which choice accurately completes the following statement regarding the operability status of the Emergency Diesel Generator?

Emergency Diesel Generator "A" is _____ while synchronized to the grid for this surveillance.

- A. OPERABLE but UNAVAILABLE
- B. OPERABLE and AVAILABLE
- C. INOPERABLE and UNAVAILABLE
- D. INOPERABLE but AVAILABLE

Proposed Answer: D

Explanation:

- A. Plausible because, after the EDG is synchronized to the grid, it can still realign to supply the vital bus if a UV and/or SI occurs. However, during startup and shutdown, switches are mis-positioned and/or tests are underway where the EDG may not meet operability requirements at any given time.
- B. Plausible because, after the EDG is synchronized to the grid, it can still realign to supply the vital bus if a UV and/or SI occurs. A candidate unfamiliar with the surveillance procedure may be unaware that the EDG is declared INOPERABLE but AVAILABLE during the surveillance, since a realignment could be accomplished in short time.
- C. Plausible because the first part is correct, and a candidate not familiar with the surveillance procedure could assume that since it is declared INOPERABLE, it must also be UNAVAILABLE.
- D. CORRECT. Per STP-O-12.1, Step 6.1.12, the EDG is declared INOPERABLE but AVAILABLE after proper system alignment is verified and before any controls manipulations. During this surveillance, the Unit/Trip switch is placed in "Parallel" to allow parallel operation with the selected bus – not it's normal configuration. Since the EDG could be quickly realigned to Unit operation, it is still "available."

Technical Reference(s): STP-O-12.1, 6.1.12 (Attach if not previously provided)
AR-DG-A-1 NOTE
TSB Pg. 513/604

Proposed references to be provided to applicants during examination: None

Learning Objective: _____ (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 8
55.43 _____

Comments: Meets K/A by considering the operability status of an EDG during the performance of a normal surveillance procedure.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	073 A4.03	
	Importance Rating	3.1	

(K&A Statement) Process Radiation Monitoring – Ability to manually operate and/or monitor in the control room: Check source for operability demonstration

RO Question #50

Plant conditions:

- 100% power
- STP-O-17.2M, PROCESS RADIATION MONITORS R-11 thru R-22, AND IODINE MONITORS R-10A and R-10B, SOURCE CHECK and ALARM SETPOINT VERIFICATION, is being performed
- R-14, Plant Vent Gas Monitor, will be tested next

Which of the following choices accurately completes the following statements?

Prior to performance of the Source Check for R-14, _____ (1) _____ to prevent inadvertent automatic actions. To demonstrate minimum operability, the source check increase must be _____ (2) _____.

- A. (1) a jumper is installed; (2) greater than a predetermined, calculated value
- B. (1) a jumper is installed; (2) greater than the required high alarm setpoint
- C. (1) the high alarm setpoint is raised; (2) greater than a predetermined, calculated value
- D. (1) the high alarm setpoint is raised; (2) greater than the required high alarm setpoint

Proposed Answer: C

Explanation:

- A. Plausible because a candidate unfamiliar with the source check surveillance might believe jumpers are necessary to bypass any automatic interlock actuation. Part 2 is correct per the CORRECT explanation below.
- B. Plausible because a candidate unfamiliar with the source check surveillance might believe jumpers are necessary to bypass any automatic interlock actuation. Part 2 is plausible because a candidate might believe the source strength is sufficient to drive the meter near-offscale high, without considering the impact of actually triggering the High Alarm interlocks and resulting consequences.
- C. CORRECT. While testing RMS channels with automatic interlock functions driven by the High Alarm, it is NOT desirable to activate the high alarm during the source check. To prevent this, the alarm setpoint is temporarily raised (to a level of E6 CPM) before the check source is activated. The as-found rate meter value is recorded, the source check actuated, and the final value achieved after activating the source is recorded. This high value is always less than the High Alarm temporary setpoint, so no automatic actuations occur. The post-source check indication must be >50 CPM (for R14 - it is different for each channel) greater than the as-found value to successfully pass this test.
- D. Plausible because part 1 is correct, whereas part 2 is incorrect for the same explanation as is provided in B above.

Technical Reference(s): STP-O-17.2M Surveillance (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X _____

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X _____
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 7 _____
55.43 _____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	076 A4.01	
	Importance Rating	2.9	

(K&A Statement) Service Water System – Ability to manually operate and/or monitor in the control room: SWS Pumps

RO Question #51

Given the following plant conditions:

- 100% power
- Offsite power has been lost
- Both D/Gs have started and energized their respective Safeguards busses
- Service Water pumps 'A' and 'D' were selected on the Service Water Selector Switch
- Only 'D' SW pump is running
- Attempts to start 'A', 'B', and 'C' SW pumps were unsuccessful
- "A" D/G local alarm for JACKET WATER TEMPERATURE is in alarm
- The AO reports that jacket water temperatures are as follows:
 - 178°F and continuing to rise on 'A' D/G
 - 160°F and stable on 'B' D/G

Which of the following is the next action required by AP-SW.2, Loss of Service Water?

- A. Establish alternate cooling to 'A' D/G
- B. Pull-stop D/G 'A' and immediately depress the Voltage Shutdown pushbutton
- C. Pull-stop BOTH D/Gs and immediately depress the Voltage Shutdown pushbuttons
- D. Trip the reactor, perform the Immediate Actions of E-0, Reactor Trip or Safety Injection, then trip both RCPs

Proposed Answer: B

Explanation:

- A. Plausible because later steps in AP-SW.2 will align alternate cooling if adequate cooling is supplied to running D/Gs, jacket water temperature are in alarm, which require shutting down the affected D/G.
- B. CORRECT. With inadequate cooling the affected D/G is shutdown
- C. Plausible if the candidate believes that a minimum of two SW pumps should be running – one to each train of SW and both D/G will need shutdown.
- D. Plausible if the candidate believes that the required minimum SW pump combination is two (2) which require a reactor trip. Per AP-SW.2, step 2 RNO, a reactor trip is required if NO SW pumps can be started.

Technical Reference(s): AP-SW.2 (Attach if not previously provided)
AR-DG-A9

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP33C 2.01 (As available)

Question Source: Bank # C000.1344 (V-63832)
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43

Comments: Meets K/A by requiring that the candidate know the power supplies and SW pump/train assignments in addition to recalling that running EDGs w/o SW must be tripped.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	076 K2.01	
	Importance Rating	2.7	

(K&A Statement) Service Water System – Knowledge of bus power supplies to: Service Water

RO Question #52

Plant conditions:

- Plant is operating at 100% power
- Service Water Pumps 'B', 'C', and 'D' are running
- 'A' and 'D' SW pumps are selected at the Service Water Selector Switch
- An SI actuation occurs, coincident with a loss of offsite power
- All equipment operated as expected

Following the SI, (1) which Service Water Pumps are running, AND (2) what is the status of Service Water Isolation?

