

2014 Ginna Initial License NRC Examination

RO Written Examination

Applicant Information

Name:

Date: December 16, 2014

Facility/Unit:

R.E. Ginna

Region: I

Reactor Type:

Westinghouse

Start Time:

Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination, you must achieve a final grade of at least 80.00 percent overall, with 70.00 percent or better on the SRO-only items if given in conjunction with the RO exam; SRO-only exams given alone require a final grade of 80.00 percent to pass. You have 8 hours to complete the combined examination, and 3 hours if you are only taking the SRO portion.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

Applicant's Signature

Results

RO -Only Examination Values

____ Points

Applicant's Score

____ Points

Applicant's Grade

____ Percent

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	007 EA1.06	_____
	Importance Rating	4.4.	_____

Ability to operate and monitor the following as they apply to a reactor trip: verification that the control and safety rods are in after the trip

RO Question #1

Given the following plant conditions:

- Manual reactor trip has just been actuated
- Reactor Trip Breaker 'A' Red indication is lit
- Reactor Trip Breaker 'B' Green indication is lit
- Reactor Power is 4% and lowering rapidly
- MRPI indicates all rods on bottom with the exception of TWO control bank D rods:
 - G-3 indicates "ERR"
 - K-7 indicates "ERR"

WHICH ONE of the following describes the condition of the reactor, and the action required?

- A. The reactor is tripped; establish emergency boration through MOV-350, Emergency Boration Valve for the two control rods not fully inserted
- B. The reactor is NOT tripped; establish a emergency boration flow path through FCV-110A, Boric Acid Flow Control Valve, for the 2 control rods not fully inserted
- C. The reactor is tripped; establish a normal boration through FCV-110A, Boric Acid Flow Control Valve, flowpath for the two control rods not fully inserted .
- D. The reactor is NOT tripped; manually insert control rods as directed by FR-S.1, NUCLEAR POWER GENERATION/ATWS

Answer: A

Explanation:

- A. CORRECT. Power level lowering with at least one reactor trip breaker open are valid indications that the reactor is tripped. ES-0.1 will take actions to address the potentially stuck control rods two or more rods emergency boration
- B. Incorrect. Plausible because the first part is NOT correct, and as an RNO action in the ES-0.1 a Boric Acid flow via normal flow path is established for a single rod not fully inserted.
- C. Incorrect. Plausible because the first part is correct, and and as an RNO action in the ES-0.1 a Boric Acid flow via normal flow path is established for a single rod not fully inserted .
- D. Incorrect. Plausible if the candidate believes that both reactor trip breakers are required to be opened – entry into FR-S.1 would be appropriate

Technical Reference(s): E-0 Background
ES-0.1 Background

Proposed references to be provided to applicants during examination: None

Learning Objective: REP00C, 2.01 (As available)

Question Source: Bank/VISION # _____
 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, .10
 55.43 _____

Justification for K/A Match:

The question matches the K/A by requiring a determination that the reactor is tripped by diverse indications of one at least one reactor trip breaker being open with neutron flux rapidly decreasing, then determining appropriate procedural actions based upon the "ERR" MRPI indication on two rods.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	008 AK2.03	_____
	Importance Rating	2.5	_____

Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: Controllers and Positioners

RO Question #2

Given the following:

- With the plant at 100% power a Pressurizer PORV fails partially open.
- Two minutes has elapsed and the reactor has not reached a trip or runback setpoint.
- Assume no operator manual action(s) have been taken

What is the status of: (1) charging pumps and
(2) Pressurizer level trend.

- A. (1) both running Charging Pumps speed are lowering
(2) rising
- B. (1) both running Charging Pumps speed are rising
(2) lowering
- C. (1) One running Charging Pump will speed up while one running Charging Pump speed will remain constant
(2) lowering
- D. (1) one running Charging Pump will slow down while one running Charging Pump speed will remain constant
(2) rising

Answer: C

10 CFR Part 55 Content:	55.41	<u>.7</u>
	55.43	<u> </u>

Justification for K/A Match:

The KA is matched because the operator must demonstrate knowledge of the interrelations between the Pressurizer Vapor Space Accident and the Auto Charging Pump and Master Pressure (431K) Controllers.

The question is at the Comprehension/Analysis cognitive level because the operator must recall bits of information (Normal Charging Pump Speed control) and then apply this information to determine how the charging Pumps speed will respond; and demonstrate an understanding of how the plant will react to a vapor space break, in order to answer the question correctly.

What MUST be known:

1. What is the normal alignment of the Charging Pump Speed Controllers at 100% power?
2. How will Pressurizer level vary during the first few minutes of a vapor space break with no operator action and the plant still at power?
3. How will Pressurizer pressure vary during the first few minutes of a vapor space break with no operator action and the plant still at power?
4. During the Vapor Space Break with the plant still at power, which plant parameter is impacted more, RCS pressure or inventory?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	009 EA2.08	
	Importance Rating	2.9	2.9

Ability to determine or interpret the following as they apply to a small break LOCA: Letdown isolation valve position indication

RO Question #3

Given the following plant conditions:

- Operators are responding to a small break LOCA which resulted in an Auto SI in accordance with E-1, LOSS OF REACTOR OR SECONDARY COOLANT
- Step 9, Establish IA to CNMT, has NOT yet been completed
- The control switches for AOV-294, CHARGING VLV RHX to LOOP B COLD, and AOV-427, LTDN LOOP B COLD LEG TO RHX, are in their normal pre-trip positions

WHICH ONE of the following identifies how the CVCS charging and letdown isolation valves respond to the given plant conditions?

	AOV-294	AOV-427
A.	OPEN	OPEN
B.	OPEN	CLOSED
C.	CLOSED	OPEN
D.	CLOSED	CLOSED

Answer: C

Explanation:

- A. Incorrect. Plausible because the normal at-power alignment for both valves would be open, and a candidate who did not know the fail position of the valves on loss of IA would select this choice..
- B. Incorrect. Plausible if a candidate did not know the correct loss of instrument air failed position of the valves and “reversed” their failed position.
- C. CORRECT. Due to the SI signal, air to CNMT is isolated, and the fail position for the valves is AOV-294 failed CLOSED and AOV-427 failed OPEN. As given in the stem, IA has not yet been restored to CNMT.
- D. Incorrect. Plausible if the candidate believes that the “fail safe” position of the valves on loss of IA is to fail CLOSED, since most CVCS valves fail closed on the CI signal.

Technical Reference(s): EOP Attachment 11.0 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R1601C, 1.10

Question Source: Bank/VISION # _____
 Modified Bank # X - Sequoyah (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 .7
 55.43 _____

Justification for K/A Match:

The question matches the K/A by requiring the candidate to identify the failure position of two charging/letdown isolation valves and to recognize that instrument air has not yet been restored following an SI/CI actuation signal.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	011 EK1.01	
	Importance Rating	4.1	

Knowledge of the operational implications of the following concepts as they apply to the Large Break LOCA: Natural circulation and cooling, including reflux boiling

RO Question #4

Given the following plant conditions:

- A LOCA has occurred 20 minutes ago
- RCPs are tripped
- None of the SI pumps are operating and cannot be operated
- RCS pressure is 900 psig and slowly rising
- Steam generator pressures are approximately 800 psig and slowly rising
- Steam Generator narrow range levels are 25%
- RVLIS is indicating 60%
- Core Exit T/Cs are 705°F and slowly rising

WHICH ONE of the following describes the heat removal mechanism(s) **currently** occurring, and the operator action(s) that will be effective in enhancing the current core cooling mechanism(s)?

- Break flow ONLY; maintain adequate ECCS flow for the current RCS pressure
- Break flow ONLY; OPEN S/G ARVs to depressurize RCS to establish long term cooling
- Break flow AND reflux boiling; maintain adequate ECCS flow for the RCS pressure
- Break flow AND reflux boiling; OPEN S/G ARVs to depressurize RCS to establish long term cooling

Answer: D

Explanation:

- A. Incorrect. For large break LOCAs, break flow is the primary heat removal mechanism and the core will remain cool as long as the coolant boiling is replaced with SI or accumulator water. When the core starts to uncover the natural and two phase circulation stops and the mechanism in S/G for heat removal becomes the reflux/condensing steam in the u-tubes.
- B. Incorrect. Plausible because the first part is partially correct and steaming the S/Gs will enhance reflux cooling, but only after S/G's have become a heat sink.
- C. Incorrect. Plausible as stated above, the ARVs must be opened to because the refluxing is needed to reduce RCS pressure to inject the accumulators and cause the pressure to reduce below the shutoff head of the RHR pumps to restore injection flow cooling.
- D. CORRECT. S/G remain effective as a heat sink therefore opening ARVs will provide increased heat removal.

Technical Reference(s): FR-C.2 Background Document (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RES12C, 2.1 (As available)

Question Source: Bank/VISION # X – Wolf Creek
 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 _____

Justification for K/A Match:

The question matches the K/A by evaluation of the plant conditions following a LOCA and determining that S/Gs are not effective as a heat removal mechanism when S/G pressure is > RCS pressure.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	025 2.1.27	_____
	Importance Rating	3.9	_____

Loss of RHR: Knowledge of system purpose or function

RO Question #5

Given the following plant conditions:

- The RCS is at 110°F.
- The A RHR Train is in operation.
- The RCS is vented to atmosphere.
- Bus 17 is de-energized for electrical maintenance

Subsequently, the A RHR Pump electrical breaker trips on overcurrent.

WHICH ONE of the following identifies the preferred means to restore core cooling?

- Align the RCDT for core cooling.
- Place the B RHR Pump/ train in Operation
- Align one SI Pump to the RCS and raise RCS loop level.
- Raise RCS pressure and dump steam from an intact Steam Generator.

Answer: B

Explanation:

- A. **Incorrect.** This is incorrect because the preferred method of restoring core cooling is with the RHR System. This is plausible because there is an electrical bus outage and the operator may incorrectly believe that the B Train of RHR is NOT available. If so, this method is a valid alternative.
- B. **CORRECT.** The major action items of AP-RHR.1 are (1) Attempt to Restore RHR Cooling, (2) Protect Personnel/ Reduce Releases, and (3) Establish Alternate RCS Cooling. According to the AP-RHR.1 Background document. Therefore, if the operator can restore RHR, this will be the preferred method. According to AP-RHR.1 (p3-10, Rev 02200), the first several steps will attempt to restore the RHR system, before the selection of the other alternate means.
- C. **Incorrect.** This is incorrect because the preferred method of restoring core cooling is with the RHR System. This is plausible because there is an electrical bus outage and the operator may incorrectly believe that the B Train of RHR is NOT available. If so, this method is a valid alternative.
- D. **Incorrect.** This is incorrect because the preferred method of restoring core cooling is with the RHR System. This is plausible because there is an electrical bus outage and the operator may incorrectly believe that the B Train of RHR is NOT available. If so, this method is a valid alternative.

Technical Reference(s): AP-RHR.1 (p3-10, Rev 2200) (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R2501C 1.12 & 1.13 (As available)

Question Source: Bank/VISION # _____
 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 _____

Justification for K/A Match:

Comments:

The KA is matched because the operator must demonstrate knowledge of the RHR system purpose (i.e. primary or preferred means of core cooling in Mode 5) during a Loss of Residual Heat Removal System (RHRS).

The question is at the Comprehension/Analysis cognitive level because the operator must recall bits of information (power supply to B RHR Pump) and then apply this information to select one of the procedurally identified alternative means to core cooling, to answer the question correctly.

What MUST be known:
1. What is the power supply to the B RHR Pump?
2. What is the preferred means of restoring core cooling in AP-RHR.1 when the operating train of RHR fails?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	026 AK3.02	_____
	Importance Rating	3.6	_____

Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The automatic actions (alignments) within the CCWS resulting from actuation of the ESFAS

RO Question #6

Given the following plant conditions:

- RCS Pressure is at 1700 psig
- Offsite power has been lost
- Safeguard buses are energized by the Emergency D/Gs

(1) What is the status of the Component Cooling Water pumps?

And

(2) What is the reason for this alignment?

- A. (1) CCW Pumps are running
(2) CCW is required to supply cooling to the RCP seals
- B. (1) CCW Pumps are not running
(2) D/G loading is the concern
- C. (1) CCW Pumps are running
(2) CCW is required to supply cooling to the SI and RHR pumps
- D. (1) CCW Pumps are not running
(2) SW Isolation is isolated from CCW Heat exchangers.

Answer: B

Explanation:

- A. Incorrect . Plausible because CCW has been lost, An automatic SI has occurred, the EDGs have energized the busses which have stripped the CCW and charging , but RCPS are off due to lost offsite power
- B. CORRECT, EDGs supplying the safeguards buses causes the CCW pumps to trip CCW is not needed until cold leg recirculation Diesel overload is a concern.
- C. The RCPs are off and CCW is not needed until cold leg recirculation SI/RHR Pumps are cooled by the cool pumped water (RWST).
- D. Incorrect. CCW PUMPS are off, Plausible because the EDGs supplying the safeguards buses causes the CCW pumps to trip and are not needed until cold leg recirculation SW isolation occurs because is not needed and non-essential loads are secured

Technical Reference(s): E-1, Step 11 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3501C, 1.07; R2801C, 1.06

Question Source: Bank/VISION # _____
 Modified Bank # 2010 Turkey Pt NRC (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 _____

Justification for K/A Match:

The question matches the K/A by requiring an evaluation of plant conditions and comprehension that an SI has occurred, EDGs have energized the Safeguards buses, CCW pumps have stripped,

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	EPE038	EA2.04
	Importance Rating	3.9	

**Ability to determine or interpret the following as they apply to a SGTR:
Radiation levels (MREM/hr)**

RO Question #7

Given the following plant conditions:

- A large main steamline break on a common line downstream of MSIVs which resulted in reactor trip and SI
- The crew has implemented E-0, REACTOR TRIP OR SAFETY INJECTION
- S/G ARVs are controlling Tavg at 547°F
- E-16, RMS PROCESS MONITOR HIGH ACTIVITY, is in alarm
- RMS panel readings are as follows:
 - R-15, Air Ejector, 310 cpm
 - R-19, S/G Blowdown, 110 cpm
 - R-31, Steam Line 'A', 3.1 mr/hr
 - R-47, Air Ejector Noble Gas, 95 cpm

WHICH ONE of the monitor readings above is a valid indication of a SGTR event?

- A. R-15
- B. R-19
- C. R-31
- D. R-47

Answer: C

Explanation:

- A. Incorrect. Plausible because while R-15 are used to detect noble gases resulting from effluent released through the air ejectors , the other conditions presented in the stem indicate that the MSIVs are closed and therefore R-15 is isolated from the S/Gs.
- B. Incorrect. Plausible because while R-19 is a primary monitor for primary to secondary leakage, the CI signal which accompanied the auto SI signal would have resulted in blowdown isolation.
- C. CORRECT. R-31 is above its alarm setpoint and is the only detector NOT isolated.
- D. Incorrect. Plausible because while R-47 directly monitors condenser off-gas and is more sensitive than either R-15 or R-48 , the other conditions presented in the stem indicate that the MSIVs are closed and therefore R-47 is isolated from the S/Gs.

Technical Reference(s): P-9, P-1, P&ID 33013-1231,1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3901C, 1.02 (As available)

Question Source: Bank/VISION # _____
 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 .11
 55.43 _____

Justification for K/A Match:

The question matches the K/A by requiring assessment of plant conditions to determine that 3 of the 4 detectors have been isolated by the automatic SI/CI signals and the remaining R-31 monitor is above its alarm setpoint.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	040 AK2.02	_____
	Importance Rating	2.6	_____

Knowledge of the interrelations between the Steam Line Rupture and the following: Sensors and detectors

RO Question #8

Given the following plant conditions:

- The plant was at 100% power
- A Steam Line Break occurred down-stream of the MSIVs
- Both S/G pressures were initially lowering
- Both S/G steam flows reached 4.0×10^6 lbm/hr
- Both S/G pressures lowered to 595 psig and have stabilized
- Pressurizer pressure is 1720 psig and lowering
- Tavg is 540°F and lowering

WHICH ONE of the following describes the expected ESF actuations?

Safety Injection

Main Steam Isolation

- | | |
|-----------------------------|--------------------------|
| A. Low Steamline Pressure | High Steamline Flow |
| B. Low Steamline Pressure | High-High Steamline Flow |
| C. Low Pressurizer Pressure | High Steamline Flow |
| D. Low Pressurizer Pressure | High-High Steamline Flow |

Answer: C

Explanation:

- A. Incorrect. Plausible if the candidate believes the given low steamline pressure condition is < the low steamline SI setpoint of 514 psig and because part 2 is correct.
- B. Incorrect. Plausible if the candidate believes the low steamline pressure alarm condition is < the low steamline SI setpoint of 514 psig and overlooks the fact that while a MSLB of this magnitude would likely result in high CNMT pressure conditions, the location was downstream of the MSIVs.
- C. CORRECT. The given RCS pressure is < the SI setpoint of 1750 psig and that caused the initial SI signal. With SI signal present, RCS Low Tavg (<545°F), and both S/G steam flows > 0.5 x 10⁶ lbm/hr, steamline isolation will occur on BOTH S/Gs..
- D. Incorrect. Plausible because the first part is correct and because the given high steamline flow value reached is above the design value of 3.94 x 10⁶ lbm/hr, it is still less than the actual high-high steamflow isolation setpoint of 4.4 x 10⁶ lbm/hr.

Technical Reference(s): P-1 Setpoints (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3501C, 1.07; R2801C, 1.06

Question Source: Bank/VISION # _____
 Modified Bank # X - Sequoyah (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 .7
 55.43 _____

Justification for K/A Match:

The question matches the K/A by requiring an evaluation of given plant parameters and a determination of which parameters (and their setpoint) would have resulted in steamline break-initiated SI and MSLI.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	054	AK3.02
	Importance Rating	3.4	

Loss of Main Feedwater: Knowledge of the reasons for the following responses as they apply to the Loss of Main Feedwater (MFW): Matching of feedwater and steam flows

RO Question: # 9

The plant is operating at 70% power when the following events occur:

- A Main Feedwater Pump trips.
- The crew has entered AP-FW.1, Abnormal MFW Pump Flow or NPSH.
- ALL AFW Pumps were started.
- A downpower was started per AP-TURB.5, Rapid Load Reduction.

WHICH ONE of the following correctly completes the statement below?

In accordance with AP-FW.1, the downpower will be terminated when feedwater flow ____ (1) ____ steam flow so that ____ (2) ____.

- A. (1) Matches
(2) Steam Generator levels stabilize > 20%, while the AFW pumps remain running.
- B. (1) Matches
(2) Steam Generator levels stabilize > 20%, and the AFW Pumps can be secured
- C. (1) Is greater than
(2) Steam Generator levels will rise and ultimately stabilize by operator action > 20%, and the AFW Pumps can be secured
- D. (1) Is greater than
(2) Steam Generator levels will rise and ultimately stabilize, by operator action > 20% while the AFW pumps remain running.

Answer: C

Explanation (Optional):

- A. **Incorrect.** 1st part wrong, 2nd part wrong. This is incorrect because AP-FW.1 clearly states that the load reduction is terminated when feed flow is greater than steam flow. This is plausible because matching steam flow and feed flow will tend to stabilize SG levels (or at least slow the drop in SG level), and the operator may incorrectly believe that this is the correct action and reason (Incorrectly believing that the AFW Pumps will remain operating).
- B. **Incorrect.** 1st part wrong, 2nd part correct. This is incorrect because AP-FW.1 clearly states that the load reduction is terminated when feed flow is greater than steam flow. This is plausible because matching steam flow and feed flow will tend to stabilize SG levels (or at least slow the drop in SG level), and the operator may incorrect believe that this is the correct action and reason.
- C. **Correct.** 1st part correct, 2nd part correct. According to AP-FW.1, Abnormal MFW Pump Flow or NPSH, Step 1.b RNO (p6; Rev 02000), if both MFW Pumps are NOT running, and power is less than 75%, the operator will be directed to start ALL AFW Pumps and initiate a downpower per AP-TURB.5. The operator is then instructed to terminate the load reduction when feed flow is greater than steam flow. The goal of AP-FW.1 is to restore inventory the Steam Generators, and ultimately stabilize SG levels. However, the AFW Pumps have been started and need to be stopped. According to the AP-FW.1 Background Document (p2; Rev 3) the AFW system may be operated for short periods to supplement flow from the MFW system. Provided that MFW pump suction can be maintained and SG level can be controlled, plant conditions are stabilized and attempts are made to return secondary conditions to normal. AFW, if started during the event is also restored to the normal configuration. Consequently, the load reduction is terminated when feedflow is greater than steam flow so that the AFW Pumps can be stopped.
- D. **Incorrect.** 1st part correct, 2nd part wrong. This is incorrect because the reason for requiring that feed flow be greater than steam flow is also so the AFW can be secured. This is plausible because the operator may incorrectly believe that feedflow must be greater than steam flow to account for the loss of inventory in the Steam Generators caused by SG Blowdown, and that ultimately the AFW Pumps will remain operating to do this. However, this would be incorrect thinking because when the AFW Pumps are started, SG Blowdown will isolate.

AP-FW.1 (p6; Rev 02000)

Technical Reference(s): AP-FW.1 Background Document (Attach if not previously provided)
(p4; Rev 3)

Proposed References to be provided to applicants during examination:

Learning Objective: RAP09C, Obj 2.01 (As available)

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

Question History: Last NRC Exam: NA

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

10 CFR Part 55 Content: 55.41 .10
55.43

Comments:

The KA is matched because the operator must demonstrate knowledge of why it is important to raise feed flow greater steam flow in a loss of main feedwater event. NOTE that AP-FW.1 does not have the operator match steam flow in these circumstances, but to actually adjust feed flow to greater than steam flow.

The question is at the Analysis/Comprehension cognitive level because the operator must demonstrate an understanding of why a specific action is taken, to answer the question correctly.

What MUST be known:
1. Under the stated conditions, how is Feed Flow adjusted?
2. Under the stated conditions, why is feed flow adjusted as it is?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	EPE055 2.4.06	
	Importance Rating	3.7	

Station Blackout: Knowledge of EOP mitigation strategies

RO Question #10

Given the following plant conditions:

- The crew is implementing ECA-0.0, Loss of All AC Power
- During the rapid depressurization of all intact S/Gs to less than 260 psig, an overshoot occurs
- S/Gs pressure reaches 150 psig before the depressurization is stabilized
- The RCS cooldown accompanying the depressurization did NOT result in a cooldown rate of $> 100^{\circ}\text{F/hr}$

WHAT is the potential consequence that could result from this overshoot in the S/G depressurization?

- A. RCP seals may be damaged
- B. Natural circulation may be impeded
- C. Unacceptable upper head voiding may occur
- D. The integrity of the S/G U-tubes may be challenged

Answer: B

Explanation:

- A. Incorrect. Plausible because it is possible to enter ECA-0.0 with both RCPs running, but they are secured early on (Step 4, before the depressurization occurs) and as long as the cooldown rate has not exceeded 100°F/hr, thermal shock to the RCP seals is not a concern.
- B. CORRECT. The concern with depressurizing excessively is that excessive N2 gas will be injected into the RCS by the accumulators during the depressurization, resulting in cessation of natural circulation cooling flow.
- C. Incorrect. Plausible because upper head voiding will occur after the bubble is lost from the PRZR. This is an acceptable consequence to mitigate the effects of further inventory loss due to the continued degradation of RCP seals.
- D. Incorrect. Plausible because the candidate may consider the high differential pressure between RCS and S/G pressure, but this is well within design limits.

Technical Reference(s): ECA-0.0 Step 20 Basis (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: REC00C, 1.02

Question Source: Bank/VISION # X - Sequoyah
 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 _____

Justification for K/A Match:

The question matches the K/A by requiring knowledge of the basis for the RCS depressurization step and limits in the 160 psig CAUTION prior to this Major Action step.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	056 AK1.04	
	Importance Rating	3.1	3.2

Knowledge of the operational implications of the following concepts as they apply to the Loss of Offsite Power: Definition of saturation conditions, implications for the systems

RO Question #11

Given the following plant conditions:

- Offsite power has been lost
- A Small Break LOCA has occurred
- The operators have just initiated a 100°F/hr cooldown in accordance with ES-1.2 POST LOCA COOLDOWN AND DEPRESSURIZATION
- CETs are 550°F and stable
- RCS pressure is 1000 psig
- RVLIS level is 83% and stable

WHICH ONE of the following describes the condition of the RCS and the consequences associated with this condition if it continues?

- A. 10°F Subcooled; Insufficient to satisfy pre-requisite for RCP restart when power restored
- B. 10°F Subcooled; Boiling is now occurring in the core area which is uncovering the fuel and could lead to core damage over time
- C. Saturated; Boiling is now occurring in the core area which will preclude starting RCPs when power is restored
- D. Saturated; Boiling is now occurring in the core area which is uncovering the fuel and will result in core damage

Answer: C

Explanation:

- A. Incorrect. Plausible if Fig-1.0 is read incorrectly and because having > 0°F Subcooling is a requirement for starting RCPs in ES-1.2.
- B. Incorrect. Plausible if Fig-1.0 is read incorrectly and because the second part is partially correct in that boiling is occurring in the core.
- C. CORRECT. Using FIG-1.0, the RCS is in the INADEQUATE SUBCOOLING region at 1000 psig and 550 °F. Per Step 12 of ES-1.2, subcooling must be >0°F to start a RCP when power is available. Since Safeguards equipment is functioning normally, adequate SI flow can be assumed, and while the RCS is saturated, inventory makeup is adequate and core uncover is not an issue. The primary concern with boiling is actually boron precipitation and long-term reduced heat transfer, but that is not addressed by this question.
- D. Incorrect. Plausible because the first part is correct (see above) and while boiling is occurring in the core, EDGs are supplying power to both trains of safeguards equipment.

Technical Reference(s): Fig-1.0, Subcooling (Attach if not previously provided)

Proposed references to be provided to applicants during examination: Fig-1.0, Subcooling

Learning Objective: R3501C, 1.07

Question Source: Bank/VISION # 2011 Callaway NRC
 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 _____

Justification for K/A Match:

The question matches the K/A by requiring an evaluation of plant conditions to determine if saturated conditions exist and the associated operational concerns for this condition.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	057 AA2.18	_____
	Importance Rating	3.1	_____

Loss of Vital AC Electrical Instrument: Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: The indicator, valve, breaker, or damper position which will occur on a loss of power.

RO Question #12

The plant is operating at 100% power.

Subsequently, a loss of an Instrument Bus results in the following:

- The Main Feedwater Pump Suction Pressure Transmitters fail to 0 psig
- The Main Feedwater Pump Suction Flow Transmitters fail to 0 gpm
- The Main Feedwater Pump Discharge Pressure Transmitters fail to 0 psig
- The Main Feedwater Pump Recirc Valves (AOV 4147/4148) fail OPEN

WHICH ONE of the following identifies the Instrument Bus that has de-energized?

- A. Instrument Bus 'A'
- B. Instrument Bus 'B'
- C. Instrument Bus 'C'
- D. Instrument Bus 'D'

Answer: D

Explanation:

- A. Incorrect. This is incorrect because Instrument Bus D powers these instruments/valves. This is plausible because Instrument Bus A powers Feedwater Control Rack (ADFCS).
- B. Incorrect. This is incorrect because Instrument Bus D powers these instruments/valves. This is plausible because Instrument Bus B powers Reheater STM TC-3040, and other secondary plant controls/instruments.
- C. Incorrect. This is incorrect because Instrument Bus D powers these instruments/valves. This is plausible because Instrument Bus C powers Feedwater Control Rack (ADFCS).
- D. CORRECT. According to P-12, Attachment 8 (p26; Rev 02300), the D Instrument Bus powers the Feedwater Transmitter Panel.

Technical Reference(s): Drawing 33013-1236 (Attach if not previously provided)
Drawing 33013-1627
Drawing 21489-0565
P-12, Attachment 8 (p26; Rev 02300)

Proposed references to be provided to applicants during examination: None

Learning Objective: R0901C 1.06

Question Source: Bank/VISION # _____
 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 .4
55.43

Justification for K/A Match:

The KA is matched because the operator must demonstrate the ability to determine and interpret the loss of power to several instruments and/or valves, associated with the Main Feedwater Pump, as they apply to the Loss of Vital AC Instrument Bus D.

The question is at the Memory cognitive level because the operator must simply recall bits of information (power supply to several Main Feedwater Pump instruments and/or valves) to answer the question correctly.

What MUST be known:

1. What is the instrument Bus that powers the Main Feedwater Pump Suction Pressure Transmitters?
2. What is the instrument Bus that powers the Main Feedwater Pump Suction Flow Transmitters?
3. What is the instrument Bus that powers the Main Feedwater Pump Discharge Pressure Transmitters?
4. What is the instrument Bus that powers the Main Feedwater Pump Recirculation Valves?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	062 AA1.02	
	Importance Rating	3.2	3.3

Ability to operate and/or monitor the following as they apply to the Loss of Nuclear Service Water (SWS): Loads on the SWS in the control room

RO Question #13

Given the following plant conditions:

- The plant is initially at 100% power
- An inadvertent Aux Building Service Water Isolation signal is received

Which ONE of the following identifies Service Water loads that still have service water available following the isolation?

- Safety Injection Bearing Coolers, ONLY.
- Safety Injection Bearing Coolers and the SAFW pump coolers.
- Safety Injection Bearing Coolers and the CCW Heat Exchangers.
- Safety Injection Bearing Coolers and the Spent Fuel Pool heat exchangers.

Answer: A

Explanation:

- A. CORRECT, since Aux Bldg SW isolation valves Loop A (MOV-4616/MOV-4735) and Loop B (MOV-4615/MOV-4734) receive an isolation signal to isolate the non-critical loads: CCW, SFP, and SAFW; only the SI Pump coolers will remain unisolated.
- B. Incorrect. Incorrect because SW to the SAFW Pumps is isolated. Plausible because the SAFW system is a backup for normal AFW, so it too is isolated on an SI signal or loss of offsite power to ensure the EDGs have adequate cooling.
- C. Incorrect. Incorrect because SW to the CCW HXs is isolated. Plausible because the CCW heat exchangers are normally aligned for power operation and are needed for long-term cooling. They are not needed at the onset of an accident, and are isolated on an SI signal or loss of offsite power to ensure the EDGs have adequate cooling.
- D. Incorrect. Incorrect because SW to the SFP HXs is isolated. Plausible because the SFP heat exchangers are normally aligned for power operation and are needed for long-term cooling. They are not needed at the onset of an accident, and are isolated on an SI signal or loss of offsite power to ensure the EDGs have adequate cooling.

Technical Reference(s): ATT-2.2, SW Isolation (Attach if not previously provided)
33013-1250 Sheets 1&2

Proposed references to be provided to applicants during examination: None

Learning Objective: R5101C, 1.07

Question Source: Bank/VISION # _____
 Modified Bank # X – 2010 Seabrook (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 .5
 55.43 _____

Justification for K/A Match:

Matches the K/A by evaluating the plant conditions, assessing SW configuration, and determining which loads are still available.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	065 AK3.03	
	Importance Rating	2.9	3.4

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

RO Question #14

Given the following plant conditions:

- The plant is initially at 100% power
- A leak developed on the Instrument Air line in Containment
- The crew has entered AP-IA.1, LOSS OF INSTRUMENT AIR, and are evaluating the need for a plant shutdown
- A CNMT entry was made and the leak is now isolated
- ONLY the following valves are impacted:
 - Letdown orifice valves AOV-200A, AOV-200B, and AOV-202
 - HCV-133, RHR LETDOWN TO CVCS
 - HCV-123, EXCESS LTDN FLOW CONTROL VALVE

ASSUMING NO OPERATOR ACTION, WHICH ONE of the following Reactor Trip signals, if any, will occur first over the next several hours?

- A. No reactor trip
- B. High PRZR Level
- C. High PRZR Pressure
- D. Low PRZR Pressure

Answer: B

Explanation:

- A. Incorrect. Plausible if the candidate overlooks the "assume no operator actions" and recognizes that AP-IA.1 will direct, with no letdown available, that the charging pumps be cycled on/off to control RCS inventory and avoid a reactor trip on high PRZR level.
- B. CORRECT. The orifice isolation valves closing will terminate L/D flow, and PRZR level will rise until the high Level trip setpoint is reached IF the operator actions directed by AP-IA.1 are not performed to cycle the charging pumps on/off to control PRZR level.
- C. Incorrect. Plausible because V-7069 does not isolate air to the PRZR spray valves, and with no operator action PRZR level will rise, raising PRZR pressure. The pressure rise, however, will be controlled by automatic actions of HCV-431K..
- D. Incorrect. Plausible if the candidate assumes that the L/D orifice valves will fail OPEN, resulting in an outsurge from the PRZR, heater trip, and reduction of RCS pressure to the trip setpoint.