- A. (1) 'B', 'C', and 'D' Service Water Pumps are running
(2) BOTH trains of Service Water Isolation occur
- B. (1) 'B', 'C', and 'D' Service Water Pumps are running
(2) NO Service Water Isolation occurs
- C. (1) 'A' and 'D' Service Water Pumps are running
(2) BOTH trains of Service Water Isolation occur
- D. (1) 'A', and 'D' Service Water Pumps are running
(2) NO Service Water Isolation occurs

Proposed Answer: C

Explanation :

- A. Plausible because the candidate may incorrectly believe that during an SI situation the running SW pumps start. The second part is correct.
- B. Plausible because the candidate may incorrectly believe that during an SI situation the running SW pumps start. Also because D/G re-energizes the bus the SW isolation will not occur.
- C. CORRECT. Only the selected SW pumps 'A' and 'D' will start and both trains of SW will isolate.
- D. Plausible because part 1 is correct. In part 2, the candidate may incorrectly assume that with because D/G re-energizes the bus the SW isolation will not occur

Technical Reference(s): ITS Basis 3.7.8-2 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R5101C, 1.04/1.05 (As available)

Question Source: Bank # C000.1452 (V-63971)
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	078 A3.01	
	Importance Rating	3.1	

(K&A Statement) Instrument Air System – Ability to monitor automatic operation of the IAS, including: Air pressure

RO Question #53

Plant conditions:

- 100% power
- Instrument Air Compressor 'C' is running
- Instrument Air and Service Air systems are cross-tied
- Instrument Air pressure is 100 psig and slowly lowering

Which choice identifies (1) the expected status of the air compressors, AND (2) the position of Service Air to Instrument Air Cross-tie Valve (AOV-5251)?

- A. (1) ONLY Instrument Air Compressor 'C' running;
(2) AOV-5251 CLOSED
- B. (1) ONLY Instrument Air Compressor 'C' running;
(2) AOV-5251 OPEN
- C. (1) Instrument Air Compressors 'A', 'B', and 'C' running;
(2) AOV-5251 CLOSED
- D. (1) Instrument Air Compressors 'A', 'B', and 'C' running;
(2) AOV-5251 OPEN

Proposed Answer: C

Explanation:

- A. Plausible because this would be the normal alignment. However, IA pressure has lowered below the auto start setpoint (105 PSI) for 1A and 1B IA Compressors. The second part is correct.
- B. Plausible because this would be the normal alignment. However, IA pressure has lowered below the auto start setpoint (105 PSI) for 1A and 1B IA Compressors. The second part is plausible if the applicant has reversed the sequence of auto responses to lowering IA header pressure.
- C. CORRECT. 1A and 1B IA Compressors are in AUTO and start at 105 PSI. AOV-5251 remains CLOSED until IA Header pressure reaches 90 PSI.
- D. Plausible because the first part is correct but AOV-5251 does NOT open until IA Header pressure reaches 90 PSI.

Technical Reference(s): SYS47 SD, Pg. 30/43 (Attach if not previously provided)
AP-IA.1, Step 4

Proposed references to be provided to applicants during examination: None

Learning Objective: _____ (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments: Meets K/A by requiring knowledge of the expected alignment for automatically controlled equipment as the pressure lowers in the IA System. Higher order (at the lower end of the spectrum) since A, C, or D could be made to be correct by changing IA Pressure.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	103 A4.04	
	Importance Rating	3.5	

(K&A Statement) Containment System Ability to manually operate and/or monitor in the control room: Phase A and Phase B resets

RO Question #54

Plant conditions:

- The reactor and main turbine tripped from 100% power
- An RCS Pressure transient caused a Pressurizer PORV to open and it failed to reseal
- The crew initiated a MANUAL SI and MANUAL CI prior to reaching the AUTO SI setpoint
- The block valve on the affected Pressurizer PORV has been closed
- The crew is performing E-1, LOSS OF REACTOR OR SECONDARY COOLANT

Which choice describes the actions required in order to restore instrument air (IA) to containment through AOV-5392, IA to CNMT?

- A. Reset CI, reset SI, open AOV-5392
- B. Reset SI, reset CI, open AOV-5392
- C. Reset CI, reset SI, reset both trains of XY relays for AOV-5392
- D. Reset SI, reset CI, reset both trains of XY relays for AOV-5392

Proposed Answer: D

Explanation :

- A. Plausible because if a candidate was unaware of the role the X-Y relays played in removing the CI signal to individual valves, they would choose this distractor (or 'B'). Similar to the correct answer, but the reset SI/CI sequence is reversed.
- B. Plausible because it was MANUAL CI initiation that closed AOV-5392, therefore it might seem that resetting that signal would allow valve operation. A candidate unfamiliar with the role of the X-Y relays in resetting CI signals might pick this option.
- C. Plausible because this is essentially the same as the correct answer with the reset SI/CI steps reversed. A candidate with a misconception of the necessary requirements to reset the CI signal could reverse this sequence improperly.
- D. CORRECT. SI must be reset to allow clearing the CI lock-in signal. The single MANUAL CI signal operates both trains of XY relays to ensure a CIV closes. Both sets of relays must be reset to allow the valve to be opened.

Technical Reference(s): E-1 Steps 6, 7, 9 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: REP01C 1.02 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X _____

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X _____
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 7 _____
55.43 _____

Comments: GINNA does not have a Phase "B" signal or valves. Meets K/A by requiring knowledge of the manual actions necessary to open the CIV that is always opened first after an accident or transient resulting in an SI.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	103 K4.04	
	Importance Rating	2.5	

(K&A Statement) Containment System – Knowledge of the containment system design feature(s) and/or interlock(s) which provide for the following: Personnel access hatch and emergency access hatch

RO Question #55

Given the following conditions:

- A Containment entry was made at power to investigate a possible steam leak
- Personnel are preparing to open the Personnel Hatch Inner Door

Which of the following accurately completes the statements below?

The Personnel Hatch Inner Equalizing Valve connects the hatch pressure with (1) pressure. The highest Technical Specification Mode that the personnel hatch interlocks may be bypassed is (2).

- | | |
|------------------------------|------------|
| A. (1) CONTAINMENT | (2) Mode 5 |
| B. (1) CONTAINMENT | (2) Mode 6 |
| C. (1) INTERMEDIATE BUILDING | (2) Mode 5 |
| D. (1) INTERMEDIATE BUILDING | (2) Mode 6 |

Proposed Answer: A

Explanation:

- A. CORRECT. The pressure equalizing valve is installed between the containment and the access hatch. The containment air locks must be operable in Modes 1-4; including the simultaneous door opening physical interlock mechanism.
- B. Plausible because first part is correct and all plant personnel have seen both access hatch doors open to support maintenance activities during a refueling outage.
- C. Plausible if applicant is thinking about equalizing the pressure between the IB and access hatch when opening the outer door. The second part is correct.
- D. Plausible if applicant is thinking about equalizing the pressure between the IB and access hatch when opening the outer door. All plant personnel have seen both access hatch doors open to support maintenance activities during a refueling outage.