Technical Reference(s): AP-IA.1 (Attach if not previously provided)
ATT-11.0, IA Concerns

Proposed references to be provided to applicants during examination: None

Learning Objective: R4701C, 1.06; RAP10C, 2.01

Question Source: Bank/VISION # 67373
 Modified Bank # _____ (Note changes or attach parent)
 New _____

Question History: Last NRC Exam Ginna 2006

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

10 CFR Part 55 Content: 55.41 .5, .10
 55.43 _____

Justification for K/A Match:

The question matches the K/A by requiring an evaluation of the fail position of the affected valves and the plant response resulting from those failures.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	E04 EK1.3	
	Importance Rating	3.5	3.9

Knowledge of the operational implications of the following concepts as they apply to the (LOCA Outside Containment): Annunciators and conditions indicating signals, and remedial actions associated with the LOCA Outside Containment

RO Question #15

Given the following plant conditions:

- D-19, PRESSURIZER LO PRESS SI 1750 PSIG, lit
- D-20, PRESSURIZER LO PRESS TRIP 1873 PSIG, lit
- R-10B, Plant Vent Iodine, and R-14, Plant Vent Gas, are in ALARM
- ECA-1.2, LOCA OUTSIDE CONTAINMENT, has been entered
- All isolation actions in ECA-1.2 have been directed.
- The HCO reports the following MCB indications now exist:
 - RCS pressure is 1100 psig and STABLE
 - ECCS flow remains STABLE at 400 gpm

WHICH ONE of the following describes the status of the LOCA and the required procedural transition?

- A. The LOCA is isolated; transition to ES-1.1, SI TERMINATION
- B. The LOCA is isolated; transition to E-1, LOSS OF REACTOR OR SECONDARY COOLANT
- C. The LOCA is NOT isolated; transition to E-1, LOSS OF REACTOR OR SECONDARY COOLANT
- D. The LOCA is NOT isolated; transition to ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION

Answer: D

Explanation:

- A. Incorrect. Plausible because with RCS pressure and ECCS flow both stable, candidate may interpret these indications as (additional) leakage has been isolated, in which case ES-1.1 would be the proper transition. Wrong because the procedure requires INCREASING RCS pressure to identify leak isolation.
- B. Incorrect. Plausible because with RCS pressure and ECCS flow both stable, candidate may interpret these indications as (additional) leakage has been isolated. Since ECA-1.2 can be entered from both E-0 AND E-1, candidate might believe that "returning to the procedure in effect" would be appropriate for entry from E-1, the procedure from which the initial transition occurred.
- C. Incorrect. Plausible because with RCS pressure not rising, the leak has not been isolated. Since ECA-1.2 can be entered from E-0 or E-1, a return to the procedure dealing with a LOCA might seem to be appropriate when no further actions are available in ECA-1.2. E-1 is entered if indications are that the leak has been isolated.
- D. CORRECT. With RCS pressure NOT rising, the leak has not been isolated. Without isolation, entry into ECA-1.2 is directed because the contents of the RWST are not being emptied into the CNMT sump, and therefore a transition to ECA-1.1 is warranted.

Technical Reference(s): ECA-1.2, Steps 7 & 8 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3501C, 1.07; R2801C, 1.06

Question Source: Bank/VISION # 106494
 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 _____

Justification for K/A Match:

The question matches the K/A by requiring an evaluation of plant conditions, diagnosing plant conditions for whether an RCS leak outside CNMT had been isolated, and then a transition to the appropriate procedure for mitigating the inability to isolate the leak outside CNMT.

Ginna's annunciator system contains only a single annunciator, L-10, AUX BLDG SUMP PUMP AUTO START, which is deliberately omitted from this question (although it would help to address the K/A) because its status would cue the candidate as to whether the leak had been isolated.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	WE11 2.1.07	
	Importance Rating	4.4	

Loss of Emergency Coolant Recirc: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation

RO Question #16

Given the following:

- A large LOCA occurred 90 minutes ago.
- RCS pressure is 40 psig.
- The crew has entered ECA-1.1, Loss of Emergency Coolant Recirculation, due to an inability to establish Cold Leg Recirculation.
- The RWST level is 15%.
- The TSC has directed the crew to reduce ECCS injection flow to minimum required.

WHICH ONE (1) of the following correctly completes the statement below?

All pumps taking suction on the RWST have been placed to Pull-Stop except for one ____ (1) ____ Pump, and ECCS injection flow will be reduced to ____ (2) ____ gpm.

- A. (1) SI Pump
(2) 90 gpm
- B. (1) SI Pump
(2) 170 gpm
- C. (1) RHR Pump
(2) 90 gpm
- D. (1) RHR Pump
(2) 170 gpm

Answer: B

Explanation:

- A. Incorrect. 1st part correct, 2nd part wrong. This is incorrect because the minimum injection flow using FIG-6.0 is 170 gpm. This is plausible because this would be the flow determination if the operator used the 900 minutes since Rx shutdown (One decade to the right) on the X-Axis of FIG-6.0, rather than 90 minutes.
- B. CORRECT. 1st part correct, 2nd part correct. According to ES-1.3 (p3; Rev 04600), Step 1, if RWST level is < 15%, the operator will be directed to place all pumps taking suction on the RWST to Pull-Stop except for one SI Pump, and go to ECA-1.1. According to ECA-1.1 (p26-27; Rev 02801), Step 28, the operator will be directed to minimize RWST Outflow. During this step the operator will be required to determine the minimum ECCS Injection flow per FIG-6.0, Figure Min RCS Injection (Rev 1). Using the figure provided, the operator will determine that the minimum injection flow is 170 gpm, 90 minutes after the reactor trips.
- C. Incorrect. 1st part wrong, 2nd part correct. This is incorrect because minimum injection flow is obtained using an SI pump rather than an RHR Pump. This is plausible because the RCS pressure is such that both an SI and an RHR Pump will be injecting.
- D. Incorrect. 1st part wrong, 2nd part wrong. See A and C.

Technical Reference(s): ES-1.3 (p3; Rev 04600) (Attach if not previously provided)
 ECA-1.1 (p26-27; Rev 02801)
 FIG-6.0, Figure Min RCS Injection (Rev 1)

Proposed references to be provided to applicants during examination: FIG-6.0

Learning Objective: REC11C Objective 2.01

Question Source: Bank/VISION # _____
 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 41.10
55.43 _____

Justification for K/A Match:

The KA is matched because the operator must demonstrate the ability to evaluate plant performance and make operational judgments (Minimum Injection flow) based on operating characteristics (i.e. 90 minutes from shutdown).

The question is at the Comprehension/Analysis cognitive level because the operator must use provided information (i.e. time since shutdown), and apply it to a Figure, to answer the question correctly.

What MUST be known:

1. When minimizing RWST Outflow in ECA-1.1, which pump is left running taking a suction from the RWST?
2. What is the minimum ECCS Injection flow 90 minutes after reactor shutdown?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	E05 EK2.02	
	Importance Rating	3.9	4.2

Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

RO Question #17

WHAT is the consequence of having only a single PORV open during implementation of the bleed and feed steps of FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK?

- A. RCS pressure will continue to rise to the PRZR safety valve setpoint, leading to further loss of coolant inventory
- B. Insufficient bleed flow will inhibit mixing of safety injection flow, leading to localized pressurized thermal shock conditions
- C. The RCS will not depressurize enough to allow for adequate reflux cooling between the loop hot legs and the steam generators
- D. The RCS will not depressurize enough to allow for adequate feed of subcooled safety injection flow to adequately remove core decay heat

Answer: D

Explanation:

- A. Incorrect. Plausible because having a single PORV open would limit the ability to depressurize the RCS by reducing the amount that the RCS could be depressurized, but RCS pressure would NOT "continue to rise" when the PORV was opened.
- B. Incorrect. Plausible because opening the PORV would lower RCS pressure and increase SI flow – but the additional SI flow is not a concern for localized thermal shock.
- C. Incorrect. Plausible because securing RCPs, and potentially setting up conditions for some degree of reflux cooling, is not one of the mitigation strategies considered in FR-H.1. The lowering of RCS pressure to increase SI flow and core cooling is the primary mitigation strategy in bleed-and-feed.
- D. CORRECT. Per the Background Document, if BOTH PORVs are not maintained open, the RCS may not depressurize sufficiently to permit adequate feed (SI) flow to remove core decay heat. If core decay heat exceeds bleed-and-feed heat removal capability, the RCS will repressurize, further reducing SI injection flow, and result in a rapid decrease in RCS inventory.

Technical Reference(s): FR-H.1 Background (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RFRH1C 1.04, 2.01

Question Source: Bank/VISION # _____
 Modified Bank # 2010 Seabrook NRC (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 _____

Justification for K/A Match:

Matches the K/A by requiring an understanding of the basis for the bleed-and-feed heat removal strategy, and the impact that the inability to use both PORVs will have on the ability to remove core decay heat.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	077 AA1.04	
	Importance Rating	4.1	4.1

Ability to operate and/or monitor Reactor controls as they apply to |
Generator Voltage and Electric Grid Disturbances.

RO Question #18

Given the following plant conditions:

- Plant operating at 100% power
- RG&E Energy Control Center reports that grid disturbances have resulted in degraded grid voltage and frequency
- 'B' RMW and 'B' Boric Acid pumps are aligned for operation
- The following alarms are received:
 - J-7, 480V MAIN OR TIE BREAKER TRIP
 - L-7, BUS 16 UNDERVOLTAGE SAFEGUARDS
 - L-5, SAFEGUARD BUS MAIN BREAKER OVERCURRENT TRIP
- CO reports that Bus 16 voltage indicates 0 volts
- CO report that all other safeguards buses indicate 470 volts

WHICH ONE of the following describes the effect on the plant AND the procedural action required for reactivity control?

- A. Reactor trip occurs and transition out of E-0, REACTOR TRIP OR SAFETY INJECTION, is made; ES-0.1, REACTOR TRIP RESPONSE, will address reactivity concerns associated with struck rods and boron concentration requirements
- B. Reactor trip occurs; E-0, REACTOR TRIP OR SAFETY INJECTION, will stabilize the plant while the guidance in AP-ELEC.14/16, LOSS OF SAFEGUARDS BUS 14/16, will address actions required for reactivity control
- C. Reactor remains critical; use the guidance in AP-ELEC.14/16, LOSS OF SAFEGUARDS BUS 14/16, to manually adjust control rods to control Tavg and restore Makeup System for boron control
- D. Reactor remains critical; use the guidance in AP-ELEC.2, SAFEGUARD BUSES LOW VOLTAGE OR SYSTEM ABNORMAL FREQUENCY, to manually adjust control rods to control Tavg and restore Makeup System for boron control

Answer: C

Explanation:

- A. Incorrect. Plausible if the candidate believes that a single loss of 480V Safeguards bus will result in a reactor trip, with ES-0.1 then being the appropriate procedure.
- B. Incorrect. Plausible if the candidate believes that a single loss of 480V Safeguards bus will result in a reactor trip AND AP-ELEC.14/16 does contain guidance for reactivity control actions.
- C. CORRECT. The loss of a single 480V Safeguards bus will not result in a reactor trip. AP-ELEC.14/16 provides guidance for use of control rods to restore Tavg and actions necessary to restore boron control in the Makeup system.
- D. Incorrect. Plausible because the first part is correct , and AP-ELEC.2 is the appropriate procedure to address concerns about the given grid frequency and voltage degradation, but no actions are contained within that procedure for reactivity control.

Technical Reference(s): AP-ELEC.14/16; AR-J-7, AR-L-7 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R0701C 1.06 & 1.10
RAP66C 2.01

Question Source: Bank/VISION # _____
 Modified Bank # 106255 (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

Justification for K/A Match:

The question matches the K/A by requiring an evaluation of the plant response to degraded/loss of the grid with subsequent loss of Safeguards Bus 14 and its impact on reactivity controls (boric acid/makeup pumps).

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	028 AA2.01	
	Importance Rating	3.4	3.4

Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: PZR level indicators and alarms

RO Question #19

Given the following initial plant conditions:

- Reactor power = 99%
- Pressurizer level = 56%
- 'A' charging pump is running in AUTO

Subsequently the following occur:

- F-4, PRESSURIZER LEVEL DEVIATION -5 NORMAL +5, alarms
- F-15, RCS TAVG DEV 4°, alarms
- CO reports Average T_{AVG} has Failed LOW

WHICH ONE of the following groups of actions describes the INITIAL indications the HCO will see? (Assume NO operator action)

Charging Pump speed Backup Heaters

- | | | |
|----|------------|--------------|
| A. | slows down | energized |
| B. | speeds up | energized |
| C. | slows down | de-energized |
| D. | speeds up | de-energized |

Answer: A

Explanation:

- A. CORRECT. . Since average-Tavg is used to calculate the program PRZR level from 20% to 56% (547°F to 574°F), Failure of average-Tavg value low will cause the programmed PRZR level setpoint to fail low. With PRZR level initially on program at 56%, the actual level will be higher than the now lowered (and inaccurate) program level setpoint. With actual level now higher than the lower level setpoint, the Backup heaters will energize. This will result in the charging pump operating in Auto to *lower* its speed to lower charging flow.
- B. Incorrect. Plausible because part 2 is correct and the candidate could confuse the response of the charging pump with whether the actual level was lower than the program level.
- C. Incorrect. Plausible because part 1 is correct and the candidate might fail to recognize that the temperature instrument failure also result in a "step change" of 5% level deviation which would have energized the Backup heaters.
- D. Incorrect. Plausible if the candidate confused the direction of failure (low) with corresponding impact/direction on the program level setpoint.

Technical Reference(s): P-10, AR-F-4 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R1901C 1.10

Question Source: Bank/VISION # _____
 Modified Bank # 63220 (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 _____

Justification for K/A Match:

Matches the K/A by requiring candidate to recognize the impact of an RCS temperature channel failure on the program PRZR level control circuit, and the alarms and plant response associated with that failure.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	037 2.2.44	
	Importance Rating	4.2	4.4

SGTL: Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.

RO Question #20

With the plant at 100% power, the following conditions exist:

- Letdown line flow indicates 41 GPM.
- Charging line flow = 33 gpm.
- "A" RCP seal injection = 7 gpm.
- "A" RCP seal return flow = 1.5 gpm.
- "B" RCP seal injection = 7 gpm.
- "B" RCP seal return flow = 1.5 gpm.
- R-31, "A" STEAM LINE = 0.3 mRad/hr.
- R-32, "B" STEAM LINE = 0.01 mRad/hr.
- R-47 Air Ejector Monitor is alarming.

WHICH ONE of the following sets of actions will be performed in response to a plant above plant condition?

- 1) Perform a normal plant shutdown at 1%/min per O-2.1, NORMAL SHUTDOWN TO HOT SHUTDOWN, while continuing actions of AP-RCS.1
- 2) Perform a load reduction at 3%/min while continuing actions of AP-SG.1
- 3) When turbine load < 15 MW, trip the turbine, trip the reactor, and transition to E-0, REACTOR TRIP OR SAFETY INJECTION
- 4) When turbine load < 15 MW, trip the turbine, trip the reactor, but do NOT transition to E-0
- 5) Close BOTH MSIVs after the reactor is tripped
- 6) Close ONLY the affected S/G MSIV after the reactor is tripped

- A. Perform items 1, 3, and 5
- B. Perform items 1, 3, and 6
- C. Perform items 2, 4, and 5
- D. Perform items 2, 4, and 6

Answer: D

Explanation:

- A. Incorrect. Item 1 is plausible if the candidate does not realize that a SGTL >1 gpm requires plant shutdown at 3%/min. Several other combinations of leakrates and rates of change less than 1 gpm require a normal plant shutdown to Mode 3 within 6 or 24 hrs. Item 4 is plausible because that would be the normal response to manually tripping the reactor, but is not performed due to the NOTE prior to the reactor shutdown step. Item 7 is the correct action to complete the isolation of the leaking S/G.
- B. Incorrect. Item 1 is plausible if the candidate does not realize that a SGTL >1 gpm requires plant shutdown at 3%/min. Several other combinations of leakrates and rates of change less than 1 gpm require a normal plant shutdown to Mode 3 within 6 or 24 hrs. Section 3 is plausible because that would be the normal response to manually tripping the reactor, but is not performed due to the NOTE prior to the reactor shutdown step. Item 6 is plausible because it could be considered to be more conservative if both the leaking and intact S/G MSIVs were isolated, but preferred option is to be able to cool down using the intact S/G and steam dumps.
- C. Incorrect. Item 2 is correct. Item 4 is plausible because that would be the normal response to manually tripping the reactor, but is not performed due to the NOTE prior to the reactor shutdown step. Item 6 is plausible because it could be considered to be more conservative if both the leaking and intact S/G MSIVs were isolated, but preferred option is to be able to cool down using the intact S/G and steam dumps.
- D. CORRECT. Per the guidance provided in AP-SG.1, if the SGTL is > 1 gpm, a load reduction of 3%/min is performed to minimize the likelihood of a SGTR developing. Load is reduced to 15MW, the turbine is tripped, and rods are driven in until power is <1% RTP, then the reactor is tripped. Per the NOTE preceding Step 28, since this is a controlled shutdown procedure, transition to E-0 is not required. Unless the leaking S/G is not isolable, only the affected S/G MSIV is closed in step 32.

Technical Reference(s): AP-SG.1 (and Background) (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP32C 2.01

Question Source: Bank/VISION # _____

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	<u>.10</u>
	55.43	<u> </u>

Justification for K/A Match:

Matches the K/A by requiring knowledge of the major actions contained with the abnormal SGTL procedure, correct interpretations of control room indications, and an overall understanding of the procedural actions required.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	2	_____
	K/A #	061 AK2.01	_____
	Importance Rating	2.5	2.6

Knowledge of the of the interrelations between the Area Radiation Monitoring (ARM) System Alarms and the following: Detectors at each ARM system location

RO Question #21

E-24, RMS AREA MONITOR HIGH ACTIVITY, is in alarm.

WHICH ONE of the following Radiation Monitors in alarm would result in this Main Control Board annunciator?

- A. R-2, CONTAINMENT
- B. R-16, CONTAINMENT FAN COOLING
- C. R-17, COMPONENT COOLING
- D. R-45, CONTROL ROOM TRAIN 'A'

Answer: A

Explanation:

- A. CORRECT. R-2 is an area monitor located in Containment and used to monitor general radiation levels on the Containment Operating Level.
- B. Incorrect. Plausible because the candidate might believe the physical arrangement of the detector is similar to that of R-2, but is located within the service water flowpath from the fan coolers. A service water leak in CNMT during an accident, combined with CNMT pressure > SW pressure, would be required to contaminate the service water and result in a reading on R-16 in cpm.
- C. Incorrect. Plausible if the candidate believes that since the CCW system is a closed-loop cooling system and not an effluent, an area monitor would be an appropriate detector for this application.
- D. Incorrect. Plausible because the control room ventilation system over the years has had a number of different types of detectors, including area monitors and automatic control room ventilation system isolation signals. Incorrect because the current R-45 detection system measures the total dose rate of incoming air through the normal HVAC air intake duct. The high alarm setpoint of 0.25 mR/hr now activates Control Room CREATS isolation.

Technical Reference(s): AR-E-24 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3901C, 1.02;

Question Source: Bank/VISION # _____
 Modified Bank # Sequoyah bank (Note changes or attach parent)
(RMS B2.005)
 New _____

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41 .11
 55.43 _____

Justification for K/A Match:

Matches the K/A by requiring an evaluation of the type of RMS detector required and used in each system application, and which one functions as an "area monitor" type of alarm.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	E14 EA1.02	
	Importance Rating	3.3	3.4

Ability to operate and / or monitor the Operating behavior characteristics of the facility as they apply to the (High Containment Pressure)

RO Question #22

Given the following plant conditions:

- The unit was at 100% power when a DBA LOCA occurred
- E-1, LOSS OF REACTOR OR SECONDARY COOLANT, is in progress
- A fault on 480V Safeguards Bus 16 has resulted in an ORANGE path condition on F-0.5, CONTAINMENT
- The crew had transitioned to FR-Z.1, RESPONSE TO HIGH CONTAINMENT PRESSURE
- FR-Z.1 has been completed, with NO additional equipment having been started, and the ORANGE path condition still exists

WHICH ONE of the following describes the expected response of containment pressure, and the next action that the crew should take as a result of these conditions? Containment pressure will _____.

- rise; the crew should return to E-1, step in effect
- rise; the crew should re-perform the actions of FR-Z.1 beginning with Step 1
- slowly lower; the crew should wait until the ORANGE condition clears before taking any additional actions
- eventually exceed the RED path criteria for FR-Z.1; the crew should return to E-1, Step 1, until the RED path criteria is met, then return to FR-Z.1

Answer: A

Explanation:

- A. CORRECT. Once all actions of FR-Z.1 have been completed, the operator is returned to the procedure and step in effect in E-1. Since both the ORANGE (28 psig) and RED (60 psig) path terminus is the same FR-Z.1 procedure, once the six (6) steps have been performed when the ORANGE path actions are taken, there is no need to return to FR-Z.1 when the RED path setpoint is encountered.
- B. Incorrect. Plausible if the candidate believes that within the FR-Z.1 procedure there are two sets of actions, depending on which terminus (ORANGE or RED) has been encountered.
- C. Incorrect. Plausible if the candidate believes that it is necessary to clear the entry conditions for the ORANGE or RED path condition before returning to the lower-priority E-1 procedure that the crew transitioned from.
- D. Incorrect. Plausible if the candidate believes that within the FR-Z.1 procedure there are two sets of actions, depending on which terminus (ORANGE or RED) has been encountered, but per the A-503.1 guidance, this would be inappropriate. Incorrect also because with at least one train of CS and CNMT recirc fans operating, the CNMT pressure should NOT exceed 60 psig.

Technical Reference(s): FR-Z.1 Background, Step 6 (Attach if not previously provided)
A-503.1, p32, step 4.c.(5)

Proposed references to be provided to applicants during examination: None

Learning Objective: RFRZ1C 2.01; REP50C 1.26

Question Source: Bank/VISION # _____
 Modified Bank # 99850 (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 _____

Justification for K/A Match:

Matches the K/A by requiring an assessment of post-accident conditions, predict the response, and then determine the appropriate actions for the high CNMT pressure condition (with degraded equipment).

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	2	_____
	K/A #	E06 EK3.3	_____
	Importance Rating	4.0	_____

Knowledge of the reasons for the following responses as they apply to the (Degraded Core Cooling): Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations

RO Question #23

Given the following plant conditions:

- The unit was at 100% power when a LOCA occurred
- Operators are performing FR-C.2 Degraded Core Cooling
- Attempts to restore SI flow have not been successful
- S/Gs have been depressurized to 160 PSIG

WHAT is the basis for the operation of the RCPs, when depressurizing the S/Gs to atmospheric pressure?

- A single RCP is kept running, regardless of support conditions, to provide forced circulation through the core.
- Both RCPs are kept running (or started), regardless of support conditions, to provide forced circulation through the core.
- The remaining RCP is secured in this procedure to prevent adding additional heat to the already degraded RCS temperature condition.
- Any operating RCP is secured before the next S/G depressurization due to the anticipated loss of number 1 seal requirements.

Answer: D

Explanation:

- A. Incorrect. Plausible because this is an action directed in FR-C.2, but is not taken in degraded core cooling conditions because the actions of depressurizing the S/Gs to atmospheric is expected to result in accumulator injection and lowering RCS pressure to below the shutoff head of the ECCS pumps.
- B. Incorrect. Plausible because this is an action directed in FR-C.2, but is not taken in degraded core cooling conditions because the actions of depressurizing the S/Gs to atmospheric is expected to result in accumulator injection and lowering RCS pressure to below the shutoff head of the ECCS pumps.
- C. Incorrect. Plausible because RCPs are eventually secured in this procedure, but not for the reason given (see below). Securing RCPs in FR-H.1 is performed for this reason.
- D. CORRECT. Per the Background document, in preparation for the subsequent depressurization of the S/Gs to atmospheric pressure, the remaining RCP is secured due to the anticipated loss of Number 1 seal requirements. Continued operation may result in damage to the RCPs. Were the conditions to continue to degrade to ICC conditions, the RCPs would be started if core cooling could not be established.

Technical Reference(s): FR-C.2 Background (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RFRC2C 1.03

Question Source: Bank/VISION # _____
 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 _____

Justification for K/A Match:

Matches the K/A by requiring knowledge of the basis for a significant mitigation strategy (RCP operation) needed to mitigate the degraded core cooling conditions.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	2	_____
	K/A #	E02 EK2.1	_____
	Importance Rating	3.4	3.9

Knowledge of the interrelations between the (SI Termination) and the Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features

RO Question #24

WHICH ONE of the following describes the sequence of operation of the following in ES-1.1, SI TERMINATION in response to a inadvertent SI actuation.

- Charging
 - Letdown
 - RHR pumps
 - SI pumps
 - Reset SI
- A. Reset SI; Stop both RHR pumps; establish 75 GPM Charging flow; stop SI pumps in sequence; restore Letdown
- B. Stop all SI pumps; stop both RHR pumps; reset SI; establish 22 GPM Charging flow; restore Letdown
- C. Reset SI; Start Charging pumps to control pressurizer level; stop all SI pumps; stop both RHR pumps; restore Letdown
- D. Start Charging pumps to control pressurizer level; restore Letdown; reset SI; stop both RHR pumps; stop all SI pumps

Answer: C

Explanation:

- A. Incorrect. Plausible because this is the correct sequence in other EOPs (e.g., ECA-3.1)
- B. Incorrect. Plausible because this is the correct sequence in other EOPs (e.g., E-3)
- C. CORRECT. As directed by the steps in ES-1.1.
- D. Incorrect. Plausible because establishing letdown after establishing charging is a reasonable action, as is securing RHR pumps with pressure above their shutoff head prior to securing the SI pumps.

Technical Reference(s): ES-1.1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RES11C 2.01

Question Source: Bank/VISION # _____
 Modified Bank # 2011 Diablo NRC (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 _____

Justification for K/A Match:

Matches the K/A because it requires an understanding of the system restoration/termination sequence used in the ES-1.1 SI TERMINATION procedure.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	005 AK1.02	
	Importance Rating	3.1	3.9

Knowledge of the operational implications of the following concepts as they apply to to Inoperable / Stuck Control Rod: Flux tilt .

RO Question #25

The following sequences of events occurred:

- The plant was initially at 90% power.
- Power was being lowered to 60% power.
- During the power change decrease Control Bank D rods were manually inserted from 212 steps to 175 steps.
- Subsequently the crew identifies that Control Bank D, G-11 did not move and is stuck at 190 steps.

Assuming NO operator action, if left uncorrected, what is the short time affect (less than 6 hours) of misaligned control rod G-11 on core neutron flux distribution?

- Neutron flux will peak locally in the area of rod G-11. This will cause hot channel concerns in all areas of the core.
- The affect on the overall neutron flux will be minimal since flux at the tip of rod G-11 is much smaller than average core flux.
- Neutron flux will be suppressed locally in the area of rod G-11. This will cause an increase in neutron flux in all other areas of the core.
- Neutron flux will peak locally in the area of rod G-11. This will only cause hot channel concerns in the local area around the stuck rod

Answer: D

Explanation:

- A. Incorrect but plausible. It is true that flux will peak locally at the stuck rod and that hot channel concerns will exist local to the stuck rod. It is conceivable that the stuck rod could be seen as causing an overall positive reactivity affect with overall core flux increasing with resulting overall hot channel concerns.
- B. Incorrect but plausible. The flux at the tip of a dropped rod is small as compared to average core flux. This distractor could be chosen if the concept of flux affects of a dropped rod were Applied
- C. Incorrect but plausible This distractor would be correct if the stuck rod were lower into the core than the rest of bank D.
- D. CORRECT. A stuck rod that is misaligned high will cause localized neutron flux peaking in the area of the stuck rod. There would be a hot channel concern due to the localized flux peak and higher power production.

Technical Reference(s): ITS B 3.1.4, (Attach if not previously provided)
 AP-RCC.2, background

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP13C 2.01
 RER12C 2.01

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

Question History: Last NRC Exam 2010 SEABROOK
 NRC

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

10 CFR Part 55 Content: 55.41 .10
 55.43 _____

Justification for K/A Match:

The question matches the K/A by evaluating the implications of stuck control rod on flux tilt verpressurized s/g caused by a high RCS temperature, and knowledge of procedure to deal with high pressure efficient pressure release path being established.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	2	_____
	K/A #	E15 EA2.2	_____
	Importance Rating	2.9	_____

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

RO Question #26

Given the following:

- The plant is operating at 100% power
- MCB Annunciator C-10, CONTAINMENT RECIRC CLRS WATER OUTLET LO FLOW 1050, has alarmed
- Containment Sump A level is 10 feet and slowly rising
- The Containment Sump A Pump is constantly running
- The crew entered AP-SW.1, Service Water Leak, and is now implementing ATT-2.3, Attachment SW Loads in CNMT

WHICH ONE of the following identifies from the list below, requirements that must be met while performing this procedure?

1. Call the control room prior to isolating Service Water to a CRFC.
2. Maximize cooling to the in-service Reactor Compartment Cooling Fan.
3. When determining the leak location, isolate Service Water to a CRFC to only one unit at a time.

- A. 1 and 2 ONLY
- B. 1 and 3 ONLY
- C. 2 and 3 ONLY
- D. 1, 2 and 3

Answer: B

Explanation:

- A. **Incorrect.** This is incorrect because it does not include the requirement to isolate Service Water to a CRFC to only one unit at a time; and because it is not required to maximize cooling to the in-service Reactor Compartment cooling fan. This is plausible because the operator may incorrectly believe that this must be accomplished in anticipation of isolation of the SW to one of the CRFCs; and because the operator may not know or understand the Note prior to Step 1 of ATT-2.3.
- B. **Correct.** According to AP-SW.1 (p6-7; Rev 02300) Steps 4 and 5 will attempt to identify SW leakage into the Containment. Step 5 of AP-SW.1 directs that ATT-2.3 be performed. According to ATT-2.3 (p1; Rev 4) Notes prior to Step 1 direct that the operator call the control room prior to isolating SW to any CRFC, and directs that the operator isolate SW to only one CRFC at a time.
- C. **Incorrect** This is incorrect because it does not include the requirement to call the control room prior to isolating Service Water to a CRFC; and because it is not required to maximize cooling to the in-service Reactor Compartment cooling fan. This is plausible because the operator may incorrectly believe that this must be accomplished in anticipation of isolation of the SW to one of the CRFCs; and because the operator may not know or understand the Note prior to Step 1 of ATT-2.3.
- D. **Incorrect.** This is incorrect because it is not required to maximize cooling to the in-service Reactor Compartment cooling fan. This is plausible because the operator may incorrectly believe that this must be accomplished in anticipation of isolation of the SW to one of the CRFCs.

Technical Reference(s): AP-SW.1 (p.6-7; Rev 02300) (Attach if not previously provided)
ATT-2.3 (p1; Rev 4)

Proposed references to be provided to applicants during examination: None

Learning Objective: RFRZ2C 1.01

Question Source: Bank/VISION # _____
 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	<u>10</u>
	55.43	<u> </u>

Justification for K/A Match:

Some reviewers have argued that this question is psychometrically flawed because distractor D uses a variation of the phrase "All of the Above." According to Appendix B of NUERG-1021, "All of the above" questions provide inadvertent clues to the examinee. When the "all of the above" option is used as a distractor, the examinee only needs to be able to determine that one option is incorrect in order to eliminate this option. Consequently, the question is constructed such that the use of the term "All of the Above" is avoided even though the all-inclusive nature of the Distractor is retained. In this manner, the operator must eliminate one element of each distractor to determine that it is incorrect. Consequently, there are no inadvertent clues provided.

The KA is matched because the operator must demonstrate the ability to adhere to appropriate procedures (AP-SW.1 and ATT-2.3) and operations within the limitations in the facility's license and amendments (TS LCO 3.6.6 requires that the CRFCs be OPERABLE, the License requires that the plant be operated within TS) in response to Containment flooding (AP-SW.1).

The question is at the memory cognitive level because the operator must recall bits of information (i.e. procedure Note requirements) to answer the question correctly.

What MUST be known:

1. Do site flooding response procedures require the AO to call the Control Room before isolating service water to a CFRC?
2. Do site flooding response procedures require that the operator maximize cooling to the in-service Reactor Compartment Cooling Fan?
3. Do site flooding response procedures limit the isolation of SW to the CRCF to one unit at a time?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	E10 EA1.2	
	Importance Rating	3.6	3.8

Ability to operate and/or monitor the following as they apply to the (Natural Circulation with Steam Void in Vessel): Operating behavior characteristics of the facility

RO Question #27

Given the following:

- The crew is cooling down the plant per ES-0.3, Natural Circulation Cooldown With Steam Voids in the Vessel.
- The RCS was just depressurized from 1200 to 800 psig.
- The pressurizer heaters have just been energized.
- PZR temperature is 500°F.

WHICH ONE of the following is indicative of a formation of a steam bubble in the reactor head during RCS depressurization, AND describes how the plant would respond if an RCP was started now, rather than an hour from now?

- PZR Level will rise rapidly while RVLIS lowers
RCS pressure would drop more rapidly if the RCP were started now rather than an hour from now.
- Core exit thermocouples and Pressurizer level will rise slowly while RVLIS lowers;
RCS pressure would drop at about the same rate regardless of whether the RCP is started now or an hour from now.
- PZR Level will rise rapidly while RVLIS lowers;
RCS pressure would drop at about the same rate regardless of whether the RCP is started now or an hour from now.
- Core exit thermocouples and Pressurizer level will rise slowly while RVLIS lowers;
RCS pressure would drop more rapidly if the RCP were started now rather than an hour from now.