Technical Reference(s): ITS, ITS Basis 3.6.2 (Attach if not previously provided)
FSAR 3.8.1.5.4, FIG 3.8-31

Proposed references to be provided to applicants during examination: None

Learning Objective: R2101C 1.07 and 1.13 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments: Meets K/A by requiring knowledge of a design feature associated with the containment air locks and the requirement for operability of the physical mechanism that prevents simultaneous door opening.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	001 G2.1.30	
	Importance Rating	4.4	

(K&A Statement) Control Rod Drive – Ability to locate and operate components, including local controls

RO Question #56

Plant conditions:

- 45% power
- The crew is preparing to recover BANK 'D', Group 1 rod C-7, in accordance with ER-RCC.1, RETRIEVAL OF A DROPPED RCC
- An operator has been dispatched to reset the step counter on the P/A Converter

Which choice fills in the blanks in the following statement?

The operator must select ____ (1) ____ at the P/A Converter. If the operator at the P/A Converter mistakenly believes that BANK 'B' Group 1 control rod E-7 is being retrieved, and takes action accordingly, then ____ (2) ____ to alert control room operators to the error.

- A. (1) BANK 'D'
(2) the BANK 'B' step counters will begin stepping out
- B. (1) BANK 'D'
(2) Alarm C-16, INSERTION LIMIT BANK B LO LO, will actuate during the process
- C. (1) RCC C-7
(2) the BANK 'B' step counters will begin stepping out
- D. (1) RCC C-7
(2) Alarm C-16, INSERTION LIMIT BANK B LO LO, will actuate during the process

Proposed Answer: B

Explanation:

- A. Plausible because the first part is correct and the second part is plausible if the candidate believes that the group selected at P/A Converter will control rod motion.
- B. CORRECT. Only a BANK can be selected at the P/A Converter. Performing the actions specified in the procedure (but on the wrong bank) will cause an insertion limit alarm to actuate on that bank because the RIL Computer gets its signal from the P/A Converter.
- C. Plausible because the specific rod is selected on the Lift Coil Disconnect Panel during dropped rod retrieval, and the group (within the affected bank) step counters are reset to ZERO, but that occurs at the MCB and not via the P/A Converter.
- D. Plausible because the specific rod is selected on the Lift Coil Disconnect Panel during dropped rod retrieval, and the second part is correct.

Technical Reference(s): ER-RCC.1, Step 6.2.5 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RER11C 3.0 and 4.0 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments: Meets K/A by demonstrating knowledge of operations performed at a Rod Control-related panel in the back of MCB and the expected indication(s) at the MCB.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	002 A1.08	
	Importance Rating	3.7	

(K&A Statement) Reactor Coolant System – Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RCS controls including: RCS average temperature

RO Question #57

Plant conditions:

- Power was being raised to 100% at 10%/hour
- The HCO was manually adjusting control rod position during the load ascension
- Following the final load adjustment to 100% power, the control rods were manually withdrawn 8 steps too far

Which of the following identifies:

- (1) The time in core life when the final Tav_g value will be the HIGHEST; AND
- (2) The MCB alarm or plant LIMIT that would occur FIRST?

- (1) Beginning of Core Life (BOL);
(2) Alarm G-9, RCS LOOP A HIGH TAVG 579°F
- (1) Beginning of Core Life (BOL);
(2) COLR Tav_g limit for DNB is exceeded
- (1) End of Core Life (EOL);
(2) Alarm G-9, RCS LOOP A HIGH TAVG 579°F
- (1) End of Core Life (EOL);
(2) COLR Tav_g limit for DNB is exceeded

Proposed Answer: B

Explanation:

- A. Plausible because the first part is correct but the DNB Tav_g limit is 577.5°F vs. 579.5°F alarm
- B. CORRECT. The value of MTC is lowest at BOL and therefore Tav_g would rise more at BOL than EOL before stabilizing. The ITS DNB limit for Tav_g is 577.5°F.
- C. Plausible if candidate does not properly apply the values of MTC to the situation and assumes that an overhead alarm would always actuate before a ITS limit is reached.
- D. Plausible if candidate does not properly apply the values of MTC to the situation and the second part is correct.

Technical Reference(s): AR-G-9 (Attach if not previously provided)
ITS 3.4.1 DNB LIMIT
COLR 2.10.2

Proposed references to be provided to applicants during examination: None

Learning Objective: _____ (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43 _____

Comments: There are no Reactor Coolant System controls that directly affect Tav_g. Meets K/A indirectly by requiring knowledge of the comparative response (BOL vs. EOL) of the RCS to a rod control failure and considering that a TS limit will be reached before the specified overhead annunciator alarm actuates.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	014 A2.04	
	Importance Rating	3.4	

(K&A Statement) Rod Position Indication – Ability to (a) predict the impacts of the following malfunctions or operations on the RPIS; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations: Misaligned rod

RO Question #58

Plant conditions:

- The unit was stable at 80% power
- Rod Control is in AUTOMATIC
- The RG&E Energy Control Center directed a rapid load reduction to 70% due to a problem on the grid
- At the conclusion of the load reduction the HCO reported that alarm C-5, PPCS ROD SEQUENCE OR ROD DEVIATION, was alarming
- Bank 'D' step counters read 181 steps
- MRPI indication for Bank 'D', group 2 rod G-3 is 164 steps
- Tavg has stabilized at 4°F lower than Tref
- The CRS has entered AP-RCC.2, RCC/RPI MALFUNCTION

Which choice identifies (1) the initial method for restoring Tavg to program, AND (2) what alarm will indicate that the problem is an actual misaligned RCC?

- A. (1) Initiate an RCS dilution;
(2) "ROD DEVIATION" alarm on the MRPI Screen
- B. (1) Initiate an RCS dilution;
(2) F-29, PPCS AXIAL OR QUADRANT POWER TILT
- C. (1) Reduce turbine load;
(2) "ROD DEVIATION" alarm on the MRPI Screen
- D. (1) Reduce turbine load;
(2) F-29, PPCS AXIAL OR QUADRANT POWER TILT

Proposed Answer: D

Explanation:

- A. Plausible because this would add positive reactivity and boration (another makeup mode) is specified to add negative reactivity if T_{avg} is greater than T_{ref} . However, dilution would take a long time and AP-RCC.2 specifies reducing turbine load rather than endorsing dilution or further rod motion. The ROD DEVIATION alarm on MRPI is ± 24 steps.
- B. Plausible because this would add positive reactivity and boration (another makeup mode) is specified to add negative reactivity if T_{avg} is greater than T_{ref} . However, dilution would take a long time and AP-RCC.2 specifies reducing turbine load rather than endorsing dilution or further rod motion. The second part is correct.
- C. Plausible because the first part is correct. However, the ROD DEVIATION alarm on MRPI is ± 24 steps.
- D. CORRECT. AP-RCC.2 specifies adjusting turbine load or initiating boration (dependent on the direction of the error) when T_{avg} is NOT stable at the programmed value. In this case, T_{ref} must be reduced to match T_{avg} . Alarm F-29 is listed as a symptom of an RCC problem and is indicative of the start of a quadrant power tilt. A QPTR calculation will be performed later in the procedure.