Answer: A

Explanation:

- A. **Correct.** 1st part correct, 2nd part correct. According to ES-0.2 (p12; Rev 01701) and the Caution prior to Step 5 in ES-0.3 (p6; Rev 01401), a rapid rise in Pressurizer level and/or a lowering of RVLIS to < 97% (Head full minus instrument inaccuracies) is indicative of a void formation in the vessel head, which is anticipated in ES-0.3.
- B. **Incorrect.** 1st part wrong, 2nd part wrong. See C and D.
- C. **Incorrect.** 1st part correct, 2nd part wrong. This is incorrect because the RCS pressure will NOT drop at about the same rate regardless of whether the RCP is started now or an hour from now. Under the current conditions the Pressurizer is NOT saturated. However, the Pressurizer Heaters are energized, and the Pressurizer will be at or closer to saturated conditions in an hour. Because the RCP is started with an unsaturated Pressurizer, according to the WOG ES-0.3 Background Document (p16; Rev 2), the RCS pressure (and Pzr level) will drop faster than it would if the Pressurizer were saturated. This is plausible because the operator may not recognize that the Pressurizer is NOT saturated, or not know why the heaters are energized to saturate the Pressurizer prior to starting an RCP in ES-0.3.
- D. **Incorrect.** 1st part wrong, 2nd part correct. This is incorrect because CETs are not expected to rise during an ES-0.3 cooldown, nor will Pressurizer level rise slowly during void formation. The CETs will remain covered during the ES-0.3 cooldown because the operator is directed to repressurize the RCS if RVLIS lowers to 81%. This level is consistent with the top of the Hot Legs and above the CETs. Consequently CETs should remain stable or lower during the ES-0.3 cooldown. This is plausible because the operator may not understand how the RCS behaves during an RCS depressurization while implementing ES-0.3.

Technical Reference(s): ES-0.3 (p6; Rev 01401) (Attach if not previously provided)
WOG ES-0.3 Background Document (p16; Rev 2)

Proposed references to be provided to applicants during examination: None

Learning Objective: RES03C 1.04 & 2.01

Question Source: Bank/VISION # _____
 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 _____

Justification for K/A Match:

Matches the K/A by requiring an understanding of plant response to procedural actions taken to monitor and control PRZR level during the performance of ES-0.3.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	003 K5.04	
	Importance Rating	3.2	3.5

Knowledge of the operational implications of the following concepts as they apply to the RCPs: Effects of RCP shutdown on secondary parameters, such as steam pressures, steam flow, and feed flow.

RO Question #28

Given the following plant conditions:

- The plant is at 20% power
- 'A' RCP trips

Assuming NO operator actions, WHICH ONE of the following identifies the (in approx. 1 min) effect that the RCP trip will have on the following:

	<u>'A' S/G Pressure</u>	<u>'A' S/G Level</u>
A.	Rise	Rise
B.	Rise	Lower
C.	Lower	Rise
D.	Lower	Lower

Answer: D

Explanation:

- A. Incorrect. Plausible because without the effect of the RCP trip on the 'A' loop, typically when steam flow is stopped in a flow path, the steam pressure rises and, without operator action, the initial steam flow-feed flow mismatch would cause level to also rise.
- B. Incorrect. Part two is correct, and part one is plausible because without the effect of the RCP trip on the 'A' loop, typically when steam flow is stopped in a flow path, the steam pressure rises.
- C. Incorrect. Part one is correct and part two is plausible if the candidate assumes that the feedflow to steamflow mismatch immediately results in an increasing S/G level. Incorrect because the immediate effect on 'A' S/G level is a lowering due to the void collapse.
- D. CORRECT. Without operator action and with power below the P-8 setpoint of 25%, a trip of 'A' RCP and the resultant backflow from 'B' loop will result in less heat input to the 'A' S/G and a reduction in 'A' S/G pressure. With 'B' S/G pressure initially unchanged, most steam load "shifts" to 'B' S/G. The overall effect is that the 'A' S/G experiences a rapid reduction in steam demand, and the unchanged feedwater flow to 'A' S/G will collapse the bubbles in the downcomer region, resulting in an initial lowering of 'A' S/G level.

Technical Reference(s): ROC01S (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: ROC01S 1.02; RAP16C 1.02

Question Source: Bank/VISION # _____
 Modified Bank # 2010 Watts Bar NRC (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 _____

Justification for K/A Match:

KA is matched because the question requires knowledge of how secondary parameters (steam pressure and steam generator level) are affected when an RCP is shutdown during power operations.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	004 K3.04	
	Importance Rating	3.7	3.9

Knowledge of the effect that a loss or malfunction of the CVCS will have on the RCPs

RO Question #29

Given the following plant conditions:

- The plant is operating at 100% power.
- V-300A and V-300B, Seal Injection Needle Valves to RCPs, are being adjusted.
- During the procedure, V-300A is CLOSED,

WHICH ONE of the following identifies how the following parameters would be affected?

	'B' Seal Injection Flow	'B' RCP Lab Seal D/P	'A' RCP Lab Seal D/P
A.	Rises	Rises	Lowers
B.	Rises	Lowers	Rises
C.	Lowers	Lowers	Lowers
D.	Lowers	Rises	Rises

Answer: A

Explanation:

- A. **Correct.** 1st part correct, 2nd part correct, 3rd part correct. According to Lesson Plan R1301C (p15-17; Rev 24) the seal water supply to each RCP comes from a common header that splits into parallel paths to supply each RCP Seal. If the valve in one line is adjusted, it will affect both RCP seal supply flows. When V-300A is inadvertently closed, all of the flow into the common seal water supply line is directed to the B RCP. Consequently, the B Seal Water Injection flow will rise. When the seal water injection flow enters the RCP, a portion of the flow will flow upward through the Seal Package, seal the shaft, and flow away from the RCP through the Seal water return line to the VCT. The remainder of the Seal water Injection flow will flow down the RCP shaft through the labyrinth seal into the RCS. The labyrinth seal has a differential pressure instrument indicating the direction of water flow past the seal. Under conditions of normal seal water flow, the differential pressure is positive. When seal injection flow is lost, RCS water will flow past the labyrinth seal toward the RCP seal, and the differential pressure instrument will reverse (i.e. go negative). When V-300A is inadvertently closed, all of the flow into the common seal water supply line is directed to the B RCP. Consequently, the B RCP Labyrinth Seal D/P will rise. At the same time, the seal water to the A RCP is lost, and RCS water will flow past the labyrinth seal toward the RCP seal, causing the differential pressure instrument to reverse (i.e. go negative or lower).
- B. **Incorrect.** 1st part correct, 2nd part wrong, 3rd part wrong. This is incorrect because the B Lab Seal DP will rise and the A Lab Seal DP will lower. This is plausible because the operator may not know how the RCP Seal package works.
- C. **Incorrect.** 1st part wrong, 2nd part wrong, 3rd part correct. This is incorrect because the Seal Injection Flow to the B RCP will rise and the B Lab Seal DP will rise. This is plausible because the operator may not know how the RCP Seal package works.
- D. **Incorrect.** 1st part wrong, 2nd part correct, 3rd part wrong. This is incorrect because the Seal Injection Flow to the B RCP will rise and the A Lab Seal DP will lower. This is plausible because the operator may not know how the RCP Seal package works.

Technical Reference(s): Lesson Plan R1301C (p15-17; Rev 24) 33013-1265sh1,2 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R1601C, 1.10; R1301C 1.10

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

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	005 A2.02	
	Importance Rating	2.7	

Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Pressure transient protection during cold shutdown

RO Question #30

Given the following plant conditions:

- The plant is in solid plant pressure control.
- The A RHR system is operating.
- HCV-625, RHR HX A Outlet Valve, is FULL OPEN.
- HCV-624, RHR HX B Outlet Valve, is FULL CLOSED.
- RCS Temperature is 185°F.

Subsequently, Letdown Pressure Transmitter PT-135 fails LOW.

WHICH ONE of the following identifies how RCS pressure will change, AND an action that could be taken to stabilize the transient?

- RCS pressure will LOWER;
Raise charging flow to control RCS pressure
- RCS pressure will RISE;
Reduce charging flow to control RCS pressure
- RCS pressure will LOWER;
Adjust HCV-625 to limit RCS cooldown.
- RCS pressure will RISE;
Adjust HCV-625 to increase RCS cooldown

Answer: B

Explanation:

- A. **Incorrect.** This is incorrect because RCS pressure will RAISE, not LOWER. This is plausible because the operator may not know how PCV-135 reacts to the PT-135 failure and conclude that the RCS pressure will LOWER. If so, Raise charging flow to control RCS pressure is possible, and a logical action to take in response.
- B. **Correct.** When PT-135 fails LOW, PCV-135, which is in AUTO, will tend to CLOSE to maintain pressure at setpoint. When the valve closes, reducing letdown flow, it will raise RCS pressure which is being controlled by the position of this valve. When RCS pressure starts to rise, MCB Annunciator F-29, PPCS LTOP HI-LOW PRESSURE, will eventually alarm at 360 psig. According to AR-F-29 (p2; Rev 01402), if RCS pressure is HIGH, the operator will be directed to pressure to reduce pressure within normal operating range (between 300 psig and 350 psig). This can be accomplished in solid plant operations by one of two means; (1) reduce charging flow, and/or (2) increase the RCS cooldown. Since HCV-625 is FULLY OPEN, the cooldown rate cannot be raised. Therefore, the operator must reduce charge flow to control RCS pressure.
- C. **Incorrect.** This is incorrect because RCS pressure will RAISE, not LOWER. This is plausible because the operator may not know how PCV-135 reacts to the PT-135 failure and conclude that the RCS pressure will LOWER. If so, Adjusting HCV-625 to reduce cooldown would have the effect of raising pressure, but is the opposite of the action need to control pressure.
- D. **Incorrect.** This is incorrect because HCV-625 is FULLY OPEN and the cooldown rate cannot be raised any further. This is plausible because the operator may not understand how the RHR HX Outlet and Bypass Valve work in association with each other to control cooldown rate (i.e. the operator may incorrectly believe that the cooldown rate can be raised).

Technical Reference(s): ROP04CLesson Plan (p20-21; Rev 13) (Attach if not previously provided)
AR-F-29 (p2; Rev 01402)

Proposed references to be provided to applicants during examination: None

Learning Objective: ROP04C1 1.01, 1.02, 1.03

Question Source: Bank/VISION # _____
 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 _____

Justification for K/A Match:

The KA is matched because the operator must demonstrate the Ability to (a) predict the impacts of a pressure transient (Letdown Valve fails Closed) protection during cold shutdown on the RHRS (RCS Pressure raises or lowers), and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations (actions to take).

The question is at the Comprehension/Analysis cognitive level because the operator must demonstrate an understanding of how the PCV-135 is affected by a PT-135 failure and/or how the RCS pressure is affected by PCV-135 failing CLOSED, to answer the question correctly.

What MUST be known:

1. How is PCV-135 affected by PT-135 failing LOW?
2. How is RCS pressure affected by PCV-135 failing CLOSED?
3. When solid plant pressure rises what actions are needed to control pressure?
4. When solid plant pressure rises will adjusting HCV-625 when it is FULLY OPEN effectively reduce RCS pressure?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	006. A2.12	_____
	Importance Rating	4.5	_____

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

RO Question #31

Given the following

- A reactor trip occurred and E-0, REACTOR TRIP OR SAFETY INJECTION, was entered
- The crew transitioned to ES-0.1, REACTOR TRIP RESPONSE

Subsequently, a Loss of Offsite Power occurs and the following conditions develop:

- RCS pressure is 1800 psig and stable
- All charging pumps are running
- Charging flow is offscale high
- Letdown is isolated
- RCS Subcooling using FIG-1.0 is 18°F
- PRZR level is 3% and lowering slowly

WHICH ONE of the following identifies the correct course of action?

- Manually initiate SI ONLY, and return to E-0.
- Manually initiate SI and CI, and return to E-0.
- Manually start SI pumps as necessary and return to E-0.
- Remain in ES-0.1, and restore the primary plant to normal operating pressure.

Answer: B

Explanation:

- A. Incorrect. Plausible because the transition to ES-0.1 is made at Step 4 of E-0 after determining (at the time) that an SI had not actuated and was not required. Returning to the procedure and "step in effect" is a frequent transitional step in the EOP network
- B. CORRECT. Per ES-0.1 FOLDOUT page item 2, "Actuate SI and CI and go to E-0, Step 1 if any automatic setpoint is reached." (RCS pressure is less than 1750 psig setpoint). Additionally, OPG-OPERATIONS-EXPECTATIONS prescribes manual preemptive actions be taken to insert manual SI if RCS pressure lowers to 1800 psig. Plausible because part 1 is correct and part 2 requires knowledge of the rules of usage and technical content of ES-0.1 FOLDOUT page.
- C. Incorrect. Plausible because manually starting SI pumps and returning to the previous procedure is frequently used in the EOP network to avoid re-initiating all of the actions (e.g., CNMT isolation) and starting all 3 SI pumps when only 1 may be needed.
- D. Incorrect. Plausible if the candidate believes there is additional benefit to maximizing flow prior to returning to E-0, Step 1 and then reassessing the plant conditions prior to performing SI actions.

Technical Reference(s): ES-0.1 FOLDOUT page (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RES01C 2.01; REP00C 1.02

Question Source: Bank/VISION # _____
 Modified Bank # Callaway 2007 NRC (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 _____

Justification for K/A Match:

Matches the K/A by requiring the candidate to assess the impact of the given parameters on procedural usage and identifying that given conditions require ECCS actuation.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	006 2.4.4	_____
	Importance Rating	4.5	_____

ECSS: Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures

RO Question #32

Given the following conditions:

- A reactor trip has occurred due to a leak in the RCS
- Concurrent with the reactor trip, leakage from the CCW system has resulted in the inability to maintain CCW surge tank level
- Safety Injection has actuated, and equipment has functioned as designed
- The operators are performing E-1, Loss of Reactor or Secondary Coolant
- RCS System pressure is 550 psig and lowering
- Pressurizer level is off-scale low
- Containment pressure is 20 psig and rising slowly
- RWST level is 88% and lowering
- SG pressures are 700 psig and slowly lowering
- SI flow is 800 gpm

WHICH ONE (1) of the following describes the procedure that will be used next to mitigate the event in progress?

- A. ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION
- B. ES-1.3, TRANSFER TO COLD LEG RECIRCULATION
- C. ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION
- D. ECA-1.3, RESPONSE TO SUMP 'B' BLOCKAGE

Answer: C

Explanation:

- A. Incorrect. Plausible because this would be the proper transition IF the ability to implement Cold Leg Recirc were not impeded by the loss of CCW.
- B. Incorrect. Plausible because RWST level is dropping steadily and would eventually require transition to ES-1.3 IF the ability to implement Cold Leg Recirc were not impeded by the loss of CCW.
- C. CORRECT. The sustained loss of CCW impacts the ability to cool the RHR heat exchanger while implementing Cold Leg Recirc flowpath. Per Step 18 of E-1, the lack of an operable CCW pump requires transitioning to ECA-1.1.
- D. Incorrect. Plausible because this is a parameter that is monitored during the performance of ES-1.3 (see 'A' above).

Technical Reference(s): E-1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: REP01C 2.1

Question Source: Bank/VISION #
 Modified Bank # B360.0052 (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

Justification for K/A Match:

Matches the K/A by assessing CCW system parameters which impact the ability of the CCW system to support post-LOCA Cold Leg Recirc capability and require transitioning to another (ECA) procedure.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	007 K1.03	_____
	Importance Rating	3.0	_____

Knowledge of the physical connections and/or cause-effect relationships between the PRTS and the following systems: RCS

RO Question #33

Given the following plant conditions:

- Plant is in MODE 4 with RHR system in operation
- RCS temperature is 340°F and stable
- PRT level is 86% and slowly rising
- PRT pressure is 10 PSIG and slowly rising
- PRT temperature is 165°F and slowly rising

WHICH ONE of the following components, if leaking, is the cause of this condition?

- RV-314, Seal Water Return Relief Valve
- RV-434, PRZR Safety Relief Valve
- RV-887, Accumulator 'B' Test Line Relief Valve
- AOV-548, Reactor Makeup Water Supply

Answer: B

Explanation:

- A. Incorrect. Plausible because the RCP seal water return line would cause pressure and level rise, but not temperature.
- B. CORRECT. A leaking PRZR safety valve would result in all 3 PRT parameters rising.
- C. Incorrect. Plausible because a leaking Accumulator relief valve would cause pressure and level rise, but not temperature.
- D. Incorrect. Plausible since this is the normal Reactor Makeup Water supply used to fill the PRT, and would cause only level and pressure to rise, but not temperature. Also, normally closed AOV-508, RMW to CNMT ISOL VLV, would also have to be leaking by.

Technical Reference(s): P-3, AR-F-17,F-1 Bkdg E-0 (Attach if not previously provided)
 step 27, UFSAR
 6.2.1.2.2,PPCS plot
 T0181.33013-1258,
 1265sh1,1262sh2

Proposed references to be provided to applicants during examination: None

Learning Objective: R1401CC, 1.03 & 1.04

Question Source: Bank/VISION # _____
 Modified Bank # Calloway 2007 NRC (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 _____

Justification for K/A Match:

Matches the K/A by evaluating potential sources of water to the PRT and the cause/effect relationship between their fluid temperatures and that of the PRT.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	007	A2.02
	Importance Rating	2.6	

Ability to (a) predict the impacts of the following malfunctions or operations on the P S; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Abnormal pressure in the PRT

RO Question # 34

While operating at full power the following occur:

- A grid disturbance resulted in a load reduction
- PORV PCV-431C lifted and did not reseal
- MOV-515, PRZR PORV BLK VLV, is closed to isolate the leakage
- PRT temperature is currently 225°F

WHICH ONE of the following correctly completes the statements below?

The LOWEST PRT pressure that will cause the rupture disc to actuate is ____ (1) ____ PSIG.
Under the stated conditions, PRT temperature will be lowered by adding Reactor Makeup Water while draining the PRT to ____ (2) ____.

- A. (1) 100
(2) the RCDT
- B. (1) 100
(2) Containment Sump A
- C. (1) 150
(2) the RCDT
- D. (1) 150
(2) Containment Sump A

Answer: A

Explanation (Optional):

- A. **Correct.** 1st part correct, 2nd part correct. According to P-2 (p29; Rev 04303) the PRT Rupture Disc will rupture at 100 psig. According to AR-F-1 (p1; Rev 00601), a high PRT temperature is remedied by "Adding Reactor Makeup Water and drain as necessary to reduce temperature. This is accomplished by opening RMW valves 508 and 548 to fill with cooler RMW, then draining the PRT by opening AOV-526, PRT TK DRAIN VLV.
- B. **Incorrect.** 1st part correct, 2nd part wrong. This is incorrect because the PRT is NOT drained to the Containment Sump A. This is plausible because if the Rupture Disc released, it releases to Containment Sump A.
- C. **Incorrect.** 1st part wrong, 2nd part correct. This is incorrect because the setpoint for the Rupture Disc is 100 psig, NOT 150 psig. This is plausible because the PRT Pressure Gage high range is 150 psig, and the operator may not know the setpoint.
- D. **Incorrect.** 1st part wrong, 2nd part wrong. See B and C.

Technical Reference(s): P-2 (p29; Rev 04303)
 AR-F-1 (p1; Rev 00601), 33013-1258 (Attach if not previously provided)

Proposed References to be provided to applicants during examination:

Learning Objective: R1401C 1.04 & 1.11 (As available)

Question Source: Bank #
 Modified Bank # 2011 Robinson (Note changes or attach parent)
 New

Question History: Last NRC Exam: NA

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

10 CFR Part 55 Content: 55.41 10
 55.43

Comments:

The KA is matched because the operator must demonstrate the ability to predict the impacts of the abnormal pressure in the PRT (i.e. Rupture pressure setpoint 100 vs. 150); and based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations (i.e. where does the feed & Bleed water go).

The question is at the Memory cognitive level because the operator must recall bits of information (i.e. Rupture Disc Setpoints, Where is bleed water sent) to answer the question correctly.

What MUST be known:

1. What is the PRT Rupture Disc Setpoint?
2. When we Feed & Bleed the PRT to reduce PRT Temperature, to what location is the bleed water sent?

Tier #	2
Group #	1
K/A #	008 A1.03
Importance Rating	4.4

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCWS controls including: CCW pressure

RO Question #35

With the plant at 100% power the following events occur:

- MCB Annunciator A-22, CCW PUMP DISCHARGE PRESS 60 PSI, alarms.
- A manual attempt to start the Standby CCW Pump fails.

The HCO observes the following:

<u>Time (Sec)</u>	<u>RCP A Motor Bearing Temp</u>	<u>RCP B Motor Bearing Temp</u>
0	126°F	135°F
+21	137°F	146°F
+41	147°F	155°F
+61	157°F	165°F
+81	168°F	174°F
+101	176°F	183°F
+121	184°F	191°F
+141	192°F	200°F
+161	200°F	208°F
+181	211°F	218°F
+201	220°F	230°F

WHICH ONE of the following identifies the EARLIEST time at which the Reactor MUST be manually tripped?

- +121 Seconds
- +141 Seconds
- +161 Seconds
- +201 Seconds

Answer:

A

Explanation:

- A. CORRECT. According to AP-CCW.2 (p3; Rev 02201), Caution 1 prior to Step 1, states that IF CCW FLOW TO A RCP IS INTERRUPTED FOR GREATER THAN 2 MINUTES OR IF EITHER RCP MOTOR BEARING TEMPERATURE EXCEEDS 200°F, THEN TRIP THE AFFECTED RCP. IF CCW FLOW TO A RCP IS INTERRUPTED FOR GREATER THAN 2 MINUTES OR IF EITHER RCP MOTOR BEARING TEMPERATURE EXCEEDS 200°F, THEN TRIP THE AFFECTED RCP. Consequently, the RCPs are both required to be tripped within 2 minutes (i.e. +120 seconds) regardless of the RCP Motor Bearing Temperature.
- B. Incorrect. This is incorrect because the RCPs must be tripped within 2 minutes regardless of RCP Motor Bearing temperature. This is plausible because the operator may not remember the 2 minute trip criteria; and believe that the reactor must be tripped when one RCP reaches a Motor Bearing Limit of 200°F.
- C. Incorrect This is incorrect because the RCPs must be tripped within 2 minutes regardless of RCP Motor Bearing temperature. This is plausible because the operator may not remember the 2 minute trip criteria; and believe that the reactor must be tripped when both RCPs reach a Motor Bearing Limit of 200°F.
- D. Incorrect. This is incorrect because the RCPs must be tripped within 2 minutes regardless of RCP Motor Bearing temperature. This is plausible because the operator may not remember the 2 minute trip criteria; and believe that the reactor must be tripped when one RCP reaches a Motor Bearing Limit of 230°F (i.e. the operator confuses the 200°F limit with the 230°F Seal Temperature Limit).

Technical Reference(s): AP-CCW.2 (p3; Rev 02201) (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R2801C, 1.06 & 1.07;

Question Source: Bank/VISION # _____
 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	<u>41.10</u>
	55.43	<u> </u>

Justification for K/A Match:

Comments:

The KA is matched because the operator must demonstrate the ability to predict (i.e. Trip is required in 2 Minutes) and/or monitor changes in parameters (RCP Motor Bearing Temperature) associated with operating the CCWS controls including CCW pressure.

The question is at the Comprehension/Analysis cognitive level because the operator must recall bits of information (i.e. Limits for RCP [Rx] Trip requirements), and apply it to a timeline of data observations, to answer the question correctly.

What MUST be known:

1. On a loss of CCW, under what conditions must the reactor be tripped?
2. Given the set of observed parameters, when is the earliest time at which a reactor trip is required?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	010 K2.03	
	Importance Rating	2.8	

Knowledge of bus power supplies to the following: Indicator for PORV position

RO Question #36

WHICH ONE of the following correctly completes the statement below?

Pressurizer PORV 431C solenoid is powered from the ____ (1) ____ DC Bus. If the DC Bus to this valve is lost the valve will indicate ____ (2) ____.

- A. (1) A
(2) Correct valve position
- B. (1) A
(2) Both lights OFF
- C. (1) B
(2) Correct valve position
- D. (1) B
(2) Both lights OFF

Answer: D

Explanation:

- A. **Incorrect.** 1st part wrong, 2nd part wrong. See B and C.
- B. **Incorrect.** 1st part wrong, 2nd part correct. This is incorrect because the valve is powered from DC Bus B. This is plausible because there are two DC Buses and the operator may incorrectly believe that PORV 431C is powered from DC Bus A.
- C. **Incorrect.** 1st part correct, 2nd part wrong. This is incorrect because the valve will not indicate valve position. This is plausible because the PORVs are air-operated valves; and there are several air-operated valves that fail OPEN on a loss of control power.
- D. **Correct Bus B.** 1st part correct, 2nd part correct. According to P-10 (p55; Rev 01901), PORV-430 and PORV-431C fail closed on a loss of DC, and indication lights will both be dark.

Technical Reference(s): P-10 (p55; Rev 01901), 21946-0755 sh1 rev 1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R0901C 1.06, RER07C 2.01

Question Source: Bank/VISION # _____
 Modified Bank # X 2010 Watts Bar (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 _____

Justification for K/A Match:

The KA is matched because the operator must demonstrate knowledge of bus power supplies (Which DC Bus) to the indicator for PORV position.
 The question is at the memory cognitive level because the operator must recall bits of information (i.e. power supply to 431C, LOP fail position to 431C) to answer the question correctly.

What MUST be known:
1. What is the power supply to Pressurizer PORV 431C? 2. What is the loss-of-power fail position of PORV 431C?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	012 K6.03	
	Importance Rating	3.1	

Knowledge of the effect of a loss or malfunction of the following will have on the RPS: trip logic circuits

RO Question #37

Given the following plant conditions:

- The plant is at 100% power
- PRZR pressure channel PT-429 has failed and been defeated per ER-INST.1, REACTOR PROTECTION BISTABLE DEFEAT AFTER INSTRUMENT LOOP FAILURE

WHICH ONE of the following identifies the RPS actuation logic required, from the REMAINING in-service pressure channels, to initiate a Reactor Trip and Safety Injection on LOW pressurizer pressure?

	Reactor Trip	Safety Injection
A.	1/2	1/2
B.	1/3	1/2
C.	1/3	2/3
D.	2/3	2/3

Answer: B

Explanation:

- A. Incorrect. Plausible if the candidate believes that BOTH the reactor trip and SI actuation signal logics are 2/3, and the tripping of PT-429, common to both logic circuits, would place the remaining channels in a 1/2 logic configuration.
- B. CORRECT. PT-429 is common to both the reactor trip (2/4 logic with inputs from PT-429, 430, 431, and 449) and SI (2/3 logic with inputs from PT-429, 430, 431) circuits. Defeating PT-429 would leave the remaining reactor trip inputs in a 1/3 configuration (2/4 necessary to trip), and the SI trip inputs in a 1/2 configuration (2/3 necessary for SI).
- C. Incorrect. Plausible because part 1 is correct and part 2 is plausible if the candidate believes that PT-429 is NOT one of the SI inputs (PT-449 is the input NOT common to both circuits), leaving the SI logic in its original required state.
- D. Incorrect. Plausible if the candidate believes that BOTH the reactor trip and SI actuation signal logics are 2/4, and the tripping of PT-429, common to both logic circuits, would place the remaining channels in a 2/3 logic configuration.

Technical Reference(s): 33013-1353, Sheets 6 & 12 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3501C 1.06; RIC02C 1.06

Question Source: Bank/VISION # 2007 CALLAWAY
NRC
 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 .7
 55.43 _____

Justification for K/A Match:

Matches the K/A by requiring knowledge of how the defeat on an RPS instrument channel affects the impact on both the reactor trip and SI logic circuits.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	012 2.4.45	_____
	Importance Rating	4.1	_____

RPS: Ability to prioritize and interpret the significance of each annunciator or alarm

RO Question #38

Given the following plant conditions:

- The plant is operating at 22% power after synchronizing to the grid
- B-27, RCS LOOP A LO FLOW CHANNEL ALERT, is received
- A-17, MOTOR OFF RCP CCWP, is received
- RCS loop A flows (FI-411, FI-412, FI-413) indicates 80% and LOWERING
- RCS loop B flows (FI-414, FI-415, FI-416) indicates 100% and STABLE

WHICH ONE of the following identifies the FIRST procedure entered?

- AP-RCS.2, LOSS OF REACTOR COOLANT FLOW
- AP-RCP.1, RCP SEAL MALFUNCTION
- AP-CCW.2, LOSS OF CCW AT POWER
- E-0, REACTOR TRIP OR SAFETY INJECTION

Answer: A

Explanation:

- A. CORRECT. With reactor power < P-8 setpoint of 25%, a single loop loss of flow trip will NOT occur. While reactor power is > the P-7 setpoint of 8%, this permissive enables the 2-LOOP loss of flow reactor trip. Per AR-B-27, if flow is <91% on 2 or more channels, check for first annunciator panel alarm D-15: if NOT lit, go to AP-RCS.2, LOSS OF REACTOR COOLANT FLOW. In AP-RCS.2, if reactor trip breakers are closed, the procedure will direct a manual reactor trip.
- B. Incorrect. Plausible if the candidate believes that one of the inputs to this alarm is EITHER loop low flow conditions. Incorrect because this alarm occurs when both RCS Loop A and RCS Loop B have low flow conditions with > P-7 (8%) conditions.
- C. Incorrect. Plausible because the stated conditions will result in Loop A flow conditions < 91%, but the automatic reactor trip (and D-7 alarm) will occur only with power > P-8 (25%).
- D. Incorrect. Plausible because both the single loop LOF and 2-loop LOF conditions are inputs into this alarm, but the alarm will occur only if the correct P-7 or P-8 setpoint is also met, as described above.

Technical Reference(s): AR-B-27, D-7, D-15, D-17 (Attach if not previously provided)
AP-RCS.2

Proposed references to be provided to applicants during examination: None

Learning Objective: R3501C 1.07 & 1.11

Question Source: Bank/VISION # 2010 Beaver Valley NRC
 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 .7
 55.43 _____

Justification for K/A Match:

Matches K/A by requiring an assessment of plant conditions (RCS flow and power level) and a determination of (a) the inputs to relevant reactor trip annunciators and (b) whether the first out annunciator would be received.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013 K4.13	
	Importance Rating	3.7	

Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for MFW isolation/reset

RO Question #39

Given the following plant conditions:

- The plant is operating at 99% power
- A Reactor Trip occurs
- A feedwater transient has caused the following alarms:
 - G-3, S/G A LEVEL DEVIATION $\pm 7\%$
 - G-4, S/G A HI LEVEL CHANNEL ALERT 85%
 - G-12, S/G A HI LEVEL 85%
- No manual operator actions have been taken

WHICH ONE of the following is correct regarding:

- (1) Impact on MFW system, AND
 - (2) Actions necessary, if any, to RESET feedwater isolation signal(s) after S/G levels are returned to normal?
- A. (1) closes MFW regulating and bypass valves (HCV-466 and HCV-480) AND MFW Isolation valve AOV-3995
- (2) Depress MANUAL pushbuttons for MFW regulating valve and bypass valve controllers, lower demand to 0%, operate as necessary to control level
- B. (1) closes MFW regulating and bypass valves (HCV-466 and HCV-480) AND MFW Isolation valve AOV-3995
- (2) NO actions are necessary - level will control normally in automatic when level restores to < 85%
- C. (1) closes only MFW regulating and bypass valves HCV-466 and HCV-480
- (2) Depress MANUAL pushbuttons for MFW regulating valve and operate as necessary to control level
- D. (1) closes only MFW regulating and bypass valves HCV-466 and HCV-480
- (2) NO actions are necessary - level will control normally in automatic when level restores to < 85%

Answer:

D

Explanation:

- A. Incorrect. Plausible because part 1 is partially correct, and it is reasonable to also assume that the associated feedwater discharge isolation valve might also receive a high level isolation signal. Part 2 is plausible because this is the required action if a reactor trip occurs AND Manual operation of the MFW valves is desired.
- B. Incorrect. Plausible because part 1 is partially correct, and it is reasonable to also assume that the associated feedwater discharge isolation valve might also receive a high level isolation signal. Part 2 is correct – normal operation will resume when the high level isolation signal is reset.
- C. Incorrect. Plausible because part 1 is correct and part 2 is plausible if the candidate assumed that the HI-LEVEL isolation signal functioned similarly to the reactor trip + LOW Tav_g signal, which can be overridden by MANUAL control if the Manual pushbuttons are held in Manual for >3 seconds.
- D. CORRECT. Per AR-G-12, the HI LEVEL signal of 2/3 levels > 85% results in feedwater isolation signal on the AFFECTED S/G only. Normal operation is restored when the high level isolation signal is reset.

Technical Reference(s): AR-G-12, G-20 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R4301C, 1.07

Question Source: Bank/VISION # _____
 Modified Bank # 2011 Vogtle NRC (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 _____

Justification for K/A Match:

Matches the K/A by requiring knowledge of the Feedwater Isolation (FWI) signals and the actions required to restore main feedwater control following the FWI actuation.

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Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	022	A1.04
	Importance Rating	3.2	

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Cooling water flow

RO Question # 40

Given the following plant conditions:

- The plant is operating at 100% power
- A steam leak has occurred inside Containment for which an entry is being planned
- FCV-4561, CNMT CLR SW OUTLET flow controller has failed such that the valve is barely open
- The Containment Pressure is 0.5 psig and slowly rising at approximately one-tenth (0.1) of a pound (psig) every 10 minutes
- The Containment Temperature is 110°F and slowly rising at approximately one degree F every 15 minutes

Assuming that these trends continue, WHICH ONE of the following predicts the EARLIEST time at which the Containment Pressure and Temperature Technical Specifications will be exceeded?

- The Containment Pressure LCO will be exceeded in 45-60 minutes; AND the Containment Temperature LCO will be exceeded in approximately 2.5 hours.
- The Containment Pressure LCO will be exceeded in 45-60 minutes; AND the Containment Temperature LCO will be exceeded in approximately 3.75 hours.
- The Containment Pressure LCO will be exceeded in 75-90 minutes; AND the Containment Temperature LCO will be exceeded in approximately 2.5 hours.
- The Containment Pressure LCO will be exceeded in 75-90 minutes; AND the Containment Temperature LCO will be exceeded in approximately 3.75 hours.

Answer:

B

Explanation:

- A. Incorrect. 1st part correct, 2nd part wrong. This is incorrect because the Containment Temperature TS LCO will be exceeded in about 3.75 hours. This is plausible if the operator recalls the previous Containment Temperature TS LCO of $\leq 120^{\circ}\text{F}$ and incorrectly bases his calculation on this value.
- B. CORRECT. 1st part correct, 2nd part correct. According to TS LCO 3.6.4 (p.3.6.4-1; Amendment 80) Containment pressure shall be ≥ -2.0 psig and ≤ 1.0 psig. Consequently, it will be exceeded in approximately 50 minutes. According to TS LCO 3.6.5 (p.3.6.5-1; Amendment 80) Containment average air temperature shall be $\leq 125^{\circ}\text{F}$. Consequently, it will be exceeded in approximately 3.75 hours.
- C. Incorrect. 1st part wrong, 2nd part wrong. See A and D.
- D. Incorrect. 1st part wrong, 2nd part correct. This is incorrect because the Containment Pressure TS LCO will be exceeded in about 50 minutes. This is plausible because the operator may not recall the Containment Pressure TS LCO parameter and base there calculation on an assumed higher value of 2 psig. This value is actually the negative pressure spec value for Containment.

Technical Reference(s): TS LCO 3.6.4 (p.3.6.4-1; Amendment 80) (Attach if not previously provided)
 TS LCO 3.6.5 (p.3.6.5-1; Amendment 80)

Proposed References to be provided to applicants during examination: None

Learning Objective: R5101C 1.06 (As available)

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

Question History: Last NRC Exam: NA

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

10 CFR Part 55 Content: 55.41 10
 55.43

Comments:

The KA is matched because the operator must demonstrate the ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) such as Containment Temperature and Pressure associated with operating the CCS controls including cooling water flow (which is lower than normal because of a valve controller failure coupled with a Steam Leak in Containment).

The question is at the Comprehension/Analysis cognitive level because the operator must recall bits of information (Containment Temp/Pressure LCOs), and then evaluate the current and/or postulated conditions; and compare this to the LCOs to answer the question correctly.

What MUST be known:
1. What is the Containment Temperature LCO?
2. What is the Containment Pressure LCO?
3. At the current rates of change, when will the LCOs be exceeded?

1. What is the Containment Temperature LCO?
2. What is the Containment Pressure LCO?
3. At the current rates of change, when will the LCOs be exceeded?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	026 A1.03	
	Importance Rating	3.5	

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: Containment sump level

RO Question #41

Given the following:

- A Large LOCA has occurred in Containment.
- RWST level is 50% and lowering.
- Containment B Sump level indicators both read 78 inches.

WHICH ONE of the following describes how the Containment Sump level indicators will change over the next several minutes AND identifies the threshold required to transition from the injection phase to the recirculation phase?

Containment B Sump level indicators will.....

- continually trend up as RWST levels trend down; AND
The transition to recirculation will occur at a Containment Sump level of 113 inches.
- change at discrete level elevation changes due to actuation of level switches as RWST levels trend down; AND The transition to recirculation will occur at Containment Sump level of 113 inches.
- change at discrete level elevation changes due to actuation of level switches as RWST level trends down; AND
The transition to recirculation will occur at a Containment Sump level of 180 inches.
- continually trend up as RWST level trends down; AND The transition to recirculation will occur at a Containment Sump level of 180 inches.

Answer: B

Explanation:

- A. **Incorrect.** 1st part wrong. 1st part correct. This is incorrect because the Containment Sump B level indicator design is such that it relies upon float switches at discreet sump levels to be covered. This is plausible because there are several plant level indicators that are capable of real level indication at any given time (i.e. RWST level).
- B. **Correct.** 1st part correct. 1st part correct. According to Lesson Plan R2701C (p38; Rev 27) the Control Room Containment Sump B level indications, LI-942 and 943, are two channels indicating water level at multiple heights: (1) 8 inches, (2) 78 inches, (3) 113 inches, (4) 180 inches, and (5) 214 inches. According to ES-1.3 (p3; Rev 04600), Step 2, the operator is directed to check Containment Sump B level at least 113 inches for the purposes of switching from the injection phase to the recirculation phase of the accident.
- C. **Incorrect.** 1st part correct. 1st part wrong. This is incorrect because the threshold for switchover from the injection phase to the recirculation phase is 113 inches, not 180 inches. This is plausible because the Containment Sump B Level indicator has a level switch at 180 inches, it is the next higher switch directly above 113, and its significance is that this is just below the design flood level.
- D. **Incorrect.** 1st part wrong. 1st part wrong. See A and C.

Technical Reference(s): ES-1.3 (p3; Rev 04600) (Attach if not previously provided)
 Lesson Plan R2701C (p38; Rev 27)
EOP setpoint M.7, M.8,M.9

Proposed references to be provided to applicants during examination: None

Learning Objective: R4701C, 1.06;

Question Source: Bank/VISION # _____
 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 41.10
 55.43 _____

Justification for K/A Match:

The KA is matched because the operator must demonstrate the ability to predict and/or monitor changes in parameters (i.e. Containment Sump Level) associated with operating the CSS controls when switching from the injection mode to the recirculation mode in the design basis accident.

The question is at the memory cognitive level because the operator must recall bits of information (i.e. procedure Note requirements) to answer the question correctly.

What MUST be known:

1. What is the design/operation of the Containment Sump Level indicators in the control room?
2. What is the Containment Sump B level threshold for switching from Injection to Recirculation mode of DBA?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	026 A3.01	
	Importance Rating	4.3	

Ability to monitor automatic operation of the CSS, including: Pump starts and MOV positioning

RO Question #42

Given the following plant conditions:

- A Large Break LOCA and Loss of Offsite Power have occurred
- EDG 'B' tripped while starting
- ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, has been implemented
- Alignment for SI and CNMT Spray Sump Recirculation has been completed
- RWST is at 13% level

WHICH ONE of the following identifies which (1) RHR PUMP DISCHARGE TO SI SUCTION valve(s) will be open for RHR pumps to supply CNMT Spray Pump(s) and (2) which CNMT SPRAY PUMP(s) and DISCHARGE VALVE(s) will be open.

- (1) MOV-857A and MOV-857C
(2) 'B' CNMT Spray pump running; MOV-860A, MOV-860B
- (1) MOV-857A and MOV-857B
(2) 'B' CNMT Spray pump running; MOV-860A, MOV-860C.
- (1) MOV-857A and MOV-857C
(2) 'A' CNMT Spray pump running; MOV-860A and MOV-860C
- (1) MOV-857B
(2) 'A' CNMT Spray pump running; MOV-860B and MOV-860C

Answer: C

Explanation:

- A. 1st part is correct 857 A & C are supplied by A train Power. 2nd Part Incorrect only the A Spray pump has power available and 860B is supplied from B train of power Plausible because 857A and C supply 'A' train and is correct while 857B is supplied from the 'B' train and is incorrect. The candidate will need to recall which valves supply which trains for the first part. If they do not have an understanding of the system flowpath they may choose the wrong valve. With a loss of off-site power and B EDG the B train components will be lost. Only A train components will be operable. MOV-860B is incorrect since this is a B train component.
- B. Incorrect. 1st part is wrong as only the A train will be supplied thus only 857A and C will be open. Part Incorrect only the A Spray pump has power available
- C. CORRECT. MOV-857A and MOV-857C are in series, and 'B' train pumps and valves are NOT available due to the LOOP and trip of 'B' EDG.
- D. Incorrect. 857B is supplied from the B train of power Plausible because 857A and C supply 'A' train and is correct while 857B supplies the 'B' train and is incorrect. The candidate will need to recall which valves supply which trains for the first part. If they do not have an understanding of the system flowpath they may choose the wrong valve. With a loss of off-site power and B EDG the B train components will be lost. Only A train components will be operable. MOV-860D is incorrect since this is a B train component.

Technical Reference(s): P-12 pgs 35,45-47 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RES13C 2.02;
R2401C 1.05 & 1.09

Question Source: Bank/VISION # _____
Modified Bank # 2011 HBR NRC (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 _____

Justification for K/A Match:

Implicit because the candidate needs to identify which valves stroke with which pumps.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	039 A2.01	_____
	Importance Rating	3.1	_____

Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Flow paths of steam during a LOCA

RO Question #43

Given the following plant conditions:

- A LOCA has occurred coincident with loss of offsite power
- RCS pressure is 1100 psig and stable
- CNMT pressure is 9 psig and stable
- The crew is implementing ES-1.2, POST-LOCA COOLDOWN AND DEPRESSURIZATION

WHICH ONE of the following describes the method, rate, and indicator that will be used to cool down the RCS until normal RHR can be placed in service?

Perform the cooldown using _____.

- S/G ARVs at a rate of $\leq 25^\circ\text{F/hr}$, using core exit thermocouples
- S/G ARVs at a rate between $80\text{-}100^\circ\text{F/hr}$, using core exit thermocouples
- Condenser steam dumps at a rate of $\leq 25^\circ\text{F/hr}$, using cold leg temperature
- Condenser steam dumps at a rate between $80\text{-}100^\circ\text{F/hr}$, using cold leg temperature

Answer: B

Explanation:

- A. Incorrect. Plausible because the method of C/D is correct (with offsite power not available) in part 1, and part 2 is plausible because with RCPs secured, some EOPs establish a maximum C/D of 25°F/hr to prevent bubble formation in the core.
- B. CORRECT. With offsite power (and Circulating Water pumps) not available, steam dumps are not available and cooldown must be performed using the S/G ARVs. Most of the EOPs want to maximize the cooldown rate without challenging the FR-P cooldown rate restrictions, so C/D is limited to < 100°F/hr.
- C. Incorrect. Plausible if the candidate overlooked that fact that loss of offsite power had rendered steam dumps inoperable, and part 2 is plausible because with RCPs secured, some EOPs establish a maximum C/D of 25°F/hr to prevent bubble formation in the core.
- D. Incorrect. Plausible because part 2 is correct and if the candidate overlooked that fact that loss of offsite power had rendered steam dumps inoperable.

Technical Reference(s): ES-1.2 Bkgd, ES-1.2 pg. 11 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RES12C 1.06 & 2.01

Question Source: Bank/VISION # B360.005
 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 _____

Justification for K/A Match:

Matches K/A by requiring identification of which MRSS heat removal method will be used to cooldown the RCS for a given set of plant conditions a rate which will maximize the beneficial effects of the cooldown while mitigating the effects of the higher-than-normal cooldown rates in avoiding PTS concerns.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	059 K3.03	_____
	Importance Rating	3.5	_____

Knowledge of the effect that a loss or malfunction of the MFW will have on the following: S/Gs

RO Question #44

Given the following plant conditions:

- The plant is at 70% power
- 'B' MFW pump trips

Assuming no operator actions, WHICH ONE of the following describes the INITIAL plant response?

- Main Feedwater regulating valves modulate open and maintain S/G levels
- Main Feedwater regulating valves modulate open, but S/G levels continue to lower
- Main Feedwater regulating AND bypass valves modulate open and maintain S/G levels
- Main Feedwater regulating AND bypass valves modulate open , but S/G levels continue to lower

Answer: B

Explanation:

- A. Incorrect. Plausible response, but 60-65% is the maximum feedwater flow that a single MFW pump can maintain S/G levels.
- B. CORRECT. With the FRV Bypass valves in MANUAL, they will not respond to this transient. The FRVs will attempt to maintain program S/G levels, but at this power level, S/G levels cannot be maintained. Per the Background document, simulator scenarios with power > 75% have demonstrated that the reactor will trip on S/G level: AFW pumps must be started to augment the decreased MFW flow from the 'B' MFP trip, and load reduced to maintain S/G levels stable.
- C. Incorrect. Plausible if the candidate assumes that both the main and bypass valves respond similarly, but the bypass valves are normally in MANUAL at power. Per the AP-FW.1 Background document, power must be reduced to 50%.
- D. Incorrect. Plausible if the candidate assumes that both the main and bypass valves respond similarly, but the bypass valves are normally in MANUAL at power. Part 2 is correct.

Technical Reference(s): AP-FW.1 Background (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R4301C, 1.10; RAP09C 2.01

Question Source: Bank/VISION # 107494
 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 _____

Justification for K/A Match:

Matches the K/A by requiring knowledge of the effect of a single MFW pump loss on maintaining S/G level with an initial power level of 70%.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	059 A4.08	_____
	Importance Rating	3.0	_____

Ability to manually operate and monitor in the control room: Feed regulating valve controller

RO Question #45

Given the following plant conditions:

- The plant is at 100% power
- Due to instability problems with Feedwater flow to the B S/G, BOTH the 'B' feedwater regulating valve controller HCV-476, AND the 'B' feedwater bypass valve controller HCV-481 have been placed in MANUAL.

WHICH ONE of the following conditions would result in both FRV-476 and FRV-481 closing while in MANUAL?

- High level > 85% in 'A' S/G
- Trip of BOTH main feed pumps
- Reactor trip with Tavg less than 554°F
- A fault on 'B' S/G which results in 'A' S/G pressure < 500 psig

Answer: D

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	061 K5.01	_____
	Importance Rating	3.6	_____

**Knowledge of the operational implications of the following concepts as they apply to the AFW:
Relationship between AFW flow and RCS heat transfer**

RO Question #46

Given the following:

- A plant startup is in progress following a mid-cycle shutdown
- Both ARVs are in manual controlling Tavg at 547°F
- Reactor power is stable at 2%
- Both S/Gs Narrow Range levels are 47% and stable
- The CRS directs the CO to return S/G levels to program by raising AFW flow 50 gpm to each SG

What effect will this change in AFW flow have on RCS temperature?

- RCS temperature will initially lower and then return to 547°F and power will return to 2% when S/G levels return to program
- RCS temperature will continue to lower the below the POAH and S/G levels will continue to rise until feed isolation at 85%.
- RCS temperature will lower and continue to lower until power turns due to the cooldown and Tavg will stabilize at some higher value, S/G levels will stabilize at some higher value.
- RCS temperature will lower and continue to lower until power turns due to the cooldown and Tavg will stabilize at some lower value, S/G levels will continue to rise until feed is manually reduced.

Answer: D

Explanation:

- A. Incorrect – Temperature will continue to lower as long as excessive feed exist, level will continue to rise.
- B. Incorrect – Midcycle will have a negative MTC and power will turn due to cooldown S/G levels will continue to rise. FWI only effects main feed reg. valves, not AFW.
- C. Incorrect – SG levels will continue to rise.
- D. Correct – . RCS temperature will lower and continue to lower until power turns due to the negative power defect, the power will rise to some new, lower Tavg. S/G levels will continue to rise until feed is manually reduced. The 50 gpm will be excessive.

Technical Reference(s): ES-0.1 Background,pg11 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: ROC02C 1.01, 2.01

Question Source: Bank/VISION # _____
 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 .4
 55.43 _____

Justification for K/A Match:

Comments - K/A met because candidate must analyze plant conditions given with AFW in manual control, with rods and ARVs also in manual. Based on this analysis the candidate must identify the effect of AFW flow due to RCS temperature lowering and determine the appropriate actions of reducing AFW flow.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	062 K3.01	_____
	Importance Rating	3.5	_____

Knowledge of the effect that a loss or malfunction of the ac distribution system will have on the following: Major system loads

RO Question #47

Given the following plant conditions:

- An accident has resulted in automatic SI and Containment Spray actuation
- CNMT pressure is 30 psig and slowly lowering
- SI has NOT yet been reset
- Bus 16 NORMAL Supply breaker has just tripped
- 'B' EDG output breaker closed and re-energized Bus 16

WHICH ONE of the following describes the response of 'B' SI and CS pumps?

- Both pumps will automatically restart
- Both pumps must be manually restarted using the individual pump breaker controls
- 'B' SI pump will automatically restart, but 'B' CS pump must be started manually using its individual pump breaker control
- 'B' CS pump will automatically restart, but 'B' SI pump must be manually started using its individual pump breaker control

Answer: A

Explanation:

- A. CORRECT. Following the SI actuation, the subsequent UV condition (1/2 + 1/2 UV sensors) on Bus 16 trips the B & C SI pump breakers, B & C CRFs, B MDAFW pump, and B RHR pump. Since SI has not been reset, the actuation signal is still present and when the 'B' EDG re-energizes Bus 16 (SI+UV sequence), the 'B' SI pump breaker recloses and the 'B' CS pump (whose breaker was never stripped and does not open on UV), is re-energized. Both components restart "automatically" with no actions required.
- B. Incorrect. Plausible if the candidate does not recognize that the SI signal is still present nor recognize that the CS pump does not have UV protection.
- C. Incorrect. Plausible because part 1 is correct and if, in part 2, the candidate fails to recognize that the CS pump does not have UV protection and does not need to be manually restarted.
- D. Incorrect. Plausible because part 1 is correct and part 2 is plausible if the candidate fails to recognize that the SI signal has not been reset and ECCS components will restart.

Technical Reference(s): 33013-1353, Sheets 5 & 8 (Attach if not previously provided)
P-12

Proposed references to be provided to applicants during examination: None

Learning Objective: R0701C 1.06

Question Source: Bank/VISION # 61956
 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 ..7
 55.43 _____

Justification for K/A Match:

Matches the K/A by requiring an assessment of the loss of a 480V Safeguards bus safeguards-related equipment.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	062 A3.04	_____
	Importance Rating	2.7	_____

Ability to monitor automatic operation of the ac distribution system, including: Operation of inverter (e.g., precharging synchronizing light, static transfer)

RO Question #48

With the plant at 100% power, 125 volt Battery A Disconnect Switch opens.

WHICH ONE of the following describes the effect on Inverter A?

Inverter 'A' output voltage will _____ (1) _____ and what action is required?
_____ (2) _____

- A.
 (1) remain the same,
 (2) None, because Inverter operation is NOT affected.
- B.
 (1) lower
 (2) Manually transfer to the backup AC power supply.
- C.
 (1) lower
 (2) None, because the static transfer switch to shift to the backup AC power supply.
- D.
 (1) remain the same,
 (2) None, because the static transfer switch will shift to the backup AC power supply.

Answer: A

Explanation:

- A **Correct.** According to Lesson Plan R0901C (p19; Rev 35), the Battery Chargers convert AC power to regulated DC power supplying the DC station loads, including the Inverters, and maintaining the station batteries in a state of readiness to accept the design based DC loads for the required time. If the Battery Charger were to fail, the Battery would immediately and imperceptibly power the normal supply to the Inverter. Additionally, the Inverters receive the DC power from the Battery Chargers, invert it to AC power, and power the AC Instrument Bus. When the normal power supply fails, the Static Switch automatically switches to the backup AC power supply. Under the stated conditions, the opening of the A Battery Disconnect Switch will NOT affect the normal or the backup supply to the Inverter.
- B. **Incorrect.** This is incorrect because the Inverter A Output Voltage will NOT lower. This is plausible because the operator may not understand how the Battery Charger/Battery operate under normal circumstances, nor understand the operation of the Static Switch.
- C. **Incorrect.** This is incorrect because the Inverter A Output Voltage will NOT lower. This is plausible because the operator may not understand how the Battery Charger/Battery operate under normal circumstances.
- D. **Incorrect.** This is incorrect because the Static Switch will NOT shift. This is plausible because the operator may not understand the operation of the Static Switch.

Technical Reference(s): Lesson Plan R0901C (p19; Rev 35) (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R0901C, Obj. 1.04

Question Source: Bank/VISION # _____

Modified Bank # 62492 (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 41.7

55.43 _____

Justification for K/A Match:

The KA is matched because the operator must demonstrate the ability to monitor automatic operation of the 120 vital inverter. This is accomplished by identifying how Inverter output voltage responds to a failure of a Battery Disconnect under normal plant alignment.

The question is at the Comprehension/Analysis cognitive level because the operator must recall bits of information (i.e. normal power alignment to inverter, operation of Static Switch), and compare this information to stated plant conditions, in order to answer the question correctly.

What MUST be known:

1. How is DC voltage normally supplied to the Vital Inverters?
2. How does the Inverter Static Switch operate?
3. What happens to the Inverter if the Battery Disconnect Switch is inadvertently opened during normal operating alignment?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	063 K1.03	
	Importance Rating	2.9	

Knowledge of the physical connections and/ or cause relationships between the DC electrical system and the Battery charger and battery

RO Question #49

WHICH ONE of the following lists the possible power sources to the 1B DC Fuse Cabinet?

- A. 1B Inverter, 1A Inverter, TSC Battery Charger
- B. 1B Inverter, 1B1 Battery Charger, TSC Battery Charger
- C. 1B Battery Charger, 1B1 Battery Charger, 1B Battery, TSC Battery
- D. 1B Battery Charger, 1B Main DC Distribution Panel, 1B Battery, TSC Battery

Answer: C

Explanation:

- A. Incorrect. Plausible, all possible with the exception of 1B Main DC Distribution Panel which is a load on the system. Plausible, all possible with the exception of Inverters which are loads on the system.
- B. Incorrect. Plausible, all possible with the exception of 1B Inverter which is a load on the system.
- C. CORRECT
- D. Incorrect. Plausible, all possible with the exception of 1B Main DC Distribution Panel which is a load on the system.

Technical Reference(s): P-12 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R0901C 1.02, 1.04

Question Source: Bank/VISION # 67650
 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 41.7 ,41.9
 55.43 _____

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	063 2.2.42	_____
	Importance Rating	3.9	_____

DC Electrical Distribution System: Ability to recognize system parameters that are entry-level conditions for Technical Specifications.

RO Question #50

Given the following:

- The plant is cooling down with RCS Temperature at 340°F.
- The 1A Battery Charger is OOS.

Subsequently, the Electricians report that the 1A1 Battery Charger is degraded to the point that it can supply a MAXIMUM of 140 amps of Battery charging capacity.

WHICH ONE of the following identifies (1) the status of compliance with, and (2) applicability of, LCO 3.8.4, DC Sources - MODES 1, 2, 3, and 4?

Under the current plant conditions LCO 3.8.4 is (1) and (2) applicable.

- A. (1) met
(2) is
- B. (1) NOT met
(2) is
- C. (1) met
(2) is NOT
- D. (1) NOT met
(2) is NOT.

Answer: B

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	064 K6.08	
	Importance Rating	3.2	

Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: Fuel oil storage tanks

RO Question #51

Given the following plant conditions:

- A loss of offsite power had occurred
- Both diesel generators started and loaded as expected
- While monitoring EDG operation, the Auxiliary Operator reports the following conditions on 'A' and 'B' EDGs:

	'A' EDG	'B' EDG
Day tank Sightglass Level	6" and ↓	12" and ↑
Fuel Oil Transfer Pump Discharge Pressure	44 psig	15.5 psig
Fuel Transfer Pump Suction Duplex Strainer D/P	0.5 psid	2.8 psid

WHICH ONE of the following describes the reason for these conditions and the consequence, if any, to EDG operation?

- 'A' Fuel Oil Transfer Pump is not functioning properly due to indications of higher discharge pressure; cross tie the fuel systems per ER-D/G.1, RESTORING D/G's, to prevent pump damage
- The Fill SOV is not functioning properly; manually operate the Fill SOV Bypass to fill the 'A' EDG Day Tank to recover the 'A' EDG Day Tank level
- The 'A' Fuel Oil Transfer Pump Suction Duplex Strainer is clogged and must be swapped immediately to ensure a minimum of one (1) hour of operation at full load
- The 'A' Recirc SOV has opened on low Day Tank level to prevent vortexing of the 'A' EDG Fuel Oil Booster pump and loss of fuel to 'A' EDG

Answer:

B

Explanation:

- A. Incorrect. Plausible if the candidate is unaware of the nominal parameters associated with Fuel Oil Transfer pump discharge pressure and Fuel Oil Strainer D/P. The given indications are that the discharge flowpath through the Fill SOV is blocked, which has raised discharge pressure to the discharge relief valve RV-5959 setpoint, which is lifting (~43-45 psig setpoint) to protect the running pump. If it WERE malfunctioning, it could be secured and an alternate method of filling a running EDG's day tank would be to utilize the other EDG's fuel oil transfer pump.
- B. CORRECT. With the fuel oil transfer pump running (automatically started at 10" day tank level), and normal, stable discharge pressure (> 12 psig) indicated, normal (< 5.5 psid) fuel suction strainer operation, and day tank level still lowering after the pump start, a failure of the fill line SOV is indicated. This SOV can be bypassed by opening a manual bypass valve, V-5937.
- C. Incorrect. Plausible if the candidate does not know the nominal parameter associated with proper duplex strainer operation (D/P <5.5 psid), and believes the requirement for a minimum of one hour of continuous operation is linked to this parameter. ITS SR 3.8.1.4 is actually linked to verification of sight glass level (8.75") in the day tank to verify adequate fuel oil.
- D. Incorrect. Plausible if the candidate does not understand that the Recirc valve on the EDG day tanks cycles open at a HIGH level condition of 13.5" (the transfer pump started with the EDG running and LOW level of 10" in the Day Tanks. The EDG Fuel Oil Booster pump WILL develop vortexing conditions on LOW level in the tank.

Technical Reference(s): ER-D/G.1, AR-DG-A-2 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R1801C 1.07, 1.08

Question Source: Bank/VISION # _____
 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 _____

Justification for K/A Match:

Matches the K/A by requiring an assessment of symptoms associated with the maintenance of proper fuel oil storage capacity (day tank) and determining what impact those malfunctions could have on continued EDG operation.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	073 K4.01	_____
	Importance Rating	4.0	_____

**Knowledge of PRM system design feature(s) and/or interlock(s) which provide for the following:
Release termination when radiation exceeds setpoint**

RO Question #52

Which one of the following radiation monitors will send a close signal to the S/G Blowdown ISOLATION and Blowdown SAMPLE valves?

- R-15, AIR EJECTOR
- R-19, STEAM GENERATOR BLOWDOWN
- R-31, STEAM LINE "A"
- R-32, STEAM LINE "B"

		"A" S/G B/D ISOL AOV-5738	"A" S/G B/D SAMP AOV-5735	"B" S/G B/D ISOL AOV-5737	"B" S/G B/D SAMP AOV-5736
A.	R-31	X		X	
B.	R-32		X		X
C.	R-15	X	X	X	X
D.	R-19	X	X	X	X

Answer: D

Explanation:

- A. Incorrect. Plausible because it is standard procedure within AP-SG.1 and E-3 to isolate the leaking/ruptured S/G once it is identified. Also plausible because the larger size of the blowdown piping represents a much larger potential radiation release pathway and because the need to sample the S/Gs during the SGTL/SGTR might preclude automatic isolation of the sample lines.
- B. Incorrect. Plausible because it is standard procedure within AP-SG.1 and E-3 to isolate the leaking/ruptured S/G once it is identified. Also plausible because the larger size of the blowdown piping represents a much larger potential radiation release pathway and because the need to sample the S/Gs during the SGTL/SGTR might preclude automatic isolation of the sample lines.
- C. Incorrect. Plausible because it is standard procedure within AP-SG.1 and E-3 to isolate the leaking/ruptured S/G once it is identified and R-15 is one of the monitors that would be a symptom to enter AP-SG.1 and E-3.
- D. CORRECT. Per the AR-RMS-19 and P-9 references, a high ALARM condition on R-19 isolates both S/Gs' blowdown and sample valves.

Technical Reference(s): P-9, AR-RMS-19 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3901C 1.07

Question Source: Bank/VISION # _____
 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 .11
 55.43 _____

Justification for K/A Match:

Matches the K/A by requiring knowledge of the automatic isolation which occurs in the blowdown and sample lines when process rad monitor R-19 reaches Alarm setpoint.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	076 K1.08	
	Importance Rating	3.5	

Knowledge of the physical connections and/or cause- effect relationships between the SWS and the following systems: RHR system

RO Question #53

Given the following plant conditions:

- A DBA LOCA has occurred which resulted in automatic SI and CI signals
- Coincident with the SI actuation, a loss of offsite power occurred
- 'A' EDG failed to start

WHICH ONE of the following describes:

(1) the impact on the Service Water supply to CCW heat exchanger and

(2) RHR systems ability to support Cold Leg Recirculation?

- (1) SW must be manually aligned to CCW system and
(2) RHR cooling is available using one RHR heat exchanger
- (1) SW must be manually aligned to CCW system and
(2) RHR cooling is available using two RHR heat exchangers
- (1) SW is available to the CCW system and
(2) RHR cooling is available using one RHR heat exchanger
- (1) SW is available to the CCW system and
(2) RHR cooling is available using two RHR heat exchangers

Answer: A

Explanation:

- A. CORRECT. Failure of EDG 'A' will result in the loss of Busses 14 & 18. The resultant UV conditions (Normal 480V Supply Breaker trip) + the SI signal will result in SW isolation signals to non-essential loads serviced by MOVs, this includes BOTH CCW heat exchangers. SW will have to be re-aligned to the CCW heat exchangers. If only one CCW Pump running only one RHR heat exchangers will be placed in service.
- B. Incorrect. Plausible 1ST part correct, only one RHR heat exchangers will be placed in service.
- C. Incorrect. Plausible because the correct RHR heat exchangers is identified, and if the candidate does not recognize that with the UV condition on Train 'B' + SI, the nonessential loads will be not be isolated and no realignment is required.
- D. Incorrect. Plausible because, as a non-essential load, the CCW heat exchangers must be aligned following the SW isolation signal and only only one RHR heat exchangers will be placed in service..

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

Proposed references to be provided to applicants during examination: None

Learning Objective: R5101C 1.07, 1.08
RES13C 2.01

Question Source: Bank/VISION # _____
 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 _____

Justification for K/A Match:

Matches the K/A by requiring an assessment of plant conditions to recognize SW isolation signal, and which SW loads which have been isolated will impact operation of the RHR on Cold Leg Recirculation.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	078 K2.02	
	Importance Rating	4.5	

Knowledge of bus power supplies to the Emergency air compressor

RO Question #54

Given the following plant conditions:

- The plant is operating at 100% power
- Instrument air compressors 1A and 1B are in constant speed
- 1C instrument air compressor is tagged for maintenance
- Bus 13 normal supply breaker has tripped on bus fault
- Instrument air pressure is 100 psig and slowly lowering
- H-8, INSTRUMENT AIR LO PRESS 100 PSIG, is lit

WHICH ONE of the following would mitigate the loss of air event?

- A. Crosstie 480V Bus 15 to Bus 16 per AP-ELEC.1, LOSS OF 12A AND/ OR 12B BUSES
- B. Locally verify that AOV-5251, SA crosstie to IA is OPEN
- C. Verify running, or start, the Service Air Compressor
- D. Crosstie Diesel Air Compressor per ATT-11.2, DIESEL AIR COMPRESSOR

Answer: D

Explanation:

- A. Incorrect. Plausible because this is the correct RNO action per Step 3 of AP-IA.1, but Bus 15 would be cross-tied to Bus 14, NOT Bus 16.
- B. Incorrect. Plausible because AOV-5251 would be open to cross-tie service air with the instrument air header, but ineffective since the SA compressor is without power from Bus 13.
- C. Incorrect. Plausible if the candidate does not know the correct power supply to the service air compressor, which is Bus 13 (de-energized).
- D. CORRECT. The 'C' IA compressor is held, 'A' IA and the SA compressors are powered from Bus 13 (de-energized), and the 'B' IA compressor is unable to maintain IA pressure. The remaining option, with lowering IA pressure per Step 4 of AP-IA.1, is to crosstie either the diesel and/or the breathing air compressor per ATT-11.2 or T-2F, BACKUP AIR SUPPLY.

Technical Reference(s): AP-IA.1, ATT-11.2 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R4701C, 1.10

Question Source: Bank/VISION # 67427
 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 _____

Justification for K/A Match:

Matches the K/A by requiring knowledge of which air compressors are available to mitigate the lowering instrument air pressure with Bus 13 de-energized.

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

Knowledge of containment system design feature(s) and/or interlock(s) which provide for the following: Personnel access hatch and emergency access hatch

RO Question #55

The plant is in Mode 6 and core alterations, head lift is in progress. WHICH ONE of the following conditions will result in a loss of containment refueling integrity?

- A. The equipment hatch "bolted in place" and held in place by only 8 bolts, equally spaced with no gaps
- B. Removal of the fuel transfer tube flange with fuel transfer canal isolation valve, V-650J closed.
- C. Movement of material through the equipment hatch with the door interlocks disabled, doors can be closed within 40 minutes.
- D. An 'A' S/G safety valve is removed and all 'A' S/G secondary manways are installed inside Containment.

Answer: C

Explanation:

- A. Plausible, Not all bolts are installed, only 4 are required.
- B. Plausible, closure is only required above mode 5
- C. CORRECT, closure is required within 30 min.
- D. Plausible, the S/G isolation boundary can be either on the primary or secondary. .