Technical Reference(s): AR-F-29 and AR-C5 (Attach if not previously provided)
AP-RCC.2, Symptoms & Step 3

Proposed references to be provided to applicants during examination: NoneLearning Objective: RAP13C 2.01 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments: Meets K/A by requiring knowledge of the impact of a misaligned rod on the RPIS and the subsequent actions for correcting a key plant parameter as addressed in the applicable procedure. Higher order because the actions would be different for different conditions and alternate actions for a *step are taken.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	015 K2.01	
	Importance Rating	3.3	

(K&A Statement) Nuclear Instrumentation – Knowledge of bus power supplies to: NIS channels, components, and interconnections

RO Question #59

Initial Plant conditions:

- A plant startup from a forced outage is in progress
- The plant is at 5% power
- Power is being raised in preparation for turbine roll for synchronization

The following conditions now exist:

- E-3, INVERTER TROUBLE, in alarm
- E-6, LOSS A INSTR BUS, in alarm
- Instrument Bus A voltage is 0 volts

Which of the following describes the plant response to these conditions? (Assuming no operator action.)

- A. Reactor trip on low PRZR pressure due to PT-429 failure, resulting in PORV-430 failing open
- B. Main turbine EHC shifts to Manual mode due to the loss of first stage impulse pressure signal
- C. Reactor trip due to de-energizing Intermediate Range N-35
- D. The reactor and turbine will continue to operate normally – a single instrument bus failure will not cause a transient.

Proposed Answer: C

Explanation:

- A. Plausible if the candidate believes PT-429 is the normal controlling PRZR channel (it's the alternate) and doesn't realize that on a loss of power all PRZR channels fails LOW. PT-429 provides the interlock function for PORV-430, and with a failure low the PORV is prevented from opening.
- B. Plausible because on the loss of Instrument Bus A, the first stage pressure input to EHC will fail LOW and cause the turbine control to shift to IMP PRESS OUT.
- C. CORRECT. Since most protection circuits take a 2/3 or 2/4 logic, a reactor trip will NOT normally occur from the loss of a single instrument bus. HOWEVER, if reactor trip breakers are closed with the Source Range and Intermediate Range flux trips NOT YET blocked during the startup (P-6 and P-10 permissives), a loss of A, B, or C instrument busses will result in a reactor trip when their bistables trip on loss of power due to the 1/2 coincidence associated with the SR and IR high flux trips.
- D. Plausible for the normal multiple-input protection logic described above.

Technical Reference(s): P-10, 5.12.C, Bus Failure (Attach if not previously provided)
P-10, 5.2.A, PRZR Press Failure

Proposed references to be provided to applicants during examination: None

Learning Objective: _____ (As available)

Question Source: Bank # C000.1429
Modified Bank # _____
New _____

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments: Meets K/A by requiring knowledge of operator action for loss of power to an instrument bus that feeds nuclear instrumentation during a reactor startup. Higher order because an assessment of other instrument failures in addition to NIS must be considered.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	027 K5.01	
	Importance Rating	3.1	

(K&A Statement) Containment Iodine Removal – Knowledge of the operational implications of the following concepts as they apply to the CIRS: Purpose of charcoal filters

RO Question #60

Which choice fills in the blanks in the following statement?

The Containment Recirculation Fan Cooler (CRFC) and Post-Accident Charcoal Filters will remove the maximum amount of _____ from the containment atmosphere when _____ CRFC units are in operation during the accident.

- A. Hydrogen; 1B and 1D
- B. Hydrogen; 1A and 1C
- C. Iodine; 1B and 1D
- D. Iodine; 1A and 1C

Proposed Answer: D

Explanation:

- A. Plausible because Hydrogen is the other gas of high interest following a DBA and 1B and 1D are powered from opposite vital buses. However, only 1A and 1C are physically connected with post-accident charcoal units.
- B. Plausible because Hydrogen is the other gas of high interest following a DBA. The second part is correct.
- C. Plausible because the first part is correct. 1B and 1D are powered from opposite vital buses but only 1A and 1C are physically connected with post-accident charcoal units.
- D. CORRECT. Post-Accident Charcoal Filter Units 1A and 1B are physically connected to receive discharge flow from their respective containment atmosphere recirculation units (1A from 1A, 1B from 1C). The purpose of the charcoal units is to filter/trap iodine from the post-accident atmosphere; with or without containment spray actuated.

Technical Reference(s): FSAR 9.4.1 (Attach if not previously provided)
33013-1863

Proposed references to be provided to applicants during examination: None

Learning Objective: R2201C 1.04 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 8
55.43 _____

Comments: Meets K/A by requiring knowledge of the purpose of the post-accident charcoal filters. Attempted to elevate the question to the licensed operator level by requiring knowledge of when the maximum flow through the charcoal filters would occur.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	029 K1.03	
	Importance Rating	3.6	

(K&A Statement) Containment Purge – Knowledge of the physical connections and/or cause-effect relationships between the Containment Purge System and the following systems: Engineered safeguards

RO Question #61

Plant conditions:

- The reactor is critical with power being held at 3% power due to a small RCS leak
- Preparations for a containment entry are in progress
- Containment atmosphere requires purging for air quality considerations prior to containment entry

What choice identifies (1) the system that must be utilized to purge the containment atmosphere, and (2) what will happen if an automatic safety injection actuation occurs while the purge system is aligned to containment?

- A. (1) Containment Purge;
(2) Isolation dampers close, fans automatically trip
- B. (1) Containment Purge;
(2) Isolation dampers close, fans must be manually stopped
- C. (1) Containment Mini-Purge;
(2) Isolation dampers close, fan automatically trips
- D. (1) Containment Mini-Purge;
(2) Isolation dampers close, fan must be manually stopped

Proposed Answer: C

Explanation:

- A. Plausible because this flowpath is permitted but not allowed above mode 4. The second part is plausible because operators check the post-SI position of the dampers but there is no direction to stop the fan(s) or to check their status and the fans will trip on a T-signal.
- B. Plausible because this flowpath is permitted but not allowed above in mode 4. The second part is plausible because operators check the post-SI position of the dampers but there is no direction to stop the fan(s) or to verify their "tripped" status.
- C. CORRECT. Mini-Purge initiation is NOT Mode dependent. The blower will trip on interlock with closure of the suction damper.
- D. Plausible because the first part is correct. However, the fans will trip on interlock with the suction damper.