Technical Reference(s): ITS B 3.9.3 (Attach if not previously provided)
O-15.2

Proposed references to be provided to applicants during examination: None

Learning Objective: RRF02C 5.01 R2101C 1.07,
1.12

Question Source: Bank/VISION # _____
 Modified Bank # 62920 (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 41.7
 55.43 _____

Justification for K/A Match:

The question matches the K/A by asking the inter-relationship and implication of disabling equipment hatch interlocks

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	001 K.203	_____
	Importance Rating	2.7	_____

Knowledge of bus power supplies to the following: One-line diagram of power supplies to logic circuits.

RO Question #56

The plant was at normal full-power alignment, when the 'A' MG set Output Breaker inadvertently tripped. WHICH ONE of the following describes the results of this action?

- A. No adverse impact. The 'B' MG set will provide all rod and all control system power.
- B. One half of the power cabinets lose power, those rods will not move the stationary/movable gripper coils get reduced current.
- C. No immediate impact, one half of the power cabinets lose power, if rod motion is demanded, the applicable rods will drop.
- D. All control rods will drop

Answer: A

Explanation:

- A. CORRECT
- B. Plausible because if power were lost to power cabinets an urgent failure would occur which use reduced currents
- C. Plausible; if power were lost, rods could drop, but power is not lost.
- D. Plausible if power were lost to power cabinet rods could drop.

Technical Reference(s): R3001C Rod Control (Attach if not previously provided)
AR-C-21

Proposed references to be provided to applicants during examination: None

Learning Objective: R3001C, 1.05;

Question Source: Bank/VISION # _____
 Modified Bank # 62236 (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 41.7
 55.43 _____

Justification for K/A Match:

The question matches the K/A by evaluation of power to rod control components

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	002 A3.01	_____
	Importance Rating	3.7	_____

Ability to monitor automatic operation of the RCS, including: Reactor coolant leak detection

RO Question #57

The plant is operating at 100% power with the following conditions:

- Both Containment Sump 'A' level indicating channels are inoperable.
- RM-10A/11/12 PUMP is inoperable
- V1590 CONTAINMENT AIR/PLANT VENT CROSS TIE ISOL cannot be opened
- PLANT VENT GASEOUS (R-14) OR PARTICULATE (R-13) MONITORS are aligned for normal operation
- Containment Condensate Collectors are operable

The following events occur:

- Annunciator C-19, CONTAINMENT SUMP A HI LEVEL is lit
- Annunciator C-18, CONTAINMENT SUMP A PUMP AUTO START, is NOT illuminated

WHICH ONE of the following is the MOST restrictive Tech Spec action required based on the given information?

- Restore particulate monitor R-11 within 1 hour
- Restore noble gas monitor R-12 within 1 hour
- Perform SR 3.4.13.1, RCS Operational LEAKAGE immediately
- Enter LCO 3.0.3 immediately

Answer: D

Explanation:

- A. Plausible, 1 hour requirement to verify R-11 operable is Tech Spec condition associated with Containment Isolation function of R-11.
- B. Plausible, 1 hour requirement to verify Noble Gas monitor operable is Tech Spec condition associated with Containment Isolation function of R-12.
- C. Plausible, with all leak detection inoperable, seems likely action, is a action with portions of the leak detection system inoperable.
- D. CORRECT, ITS 3.4.15 require 3 instrumentation systems for OPERABILITY, the conditions make all 3 INOPERABLE. Since all 3 channels INOPERABLE, ITS 3.4.15, F applies requiring entry into LCO 3.0.3.

Technical Reference(s): ITS 3.4.15 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R1001C 1.12, 1.13

Question Source: Bank/VISION # _____
 Modified Bank # 104887 (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 41.7
 55.43 _____

Justification for K/A Match:

The question matches the K/A by asking ITS 3.4.15 LCO required Leak Detection systems and knowledge of 1 hour of less Tech Specs.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	011 K5.11	_____
	Importance Rating	2.5	_____

Knowledge of the operational implications of the following concepts as they apply to the PZR LCS: Reasons for selecting "manual" on letdown control valve controller.

RO Question #58

Given the following:

- The plant is at 100% power
- Normal letdown was removed from service for maintenance

HOW would Pressurizer level be maintained (long term) with Normal Letdown secured:

- Adjust HCV-142, CHARGING FLOW TO REGENERATIVE HEAT EXCHANGER, to minimize Regenerative HX charging flow
- Manually open of HCV-133, RHR LETDOWN TO CVCS, to control Low Pressure Purification in flow
- Manually open HCV-123, EXCESS LETDOWN HX FLOW CONTROL VALVE and establish Excess Letdown
- Adjust valves 300A and 300B, SEAL INJ NEEDLE VLV TO RCP A/B, to minimize RCP Seal Injection

Answer: C

Explanation:

- A. Incorrect. Plausible because the candidate could associate PZR level control with adjustments in charging and Seal Injection flow. With an adjustment in the manually operated seal injection valves it could be plausible that PZR level would change. This is true except that with normal letdown removed from service, the PZR level will continue to rise, but at a different rate, until a letdown path has been restored. With normal letdown isolated, the Charging pumps would potentially be reduced to one pump operation and flow adjusted using speed control until normal or excess letdown can be restored, thus the candidate may associate charging flow adjustment with HCV-142.
- B. Incorrect. Plausible because HCV-133 is a component in excess letdown and is addressed by procedure S-3.2E, and if the candidate is not familiar with CVCS they may believe this to be correct to help control PZR level. Limiting in-flow to CVCS system by manually operating HCV-133 would be an option. The candidate will need to recognize that this valve would not normally be opened at power or for the conditions and thus makes this incorrect.
- C. CORRECT. With Normal Letdown out of service the excess letdown will need to be in placed service IAW S-3.2E to avoid overfilling the PZR due to the charging-letdown mismatch. Part of the lineup will require the operator to manually operate HCV-123 and establish excess letdown flow.
- D. Incorrect. Plausible because the candidate could associate PZR level control with adjustments in charging and Seal Injection flow. With an adjustment in the manually operated seal injection valves it could be plausible that PZR level would change. This is true except that with normal letdown removed from service, the PZR level will continue to rise, but at a different rate, until a letdown path has been restored.

Technical Reference(s): S-3.2E, UFSAR 9.3.4.2.2.1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R1901C 1.04, 1.08
R1601C 1.07.,1.08

Question Source: Bank/VISION # _____
Modified Bank # 61052 (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	<u>41.5</u>
	55.43	<u> </u>

Justification for K/A Match:

The question describes circumstances in which manual operation of the PZR level control system is required. Therefore a question on the reason for operating the Excess Letdown manual controller fits the K/A.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	014	K1.01
	Importance Rating	3.2	

Knowledge of the physical connections and/or cause effect relationships between the RPIS and the following systems: CRDS

RO Question: #59

Given the following:

- The plant was at 100% power
- A loss of off-site power and REACTOR TRIP occurred.
- The immediate actions of E-0, Reactor Trip or Safety Injection, and been directed by the CRS and completed by the control board operators.

Which ONE (1) of the following correctly describes the rod position indication (MRPI) the crew will observe?

- A. All MRPI indications are ZERO steps and blue;
All Group Step Counters are at 0 steps;
- B. All MRPI indications read ZERO steps and blue;
All Group Step Counters are at same value as prior to the trip;
- C. All MRPI indications are blank, replaced by "all control and shutdown rods on bottom" message;
All Group Step Counters are at 0 steps;
- D. All MRPI indications are blank, replaced by "all control and shutdown rods on bottom" message;
All Group Step Counters are at same value as prior to the trip;

Answer: B

Explanation (Optional):

- A. **Incorrect.** 1st part correct, 2nd part wrong, 3rd part wrong. This is incorrect because the Groups Step Counters are at the same position they were prior to the trip, and because the CRDMs are NOT energized. This is plausible because the operator may incorrectly believe that the GPIS signal comes from actual rod position indication, and that the CRDMs are energized to function.
- B. **Correct.** 1st part correct, 2nd part correct, 3rd part correct. According to Lesson Plan R3101C (p11, 16 & 23; Rev 23), MRPI is powered from MCC K which is powered off Bus14. This bus will be re-energized when the D/G starts and repowers the MCC. On a reactor trip the step counters will read the last demanded position, and MRPI indicates all control and shutdown rods on bottom. According to Lesson Plan R3001C (p37; Rev 26), when the reactor trip breakers open, power is lost to the CRDMs and the control rods will drop into the core.
- C. **Incorrect.** 1st part wrong, 2nd part wrong, 3rd part wrong. This is incorrect because MRPI will indicate that all rods are on the bottom, Groups Step Counters are at the same position they were prior to the trip, and because the CRDMs are NOT energized. This is plausible because the operator may incorrectly believe that MRPI is de-energized, the GPIS signal comes from actual rod position indication, and that the CRDMs are energized to function.
- D. **Incorrect.** 1st part wrong, 2nd part correct, 3rd part correct. This is incorrect because MRPI will indicate that all rods are on the bottom. This is plausible because the operator may incorrectly believe that MRPI is de-energized.

Technical Reference(s): Lesson Plan R3101C (p11, 22 & 23; Rev 19) (Attach if not previously provided)
E-0

Proposed References to be provided to applicants during examination: None

Learning Objective: R3101C, Obj 1.07 (As available)

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

Question History: Last NRC Exam: NA

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

10 CFR Part 55 Content: 55.41 6
55.43

Comments:

The KA is matched because the operator must demonstrate Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes, etc. In this case, the announcement is made to control a required plant specific-area evacuation. This situation arises from the fact that the Containment Evacuation Alarm is often disabled (inoperable until less than 200F). Consequently, A-3 requires that the Plant Evacuation Alarm be used, requiring the prior announcement to control the subsequent evacuation (i.e. don't want personnel outside Containment to evacuate).

The question is at the Memory cognitive level because the operator must recall bits of information (MRPI operation, GRPI Operation, CRDM Operation) in order to answer the question correctly.

What MUST be known:

1. How does the MPRI function on a reactor trip to indicate individual rod position?
2. How do the step counters operate on a reactor trip?
3. Are the CRDMs energize to function or de-energize to function?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	015 2.2.25	_____
	Importance Rating	3.2	_____

NIS: Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits

RO Question #60

WHICH ONE of the following describes how large AXIAL Xenon oscillations are prevented?

- A. Operators use the control rods to maintain the Axial Flux Difference (Delta-I) within a band, which will limit Xenon oscillations
- B. Operators monitor the Quadrant Power Tilt Ratio (QPTR) to verify it is within specification to prevent Xenon oscillations
- C. The calculation of the OPΔT setpoint include a factor based upon Delta-I which will prevent Xenon oscillations by initiating a reactor trip
- D. Xenon oscillations are prevented by the addition of natural uranium "blankets" at the top and bottom of the core

Answer: A

Explanation:

- A. CORRECT. Per the ITS Basis for LCO 3.2.3, Axial Flux Distribution, the purpose of the LCO is to establish limits on the values of the AFD in order to limit the amount of axial power distribution skewing to either the top or bottom of the core. By limiting the amount of power distribution skewing, core peaking factors are consistent with the assumptions used in the safety analyses. Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in axial power distribution control.
- B. Incorrect. Plausible because, per the ITS Basis for LCO 3.2.4, QPTR, limiting the QPTR prevents RADIAL xenon oscillations and will indicate any core asymmetries.
- C. Incorrect. Plausible because the OPΔT setpoint does include consideration of ΔI in the setpoint formula, but the value is set to zero (0).
- D. Incorrect. Plausible because the addition of enriched fuel at the top and bottom of the fuel assemblies is there for a reason (leakage considerations), but not to prevent xenon oscillations.

Technical Reference(s): ITS Bases 3.2.3, 3.2.4 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3301C 1.12

Question Source: Bank/VISION # 65570
 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 .2, .7
 55.43 _____

Justification for K/A Match:

Matches the K/A by requiring knowledge of the bases for LCOs relating to NIS role in preventing xenon oscillations to prevent exceeding core power distribution limits.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	016 K4.03	
	Importance Rating	2.8	

Knowledge of NNIS design features(s) and / or interlock(s) which provide for the following: Input to control systems

RO Question #61

The plant is operating at 98% power when a Reactor Trip occurs.

WHICH ONE of the following describes how the Main Feedwater Regulating Valves (FRVs) will respond to the reactor trip?

- A. If AVG Tavg is < 554°F, the FRVs will close
- B. If AVG Tavg increases to >554°F, the FRVs will not modulate but may be manually opened
- C. If AVG Tavg is < 554°F, the FRVs will modulate OPEN only on ADFCS level error
- D. If AVG Tavg is > 554°F, the FRVs will modulate CLOSED only on ADFCS flow error

Answer: A

Explanation:

- A. CORRECT. Post trip when Tavg is less than 554°F, the logic commands the FRVs to close.
- B. Plausible, AFDCS will control valve position on a reactor trip when Tavg > 554°F, but the valves do not "snap open".
- C. Plausible, AFDCS will control valve position when Tavg > 554°F. If Tavg is < 554°F, the FRV's do not respond to ADFCS demand signal.
- D. Plausible, FRV's respond to an AFDCS level error signal, not a flow error. Due to the reactor trip, S/G level will shrink and the valves will modulate open in response.

Technical Reference(s): P-1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R2001C 1.04, 1.07

Question Source: Bank/VISION # 67038
 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 41.7
 55.43 _____

Justification for K/A Match:

The question matches the K/A by requiring knowledge of the inter-relationship between RCS TEMP (NNIS) and Feed Water FRV control.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	034 K6.02	_____
	Importance Rating	2.6	_____

Knowledge of Knowledge of the effect of a loss or malfunction on the following will have on the Fuel Handling System: Radiation monitoring systems

RO Question #62

Given the following plant conditions:

- The plant is in Mode 6
- Refueling Activities are in progress in the Containment Building.
- Containment purge is in operation
- While performing Daily Checks it is noted that the sample pump for R-11, Containment Air Particulate Monitor, is not running.

WHICH ONE of the following statements is applicable to this condition?

- R-11 is OPERABLE and refueling activities may continue. The sample pump is not normally running when purge is in service supplying sample flow.
- R-11 is INOPERABLE and refueling activities may continue as long as R-10A, Containment Iodine Monitor is operable for Containment Vent Isolation
- R-11 is INOPERABLE and refueling activities must be stopped due to Containment Vent Isolation Instrumentation being inoperable
- R-11 is OPERABLE and refueling activities may continue. The Containment Air Particulate Monitor sample pump is only required for the RCS LEAK DETECTION function of the monitor

Answer: C

Explanation:

- A. Plausible, The piping arrangement of the sample lines from containment purge exhaust is pressurized to cause flow from containment to the atmosphere with a flowpath. to the R-11 monitor and the candidate can infer therefore that no sample pump is needed for sample flow. INCORRECT since the pump is required to be in operation per LCO 3.3.5, CVI Instrumentation therefore is not OPERABLE and refueling activities must be halted until R-11 is made operable.
- B. Plausible, See item distractor A plausibility. R-11 is inoperable and refueling cannot continue even if R-10A is operable. R-11 is required to be operable.
- C. CORRECT
- D. Plausible, See item distractor A plausibility and per ITS 3.4.15 is required for LCO compliance, however not applicable for the conditions given. R-11 inoperable makes the CVI instrumentation inoperable. The backup criticality monitoring is not lost when R-11 is inoperable

Technical Reference(s): ITS B3.3.5 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3701C 1.12, 1.13
RRF02C 5.0

Question Source: Bank/VISION # 63863
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2006 Ginna RO

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

10 CFR Part 55 Content: 55.41 41.7
55.43 _____

Justification for K/A Match:

The question matches the K/A by EVALUATION of operability of R-11, needed for a CORE ALTERATIONS

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	041	A1.01
	Importance Rating	2.9	

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SDS controls, including: T-ave., verification above low/low setpoint

RO Question #63

Given the following plant conditions:

- Plant startup in progress
- Turbine just placed on line holding at 55 MW
- The Steam Dump Mode Selector switch is in MANUAL, with HC-484 in AUTO.
- The First set of Steam Dump Valves is partially open
- PT-484, Main Steam Header Pressure, fails off-scale high.

Assuming no operator action,

(1) WHAT will be the status of steam dumps
and

(2) WILL RCS Tav_g stabilize above or below the required **RCS Minimum Temperature for Criticality?**

- A. (1) Steam Dumps will close
(2) RCS temperature rises to ARV setpoint above the required temperature for criticality
- B. (1) Steam Dumps open
(2) RCS temperature rapidly lowers until steam dumps start close at 547°F, RCS temperature will lower to 535°F, below the required temperature for criticality
- C. (1) Steam Dumps will close
(2) RCS temperature rises to SG safety setpoint above the required temperature for criticality
- D. (1) Steam Dumps open
(2) RCS temperature rapidly lowers until auto SI and Main Steam Line Isolation below the required temperature for criticality

Answer: D

Explanation:

- A. Incorrect: Failure of PT-484 will result in the Steam Dump opening fully. Plausible, since the trainee selecting the wrong effect of the PT-484 failure would make both parts of this distractor appear to be correct. If the Valves closed the S/G pressure would rise till the ARVs opened.
- B. Incorrect. With a PT-484 failure the Steam Dumps will not close at 547°F Plausible If the trainee doesn't understand that the Steam Dump are operating in Pressure Control Mode. The expected response would be that the SD open and remain open until the operator manually closes the valves
- C. Incorrect: Failure of PT-484 will result in the Steam Dump opening fully. Plausible, since the trainee selecting the wrong effect of the PT-484 failure would make both parts of this distractor appear to potentially be correct. If the Valves closed the S/G pressure would rise however it is expected that the ARV would .terminate the pressure rise
- D. CORRECT Failure of PT-484 will result in SD valve fully opening when in Pressure control mode. The temperature will lower until terminated by an SI signal and Steamline isolation. The temperature will lower below the MIN Temp for criticality prior to SI occurring.

Technical Reference(s): P-1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R4501C 1.10

Question Source: Bank/VISION # _____
 Modified Bank # 62410 (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 41.5
 55.43 _____

Justification for K/A Match:

The question matches the K/A by EVALUATION of steam dump status and RCS temp

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	071 A4.24	_____
	Importance Rating	2.9	_____

**Ability to manually operate and/or monitor in the control room:
The double verification required before waste gas release**

RO Question #64

Prior to the release of a Gas Decay Tank, in addition to the authorization by Shift Manager, Att. 1, Gaseous Waste Release Form must be authorized by (1) and the alarm set point of (2) monitor must be verified in the Control Room.

- A. (1) Chemistry Analyst
(2) R-10B, Plant Vent Iodine
- B. (1) Chemistry Supervision
(2) R-10B, Plant Vent Iodine
- C. (1) Chemistry Analyst
(2) R-14, Plant Vent Noble Gas
- D. (1) Chemistry Supervision
(2) R-14, Plant Vent Noble Gas

Answer: D

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	072 A2.01	_____
	Importance Rating	2.7	_____

Ability to (a) predict the impacts of the following malfunctions or operations on the ARM system- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Erratic or failed power supply

RO Question #65

Given the following conditions:

- Plant is in MODE 5.
- Irradiated Fuel movement is in progress in the Spent Fuel Pool
- E-24 RMS AREA MONITOR HIGH ACTIVITY, is in alarm
- R-5, Spent Fuel Pit loses power
- Operator have entered AR-RMS-5, R-5 Spent Fuel Pit

WHICH ONE of the following describes the impact on (1) Aux Building Ventilation Alignment and (2) Irradiated Fuel movement in the Spent Fuel Pool?

- A. (1) "C" Aux Bldg Exhaust Fan trips
(2) Immediately suspend Irradiated Fuel movement
- B. (1) No change in Aux Building Ventilation Alignment
(2) Immediately suspend Irradiated Fuel movement
- C. (1) "C" Aux Bldg Exhaust Fan trips
(2) Continue Irradiated Fuel movement.
- D. (1) No change in Aux Building Ventilation Alignment
(2) Continue Irradiated Fuel movement.

Answer: B

Explanation:

- A. Plausible, "C" Aux Bldg Exhaust Fan trips on high radiation on R-13/R-14. TRM TR 3.9.2 LCO A, requires immediate suspension of fuel movement.
- B. CORRECT.
- C. Plausible, "C" Aux Bldg Exhaust Fan trips on high radiation on R-13/R-14. TRM TR 3.9.2 LCO A, requires immediate suspension of fuel movement not continue and replace monitor. Once the monitor is replaced fuel movement can commence.
- D. Plausible, first part correct TRM TR 3.9.2 LCO A, requires immediate suspension of fuel movement not continue and replace monitor. Once the monitor is replaced fuel movement can commence.

Technical Reference(s): TRM 3.9.2, RF-8.4, (Attach if not previously provided)
 AR-RMS-5

Proposed references to be provided to applicants during examination: None

Learning Objective: R3901C 1.12

Question Source: Bank/VISION # _____
 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 41.5
 55.43 _____

Justification for K/A Match:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	2.1.8	
	Importance Rating	4.5	

Ability to coordinate personnel activities outside the control room.

RO Question #66

Given the following plant conditions:

- A station blackout has occurred
- The crew is performing actions of ECA-0.0, Loss of All AC Power
- Off-Site power has NOT been restored
- BOTH EDGs are tripped and have NOT been restarted
- SGs depressurization is in progress

WHICH ONE of the following actions may be taken to provide power to a safeguards bus, and the procedure used following the power restoration?

Direct an AO/Electrician(s) to align the TSC Diesel to power BUS_____.
The BUS _____ considered restored when power is aligned .

- A. 14; IS
- B. 14; IS NOT
- C. 16; IS
- D. 16; IS NOT

Answer: D

Explanation:

- A. Incorrect. Plausible if unsure of the electrical lineup since the TSC diesel is aligned to Bus 15 and then cross-tied to Bus 16.
- B. Incorrect. Plausible if unsure of the electrical lineup since the TSC diesel is aligned to Bus 15 and then cross-tied to Bus 16.
- C. Incorrect. Plausible if the NOTE in ECA-0.0 is not understood.
- D. Correct. Note prior to ECA-0.0, Step 27.

Technical Reference(s): ECA-0.0 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: REC00C 1.02
RER05C 1.02, 1.05

Question Source: Bank/VISION # 94754
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 _____

Justification for K/A Match:

Matches the K/A by requiring knowledge of the need for field personnel to take actions per an EOP.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	2.1.14	
	Importance Rating	3.1	

Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes, etc.

RO Question # 67

WHICH ONE of the following conditions would require the Control Room personnel to announce over the plant PA system that the plant evacuation alarm is applicable ONLY to personnel in CNMT, and then sound the Plant Evacuation Alarm?

- A. Area monitor R-2 containment at 6 mR/hr.
- B. A stuck fuel assembly during fuel movement.
- C. Shutdown count rate rises by a factor of three.
- D. R-11 containment atmosphere particulate at 130 cpm.

Answer: C

Explanation (Optional):

- A. **Incorrect.** This is incorrect because it does NOT meet a condition identified in Section 3.1 of A-3. This is plausible because the condition for evacuation and the site-wide announcement is unexpected radiation monitor alarms, and the operator may incorrectly believe that this is an unexpected reading on R-2. According to P-9 (p25; Rev 09900), the Warning alarm occurs at 30 mrem/hour and the High alarm occurs at 50 mrem/hour.
- B. **Incorrect.** This is incorrect because According to RF-601 (p10-11; Rev 00201), there is no need to evacuate the Containment simply for a Stuck Fuel Assembly. This is plausible because the operator might not know the criteria for evacuation during various stuck fuel assembly scenarios (i.e. high rads, increasing gas concentrations); and incorrectly believe that this condition presents a hazard to personnel within the Containment.
- C. **Correct.** According to AR-E-29 (p1; Rev 00702), if the SOURCE RANGE HI FLUX AT SHUTDOWN annunciator alarms, the operator will be directed to check the SR indication, and if the neutron flux is actually rising, then evacuate Containment. According to A-3 (p4; Rev 06800), Control Room personnel SHALL sound the Plant Evacuation Alarm if degraded conditions are noted, such as (1) Increasing RCS leakage, (2) Unexpected CNMT radiation monitor alarms, (3) Increasing gas, particulate or iodine concentrations, or (4) Any other condition which threatens personnel safety. Consequently, the Plant Evacuation Alarm should be sounded if the SR flux rises by a factor of 3. However, this procedure also states that prior to sounding the Plant Evacuation Alarm to evacuate the CNMT, Control Room personnel SHALL announce over the plant PA system that the plant evacuation alarm is applicable ONLY to personnel in CNMT. Consequently, under this condition, the Control Room crew must first announce over the plant PA system that the plant evacuation alarm is applicable ONLY to personnel in CNMT, and then sound the Plant Evacuation Alarm.
- D. **Incorrect.** This is incorrect because it does NOT meet a condition identified in Section 3.1 of A-3. This is plausible because the condition for evacuation and the site-wide announcement is unexpected radiation monitor alarms, and the operator may incorrectly believe that this is an unexpected reading on R-11. According to P-9 (p25; Rev 09900), the Warning alarm occurs at 1E4 cpm and the High alarm occurs at 2E4 cpm.

Technical Reference(s): AR-E-29 (p1; Rev 00702) (Attach if not previously provided)
 A-3 (p4; Rev 06800)

Proposed References to be provided to applicants during examination:

Learning Objective: RAD02C Obj. 1.010 (As available)

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

Question History:

Last NRC Exam: NA

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

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

The KA is matched because the operator must demonstrate Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes, etc. In this case, the announcement is made to control a required plant specific-area evacuation. This situation arises from the fact that the Containment Evacuation Alarm is often disabled (inoperable until less than 200F). Consequently, A-3 requires that the Plant Evacuation Alarm be used, requiring the prior announcement to control the subsequent evacuation (i.e. don't want personnel outside Containment to evacuate).

The question is at the Comprehension/Analysis cognitive level because the operator must recall bits of information (Criteria for Containment Evacuation), and then evaluate four conditions to determine if the criteria has been met, in order to answer the question correctly.

What MUST be known:
<ol style="list-style-type: none">1. What are the criterion for sounding the Plant Evacuation Alarm when operating within the requirements of A-3?2. Does the SR rising by a factor of three meet the criteria for evacuating Containment?3. Does R-2 rising 6 mrem/hour meet the criteria for evacuating Containment?4. Does a stuck fuel assembly during fuel movement meet the criteria for evacuating Containment?5. Does R-11 rising to 130 cpm meet the criteria for evacuating Containment?

Examination Outline Cross-reference:

Level

RO

SRO

Tier #

3

Group #

1

K/A #

2.1.26

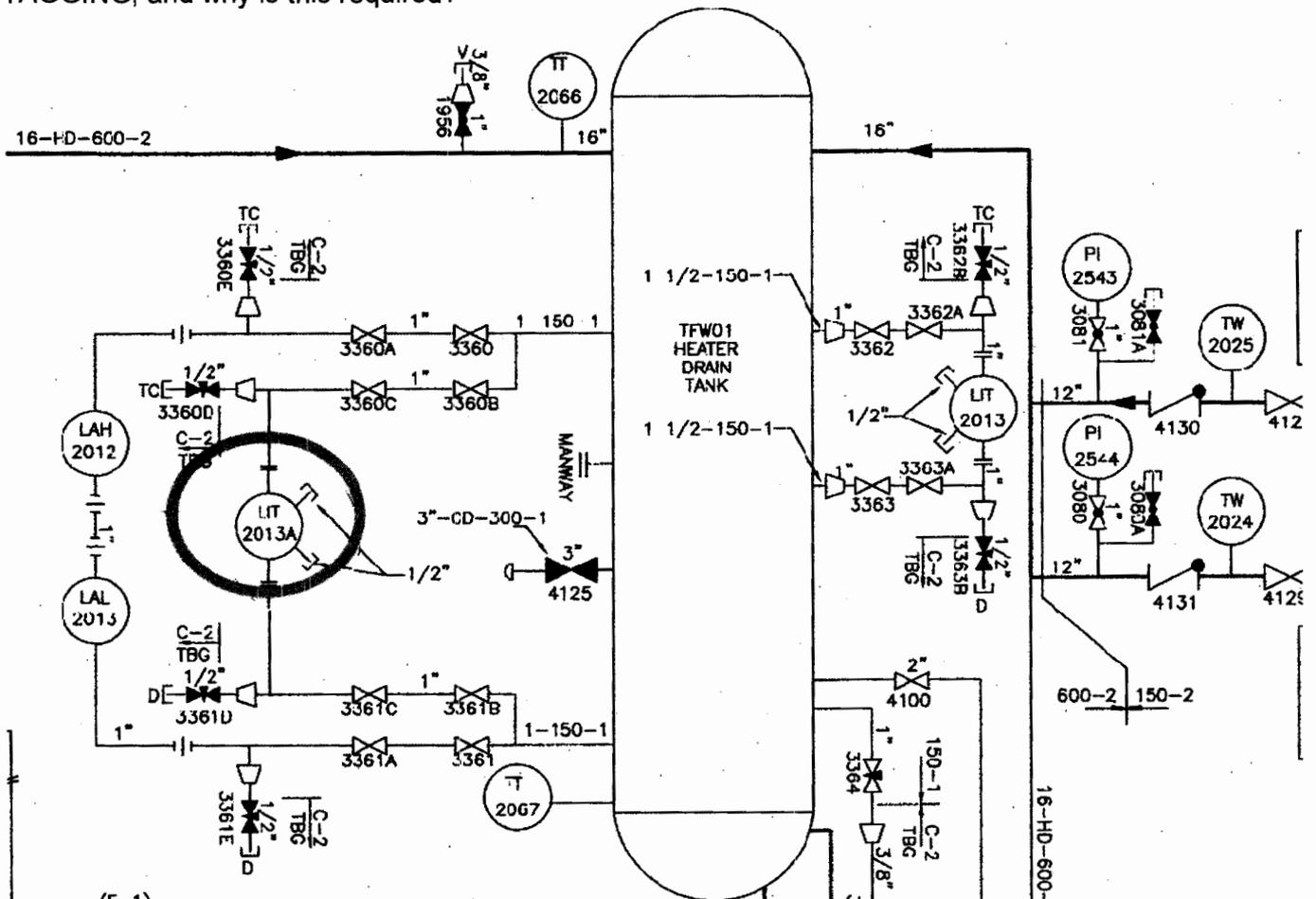
Importance Rating

3.4

Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and Hydrogen).

RO Question #68

Heater drain tank Level transmitter, LIT 2013A, is being tagged for on line maintenance. Which valves are the **minimum** valves required to be tagged by CNG -OP-1.01-1007, CLEARANCE AND SAFETY TAGGING, and why is this required?



- A. Valves 3360C and 3361C are required due to temperature $\geq 120^{\circ}\text{F}$.
- B. Valves 3360C and 3361C are required due to temperature $\geq 200^{\circ}\text{F}$.
- C. Valves 3360C, 3360B, 3361C and 3361B are required due to temperature $\geq 120^{\circ}\text{F}$.
- D. Valves 3360C, 3360B, 3361C and 3361B are required due to temperature $\geq 200^{\circ}\text{F}$.

Answer: D

Explanation:

- A. Incorrect. Plausible because single valve isolation is require when $\geq 120^{\circ}\text{F}$
- B. Incorrect. Plausible because single valve isolationis require when $\geq 120^{\circ}\text{F}$, double valve isolation is required $\geq 200^{\circ}\text{F}$. HDT temperature $\approx 350^{\circ}\text{F}$.
- C. Incorrect. Plausible because double valve isolation is required $\geq 200^{\circ}\text{F}$. Temperature Requirement wrong.,
- D. CORRECT

Technical Reference(s): CNG –OP-1.01-1007, (Attach if not previously provided)
 CLEARANCE AND SAFETY
 TAGGING,

Proposed references to be provided to applicants during examination: None

Learning Objective: RAD30C 3.07

Question Source: Bank/VISION # _____
 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 41.10
 55.43 _____

Justification for K/A Match:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	2	_____
	K/A #	2.2.37	_____
	Importance Rating	3.6	_____

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

RO Question #69

Given the following conditions:

- The plant is operating at 100% power
- A loss of DC Bus 'A' occurs

WHICH ONE of the following describes equipment that will be made INOPERABLE by this failure?

- A. "C" Containment Recirc Fan
- B. MOV-860D CS PUMP B DISCH VLV
- C. Turbine driven AFW pump
- D. Train 'A' SI Actuation Circuitry

Answer: D

Explanation:

- A. Incorrect. Plausible if the candidate does not recall the "C" Containment Recirc Fan are DC Bus 'B' components.
- B. Incorrect. Plausible because the candidate will have to recall which DC bus powers which 860 valve. For this event, 860C is rendered inoperable, but 860D is affected by DC Train 'B'.
- C. Incorrect. Plausible if the candidate does not recall which components are powered from which DC trains, and since there are components of the TDAFW pump powered from DC trains, they may believe this to be the correct answer by assuming that a loss of the DC bus makes the pump inoperable. If DC Bus 'B' was lost, the TDAFW pump discharge MOV would fail as-is, but Train 'A' does not affect TDAFW, and does not render the pump inoperable.
- D. CORRECT. DC Bus 'A' provides power to the Train 'A' SI actuation circuits.