Technical Reference(s): S-23.2.2, 5.6 (Attach if not previously provided)
AR-C17
ATT-3.0

Proposed references to be provided to applicants during examination: None

Learning Objective: R2201C 1.07 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 9
55.43

Comments: Meets K/A by requiring knowledge of the response of the containment purge alignment when an auto SI actuates. The flowpath part of the question provides two, more challenging choices for what would otherwise be a very easy question. Higher order because the permitted alignment would be different if the plant were in a different mode.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	034 K4.03	
	Importance Rating	2.6	

(K&A Statement) Fuel Handling Equipment – Knowledge of design feature(s) and/or interlock(s) which provide for the following: Overload protection

RO Question #62

Plant conditions:

- Core off-load is in progress
- The Manipulator Crane is aligned over the core
- The gripper is engaged on a fuel assembly

Which manipulator crane interlock will stop upward hoist motion if a grid strap on the engaged assembly becomes caught in a grid strap on an adjacent assembly?

- A. HOIST TRIP
- B. GRIPPER
- C. OVERLOAD
- D. SLACK CABLE

Proposed Answer: C

Explanation:

- A. Plausible as one of the four load cell interlocks. However, this circuit prevents upward hoist motion when a load is sensed with the gripper disengaged. Trolley motion is prevented.
- B. Plausible as one of the four load cell interlocks. However, this interlock prevents operation of the disengage solenoid before the assembly is resting on the lower core plate. Hoist can still be lowered.
- C. CORRECT. If 2250 pounds of tension is detected by the load cell with the gripper engaged then UP motion is disabled. Trolley motion is prevented.
- D. Plausible as one of the four load cell interlocks. However, this functions in the DOWN direction to prevent cable unspooling. Trolley motion is prevented.

Technical Reference(s): SYS37 SD, pg. 12 (Attach if not previously provided)
TRM Basis 3.9.3

Proposed references to be provided to applicants during examination: None

Learning Objective: R3701C 1.07 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 _____
55.43 7

Comments: Meets K/A by presenting a fuel handling situation and requiring knowledge of the circuit (OVERLOAD) that will prevent fuel assembly damage.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	055 K3.01	
	Importance Rating	2.5	

(K&A Statement) Condenser Air Removal – Knowledge of the effect that a loss or malfunction of the CARS will have on the following: Main Condenser

RO Question #63

Plant conditions:

- 100% power
- 3422, Air Ejector Steam Control Valve AOV, fails closed

What will be the long term effect on Main Condenser vacuum? Vacuum will:

- A. Be unaffected due to the rise in Gland Sealing Steam pressure
- B. Be unaffected, as the Priming Ejectors will automatically maintain vacuum when the primary steam source is isolated
- C. Degrade and stabilize at the point where the condensing action of the steam can maintain vacuum
- D. Degrade, resulting in an automatic turbine trip

Proposed Answer: D

Explanation:

- A. Plausible. Gland Sealing pressure would increase, however at this power level the turbine glands are self sealing and the excess steam would be controlled by the Steam Seal supply system. The effect of the loss of air removal would also far exceed the effect of increased gland sealing.
- B. Plausible. The Priming Ejectors can be used, however, they do not have automatic control.
- C. Plausible, however at 100% power the condensing action alone is not adequate to maintain vacuum. The non-condensable gases in the condensate would come out of solution in the condenser and vacuum will rise with no method of removal available.
- D. CORRECT. Main Condenser vacuum would decrease to less than 20" resulting in an auto turbine trip.

Technical Reference(s): AP-TURB.4 (Attach if not previously provided)
FSAR 10.4.3, 10.7.6
GP COMPONENTS, CH.3

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP23C 2.01 (As available)

Question Source: Bank # C000.1335
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 4
55.43

Comments: GINNA uses air ejectors to establish and maintain condenser vacuum. The CARS has no active equipment directly controlled from the MCB. Such being the case, the K/A is met by requiring knowledge of a CARS malfunction that will immediately affect condenser vacuum.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	068 A3.02	
	Importance Rating	3.6	

(K&A Statement) Liquid Radwaste – Ability to monitor automatic operation of the Liquid Radwaste System including: Automatic Isolation

RO Question #64

Plant conditions:

- The plant is operating at 100% power
- Monitor Tank "A" is being released to the discharge canal via RCV-18, LIQUID WASTE RELEASE OUTLET AOV TO DISCHARGE CANAL
- The following alarms have been received:
 - E16, RMS PROCESS MONITOR HIGH ACTIVITY
 - R-18, Radiation monitor warning and high alarm light are on

Which ONE of the following describes the status of the liquid waste release path for these conditions?

- A. RCV-18 automatically shuts and the Monitor Tank Pump automatically trips
- B. RCV-18 automatically shuts, the Monitor Tank Pump must be manually tripped
- C. RCV-18 must be locally closed, the Monitor Tank Pump automatically trips
- D. The discharge continues as long as the Monitor Tank Selector Switch is in DEFEAT

Proposed Answer: A.

Explanation:

- A. CORRECT. R-18 ALARM will cause all running discharge pumps to trip, and RCV-18 closes
- B. Plausible, automatic operation of RCV-18 can be bypassed during low discharge flow Conditions when only SW pumps are running, the Monitor Tank pumps may also be bypassed during low power conditions
- C. Plausible because the "open" interlock is defeated during an outage when a Circ Water pump is not operating. Candidate may incorrectly believe that this defeats the automatic closure of RCV-18. Part 2 is correct.
- D. Plausible because the candidate may incorrectly assume that the DEFEAT switch bypasses the auto closure of RCV-18. The switch actually defeats the Monitor Tank pump trip.

Technical Reference(s): AR-RMS-R-18 (Attach if not previously provided)
P-8

Proposed references to be provided to applicants during examination: None

Learning Objective: _____ (As available)

Question Source: Bank # _____
Modified Bank # X (Note changes or attach parent)
New _____

Question History: Last NRC Exam Wolf Creek
2009 Q5

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 _____
55.43 7

Comments: Meets K/A by requiring knowledge of automatic isolation interlocks that are operable for a specific set of conditions

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	075 A4.01	
	Importance Rating	3.2	

(K&A Statement) Circulating Water System – Ability to manually operate and/or monitor in the control room: Emergency/essential SWS Pumps

RO Question #65

Plant conditions:

- 75% power
- Alarm I-1, SCREEN HOUSE LO LEVEL 22', has actuated due to continued ice buildup.
- Both PPCS and local indications confirm lowering level
- The crew is performing ER-SC.3, LOW SCREENHOUSE WATER LEVEL,
- AP-TURB.5, RAPID LOAD REDUCTION, is also being performed to lower power to less than 50%

Which choice fills in the blanks in the following statement?

Power is lowered to less than 50% in anticipation of (1) and, if screenhouse level continues to lower, the (2) pumps will be the first to be considered inoperable.