Technical Reference(s): ER-ELEC.2 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RER07C 1.02, 2.01

Question Source: Bank/VISION # 94755
 Modified Bank # _____ (Note changes or attach parent)
 New _____

Question History: Last NRC Exam 2010 Ginna

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

10 CFR Part 55 Content: 55.41 .7
 55.43 _____

Justification for K/A Match:

Matches the K/A because the candidate must demonstrate knowledge of DC safety-related equipment power supplies, and base on equipment failures, demonstrate the ability to determine if the equipment is INOPERABLE.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	2	
	K/A #	2.2.41	
	Importance Rating	3.5	

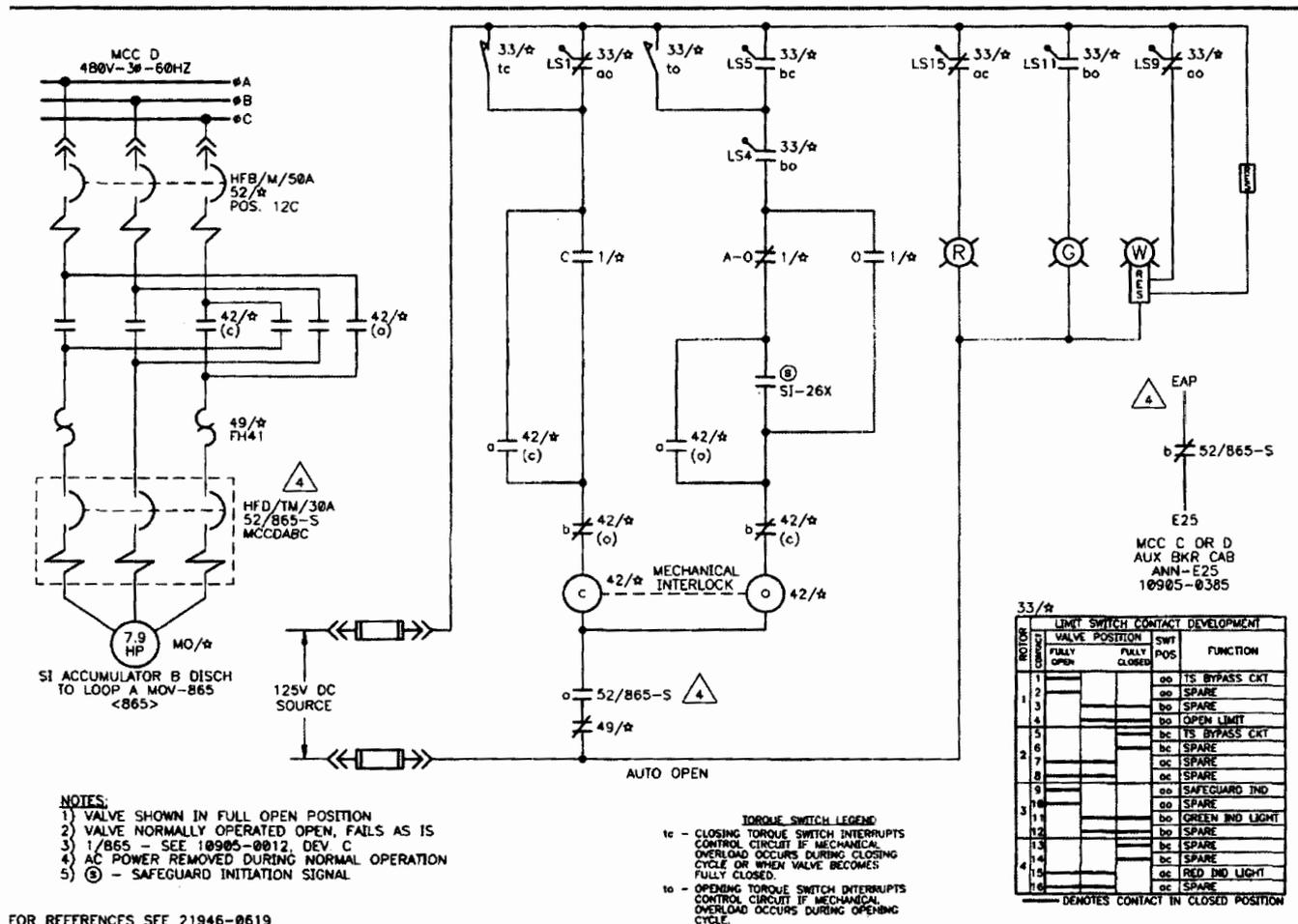
Ability to obtain and interpret station electrical and mechanical drawings.

RO Question #70

Given the following sequence of events:

- MOV-865, SI Accumulator B Dish to LOOP A, was full open
- The MCB switch for MOV-865 was placed in the CLOSE position and then released
- MOV-865 is stroking closed

Using the print, identify WHICH ONE of the following is the DESIGNED method to stop the valve when it is fully closed?



- A. LS1 opening
- B. 33/★ tc opening.
- C. 42/★ open "b" contact opening.
- D. 42/★ closed "a" contact opening.

Answer:

B

Explanation:

- A. Incorrect. Plausible if candidate believes that LS1 device opening and being in line is designed to stop valve movement by interrupting the current flow. This device opens when the closed limit switch is made up; ultimately the 33/★ tc device opens at a preset torque to stop valve movement and protect the valve seat from overtorquing.
- B. CORRECT. The 33/★ tc opening device will open by design on a preset torque value to prevent damage to the valve, thus interrupting current flow.
- C. Incorrect. Plausible if candidate does not understand how to use the print and may interpret that the 42/★ open “b” contact opening is designed to stop valve movement. This contact works with the mechanical interlock for controlling which direction the motor will turn corresponding to valve movement and is not designed to stop valve movement.
- D. Incorrect. Plausible if candidate does not understand how to use the print and may interpret that the 42/★ open “a” contact opening is designed to stop valve movement. This contact works with the mechanical interlock for controlling which direction the motor will turn corresponding to valve movement and is not designed to stop valve movement.

Technical Reference(s): 10905-0619 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: _____

Learning Objective: RO102C, 5.04

Question Source: Bank/VISION # 99876
 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 41.10
 55.43 _____

Justification for K/A Match: The KA is matched because the candidate must demonstrate the ability to read and interpret the symbols and legends of the electrical print to choose the correct answer.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	3	_____
	K/A #	2.3.7	_____
	Importance Rating	3.5	_____

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

RO Question #71

You are assigned to perform a valve alignment in the auxiliary building:

- You are signed in on RWP 14-6001.
- The highest General Area is 40 mrem/hour.
- The highest General Area contamination levels are, <500 dpm/100cm².

WHICH ONE of the following correctly completes the statement below?

To enter this area you _____ (1) _____ need to wear a full set of PCs, and you must exit the area if your Electronic Dosimeter indicates _____ (2) _____.

- A. (1) Will
(2) 16 mrem accumulated dose
- B. (1) Will
(2) The dose rate where you are standing is 300 mrem/hour
- C. (1) Will not
(2) 16 mrem accumulated dose
- D. (1) Will not
(2) The dose rate where you are standing is 300 mrem/hour

Answer: C

Explanation:

- A. Incorrect. 1st part wrong, 2nd part correct. This is incorrect because the RWP does not require the operator to wear PCs under the contamination levels indicated. This is plausible because if the accumulated dose was 15 mrem instead of 16 mrem, they would NOT have to leave.
- B. Incorrect. 1st part wrong, 2nd part wrong. See A and D.
- C. CORRECT. 1st part correct, 2nd part correct. According to RWP 14-6001, a worker must wear one full set of PCs for Contaminated work area, however, the same section specifically states that PCs are not required if the loose surface contamination levels are <500 dpm/cm². Additionally, according to RWP 14-6001, a worker must secure work and exit the area when the accumulated dose equals 80% of the dose alarm setting (20 mrem).
- D. Incorrect. 1st part correct, 2nd part wrong. This is incorrect because the RWP does not require the operator to leave the area under the postulated condition. This is plausible because if the dose rate were 350 mrem/hour (Enough to cause an alarm), rather than 300 mrem, they would have to leave.

Technical Reference(s): RWP 14-6001, RP-AA-1008 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: RWP 14-6001

Learning Objective: RRC03C 2.09

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

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 12
 55.43 _____

Justification for K/A Match:

The KA is matched because the operator must demonstrate the ability to comply with radiation work permit requirements during normal conditions. The operator must recognize that PCs are not required in areas < 500 dpm/100cm², and that they must back out of the area if they accumulate 80% of the allowable dose.

The question is at the Comprehension/Analysis cognitive level because the operator must evaluate the current and/or postulated conditions; and compare this to specific RWP requirements to answer the question correctly.

What MUST be known:

1. What is the requirement for wearing or not wearing PCs into the high radiation area under RWP 14-6001?
2. When operating under RWP 14-6001 does the operator need to leave area if they accumulate 16 mrem?
3. When operating under RWP 14-6001 does the operator need to leave area if they are located in an area where the dose rate is 300 mrem/hour?

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	3	_____
Group #	3	_____
K/A #	2.3.14	_____
Importance Rating	3.4	_____

Radiation Control: Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities

RO Question #72

Given the following:

- A Steam Generator Tube Rupture has occurred on S/G 'B'
- The crew has performed all actions of E-3, STEAM GENERATOR TUBE RUPTURE, up to the step to commence depressurization of the RCS

WHICH ONE of the following describes the action taken with 'B' S/G ARV, and the reason for this action?

- CLOSED with controller in Manual; prevent radioactive release to atmosphere
- CLOSED with controller in Manual; ensures minimum RCS subcooling will be maintained when RCS depressurization is initiated
- Set at 1050 psig with controller in AUTO; to prevent lift of S/G safety valve
- Set at 1050 psig with controller in AUTO; ensures minimum RCS subcooling will be maintained when RCS depressurization is initiated

Answer: C

Explanation:

- A. Incorrect. Plausible because it is logical to maintain valve closed but controller will not be in manual. Reason is correct
- B. Incorrect. Same reason as option A, and additionally, reason is plausible because if the ARV stuck open on a ruptured SG, the depressurization would also cause depressurization of the RCS. This would result in loss of RCS subcooling
- C. Correct
- D. Incorrect. Correct for status of valve, but reason is incorrect. Plausible because valve would be placed in manual and closed if it stuck open below 1160 psig, but this is not the reason that the valve is placed in AUTO. The remainder of the steps for SG isolation are correct for this reason

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

Proposed references to be provided to applicants during examination: NONE

Learning Objective: ROP03C 2.01

Question Source: Bank/VISION # WOLF CREEK 09
NRC

Modified Bank # _____ (Note changes or attach parent)

New _____

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 12
 55.43 _____

Justification for K/A Match:

The KA is matched because the operator must demonstrate knowledge of the actions taken in E-3. Such accidents provide a direct release path for contaminated primary coolant to the environment via the secondary side relief valves.

The question is at the Comprehension/Analysis cognitive level because the operator must evaluate the current and/or postulated conditions

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	2.4.5	
	Importance Rating	3.7	

Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions activities .

RO Question #73

An accident has occurred that has resulted in a reactor trip and safety injection:

- Prior to the trip, an AP was being used to address an abnormal condition.
- The CO is the coordinating the AP actions that were in use prior to the trip, at the CRS direction.
- A conflict has arisen between the EOP and the AP regarding an electrical lineup.

WHICH ONE of the following statements describes the correct method to resolve the conflict?

- A. Guidance in the AP must be followed since it was in effect at the time of the trip. Guidance in conflicting EOP will NOT be performed.
- B. Guidance in the EOP must be followed since it is the controlling procedure. Guidance in the conflicting AP will NOT be performed.
- C. The SM will, with the concurrence of the CO, decide which action is the most applicable for the situation.
- D. The SM, along with the STA, invoke 10CFR50.54(x) and perform the procedure most applicable for the situation.

Answer: B

Explanation: The SM, along with the STA, invoke 10CFR50.54(x) and perform the procedure most applicable for the situation.

- A. Plausible Candidate if candidate does not understand procedure hierarchy per A-503.1. Incorrect as the highest priority procedure will be the procedure in use per A-503.1 step 5.2.A.1
- B. Correct per A-503.1 step 5.2.A.6
- C. Plausible Candidate if candidate does not understand procedure deviation per A-503.1 step 5.3.A.2. Incorrect since EOP procedure guidance exists and can be applied in the prescribe sequence.
- D. Plausible if candidate does not understand requirement for 10CFR50.54X per A-503.1 step 5.2.A.4 Incorrect. 10CFR50.54X does not apply since EOP guidance does exist and EOPs takes precedence over actions specified in APs

Technical Reference(s): A-503.1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: NONE

Learning Objective: REP50C 1.02

Question Source: Bank/VISION # 64391
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 10
55.43 _____

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	4	_____
	K/A #	2.4.21	_____
	Importance Rating	4.0	_____

Emergency Procedures/Plan: Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.

RO Question #74

WHICH ONE of the following states the MINIMUM requirements necessary for an extreme challenge to the RCS Integrity Critical Safety Function?

A Red Path will exist on RCS Integrity if _____ lowered at least 100°F in the last hour and is/are less than 284°F.

- A. any CET has
- B. any Tcold has
- C. both Tcolds have
- D. the average of 10 CETs have

Answer: B

Explanation:

- A. Incorrect. This is incorrect because Tcold, not CETs, is considered when evaluating the challenge to the RCS Integrity Critical Safety Function; and because only one of the two loops is required to produce the Red Path condition. It is plausible because CET values are used frequently in the EOP network (e.g., subcooling calculation, SGTR cooldown).
- B. CORRECT. According to F-0.4 (p2; Rev 00400), to get to a Red Path condition the operator must answer "NO" to the question "Temperature Lowers in All RCS Cold Legs Less Than 100°F in the last 60 minutes." Therefore, if only one Tcold has lowered greater than 100°F, the Red Path condition is still under consideration. Then, the operator must answer "NO" to the question "All RCS Cold Leg Temperature Values Greater than 284°F." Consequently, if only one Tcold is less than or equal to 284°F, the Red Path condition will exist.
- C. Incorrect. This is incorrect because only one of the two loop Tcolds is required to produce the Red Path condition. It is plausible because the logic associated with the Red Path condition could be confusing.
- D. Incorrect. This is incorrect because Tcold, not Thot, is considered when evaluating the challenge to the RCS Integrity Critical Safety Function. It is plausible the "average of the 5 hottest CETs" is used when determining subcooling manually.

Technical Reference(s): F-0.4 (p2; Rev 00400) (Attach if not previously provided)

Proposed references to be provided to applicants during examination: _____

Learning Objective: FR-P.1 1.5

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

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 10
 55.43 _____

Justification for K/A Match:

The KA is matched because the operator must demonstrate knowledge of the parameters (Thot or Tcold) and logic (MINIMUM of one or two) used to assess the status of the reactor coolant system integrity safety function.

The question is at the Memory cognitive level because the operator must simply recall bits of information with respect to two issues to answer the question correctly.

What MUST be known:

1. What parameters must be considered when evaluating the RCS Integrity Critical Safety Function?
2. What is the logic necessary to determine that an extreme challenge exists to RCS Integrity?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	4	_____
	K/A #	2.4.41	_____
	Importance Rating	2.9	_____

Knowledge of the emergency action level thresholds and classifications

RO Question #75

Given the following plant conditions:

- The plant is in a 100/0 electric lineup on Circuit 767 due to maintenance on Circuit 7T
- The crew entered ER-SC.1, ADVERSE WEATHER PLAN, 2 hours ago due to sustained winds of 53 MPH
- An unidentified RCS leak initially estimated at 2 GPM has been evident for 1 hr. The crew is implementing AP-RCS.1
- You are performing the duties of the HCO and have the Monitoring function

WHICH ONE of the following events would require that the Shift Manager, assuming the role of Emergency Director, declare an ALERT condition?

- A. Circuit 767 is suddenly lost and the 'A' EDG has failed to load onto either Bus 14 or Bus 18. Energy Control Center reports the cause and duration of 767 loss is unknown at this time.
- B. A main control board annunciator test reveals that Annunciator Panels 'C' and 'D' are completely de-energized
- C. Security reports a waterspout NE of the plant, approximately 3 miles offshore
- D. With letdown isolated, you estimate the RCS leakrate is now at 6 GPM

Answer: A

Explanation:

- A. CORRECT. The loss of offsite power was a UE per SU1.1, but the failure of 'A' EDG to power its safeguards busses escalates the classification to an ALERT per SA1.1..
- B. Incorrect. Plausible because it would seem that the loss of two critical (including the Reactor First Out) panels would require a declaration of an event, but SU5.1 would be an Unusual Event only if 6 or more panels in Table S-2 are affected.
- C. Incorrect. Plausible because with entry into ER-SC.1 due to high winds, and possible consideration of the waterspout being classified as a tornado, the tornado would have to touch down and cause damage within the Table H-1 Safe Shutdown Areas to be classified as an Alert.
- D. Incorrect. The original unidentified leakrate of 2 gpm did not meet a classification threshold, but the rise to 12 gpm exceeds the threshold for unidentified leakage > 10 gpm and would be declared an Unusual Event per SU8.1.

Technical Reference(s): EAL Wallchart (Attach if not previously provided)

Proposed references to be provided to applicants during examination: EAL Wallchart

Learning Objective: RSC02, Obj. 3.00

Question Source: Bank/VISION # _____
 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 _____

Justification for K/A Match:

Matches the K/A by requiring basic entry level and parameter-related (RCS leakage) EAL classification knowledge using job-specific conditions.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	015 2.1.20	
	Importance Rating		4.6

RCP Malfunctions: Ability to interpret and execute procedural steps

SRO Question #76

Given the following plant conditions:

- The plant is at 20% power
- The crew has just entered AP-RCP.1, RCP SEAL MALFUNCTION
- B-17, RCP 1A No.1 SEAL HI-LO FLOW 5.0 GPM 1.0 GPM, is received
- 'A' RCP labyrinth seal D/P is lowering
- B-9, RCP 1A LABYR SEAL LO DIFF PRESS 15" H2O, is received
- The HCO reports that RCP 'A' seal flow is 8.2 GPM and slowly rising
- No.1 seal inlet and outlet temperatures are rising

WHICH ONE of the following describes the required procedural flowpath which will mitigate the conditions described?

- A. Utilize O-2.1, NORMAL SHUTDOWN TO HOT SHUTDOWN, to perform a controlled plant shutdown and secure the 'A' RCP within 8 hrs
- B. Per AR-B-9, continue to monitor 'A' RCP using ATT-15.1, ATTACHMENT RCP DIAGNOSTICS, and refer to S-2.1, RCP OPERATION, to determine when a reactor trip is required
- C. Per AP-RCP.1, trip 'A' RCP, Transition to AP-RCS.2, LOSS OF RCS FLOW.
- D. Per AP-RCP.1, trip the reactor, perform the immediate actions of E-0, then trip 'A' RCP. Transition to E-0 Reactor trip or Safety Injection while completing actions in AP-RCP.1.

Answer: D

Explanation:

- A. Incorrect. Plausible because this is the required action for No.1 seal failure with total seal flow *less than* 6.0 GPM.
- B. Incorrect. Plausible because ATT-15.1 is the attachment used for RCP seal failure diagnosis and S-2.1 does contain threshold setpoints for RCP seal parameters, but the SRO should be able to identify the symptoms of No.1 seal failure which require an immediate reactor trip.
- C. Incorrect. Plausible because a reactor trip is will not automatically occur, AP-RCS.2 actions require will also require a reactor trip, however AP-RCP.1, will require actions to trip the reactor.
- D. CORRECT. The given conditions provides multiple symptoms of a significant failure of No.1 seal. Candidate should know that AP-RCP.1 requires a reactor trip, RCP trip, and isolation of seal leakoff within 4 minutes if the Total No.1 seal flow exceeds 8.0 GPM. The NOTE prior to Step 1 directs that if a reactor trip is initiated, the transition to E-0 should occur while completing subsequent actions of Step 1.

Technical Reference(s): AP-RCP.1, AR-B-9 Rev 10, (Attach if not previously provided)
 AR-B-17 rev 12, ATT.15.1
 Rev 3, FIG-4.0 Rev 2

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP14C, 2.02

Question Source: Bank/VISION # _____
 Modified Bank # 105685 (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 _____
 55.43 .5

Justification for K/A Match:

Matches K/A by requiring recognition of degraded RCP seal conditions which require a reactor trip and immediate securing of affected RCP.

The question is SRO-ONLY because it cannot be answered solely by knowing system knowledge, immediate operator actions, plant parameters that require direct entry into EOPs, or knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure; AND requires the operator to assess plant conditions and then select a procedure or section of a procedure to mitigate, recover, or with which to proceed.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	022 2.4.50	
	Importance Rating	_____	4.0

Loss of Reactor Coolant Makeup: Ability to verify system setpoints and operate controls identified in the alarm response manual

SRO Question #77

Given the following plant conditions:

- The plant is operating at 100% power
- LI-112, VCT level has failed HIGH
- A-2, VCT LEVEL 14 % 86, is lit
- A-10, VCT PRESSURE 15 PSIG 65, is lit
- FI-128B and FI-128C, Charging Line Flows, are oscillating
- PI-128, Charging Pump Disch Press, is erratic
- PRZR level is 56% and slowly lowering

WHICH ONE of the following correctly completes the statement below?

MCB Annunciator A-2 illuminated when ____ (1) _____. The CRS will direct the following actions ____ (2) _____.

- A. (1) actual VCT level is >86%
(2) place LCV-112A VCT OR HOLDUP TANK DIVERT VALVE to "HUT" position to reduce VCT level, ensure RMW mode selector switch in AUTO
- B. (1) actual VCT level is < 14%
(2) isolate all letdown, stop all Charging Pumps
- C. (1) actual VCT level is >86%
(2) ensure proper H₂ regulator operation, open AOV-258 to control VCT pressure 22-25 psig.
- D. (1) actual VCT level is < 14%
(2) place LCV-112A in the "VCT" position, Ensure RMW mode selector switch in AUTO

Answer:

B

Explanation:

- A. **Incorrect.** 1st part wrong. 2nd part correct if level was actually high. This is incorrect because LT-112 failing high causes the level divert valve to open based on high level. This is plausible because the operator may incorrectly believe that it does not.. Actions in 2nd part would be correct IAW AR-A-2 if level were high
- B. **Correct.** 1st part correct. 2nd part correct. According to P-3 (p25; Rev 03102) when LT-112 fails HIGH, Letdown Divert Valve (LCV-112A) will divert Letdown to the Waste System. At the same time, Auto Makeup will not function because LT-112 is 100%. isolate all letdown, stop all Charging Pumps then go to AP-CVCS. All given symptoms are diverse indications of gas intrusion and/or cavitation on the Charging pumps, and the actions given are as directed by AR-A-2 and AP-CVCS.3, LOSS OF ALL CHARGING
- C. **Incorrect.** 1st part incorrect. 2nd part incorrect .This is incorrect because LT-112 failing high causes the level divert valve to open based on high level. This is plausible because the operator may incorrectly believe that it does not. The high level would possibly cause a corresponding high pressure condition which is addressed by AR-A-10 which would direct action to adjust pressure using AOV-258..
- D. **Incorrect.** 1st part correct. 2nd part wrong. See A and C.

Technical Reference(s): P-3 (p25; Rev 03102) (Attach if not previously provided)
AR-A-2 (p1, Rev 01100), AR-A-10 (Rev 00901)

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP31C 2.01

Question Source: Bank/VISION # _____
 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
55.43 5

Justification for K/A Match:

The KA is matched because the operator must demonstrate the ability, during a Loss of Reactor Coolant Makeup (i.e. Charging flow), to verify system alarm setpoints (The alarm is a common hi/low alarm and the operator must decide upon which condition is the source of the alarm) and operate controls identified in the alarm response manual (The Charging Pumps are directed to be stopped in the AR, and will be vented and restarted in the AP).

The question is at the Comprehension/Analysis cognitive level because the operator must recall bits of information (Source of A-2) and then use this information to predict an outcome (i.e. Cause of A-2 in alarm), in order to answer the question correctly.

The question is SRO-ONLY because it cannot be answered solely by knowing system knowledge, immediate operator actions, plant parameters that require direct entry into EOPs, or knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure; AND requires the operator to assess plant conditions and then select a procedure or section of a procedure to mitigate, recover, or with which to proceed.

What MUST be known:

1. How does VCT level respond when LT-112 fails high?
2. What is the source of A-2 going into alarm?
3. What VCT level condition is causing the A-2 alarm under the current plant conditions?
4. What procedure is used by the CRS to vent and restart the Charging Pumps after they have become airborne?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	027 G2.4.31	
	Importance Rating		4.1

**Pressurizer Pressure Control System (PZR PCS) Malfunction:
Knowledge of annunciator alarms, indications, or response
procedures.**

SRO Question # 78

Given the following plant conditions:

- The plant is in Mode 4
- Both 'A' and 'B' RHR Systems are in service
- RCS Temperature is 250°F
- RCS pressure is 320 psig

Subsequently:

- A transient occurs and RCS pressure starts to rise
- At 410 psig RCS pressure lowered rapidly to 340 psig
- After this, the transient subsides and RCS pressure stabilizes at 340 psig
- The HCO reports that PRZR PORV PCV-431C did NOT automatically open during this transient
- F-19, PRZR PORV HI TEMP 145°F Actuates

WHICH ONE of the following identifies the required ACTION?

- A. Declare PCV-431C inoperable per Tech Spec 3.4.11 PORVs
- B. Declare BOTH PCV-430 AND PCV-431C inoperable per Tech Spec 3.4.12 LTOP
- C. Declare PCV-431C inoperable AND close MOV-515 per Tech Spec 3.4.11 PORVs
- D. Declare PORV-431C inoperable per Tech Spec 3.4.12 LTOP AND verify that PORV-430 is CLOSED

Answer: D

Explanation:

- A. Incorrect. Plausible because this represents the a correct action taken by ITS 3.4.11, PORV.
- B. Incorrect. This is plausible if the candidate believes that PORV-430 opened at an incorrect pressure and because 431C failed to open.
- C. Incorrect. Plausible because this represents the correct action taken by ITS 3.4.11, PORV actuation which is not applicable in this Mode.
- D. CORRECT. Per TS 3.4.12 PORV-431C is inoperable. Given indications are that RCS pressure has exceeded the LTOP relief actuation setpoint. The alarm response procedure for AR-AA-22, 23, & 31 has the operator verify that at least one PORV has actuated (opened and closed) as appropriate if overpressure protection is required to be Operable and RCS pressure has exceeded 410 psig.

Technical Reference(s): TS LCO 3.4.12 (p3.4.12-1; Amendment 88); PTLR (pPTLR-3 of 16; Rev 6); (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
 Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
 55.43 2

Comments:

The KA is matched because the operator must demonstrate knowledge of Knowledge of response procedures (i.e. TS Actions) associated with a PPCS Malfunction (i.e. PORVs did NOT open when required in LTOP).

The question is at the Comprehension/Analysis level cognitive level because the operator must recall bits of information (TS LCO 3.4.12 operability requirements in Mode 4, PTLR PORV Setpoints in LTOP Mode) and then use this information to predict an outcome (i.e. Are the PRZR PORVs Operable, TS Action Required based on Operable), in order to answer the question correctly.

The question is SRO-ONLY because it cannot be answered solely by knowing \leq 1 hour TS/TRM action statements, the LCO information listed "above the line," or by knowing the TS Safety Limits; AND requires the operator to demonstrate knowledge of the TS basis that is required to analyze TS required actions and terminology (When Two PORVs inoperable in LTOP Mode Action G is required (electrically inhibit one Charging Pump and establish vented RCS)).

What MUST be known:

1. What are the Mode4 Operability Requirements for the PRZR PORVs?
2. What is the PTLR setpoint for the PRZR PORVs when operating in LTOP Mode?
3. Under the current plant conditions are the PRZR PORVs OPERABLE?
4. Under the current plant conditions, what TS Action is required?

Examination Outline Cross-reference:

Level

RO

SRO

Tier #

1

Group #

1

K/A #

029 EA2.06

Importance Rating

3.9

Ability to determine or interpret the following as they apply to an ATWS: Main turbine trip switch position indication

SRO Question #79

Given the following plant conditions:

- Due to an ATWS the crew has entered FR-S.1, Response to Reactor Restart/ATWS.
- The HCO is manually inserting control rods.
- The CO is currently at the step 4, initiating boration of the RCS.
- Main turbine EHC display currently is as shown below:

EH VALVE STATUS					
CVL-3 OPEN					
CVL-2 CLOSED	CVL-4 CLOSED		CVR-1 CLOSED	CVR-2 CLOSED	
	SVL CVR IN TEST CLOSED	CVL TEST OPEN	SVP OPEN	BVR CVR IN TEST CLOSED	CVR TEST OPEN
			SVP CLOSED		
#1 ARV IV TEST	#1 BRV OPEN	#1 AVR OPEN	#1 BRV IV TEST	#1 BRV OPEN	#1 BRV OPEN
	#1 BRV CLOSED	#1 AVR CLOSED		#1 BRV CLOSED	#1 BRV CLOSED
#2 ARV IV TEST	#2 BRV OPEN	#2 AVR OPEN	#2 BRV IV TEST	#2 BRV OPEN	#2 BRV OPEN
	#2 BRV CLOSED	#2 AVR CLOSED		#2 BRV CLOSED	#2 BRV CLOSED

WHICH ONE of the following identifies the expected status of the MSIVs, AND identifies how the CRS would proceed if an subsequent SI were to occur?

The MSIVs are.....

- A. OPEN;
The CRS will simultaneously perform Steps 3-7 of E-0 with FR-S.1, and start at E-0 step 8 when FR-S.1 directs that the operator return to procedure step in effect.
- B. OPEN;
The CRS will continue in FR-S.1, and when the HCO reports that the intermediate range startup rate is negative, transition back to Step 1 of E-0 to verify the SI response.

C. CLOSED;

The CRS will simultaneously perform Steps 3-7 of E-0 with FR-S.1, and start at E-0 step 8 when FR-S.1 directs that the operator return to procedure step in effect.

D. CLOSED;

The CRS will continue in FR-S.1, and when the HCO reports that the intermediate range startup rate is negative, transition back to Step 1 of E-0 to verify the SI response.

Answer: C

Explanation:

- A. **Incorrect.** 1st part wrong. 2nd part correct. This is incorrect because the MSIVs would not be OPEN with the current EHC display. This is plausible because during the event the valves will be open and closed at different times.
- B. **Incorrect.** 1st part wrong. 2nd part wrong. See A and D.
- C. **Correct.** 1st part correct. 2nd part correct. According to FR-S.1 (p3; Rev 02000) Step 2, the operator will be directed to check the Turbine stop valves closed. If the stop valves are NOT closed, the operator will be directed to trip the turbine. If the turbine will NOT trip, the operator will be directed to close the MSIVs. Under the current conditions, Step 2 is in the past. The EHC Panel shows that the Turbine Stop valves are not closed, and they were not closed when directed by the Step 2 RNO. Consequently, the MSIVs would have been closed. According to A503.1 (p21; Rev 04409), if an SI occurs, coincident with ATWS, E-0 step 1 transitions to FR-S.1 and as directed by FR-S.1, E-0 steps 3 through 7 are completed. When FR-S.1 directs to return to procedure and step in effect E-0 shall be re-entered at the step in effect (step 8 in this example, since steps 1 through 7 have been completed).
- D. **Incorrect.** 1st part correct. 2nd part wrong. This is incorrect because the Steps 3-7 of E-0 will be performed simultaneously with FR-S.1, and when the reactor is shutdown the CRS will go to Step 8 of E-0. This is plausible because the operator may incorrectly believe that because of the extreme challenge to the Subcriticality CSFST, no procedures may be performed simultaneously with FR-S.1.

Technical Reference(s): E-0 (Rev 4602), FR-S.1 (p3; Rev 02000) (Attach if not previously provided)
 A503.1 (p21; Rev 04409)

Proposed references to be provided to applicants during examination: None

Learning Objective: R4901C 4.07;

Question Source: Bank/VISION # _____
 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 _____
 55.43 5

Justification for K/A Match:

The KA is matched because the operator must demonstrate the ability to interpret the Main turbine trip switch position indication as it applies to an ATW. The facility uses a pushbutton for the turbine trip function. The intent of the KA is met by showing the operator a current display of the Turbine Control Panel and then asking a question about subsequent actions after an interpretation of the EHC Display is made (i.e. Turbine is NOT tripped).

The question is at the Comprehension/Analysis cognitive level because the operator must recall bits of information (indications of Turb Trip, rules of EOP usage applicable to simultaneous SI/ATWS) and then use this information to predict an outcome (i.e. condition of the MSIVs), in order to answer the question correctly.

The question is SRO-ONLY because it cannot be answered solely by knowing system knowledge, immediate operator actions, plant parameters that require direct entry into EOPs, or knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure; AND requires the operator to assess plant conditions and then select a procedure or section of a procedure to mitigate, recover, or with which to proceed, and demonstrate knowledge of administrative procedures that specify hierarchy, implementation, and/or coordination of plant normal, abnormal and emergency procedures.

What MUST be known:

1. What are the EHC indications of a tripped Turbine?
2. Under the current display is the Turbine tripped?
3. If the Turbine is NOT tripped at Step 4 of FR-S.1, what is the status of the MSIVs?
4. When operating in FR-S.1 and an SI occurs how does the CRS implement the FR-S.1/E-0 connection?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	WE12 EA2.02	
	Importance Rating		3.9

Ability to determine and interpret the following as they apply to the Uncontrolled Depressurization of all S/Gs: Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments

SRO Question #80

Given the following initial plant conditions:

- A main steamline break (MSLB) occurred in the Turbine Building
- Both MSIVs failed to close and Main Control Room attempt to close them was unsuccessful
- The crew entered ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF BOTH STEAM GENERATORS

Current plant conditions:

- RCS temperature has lowered from 547°F to 422°F within the last hour
- S/G NR levels are both offscale low
- The crew has taken the appropriate action for controlling AFW flow
- The crew is at Step 5, "Check Secondary Radiation Levels – NORMAL" of ECA-2.1
- The secondary AO reports that he has successfully closed the 'A' MSIV locally
- 'A' S/G pressure is 500 PSIG and rising

WHICH ONE of the following describes the proper value of AFW flow at THIS time, AND when the transition to the appropriate procedure should occur?