- A. (1) tripping the Main Turbine;
(2) Service Water
- B. (1) tripping the Main Turbine;
(2) Fire
- C. (1) stopping one Circulating Water Pump;
(2) Service Water
- D. (1) stopping one Circulating Water Pump;
(2) Fire

Proposed Answer: C

Explanation:

- A. Plausible if the candidate is thinking about circulator trips and/or SW flow to turbine auxiliaries. 50% is the P-9 setpoint that prevents a reactor trip on a turbine trip. The second part is correct.
- B. Plausible if the candidate is thinking about circulator trips and/or SW flow to turbine auxiliaries. 50% is the P-9 setpoint that prevents a reactor trip on a turbine trip. The Fire Pump suction bell strainer is located higher in the screenhouse than the SW Pump suction bell but the Fire Pumps remain OPERABLE after the SW Pumps have already been declared INOPERABLE.
- C. CORRECT. Per ER-SC.3, stopping one CW Pump will raise screenhouse level approximately 7'. SW Pumps are declared INOPERABLE at 16' then the Fire Pumps will be declared INOPERABLE if level continues to lower below 15.5'.
- D. Plausible because the first part is correct. The Fire Pump suction bell strainer is located higher in the screenhouse than the SW Pump suction bell but the Fire Pumps remain OPERABLE after the SW Pumps have already been declared INOPERABLE.

Technical Reference(s): ER-SC.3: Precaution 5.1.3, (Attach if not previously provided)
5.1.4; 6.3.6.NOTE; ATT. 1

Proposed references to be provided to applicants during examination: None

Learning Objective: RER20C, 2.01 and 2.10 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments: Meets K/A by requiring knowledge of the actions associated with CW Pumps and operability of SW and FP Pumps as the level lowers in the screenhouse: the common suction area of the pumps. Borderline but considered higher order because the order of pump inoperability is determined.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.1.3	
	Importance Rating	3.7	

(K&A Statement) Knowledge of shift or short-term relief turnover practices

RO Question #66

A Control Board Operator is reporting for a normally scheduled shift after being off for the past eight (8) days. Which of the following is required to be performed when relieving the off-going watch?

- A. Walkdown/tour of the Control Room panels
- B. Review of the Night Orders & Instructions for the previous 72 hours
- C. Review of ALL Condition Reports submitted since the previous watch of the on-coming watchstander
- D. Review of the past eight days worth of Control Room Logs back to the previous watch of the on-coming watchstander.

Proposed Answer: A

Explanation:

- A. CORRECT. Per CNG-OP-1.01-2002, Operations Shift Turnover and Relief, Section 5.2.B.2, the on-coming watchstation panel operators shall tour Control Room panels with the off-going watch.
- B. Plausible because per CNG-OP-1.01-2002, Operations Shift Turnover and Relief, Section 5.2.B.1.b, the on-coming watchstation panel operators shall review the Night Orders & Instructions back to their last shift,
- C. Plausible because per CNG-OP-1.01-2002, Operations Shift Turnover and Relief, Section 5.2.B.2.d, the on-coming watchstation panel operators shall review Condition Reports that affect Operations, not ALL Condition Reports.
- D. Plausible because per CNG-OP-1.01-2002, Operations Shift Turnover and Relief, Section 5.2.B.1.d, the on-coming watchstation panel operators shall review Control Room log back to their last watch, or the last 48 hours, whichever is SHORTER. Since the operator is returning from 8 days off, only a review of the logs for the past 48 hrs is required.

Technical Reference(s): CNG-OP-1.01-2002, Operations Shift Turnover and Relief (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RAD23C, 4.00 – Describe the turnover process as described in CNG-OP-1.01-2002 (As available)

Question Source: Bank # C000.1055
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.1.23	
	Importance Rating	4.3	

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

RO Question #67

Given the following conditions:

- Plant is cooling down to cold shutdown as a result of high RCS activity
- It is desirable to maintain the maximum amount of Letdown flow due to the RCS activity
- With reduced RCS pressure, current Letdown flow is 6 gpm with all 3 orifices in service
- The next step in O-2.2, Plant Shutdown from Hot Shutdown to Cold Conditions, will have the crew align RHR and place it in service

How will purification flow continue as RCS pressure is further reduced from 350 psig to 125 psig?

- A. Solid plant pressure control will establish satisfactory letdown flow through the orifice valves while operating on RHR
- B. Purification flow will continue through the orifice valves, but at lower flow rates as RCS pressure is reduced
- C. The Refueling Water Purification pump is placed in service at ~350 psig to assist in developing Letdown flow
- D. The RHR pump head will provide sufficient letdown flow from the RHR system to allow greater purification flow

Proposed Answer: D

Explanation:

- A. Plausible because when solid pressure control is via PCV-135 and the orifices do still allow RCS pressure control, however the flow is too low to provide purification
- B. Plausible because purification flow will be inadequate at low pressures and orifice valves are closed to place Low Pressure Purification in service
- C. Plausible because the Refueling Water Purification pump is used to continue purification, however it is only used when RCS pressure is less than 100 psig
- D. CORRECT. When RHR is placed in service part of the flow is diverted to the CVCS system thru HCV-133 to provide driving head for RCS purification and pressure control when solid

Technical Reference(s): O-2.2, Plant Shutdown from Hot Shutdown to Cold Conditions (Attach if not previously provided)
S-7B

Proposed references to be provided to applicants during examination: None

Learning Objective: _____ (As available)

Question Source: Bank # C004.0049
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.1.29	
	Importance Rating	4.1	

(K&A Statement) Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.

RO Question #68

Given the following conditions:

- You are conducting a valve lineup
- You are verifying the position of a normally LOCKED OPEN valve
- The locking device is preventing any movement of the handwheel

Which of the following describes the method used to completely verify the position of this locked valve in the OPEN position?

- A. Verify position by local stem indicator, local light indication if available, or limit switch position if available. Positioning of the valve is NOT required.
- B. Verify that the locking device prevents any valve movement by visual inspection or by physically attempting movement of the locking device. Positioning of the valve is NOT required.
- C. Remove the locking device, attempt to move the valve in the OPEN direction, return valve to original position, and reinstall locking device. Second person independently verifies the locking device installed.
- D. Remove the locking device, attempt to move the valve in the CLOSED direction, return valve to original position, and reinstall locking device. Second person independently verifies the locking device installed.

Proposed Answer: D

Explanation:

- A. Plausible because the candidate may incorrectly assume that the valve position can be verified solely by valve stem position, indicator lights, or limit switch operation. A-52.2, Control of Locked Valve and Breaker Operation, is very specific in how to verify a LOCKED OPEN valve.
- B. Plausible because the candidate, if not familiar with A-52.2, may incorrectly assume that no movement from a locking device is sufficient to verify valve position.
- C. Plausible because this distractor is correct EXCEPT that A-52.2 specifies that the valve is to be checked in the CLOSED position.
- D. CORRECT. Per A-52.2, Section 6.3.7.2, reads: "Attempt to move handwheel or operator in the CLOSED direction only enough to verify valve indicating the valve is open. IF unable to move the operator due to the locking device, remove the locking device and attempt to move the operator or handwheel in the CLOSED direction only long enough to verify valve movement."