- AFW flow is 50 GPM per S/G; remain in ECA-2.1 until SI is terminated, then transition to E-1, LOSS OF REACTOR OR SECONDARY COOLANT
- AFW flow is 50 GPM per S/G; transition to E-2, FAULTED S/G ISOLATION, upon observing the pressure rise in 'A' S/G
- AFW flow is a minimum of 200 GPM; remain in ECA-2.1 until SI is terminated, then transition to E-1, LOSS OF REACTOR OR SECONDARY COOLANT
- AFW flow is a minimum of 200 GPM; transition to E-2, FAULTED S/G ISOLATION, upon observing the pressure rise in 'A' S/G

Answer:

B

Explanation:

- A. Incorrect. Plausible because the AFW flow amount is correct in part one, and part two would be correct if the crew was making the normal exit transition from E-2 without a SGTR in progress.
- B. CORRECT. AFW flow is throttled to 50 GPM in Step 2 of ECA-2.1, and part 2 is correct per the FOLDOUT page direction to transition back to E-2 when pressure begins to rise in either S/G (unless actually performing the SI termination steps of ECA-2.1 when the pressure rise is noted.)
- C. Incorrect. Plausible if the candidate believes that the "normal" value of AFW flow found in most of the EOPs still must be maintained until S/G levels have been returned to the narrow range and if the crew was making the normal exit transition from E-2 without a SGTR in progress.
- D. Incorrect. Plausible if the candidate believes that the "normal" value of AFW flow found in most of the EOPs still must be maintained until S/G levels have been returned to the narrow range and because part two is correct.

Technical Reference(s): ECA-2.1 FOLDOUT (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: REC21C 1.03

Question Source: Bank/VISION # 108550
 Modified Bank # _____ (Note changes or attach parent)
 New _____

Question History: Last NRC Exam Ginna 2007

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

10 CFR Part 55 Content: 55.41 _____
 55.43 .5

Justification for K/A Match:

Matches the K/A by assessing plant conditions and implementing procedural FOLDOUT page transition to another EOP.

The question is SRO-ONLY because it cannot be answered solely by knowing system knowledge, immediate operator actions, plant parameters that require direct entry into EOPs, or knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure; AND requires the operator to assess plant conditions and then select a procedure or section of a procedure to mitigate, recover, or with which to proceed.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	058 A2.02	_____
	Importance Rating	_____	3.6

Ability to determine and interpret the following as they apply to the Loss of DC Power: 125 VDC bus voltage, low/critical low, alarm

SRO Question #81

Given the following:

- Plant is at 3% power
- the following alarms are lit:
 - J-21, 1A OR 1B BATTERY UNDERVOLTAGE
 - J-31, VITAL BATTERY MONITORING SYSTEM
- DC Bus 'A' voltmeter on MCB reads 108 VDC
- Battery 'A' Discharge rate is 80 amps

WHICH ONE of the following would complete the statements?

(1) DC Train 'A' is _____.

(2) _____ DC train(s) is/are required to be OPERABLE

- A. (1) OPERABLE
(2) One
- B. (1) OPERABLE
(2) Two
- C. (1) INOPERABLE
(2) One
- D. (1) INOPERABLE
(2) Two

Answer: D

Explanation:

- A. Incorrect. Plausible because if the candidate does not recall the voltage for operability of 108.6vDC, may incorrectly assume that the battery is operable.. In part 2 the power level is at 3% power level or MODE 2. The candidate may assume that this is a MODE that only one train is required to be operable.
- B. Incorrect. Plausible because if the candidate does not recall the voltage for operability of 108.6vDC, may incorrectly assume that the battery is operable The required number of DC trains to be OPERABLE in MODES 1-4 is two trains, which is the correct answer since the information given is 3% power.
- C. Incorrect. Plausible The Battery is Inoperable when voltage is <108.6 volts. The alarms J-21 and 31 are consistent with voltage problems. In part 2 the power level is at 3% power or MODE 2. The candidate may assume that this is a MODE that only one train is required to be operable.
- D. Correct. The Battery is Inoperable when voltage is <108.6 volts. The alarms J-21 and 31 are consistent with voltage problems. The 2nd part is correct for the current plant power level 3% (MODE 2) is correct.

Technical Reference(s): AR-J-15, AR-J-21, AR-J-31, (Attach if not previously provided)
 P-12

 ITS-3.8.4 Basis

Proposed references to be provided to applicants during examination: None

Learning Objective: RER07C 1.02

Question Source: Bank/VISION # _____
 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, 5

Justification for K/A Match:

Matches the K/A by requiring knowledge of the significance of a low voltage alarm associated with 125VDC bus voltage.

SRO-only because it requires knowledge of the significance of a low DC Bus voltage, which has potential technical specification implications.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	036 AA2.02	
	Importance Rating		4.1

Ability to determine and interpret the following as they apply to Fuel Handling Incidents: Occurrence of a fuel handling incident

SRO Question #82

Given the following plant conditions:

- The plant is in Mode 6 with fuel offload in progress
- A Fuel Assembly has been partially withdrawn from the core when the refueling machine gripper fails causing the assembly to fall back into the core.
- The refueling bridge SRO reports bubbles rising from the mechanically distorted assembly
- R-2, CONTAINMENT is in alarm
- R-10A, CONTAINMENT VENT IODINE, and R-12, CONTAINMENT VENT GAS, are rising
- Containment has been evacuated, Closure of at Personnel Air Lock Door, and closure of the Equipment Hatch opening in progress.

WHICH ONE of the following describes: (1) the actions to be taken in response to the dropped assembly by the control room operators, and (2) which procedure(s) will provide the detailed guidance?

- A. (1) CLASSIFY the Event per EPIP-1-0;
(2) RF-601, FUEL HANDLING ACCIDENT INSTRUCTIONS, ONLY
- B. (1) DIRECT Installation of the SFP Weir Gate;
(2) RF-601, FUEL HANDLING ACCIDENT INSTRUCTIONS AND EPIP-1-13 LOCAL RADIATION EMERGENCY
- C. (1) DIRECT Installation of the SFP Weir Gate;
(2) RF-601, FUEL HANDLING ACCIDENT INSTRUCTIONS, ONLY
- D. (1) CLASSIFY the Event per EPIP-1-0;
(2) RF-601, FUEL HANDLING ACCIDENT INSTRUCTIONS AND EPIP-1-13 LOCAL RADIATION EMERGENCY

Answer:

D

Explanation:

- A. Incorrect. Plausible Part (1) is correct RF-601 directs evacuation of CNMT, closure of Personnel Air Lock Doors and the Equipment Hatch Opening. EPIP-1-13 directs that the Event be Classified per EPIP-1-0 (Event is an Alert RA2.1) Therefore Part (2) is incorrect since both procedures are required to be performed. Also neither RF-601 nor EPIP-1-13 directs installation of the SFP Weir Gate.
- B. Incorrect. Plausible because if the examinee doesn't know that EPIP-1-13 requires a evaluation of EPIP-1-0 Classifications.
- C. Incorrect. Plausible because if the examinee doesn't know that EPIP-1-13 requires a evaluation of EPIP-1-0 Classifications. Part (2) is incorrect since both procedures are required to be performed. Also neither RF-601 nor EPIP-1-13 directs installation of the SFP Weir Gate.
- D. CORRECT. Part (1) is correct RF-601 directs evacuation of CNMT, closure of Personnel Air Lock Doors and the Equipment Hatch Opening. EPIP-1-13 directs that the Event be Classified per EPIP-1-0 (Event is an Alert RA2.1). Part 2 is the list of the required procedures.

Technical Reference(s): RF-601, ATT.1 (Attach if not previously provided)
EPIP-1-13
EPIP-1-0

Proposed references to be provided to applicants during examination: None

Learning Objective: R3701C;

Question Source: Bank/VISION # _____
 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 _____
 55.43 .7

Justification for K/A Match:

Matches the K/A by requiring recognition of the symptoms of a damaged fuel assembly during removal and determining the appropriate action using the applicable procedure.

The question is SRO-ONLY because it deals directly with Containment SRO (i.e. Refuel floor SRO) responsibilities during Refueling, which are not shared by the RO, specifically Refuel SRO floor responsibilities.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	2
	K/A #	E16 A2.01	_____
	Importance Rating	_____	3.3

Ability to determine and interpret the following as they apply to the High Containment Radiation: Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

SRO Question #83

Given the following plant conditions:

- The crew had implemented AP-RCS.3, HIGH REACTOR COOLANT ACTIVITY, at 100% power
- During the subsequent load reduction, an RCS leak developed which resulted in the need for a manual reactor trip and SI
- Containment pressure is 19 PSIG and slowly rising
- 'A' MDAFW pump tripped on start, and the TDAFW pump governor valve tripped and cannot be reset.
- 'B' MDAFW pump flowrate is 180 GPM
- 'A' S/G NR level is 0%, 'B' S/G NR level is 28% and slowly rising
- R29 and R30, CNMT HIGH RANGE, read 12 R/hr and 15 R/hr, respectively
- The crew has just transitioned to E-1, LOSS OF REACTOR OR SECONDARY COOLANT
- The STA has informed the CRS that a CSFST entry condition has been met, and recommends transitioning to that procedure

WHICH ONE of the following identifies the correct procedure flowpath?

- Transition to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK
- Transition to FR-Z.1, RESPONSE TO HIGH CONTAINMENT PRESSURE
- Remain in E-1, consider implementing FR-H.5 ONLY, RESPONSE TO STEAM GENERATOR LOW LEVEL.
- Remain in E-1, consider implementing FR-H.5 AND/OR FR-Z.3, RESPONSE TO HIGH CNMT RADIATION LEVEL

Answer: D

Explanation:

- A. Incorrect. Plausible because if the FR-H.1 threshold criteria were met, a transition from E-1 to FR-H.1 would be the correct action. Requires that the candidate be knowledgeable that although the total AFW flow is inadequate, entry into FR-H.1 is avoided due to the 'B' S/G level > 25% with adverse CNMT conditions.
- B. Incorrect. Plausible if the candidate realizes that FR-Z.1 entry is both on a RED path (>60 PSIG) and an ORANGE path (≥28 PSIG) and confuses the orange path entry pressure with that of Main Steamline Isolation setpoint of 18 PSIG. Either an ORANGE or RED path condition would require the transition from E-1 to FR-Z.1.
- C. Incorrect. Plausible because this is a valid yellow path condition for FR-H.5 with 'A' S/G level < 25% (adverse), but this is not the ONLY yellow path condition met. Incorrect because a second yellow path entry condition is met with R29 and R30 > 10 R/hr as valid entry conditions for FR-Z.3, RESPONSE TO HIGH CNMT RADIATION LEVEL.
- D. CORRECT. R29 and R30 > 10 R/hr are valid entry conditions for FR-Z.3, RESPONSE TO HIGH CNMT RADIATION LEVEL, as well as a valid yellow path condition for FR-H.5 with 'A' S/G level < 25% (adverse), Either or both of these may be implemented while remaining in E-1.

Technical Reference(s): CSFST, F-0.5 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RFRZ3C 2.01

Question Source: Bank/VISION # _____
 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 _____
 55.43 .5

Justification for K/A Match:

Matches the K/A by requiring an assessment of plant conditions following an accident involving CNMT high radiation, then determining which procedure is appropriate.

The question is SRO-ONLY because it cannot be answered solely by knowing system knowledge, immediate operator actions, plant parameters that require direct entry into EOPs, or knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure; AND requires the operator to demonstrate knowledge of diagnostic steps and decision points in the EOPs that involve transitions to event specific sub-procedures or emergency contingency procedures.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	W03 2.4.20	
	Importance Rating		4.3

LOCA Cooldown & Depressurization: Knowledge of the operational implications of EOP warnings, cautions, and notes.

SRO Question #84

Given the following CAUTION from ES-1.2, POST-LOCA COOLDOWN AND DEPRESSURIZATION:

EOP:	TITLE:	REV: 03601
ES-1.2	POST LOCA COOLDOWN AND DEPRESSURIZATION	PAGE 10 of 35

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>CAUTION</p> <p>PRZR HEATERS SHOULD NOT BE ENERGIZED UNTIL PRZR LEVEL INDICATES GREATER THAN MINIMUM RECOMMENDED BY TSC TO ENSURE HEATERS ARE COVERED.</p>		
7	Deenergize PRZR Heaters	
	a. Place PRZR proportional heaters in PULL STOP	
	b. Place PRZR backup heaters in OFF	
	c. Consult TSC for a recommended minimum indicated PRZR water level that will ensure heaters are covered	

(1) WHAT is the basis for this CAUTION in ES-1.2, and (2) WHICH guidance would the TSC use in determining a value for the recommended minimum indicated PRZR water level?

- A. (1) The post-accident ADVERSE CNMT temperature value would result in indicated PRZR level being LOWER than actual level;
(2) ITS 3.3.3, Post-Accident Monitoring Instrumentation Bases
- B. (1) The post-accident ADVERSE CNMT temperature value would result in indicated PRZR level being LOWER than actual level;
(2) EOP-DIRECTED-TSC-ACTIONS document
- C. (1) Hydrogen in the reference legs of PRZR water level instruments can come out of solution in accidents involving depressurization, resulting in indicated PRZR level being HIGHER than actual level
(2) ITS 3.3.3, Post-Accident Monitoring Instrumentation Bases
- D. (1) Hydrogen in the reference legs of PRZR water level instruments can come out of solution in accidents involving depressurization, resulting in indicated PRZR level being HIGHER than actual level
(2) EOP-DIRECTED-TSC-ACTIONS document

Answer: D

Explanation:

- A. Incorrect. Plausible because post-LOCA CNMT temperature would result in reference leg heatup, but the weight of the reference leg would decrease, D/P would decrease, and indicated level would be HIGHER than actual. ITS PAM instrumentation is also a credible choice, but does not address the H2 dissolution issue.
- B. Incorrect. Plausible because post-LOCA CNMT temperature would result in reference leg heatup, but the weight of the reference leg would decrease, D/P would decrease, and indicated level would be HIGHER than actual. Part 2 is the correct reference.
- C. Incorrect. Plausible because part 1 is the correct reason, and part 2 is also plausible because ITS PAM instrumentation is also a credible choice, but does not address the H2 dissolution issue.
- D. CORRECT. For accidents involving rapid RCS depressurizations which might drive H2 out of solution, as much as a +20% positive bias can result which was NOT considered in developing the EOP setpoints (and had to be referenced by this CAUTION). The referenced procedure was developed to assist the TSC in evaluating EOP-driven technical issues.

Technical Reference(s): EOP-DIRECTED-TSC-ACTIONS (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RES12C, 1.02;

Question Source: Bank/VISION # _____
 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 _____
 55.43 .5

Justification for K/A Match:

Matches K/A by requiring candidate to understand the operational implications of a CAUTION in ES-1.2.

The question is SRO-ONLY because it cannot be answered solely by knowing system knowledge, immediate operator actions, plant parameters that require direct entry into EOPs, or knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure; AND requires the operator to demonstrate knowledge of TSC decision making process and implications to the operation of pressurizer heaters.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	E08	2.4.18
	Importance Rating		4.0

Pressurized Thermal Shock: Knowledge of the specific bases for EOPs.

SRO Question # 85

A LOCA occurred with the plant at 100% power.

- RCS Pressure is 75 psig and stable.
- Containment pressure is 17 psig and stable.
- RHR flow is 1000 gpm
- The crew has just entered E-1, LOSS OF REACTOR OR SECONDARY COOLANT
- A RED Path exists on RCS Integrity and the crew transitions to FR-P.1, RESPONSE TO IMMINENT PRESSURIZED SHOCK

Which one of the following: (1) identifies the basis for the actions that will be taken upon entry into FR-P.1, AND (2) which procedure will be performed?

- (1) Cooldown rate and RCS pressure are checked to determine if PTS is a serious concern, (2) FR-P.1 will be continued.
- (1) RCS pressure and RHR flow are checked to determine if an RCS Soak is required (2) FR-P.1 will be continued
- (1) RCS pressure and RHR flow checked to determine if PTS is a serious concern (2) E-1 will be performed.
- (1) Cooldown rate and RCS pressure are checked to determine if an RCS Soak is required (2) E-1 will be performed.

Answer: C

Explanation (Optional):

- A. **Incorrect.** The first step in FR-P.1 checks pressure is less than the RHR pump shutoff head and should return to the procedure and step in effect since these symptoms are indicative of a large-break LOCA. In this instance, the actions in FR-P.1 should not be performed since pressurized thermal shock is not a serious concern, for a large-break LOCA since re-pressurization will not happen. The cooldown is only checked if RHR flow is not occurring.
- B. **Incorrect.** This is incorrect because the operator will NOT perform an RCS soak in this procedure. This is plausible because if the RCS pressure was sufficiently high, or RHR flow was less than 475 gpm, this would be correct.
- C. **Correct.** 1st part correct, 2nd part correct. According to FR-P.1 Step 1 (p3; Rev 03200) the operator will check RCS pressure greater than 350 psig (Adverse). The RNO will direct the operator to check RHR flow greater than 475 gpm, and if so (as is the case) return to procedure to step in effect. The crew will return to E-1.
- D. **Incorrect.** 1st part wrong, 2nd part correct. See A and B.

Technical Reference(s): FR-P.1 Step 1 (p3; Rev 03200) (Attach if not previously provided)
 E-1 Step 19 (p19; Rev 041)

Proposed References to be provided to applicants during examination: None

Learning Objective: RFRP1C OBJ. 2.1 (As available)

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

Question History: Last NRC Exam: NA

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

10 CFR Part 55 Content: 55.41
 55.43 2

Comments:

The KA is matched because the operator must demonstrate knowledge of the basis of Step 1 of FR-P.1. This is accomplished by requiring that the operator choose between potential plausible actions within FR-P.1. If the candidate chooses the correct path, it is indicative of an understanding of the Step basis.

The question is at the Comprehension/Analysis level cognitive level because the operator must recall bits of information (Criteria for RHR flow decision points in FR-P.1 and E-1) and then use this information to predict an outcome (i.e. how to proceed through FR-P.1 and which procedure to go to from E-1), in order to answer the question correctly.

What MUST be known:

1. What is the criteria within FR-P.1 that allows the operator to disregard an attempt to save RCS Integrity, and return to procedure Step in effect?
2. What is the criteria within E-1 that allows the operator to choose between ES-1.2 and ES-1.3 as the ultimate recovery procedure?
3. Under the stated plant conditions, how will the crew proceed through FR-P.1?
4. Under the stated plant conditions, will the crew implement ES-1.2 or ES-1.3 when transitioning from E-1?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	004 A2.27	
	Importance Rating		4.2

Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Improper RWST boron concentration

SRO Question # 86

Given the following plant conditions:

- The plant is operating at 100% power
- MOV-350, Immediate Borate Valve, is OOS
- Chemistry calls and reports that the weekly sample of the RWST shows that the boron concentration is 2725 ppm

In accordance with TR 3.1.1, Boron Injection System – Modes 1, 2, 3 and 4, WHICH ONE of the following identifies:

(1) the impact, if any, of the RWST sample results;

AND

(2) if there is an impact, the action needed to ensure that TR 3.1.1 is being complied with?

- A. (1) There is no impact on TR 3.1.1;
(2) Refer to ER-CVCS.1, REACTOR MAKEUP MALFUNCTION to restore equipment.
- B. (1) TR 3.1.1 is NOT met;
(2) Align the flowpath through V-356, Immediate boration valve in accordance with ER-CVCS.1.
- C. (1) TR 3.1.1 is NOT met;
(2) Raise RWST boron concentration using S-9J, Blending to RWST.
- D. (1) TR 3.1.1 is NOT met;
(2) Lower RWST boron concentration boron concentration using S-9J.

Answer:

C

Explanation :

- A. Incorrect. This is incorrect because three of the four required boron injection flowpaths are inoperable. This is plausible because the operator may not know the TSR 3.1.1 required boron concentration, and incorrectly believe that this boron concentration is within the allowable band. If the operator incorrectly believes that the RWST boron concentration is within, then they would believe that both flowpaths from the RWST are operable. Since only two flowpaths are required, TR 3.1.1 is NOT impacted. Note that the BAST through an operable BA Pump through the normal makeup path [AOV-110A] is currently operable, and therefore the operator would incorrectly believe that there are a total of three operable flowpaths when only two are needed.
- B. Incorrect. This is incorrect the Immediate Borate Manual valve cannot be credited as a separate flowpath from the flowpath using AOV-110A. According to Drawing 33016-1266, this valve is located downstream of AOV-110A. Consequently, AOV-110A, which is already credited as one of the required two flowpaths must be opened to credit this valve. This is plausible because the operator may incorrectly believe that the flowpath involving the Immediate Borate Manual Valve can be used as an alternative to the OOS MOV-350.
- C. CORRECT. According to TRB 3.1.1 (pTRB 3.1.1-1; Rev 37), the two required boron injection subsystems must be supported by two operable charging pumps and two of the following four flowpaths: (1) BAST through an operable BA Pump through the normal makeup path [AOV-110A], (2) BAST through an operable BA Pump through the Immediate Borate Valve [MOV-350], (3) RWST to the Charging Pump through the Emergency Makeup Valve [AOV-112B], and (4) RWST via gravity feed to the Charging Pump through the Emergency Makeup Valve Bypass Valve [V-358]. According to TSR 3.1.1 (pTR 3.1.1-2; Rev 43) when the RWST is being used as a boron injection flowpath the boron concentration must be > 2750 ppm. Since the RWST Boron concentration is < 2750 , flowpaths 3 and 4 above are inoperable. Therefore, TR 3.1.1 is NOT met. Because of this the RWST boron concentration must be raised to greater than 2750 ppm.
- D. Incorrect. This is incorrect because the RWST boron concentration is too low, rather than too high. This is plausible because according to TS LCO 3.5.2, Surveillance Requirement 3.5.4.2 (p3.5.4-1; Amendment 96), the operator must verify RWST boron concentration is ≥ 2750 ppm and ≤ 3050 ppm every seven days. Recognizing that TS LCO 3.5.4 has an upper limit, the operator may incorrectly believe that the current RWST boron concentration is too high (i.e. above the TS LCO 3.5.4 upper limit). If the operator incorrectly believes that the RWST boron concentration is too high, then they would believe that both flowpaths from the RWST are inoperable. This, coupled with the flowpath from the Immediate Borate, renders three of the four flowpaths inoperable with two required. If the operator incorrectly believed this the correct action would be to lower RWST boron concentration.

Technical Reference(s): TRB 3.1.1 (pTRB 3.1.1-1; Rev 37) (Attach if not previously provided)

TSR 3.1.1 (pTR 3.1.1-2; Rev 43)
ER-CVCS.1, REACTOR MAKEUP
MALFUNCTION

S-9J, BLENDING TO RWST

Proposed References to be provided to applicants during examination: None

Learning Objective: RTS00C, Obj. 3.01, 3.02 (As available)

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

Question History: Last NRC Exam: NA

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

10 CFR Part 55 Content: 55.41
 55.43 2

Comments:

The KA is matched because the operator must demonstrate the ability to predict the impact of a low RWST boron concentration on the CVCS (Boron Injection Flowpaths); and use procedures (In this case, the required actions within procedures) to correct, control, or mitigate the consequences.

The question is at the Comprehension/Analysis level cognitive level because the operator must recall bits of information (TR 3.1.1 RWST boron concentration requirements, how many flowpaths required to be OPERABLE, which flowpaths are allowed) and then use this information to predict an outcome (i.e. no impact), in order to answer the question correctly.

The question is SRO-ONLY because it cannot be answered solely by knowing ≤ 1 hour TS/TRM action statements, the LCO information listed "above the line," or by knowing the TS Safety Limits; AND requires the operator to apply the Required Actions and Surveillance Requirements in accordance with the rules of application. Additionally, the operator must demonstrate knowledge of the TS basis that is required to analyze TS required actions and terminology.

What MUS <input type="checkbox"/> be known:
<ol style="list-style-type: none"> 1. What is the TSR 3.1.1 required RWST boron concentration? 2. What are the potential boron injection flowpaths that can satisfy TR 3.1.1 in Mode 1? 3. How many boron injection flowpaths are required to be OPERABLE in Mode 1? 4. What is the impact on TR 3.1.1 of RWST boron concentration being higher than that allowed by TS LCO 3.5.4, SR 3.1.1?

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>1</u>
	K/A #	<u>2.2.40</u>	_____
	Importance Rating	_____	<u>4.7</u>

RHR: Ability to apply Technical Specifications for a system

SRO Question #87

WHICH ONE of the following describes (1) the requirement for RHR cooling while in REFUELING mode, AND (2) the basis for that requirement?

- A. (1) With >23 feet in reactor cavity, two RHR loops are required to be OPERABLE, with one in operation
(2) With the water volume available in the cavity two RHR loops are required to provide adequate mixing to prevent inadvertent criticality
- B. (1) With >23 feet in reactor cavity, one RHR loop is required to be OPERABLE and in operation
(2) Single failures are not considered due to the time available for the operator to respond to the loss of the operating RHR pump prior to reaching boiling in the RCS
- C. (1) With <23 feet in reactor cavity, two RHR loops are required to be OPERABLE, with both RHR loops in operation
(2) The reduced volume of water contained within the reactor cavity can result in a rapid approach to boiling if only a single RHR loop is in operation and is lost
- D. (1) With <23 feet in reactor cavity, one RHR loop is required to be OPERABLE and in operation
(2) With the water volume available in the cavity one RHR loop is required to provide adequate mixing to prevent inadvertent criticality

Answer:

B

Explanation:

- A. Incorrect. Plausible because the requirement for many 2-loop cooling systems is that both be available, and one be in operation. Incorrect because with a large volume (>23') of water in the reactor cavity, the failure of a single running RHR loop is not as much a concern because of the time available to operators to respond to the failure. Part 1 is incorrect, part 2 is incorrect since only one RHR loop is required to provide mixing
- B. CORRECT. Per the ITS basis found in ITS 3.9.4, a significant amount of time exists with a water level >23' in the cavity before boiling of the coolant would occur following the loss of the single RHR cooling loop. Because of this, single failures are not considered for this LCO due to the time available to respond to the loss of cooling.
- C. Incorrect. Plausible because with a reduced volume of water in the cavity and an elevated decay heat load early in the outage, two RHR cooling loops might be required. Part 2 is reasonable, but incorrect – core decay heat and time to boiling is a concern throughout the core unload/reload process.
- D. Incorrect. Part 1 is plausible for the basis given in part 2, but part 2's is correct

Technical Reference(s): ITS 3.9.4 & 5 and 3.9.4 bases (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R2501C 1.13

Question Source: Bank/VISION # _____
 Modified Bank # 69384 (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 _____
 55.43 2

Justification for K/A Match:

Matches the K/A by requiring knowledge of RHR Cooling Loop requirements during MODE 6.

SRO-only because it requires explanation of the ITS basis which justifies the LCO requirement.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	013 A2.03	
	Importance Rating		4.7

Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS, and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Rapid Depressurization

SRO Question # 88

Given the following:

- The plant has tripped from 100% power due to a Steam Break in Containment.
- Containment pressure has risen to 25 psig and is slowly rising.
- The crew has transitioned from E-0 to the appropriate recovery procedure and isolated the faulted Steam Generator.

WHICH ONE of the following identifies when the ARV setpoint is adjusted to minimize the RCS heatup, AND the plant parameter that is used to determine the correct ARV setpoint?

The crew will adjust the Intact Steam Generator ARV setpoint.....

- Prior to exiting E-2, Faulted Steam Generator Isolation; AND The Maximum Hot Leg temperature.
- Immediately after reducing SI flow in ES-1.1, SI Termination; AND The Maximum Hot Leg temperature.
- Immediately after reducing SI flow in ES-1.1, SI Termination; AND The Maximum Core Exit Thermocouple temperature.
- Prior to exiting E-2, Faulted Steam Generator Isolation; AND The Maximum Core Exit Thermocouple temperature.

Answer: A

Explanation:

- A. **Correct.** 1st part correct, 2nd part correct. According to E-2 (p8; Rev 01301), Step 8, the operator will be directed to determine allowable intact S/G pressure using maximum hot leg temperature using FIG-7.0.
- B. **Incorrect.** 1st part wrong, 2nd part correct. This is incorrect because the action is taken in E-2, not ES-1.1; and before addressing the SI termination criteria. This is plausible because according to ES-1.1 (p10-11; Rev 03400) the operator is directed to dump steam and stabilize RCS temperature and immediately after terminating ECCS injection flow. However, this is a continuation of controlling the post-accident plant temperature. The determination of the Intact Steam Generator ARV setpoint per FIG-7.0 and the establishing of steam dump per the ARVs were completed in E-2.
- C. **Incorrect.** 1st part wrong, 2nd part wrong. See B and D.
- D. **Incorrect.** 1st part correct, 2nd part wrong. This is incorrect because the direction in E-2 is to apply the maximum Thot temperature to FIG-7.0, rather than the maximum CET. This is plausible because the CETs are used for other decision points when operating within the EOP network (RCS Subcooling, PTS CSFST decision tree), and the operator may incorrectly believe that the CETs are used in this action.

Technical Reference(s): E-2 (p8; Rev 01301) (Attach if not previously provided)

Proposed References to be provided to applicants during examination: None

Learning Objective: REP02C, Obj. 1.2 (As available)

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

Question History: Last NRC Exam: NA

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

10 CFR Part 55 Content: 55.41
 55.43 2 or 5

Comments:

The KA is matched because the operator must demonstrate the ability to predict the impacts of a rapid SG depressurization on the ESFAS (i.e. Subsequently will need to terminate SI to avoid a PTS concern, requiring that the heat up be controlled during the mitigation process to avoid a reduction in RCS Subcooling once the faulted SG dries out); and based on those predictions, use procedures to correct, control, or mitigate the consequences of those operations (i.e. use FIG-7.0 within E-2).

The question is at the memory cognitive level because the operator must simply recall bits of information (What plant parameter is applied to FIG-7.0 to determine Intact ARV setpoint, When in the mitigation process are these actions taken) in order to answer the question correctly.

The question is SRO-ONLY because it cannot be answered solely by knowing system knowledge, immediate operator actions, plant parameters that require direct entry into EOPs, or knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure; AND requires the operator to demonstrate knowledge of when to implement attachments and appendices (i.e. FIG-7.0), including how (i.e. what plant parameter) to coordinate these items with procedure steps.

What MUST be known:

1. When does the operator take action to determine the setpoint of the Intact SG ARV and dump steam to minimize RCS Heatup during a faulted SG?
2. What plant parameter is applied to FIG-7.0 to determine Intact ARV setpoint when operating in E-2?

Level	RO	SRO
Tier #		2
Group #		1
K/A #	063	A2.01
Importance Rating		3.2

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.

SRO Question # 89

Given the following:

- The plant is operating at 100% Power
- Annunciator J-23, BATTERY BANK GROUND is received
- The source of the ground is identified to be on MCB DC Distribution Panel A
- The Electricians have requested that breaker #14 to MQ 483 inverter be opened to isolate the ground and de-energizes relay PC-950B, Containment Pressure

WHICH ONE of the following describes (1) the consequence that this ground isolation action will have on Containment Spray (CS) actuation logic prior to defeat, AND (2) what procedure will be referenced to ensure the ITS 3.3.2 function is satisfied?

- A. (1) Changes the CS actuation logic to 2 out of 2 + 2 out of 3 logic effectively reducing redundancy
(2) ER-INST.1, REACTOR PROTECTION BISTABLE DEFEAT AFTER INSTRUMENTATION LOOP FAILURE
- B. (1) Changes the CS actuation logic to 2 out of 2 + 2 out of 3 logic effectively reducing redundancy
(2) ER-ELEC.2, RECOVERY FROM A LOSS OF A OR B DC TRAIN
- C. (1) Causes a protective function changes the CS actuation logic to 1 out of 2 logic
(2) ER-INST.1, REACTOR PROTECTION BISTABLE DEFEAT AFTER INSTRUMENTATION LOOP FAILURE
- D. (1) Causes a protective function changes the CS actuation logic to 1 out of 2 logic
(2) ER-ELEC.2, RECOVERY FROM A LOSS OF A OR B DC TRAIN

Answer: A

Explanation:

- CORRECT. MQ-483 provides power to Containment pressure PC-950A, PC-950B, and Steam pressure PC-479A instrumentation. PC-950B is Containment spray input from Containment Pressure. De-energizing this relay changes the Containment Spray logic from 2 out of 3+2 out of 3 (CNMT Spray utilizing both sets of CNMT Pressure Inst. Front and back of MCB) to a 2 out of 2 +2 out of 3 logic. 2nd part is correct. PC-950B requires DC power to perform its safety function and is "energize" to function bistable relay. Above MODE 5 I&C installs jumpers in order to energize the relay. This will ensure that the ITS 3.3.2 function to "defeat the bistable is performed and refer to ER-INST.1
- A.
- Incorrect. 1st part is correct as described in A. 2nd part is in correct but plausible since ER-ELEC.2 is associated with problems associated with DC trains and is referenced for other DC events. This does not discuss jumper actions for this relay
- B.
- Incorrect. Plausible because the candidate may believe that the change to the logic is that of PC-950A, Steam Line Isolation, also powered from MQ-483, which will go from 2 out of 3 to 1 out of 2. Plausible because the 2nd part is correct for jumpers to be installed on PC-950B.
- C.
- Incorrect. Plausible because the candidate may believe that the change to the logic is that of PC-950A, Steam Line Isolation, also powered from MQ-483, which will go from 2 out of 3 to 1 out of 2. 2nd part is in correct but plausible since ER-ELEC.2 is associated with problems associated with DC trains and is referenced for other DC events. This does not discuss jumper actions for this relay
- D.

Technical Reference(s): P-11, Electrical Distribution Panel (Attach if not previously provided)
Reference Manual;
ER-INST.1, ATT 23 Yellow
channel- CNMT CH 3B Pressure
PI-950

Proposed References to be provided to applicants during examination: None

Learning Objective: R0901C, Obj 1.06, 1.10 (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
55.43 .5

Comments:

Matches the K/A because

This question matches the K/A because it requires the candidate to assess the impacts of operating a DC breaker during ground isolation and predict its affect on the Containment Spray system. The examinee will have to decide which procedure will apply for this maintenance.

This is SRO only because it requires the candidate to assess the maintenance activity and its affects and then determine which procedure would be applicable for the situation.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	103 2.1.25	
	Importance Rating		4.2

Containment: Ability to interpret references materials, such as graphs, curves, tables, etc.

SRO Question #90

Given the following plant conditions:

- A large break LOCA has occurred
- ES-1.3 , TRANSFER TO COLD LEG RECIRC, is in progress
- CNMT pressure is 47 psig and slowly lowering
- RHR suction temperature (PPCS point T0684A/B) is 292°F
- The crew is assessing FIG-21.0, FIGURE CNMT SPRAY RESTART CRITERIA

WHICH ONE of the following identifies the required CNMT Spray Pump 'A' operation AND what procedural actions will need to be taken next?

- START Cnmt Spray Pump A;
Stay in ES-1.3 and consult TSC to determine if Rx Vessel Head should be vented.
- START Cnmt Spray Pump A;
Stay in ES-1.3 and Establish Normal Shutdown alignment.
- Cnmt Spray Pump A will NOT BE STARTED;
Stay in ES-1.3 and monitor for indications of Sump blockage
- Cnmt Spray Pump A will NOT BE STARTED;
go to FR-Z.1, RESPONSE TO HIGH CONTAINMENT PRESSURE,
when pressure lowers to less than 28 psig return to ES-1.3

Answer: C

Explanation:

- A. Incorrect. Plausible because FR-Z.1 procedure would have both CS pumps started, but the NOTE prior to step 2 in FR-Z.1 would operate them per E-1 guidance (which would include the ES-1.3 transition). Crew is past Step 12 in ES-1.3, so FR's can be implemented again.
- B. Incorrect. Plausible since ATT-28.0 will stop the running CS pump that was started WHEN CNMT pressure lowers to 43 psig, but per rules of procedural usage, that pressure condition has not yet been satisfied.
- C. CORRECT. The CAUTION prior to starting the single CS pump in ATT-28.0 warns that RHR suction temperature must be monitored closely and checked against FIG-21.0 to guard against loss of RHR pump suction. Using FIG-21.0, the candidate should determine that the maximum allowable RHR suction temperature for a CNMT pressure of 47 psig is 285°F, and the given PPCS temperature exceeds that, so the CNMT spray pump should be STOPPED.
- D. Incorrect. Plausible because FR-Z.1 this is the correct action as long as RHR suction temperature remains within limits. Incorrect because it hasn't.

Technical Reference(s): ES-1.3, ATT-28.0, and FIG-21.0 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: FIG-21.0

Learning Objective: RES13C 1.02;

Question Source: Bank/VISION # _____
 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 _____
 55.43 .5

Justification for K/A Match:

Matches the K/A because it requires the use of an infrequently-performed Attachment and Figure to determine if Containment Spray pump should be secured.

SRO-only because it requires knowledge of when to implement attachments, including how to coordinate these items with procedural steps.

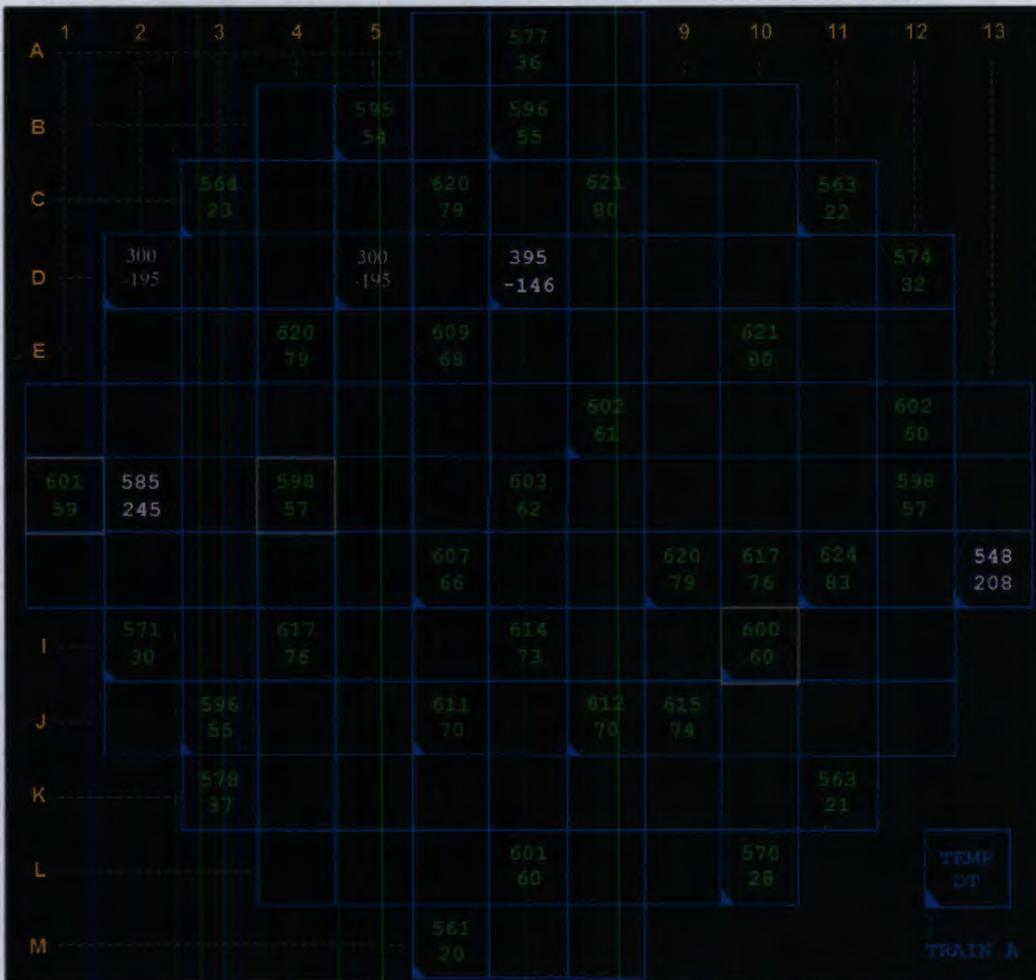
Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	2
	Group #	_____	2
	K/A #	017 A2.01	_____
	Importance Rating	_____	3.5

Ability to (a) predict the impacts of the following malfunctions or operations on the ITM system; and (2) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Thermocouple open and short circuits

SRO Question #91

Given the following plant conditions:

- A large break LOCA has occurred
- The STA is monitoring the Incore Thermocouple Display as seen below
- The hottest CETs (D2 and D5) have developed a partial SHORT and now reads 300°F



WHICH ONE of the following (1) accurately describes the response of the PPCS Subcooled Margin indication, and (2) what action should be taken, if any, per ITS 3.3.3, PAM Instrumentation for Quadrant 1 Core Exit Temperature (CETs)?

PPCS indicated Subcooled Margin will:

- A. (1) RISE; (2) The Quadrant 1 CETs PAM requirements are met no action is required
- B. (1) RISE; (2) subcooling must be manually averaged using the next five hottest CETs
- C. (1) LOWER; (2) The Quadrant 1 CETs PAM requirements are met no action is required
- D. (1) LOWER; (2) subcooling must be manually averaged using the next five hottest CETs

Answer: A

Explanation:

- A. CORRECT. because it requires knowledge of the direction (fail HIGH or LOW) that the partial SHORT CET will indicate. Part 2 is correct because the higher value IS still part of the 5-hottest CET indications, and that is causing an artificially high CET average value which requires manual calculation.
- B. Incorrect the partially shorted thermocouple will result in a much lower than the current value condition, which will be reflected in a lower value for the hottest CET, which will drive the PPCS Subcooled Margin value lower. Per the guidance provided in A503.1, Generic Concern section N, use of PPCS for determining Subcooled Margin is identified, and any questionable PPCS data should be verified using other indications.
- C. Incorrect. Plausible because it requires knowledge of the direction (fail HIGH or LOW) that the Shorted CET will indicate. Part 2 is plausible because it's correct – and that's the problem which has to be addressed via alternative method for determining subcooled margin.
- D. Incorrect. Plausible because it requires knowledge of the direction (fail HIGH or LOW) that the Shorted CET will indicate. Part 2 is plausible because the answer is correct trend for the temperature change because the indicated margin actually rises.

Technical Reference(s): A-503.1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3201C 1.04

Question Source: Bank/VISION # _____
 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 _____
 55.43 .5

Justification for K/A Match:

Matches the K/A by requiring knowledge of the failed value direction of an OPEN thermocouple and what corrective actions are required by the EOP rules of usage procedure to correct the invalid Subcooled Margin calculation.

SRO-only because it requires an assessment of plant conditions and actions required by a procedure to mitigate the effects of the failure.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	033 A2.03	
	Importance Rating		3.5

Ability to (1) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System; and (2) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Abnormal spent fuel pool water level or loss of water level

SRO Question #92

Given the following plant conditions in the Spent Fuel Pool:

- The plant is two weeks into a refueling outage
- Full core offload was required for RCS maintenance
- SFP cooling loop 'B' is in service
- The standby SFP pump is installed
- SFP cooling temperature is 102°F and stable
- The Primary AO reports SFP level is slowly lowering due to SFP weir gate leakage.
- Annunciator K-29, SFP HI TEMP HI-LO LEVEL, has just been received

WHICH ONE of the following describes (1) the response of the SFP cooling system to the K-29 alarm, if any, AND (2) what action will be directed by the appropriate procedure to mitigate the effects of this condition?

- A. (1) SFP pump 'B' will continue to run until SFP level lowers an additional 2" below the K-29 low level alarm setpoint;
(2) Direct the crew to fill the SFP from the RWST.
- B. (1) SFP pump 'B' will continue to run, resulting in continued loss of SFP inventory through the weir gate;
(2) Direct the crew to monitor SFP temperatures and place the standby SFP cooling loop in service if necessary.
- C. (1) SFP pump 'B' will trip immediately upon receipt of the K-29 low level alarm;
(2) Direct the crew to fill the SFP from the RWST
- D. (1) SFP 'B' will trip immediately upon receipt of the K-29 low level alarm;
(2) Direct the crew to place the 'A' SFP cooling loop in service, monitor SFP temperature, and determine if the standby SFP cooling system needs to be placed in service.

Answer: A

Explanation:

- A. CORRECT. The auto trip and low level alarm functions were given separate detectors in ~2012, and the auto trip now occurs ~2" below the receipt of the LLA (pre-warning). Filling the SFP will prevent " B" SFP from tripping on low level.
- B. Incorrect. Plausible if the candidate believes that it is 'A' SFP pump which trips automatically on a low level condition. Part 2 is plausible because the answer is partially correct (monitor temp, place standby system in service if necessary).
- C. Incorrect. Plausible because part 1 used to be true – the 'B' SFP pump would trip when the LLA was received. Part 2 is plausible because filling the SFP would be required to start SFP cooling using " B" SFP.
- D. Incorrect. Plausible because part 1 used to be true – the 'B' SFP pump would trip when the LLA was received. Part 2 would be correct action if " B" SFP has tripped.

Technical Reference(s): AR-K-29 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R3601C 1.07 & 1.11

Question Source: Bank/VISION # _____
 Modified Bank # 68705 (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 41.6
 55.43 _____

Justification for K/A Match:

Matches the K/A by predicting the impact of lowering SFP level on the SFPCS, then determining the correct procedural action by assessing recent plant instrumentation mods and full core offload in progress.

SRO-only because it requires an assessment of plant conditions and knowledge of SFP procedural lineups required to select the correct course of action.

Level	RO	SRO
Tier #		2
Group #		2
K/A #	035	2.2.22
Importance Rating		4.7

Steam Generator: Knowledge of limiting conditions for operation and safety limits

SRO Question # 93

Given the following conditions:

- The plant is in MODE 1, 5% power
- The test team has just completed the "as found" test for lift setpoints for safety valves 3509 and 3511 with the following data:

V-3509 = 1108.6 psig

V-3511 = 1152.4 psig

(1) ARE these lift settings in compliance with Tech Specs, AND (2) WHAT purpose(s) do the MSSVs serve?

- A. (1) V-3509 meets lift setpoint, V-3511 is out of spec.
 (2) Provide overpressure protection for the secondary system AND protection against overpressurizing the Reactor Coolant System Boundary (RCPB)
- B. (1) V-3509 meets lift setpoint, V-3511 meets lift setpoint
 (2) Provide overpressure protection for the secondary system AND protection against overpressurizing the Reactor Coolant System Boundary (RCPB)
- C. (1) V-3509 meets lift setpoint, V-3511 meets lift setpoint
 (2) **Only** credited with providing overpressure protection of the secondary system
- D. (1) V-3509 meets is out of spec., V-3511 is out of spec.
 (2) **Only** credited with providing overpressure protection of the secondary system

Answer:

A

Explanation:

- A. CORRECT. Per SR 3.7.1.1, the setpoint of 3509 and 3511 should be 1140 psig +1%, -3%. One % of 1140 = 11.4, so the high limit would be 1151.4 psig. The low limit would be $1140 - 3\%(1140) = 1140 - 34.2 = 1105.8$ psig. With the range between 1105.8 and 1151.4, 3509 is IN spec but 3511 is OUT of spec. The Basis for 3.7.1 states that the primary purpose of the MSSVs is to provide overpressure protection for the secondary system, but they also provide protection against overpressurizing the reactor coolant pressure boundary (RCPB) by providing a heat sink for the removal of energy from the RCS if the preferred heat sink provided by the condenser and circ water system is not available.
- B. Incorrect.. Part 1 is plausible if the surveillance acceptable limits are miscalculated and because part 2 is correct.
- C. Incorrect. Plausible because part 1 is correct and because while part 2 is the *primary* purpose that they serve, they do serve a secondary purpose as explained in the ITS Basis.
- D. Incorrect. Part 1 is plausible if the surveillance acceptable limits are miscalculated and because while part 2 is the *primary* purpose that they serve, they do serve a secondary purpose as explained in the ITS Basis.

Technical Reference(s): ITS3.7.1 and its Basis (Attach if not previously provided)

Proposed References to be provided to applicants during examination: ITS 3.7.1

Learning Objective: R4001C, Obj 1.06, 1.10 (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 X
 Comprehension or Analysis

10 CFR Part 55 Content: 55.41
 55.43 43.1

Comments:

Matches the K/A because it requires knowledge of and application of the LCO associated with the S/G main steam safety valves.

SRO-only because it requires knowledge of the basis associated with the MSSVs.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		3
	Group #		1
	K/A #	2.1.23	
	Importance Rating		4.4

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

SRO Question #94

Given the following plant conditions:

- A controlled cooldown and depressurization from Hot Shutdown to Cold Shutdown is in progress
- RCS T-cold is 370°F and stable
- RCS pressure is 600 psig and stable
- The CRS had the AO unlock and close the breakers for MOV-878B (SI PMP A DISCH TO LOOP B) and MOV-878D (SI PMP B DISCH TO LOOP A) in anticipation of closing those valves.

WHICH ONE of the following actions, if any, will the SM be required take in response to the AO's Action and the reason for the SM's action?

- A. None. The valve breakers being unlocked does not affect the OPERABILITY of the SI train
- B. None. The SI system is not required to be operable with RCS pressure LESS THAN 1500 psig
- C. Enter Tech Spec 3.0.3. These valve breakers must be maintained LOCKED OFF until RCS temperature is < 350°F
- D. Enter Tech Spec 3.0.3. These valve breakers must be maintained LOCKED OFF until RCS temperature is < 200°F

Answer: C

Explanation:

- A. Incorrect. Plausible because power is still removed from 878A-878D, and the candidate might believe that if the valves have not changed out of the safeguard position that system is in a operable configuration.
- B. Incorrect. Plausible because the major action category in O-2.2 section 6.3 is "RCS Cooldown and Depressurization to 350°F and 1500 PSIG.
- C. CORRECT. Per ITS 3.5.2, in Modes 1, 2, & 3 both ECCS trains must be OPERABLE. Per ITS 3.5.3, 4 only 1 ECCS train is required to be operable. Unlocking the breakers while still in Mode 3 would disable BOTH ECCS trains. The statement in B3.5.3 that "ECCS components are OPERABLE if they are capable of being reconfigured to the injection mode (remotely or locally) within 10 minutes is NOT found in the Bases for 3.5.2. Per ITS 3.5.2 with both trains of SI inoperable an Immediate entry into ITS 3.0.3 is required. STP-O-30.1 Attachment 1 requires the breaker be locked off.
- D. Incorrect. Plausible because the first part is correct and the candidate could mistakenly believe that the ITS applies when Mode 5 is entered (<200°F) and not Mode 4 (<350°F).

Technical Reference(s): O-2.2, section 6.4 (Attach if not previously provided)
ITS 3.5.2 & 3.5.3

Proposed references to be provided to applicants during examination: None

Learning Objective: R2701C 1.07, 1.09

Question Source: Bank/VISION # 69327
 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 _____
 55.43 .1

Justification for K/A Match:

Matches the K/A by required knowledge of the basis and past Ginna OE for actions contained within O-2.2 integrated plant procedure.

SRO only by requiring knowledge of ITS 3.5.2 required actions and bases, AND and applicability during performance of significant action steps in O-2.2.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>3</u>
	Group #	_____	<u>2</u>
	K/A #	2.2.06	_____
	Importance Rating	_____	<u>3.6</u>

Equipment Control: Knowledge of the process for making changes to procedures

SRO Question #95

Given the following conditions:

- The crew is in the process of implementing an Emergency Contingency Action (ECA) procedure.
- The crew believes that procedure steps that provides guidance to prevent damage to plant equipment is 15 steps later in the procedure . Action by the crew is desired to be perform the prescribed EOP step earlier than the actual step sequence.
- The TSC has determined this action has to be taken 10 minutes from now

WHICH ONE of the following describes the process to be used to perform the desired action?

- Perform only the prescribed EOP step sequence
- Perform 10CFR50.54X actions, departure from license conditions or technical specifications conditions departure from license conditions or technical specifications conditions
- CNG-PR-1.01-1011, PROCEDURE PROCESS, Procedure change
- A-503.1, EMERGENCY AND ABNORMAL OPERATING PROCEDURE USERS GUIDE, Procedure Deviation

Answer: D

Justification for K/A Match:

Matches the K/A by requiring knowledge of which procedural process addresses making a change to an ECA procedure.

SRO-only because it requires knowledge of the procedural process for changing plant procedures.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		3
	Group #		2
	K/A #	2.2.18	
	Importance Rating		3.9

Knowledge of the process for managing maintenance activities during shutdown | operations, such as risk assessments, work prioritization, etc.

SRO Question #96

Given the following:

- RCS reduced inventory operation is in progress.
- A new open CNMT penetration (#10) is about to be established and assigned to operator A.
- Estimated closure time of Penetration #10 is 7 minutes.
- Time to Boil is determined to be 15 minutes.
- There are three Responsible Individuals assigned to the Containment Closure Deviation Status:
 - Operator A – Total of 5 Minutes assigned
 - Operator B - Total of 12 Minutes assigned
 - Operator C - Total of 13 Minutes assigned

After Operator A is assigned an additional action to close, Penetration #10, WHICH ONE of the following identifies the effect on the Most Limiting Total Estimated Closure (MLTEC) Time, AND identifies the MAXIMUM allowable MLTEC?

The MLTEC will.....

- A. RISE; AND
The maximum MLTEC is 15 minutes
- B. RISE; AND
The maximum MLTEC is 120 minutes
- C. Remain the same; AND
The maximum MLTEC is 15 minutes
- D. Remain the same; AND
The maximum MLTEC is 120 minutes

Answer: C

Explanation:

- A. **Incorrect.** 1st part wrong, 2nd part correct. This is incorrect because MLTEC will remain the same, not rise. This is plausible because the operator may not understand the concept of MLTEC.
- B. **Incorrect.** 1st part wrong, 2nd part wrong. See A and D.
- C. **Correct.** 1st part correct, 2nd part correct. According to Attachment 1 of O-2.3.1A (p61-63; Rev 02601) the MLTEC will remain at 13 Minutes because there are three individuals that are assumed to be working in parallel, and Operator C has a total of 13 minutes. Consequently, the Operator C work is the most limiting. Also according to Attachment 1 of O-2.3.1A (p61-63; Rev 02601), the MLTEC must be less than 120 minutes or the Time-To-Boil (whichever is less).
- D. **Incorrect.** 1st part correct, 2nd part wrong. This is incorrect because the maximum MLTEC is 15 minutes, not 120 minutes. This is plausible because procedurally the maximum MLTEC can be as high as 120 if the Time-To-Boil were greater than 2 hours.

Technical Reference(s): O-2.3.1A Attachment 1 (p61-63; Rev 02601) (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: ROP14C 1.02

Question Source: Bank/VISION # _____
 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 _____
 55.43 .5

Justification for K/A Match:

Matches the K/A by requiring knowledge of how maintenance activities involving open CNMT penetrations are controlled during shutdown conditions.

SRO-only because it requires knowledge of how to ensure that CNMT closure capability exists within 2 hrs during reduced RCS inventory conditions by implementation of ATT-1 of O-2.3.1A.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		3
	Group #		3
	K/A #	2.3.5	
	Importance Rating		2.9

Radiation Control: Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.

SRO Question #97

Given the following plant conditions:

- The plant is at 100%
- "B" S/G has been identified as the leaking S/G
- AP-S/G.1, STEAM GENERATOR TUBE LEAK, has been implemented
- PPCS point R-47G is currently 25 gpd and rising
- The CRS has **initiated a 1%/min.** load reduction to less than 50% IAW AP-TURB.5, RAPID LOAD REDUCTION
- During the load reduction R-47G indicates leak rate is 1490 pgd

Based on the change on PPCS reading on R-47G, what action should be taken?

- Raise load reduction rated to 3%/min, continue AP-TURB.5 load reduction,
- Raise load reduction rated to 3%/min, use AP-SG.1 to continue load reduction,
- R-47 should NOT be used to determine S/G leakage once the power reduction has begun, continue AP-TURB.5 at 1%/min.
- AP-SG.1, continuous action step for reactor trip is met, Trip the reactor and go to E-0, REACTOR TRIP OR SAFETYINJECTION.INJECTION.

Answer:

C

Explanation:

- A. Incorrect. 1st part is incorrect. A NOTE prior to the load reductions states that the measured leakrate depends on RCS activity level, which may rise or lower during power reduction. Therefore, once the power reduction has begun, R-47 should NOT be used to determine if the rate of power reduction should be changed. 2nd part is correct
- B. Incorrect. Plausible, this would be correct if other parameters other than R-47 indicate > 1440 gpd (1gpm) leak rate.
- C. CORRECT.
- D. Incorrect. Plausible, this would be correct if other parameters, ie charging can not maintain Pressurizer level, then the continuous action would require reactor trip

Technical Reference(s): AP-SG.1 BACKGROUND (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RAP32C, 1.03, 2.01

Question Source: Bank/VISION # _____
 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 _____
 55.43 .4

Justification for K/A Match:

Matches the K/A by requiring knowledge of radiation monitors which must be in service in order to conduct AP-SG.1 actions

SRO-only because it assesses what radiation monitors have operability requirements during leak rate determination using R-47.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>3</u>
	Group #	_____	<u>3</u>
	K/A #	2.3.11	
	Importance Rating	_____	<u>4.3</u>

Radiation Control: Ability to control radiation releases.

SRO Question #98

You, as the Shift Manager, are authorizing a Gas Decay Tank Release per CH-703, RELEASE OF GDT's AND OTHER GASEOUS BATCH RELEASES.

The release must be initiated within _____ hours of the tank sample time, with no additions to the tank since the sample was drawn, AND if the release is NOT initiated within the required time limit, _____ is required to initiate the release.

- A. 12 ; Chemistry technician permission
- B. 12 ; Generate a new release from the original sample
- C. 24 ; Chemistry technician permission
- D. 24 ; Generate a new release from the original sample

Answer: A

Explanation:

- A. CORRECT. Per the NOTE prior to Step 6.7.3 of CH-703, the release should be initiated within 12 hours after sample time. With chemistry technician approval, the 12 hour rule may be exceeded, providing applicable rad monitors, tank levels, pressures OR analyses are reviewed to ensure conditions that existed when permit was made still exist. This is a change from the previous CH-RETS-GDT-REL procedure, which required that the Chemistry Supervisor approve the deviation from sample time.
- B. Incorrect. Plausible because part 1 is correct, and in part 2 it is reasonable to assume that if the allowed release time delay had occurred, generating a release from the original sample would be required (it was required in previous versions of the procedure).
- C. Incorrect. Plausible because the time is reasonable ("within 24 hours"), and part 2 was the correct supervisory approval in previous version of the procedure.
- D. Incorrect. Plausible because the time is reasonable ("within 24 hours"), and in part 2 it is reasonable to assume that if the allowed release time delay had occurred, generating a release from the original sample would be required (it was required in previous versions of the procedure).

Technical Reference(s): CH-703 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: R4701C, 1.06;

Question Source: Bank/VISION # 100146
 Modified Bank # _____ (Note changes or attach parent)
 New _____

Question History: Last NRC Exam 2008 NRC Exam

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

10 CFR Part 55 Content: 55.41 _____
 55.43 43.4

Justification for K/A Match:

Matches K/A by requiring knowledge of procedural requirements in place to maintain the accuracy of how much activity has been released.

SRO-only because it cannot be answered solely by knowing system knowledge, immediate operator actions, plant parameters that require direct entry into EOPs, or knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure; AND requires the operator to demonstrate knowledge of administrative procedures (or in this case, Chemistry procedures) that specify hierarchy, implementation, and/or coordination of plant normal procedures (i.e. get this done within x amount of time or alternative actions required).

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		3
	Group #		4
	K/A #	2.4.08	
	Importance Rating		4.5

Emergency Procedures/Plan: Knowledge of how abnormal operating procedures are used in conjunction with EOPs.

SRO Question #99

Given the following plant conditions:

- Reactor was tripped due to a SGTR on 'A' S/G
- 'B' RCP is running
- The crew is implementing E-3, STEAM GENERATOR TUBE RUPTURE, and the RCS cooldown is in progress
- The following alarms are received:
 - A-15, RCP 'B' CCW RETURN HI TEMP OR LOW FLOW 165GPM 125°F
 - A-17, MOTOR OFF RCP CCWP,
 - A-22, CCW PUMP DISCHARGE LO PRESS 60 PSI
- PPCS reading for 'B' RCP motor bearing temperatures are 210°F and rising

WHAT ACTION(s), if any, are required to address these conditions?

- A. After two (2) minutes, if conditions do not improve, trip 'B' RCP
- B. Trip 'B' RCP per AP-CCW.2, LOSS OF CCW, while continuing actions in E-3 for cooldown
- C. Continue actions in E-3 until the cooldown is complete, since later steps in E-3 address RCP operation
- D. Suspend actions in E-3, enter AP-CCW.2, LOSS OF CCW, to address RCP operation

Answer: B

Explanation:

- A. Incorrect. Plausible because this would be the required action (trip within 2 minutes) IF the motor bearing temperatures had not exceeded 200°F.
- B. CORRECT. Per A503.1, section 5.2.A.6, "When performing EOPs, various plant conditions may occur which would normally be addressed by AOPs. Actions may be taken per AOPs that DO NOT conflict with the actions of the EOPs if adequate resources are available. (For example, IF during the performance of the EOPs there are indications of abnormal RCP conditions, THEN the RCP Abnormal Procedure SHOULD be performed in parallel with the EOP in effect.)" In addition, the CAUTION in E-3 prior to the cooldown step which states that "Following initiation of controlled cooldown or depressurization, RCP trip criteria is no longer applicable" is designed to apply to the RCP TRIP CRITERIA found in many EOPs, and does NOT apply to conditions which could severely damage the RCP itself.
- C. Incorrect. Plausible because of the CAUTION which exists prior to Step 10, "Initiate RCS Cooldown," could be interpreted by the candidate to apply to ALL RCP trip criteria. Incorrect because the CAUTION in E-3 prior to the cooldown step which states that "Following initiation of controlled cooldown or depressurization, RCP trip criteria is no longer applicable" is designed to apply to the RCP TRIP CRITERIA found in many EOPs, and does NOT apply to conditions which could severely damage the RCP itself.
- D. Incorrect. Plausible if the candidate recognizes the need to trip the RCP, but is not aware (per A-503.1, Section 5.2.A.6) that the actions of the AOP should be performed in parallel with the EOP.

Technical Reference(s): A-503.1; E-3; AP-CCW.3 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: REC50, 1.18

Question Source: Bank/VISION # 110219 (108449)
 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
55.43 .5

Justification for K/A Match:

Matches the K/A by requiring an assessment of how an abnormal procedure's significant action can be implemented while performing a major action in the EOPs.

SRO-only because it requires an assessment of plant conditions (RCP trip criteria in AOP) during the performance of an EOP and selecting a portion of the abnormal procedure to perform to prevent damage to the RCP.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		3
	Group #		4
	K/A #	2.4.47	
	Importance Rating		4.2

Ability to diagnose and recognize trends in an accurate and timely manner, utilizing the appropriate control room reference material

SRO Question #100

Given the following plant conditions:

- MSLB has occurred which resulted in an imminent PTS condition
- The crew has completed all required actions, and at 1000 determine that an RCS soak is required

The following RCS cold leg temperatures are subsequently recorded:

1000: 285°F
1030: 265°F
1100: 265°F
1130: 245°F
1200: 245°F
1230: 245°F
1300: 245°F

Based on this data, AT WHAT TIME is the soak period considered complete?

- A. 1100
- B. 1200
- C. 1230
- D. 1300

Answer: C

Explanation:

- A. Incorrect. Plausible if the candidate believes that "soak" is completed when two consecutive time period readings result in no change in temperature (1030 and 1100). Incorrect because the temperature being stable must last for 1 hour.
- B. Incorrect. Plausible if the candidate believes that the "soak" is completed when a minimum of two consecutive time period readings result in no change in temperature.
- C. CORRECT. Since the temperature reached 245°F at 1130, the 1-hr soak period required by the EOP would be completed at 1230, since temperature remained at 245°F for 1 hr.
- D. Incorrect. Plausible if the candidate believed that the soak was completed when 4 temperature readings remained the same value.

Technical Reference(s): FR-P.1 Background and EOP setpoint J.3 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: RFRP1C 2.1

Question Source: Bank/VISION # 59962
 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 _____
 55.43 .2

Justification for K/A Match:

Matches K/A by requiring whether the requirements for a 1-hr soak had been met, per the Background and Setpoint document, after assessing temperature trends.

SRO-only because it requires knowledge of the definition of "soak" in the EOP Background and Setpoint documents and an evaluation of when the cooldown can be continued in FR-P.1.

R. E. Ginna 2014 NRC Examination
RO/SRO Answer Key

1.	A	26.	B	51.	B	76.	D
2.	C	27.	A	52.	D	77.	B
3.	C	28.	D	53.	A	78.	D
4.	D	29.	A	54.	D	79.	C
5.	B	30.	B	55.	C	80.	B
6.	B	31.	B	56.	A	81.	D
7.	C	32.	C	57.	D	82.	D
8.	C	33.	B	58.	C	83.	D
9.	C	34.	A	59.	B	84.	D
10.	B	35.	A	60.	A	85.	C
11.	C	36.	D	61.	A	86.	C
12.	D	37.	B	62.	C	87.	B
13.	A	38.	A	63.	D	88.	A
14.	B	39.	D	64.	D	89.	A
15.	D	40.	B	65.	B	90.	C
16.	B	41.	B	66.	D	91.	A
17.	D	42.	C	67.	C	92.	A
18.	C	43.	B	68.	D	93.	A
19.	A	44.	B	69.	D	94.	C
20.	D	45.	D	70.	B	95.	D
21.	A	46.	D	71.	C	96.	C
22.	A	47.	A	72.	C	97.	C
23.	D	48.	A	73.	B	98.	A
24.	C	49.	C	74.	B	99.	B
25.	D	50.	B	75.	A	100.	C

Answer Distribution: RO	Answer Distribution: SRO	Answer Distribution: Overall
Number of A's = 17	Number of A's = 6	Number of A's = 23
B's = 21	B's = 4	B's = 25
C's = 17	C's = 8	C's = 25
D's = 20	D's = 7	D's = 27