Technical Reference(s): A-52.2, Control of Locked Valve and Breaker Operation (Attach if not previously provided)

IP-OPS-5, Operational Configuration Control, Att.4

Proposed references to be provided to applicants during examination: None

Learning Objective: RAD08C, 1.05 – Explain how the verify the position of a locked valve. (As available)

Question Source: Bank # C000.1050

Modified Bank # (Note changes or attach parent)

New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10

55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.2.13	
	Importance Rating	4.1	

(K&A Statement) Knowledge of tagging and clearance procedures

RO Question #69

You have been directed to develop a tagout (Barrier 2) in accordance with CNG-OP-1.01-1007, Clearance and Safety Tagging.

Which one of the following conditions requires the associated tagout to be considered an "EXCEPTIONAL TAGOUT"?

- A. Reactor Coolant System level is being maintained at < 6" for RTD replacement
- B. Double isolation is not provided for a Service Water System component tagout
- C. Tags Plus not applied to a CAUTION-tagged component
- D. A tagged-out Confined Space whose atmospheric conditions areas have been verified acceptable

Proposed Answer: A

Explanation:

- A. CORRECT. System conditions, such as RCS Level, used for boundaries are considered to be EXCEPTIONAL TAGOUTS .
- B. Plausible because if double isolation can be provided, a tagout is considered EXCEPTIONAL for system conditions of 200°F and 500 psig. Service Water system pressure is 40-60 psig, and is well below the required pressure of 500 psig for an EXCEPTIONAL TAGOUT.
- C. Plausible because the candidate may not understand that CNG-OP-1.01-1007 states that one of the conditions for an EXCEPTIONAL TAGOUT is "Tags Plus not applied to a DANGER-tagged component" – and therefore CAUTION-tagged valves do NOT apply to the EXCEPTIONAL tagout.
- D. Plausible because Confined Spaces qualify as an EXCEPTIONAL TAGOUT until the atmospheric conditions are confirmed.

Technical Reference(s): CNG-OP-1.01-1007, Rev. 01000 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LP-XX-FIC-SAFTG, 3.0 (As available)

Question Source: Bank # _____

Modified Bank # _____ (Note changes or attach parent)

New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 10

55.43 _____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.2.40	
	Importance Rating	3.4	

(K&A Statement) Ability to apply Technical Specifications for a system

RO Question #70

Given the following plant conditions:

- RCS dilution is in progress for reactor startup
- Rx trip breakers are closed
- Shutdown Bank rods have been withdrawn
- N31 reading $\sim 3 \times 10^2$ cps
- N32 reading $\sim 2 \times 10^2$ cps
- N35 reading $\sim 1.5 \times 10^{-11}$ amps
- N36 reading $\sim 1.0 \times 10^{-11}$ amps

Suddenly N32 reading drops to < 1 cps.

Which of the following is a required action, based upon the inoperability of N32?

- A. Restore N32 AND open the reactor trip breakers within 1 hr
- B. Immediately suspend the RCS dilution
- C. Immediately open the reactor trip breakers
- D. No action required – the ITS LCO is satisfied

Proposed Answer: B

Explanation:

- A. Plausible because the importance of the Source Range instrumentation during a reactor startup could lead the candidate to believe that this LCO is one of the <1 hr Action requirements.
- B. CORRECT. Per ITS LCO Action F.2, "Suspend operations involving positive reactivity additions IMMEDIATELY" and F.3, "restore the channel to OPERABLE status within 48 hrs."
- C. Plausible because the reactor trip breakers must be opened immediately if BOTH N31 and N32 are inoperable per Action F.1.
- D. Plausible if the candidate misread Table 3.3.1.1 for mode applicability, in which case a single Source Range channel is possible with no further actions

Technical Reference(s): ITS LCO 3.3.1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3301C, 1.13 (As available)

Question Source: Bank # B015.0002
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 6
55.43

Comments: RO knowledge due to IMMEDIATE action knowledge of LCO to suspend positive reactivity evolutions.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.3.4	
	Importance Rating	3.2	

(K&A Statement) Knowledge of radiation exposure limits under normal or emergency conditions
RO Question #71

Given the following conditions:

- The Survey Center has been directed to provide immediate entry for Operations personnel in accordance with EPIP 3-3, Immediate Entry
- Enroute to the TSC, radiation levels are higher than initially estimated

Given these conditions, (1) what is the maximum radiation level in an area that the team can enter without permission, AND (2) if exceeded, whose permission is required to proceed through those areas?

- A. (1) less than 2 Rem/hr (2) General Supervisor Radiation Protection
- B. (1) less than 2 Rem/hr (2) Emergency Coordinator
- C. (1) less than 5 Rem/hr (2) General Supervisor Radiation Protection
- D. (1) less than 5 Rem/hr (2) Emergency Coordinator

Proposed Answer: B

Explanation:

- A. Plausible because part 1 is correct and because the, General Supervisor Radiation Protection permission is required to exceed site dose limits ,but the direction to enter areas > 2 Rem/hr is provided by the Emergency Coordinator.
- B. CORRECT. Per EPIP-3.3, one of the requirements for an Immediate Entry departure briefing is "A reminder that the teams DO NOT enter areas with radiation levels greater than 2 Rem/hr unless directed by the Emergency Coordinator."
- C. Plausible because 5 Rem is a recognizable number corresponding to the Annual Regulatory Limit for dose, and makes 5 Rem/hr a potentially attractive number., General Supervisor Radiation Protection permission is required to exceed site dose limits but the direction to enter areas > 2 Rem/hr is provided by the Emergency Coordinator.
- D. Plausible because 5 Rem is a recognizable number corresponding to the Annual Regulatory Limit for dose, and makes 5 Rem/hr a potentially attractive number, and part 2 is correct,

Technical Reference(s): A-1 (Attach if not previously provided)
EPIP 3-3

Proposed references to be provided to applicants during examination: None

Learning Objective: RSC02C, 15 and 16 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.3.13	
	Importance Rating	3.4	

(K&A Statement) Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to LHRA, aligning filters, etc.

RO Question #72

Given the following:

- Plant operating at 100% power
- Containment entry is in progress to search for an unidentified RCS leak
- S-12.2, Operator Action In The Event Of Indication Of Significant Increase In RCS Leakage, is open
- R10A, Containment Vent Iodine Monitor, counts start rising and High Alarm actuates

What is the next required action to be taken per A-3, Containment Vessel Entry, for these conditions?

- A. Evacuate Containment
- B. Start Aux. Charcoal Filter Fans
- C. Initiate Containment Ventilation Isolation
- D. Initiate sampling of Containment Sump 'A'

Proposed Answer: A

Explanation:

- A. CORRECT. Per A-3, Step 3.1, Control Room personnel **SHALL** announce over the plant PA system that the plant evacuation alarm is applicable **ONLY** to personnel in CNMT and Control Room personnel **SHALL** sound the Plant Evacuation Alarm as a response to a degraded condition with personnel in CNMT."
- B. Plausible because the candidate may recognize that the Aux. Charcoal Filter Fans must be running per A-3, but are started prior to entry
- C. Plausible because the candidate may assume that R10A is an input to CVI. The inputs for automatic CVI actuation are provided by R11 and R12
- D. Plausible because the candidate might assume that samples are taken in A-3 for RCS leakage, when in actuality samples are directed by S-12.2, which is open per the given conditions. The sump would have been sampled already with the RCS leakage condition previously identified.

Technical Reference(s): A-3 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RAD02C, 1.02 (As available)

Question Source: Bank # X

Modified Bank # (Note changes or attach parent)

New

Question History: Last NRC Exam 2008 Ginna

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 12

55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.4.4	
	Importance Rating	4.5	

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

RO Question #73

Given the following plant conditions:

- The reactor has tripped, concurrent with a loss of offsite power
- Safety Injection has actuated
- The crew is performing the actions of E-0, Reactor Trip or Safety Injection
- RCS pressure is 1700 psig and rising slowly
- CNMT pressure is 28 psig and rising slowly
- Power Range NIS read 2%
- CETs 705°F and rising slowly
- RVLIS level is 45% and lowering slowly
- Both S/G NR levels are offscale low
- AFW flow is 75 GPM to each S/G, and cannot be raised

Which of the following describes the procedural transition upon exit from E-0, based upon assessment of the Critical Safety Function Status Trees?

- A. FR-Z.1, Response to High Containment Pressure
- B. FR-H.1, Response to Loss of Secondary Heat Sink
- C. FR-S.1, Response to Reactor Restart/ATWS
- D. FR-C.1, Response to Inadequate Core Cooling

Proposed Answer: D

Explanation:

- A. Plausible because CNMT pressure of 28 psig is entry condition for FR-Z.1. This is the correct procedure (same as RED path) but higher RED path entries exist on Core Cooling and Heat Sink.
- B. Plausible because with both S/G NR levels offscale low, and AFW flow limited to <200 GPM, entry requirements for Loss of Heat Sink are met, and a RED path on FR-H.1 exists, but higher priority CSFST conditions are met.
- C. Plausible because there is indication that the reactor is not subcritical. Incorrect because the RED path criteria for FR-S.1 is power range > 5%.
- D. CORRECT. For the given conditions: CETs >700°F and rising, Subcooling <0°F, no RCPs running, and RVLIS < [55%], RED path condition exists for FR-C.1. This is the correct transition to be made from E-0.

Technical Reference(s): CSFST Summaries (Attach if not previously provided)
A-503.1, EOP Rules of Usage

Proposed references to be provided to applicants during examination: None

Learning Objective: RFR00C, 2.01 (As available)

Question Source: Bank # B000.1063
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.4.18	
	Importance Rating	3.3	

(K&A Statement) Knowledge of the specific bases for EOPs

RO Question #74

Plant conditions:

- E-3, STEAM GENERATOR TUBE RUPTURE, is in progress
- The crew is preparing to depressurize the RCS to minimize break flow and refill the pressurizer

Which one of the following explains why a limit of 75% is placed on pressurizer level during the depressurization? This pressurizer level ensures _____.

- A. an accurate indication of RCS inventory exists under adverse CNMT conditions
- B. an adequate steam bubble volume exists for effective pressure control
- C. sufficient inventory exists, under adverse CNMT conditions, to cover the PRZR heaters
- D. sufficient inventory exists to accommodate the collapse of an upper head steam bubble

Proposed Answer: B

Explanation:

- A. Plausible because concern for establishing and utilizing excess PRZR liquid inventory to make up for expected inventory losses after SI is terminated is mentioned in many bases steps. HOWEVER, the reason for allowing a maximum level of 75% has only to do with maintaining sufficient steam volume to maintain pressure control.
- B. CORRECT. Covering PRZR heaters, establishing excess RCS inventory, being able to monitor RCS inventory trend, etc. are all reasonable bases for establishing a PRZR level above some minimum level. Too much liquid inventory, however, will reduce the size of the bubble in the PRZR and make RCS pressure control more challenging. This is the basis for the EOP setpoint of 75% PRZR, as explained in the setpoint document.
- C. Plausible because concern for establishing enough inventory to keep the PRZR heaters covered and capable of being utilized for PRZR pressure control is valid – but is the basis for a MINIMUM PRZR level, not the maximum of 75%.
- D. Plausible because in later in E-3 actions are taken to collapse a bubble in the upper head, a minimum PRZR level is established to anticipate an outsurge from the PRZR – but the required maximum level during RCS DEPRESSURIZATION has nothing to do with this given reason.

Technical Reference(s): EOP BKGD, E-3, p95 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: REP03C 2.01 (As available)

Question Source: Bank # B000.0326
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	2.4.29	
	Importance Rating	3.1	

(K&A Statement) Knowledge of the emergency plan

RO Question #75

Given the following:

- A Site Area Emergency has been declared
- The Emergency Response Organization is staffed
- A repair team consisting of one AO, one Mechanic, and one RP Technician must be sent to the Aux Building to isolate a leak

Which one of the following Emergency Response Facilities is used for the assembly and preparation of the repair team?

- A. Main Control Room
- B. Technical Support Center (TSC)
- C. Operational Support Center (OSC)
- D. Emergency Offsite Facility (EOF)

Proposed Answer: C

Explanation:

- A. Plausible because during normal plant operation, prior to EPIP-entry and implementation conditions, most work is initiated by the Control Room and implemented through the Work Control Center (WCC).
- B. Plausible because the TSC "establishes and approves repair priorities" (Section 4.2 of EPIP-1-10), but implements those activities via EPIP-1-12. It is the OSC Maintenance Supervisor who is responsible for assembling and directing the repair team (Section 4.5)
- C. CORRECT. EPIP-1-12 describes the process used to dispatch and control the assessment and repair teams. The OSC Director is responsible for using Att-2 to assemble the assessment and repair team.
- D. Plausible because while ultimate responsibility for the accident recovery lies with the Emergency Director in the EOF, the EOF Recovery Manager still works in conjunction with the manpower assets available in the TSC and OSC. As described above, the repair teams are directed by the OSC Director.

Technical Reference(s): EPIP 1-10, OSC Activation (Attach if not previously provided)
EPIP-1-12, Control of Emergency Maintenance Assessment and Repair Teams

Proposed references to be provided to applicants during examination: None

Learning Objective: RSC01C, 4.0 (As available)

Question Source: Bank # X
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2007 Ginna

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments: