Site Specific RO Written Examination
Cover Sheet

U. S. Nuclear Regulatory Commission

Site Specific RO Written Examination

Applicant Information

Name:	
Date:	Facility/Unit: **Beaver Valley Unit 2**
Region: I ☒ II ☐ III ☐ IV ☐	Reactor Type: W ☒ CE ☐ BW ☐ GE ☐
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. Examination papers will be collected 6 hours after the examination begins.

Applicant Certification

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

_____
Applicant's Signature

Results

Examination Values	75 Points
Applicant's Scores	_____ Points
Applicant's Grade	_____ Percent

Beaver Valley Unit 2 NRC Written Exam (2LOT15)

1. The plant is at 100% power with all systems in normal alignment **EXCEPT**:
   - Power Range Channel N-44 has been declared inoperable
   - Power Range Channel N-44 has been removed from service IAW AOP-2.2.1C, "Power Range Channel Malfunction"

   Power Range Channel N-43 NOW fails HIGH.
   - All systems function as designed
   - No Operator Actions have been taken

   Which, of the below listed First Out Annunciators (ANN. A5), will alarm in the **FIRST** 45 seconds **AFTER** N-43 fails High?

   (1) A5-1D 2/3 Loops Overtemp ΔT Reactor Trip
   (2) A5-2A Reactor Protection System Train A Trouble
   (3) A5-5G Reactor Trip Due To Turbine Trip
   (4) A5-6B Turbine Anti-Motoring Turbine Trip
   (5) A5-6D Turbine Trip Due To Reactor Trip
   (6) A5-7D Generator Trip Due To Turbine Trip

A. 1, 3, 5, 6 **ONLY**

B. 2, 4, 6 **ONLY**

C. 3, 5, 6 **ONLY**

D. 1, 2, 3, 4 **ONLY**

Answer: C

Explanation/Justification: K/A is met because the candidate must determine which First Out Annunciators on the A5 panel (Rx trip status panel) will alarm 45 seconds after a Rx Trip occurs.

A. Incorrect. (1) is plausible if it is not known that N-44 does NOT input into OTΔT trip setpoint calculation. Therefore this alarm will NOT be energized.

B. Incorrect. (2) is plausible because candidate may confuse rod control urgent alarm with protection system trouble. Rod control urgent will energize on the trip. (4) Anti-motoring would alarm if the output breakers did not open. Plausible if the stem of the question didn't state that all systems functioned as designed.

C. Correct. The reactor will trip due to actions of N-44 failing having been completed which places N-44 bistable to TRIP, then N-43 fails High meeting the required 2/4 PR high Rx trip coincidence. These 3 are normal Rx trip annunciators, and reasons for the other annunciators are not correct are given in the other explanations.

D. Incorrect. (1) is plausible if it is not known that N-44 does NOT input into OTΔT trip setpoint calculation. (2) is plausible because candidate may confuse rod control urgent alarm with protection system trouble. Rod control urgent will energize on the trip. (4) Anti-motoring would alarm if the output breakers did not open. Plausible if the stem of the question didn't state that all systems functioned as designed.

Sys #	System	Category	KA Statement
000007	Reactor Trip /1	EK2 Knowledge of the interrelations between a reactor trip and the following:	Reactor trip status panel

K/A# EK2.03 **K/A Importance** 3.5 **Exam Level** RO

References provided to Candidate None **Technical References:** 1.4.AAD, 26.4.AAI and 35.4.AAF UFSAR Fig. 7.3-8 Rev. 14

Question Source: Bank - 2LOT6 NRC Exam (Q1)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.7 / 45.7)

Objective:

2. The plant was operating at 100% power when the reactor tripped on low PRZR pressure.

[2RCS-PI472], Pressurizer Relief Tank pressure indicates 35 psig. The crew suspects that a PORV opened inadvertently and is now stuck partially open.

Which of the following confirming indications could be expected if a PORV is stuck partially open?

A. PORV relief line temperature stabilized at 281°F, and the PRZR safety relief line temperatures are slowly rising.

B. PORV relief line temperature stabilized at 259°F, and the PRZR safety relief line temperatures are slowly rising.

C. PORV relief line temperature stabilized at 281°F, and the PRZR safety relief line temperatures indicate ambient temperature and stable.

D. PORV relief line temperature stabilized at 259°F, and the PRZR safety relief line temperatures indicate ambient temperature and stable.

Answer: A

Explanation/Justification: K/A is met because the partially open PORV will be discharging PRZR vapor space to the PRT. The candidate will have to evaluate the condition to determine what the temperature is at the outlet of a throttled valve (PORV) based on the determined saturation pressure, then using system flowpath knowledge determine if the PRZR safety relief line temperatures will sense this temperature change.

A. Correct. 281°F is the saturation temperature corresponding to 50 psia. The safety relief lines would be rising because they share a common discharge line to the PRT with the PORV's.
B. Incorrect. 259°F is approximately the saturation temperature corresponding to 35 psia (35 psig PRT pressure = 50 psia). Safety relief line temperatures would be rising because they share a common discharge line to the PRT with the PORV's.
C. Incorrect. 281°F is the saturation temperature corresponding to 50 psia. Plausible to have the safety relief line temperatures ambient temp if it was not known that they share a common discharge line to the PRT with the PORV's.
D. Incorrect. 259°F is approximately the saturation temperature corresponding to 35 psia (35 psig PRT pressure = 50 psia). Plausible to have the safety relief line temperatures ambient temp if it was not known that they share a common discharge line to the PRT with the PORV's.

Sys #	System	Category	KA Statement
000008	Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) / 3	AK1. Knowledge of the operational implications of the following concepts as they apply to a Pressurizer Vapor Space Accident:	Thermodynamics and flow characteristics of open or leaking Valves

K/A# AK1.01 **K/A Importance** 3.2 **Exam Level** RO

References provided to Candidate Steam Tables **Technical References:** Steam Tables U2 RM-0406-001 Rev. 27

Question Source: Bank - Vision #135831

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

Objective:

3. The plant is at 100% power.

- Annunciator A2-5C, Reactor Coolant Pump Vibration Alert/Danger Alarms
- 'B' RCP shaft vibration is 16 mils and stable
- 'B' RCP frame vibration is 1 mil and stable
- The crew enters AOP-2.6.8, "Abnormal RCP Operation"

While performing the actions of AOP-2.6.8, the following additional alarms and indications are received:

- A2-5D, Reactor Coolant Pump Seal Vent Pot Level High/Low (RCP 21B Seal Pot Lvl High, computer address point L0508D)
- A2-4D, Reactor Coolant Pump Seal Trouble (RCP 21B Seal Lk Off, 2CHS-FT155B Low, computer address point F0128D)
- RCP 21B Seal Lk Off, 2CHS-FT155B is 0.80 gpm and stable

Based on these alarms and indications, which 'B' RCP seal has failed?

A. #1 seal

B. #2 seal

C. #3 seal

D. Low pressure seal

Answer: B

Explanation/Justification: K/A is met because the 'B' RCP has a high vibration condition which leads to a coolant pump seal failure. The candidate must analyze the indications given to determine which seal has failed due the malfunction.

A. Incorrect. If #1 seal had failed seal leak-off flow would be high NOT low.
B. Correct. IAW 2OM-7.4.AAH, 6.4.AAE and AOP-2.6.8
C. Incorrect. If #3 seal had failed the seal vent pot level low would be indicated NOT high.
D. Incorrect. The low pressure seal is not functional when the motor is coupled to the pump.

Sys #	System	Category	KA Statement
000015/000017	Reactor Coolant Pump (RCP) Malfunctions / 4	AK2. Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following:	RCP seals

K/A# AK2.07 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-6.4.AAE Rev. 12, 2OM-7.4.AAH Rev. 22

Question Source: Bank - 2LOT6 NRC Exam (Q4)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.7 / 45.7)

Objective:

4. The plant is at 100% power.

- A Loss of Charging occurs due to 2CHS*MOV289, 'Normal Charging Header Isol Vlv' failing CLOSED
- Immediate Operator Actions of AOP-2.7.1, "Loss of Charging or Letdown", have been completed
- NO other actions have been completed
- Total Seal Injection flow is 20 gpm
- Total Seal Water Leakoff is 9 gpm

1) How long will it take to receive A4-1C, Pressurizer Control Level Deviation High/Low alarm?

2) Will the Pressurizer Level Deviation alarm be HIGH or LOW?

A. 1) 22 - 28 minutes
   2) High

B. 1) 41 - 49 minutes
   2) High

C. 1) 4 - 6 minutes
   2) Low

D. 1) 10 - 15 minutes
   2) Low

Answer: B

Explanation/Justification: K/A is met because the candidate must determine how the PRZR level will respond to a loss of charging and letdown (due to AOP IOAs). The candidate must realize that with the charging pump still in service (given that seal injection flow is 20 gpm) and seal leakoff flow, PRZR level will still change even with a Loss of Reactor Coolant Makeup flowpath.

Net charging = (Charging flow) + (Total seal inj flow) – (Letdown flow) – (Total seal leakoff), 1% PRZR level =100 gal. PRZR level deviation setpoint is +/-5% above/below program level

A. Incorrect. It will take 25 minutes to receive the HIGH deviation if it is assumed that Letdown is isolated and all seal injection flow is entering the RCS/PRZR. The misconception is that 9 gpm is seal leakoff going back to charging pump suction..

B. Correct. It will take 45 minutes to receive the HIGH deviation. (0 charging) + (20 seal inj) - (Letdown) - (9 leakoff) = 11 gpm net charging. 500 gal/11 gal=45 min to raise PRZR 5% above program level.

C. Incorrect. It would take ~5 minutes to receive the LOW deviation if it is not recognized that Letdown was isolated as an IOA and misconceptions of seal injection volume entering the RCS. 0 + 20 -105 – 9 = (500/94 gpm) = 5.3.

D. Incorrect. It would take ~10 minutes to receive the LOW deviation if it is not recognized that Letdown was isolated (only 1 orifice in service) as an IOA and misconceptions of seal injection volume entering the RCS. 0 + 20 – 60 – 9 = (500/49 gpm)= 10.2, or using 45 gpm orifice (500/34)=14.7.

Sys #	System	Category	KA Statement
000022	Loss of Reactor Coolant Makeup / 2	AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Makeup:	Relationship between charging flow and PZR level

K/A# AK1.03 **K/A Importance** 3.0 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.7.1 Rev 6, 2OM-6.4.AAL Rev. 8, 2OM-6.1.C Rev. 5 pg.12

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

Objective:

5. The following conditions exist:
   - Plant is in Mode 5
   - A1-2G, INCORE INSTR ROOM/CNMT SUMP LEVEL HIGH/VALVE NOT RESET is in alarm
   - RHR HX A INLET TEMP is 113°F and STABLE
   - 2RHS*FCV605A, RHS TRAIN A HX BYPASS FLOW CONTROL valve has OPENED an additional 5% in response to the leak

   Based on the given conditions:

   1) Which of the following identifies the location of the leak in the RHR system?

   2) Which of the following procedures would be used to isolate the affected train of RHR?

A. 1) RHS*MOV720A, 'RHS Train Return to B Loop Isolation' INLET flange
   2) AOP-2.10.1, "Loss of Residual Heat Removal Capability"

B. 1) RHS*MOV720A, 'RHS Train Return to B Loop Isolation' INLET flange
   2) AOP-2.6.5, "Shutdown LOCA"

C. 1) 2RHS-E21A, "A' RHR HX' OUTLET flange
   2) AOP-2.10.1, "Loss of Residual Heat Removal Capability"

D. 1) 2RHS-E21A, "A' RHR HX' OUTLET flange
   2) AOP-2.6.5, "Shutdown LOCA"

Answer: C

Explanation/Justification: K/A is met by the following. Based on the response of the Bypass Flow Control valve, the candidate must determine the leak location within the RHR system. Once the location is determined, the candidate must decide which AOP would be used to mitigate and isolate the leak in the RHR system.

A. Incorrect. A leak at the inlet of RHS-MOV720A is downstream of (FT605A) flow element, therefore the loss in flow would not cause FCV-605A to respond because it is not seen by the flow element. AOP-2.10.1 is the correct procedure for plant conditions.

B. Incorrect. A leak at the inlet of RHS-MOV720A is downstream of (FT605A) flow element, therefore the loss in flow would not cause FCV-605A to respond because it is not seen by the flow element. AOP-2.6.5 is used for a loss of coolant accident when in mode 3 (after the accumulators are isolated) or mode 4.

C. Correct. A leak at the outlet of the RHR Hx will cause flow to be lower at (FT605A) flow element downstream of the Hx and FCV. This reduced flow will cause FCV-605A to open to raise flow back to the desired setpoint. AOP 2.10.1 is the correct procedure when there is a loss of coolant accident in mode 5 & 6.

D. Incorrect. This is the correct leak location, but the incorrect procedure for the plant conditions. AOP-2.6.5 is used for a loss of coolant accident when in mode 3 (after the accumulators are isolated) or mode 4.

Sys #	System	Category	KA Statement
000025	Loss of Residual Heat Removal System (RHRS) / 4	AA2. Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System:	Location and isolability of leaks

K/A# AA2.04 **K/A Importance** 3.3* **Exam Level** RO

References provided to Candidate None **Technical References:** RM-0410-001 Rev. 16; 2OM-53C.4.2.10.1 rev. 12 pgs.1 & 14

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective:

6. The plant was operating at 100% power when a main steam line break occurred inside containment.

The following conditions exist:

- The Reactor automatically tripped
- Containment pressure peaked at 15 psig
- The crew is performing the actions of E-0, "Reactor Trip and Safety Injection"

In accordance with E-0, what is the expected crew response for the Reactor Coolant Pumps (RCPs), and why?

1) The RCPs should be _____.

2) Because _____.

A. 1) monitored for proper operation
2) Safety Injection could cause damage to the pump seals due to maximum seal injection flow

B. 1) monitored for proper operation
2) thermal barrier and motor cooling flow was secured

C. 1) tripped
2) Safety Injection could cause damage to the pump seals due to maximum seal injection flow

D. 1) tripped
2) thermal barrier and motor cooling flow was secured

Answer: D

Explanation/Justification: K/A is met because the candidate must know that E-0 gives the guidance to trip the RCPs if a CIB occurs. The reason for the trip is that primary component cooling water is isolated to the thermal barrier and motor.

A. Incorrect. With a CIB occurring, monitoring the RCPs would be inappropriate. The correct action is to trip the RCPs. It is not a correct statement regarding Safety Injection initiation since Seal Injection flow is limited by Tech Specs for the explicit purpose of not affecting Safety Injection flow into the RCS when actuated. Plausible distractor if they do not remember that seal injection flow is limited to a maximum of 28 gpm by TSs.

B. Incorrect. With a CIB occurring, monitoring the RCPs would be inappropriate. The correct action is to trip the RCPs. It is correct that a loss of CCP flow to the RCPs has occurred due to the CIB.

C. Incorrect. Tripping the RCPs is correct per E-0 LHP. It is not a correct statement regarding Safety Injection initiation since Seal Injection flow is limited by Tech Specs for the explicit purpose of not affecting Safety Injection flow into the RCS when actuated. Plausible distractor if they do not remember that seal injection flow is limited to a maximum of 28 gpm by Tech Specs.

D. Correct. With Containment pressure peaking at 15 psig, CIB occurred and isolated (CCP) to both 'A' & 'B' containment headers. This will remove cooling water to the thermal barrier, upper & lower bearing cooler, and the stator cooler. In accordance with E-0 LHP, it is required to trip the RCPs on a loss of CCP flow to the RCPs.

Sys #	System	Category	KA Statement
000026	Loss of Component Cooling Water (CCW) / 8	AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water:	Guidance actions contained in EOP for Loss of CCW

K/A# AK3.03 **K/A Importance** 4.0 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.E-0 Iss. 2 Rev.1 LHP
2OM-53B.5.GI-6 Iss. 1C Rev.1 pg.45

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.5,41.10 / 45.6 / 45.13)

Objective:

7. The plant is at 75% power with all systems in normal alignment for this power level **EXCEPT** [2RCS*MOV535] PORV 455C MOTOR OPERATED ISOL VLV is **CLOSED** due to PORV seat leakage.

- [2RCS*PK444A] PRZR PRESS CONTROL output fails to 10% in Automatic
- No Operator action is taken

What is the status of the plant 15 minutes after this event?

A. The plant will trip due to a PRZR Pressure LOW reactor trip.

B. The plant will trip due to a PRZR Pressure HIGH reactor trip.

C. The plant will remain at power and RCS pressure will cycle around the PORV setpoint.

D. The plant will remain at power and RCS pressure will cycle around the PRZR Code Safety setpoint.

Answer: C

Explanation/Justification: K/A is met by the knowledge required to determine that the purpose of 2RCS*PK444A is to control PRZR pressure and how the controller will function when it fails to 10%. This knowledge will encompass the response of the PORVs in the non-affected portion of the Pressurizer Pressure Control System, and the control function side with the heaters and spray valves, and the resulting 455C PORV being isolated.

A. Incorrect. Plausible if 2RCS*PK444 output failed high, causing both spray valves to open fully and depressurize the RCS until LP Rx trip occurs.
B. Incorrect. Plausible distractor because pressure would rise to 2375 psig and cause a HP Rx trip if the PORVs didn't lift at 2335 psig. Candidate must know the that the Rx trip setpoint is higher than the PORV opening setpoint, and that the PORV will prevent the trip setpoint from being reached.
C. Correct. The plant will remain at power and the pressure will cycle between the PORV auto open setpoint of 2335 psig, and the LP PORV block at 2185 psig. This will occur only on 456 & 455D since 455C is manually isolated.
D. Incorrect. Plausible distractor if it is not recognized that the code safety setpoint is 2475 psig, and PORVs 456 & 455D are available. The PORV 455C was isolated in the question stem due to it being controlled from PK444A. Making the code safety a plausible distractor.

Sys #	System	Category	KA Statement
000027	Pressurizer Pressure Control System (PZR PCS) Malfunction / 3	Generic	Knowledge of the purpose and function of major system components and controls.

K/A# 2.1.28 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-6.4.IF Att.2 Rev.13

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7)|

Objective:

8. The crew is implementing FR-S.1, "Response to Nuclear Power Generation/ATWS".

Which of the following combinations of breaker positions indicate that the reactor has been tripped?

Note: The Motor Generator INPUT Breakers are both closed.

- RTA = Reactor Trip Breaker A
- RTB = Reactor Trip Breaker B
- BYA = Reactor Trip Bypass Breaker A
- BYB = Reactor Trip Bypass Breaker B
- MG21 = MG21 output Breaker
- MG22 = MG22 output Breaker

LEGEND: X = CLOSED; O = OPEN

	RTA	RTB	BYA	BYB	MG21	MG22
A.	X	X	O	O	X	O
B.	X	O	O	X	O	X
C.	O	X	X	O	X	X
D.	X	O	X	O	X	X

Answer: D

Explanation/Justification: K/A is met by the knowledge required to determine which combination of Rx trip, bypass, or motor generator output breaker positions will trip the reactor during an ATWS.

A. Incorrect. Only one MG set breaker is open. Both required to be open to trip reactor.
B. Incorrect. RTA and BYB closed will provide flowpath to the rod coils. Only one MG set breaker is open. Both required to be open to trip reactor.
C. Incorrect. RTB and BYA closed will provide flowpath to the rod coils.
D. Correct. With both RTB and BYB open, the MG set output supply to the rod coils is interrupted, which will result in the rods dropping into the core (a reactor trip).

Sys #	System	Category	KA Statement
000029	Anticipated Transient Without Scram (ATWS) / 1	EK2 Knowledge of the interrelations between the and the following an ATWS:	Breakers, relays, and disconnects

K/A# EK2.06 **K/A Importance** 2.9* **Exam Level** RO
References provided to Candidate None **Technical References:** Westinghouse 2001.409-001-018 Rev. L
Question Source: Bank – DC Cook 2012 NRC Exam (Q46)
Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.7 / 45.7)
Objective:

9. Given the following conditions:

- Rx Tripped due to SGTR on 21A SG
- Safety Injection is actuated
- E-3, "Steam Generator Tube Rupture" is in progress
- The crew is currently isolating flow from the ruptured SG

1) What causes 2SSR*AOV117A, '21A SG Blowdown Sample Outside Cnmt Isol Vlv' to close on a SG tube rupture?

2) What is this purpose for isolating the normal sample flowpath from the ruptured Steam Generator in E-3?

A. 1) Steam Generator Blowdown Sample Radiation Monitor 2SSR-RQ100 High Alarm
2) To conserve Steam Generator inventory.

B. 1) CIA Signal
2) To minimize radiological releases from the ruptured SG.

C. 1) Steam Generator Blowdown Sample Radiation Monitor 2SSR-RQ100 High Alarm
2) To minimize radiological releases from the ruptured SG.

D. 1) CIA Signal
2) To conserve Steam Generator inventory.

Answer: C

Explanation/Justification: K/A is met by the knowledge required to determine that 2SSR*AOV117A '21A SG Blowdown Sample Outside Cnmt Isol Vlv' will automatically close due to a High radiation monitoring alarm on 2SSR-RQ100, and the reason for the isolation is to minimize radiological releases from the ruptured SG.

A. Incorrect. 2SSR*AOV117A is closed by 2SSR-RQI100 High Alarm. The reason to isolate the normal flowpath is to minimize radiological releases. Plausible distractor thinking that conserving inventory is the priority in E-3.
B. Incorrect. CIA is not correct. Plausible distractor because 2SSR* AOV117A is an Outside CNMT Isol valve, but it is not a CIA valve that closes when CIA actuates (SI actuated in stem). Minimize radiological releases from the ruptured SG is correct.
C. Correct. 2SSR*AOV117A is closed by 2SSR-RQI100 High Alarm. Minimize radiological releases from the ruptured SG is correct
D. Incorrect. CIA is not correct. Plausible distractor because 2SSR* AOV117A is an Outside CNMT Isol valve, but it is not a CIA valve that closes when CIA actuates (SI actuated in stem). Plausible distractor thinking that conserving inventory is the priority in E-3.

Sys #	System	Category	KA Statement
000038	Steam Generator Tube Rupture (SGTR) / 3	EK3 Knowledge of the reasons for the following responses as the apply to the SGTR:	Automatic actions associated with high radioactivity in S/G sample lines.

K/A# EK3.03 **K/A Importance** 3.6* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53B.4.E-3 Iss. 1C Rev. 19
2OM-43.1.E Rev. 6
U2 RM-0414A-001 Rev. 18

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR 41.5 / 41.10 / 45.6 / 45.13)

Objective: 2SQS-43.1 Obj. 7 Describe the control, protection and interlock functions for the control room components associated with the Radiation Monitoring System, including automatic functions, and changes in equipment status as applicable.

10. The following conditions exist:

- The plant is at 75% power with all systems in normal alignment for this power level
- Charging pump 2CHS*P21A is RUNNING
- Condensate pumps 2CNM-P21A and B are RUNNING

A loss of 4160V Bus 2D occurs with all equipment operating as designed.

What procedure will the crew use to mitigate this event?

A. E-0, "Reactor Trip Or Safety Injection"

B. AOP 2.24.1, "Loss Of Main Feedwater"

C. AOP 2.7.1, "Loss Of Charging Or Letdown"

D. AOP 2.36.2, "Loss of 4KV Emergency Bus"

Answer: B

Explanation/Justification: K/A is met by having the candidate determine what equipment will be lost based on interpreting the conditions given, after which they will determine that only 1 MFW pump was lost, and Loss Of Main Feedwater AOP is the appropriate procedure.

A. Incorrect. Plausible because the candidate may think a RCP will be lost, or a condensate pump would trip ('C' is powered by 'D' Bus), or if they are thinking that we lost the 'B' MFP, without knowing that the AOP states <80% power, then reduce power to <52%.

B. Correct. With the plant at 75% power, AOP 2.24.1 is the correct procedure to mitigate the loss of 1 MFP when at power and <80%. The candidate should know by AOP-2.24.1 IOAs that the Rx should not be tripped if the plant is <80% power.

C. Incorrect. Plausible if the candidate thinks 2CHS-P21A is lost due to the bus loss, but this is incorrect.

D. Incorrect. Plausible if the candidate does not think the 'DF' bus will be energized by the 2-2 EDG. This is incorrect because the stem states that all equipment operated as designed.

Sys #	System	Category	KA Statement
000054	Loss of Main Feedwater (MFW) / 4	AA2. Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW):	Differentiation between loss of all MFW and trip of one MFW pump

K/A# AA2.02 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.24.1 Rev. 6 pg. 2

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective:

11. The following conditions exist:

- The plant has tripped due to a loss of all 4Kv power
- The crew is performing ECA-0.0, "Loss of All AC Power"
- The BOP Operator is placing equipment in PTL in accordance with step 13 of ECA-0.0

Which of the following components will **NOT** be placed in PTL during this step, and what is the basis for not removing this component from service?

A. Auxiliary Feedwater pump; provide sufficient water to maintain an effective secondary heat sink.

B. Primary Component Cooling Pump; provide cooling to the Reactor Coolant Pump thermal barrier.

C. Charging Pump; provide cooling to the Reactor Coolant Pump seals.

D. Service Water Pump; provide cooling to the Emergency Diesel Generator.

Answer: D

Explanation/Justification: K/A is met by the knowledge that ECA-0.0 places equipment to PTL to defeat automatic loading of large loads on the AC emergency bus with the exception of the Service Water Pumps. The knowledge of the bases of the SW pump remaining available to load on a diesel start to provide diesel cooling is expected RO knowledge.

A. Incorrect. MDAFW pumps are not required immediately after power restoration and are considered a large load. The goal of this step is to avoid potential overload of the energized emergency bus. During ECA-0.0, sufficient AFW flow is provided by the turbine driven AFW pump, so heat sink is not a concern.

B. Incorrect. CCP pumps are not required immediately after power restoration and are considered a large load. The goal of this step is to avoid potential overload of the energized emergency bus. Providing cooling flow to the hot thermal barrier is not required at this time.

C. Incorrect. Charging pumps are not required immediately after power restoration and are considered a large load. The goal of this step is to avoid potential overload of the energized emergency bus. Providing cooling flow to the hot RCP seals could cause thermal shock to the seals & shaft.

D. Correct. Service water pump auto start is desired to provide cooling to the EDG in the event it is locally restored. This is stated as a caution prior to step 13 and switches are placed to Auto in step 1 of Att. A-1.5 for starting the diesel locally.

Sys #	System	Category	KA Statement
000055	Loss of Offsite and Onsite Power (Station Blackout) / 6	Generic	Knowledge of the specific bases for EOPs.

K/A# 2.4.18 **K/A Importance** 3.3 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.ECA-0.0 Rev. 1 Iss. 2 pg. 4 & 9; 2OM-53B.4.ECA-0.0 Rev. 1 Iss. 2 pg 84; 2OM-53A.1.A-1.5 Iss. 1C Rev. 5

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 43.1 / 45.13)

Objective:

12. The plant has been operating at 100% power with all systems in NSA for the past 100 days.
    - An inadvertent reactor trip occurs coincident with a loss of offsite power
    - All systems function as designed
    - The crew is implementing the actions of ES-0.2, "Natural Circulation Cooldown"
    - RCS temperature is 350°F and stable
    - RCS Subcooling is 200°F and stable
    - RCS Pressure 1200 psig and stable
    - RCS cooldown rate is 20°F/hr and stable

    Alarm A11-5G, CRDM Shroud Fan Auto-Start/Auto-Stop is received. ALL CRDM shroud fans have tripped and cannot be restarted.

    What ramifications will the loss of these CRDM Shroud Fans have on the continued performance of ES-0.2, "Natural Circulation Cooldown"?

A. Further RCS cooldown (below 350°F) cannot continue UNTIL a suitable RX vessel head soak has been performed.

B. Further RCS depressurization (below 1200 psig) cannot continue UNTIL a suitable RX vessel head soak has been performed.

C. Immediately INCREASE RCS pressure 100 psig to RAISE RCS subcooling.

D. Immediately DECREASE RCS pressure 100 psig to LOWER RCS subcooling.

Answer: B

Explanation/Justification: K/A is met with the knowledge of ES-0.2 major action step of the requirement to cooldown and depressurize RCS with no upper head void growth when RCS forced flow is lost. Knowledge that the CRDM cooling units offer alternative cooling to the upper vessel head region during NC cooldown since core bypass flow existing with forced convection is lost to the upper head region is important to cooling down the head.

A. Incorrect. With the CRDM fans lost, the RCS pressure is held at 1200 psig while the RCS is cooled down below 350F. At these conditions there is approx. 200F of subcooling is required for the RCS due to the heat buildup in the head. The 9 hour soak time will ensure the head cools off sufficiently since the CRDM fans were lost

B. Correct. IAW ES-0.2 step 15. Without any CRDM fans running, subcooling requirements will be more than 3 times greater (200F). The CRDM fans provide alternate cooling to the upper vessel head region during NC C/D since core bypass flow existing with forced convection C/D is lost in the upper vessel head region. Since this forced cooling is lost, a 9 hr soak is required to ensure the head cools to less than saturation temp for 400 psig.

C. Incorrect. Raising pressure 100 psig is a technique employed by ES-0.4 natural circulation procedure when the head void growth becomes too large.

D. Incorrect. Minimizing Subcooling is a technique employed when RX vessel stresses are the concern but NOT when RX vessel head voids are the concern. Decreasing pressure may actually cause a void to form.

Sys #	System	Category	KA Statement
000056	Loss of Offsite Power / 6	AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power:	Principle of cooling by natural convection

K/A# AK1.01 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.ES-0.2 Iss. 2 Rev. 1 step 15
2OM-53B.4.ES-0.2 Iss. 2 Rev. 1 pg. 51

Question Source: Bank-2LOT6 NRC Exam (Q27)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** CFR 41.8 / 41.10 / 45.3)

Objective:

13. Reactor power is at 46% with all systems in normal alignment **EXCEPT**:
    - Rod control is in MANUAL

    A loss of Vital Bus 2 occurs.

    Which of the following indications on Panel 308, PRI PLANT PARAMETERS STATUS panel will be LIT due to the loss of Vital Bus 2?

    1) PWR RNG N41 TO P-8
    2) PWR RNG N42 HIGH POWER SP
    3) PRZR LOW PRESS RX TRIP CHAN III
    4) SOURCE RNG N32 RX TRIP
    5) RCS LOOP A OTΔT RX TRIP
    6) RCS LOOP B OPΔT RX TRIP

A. 1, 3, 5

B. 2, 4, 6

C. 1, 4, 5

D. 2, 3, 6

Answer: B

Explanation/Justification: K/A is met by the candidate interpreting the effects of a loss of vital bus 2 will have on the RPS system, and determining which RPS panel alarms and trip indications will illuminate due to the loss of power/equipment out of service.

A. Incorrect. N41 to P-8 is normally lit when >30% power (also CH1 powered from VB1), PRZR LOW PRESS RX TRIP CHAN III is powered from VB3 and not effected, RCS LOOP A OTΔT RX TRIP is CH1 powered from VB1 and not effected.

B. Correct. PWR RNG N42 HIGH POWER SP, SOURCE RNG N32 RX TRIP, and RCS LOOP B OPΔT RX TRIP are all normally off when not above a setpoint condition. They are all CH2, so in this case, a loss of VB2 will cause the bistable lights to illuminate.

C. Incorrect. N41 to P-8 is normally lit when >30% power (also CH1 powered from VB1),, SOURCE RNG N32 RX TRIP will be lit due to the loss of VB3, and LOOP A OTΔT RX TRIP is CH1 powered from VB1.

D. Incorrect. PRZR LOW PRESS RX TRIP CHAN III is powered from VB3 and not effected, PRZR LOW PRESS RX TRIP CHAN III is powered from VB3 and not effected, RCS LOOP B OPΔT RX TRIP will be lit due to the loss of VB2.

Sys #	System	Category	KA Statement
000057	Loss of Vital AC Electrical Instrument Bus / 6	AA2. Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus:	RPS panel alarm annunciators and trip indicators

K/A# AA2.03 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.38.1B Rev. 6, pgs. 1, 18, 21

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective:

14. The plant is at 100% power.

- 21A Pri Comp Cooling Hx Temp Control Vlv 2CCP-TCV100A is in Manual
- 21B Pri Comp Cooling Hx Temp Control Vlv 2CCP-TCV100B is in Manual
- CCS Hx Bypass Temp Control Vlv 2CCS-TCV215 is in Auto
- An inadvertent Train 'A' CIA occurs

What are the effects on the Primary and Secondary Component Cooling Water Hx outlet temperatures 10 minutes after the inadvertent Train 'A' CIA occurs?

Primary Component Cooling Water Heat Exchanger (CCP) outlet Temperatures will __(1)__.

Secondary Component Cooling Water Heat Exchanger (CCS) outlet Temperatures will __(2)__.

A. 1) rise
   2) rise

B. 1) rise
   2) lower

C. 1) lower
   2) lower

D. 1) lower
   2) rise

Answer: D

Explanation/Justification: K/A is met by demonstrating knowledge of the increased service water flow through the CCP Hxs to the Circ Water pump suction when the secondary portion of service water is isolated. Secondary side of service water is isolated due to 2 Train 'A' CIA isolation valves closing, and isolating both SWS headers to the Secondary Cooling Water Hxs, thus causing a loss of CCS.

A. Incorrect. Temp will lower with more SW through the Hxs. Plausible distractor because they must know that Train 'A' CIA will close both 107A & C and isolate both Trains of SW to the CCS Hxs, not the CCP HXs (CCP Hxs are isolated on CIB). It is correct that CCS temps will rise.

B. Incorrect. Temp will lower with more SW through the Hxs. Plausible distractor because they must know that Train 'A' CIA will close both 107A & C and isolate both Trains of SW to the CCS Hxs, not the CCP HXs (CCP Hxs are isolated on CIB). CCS temps will rise with SW isolated.

C. Incorrect. CCP temp will lower due to increased SW flow through the CCP Hxs with the TCVs in manual and the secondary side SW isolated. Plausible distractor of CCS temperature lowering if candidate thinks only the 'A' SW header is isolated from the CCS Hxs, and CCS loads have reduced due to the CIA.

D. Correct. CCP temp will lower due to increased SW flow through the CCP Hxs with the TCVs in manual and the secondary side SW isolated. The inadvertent Train 'A' CIA will close 2SWS-MOV107A & C, isolating both SW headers from the CCS HX causing CCS temps to rise.

Sys #	System	Category	KA Statement
000062	Loss of Nuclear Service Water / 4	AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water:	Effect on the nuclear service water discharge flow header of a loss of CCW

K/A# AK3.04 **K/A Importance** 3.5 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-30.1.D Rev. 8, pg. 6, U2 RM -0430-001 and 003 2SQS-30.1 PPNT Rev. 23 Slide 11

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.4, 41.8 / 45.7)

Objective:

15. The plant is at 45% power with all systems in normal alignment for this power level **EXCEPT** Station Air Compressor 2SAS-C21A is on Clearance for motor replacement.

The following conditions exist:

- ERF Substation bus 1H has tripped on overcurrent
- A7-3C, 'Turbine Bearing/Autostop Oil Trouble' is in alarm due to a loss of power to Main Turb Bearing Oil Pump 2TML-P207
- No Operator actions have been taken

Based on the above indications, which of the following procedures would be entered to mitigate this event?

A. E-0, "Reactor Trip or Safety Injection"

B. AOP-2.26.1, "Turbine and Generator Trip"

C. AOP-2.34.1, "Loss of Station/Cnmt Instrument Air"

D. AOP-2.37.1, "Loss of 480V BUS 2N OR 2P"

Answer: C

Explanation/Justification: K/A is met by requiring the candidate to recognize the entry conditions for AOP-2.34.1 "Loss of Station/Cnmt Instrument Air" which are given in the stem of the question as bus 1H tripped on overcurrent which supplies bus 2J (power supply for 2SAS-C21B). With both SACs secured, the next air compressor to start will be 2SAS-C22 at 90 psig, therefore air pressure will be lowering. These 2 conditions are entry level conditions for loss of Station/Cnmt Instrument Air AOP.

A. Incorrect. Plausible is the candidate thinks the Rx will trip due to the Turb Bearing Oil Pump 2TML-P207 being de-energized causing a turbine trip, or if they think DC bus 2-6 (powered by 2K) will de-energize and trip the Rx similar to DC bus 2-1 or 2-2.

B. Incorrect. Plausible distractor with power <49% and receiving Turbine Bearing/Autostop Oil Trouble alarm. The cause of the alarm is due to Main Turb Bearing Oil Pump 2TML-P207 being de-energized. The candidate must realize that P207 is not running when the turbine is online, and will only auto start when Turb bearing oil header pressure is low. The Turbine will not trip with Bus 2K de-energized.

C. Correct. With the loss of the 1H 4160KV bus, a loss of the 480V 2J bus occurs. 2J supplies power to the 2SAS-C21B air compressor. When 'B' SAC trips, the stby air compressor 2SAS-C22 won't auto start until 90 psig. An entry condition for AOP 2.34.1 is running SAC trips, and Station Inst. Air pressure will be dropping.

D. Incorrect. Plausible if the candidate thinks the 1H bus supplies either the 2N or 2P 480v bus. Electrical system knowledge is required to not select this AOP.

Sys #	System	Category	KA Statement
000065	Loss of Instrument Air / 8	Generic	Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.

K/A# 2.4.4 **K/A Importance** 4.5 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.34.1 Rev.18 pg. 1 & 2
1/2OM-53C.4A.58E.1 Rev. 9 pg. 8

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 43.2 / 45.6)

Objective:

16. The plant is at 45% power with all systems in normal alignment for this power level **EXCEPT** 2FWS-P21A, 'A' Main Feedwater Pump is cleared for bearing replacement.

- The crew is performing AOP-1/2.35.1, "Degraded Grid" due to grid voltage and frequency swings
- Control Rod Group Selector switch is in MANUAL due to N-44 failing LOW. **NO** other actions have been taken for the N-44 failure
- A 20% Load Rejection has occurred
- Tavg-Tref deviation is 8.5 °F and STABLE

Based on the above conditions, what are the required actions to restore the RCS Tavg-Tref deviation?

A. Manually Withdrawal Control Rods

B. Manually Insert Control Rods

C. Manually trip the Reactor

D. Manually trip the Turbine

Answer: B

Explanation/Justification: K/A is met by requiring the candidate to recognize that the control rods must be manually operated to lower Tavg due to the group selector switch being in manual when a load rejection occurs during the degraded grid event, and then recognize that the Tavg-Tref deviation of 8.5F is outside the expected band of +/- 2F.

A. Incorrect. Rod withdrawal would only make a larger Tavg-Tref deviation. Plausible distractor if there is a misunderstanding of which temperature the rods affect.

B. Correct. With a deviation of 8.5F due to a load rejection (Tref lowering & Tavg remaining constant), the rods will have to be driven inward to lower Tavg to Tref. If the rods were in auto, and N-44 was operable the rods would automatically drive inward to reduce the mismatch. AOP 2.35.2 (Load rejection) states to restore Tavg-Tref by manual rod insertion or boration. AOP-2.35.2 is directed by AOP-1/2.35.1.

C. Incorrect. Tripping the Rx is not required or directed. It is a plausible distractor due to the Tavg to Tref deviation. The Transient response Guidelines state to trip the Rx if the mismatch is +/- 10F and the cause cannot be readily determined. In this case the deviation is only 8.5F and there was a load rejection.

D. Incorrect. Tripping the Turbine is not required or directed. It is a plausible distractor because the initial conditions are <P9, larger than normal Tavg-Tref deviation, and AOP-1/2.35.1 has been implemented.

Sys #	System	Category	KA Statement
000077	Generator Voltage and Electric Grid Disturbances / 6	AA1. Ability to operate and/or monitor the following as they apply to Generator Voltage and Electric Grid Disturbances:	Reactor controls

K/A# AA1.04 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.35.2 Rev. 20

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 and 41.10 / 45.5, 45.7, and 45.8)

Objective:

17. The plant has tripped 3 hours ago from 100% power due to a RCS leak.

- The EOP network has been entered and plant conditions required a transition to ECA-1.1, "Loss Of Emergency Coolant Recirculation"
- Step 18, Establish Minimum SI Flow to Remove Decay Heat is being performed

Refer to attached ECA-1.1 step 18, and Attachment A-4.7, Minimum SI Flow Versus Time After Trip

What is the minimum **REQUIRED** Safety Injection flow and what injection flowpath will be used?

The minimum **REQUIRED** SI flow is _____(1)_____.

The injection flowpath that will be used is the _____(2)_____ flowpath.

A. (1) 380 gpm
(2) normal charging

B. (1) 380 gpm
(2) high head safety injection

C. (1) 220 gpm
(2) normal charging

D. (1) 220 gpm
(2) high head safety injection

Answer: D

Explanation/Justification: K/A is met by placing the candidate into a specific point of an EOP, and requiring them to determine the minimum injection flow and flowpath by which they will operate the Safety Injection system when in ECA-1.1, "Loss Of Emergency Coolant Recirculation".

A. Incorrect. If the curve lower axis is read as hours, the flow requirement would be 380 gpm, however this exceeds the capacity of the normal charging flowpath.
B. Incorrect. If the curve lower axis is read as hours, the flow requirement would be 380 gpm, this would require the use of the HHSI flowpath.
C. Incorrect. The flow required is 220 gpm, however this is above the capacity of the normal charging flowpath.
D. Correct. Requires the use of the SI flow curve based upon time after the Reactor trip and an understanding of the injection flowpath capacities. Provided the value used as a determinant since this is not required information from memory. The time after trip for 3 hrs is 180 minutes, the curve is at 220 gpm at this point. Above 150 GPM, the HHSI flowpath is used. Step 18, Establish Minimum SI Flow to Remove Decay Heat will establish flow through either the Normal Charging Header with flow control from the Control Room or flow will be established through the HHSI injection flowpath with local operator action required to throttle flow. Even through the step wording is for SI flow to remove decay heat, injection is not always via the SI flowpath.

Sys #	System	Category	KA Statement
W/E11	Loss of Emergency Coolant Recirculation / 4	EA1. Ability to operate and / or monitor the following as they apply to the (Loss of Emergency Coolant Recirculation)	Desired operating results during abnormal and emergency situations.

K/A# EA1.3 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate 2OM-53A.1.A-4.7 R2 I1C; 2OM-53A.1.ECA-1.1 Rev 1 Iss 2 pg 14 - 17

Technical References: 2OM-53A.1.ECA-1.1 Rev 1 Iss 2; 2OM-53A.1.A-4.7 Rev 2 Iss1C

Question Source: Bank-1LOT14 NRC Exam (Q18)

Question Cognitive Level: Lower – Memory or Fundamental

10 CFR Part 55 Content: (CFR: 41.7 / 45.5 / 45.6)

Objective:

18. The plant was at 100% power.

- Main Steam Line break inside containment occurs
- Main Steam Line Isolation Valves failed to close
- Transition to ECA-2.1, "Uncontrolled Depressurization Of All Steam Generators" has occurred

Current plant conditions:

- SG A, B and C NR Level = 14% and slowly lowering
- CNMT pressure = 5.4 psig and lowering

In accordance with ECA-2.1, based on the above conditions:

1) The MINIMUM feed flow requirement for the Steam Generators is _____(1)_____.

2) The MAXIMUM cooldown rate allowed is _____(2)_____.

A. 1) 50 gpm each
2) <100 °F/hr

B. 1) 50 gpm each
2) <25 °F/hr

C. 1) 700 gpm total
2) <100 °F/hr

D. 1) 700 gpm total
2) <25 °F/hr

Answer: A

Explanation/Justification: K/A is met by requiring the candidate to understand the importance of monitoring and operating the plant to limit feed flow when all SGs are faulted. This is required in order to minimize cooldown rate if necessary, prevent overfilling the SGs, control RCS temperature when cooldown stops, and prevent SG tube dyrout. Based on these primary plant behaviors during an event in which all SGs are faulted, the candidate must have an understanding of how to monitor and operate the plant to limit the effects of thermal shock to the SG components.

A. CORRECT. Per ECA-2.1, if SG NR level < 12% [31% adverse], maintain a minimum of 50 gpm to each SG. With all 3 SGs blowing down in containment, adverse conditions do exist (5.4 psig). Cooldown rate is limited to <100 F/hr.

B. INCORRECT. Per ECA-2.1, if SG NR level < 12% [31% adverse], maintain a minimum of 50 gpm to each SG. Adverse conditions do exist (5.4 psig). 25 F/Hr is incorrect. Plausible distractor because natural circ cooldown is limited to 25F/hr.

C. INCORRECT. 700 gpm total is incorrect, but a plausible distractor because when adverse and <31% SG level, it is the required flow to removed heat generated when in FR-S.1. Cooldown rate is limited to 100 F/hr.

D. INCORRECT. 700 gpm total is incorrect, but a plausible distractor because when adverse and <31% SG level, it is the required flow to removed heat generated when in FR-S.1. 25F/hr cooldown is incorrect. Plausible distractor because natural circ cooldown is limited to 25F/hr.

Sys #	System	Category	KA Statement
W/E12	Uncontrolled Depressurization of all Steam Generators /4	EA1. Ability to operate and / or monitor the following as they apply to the (Uncontrolled Depressurization of all Steam Generators)	Operating behavior characteristics of the facility.

K/A# EA1.2 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.ECA-2.1 Iss.2 Rev. 0

Question Source: Bank - 2010 Surry NRC Exam (Q18) Modified

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 / 45.6)

Objective:

19. A Reactor Trip occurred from 60% power.

25 minutes post-trip the following conditions exist

- N-35 indicates 4 x 10^{-10} amps, SUR of 0 DPM
- N-36 indicates 1 x 10^{-11} amps, SUR of 0 DPM

Which of the following describes the current conditions?

A. N-35 is undercompensated.
N-31 and N-32 must be manually energized.

B. N-35 is undercompensated.
N-31 and N-32 energized automatically.

C. N-35 is overcompensated.
N-31 and N-32 must be manually energized.

D. N-35 is overcompensated.
N-31 and N-32 energized automatically.

Answer: A

Explanation/Justification: K/A is met by knowledge required of the effects of compensating voltage on the Intermediate range detectors, and how an undercompensated IR detector will provide inaccurate indications and prevent the source range detectors from automatically energizing.

A. Correct. With N-35 indicating 4 x E-10 25 minutes after the trip, it is undercompensated. Since it did not reach the P-6 setpoint of 1xE-10, SR detectors will not auto energize since the logic is 2/2 below P-6. N-31 and N-32 will have to be manually energized.
B. Incorrect. With N-35 indicating 4 x E-10 25 minutes after the trip, it is undercompensated. It is incorrect that SR will auto energize because 2/2 P-6 logic has not been met.
C. Incorrect. If N-35 was overcompensated, it would go below P-6 before N-35, and the 2/2 logic below P-6 would be met. It is correct that N-31 and N-32 will have to be manually energized since the 2/2 P-6 logic has not been met.
D. Incorrect. If N-35 was overcompensated, it would go below P-6 before N-35, and the 2/2 logic below P-6 would be met. It is incorrect that SR will auto energize because the 2/2 P-6 logic has not been met.

Sys #	System	Category	KA Statement
000033	Loss of Intermediate Range Nuclear Instrumentation / 7	AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of Intermediate Range Nuclear Instrumentation:	Effects of voltage changes on performance

K/A# AK1.01 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-2.1.B, Rev. 3 pg. 3 & 17
2OM-1.5.B.2 Iss. 4 Rev. 0

Question Source: Bank - Surry 2012 NRC Exam (Q22)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

Objective:

20. The following plant conditions exist:

- A discharge of the STEAM GENERATOR BLOWDOWN EVAPORATOR TEST TANK [2SGC-TK23B] TO UNIT 2 COOLING TOWER BLOWDOWN is ready to start.
- 60 hours have passed since sampling was completed (Currently 12-14-15 1400)
- Unit 1 is in Mode 4
- Unit 1 is discharging 1LW-TK-6A, LAUNDRY AND CONTAMINATED SHOWER DRAIN TANK
- Unit 1 COOLING TOWER BLOWDOWN FLOW from RCDR-ENV-MON-1 Ch. 3 is 12000 gpm
- 2CWS-FR101 COOLING TOWER BLOWDOWN FLOW recorder is reading 9400 gpm
- No expected reductions in actual cooling tower blowdown flow exists

Refer to attached RWDA-L for 2SGC-TK23B and 2OM-25.4L, pages 18-20

Based on the conditions above, which of the following statements are correct?

A. Cooling Tower Blowdown Flow is below the minimum allowed for discharge. Discharge can NOT start.

B. The permit is no longer effective due to exceeding the required time since the sample was taken. Discharge can NOT start.

C. Two tanks are not permitted to be discharged at the same time. Discharge can NOT start.

D. All conditions are satisfactory. Tank discharge is allowed.

Answer: C

Explanation/Justification: K/A is met by having the candidate interpret a discharge permit, and determine if a liquid radioactive-waste discharge can commence. The Liquid Waste Release (LWR) permit is designed to prevent an UNCONTROLLED release of radioactive materials to the environment in liquid effluents. The amount of dilution needed is based on the activity of the tank to be released. The dilution includes a limit on the tank release rate and the Cooling Tower Blowdown flowrate.

A. Incorrect. Plausible distractor with 2CWS-FR101 indicating 9400 gpm, which is less than the minimum cooling tower blowdown flow of 10000gpm. By using the open reference pages given, it should be determined that RWDA-L required minimum is based on U1 & U2 CT Blowdown flowrate.

B. Incorrect. Plausible distractor if the candidate does not recognize that the RWDA-L is effective for 72 hours after tank sample time (2OM-25.4.N, P&L J). The initial conditions gave a 2.5 day period to make it appear excessive.

C. Correct. Only one tank may be discharged at a time from the BVPS Unit1/Unit 2 site (2OM-25.4.N P&L C). RWDA-L are based on the proper dilution (Cooling Tower Blowdown Flow) for a particular activity in a tank. Since the site looks at the combined Cooling Tower Blowdown Flow, and if another tank discharge was commenced, dilution would be inadequate and an accidental liquid radwaste release would occur.

D. Incorrect. As stated above, two tanks may not be discharged at the same time.

Sys #	System	Category	KA Statement
000059	Accidental Liquid Radwaste Release / 9	AA2. Ability to determine and interpret the following as they apply to the Accidental Liquid Radwaste Release:	The permit for liquid radioactive-waste release

K/A# AA2.02 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate RWDA-L for 2SGC-TK21A 2OM-25.4.N, pgs. 18-20 **Technical References:** 2OM-25.4.N Rev. 16

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective:

21. The crew is performing 2OM-56C, "Alternate Safe Shutdown from Outside the Control Room" due to a fire in the Control Room.

What is the reason for closing 21C SG AFW Throttle Vlv [2FWE*HCV100A] within 40 minutes of Auxiliary Feedwater actuation?

A. To prevent 'C' SG overfill.

B. To prevent runout of the running AFW pump.

C. To insure adequate supply of AFW to 'A' and 'B' SGs.

D. To prevent rapid cooldown of the RCS.

Answer: A

Explanation/Justification: K/A is met by the required knowledge of the reason for isolating AFW to the 'C' SG when a fire which could degrade control of the plant from the Control Room occurs. In this case, the crew must trip the reactor and achieve cold shutdown within 72 hrs. from outside the control room using 2OM-56C, "Alternate Safe Shutdown from Outside the Control Room".

A. Correct. Preventing 'C' SG overfill is a time critical action as stated in 2OM-56C. The concern is also stated multiple places in 2OM-56C.4.C & D (NCO & NO procedures). De-energizing the DF bus removes the 'B' AFW from service, and closing HCV100A stops all AFW to 'C' SG.

B. Incorrect. Plausible distractor because the 2OM-56C procedures only counts on the 'A' MDAFW and the TDAFW pumps, and they may feel that feeding three SGs may cause the pumps to runout. Incorrect because the steaming rate during C/D is within the AFW pump capabilities.

C. Incorrect. Plausible distractor since it may be thought that water could be limited since TK-210 has approx. 130000 gals of water to feed the SGs during the 72 hr. C/D. Incorrect because AFW pumps do have backup supplies available.

D. Incorrect. Plausible distractor because they may feel that the limited C/D rate of 25F/Hr may be exceeded if three SGs are fed at once.

Sys #	System	Category	KA Statement
000067	Plant fire on site / 9	AK3. Knowledge of the reasons for the following responses as they apply to the Plant Fire on Site:	Actions contained in EOP for plant fire on site

K/A# AK3.04 **K/A Importance** 3.3 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-56C.4.B Rev. 32 pg. 3; 2OM-56C.4.C Rev. 20 pg. 4; 2OM-56C.4.D Rev. 24 pg. 3

Question Source: Bank – Vision #254205

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR 41.5,41.10 / 45.6 / 45.13)

Objective:

22. The plant is at 83% power with all systems in normal alignment for this power level.

- A serious fire breaks out in the Cable Spreading Room (CB-2)
- Shift manager determines that Control Room evacuation is likely to occur, and directs entering 2OM-56C, "Alternate Safe Shutdown From Outside Control Room Operating Procedures"

In accordance with 2OM-56C.4.C, "NCO Procedure", the Reactor Operator is expected to trip the Reactor from the _____.

A. Emergency Shutdown Panel

B. Alternate Safe Shutdown Panel

C. Main Control Room

D. Reactor Trip breakers or MG Set Breakers

Answer: C

Explanation/Justification: K/A is met by the required knowledge of the Reactor Operator responsibilities during performance of 2OM-56C.4.C which include manually tripping the Rx from the Control Room prior to evacuating during a fire.

A. Incorrect. Plausible because it is a panel located outside the CR, used to shutdown the plant. Knowledge that the purpose of the 56C procedures is to perform a safe shutdown from outside the CR without the Emergency Shutdown panel. No means to trip the Rx exists on the ESP.
B. Incorrect. Plausible because the procedure entered is called Alternate Safe Shutdown. No means to trip the Rx exist on the ASP.
C. Correct. Step 1 of the NCO procedure is manually trip the Rx. The procedure does not have the RO evacuate the CR until 7 steps later. It is assumed in 2OM-56C.3.A that an automatic or manual trip will put the plant in Mode 3.
D. Incorrect. Plausible answer because locally tripping the reactor is expected if a failure from the Control Room occurs. In this case, the first step of the NCO procedure is to manually trip the Rx.

Sys #	System	Category	KA Statement
000068	Control Room Evacuation / 8	AK2. Knowledge of the interrelations between the Control Room Evacuation and the following:	Reactor trip system

K/A# AK2.02 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-56C.4.C Rev. 20

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR 41.7 / 45.7)

Objective:

23. The plant has tripped due to a large break LOCA.

The following conditions exist:

- E-1, "Loss of Reactor or Secondary Coolant" is in progress
- Pressurizer Level is 0%
- RVLIS Full Range Level is 45% and steady
- Containment pressure peaked at 37.1 psig, and is currently 10.5 psig and lowering
- RWST level is 440 inches and lowering
- Containment sump level is 191 inches and rising

Based on the above conditions, which of the following is the highest priority procedure transition required by the crew, and what is the reason for the transition?

A. ES-1.3, "Transfer to Cold Leg Recirculation" because Safety Injection is aligned for recirculation to provide for long term cooling

B. FR-Z.1, "Response to High Containment Pressure" because containment integrity is challenged due to peak CNMT pressure

C. FR-Z.2, "Response to Containment Flooding" because containment integrity is challenged due to high CNMT sump level

D. FR-I.2, "Response to low Pressurizer Level" because PRZR level has lowered below 14%

Answer: C

Explanation/Justification: K/A is met by the knowledge required to determine that entry into FR-Z.2, CNMT Flooding is required to prevent a loss of containment integrity due to high sump level. As the water level rises, it might threaten the availability of equipment required for long-term cooling of the core and/or containment. Such a high water level is considered a severe challenge to the cnmt barrier and restoration is FR-Z.2.

A. Incorrect. ES-1.3 is a plausible distractor if the candidate doesn't know the RWST setpoint of <430 inches, stem states level is 440 inches..

B. Incorrect. With CNMT pressure <11 psig, there are no entry conditions met into FR-Z.1. The candidate must know entry conditions to FR-Z.1 Red or Orange path.

C. Correct. FR-Z.2 Orange path for Containment Flooding is the correct procedure based on Status Tree F-0.5 with CNMT pressure <11 psig and CNMT sump level >187 inches. The reason for using FR-Z.2 is to identify and isolate water sources to minimize sump level which could challenge cnmt integrity.

D. Incorrect. With a PRZR level of 0% and RVLIS level at 45%, this is a plausible distractor with for Inventory (with RVLIS) Status Tree paths.

Sys #	System	Category	KA Statement
000069	Loss of Containment Integrity / 5	AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Containment Integrity:	Guidance contained in EOP for loss of containment integrity

K/A# AK3.01 **K/A Importance** 3.8* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.F-0.5, Iss. 2 Rev. 0

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 41.5,41.10 / 45.6 / 45.13)

Objective:

24. Reactor trip and Safety Injection actuated 20 minutes ago due to faulted Steam Generators.

The following conditions exist:

- RCS Pressure is 1550 psig and rising
- PRZR level is 95% and rising
- S/G A NR level reads 0%
- S/G B NR level reads 0%
- S/G C NR level reads 35% and slowly rising
- RCS cold leg temperature indicates 230°F and slowly lowering
- RVLIS Full Range level is 105%
- SI flow indicates 400 gpm and stable
- Total AFW flow is 180 gpm total
- Containment pressure reads 27 psig and stable
- All RCPs have been secured
- The Crew has just completed isolation of 'A' and 'B' S/G's in E-2, "Faulted Steam Generator Isolation"

Which of the following is the next procedure to be performed, and what is the procedural basis for this action?

A. FR-I.1, "Response to High Pressurizer Level" to restore Pressurizer level to normal.

B. FR-I.1, "Response to High Pressurizer Level" to minimize an overpressure condition.

C. FR-P.1, "Response to Imminent Pressurized Thermal Shock Condition" to restore Pressurizer level to normal.

D. FR-P.1, "Response to Imminent Pressurized Thermal Shock Condition" to minimize an overpressure condition.

Answer: D

Explanation/Justification: K/A is met by the candidate assessing the parameters given to decide that entry into safety function FR-P.1 (Orange path) is required, and they required to know that a mitigative strategy of FR-P.1 is to Terminate SI because it is a significant contributor to cold leg temperature decreases and intact RCS over pressurization.

A. Incorrect. Plausible distractor due to przr level at 95% and rising, and entry into F-0.6 (Inventory with RVLIS) is przr level >92%. The above conditions do meet Yellow path FR-I.1, but the FR-P.1 conditions are met for an Orange path at minimum, and rules of usage dictates FR-P.1 entry. Correct purpose of FR-I.1, but not for these conditions.

B. Incorrect. Plausible distractor due to przr level at 95% and rising, and entry into F-0.6 (Inventory with RVLIS) is przr level >92%. The above conditions do meet Yellow path FR-I.1. Preventing overpressure condition is the purpose of FR-P.1.

C. Incorrect. FR-P.1 conditions are met for an Orange path at minimum. Incorrect purpose.

D. Correct. FR-P.1 conditions are met for an Orange path at minimum, and rules of usage dictates FR-P.1 entry over a Yellow path Inventory. Correct purpose of FR-P.1. The RO candidate is required to know that a mitigative strategy of FR-P.1 is to Terminate SI because it is a significant contributor to cold leg temperature decreases and intact RCS overpressurization.

Sys #	System	Category	KA Statement
W/E02	SI Termination / 3	Generic	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.

K/A# 2.4.21 **K/A Importance** 4.0 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1-0.4 Iss.2 Rev. 0
2OM-53B.4.FR-P.1 Iss. 2 Rev. 0

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 43.5 / 45.12)

Objective:

25. The following conditions exist:

- A LOCA has occurred
- The crew is performing ES-1.2, "Post LOCA Cooldown and Depressurization"
- RCS cooldown to cold shutdown is in progress
- All RCPs are shutdown
- The crew is reducing RCS pressure to refill the pressurizer

Which of the following would indicate to the crew that voiding in the RCS is occurring?

A. 2RCS-LI460, PRZR CHANNEL 2 LEVEL, rapidly increasing.

B. 2RCS-PI402, RX CLNT SYSTEM WIDE RNG PRESS, rapidly increasing.

C. 2SIS*FI943, HHSI TRN B, rapidly decreasing.

D. UPS011, PSMS Average Incore T/C Temp, rapidly decreasing.

Answer: A

Explanation/Justification: K/A is met by the required knowledge that the Reactor Operator must understand the implications of depressurizing the RCS when directed by ES-1.2, "Post LOCA Cooldown and Depressurization", and recognize available Control Room indications which indicate a void in the vessel head is occurring.

A. Correct - Voiding causes water to be displaced in the RCS which shows up as an increase in pressurizer level.
B. Incorrect - Increasing RCS pressure would suppress voiding in the RCS. Plausible for the same reason as C.
C. Incorrect - Decreasing SI flow would be indicative of a pressure increase which is inconsistent with voiding in the RCS. Plausible because candidate may think that the expansion of a void bubble and PRZR level rising would cause pressure to rise, thereby reducing HHSI flow.
D. Incorrect - Plausible because the candidate may think that during void formation, there will be less heat transfer and temperature will go down rapidly. Due to saturation conditions during void formation, temperature should stay approximately the same.

Sys #	System	Category	KA Statement
W/E03	LOCA Cooldown and Depressurization / 4	EK1. Knowledge of the operational implications of the following concepts as they apply to the (LOCA Cooldown and Depressurization)	Normal, abnormal and emergency operating procedures associated with (LOCA Cooldown and Depressurization).

K/A# EK1.2 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.ES-1.2 Iss. 2 Rev. 1 pg.11

Question Source: Bank - Farley 2011 NRC Exam (Q70)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.8 / 41.10 / 45.3)

Objective:

26. While performing actions of FR-C.3, "Response to Saturated Core Cooling", which of the following identifies the condition that the PRZR PORVs and block valves are required to be in?

(Assume no previous PRZR PORV failures)

A. Three PORVs manually closed with all block valves closed to minimize RCS leakage.

B. Two PORVs manually closed and one PORV manually open with associated block valve open for RCS pressure control.

C. Three PORVs in AUTO and closed with at LEAST one block valve open for RCS pressure control.

D. One PORV in AUTO with two PORVs open to depressurize the RCS to facilitate SI Accumulator Injection.

Answer: C

Explanation/Justification: K/A met by knowledge of FR-C.3, "Response to Saturated Core Cooling" major action step to check for open RCS vent paths, and the ability to monitor the PORVs and Block valves in the required system configuration.

A. Incorrect. Plausible to prevent RCS inventory loss since core cooling is degraded already, but not IAW FR-C.3.
B. Incorrect. Plausible if they assumed that the PORV was being used to lower RCS pressure as is a mitigative strategy in FR-C.1.
C. Correct. The candidate must be familiar with the basic purpose, overall sequence of events or overall mitigative strategy of Saturated Core Cooling. With knowledge of the FR-C procedures, the RO demonstrates the ability to operate the plant and obtain desired operating results during these emergency plant conditions. The major action categories for FR-C.3 is to establish SI flow to maintain minimum RCS subcooling, and check for open RCS vent paths.
D. Incorrect. This action could be performed in FR-C.1 to depressurize RCS but not performed for yellow condition FR-C.3.

Sys #	System	Category	KA Statement
W/E07	Saturated Core Cooling / 4	EA1. Ability to operate and / or monitor the following as they apply to the (Saturated Core Cooling)	Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

K/A# EA1.1 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.FR-C.3 Iss. 2 Rev. 0

Question Source: Bank – Ginna 2011 NRC Exam (Q62) Modified

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 / 45.6)

Objective:

27. Given the following plant conditions:

- 'A' S/G Pressure is 1150 psig
- 'A' S/G Narrow range level is 82%
- RCS hot leg temperatures are 563 °F
- FR-H.2, "Response to Steam Generator Overpressure" has been entered
- All MSIVs are CLOSED
- 2SVS*PCV101A, 21A SG ATM STM DUMP has failed CLOSED
- 2SVS*HCV104 Residual Heat Release Vlv is CLOSED and will not open
- 2FWE*P22, Turbine Driven AFW pump is out of service for bearing replacement

Which of the following describes the preferred method to reduce "A" S/G pressure in accordance with FR-H.2?

A. Feed 'A' SG with AFW and commence an RCS cooldown to less than 534°F using 'B' & 'C' SGs.

B. Feed 'A' SG with AFW and establish Blowdown from the 'A' steam generator.

C. Isolate AFW to the 'A' SG and commence RCS cooldown to less than 534°F using 'B' & 'C' SGs.

D. Isolate AFW to the 'A' SG and establish Blowdown from the 'A' Steam Generator.

Answer: C

Explanation/Justification: K/A met by candidates ability to perform FR-H.2, "Response to Steam Generator Overpressure" major action steps of Controlling the affected SG pressure and initiate C/D using the unaffected SGs. In the stem of the question steam dumps are unavailable for 'A' SG, therefore candidate must recognize that cooldown is required on the unaffected SGs.

A. Incorrect. Feeding the A SG is not permitted (or procedurally driven) because feed may be the cause of the overpressure. Cooling the RCS using the unaffected SGs is the correct answer if steam cannot be dumped from the affected SG.

B. Incorrect. Feeding the A SG is not permitted (or procedurally driven) because feed may be the cause of the overpressure. Establishing blowdown from A SG is not procedurally driven.

C. Correct. Major action steps of FR-H.2 are Control the affected SG pressure and initiate C/D using the unaffected SGs. Given the initial conditions in the stem it is determined that there are no means to control pressure in the affected SG, therefore it will be necessary to isolate AFW to the 'A' SG and cooldown using the other SG by dumping steam using B and/or C ADV.

D. Incorrect. Isolating AFW is correct, but establishing blowdown from A SG is not procedurally driven.

Sys #	System	Category	KA Statement
W/E13	Steam Generator Overpressure / 4	Generic	Ability to perform specific system and integrated plant procedures during all modes of plant operation.

K/A# 2.1.23 **K/A Importance** 4.3 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.FR-H.2 Iss. 2 Rev.0

Question Source: Bank - Surry 2012 NRC (Q24)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.2 / 45.6)

Objective:

28. During a plant startup, the following conditions exist:

- Reactor is at 13% power
- Offsite power is supplying all 4KV busses
- All 3 Reactor Coolant Pumps (RCPs) are running

The "2B STA SERVICE FEEDER 138KV BREAKER PCB-94" spuriously tripped open.

Which RCP(s) will lose power, and will the Reactor automatically trip due to this loss of the RCP(s)?

_____(1)_____ will lose power.

The reactor _____(2)_____ automatically trip due to this loss of the RCP(s).

A. 1) Only 'C' RCP
   2) will

B. 1) Only 'C' RCP
   2) will NOT

C. 1) Both 'A' and 'B' RCPs
   2) will

D. 1) Both 'A' and 'B' RCPs
   2) will NOT

Answer: B

Explanation/Justification: K/A is met by the candidates ability to analyze the loss of power to the system service transformer 2B, and the loss of power to only 'C' RCP.

A. Incorrect. It is correct that 'C' RCP will lose power. It is incorrect that the Rx will trip. Plausible distractor because the student needs to know that a loss of 1 RCP when power is <P-8 (30%) will not trip the Rx. This coincidence is easy to confuse because a loss of 2/3 RCPs >P-7 (10%) will trip the Rx.

B. Correct. 'C' RCP is powered from 4160 Bus 2C, which is supplied from the 2B System Service Transformer. When PCB-94 opens SSST 2B is de-energized, which de-energizes 4160 bus 2C & 2D. There are no RCPs on bus 2D. It is correct that the Rx will not trip on the loss of 1 RCP since the plant was <P8 (30% power).

C. Incorrect. 'A' & 'B' RCPs are powered from SSST 2A, which is not effected by PCB-94 opening. Plausible distractor because the candidate must know which off-site feed supplies the SSSTs and ultimately the RCP busses. It is incorrect that the Rx will trip. Plausible distractor because the student needs to know that a loss of 1 RCP when power is <P-8 (30%) will not trip the Rx. This coincidence is easy to confuse because a loss of 2/3 RCPs >P-7 (10%) will trip the Rx.

D. Incorrect. 'A' & 'B' RCPs are powered from SSST 2A, which is not effected by PCB-94 opening. It is correct that the Rx will not trip.

Sys #	System	Category	KA Statement
003	Reactor Coolant Pump System (RCPS)	K2 Knowledge of bus power supplies to the following:	RCPS

K/A# K2.01 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-1.5.B.1 Rev. 2 pg. 2; RE-0001DH Rev. 4 & RE-0001E Rev. 9

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7)

Objective:

29. The plant is shutting down for a refueling outage in accordance with 2OM-52.4.R.1.F, "Station Shutdown From 100% Power To Mode 5".
    - Plant is at 30% power
    - All systems in normal alignment for this power level

    Chemistry has requested a purge of the VCT to remove non-condensable gases.

    In accordance with 2OM-7.4.F, "Degassing the Reactor Coolant System From The Volume Control Tank", which of the following completes the statements below?

    _____(1)_____ gas is used for purging the RCS of non-condensable gasses.

    The non-condensable gasses from the VCT will be purged to the _____(2)_____.

A. 1) Hydrogen
   2) Primary Plant Sample System

B. 1) Hydrogen
   2) Boron Recovery System

C. 1) Nitrogen
   2) Primary Plant Sample System

D. 1) Nitrogen
   2) Boron Recovery System

Answer: D

Explanation/Justification: K/A is met with the knowledge of nitrogen gas being used in conjunction with raising and lowering VCT level to purge the Hydrogen and non-condensable gasses from the VCT (CVCS) during RCS degassing when performing a plant shutdown. Reducing gas concentration at BVPS is accomplished by reducing Hydrogen and non-condensable gasses from the RCS via the VCT, and venting the PRZR to the sample system. Although the K/A statement states from the przr bubble space, it would not be possible to meet the K/A due to purging the gasses from the przr to the sample system bypasses the CVCS system which is the K/A required system tie. Purging the PRZR is a Chemistry procedure.

A. Incorrect. Plausible because Hydrogen is the normal cover gas maintained on the VCT during operation. The goal during degas is to reduce Hydrogen and non-condensable gasses. Primary Sample System is a plausible distractor because this is an approved method of continually degasifying the przr, but the stem asked about purging the VCT to remove non-condensable gasses from the RCS.

B. Incorrect. Plausible because Hydrogen is the normal cover gas maintained on the VCT during operation. The goal during degas is to reduce Hydrogen and non-condensable gasses. The gasses will be purged from the VCT to the Degasifiers in the Boron Recovery System.

C. Incorrect. Nitrogen is used as the cover gas when removing Hydrogen and non-condensable gasses from the RCS. Primary Sample System is a plausible distractor because this is an approved method of continually degasifying the przr, but the stem asked about purging the VCT to remove non-condensable gasses from the RCS.

D. Correct. Nitrogen is used as the cover gas when removing Hydrogen and non-condensable gasses from the RCS due to chemistry requirements to reduce Hydrogen and non-condensable gasses prior to an outage. The gasses will be purged from the VCT to the Degasifiers in the Boron Recovery System.

Sys #	System	Category	KA Statement
004	Chemical and Volume Control System	K5 Knowledge of the operational implications of the following concepts as they apply to the CVCS:	Reduction process of gas concentration in RCS: vent accumulated non-condensable gases from PZR bubble space, depressurized during cooldown or by alternately heating and cooling (spray) within allowed pressure band (drive more gas out of solution)

K/A# K5.14 **K/A Importance** 2.5 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-7.4.F, Rev. 19 pg. 3 & 4
U2 RM-0407-002, RM-0409-002, RM-0408-001

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5/45.7)

Objective:

30. Which of these components can be supplied power from either the 'A' **OR** 'B' Train of 480VAC (selectable)?

A. 2RHS*MOV702A, RHS Train A Supply Isolation Valve

B. 2RHS*MOV702B, RHS Train B Supply Isolation Valve

C. 2RHS*MOV720A, RHS Train Return to B Loop Isolation Valve

D. 2RHS*MOV720B, RHS Train Return to C Loop Isolation Valve

Answer: A

Explanation/Justification: K/A is met by the knowledge required to determine which of the RHR pressure boundary MOVs are supplied by dual power supplies.

A. Correct. 2RHS*MOV702A can be powered by either MCC*2-E05 or E06. All other valves listed below are plausible because they are RCS pressure boundary MOVs, but only have one power supply.
B. Incorrect. 2RHS*MOV702B is only powered from MCC*2-E06.
C. Incorrect. 2RHS*MOV720A is only powered from MCC*2-E05.
D. Incorrect. 2RHS*MOV720B is only powered from MCC*2-E06.

Sys #	System	Category	KA Statement
005	Residual Heat Removal System (RHRS)	K2 Knowledge of bus power supplies to the following:	RCS pressure boundary motor-operated valves

K/A# K2.03 **K/A Importance** 2.7* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-10.1.D rev. 0 Iss. 4

Question Source: Bank – Vision #240045 Modified

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7)

Objective:

31. Given the following conditions:

- The plant was at 80% power when a LOCA occurred
- All ESF equipment operated as designed
- RCS pressure is now 50 psig
- RWST level is 360 inches and lowering

Which of the following describes the Safety Injection System alignment for these conditions?

A. LHSI pumps taking a suction from the RWST and discharging to the RCS Cold Legs.

B. HHSI pumps taking a suction from the RWST and discharging to the RCS Cold Legs.

C. LHSI pumps stopped and suction isolated from the RWST.

D. LHSI pumps taking a suction from the Containment Sump and discharging to the HHSI pump suction.

Answer: C

Explanation/Justification: K/A is met by the candidates ability to monitor the given plant conditions, and recognize that when RWST level is <369", the ECCS system will transfer into Cold Leg Recirc mode, at which time the LHSI pumps will automatically trip and the RWST suction valves will close.

K/A statement was changed from RHR pumps to LHSI pumps after discussion with the Chief Examiner based on the fact that at BVPS2 RHR is not an ECCS system. By changing the system name only, the intent of the K/A was preserved.

A. Incorrect. Plausible distractor because this is the lineup prior to the Cold Leg Recirc mode at 369" in RWST. When the transfer occurs, 2SIS-8809A & B close to isolate the RWST, and the LHSI pumps trip.

B. Incorrect. Plausible distractor because this is the lineup prior to the Cold Leg Recirc mode at 369" in RWST. When the transfer occurs, 2CHS-MOV115B & D close to isolate the RWST, and 2SIS-MOVMOV863A & B open to align the suction to the LHSI discharge piping for the RS pump.

C. Correct. When the RWST level lowers to less than 369" on 2/4 channels coincident with a Safety Injection signal, the ECCS system will transfer into Cold Leg Recirc mode. This will cause Recirc Spray pumps C & D to start, and align their discharge to the suction of the HHSI pumps. The LHSI pumps will trip and their suction valves to the RWST will close.

D. Incorrect. Plausible distractor because LHSI pumps are vital pumps and there is a misconception that they take suction from the sump.

Sys #	System	Category	KA Statement
006	Emergency Core Cooling System (ECCS)	A3 Ability to monitor automatic operation of the ECCS, including:	~~RHR pumps~~ (LHSI Pumps)

K/A#	A3.07	**K/A Importance**	3.6*	**Exam Level**	RO
References provided to Candidate	None			**Technical References:**	2OM-11.1.D rev.1 2OM-11.2.B rev. 5

Question Source: Bank – Vision #123771

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5)

Objective:

32. The plant is at 100% power.

- 'B' Charging pump is RUNNING
- 'A' Charging pump is in STBY
- Normal 480 VAC MCC-2-13 Cub 8D tripped on overcurrent causing the following:
  - 2CHS-SOV150A, 'CHG PP 21A Lube Oil Temp Solenoid VLV' is de-energized
  - 2CHS-P21A-1, 'Charging Pump Auxiliary Lube Oil Pump' is de-energized

How will 2CHS-TCV150A, 'CHG PP 21A Lube Oil Temp Control Valve' respond to this failure, and is the 'A' Charging pump capable of starting without the Aux Oil Pump running?

1) 2CHS-TCV150A will direct all oil flow _____(1)_____ the lube oil cooler.

2) The 'A' Charging pump _____(2)_____ capable of starting without the Aux Oil Pump running.

A. 1) to bypass
   2) is

B. 1) to bypass
   2) is NOT

C. 1) through
   2) is

D. 1) through
   2) is NOT

Answer: C

Explanation/Justification: K/A is met by the knowledge demonstrated of the design feature of the centrifugal charging (HHSI) pumps lube oil TCV to divert all oil flow through the LO cooler to provide max cooling to the pump bearings on a loss of air.

A. Incorrect. TCV150A will direct all oil through the cooler to maximize cooling. It is correct the charging pump will start without the AOP running.

B. Incorrect. TCV150A will direct all oil through the cooler to maximize cooling. It is incorrect to state that the Charging pump will not start. Plausible distractor because the design feature to start the Aux Oil Pump at 14 psig, and stop the AOP when the shaft driven pump raises pressure to normal. This feature could lead to thinking that the AOP must be running to start the Charging Pump.

C. Correct. When 2CHS-SOV150A is de-energized, it vents air from 2CHS-TCV150A causing it to divert all flow through the lube oil cooler for maximum cooling to bearings and gears. The Aux Oil Pump has a design feature to provide lubrication and cooling to the charging pump, but it is not required to be running in order to start the Charging Pump.

D. Incorrect. It is correct that TCV150A will divert all flow through the lube oil cooler. It is incorrect to state that the Charging pump will not start. Plausible distractor because the design feature to start the Aux Oil Pump at 14 psig, and stop the AOP when the shaft driven pump raises pressure to normal. This feature could lead to thinking that the AOP must be running to start the Charging Pump.

Sys #	System	Category	KA Statement
006	Emergency Core Cooling System (ECCS)	K4 Knowledge of ECCS design feature(s) and/or interlock(s) which provide for the following:	Cooling of centrifugal pump bearings

K/A# K4.01 **K/A Importance** 2.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-7.3.C Rev. 15 pg. 2; U2 TLD-007-096-01 & 02 Rev. 5; U2 LSK-026-001G Rev. 13 & 001A Rev. 14

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7)

Objective:

33. Annunciator A4-3H, Pressurizer Relief Tank (PRT) Trouble has alarmed.
    - The operator reports it is due to HIGH PRT temperature
    - Level and pressure are within the normal range
    - PRZR Safety valves and PORVs are closed

    In accordance with 2OM-6.4.AAY, PRT Trouble ARP, which of the following is the initial action taken to lower PRT temperature?

A. Lower RCS pressure by opening the Pressurizer spray valves [2RCS*PCV455A/B].

B. Open the Primary Water system supply valves [2RCS-MOV516 and 2RCS-AOV519].

C. Vent the PRT to the Degasifiers [2BRS-EV21A/B].

D. Drain the PRT to the Primary Drains Tank [2DGS-TK21].

Answer: B

Explanation/Justification: K/A is met by the required knowledge of the Pressurizer Relief Tank (PRT) system design of the ability to spray down the PRT with primary water to cool the tank.

A. Incorrect. With the safeties and PORVs closed, lowering RCS pressure will not lower PRT pressure if the assumption is that the PRZR and PRT are interconnected.
B. Correct. Temperature is lowered by opening 2RCS-MOV516 and 2RCS-AOV519 and spraying the PRT.
C. Incorrect. Pressure and level are normal therefore venting is not necessary. Venting to the Degasifiers is directed in the ARP for high pressure.
D. Incorrect. Pressure and level are normal therefore draining is not necessary. Draining to TK21 is directed in the ARP for high level.

Sys #	System	Category	KA Statement
007	Pressurizer Relief Tank/Quench Tank System (PRTS)	K4 Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following:	Quench tank cooling

K/A# K4.01 **K/A Importance** 2.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-6.4.AAY Rev. 10

Question Source: Bank - Diablo Canyon 2012 NRC Exam (Q6)

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7)

Objective:

34. Given the following conditions:

- The plant is in Mode 3
- Cooling down to Mode 5 for an inoperable 'A' CCP Train (LCO 3.7.7 Cond. B)
- 'B' Train of CCP becomes inoperable due to an unisolable leak on the 'B' supply header

Based on the above information, what is the MINIMUM temperature the crew must stop the cooldown with both CCP Trains inoperable?

A. 350° F

B. 201° F

C. 200° F

D. 137° F

Answer: B

Explanation/Justification: K/A is met by the 1 hr. and less LCO conditions associated with TS.3.7.7 Component Cooling Water System (CCW), and the requirement of not entering mode 5 without Primary Component Colling water available for RHR to be placed in service.

A. Incorrect. This is the minimum temperature of Mode 3. 2 RCS loops are still required to operable. Procedurally RHS is not available to use until ≤350F.

B. Correct. This is the minimum temperature for Mode 4. Entry into Mode 5 is not permissible with both trains of CCP inoperable as stated by the note in TS 3.7.7 cond. C (immediate completion time).

C. Incorrect. This is maximum temperature of Mode 5 entry. Entry into Mode 5 is not permissible with both trains of CCP inoperable as stated by the note in TS 3.7.7 cond. C (immediate completion time). Without CCP, RHS is inoperable (TS 3.4.7) and 1 RHS loop is required to be in operation in Mode 5.

D. Incorrect. This is the minimum temperature to operate 3 RCPs. Plausible distractor if the candidate thinks that the RCS loops must remain operable when RHS is not operable due to both Trains of CCP inoperable and Mode 5 is required.

Sys #	System	Category	KA Statement
008	Component Cooling Water System (CCWS)	Generic	Knowledge of conditions and limitations in the facility license

K/A# 2.2.38 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** TS. 3.7.7 A278/161; TS. Table 1.1-1 Def. of modes

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 41.10 / 43.1 / 45.13)

Objective:

35. Given the following conditions:
    - The plant is at 100% power
    - A rupture of the 21A RCP Thermal Barrier occurs
    - No annunciators are in alarm

    Which of the following completes the statements below?

    1) 2CCP*AOV107A, 21A RCP THERMAL BARRIER OUTLET ISOL VLV will automatically close at _____(1)_____.

    2) In accordance with AOP-2.6.8, "Abnormal RCP Operation", a shutdown of the 'A' RCP _____(2)_____ required for this failure.

	___(1)___	___(2)___
A.	122 psig	is <u>NOT</u>
B.	122 psig	is
C.	50 gpm	is <u>NOT</u>
D.	50 gpm	is

<u>Answer: A</u>

Explanation/Justification: K/A is met by demonstrating the knowledge that RCPs can still operate with a loss of CCP thermal barrier flow as long as RCP seal injection flow is available.

A. Correct. 2CCP*AOV107's auto close at 122 psig and/or 58 gpm. The AOP does not require a shutdown of the RCP as long as there is still Seal Injection. The stem of the question does not state any problems which would lead to seal injection failure and there are no annunciators in alarm.

B. Incorrect. This is the correct pressure which auto closes 2CCP*AOV107's. It is incorrect that the AOP requires a RCP shutdown. There are no indications of a loss of seal injection.

C. Incorrect. 50 Gpm is less than the setpoint of 58 gpm required to auto close 2CCP*AOV107's. It is correct that a shutdown of the RCP is not required.

D. Incorrect. 50 Gpm is less than the setpoint of 58 gpm required to auto close 2CCP*AOV107's. It is incorrect that the AOP requires a RCP shutdown. There are no indications of a loss of seal injection.

Sys #	System	Category	KA Statement
008	Component Cooling Water System (CCWS)	K3 Knowledge of the effect that a loss or malfunction of the CCWS will have on the following:	RCP

K/A# K3.03 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-15.2.B Rev. 1 pg. 4; 2OM-53C.4.2.6.8 Rev. 12 pg 1 & 2

Question Source: Bank - Farley 2012 NRC Exam (Q14)

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** None Listed

Objective:

36. The plant is at 100% power.

- PRZR Channel 1 Press 2RCS-PT455 has failed HIGH
- The control room crew has tripped all associated bistables IAW 2OM-6.4.IF, "Instrument Failure Procedure"

PRZR Control Pressure [2RCS-PT445] **THEN** fails **HIGH**.

What will be the **INITIAL** plant response to this additional failure?

A. PRZR Spray Valve 2RCS*PCV455A & 2RCS*PCV455B will **OPEN**.

B. PRZR PORV 2RCS-PCV455C will **OPEN**.

C. PRZR PORVs 2RCS-PCV455D & 2RCS-PCV456 will **OPEN**.

D. High PRZR Pressure Reactor Trip will **ACTUATE**.

Answer: C

Explanation/Justification: K/A is met by demonstrating the knowledge of how PRZR pressure will respond to a pressure control channel failing high, and the knowledge that 2 PORVS (PCV455D & PCV456) will automatically open.

A. Incorrect. This would be the INITIAL response if 2RCS-PT444 failed High.
B. Incorrect. This would be the next response if 2RCS-PT444 failed High.
C. Correct. IAW 2OM-6.4.IF attachment 2.
D. Incorrect. Failures are one control channel and one protection channel, therefore NO reactor trip.

Sys #	System	Category	KA Statement
010	Pressurizer Pressure Control System (PZR PCS)	A3 Ability to monitor automatic operation of the PZR PCS, including:	PZR pressure

K/A# A3.02 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-6.4.IF attachment 2 Rev. 13

Question Source: Bank - 2LOT6 NRC Exam (Q36)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5)

Objective:

37. Given the following conditions:

- A reactor startup is in progress
- The reactor is critical in the source range
- N42 Power Range channel has failed and has been removed from service with all bistables placed in the trip condition
- A loss of Vital Bus 1 occurs
- A12-1H, NOT P-7 changed state after the loss of Vital Bus occurred

What is the condition of the reactor, and source range detectors after Vital Bus 1 is lost?

A. Reactor trips
N31 Source Range channel is de-energized.
N32 Source Range channel is still in operation.

B. Reactor remains critical
BOTH source range channels are de-energized.

C. Reactor remains critical
N31 Source Range channel is de-energized.
N32 Source Range channel is still in operation.

D. Reactor trips
BOTH source range channels are de-energized.

Answer: D

Explanation/Justification: K/A is met by requiring knowledge of a loss of a 2nd (redundant) PR NI channel due to the loss of vital bus 1, and the effects it has on both the Rx Protection System causing a Rx trip and de-energizing both SR channels.

A. Incorrect. It is correct that the Rx will trip due to 2/4 PR high setpoints. N31 is de-energized by the loss of vital bus 1. N32 will not be in operation due to P-10 auto de-energizing both SR detectors

B. Incorrect. Reactor trips on a number of PR/SR trip setpoints. It is correct that both SR detectors will be de-energized

C. Incorrect. Reactor trips on a number of PR/SR trip setpoints. N31 is de-energized by the loss of vital bus 1. N32 will not be in operation due to P-10 auto de-energizing both SR detector.

D. Correct. A loss of Vital 1 causes a loss of power to N41. This loss also causes a loss of power to RPS channel 1. This will cause a trip condition for Power range trips for channel 1. Since N42 is already removed from service its bistable are in the tripped condition. This meets the 2/4 logic to cause a reactor trip. N31 is de-energized by the loss of vital bus 1. Additionally the signal for 2/4 power range channels above P-10 will cause the SR channels to auto de-energize causing N32 to de-energize.

Sys #	System	Category	KA Statement
012	Reactor Protection System (RPS)	K6 Knowledge of the effect of a loss or malfunction of the following will have on the RPS:	Redundant channels

K/A# K6.02 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-2.2.A Rev. 1 (P&L 9)
UFSAR Fig. 7.3-8 and 7.3-9
2OM-2.3.C Rev. 5 pg. 3

Question Source: Bank – DC Cook 2010 NRC Exam (Q39)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45/7)

Objective:

38. Given the following conditions:

- The plant is at 100% power
- Containment Pressure Channel IV pressure indication was oscillating and has been removed from service IAW 2OM-1.4.IF, "Instrument Failure Procedure"

Which of the following identifies the logic associated with the HIGH 1 and HIGH 3 Containment Pressure actuations after the Channel IV is removed from service?

	HIGH 1 SI Actuation	HIGH 3 CIB Actuation
A.	1/2	2/3
B.	1/2	1/3
C.	1/3	2/3
D.	1/3	1/3

Answer: A

Explanation/Justification: K/A is met by demonstrating knowledge of the containment pressure channel inputs to both Safety injection and Cnmt Isol phase B actuation logics, and how these inputs are removed from service for the reliability of the actuation coincidence.

A. Correct. Channel IV (2LMS-PT953) was removed from service iaw 2OM-1.4.IF. This procedure and Tech Specs has the bistable tripped for High 1 (SI) which then makes the logic 1/2. The bistable for the High 3 (CIB) is required to be placed in bypass, which then requires a 2/3 coincidence to initiate a CIB. Both of these bistable configurations satisfies redundancy requirements.

B. Incorrect. Plausible if both bistables are tripped. High-1 is normally a 2/3 logic but changes to 1/2 when one of the logic channels are tripped. For High-3, 2/4 logic, the channel is bypassed, so 2/3 is required.

C. Incorrect. Plausible if the logic for both are 2/4 and only High-1 is tripped.

D. Incorrect. Plausible if the logic for both are 2/4 and both are tripped.

Sys #	System	Category	KA Statement
013	Engineered Safety Features Actuation System (ESFAS)	K5 Knowledge of the operational implications of the following concepts as they apply to the ESFAS:	Safety system logic and reliability

K/A# K5.02 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-1.4.IF Att. 1 Rev. 9; BVPS TS Bases pg. B3.3.2-38 & 39

Question Source: Bank – Harris 2012 NRC Exam (Q40)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 45.7)

Objective:

39. The plant is at 100% power when a rupture of the Chilled Water supply header to Containment occurs. The crew has isolated the rupture.

1) Which of the following components will be effected by the loss of Chilled Water?

2) What is the design backup for this system?

A. 1) Control Rod Drive Mechanism (CRDM) Fans
2) Primary Component Cooling Water

B. 1) Containment Air Recirculation (CAR) Fans
2) Service Water

C. 1) Control Rod Drive Mechanism (CRDM) Fans
2) Service Water

D. 1) Containment Air Recirculation (CAR) Fans
2) Primary Component Cooling Water

Answer: B

Explanation/Justification: K/A was met by having the candidate predict which Cnmt cooling equipment will lose cooling capabilities when Chilled Water system is lost, and knowledge of the Service Water system as a design backup.

K/A statement is a loss of service water. At BVPS Chill Water is the normal system aligned the Containment Air Recirc Fans, and Service Water is the backup supply. The question is written to meet the intent of the K/A as designed at BV.

A. Incorrect. CRDM coolers are supplied by CCP and no backup cooling is available. CCP is the normal cooling for the CRDM coolers.
B. Correct. CAR fan coolers are supplied by chilled water, and a loss of chilled water can effect cnmt temperature. Service Water is the emergency backup cooling source for the CAR fan coolers.
C. Incorrect. CRDM coolers are supplied by CCP and no backup cooling is available. Service water is the emergency backup for the CAR fan coolers.
D. Incorrect. CAR fan coolers are supplied by chilled water, and a loss of chilled water can effect cnmt temperature. CCP is not the backup for CAR fan coolers. It is the primary cooling for CRDM coolers.

Sys #	System	Category	KA Statement
022	Containment Cooling System (CCS)	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Loss of ~~service water~~ Chilled Water

K/A# A2.04 **K/A Importance** 2.9* **Exam Level** RO

References provided to Candidate None **Technical References:** U2 RM-0429-004 Rev. 14
2SQS-44C.1 PPNT Rev. 12 pgs. 7 & 8

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Objective: 2SQS-44C.1 ELO-1 Describe the function of the Containment Ventilation System and the associated major components as documented in Operating Manual Chapter 2OM-44C.

40. The plant is at 100% power.

Based on the information provided on the attached PCS screen, what is the status of Tech Spec LCOs 3.6.4, Containment Pressure and 3.6.5, Containment Air Temperature?

LCO 3.6.4, Containment Pressure is _____(1)_____ met **AND** LCO 3.6.5, Containment Air Temperature is _____(2)_____ met.

Refer to attached PCS screen

A. (1) not being
(2) not being

B. (1) not being
(2) being

C. (1) being
(2) not being

D. (1) being
(2) being

Answer: B

Explanation/Justification: K/A is met by having the candidate analyze a Plant Computer Screen printout as seen in the Control Room, and evaluate CNMT temperatures and Pressures for Tech Spec above the line LCO specs.

A. Incorrect. See correct answer explanation.

B. Correct. Cnmt pressures are both above the 14.2 psia required by Tech Specs. The pressure indicated are not red on the PCS screen to indicate they are greater than TS limits, but to display that they are above the high pressure alarm setpoint of 13.9 psia. Average temperature is 101.9 which is below the LCO required 108F. The CNMT PCS screen shot was assembled to purposely make the average temp and pressure a BAD reading so the candidate would have to average all of the temperatures manually to determine average temperature then compare this to the LCO requirement w/o reference to the LCO. One of the temperatures were purposely placed above the 108 °F allowed value to ensure the candidates awareness of the LCO being the average, and not any one temperature. To answer this question the candidate will need to assess the computer data provided and determine the status of the LCOs.

C. Incorrect. See correct answer explanation.

D. Incorrect. See correct answer explanation.

Sys #	System	Category	KA Statement
022	Containment Cooling System (CCS)	A4 Ability to manually operate and/or monitor in the control room:	Containment readings of temperature, pressure, and humidity system.

K/A# A4.05 **K/A Importance** 3.8 **Exam Level** RO

References provided to Candidate CNMT PCS screen shot **Technical References:** TS 3.6.4 & 3.6.5
2OM-54.3.L5 Rev. 80

Question Source: Bank – 1LOT14 NRC Exam (Q54) Modified

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 to 45.8)

Objective:

41. Given the following conditions:

- The plant was at 100% power when all 3 Steam Generators Faulted in Containment
- Containment Pressure is 31 psig and RISING
- Quench Spray Pumps [2QSS*P21A and P21B] failed to start

1) What is(are) the minimum required Engineered Safety Features Actuation System (ESFAS) switch manipulations required to start BOTH Quench Spray Pumps?

A. 1

B. 2

C. 3

D. 4

Answer: B

Explanation/Justification: K/A is met by the candidates recognizing that CIB did not actuate and the knowledge of how many ESF actuation switches must be operated to ensure both trains of Quench Spray Pumps start and prevent CNMT pressure from exceeding design pressure.

A. Incorrect. Plausible distractor if candidate thinks Safety Injection ESF actuation will start the Quench Spray pumps (CIB is required for QS).
B. Correct. 2 CIB switches on the same train will actuate CIB on both trains. There are a total of 4 CIB switches on the Bench Board. 2 switches per train.
C. Incorrect. Plausible distractor if candidate thinks BOTH a CIB and Safety Injection ESF actuation is needed to start the Quench Spray pump.
D. Incorrect. Plausible distractor if candidate thinks BOTH trains of CIB are required to start BOTH Quench Spray pumps. There are a total of 4 CIB switches on the Bench Board, 2 for each train, and 1 train will actuate both CIB trains.

Sys #	System	Category	KA Statement
026	Containment Spray System (CSS)	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including:	Containment pressure

K/A# A1.01 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** USFAR Fig. 7.3-13 Rev. K; USFAR Fig. 7.3-62 Rev. K

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5 / 45.5)

Objective:

42. 2OST-13.1, "Quench Spray Pump [2QSS*P21A] Test" (Comprehensive Pump Test) was just completed.

Review the attached Data sheets 2B and 4, and determine the operability status of the 'A' Quench Spray Pump.

What is the status of the 'A' Quench Spray Pump?

'A' Quench Spray Pump is _____.

A. inoperable due to vibration data only

B. inoperable due to pump differential pressure only

C. inoperable due to both vibration data and pump differential pressure

D. operable

Answer: C

Explanation/Justification: K/A is met by demonstrating the candidates knowledge of reviewing and evaluating the Quench Spray Pump surveillance test, and determining equipment operability.

A. Incorrect. See correct answer justification.
B. Incorrect. See correct answer justification.
C. Correct. The pump is inoperable due to V1 pump outbd axial vibration being high above the alert range which makes it inoperable per the note on Data Sheet 2B. It is also inoperable due to the pump D/P of 134.4 psid based on the note on Data sheet 4.
D. Incorrect. See correct answer justification.

Sys #	System	Category	KA Statement
026	Containment Spray System (CSS)	Generic	Knowledge of surveillance procedures.

K/A# 2.2.12 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate 2OST-13.1 Data sheet 2B & 4 **Technical References:** 2OST-13.1 Rev. 32

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 45.13)

Objective:

43. Given the following conditions:

- Unit 2 has just entered MODE 1
- Rx power is 6%
- Power is being raised slowly in preparation for rolling the Main Turbine
- 'A' MFP is in service
- Feedwater Bypass Control Valves are in AUTOMATIC
- ALL AFW pumps are aligned for normal standby operation

A spurious MSLI actuation occurs.

Which of the following describes the effect the MSLI will have on the Auxiliary Feedwater pumps with **NO** operator action?

A. **ONLY** the MDAFW pumps will start.

B. ALL AFW pumps will remain in standby.

C. **ONLY** the TDAFW pump will start.

D. ALL AFW pumps will start.

Answer: B

Explanation/Justification: K/A met by demonstrating knowledge of the integrated plant response to MSIVs inadvertently closing at low power conditions, and the response of the AFW pumps to these changing conditions.

A. Incorrect. Plausible if it is thought that the MDAFW pump started on 2/3 lo-lo SG water level on 2/3 SGs due to a Rx trip. Also, it could be thought that MDAFW pump started due to an auto trip of the MFP.

B. Correct. This is the expected plant response from a low reactor power level. S/G water level shrink is not as severe as a high power level trip. Additionally, the MFP will remain running and provides more than enough capacity to maintain S/G water levels above the lo-lo SG water level setpoint which would trip the reactor and auto start AFW pumps.

C. Incorrect. Plausible if it is thought that the TDAFW pump started on 2/3 lo-lo SG water level on 1/3 SGs due to a Rx trip.

D. Incorrect. Plausible if it is thought that a RX trip will occur and due to lo-lo SG water level <20.5% all AFW pumps would start. This is not the case since a Rx Trip or low SG water level will not occur with these condition.

Sys #	System	Category	KA Statement
039	Main and Reheat Steam System (MRSS)	K3 Knowledge of the effect that a loss or malfunction of the MRSS will have on the following:	AFW pumps.

K/A#	K3.03	**K/A Importance**	3.2*	**Exam Level**	RO
References provided to Candidate	None			**Technical References:**	UFSAR Instrumentation and control system logic diagram sheet Figure 7.3-19, Rev 7

Question Source: Bank – BVPS 2LOT6 NRC P.D. Practice

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 45.6)

Objective:

44. The plant is at 65%.

- An Inadvertent Turbine trip occurs
- 2TMS-GV2, GOVERNOR VLV NO. 2 indicates DUAL
- 2TMS-TV3, THROTTLE VLV NO. 3 Indicates OPEN
- All other TVs and GVs are CLOSED

Based on the above conditions:

1) What is the correct procedure to enter?

2) What additional actions would be required to be taken by the procedure?

A. 1) Enter AOP 2.26.1, TURBINE AND GENERATOR TRIP
2) Manually initiate a Steam Line Isolation.

B. 1) Enter AOP 2.26.1, TURBINE AND GENERATOR TRIP
2) Place BOTH Turb EH Fluid Pumps in Pull-to-Lock.

C. 1) Enter E-0, REACTOR TRIP OR SAFETY INJECTION
2) Manually initiate a Steam Line Isolation.

D. 1) Enter E-0, REACTOR TRIP OR SAFETY INJECTION
2) Place BOTH Turb EH Fluid Pumps in Pull-to-Lock.

Answer: C

Explanation/Justification: K/A is met by demonstrating the required knowledge to recognize that a turbine trip occurred above P9 which will cause an automatic Rx trip and entry into E-0. Candidate should also recognize that one main steam throttle and governor valve did not close, and must take IOA RNO action steps.

A. Incorrect. With power at 65%, entry into the AOP would be inappropriate because the Rx would have already tripped, and the purpose of the AOP clearly states to stabilize the unit after a turbine and generator trip below the P-9 setpoint. SLI would be correct if the correct procedure were entered (E-0). The AOP does have IOAs for the TV & GVs not being closed, manually trip the turbine, but SLI is not an option.

B. Incorrect. With power at 65%, entry into the AOP would be inappropriate because the Rx would have already tripped, and the purpose of the AOP clearly states to stabilize the unit after a turbine and generator trip below the P-9 setpoint. Placing both EH pumps to PLT would cause the TVs & GVs to close if oil pressure was maintaining them open, but this is no longer an approved method of closing the valves, and it is not procedurally permitted.

C. Correct. With power at 65% when the turbine tripped, the Rx would have tripped due to being >P9 (49% power). Even if they thought the Rx was still critical, E-0 would still be the correct procedure to enter. To respond to All TV &/or GV closed in E-0 step 2 IOA, this is a correct action in the RNO of step 2.

D. Incorrect. With power at 65% when the turbine tripped, the Rx would have tripped due to being >P9 (49% power). Placing both EH pumps to PLT would cause the TVs & GVs to close if oil pressure was maintaining them open, but this is no longer an approved method of closing the valves, and it is not procedurally permitted.

Sys #	System	Category	KA Statement
039	Main and Reheat Steam System (MRSS)	Generic	Knowledge of EOP entry conditions and immediate action steps.

K/A# 2.4.1 **K/A Importance** 4.6 **Exam Level** RO

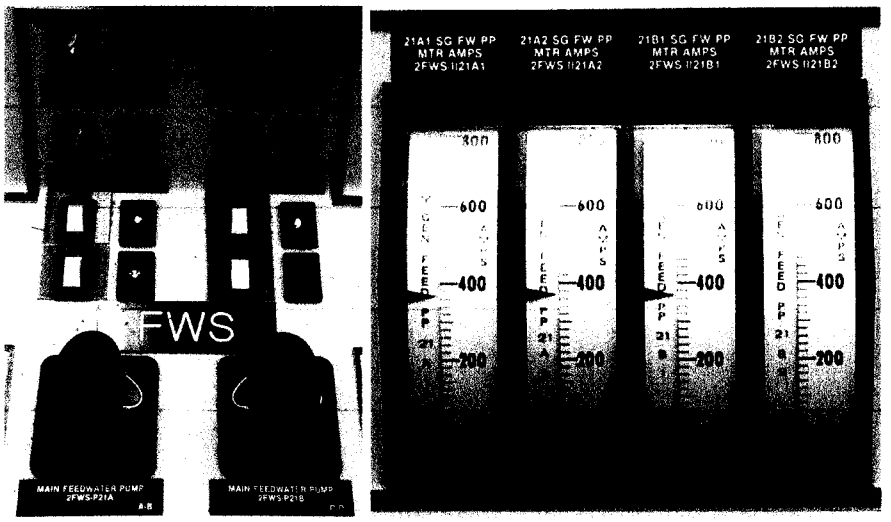
References provided to Candidate None **Technical References:** 2OM-53A.1.E-0, Rev. 1 Iss. 2

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective:

45.



The plant is at 90% power

The Balance of the Plant Operator observes the above indications. What are the required actions for the crew?

A. Trip the Rx

B. Restart the MFP motor

C. Commence Unplanned Power Reduction AOP

D. Take MANUAL control of the MFRVs and maintain SG water level

Answer: A

Explanation/Justification: K/A is met by candidate demonstrating the ability to monitor control room indications, and determine that a MFW pump motor has tripped, then based on plant conditions, take IOA of tripping the Rx per the loss of MFW AOP.

K/A statement was changed from MFW turbine trip indication to MFW trip indication after discussion with the Chief Examiner based on the fact that BV2 does not have turbine driven MFW pumps. By removing turbine from the K/A statement, the intent of the K/A was preserved.

A. Correct. The immediate operator actions of AOP-2.24.1 (Loss of Main Feedwater) requires that the Rx be tripped if less than 2 MFPs are running when >80%. The candidate must know that if one pump motor is running and the other motor trips, a trip of the running motor will occur.

B. Incorrect. The bright white light on the pump indicates the motor tripped. The candidate must know that if one pump motor is running and the other motor trips, a trip of the running motor will occur.

C. Incorrect. The appropriate action would be to enter AOP-2.24.1 (Loss of Main Feedwater) which would give direction to lower reactor power to <52% IF initial condition were <80% power. Unplanned Power Reduction AOP is plausible if candidate didn't realize AOP-2.24.1 would lower power and if the plant initial power had been <80%.

D. Incorrect. The candidate may feel that with one motor still running that the feed pump is capable to maintain feed flow but at a reduced capability. This may lead them to believe that manual FRV control would be required.

Sys #	System	Category	KA Statement
059	Main Feedwater (MFW) System	A4 Ability to manually operate and monitor in the control room:	MFW ~~turbine~~ trip indication

K/A# A4.01 **K/A Importance** 3.1* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.24.1 Rev. 6 pg. 2; 2OM-24.1.D Rev. 6 pg. 10

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 to 45.8)

Objective:

46. The following conditions exist:

- The plant is at 17% power
- The crew is raising power in accordance with 2OM-52.4.A, 'Raising Power From 5% to Full Load Operation"
- All Feedwater Bypass Control valves are in AUTO maintaining SG levels within the control band
- The controller for 2FWS-FCV489, '21B Feedwater Bypass Control Valve' fails to 10% open causing 'B' SG NR water level to lower

1) What is the correct AOP to respond to this event when annunciator A6-10E "SG 21B LEVEL DEVIATION FROM SETPOINT' alarms?

2) If a reactor trip due to SG low-low level occurs, which Auxiliary Feed Pump(s) will automatically start?

A. 1) AOP-2.24.1 'LOSS OF MAIN FEEDWATER'
2) TURBINE Driven Auxiliary Feedwater Pump

B. 1) AOP-2.24.1 'LOSS OF MAIN FEEDWATER'
2) MOTOR Driven Auxiliary Feedwater Pumps

C. 1) AOP-2.4.1 'PROCESS CONTROL FAILURE'
2) TURBINE Driven Auxiliary Feedwater Pump

D. 1) AOP-2.4.1 'PROCESS CONTROL FAILURE'
2) MOTOR Driven Auxiliary Feedwater Pumps

Answer: C

Explanation/Justification: K/A is met by demonstrating the ability to predict the MFW system response to a MFRV controller malfunction, and determining which procedure would be used to mitigate the event. Then state which AFW pump will automatically start if the MFRV failure is not corrected, based on knowledge of the AFW pump auto start coincidences.

A. Incorrect. AOP-2.24.2 is a plausible distractor is it is thought that this event constitutes a loss of main feedwater, but in this case a controller has failed and the SGs are still being fed. TDAFW pump is the correct pump to start when 2/3 SGWL detectors in only 1 SG reaches 20.5%.

B. Incorrect. AOP-2.24.2 is a plausible distractor is it is thought that this event constitutes a loss of main feedwater, but in this case a controller has failed and the SGs are still being fed. MDAFW pump is incorrect because they will start when 2/3 SGWL detectors in 2/3 SGs reaches 20.5%.

C. Correct. Correct AOP to use when a process parameter is not being controlled within its normal control band with the control in auto. TDAFW pump is the correct pump to start when 2/3 SGWL detectors in only 1 SG reaches 20.5%.

D. Incorrect. Correct AOP to use when a process parameter is not being controlled within its normal control band with the control in auto. MDAFW pump is incorrect because they will start when 2/3 SGWL detectors in 2/3 SGs reaches 20.5%.

Sys #	System	Category	KA Statement
059	Main Feedwater (MFW) System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Feedwater actuation of AFW system

K/A# A2.01 **K/A Importance** 3.4* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.4.1 Rev. 1 pg. 1
USFAR figure 7.3-19 Rev. 7
2OM-24.4.AAP Rev. 5

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Objective:

47. The reactor has tripped from 100% power due to a small RCS leak. E-0, "Reactor Trip or Safety Injection" has been exited, and ES-1.1, "SI Termination" is being performed.

The following conditions exist:

- Containment pressure is 1.2 psig
- Pressurizer pressure is 1752 psig and slowly rising
- RCS T_{avg} is 534 °F and slowly lowering
- AFW flow has been throttled to limit the cooldown
- ES-1.1 Step 21, Check Intact Steam Generator Levels is being performed

The Steam Generator parameters are as follows:

SG	Narrow Range Level	AFW Flow
'A'	10%	116 gpm
'B'	5%	114 gpm
'C'	8%	119 gpm

1) What is the current condition of the Red Path Heat Sink Status tree?

2) Which of the following power levels would generate **more** decay heat after the Reactor Trip?

Entry into FR-H.1, "Response to Loss of Secondary Heat Sink" _____(1)_____ required, and **more** decay heat load after the Reactor Trip is generated from _____(2)_____ reactor power.

A. 1) is
2) 25%

B. 1) is NOT
2) 25%

C. 1) is
2) 100%

D. 1) is NOT
2) 100%

Answer: D

Explanation/Justification: K/A is met by determining sufficient AFW flow is available to provide decay heat removal, and the knowledge that decay heat load will be larger after a Rx trip from higher power levels.

A. Incorrect. Plausible distractor with all SG levels <12%. See correct answer below.

B. Incorrect. H-1 entry is not required, but 25% power is incorrect for magnitude of decay heat generation. See correct answer below.

C. Incorrect. Plausible distractor with all SG levels <12%. See correct answer below.

D. Correct. With total AFW flow being >340 gpm, there is sufficient decay heat removal capability even though all SG NR levels are <12%. To meet the K/A for decay heat magnitude, the decision of which power level produces the highest decay heat has to be made. 100% power produces more decay heat after a Rx trip than 25% power.

Sys #	System	Category	KA Statement
061	Auxiliary / Emergency Feedwater (AFW) System	K5 Knowledge of the operational implications of the following concepts as the apply to the AFW:	Decay heat sources and magnitude

K/A# K5.02 **K/A Importance** 3.2 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53A.1.F-0.3 I2 R0, GO-GPF.R8 A Rev. 1

Question Source: Bank-1LOT14 (Q47) Modified

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 45.7)

Objective:

48. The plant is at 15% power in preparation for turbine startup in accordance with 2OM-52.4.A, "Raising Power from 5% to Full Load Operation".

- Charging pump 2CHS*P21A is RUNNING
- Main Feedwater Pump 2FWS-P21B is RUNNING
- Service Water is in NSA
- Diesel Generator 2-1 is on clearance
- All Tech Spec actions for DG 2-1 have been completed

Load Tap Changer for Bus 2A SS Serv Tfmr 2A is in auto and drifts low.
Bus voltage is 3800 VAC (108.5 VAC indicated) and steady.
Load Tap Changer will not respond in Auto or Manual.

Based on the above conditions:

1) What will be the status of the plant 5 minutes after bus voltage drifts to 3800 VAC?

2) What procedure (if any) will be used to mitigate this condition?

A. 1) The plant will be in Mode 3 due to an Automatic Rx Trip
2) E-0, "Reactor Trip Or Safety Injection"

B. 1) Bus 2AE will be de-energized
2) AOP 2.36.2, "Loss of 4KV Emergency Bus"

C. 1) Main Feedwater will be lost
2) AOP 2.24.1, "Loss Of Main Feedwater"

D. 1) The plant will remain at power
2) No procedural guidance is required.

Answer: B

Explanation/Justification: K/A is met by candidate predicting the effect low voltage on Bus 2A will have on the emergency bus 2AE (undervoltage condition will strip Bus 2AE, and the EDG is not available), then respond using the appropriate abnormal operating procedure.

A. Incorrect. Plausible distractor because they may feel that the 'A' RCP would trip (<75% undervoltage, stem is ~91%) due to lowered 'A' bus voltage. With the plant being >P-7 (10%) Rx trip would be a possibility if 2/3 RCPs tripped. 1 RCP tripping >P-8 (30%) will trip the Rx. Neither the Rx, nor the 'A' RCP will trip.

B. Correct. With DG 2-1 on clearance and Bus voltage dropping below 93.4% (3885 VAC with 90 sec.TD) the emergency power undervoltage protection will strip and isolate the 2AE bus. The bus will be de-energized and the correct procedure is AOP 2.36.2 for the loss of 2AE.

C. Incorrect. Main Feedwater will not be lost since 'B' MFP was running and it is powered from normal bus 2C & 2D. At this point in the procedure only one MFP would be running. A second MFP would not be started until feed flow is 6.3-6.8 mpph.

D. Incorrect. Plausible distractor if it is not recognized that the voltage dropped below the 93.4% and the 2AE bus was lost. Most people remember the 75% voltage drop for 1 second, and may feel that nothing will occur to the plant.

Sys #	System	Category	KA Statement
062	AC Electrical Distribution System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Consequences of exceeding voltage limitations

K/A# A2.08 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** LSK-022-005B rev. 8
SPD-27-VE3200AB rev. 1

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Objective:

49. Which of the following is correct regarding a loss of Vital Bus Inverter 2-1 normal power supply?

If Vital Bus 2-1 normal power supply _____(1)_____ is de-energized, Vital Bus Inverter 2-1 will automatically be supplied by _____(2)_____ without affecting the regulated AC output to Vital Bus 2-1.

A. 1) MCC2-E13
   2) MCC2-E05

B. 1) MCC2-E07
   2) DC SWBD 2-1

C. 1) MCC2-E13
   2) DC SWBD 2-1

D. 1) MCC2-E07
   2) MCC2-E05

Answer: C

Explanation/Justification: K/A is met by demonstrating knowledge of the physical connections between AC and DC supplies to the UPS units, and demonstrating an understanding of the cause and effect relationship between AC source being lost, DC source will pick up the load.

A. Incorrect. Normal power supply is E-13. Incorrect answer of MCC2-E05 being the backup power supply if normal power is lost. Plausible distractor because MCC2-E05 is the backup regulated voltage supply to Vital Bus 2-1 if the inverter is removed from service.
B. Incorrect. Plausible distractor because MCC2-E07 is the backup regulated voltage supply to Vital Bus 2-3. DC SWBD 2-1 is the normal backup to the inverter.
C. Correct. Normal power supply is E-13, with DC SWBD 2-1 being the normal backup to the inverter.
D. Incorrect. Plausible distractor because MCC2-E07 is the backup regulated voltage supply to Vital Bus 2-3 and MCC2-E05 is the backup regulated voltage supply to Vital Bus 2-1 if the inverter is removed from service.

Sys #	System	Category	KA Statement
063	DC Electrical Distribution System	K1 Knowledge of the physical connections and/or cause effect relationships between the DC electrical system and the following systems:	AC electrical system

K/A# K1.02 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-38.1.B Rev. 1, pg. 2
RE-0001AW Rev.21

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Objective: 3SQS-38.1 Rev. 8, Obj. 2 From memory, describe the Normal System Arrangement for the Emergency 120 VAC Distribution Systems, including distribution paths, status of feeder breakers, loads, bus transfer switches, power train, and bus designation.

50. A large air break at the outlet of EDG 2-1 air receiver [2EGA*TK21A] is depressurizing the air receiver.

1) What is the minimum Tech Spec required Air Receiver pressure?

2) If air receiver [2EGA*TK21A] fully depressurizes, EDG 2-1 _____(1)_____ start upon receipt of an auto start signal.

A. 1) ≥165 psig
2) will

B. 1) ≥380 psig
2) will

C. 1) ≥165 psig
2) will NOT

D. 1) ≥380 psig
2) will NOT

Answer: B

Explanation/Justification: K/A is met by requiring knowledge of the EDG air system configuration and lineup, and the effects that a loss of one air receiver will have on the starting capabilities of the EDG.

A. Incorrect. Tech Spec minimum air pressure is 380 psig. BV1 & 2 use combined Tech Specs which identify both unit air pressures on the same page, this makes 165 psig a plausible distractor at BV. DG will start.
B. Correct. TS limit for air pressure is ≥380 psig. The knowledge of the correct value is gained through performing OSTs, tech specs, and log taking. DG will start even with a rupture at the outlet of TK-21A due to there being 2 air systems/receivers which are not cross tied. This allows the pressurized receiver to admit air to 6 cylinders (1/2) and start the diesel.
C. Incorrect. Tech Spec minimum air pressure is 380 psig. BV1 & 2 use combined Tech Specs which identify both unit air pressures on the same page, this makes 165 psig a plausible distractor at BV. DG will start as explained in the correct answer.
D. Incorrect. TS limit for air pressure is ≥380 psig. DG will start as explained in the correct answer.

Sys #	System	Category	KA Statement
064	Emergency Diesel Generator (ED/G) System	K6 Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system:	Air receivers

K/A# K6.07 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-36.1.C Rev. 4 pg. 8
2OST-36.1 rev. 71, pg. 9
U2 RM-0436-003 Rev. 19

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 45.7)

Objective: 2SQS-36.2 Rev. 21 Obj. 9 Identify the EDG field instruments, subsystems and components that are required to be operable by the Technical Specifications. 2OJT-1.36

51. The plant is at 75% power with all systems in normal alignment for this power level.
    - Leak Collection Ventilation Radiation monitor 2RMR-RQI301 fails HIGH

    In response to this failure, where will the Contiguous areas exhaust be discharged?

    The Contiguous areas exhaust will be directed through the filter banks and _____.

A. discharged through the Ventilation Vent to atmosphere

B. discharged through the Elevated Release to atmosphere

C. discharged to the Auxiliary Building

D. discharged to the Containment Building

Answer: B

Explanation/Justification: K/A is met by demonstrating knowledge that the normally unfiltered ventilation system realigns to filter the contiguous area exhaust before releasing it to the atmosphere when a process rad monitor malfunction occurs.

A. Incorrect. Plausible distractor because they must know that the Ventilation Vent is the normal discharge path for the Contiguous areas, but that it does not normally pass through the filter banks.
B. Correct. When 2RMR-RQI301 fails high, 2HVS-MOD201A&B will close isolating the Ventilation Vent flowpath, and 2HVS-MOD202A&B opens to align the contiguous areas to the filter banks. The only flowpath from the filter banks is through Leak Collection Filtered Exhaust fans to the Elevated Release to atmosphere.
C. Incorrect. Plausible distractor because they may think that the ventilation lineup will re-align the discharge of filtered exhaust to the surrounding area of the filter banks, which is the Auxiliary Building.
D. Incorrect. Plausible distractor because it could be thought that the ventilation would re-align the discharge of filtered exhaust to the containment building via the purge supply or exhaust.

Sys #	System	Category	KA Statement
073	Process Radiation Monitoring (PRM) System	K3 Knowledge of the effect that a loss or malfunction of the PRM system will have on the following:	Radioactive effluent releases

K/A# K3.01 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-16.1.D Rev.2 pg. 2; 2SQS-16.1 PPNT Rev. 12 slide 6

Question Source: Bank- Vision #124119

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 45.6)

Objective:

52. Given the following plant conditions:

- The Unit was operating at 100% power with all systems in NSA
- An event occurred that caused containment pressure to peak at 6 psig
- Offsite Power has remained available for the duration of the event
- All System functions as designed

Based on these plant conditions, which of the following combinations of reactor and turbine building components will have service water flow for temperature control?

CCP HX's = Primary Component Cooling Water Heat Exchangers
CCS HX's = Secondary Component Cooling Water Heat Exchangers
EDG's = Emergency Diesel Generators
RSS HX's = Recirculation Spray Heat Exchangers

	CCP HX's	CCS HX's	EDG's	RSS HX's
A.	YES	YES	YES	YES
B.	YES	YES	YES	NO
C.	NO	NO	NO	NO
D.	YES	NO	YES	NO

Answer: D

Explanation/Justification: K/A is met by the candidate predicting which of the listed components will have cooling water supplied after a an SI and CIA occur. The K/A statement is met by identifying that the CCP HXs (Rx plant CCW) will have temperature control capabilities and the CCS HXs (Turbine plant CCW) will not have temperature control.

A. Incorrect. CCS HX will isolate on SI/CIA. RSS HX's will be isolated until CIB actuates at 11.1 psig containment pressure.
B. Incorrect. CCS HX will isolate on SI/CIA.
C. Incorrect. CCP HX's will not isolate until CIB at 11.1 psig containment pressure so therefore will be providing flow and temperature control. EDG will have cooling even though they will be running unloaded in this plant configuration.
D. Correct. At > 5 psig containment pressure, SI and CIA have actuated. 2SWS*MOV107A-D close isolating CCS HX's, therefore there will be no cooling or temperature control to the CCS HX's. The SI signal will start EDGs and open 2SWS*MOV113A&D, therefore providing cooling to EDG's. CIB does not actuate until 11.1 psig, so therefore 2SWS*MOV106A&B will remain open providing cooling and therefore temperature control to the CCP HX's. 2SWS*MOV103A&B remain shut and do not open until containment pressure reaches 11.1 psig (CIB).

Sys #	System	Category	KA Statement
076	Service Water System (SWS)	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including:	Reactor and turbine building closed cooling water temperatures.

K/A# A1.02 **K/A Importance** 2.6* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-30.1.D, Rev. 8
2SQS-30.1 PPT, Rev. 23

Question Source: Bank - 2LOT7 NRC Exam (Q53)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 45.5)

Objective:

53. Given the following conditions:

- The plant is at 100% power
- Containment Instrument Air is being supplied by Station Instrument Air
- A Large Break Loss of Coolant Accident occurs
- All systems function as designed
- No operator actions have been taken

Based on these plant conditions, which valve(s) will need to be **reopened** to restore instrument air to the containment?

1. 2IAC-MOV130, CNMT Instrument Air Isol Vlv.
2. 2IAC-MOV131, CNMT Instrument Air Backup Supply Vlv.
3. 2IAC-MOV133, CNMT Instrument Air Isol Vlv.
4. 2IAC-MOV134, CNMT Instrument Air Isol Vlv.

A. 1 **ONLY**.

B. 1 **AND** 2 **ONLY**.

C. 3 **AND** 4 **ONLY**.

D. 1, 2, **AND** 3.

Answer: A

Explanation/Justification: K/A met with the required knowledge that CNMT instrument air is supplied from station instrument air, and that a CIA signal will close 2IAC-MOV130 and isolate air to CNMT.

A. Correct. 2IAC-MOV131 and 2IAC*130 are open at 100% power to supply instrument air from instrument air compressors into containment. BVPS Unit 2 no longer uses containment air compressors. Upon a large break LOCA and SI, the subsequent CIA signal will auto close 2IAC*130. In order to restore instrument air to containment, this valve needs to be reopened only.

B. Incorrect. Correct that 2IAC*MOV130 needs to be reopened. Plausible if the candidate does not know that 2IAC-MOV131 does not receive a CIA signal or believes this valve is affected by this signal. The EOP directs both of these valves opened, however, the EOP deals with all modes of operation and in the stated plant mode, the candidate must know it is not necessary to reopen 2IAC-MOV131.

C. Incorrect. 2IAC*MOV133 & 134 both receive a CIA signal and close. This was the old configuration when running CNMT IAC instrument air to containment. Opening these valves will not restore IA to containment.

D. Incorrect. All three of these valves receive a CIA signal and close from their NSA open positions. The candidate may believe that these valves all need to be reopened to restore instrument air.

Sys #	System	Category	KA Statement
078	Instrument Air System (IAS)	K1 Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems:	Containment air

K/A# K1.03 **K/A Importance** 3.3* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-34.1.D Rev. 4 pg. 7; U2 RM-0434-003 rev. 17; 2OM-53A.1.E-0, Issue 2, Rev. 1, pg. 20

Question Source: Bank - 2LOT8 NRC Exam (Q53)

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Objective:

54. When in Mode 1, what is the NSA required position of 2HVR*DMP206, Containment Vacuum Breaker Ball Valve, to prevent inadvertently breaking containment vacuum?

2HVR*DMP206 is CLOSED _____.

A. with Instrument Air Isolated

B. and De-energized

C. and Chain Locked

D. with Shorting Bar removed

Answer: C

Explanation/Justification: K/A is met by the knowledge of that CNMT vacuum breaker is chain locked closed to prevent inadvertent breaking of CNMT vacuum when in Modes 1-4. This is an administrative interlock.

Manually operated 2HVR*DMP206 has remote position indication on the Building Service Control Panel in the Control Room. With this indication available in the CR, it helps to make all incorrect distractors plausible as the candidate may think it is an electrically operated valve.

A. Incorrect. Plausible means of failing an air operated valve closed.
B. Incorrect. Plausible means of failing a motor operated valve in a desired position.
C. Correct. IAW 2OST-48.7, 2HVR*DMP206 is required to be chain locked closed in Modes 1-4.
D. Incorrect. Plausible means of removing power from the contactor to prevent valve movement.

Sys #	System	Category	KA Statement
103	Containment System	K4 Knowledge of containment system design feature(s) and/or interlock(s) which provide for the following:	Vacuum breaker protection

K/A# K4.01 **K/A Importance** 3.0* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-44C.4.A Rev. 23 pg 4, RM-0444C-002 Rev. 7, 2OST-48.7 Rev. 41 pg 16

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7)

Objective:

55. The plant is at 50% power.

- Annunciator A1-1E, Containment Air Pressure High/Low has alarmed
- 2CVS-PI101A1 CNMT PRESS is reading 14.1 psia
- No other annunciators are in the Control Room

Which of the actions below will clear annunciator A1-1E in accordance with 2OM-12.4.AAA, "Containment Air Pressure High/Low"?

A. Align the Containment Vacuum Ejector for use

B. Isolate Cooling Water flow to the operating CNMT Air Recirc (CAR) Fans

C. Shutdown an operating CNMT Air Recirc (CAR) Fan

D. Start a CNMT Vacuum Pump

Answer: D

Explanation/Justification: K/A is met by demonstrating the ability to recognize a CNMT high pressure condition from the Control room, and respond by manually starting the CNMT vacuum pump to restore pressure.

A. Incorrect. This is a plausible means of lowering cnmt pressure, but it is used to draw initial cnmt vacuum. It is not an approved method iaw 2OM-12.4.AAA to lower cnmt pressure.

B. Incorrect. This is a plausible distractor if it is thought that cnmt pressure is low due to low temperature, and must be raised back into normal band. Incorrect because cnmt pressure is high.

C. Incorrect. Plausible distractor if it is thought that cnmt pressure is low due to low temperature, and must be raised back into normal band. Incorrect because cnmt pressure is high.

D. Correct. Must recognize that cnmt pressure is high and must be lowered to 13.4-13.6 psia using the vacuum pumps. This is directed by 2OM-12.4.E "Maintaining the Containment Vacuum" which 2OM-12.4.AAA references. This knowledge of the setpoint range can be determined by the above the line RO knowledge for TS 3.6.4 pressure limits of ≥12.8 - ≤14.2 psia.

Sys #	System	Category	KA Statement
103	Containment System	A4 Ability to manually operate and/or monitor in the control room:	Containment vacuum system

K/A# A4.09 **K/A Importance** 3.1* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-12.4.AAA Rev. 4 pg.6; 2OM-12.4.E Rev. 4 pg. 2

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 to 45.8)

Objective:

56. The plant is at 75% power with all systems in normal alignment for this power level **EXCEPT** PRZR Pressure Controller 2RCS*PK444A is in MANUAL controlling pressure at 2235 psig.

- All plant parameters are on program
- A 20% Load Rejection occurs
- No operator actions have occurred

As compared to the initial conditions, what is the status of the PRZR level and pressure 5 minutes after the Load Rejection occurred?

	PRZR Level	PRZR Pressure
A.	Lower	Lower
B.	Lower	Higher
C.	Higher	Lower
D.	Higher	Higher

Answer: A

Explanation/Justification: K/A is met by predicting the effect that the control rods inserting during a load rejection will have on both PRZR level and pressure.

A. Correct. With a 20% load rejection Tref will be at a lower value than initial. Rod control will drive the rods in to get Tavg down to within 1.5F of Tref. This will cause Tavg to lower. PRZR program level control (22-53% program) is based on Tavg (547-574F), therefore, PRZR level will be lower. With 2RCS*PK444A in manual (approx. 42% demand for 2235 psig), when the LR occurs PRZR pressure will lower, since the spray valves remain open (where as if in auto they would close at 40.6%), pressure will drive lower than expected, and it will take longer for heaters to recover pressure because all Backup heaters will not energize. (all Backup heaters turn on at 9.4% demand if in auto).

B. Incorrect. Plausible distractor if it is thought that PRZR Pressure Controller in manual will allow pressure to rise about initial pressure and remain higher.

C. Incorrect. Plausible distractor if the candidate does not have a thorough understanding of PRZR level controller programming and Rod Control Temperature control. Pressure will be lower than initial.

D. Incorrect. Plausible distractor if the candidate does not have a thorough understanding of PRZR level controller programming and Rod Control Temperature control. Pressure would be lower than initial.

Sys #	System	Category	KA Statement
001	Control Rod Drive System	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CRDS controls including:	PZR level and pressures

K/A# A1.04 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-1.1.B Rev. 6 pg 10; 2OM-1.5.A.48 Iss. 1 Rev. 1; 2OM-6.4.IF Rev. 13 Pgs. 24 & 25

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5/45.5)

Objective:

57. The following conditions exist:

- The Plant is at 100% power
- PRZR PRESS CONTROL 2RCS*PK444A is in AUTO set at 2235 psig
- PRZR HEATERS CONTROL GROUP C [2RCP-H2C] CS has a RED target
- PRZR HEATERS BACKUP GROUP B & D [2RCP-H2B & H2D] CS have RED targets
- PRZR HEATERS BACKUP GROUP A & E [2RCP-H2A & H2E] CS have GREEN targets

[2RCS*PCV455B] 'B' PRZR SPRAY VALVE Fails OPEN.

Which of the following is the correct order of automatic actions that occur as RCS pressure is lowering?

1. PRZR Backup Heaters ON
2. Safety Injection Actuation
3. 'A' PRZR Spray Valve [2RCS*PCV455A] CLOSED
4. PRZR Pressure Low Rx Trip
5. PRZR Heaters Control Group C [2RCP-H2C] ON

A. 3, 5, 1, 4, 2

B. 3, 1, 5, 2, 4

C. 5, 3, 1, 4, 2

D. 5, 1, 3, 2, 4

Answer: A

Explanation/Justification: K/A is met by the candidates ability to identify automatic actions which occur as RCS pressure is lowering, this includes automatic operation of PRZR heaters which raise PRZR temperature, and PRZR spray flow control on the non-faulted spray valve, as well as automatic SI flow actuation into the RCS.

A. Correct. The Master Pressure Controller will respond to the lowering pressure by controlling the spray valve and heaters. PRZR Pressure Protection channels will control the Low pressure Rx trip, and the SI Initiation. The MPC output will be driving to 0 as pressure is lowering. PCV455A will close at 40.6, Control Htrs will come on at 34.4, B/U htrs will energize at 9.4 (2210 psig), Rx trip at 1945, and SI at 1856 psig.

B. Incorrect. See correct explanation.

C. Incorrect. See correct explanation.

D. Incorrect. See correct explanation.

Sys #	System	Category	KA Statement
002	Reactor Coolant System (RCS)	A3 Ability to monitor automatic operation of the RCS, including:	Pressure, temperatures, and flows

K/A# A3.03 **K/A Importance** 4.4 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-6.4.IF Att. 2 Rev. 13

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5)

Objective:

58. The plant is at 100% power.
    - PRZR Level Control Channel Selector is in Channel I & II (LT459 & 460)
    - PRZR level is on program

    The reference leg for PRZR Channel I Level [2RCS*LT459] develops a leak.

    With NO operator action, how will the following PRZR level indicators in the Control Room respond 5 minutes after the leak develops?

    If the event continues with NO operator action, a Rx trip signal _____ be generated.

	2RCS*LI459	2RCS*LI460	Rx trip Signal
A.	Rise	Lower	will
B.	Lower	Rise	will NOT
C.	Rise	No change	will
D.	Lower	No change	will NOT

Answer: A

Explanation/Justification: K/A is met by demonstrating the knowledge to understand the effects a reference leg failure on one of the post accident monitor PRZR level indicators will have of the PRZR Level Control System, and the overall function that all 3 PAM PRZR level indicators have as reactor trip inputs. At BVPS all three of the PAM przr level instruments are used for the level control system.

A. Correct. A reference leg leak will cause the affected PAM channel (LT459) to indicate high. Since LT459 is the controlling channel, it will cause 2CHS-FCV122 to close to minimum flow, thus causing PRZR level to initially lower until letdown isolates at 14%. After L/D isolates, PRZR level will rise due to charging flow (minimum flow of 25 gpm when FCV122 is automatically closed) and seal injection, until PRZR level reaches 92% on 2/3 indicator when >10% power. This will generate a rx trip.

B. Incorrect. Plausible if the candidate doesn't understand the difference between a reference leg and a variable leg leak. Because a variable leg leak on LT459 would cause indicated level to lower. The operable (LT460) level instruments would indicate a higher PRZR level in this case because charging flow would be maximized. A rx trip would be generated on high przr level due to LT459 isolating L/D.

C. Incorrect. A reference leg leak will cause the affected PAM channel (LT459) to indicate high. The No change indications on the operable PAM indicators is plausible if the candidate thinks that LT459 is NOT the controlling channel for 2CHS-FCV122, and will have no effect on charging. Plausible distractor of Rx trip if candidate feels that LT459 and LT461 both rise to the przr level trip setpoint.

D. Incorrect. Plausible because a variable leg leak on LT459 will cause indicated level to lower. The No change indications on the operable PAM indicators is plausible if the candidate thinks that LT459 is NOT the controlling channel for 2CHS-FCV122, and will have no effect on charging. Rx not tripping would be correct for the assumed failure conditions of this answer.

Sys #	System	Category	KA Statement
011	Pressurizer Level Control System (PZR LCS)	K6 Knowledge of the effect of a loss or malfunction on the following will have on the PZR LCS:	Function of PZR level gauges as post accident monitors

K/A# K6.05 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** GO-GPF.C7 Rev. 4 pg. 55, 2OM-1.5.B.1 Rev. 2
2OM-6.4.IF, attachment 1, rev 13
U2 RM-0406-003 Rev. 6

Question Source: Bank – Vision #131762 Modified

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.7)

Objective:

59. The following conditions exist.
- A large break LOCA has occurred
- TSC has been activated
- Annunciator A1-2B, Hydrogen Level High/High-High is in alarm

Complete the following statements. Assume the TSC has been contacted and concurs with the decision.

The High-High Hydrogen concentration in Containment setpoint is _____(1)_____.

In accordance with the Hydrogen Level High/High-High ARP, the crew will _____(2)_____ in response to the High-High Hydrogen level in Containment.

A. 1) 0.5%
2) intentionally ignite the Containment atmosphere

B. 1) 0.5%
2) start [2HCS-FN21] Containment Atmosphere Purge Blower

C. 1) 4.5%
2) intentionally ignite the Containment atmosphere

D. 1) 4.5%
2) start [2HCS-FN21] Containment Atmosphere Purge Blower

Answer: D

Explanation/Justification: BVPS2 has retired the H2 recombiners and explosive H2 concentration in the Cnmt is beyond design based accident. We discussed the K/A with Chief Examiner who stated to stay focused on the purge control portion of the system.

K/A is met knowledge of the operation of the containment purge system in the event of a High-High Hydrogen concentration in the containment.

A. Incorrect. 0.5% is the High H2 alarm. Plausible distractor of igniting the atmosphere since this is an option in our severe accident management guidelines, but this is not the correct response at this H2 level or iaw the ARP.
B. Incorrect. 0.5% is the High H2 alarm. This is the correct response iaw the ARP.
C. Incorrect. Correct setpoint for the High-High alarm. Plausible distractor of igniting the atmosphere since this is an option in our severe accident management guidelines, but this is not the correct response at this H2 level or iaw the ARP.
D. Correct. Correct setpoint for the High-High alarm. Correct actions iaw the ARP.

Sys #	System	Category	KA Statement
028	Hydrogen Recombiner and Purge Control System (HRPS)	K5 Knowledge of the operational implications of the following concepts as they apply to the HRPS:	Explosive hydrogen concentration

K/A# K5.01 **K/A Importance** 3.4 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-46.4.ABD Rev. 3 pg. 5

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5 / 45.7)

Objective: 2SQS-46.1 Obj. 15 Describe the control, protection and interlock functions for the control room components associated with Post DBA Hydrogen Control System, including automatic functions, setpoints and changes in equipment status as applicable.

60. Given the following:

- The plant is in Mode 5
- An Induced Containment Purge through the SLCRS Unfiltered flow path is in progress
- The Personnel Airlock and Equipment Hatch are closed
- The Cnmt Purge Supply Isol Damper 2HVR*MOD25B is inadvertently CLOSED
- NO other components reposition

Which of the following containment parameters will be the **FIRST** to be affected by this failure?

A. Pressure

B. Temperature

C. Radiation Level

D. Humidity Level

Answer: A

Explanation/Justification: K/A is met with the knowledge of the Containment Purge system being aligned for induced purge, and the Cnmt Purge Supply Isol Damper goes closed, what containment parameter will be effected due to this misalignment.

A. Correct. The Induced purge flowpath has Leak Collection Normal Exhaust Fan taking suction on the Cnmt exhaust line. When the Containment Purge Supply Isol Damper is closed, the cnmt pressure will lower.
B. Incorrect. Temperature will remain constant since the Induced Purge flowpath does not provide a cooling function
C. Incorrect. Radiation levels would only rise to cause a purge isolation, they would not rise because of an isolation
D. Incorrect. Humidity is a function of the containment temperature and dewpoint, which are unaffected by purge control operation.

Sys #	System	Category	KA Statement
029	Containment Purge System (CPS)	K3 Knowledge of the effect that a loss or malfunction of the Containment Purge System will have on the following:	Containment parameters

K/A# K3.01 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** U2 RM-0444C-002 Rev 7, U2 RM-0444D-001 Rev. 8 U2 RM-0416-001 rev. 12 2OM-44C.4.A Rev. 23 pg. 5

Question Source: Bank - 1LOT7 NRC Exam (Q28)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.6)

Objective:

61. The following conditions exist:
    - The plant is in Mode 6
    - Core off-load is in progress
    - A4-5D, NIS Source Range High Flux at Shutdown is in alarm
    - Both SR channels indicate a rising Neutron rate and positive startup rate

    Based on the above conditions, Fuel Handling personnel are required to stop fuel movement and evacuate the _____(1)_____.

    The High Flux at Shutdown setpoint is _____(2)_____ decade above the SR detector background count rate.

A. 1) Fuel Building
   2) 1/2

B. 1) Fuel Building
   2) 1

C. 1) Containment Building
   2) 1/2

D. 1) Containment Building
   2) 1

Answer:C

Explanation/Justification: K/A is met with the knowledge of the cause and effect relationship between the NIS Source Range High Flux at Shutdown alarm being in alarm, and what effect it will have on the fuel movement in containment.

A. Incorrect. Plausible distractor is the candidate thinks the High Flux at Shutdown alarm is monitoring the core offload in the Fuel Pool and the setpoint was based on the SR values in the core. 1 decade is an incorrect value for the setpoint.
B. Incorrect. Plausible distractor is the candidate thinks the High Flux at Shutdown alarm is monitoring the core offload in the Fuel Pool and the setpoint was based on the SR values in the core. 1/2 is the correct setpoint.
C. Correct. When both SR channels indicate a rising Neutron rate and positive startup rate, the CR is directed to evacuate the Cnmt Building iaw. A4-5D ARP. In accordance with 2OM-2.4.H, the setpoint is set at ½ times (3.16) SR background.
D. Incorrect. This is the correct action for the conditions. It is an incorrect value for the setpoint.

Sys #	System	Category	KA Statement
034	Fuel Handling Equipment System (FHES)	K1 Knowledge of the physical connections and/or cause effect relationships between the Fuel Handling System and the following systems:	NIS

K/A# K1.04 **K/A Importance** 2.6 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-2.4.H Rev.4, 2OM-2.4.AAG Rev. 1

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Objective:

62. Given the following conditions:

- 'C' MAIN FEEDWATER REG VALVE 2FWS*FCV498 failed CLOSED
- Reactor tripped on Low-Low Steam Generator level

1) What is the Steam Generator level setpoint for the Motor Driven Auxiliary Feedwater Pumps to automatically start?

2) What is the basis for Auxiliary Feedwater automatically initiating?

A. 1) 20.5% Narrow Range Level
2) Provide a secondary heat sink.

B. 1) 20.5% Narrow Range Level
2) Prevent Steam Generator dryout.

C. 1) 19.6% Narrow Range Level
2) Provide a secondary heat sink.

D. 1) 19.6% Narrow Range Level
2) Prevent Steam Generator dryout.

Answer: A

Explanation/Justification: K/A is met by the candidate demonstrating the knowledge of the design feature of the MDAFW pump start setpoints, and that the reason AFW starts is to supply feed to the SG for decay heat removal.

A. Correct. 2/3 detectors indicating 20.5% NR level (low-low setpoint) on 2/3 SGs will start the MDAFW pumps to keep the tubes covered for secondary heat removal.
B. Incorrect. Plausible because the setpoint is correct. Incorrect basis. It could be thought that aux feedwater was provided just to prevent SG dryout, however, the reason is to keep the tubes covered for secondary heat removal.
C. Incorrect. Plausible level because 19.6% is the Unit 1 setpoint. Correct bases.
D. Incorrect. Plausible because 19.6% is the Unit 1 setpoint. Incorrect bases. It could be thought that aux feedwater was provided just to prevent SG dryout, however, the reason is to keep the tubes covered for secondary heat removal.

Sys #	System	Category	KA Statement
035	Steam Generator System (S/GS)	K4 Knowledge of S/GS design feature(s) and/or interlock(s) which provide for the following:	Amount of reserve water in S/G

K/A# K4.05 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-53B.4.E-0 Iss. 2 Rev. 1 pg. 16
2OM-24.1.D Rev. 6 pg. 16
2OM-24.2.B Rev. 16 pg. 4

Question Source: Bank – Comanche Peak 2013 NRC Exam (Q35)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7)

Objective:

63. Plant conditions have been established to perform 2OST-26.8, "Main Turbine Overspeed Trip Test".

- Reactor power is stable at 13%
- The generator is NOT synchronized to the grid
- Overspeed Protection Test Switch is in the "Inservice" position
- As Turbine speed is raised, Annunciator A7-2E "Turbine Overspeed Prot Controller Operating" alarms
- S/G pressures are 1000 psig and stable

When Turbine speed reaches 1870 RPM, how will the Reactor and Turbine EHC valves respond?

(IV = Intercept valves, GV = Governor valves, TV = Throttle valves)

	Reactor Status	Turbine EHC valves
A.	At Power	Only IV's and GV's Close
B.	At Power	ALL IV's, GV's, and TV's Close
C.	Not at power	Only IV's and GV's Close
D.	Not at power	ALL IV's, GV's, and TV's Close

Answer: A

Explanation/Justification: K/A is met by the understanding that when testing the turbine overspeed, and the annunciator for "Turbine Overspeed Prot Controller Operating" alarms, that only the IVs and GVs will be effected by the OPC.

A. Correct. At 103% (1844-1864 rpm) the Overspeed Protection Controller actuates causing all 4 GVs and all 4 IVs to close. The TVs are not closed by the OPC. The Rx will remain at power. Position indication of Turbine valves can be monitored on BB-C.

B. Incorrect. The TVs are not closed by the OPC which makes the distractor incorrect. The Rx will remain at power.

C. Incorrect. It is correct that only the IVs and GVs will close. It is incorrect to believe that the Rx will trip. Plausible distractor because a Turbine trip generates a Rx trip when >P-9. Power was set at 13% to be >P-10 to support the plausibility of the distractor.

D. Incorrect. The TVs are not closed by the OPC which makes the distractor incorrect. It is incorrect to believe that the Rx will trip. Plausible distractor because a Turbine trip generates a Rx trip when >P-9. Power was set at 13% to be >P-10 to support the plausibility of the distractor.

Sys #	System	Category	KA Statement
045	Main Turbine Generator (MT/G) System	A4. Ability to manually operate and/or monitor in the control room:	Turbine valve indicators (throttle, governor, control, stop, intercept), alarms, and annunciators

K/A# A4.01 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-26.4.AAU Iss.1 Rev. 5; 2OST-26.8 Rev. 16 pg.15

Question Source: Bank – Vision #138661

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 to 45.8)

Objective:

64. The following conditions exist:

- Plant is at 80% power
- Control Room ACU Outside Air Intake and Exhaust Dampers 2HVC*MOD201B & D automatically CLOSED.
- Control Room Emergency Supply Fan [2HVC*FN241B] automatically STARTS 120 seconds after the Control Room isolation occurs

Which of the following radiation monitors, and setpoint would cause the above ventilation lineup?

A. Control Room Area [2RMC*RQ201] radiation monitor above the ALERT setpoint.

B. Control Room Area [2RMC*RQ202] radiation monitor above the HIGH setpoint.

C. Control Room Airborne Particulate [2RMC-RQ301A] radiation monitor above the ALERT setpoint.

D. Control Room Airborne Gas [2RMC-RQ301B] radiation monitor above the HIGH setpoint.

Answer: B

Explanation/Justification: K/A is met by re-aligning the Control Room ventilation system and having the candidate demonstrate the ability to determine which radiation monitor alarm would cause the automatic ventilation alignment.

A. Incorrect. Plausible distractor because RQ201 does initiate CR isolation at the HIGH setpoint, but not at the alert setpoint.
B. Correct. RQ202 does initiate a CR isolation when at High setpoint.
C. Incorrect. Plausible distractor with it being a CR rad monitor. RQ301A will not initiate CR isolation.
D. Incorrect. Plausible distractor with it being a CR rad monitor. RQ301B will not initiate CR isolation.

Sys #	System	Category	KA Statement
072	Area Radiation Monitoring (ARM) System	Generic	Ability to verify that the alarms are consistent with the plant conditions.

K/A# 2.4.46 **K/A Importance** 4.2 **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-43.4.ADB Rev.7 pg. 2
2OM-43.1.C Rev. 5 pg. 24
1/2OST-43.17D Rev. 44

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.3 / 45.12)

Objective:

65. Given the following conditions:

- The plant was operating at Full Power with all systems in NSA
- A Loss of Offsite Power occurred following a design basis earthquake
- The Control Room crew is performing actions of E-0, "Reactor Trip or Safety Injection"
- Emergency Diesel Generator #1 has failed to start
- All other systems function as designed

Which of the following describes the status of power to 2SWS*P21A and P21B, "Service Water Pumps"?

2SWS*P21A has _____(1)_____.
2SWS*P21B has _____(2)_____.

A. (1) power
(2) power

B. (1) **no** power
(2) power

C. (1) power
(2) **no** power

D. (1) **no** power
(2) **no** power

Answer: B

Explanation/Justification: K/A is met by demonstrating the knowledge of the available power to the essential SWS pumps following a loss of offsite power coincident with an EDG start failure.

A. Incorrect. Incorrect that 2SWS*P21A has power (refer to correct answer explanation) Correct 2SWS*P21B status.
B. Correct. 2SWS*P21A is normally powered from Bus 2AE. Since there is no offsite power and EDG 2-1 failed to start, 2SWS*P21A has no power. 2SWS*P21B is powered from Bus 2DF. Since all other systems functioned as designed, EDG 2-2 started and is supplying Bus 2DF so therefore 2SWS*P21B does have power.
C. Incorrect. Incorrect that 2SWS*P21A has power (refer to correct answer explanation) Incorrect 2SWS*P21B status. Plausible if the candidate does not understand integrated plant status and power supplies.
D. Incorrect. Correct that 2SWS*P21A has no power. Incorrect 2SWS*P21B status

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Sys #	System	Category	KA Statement
075	Circulating Water System	K2 Knowledge of bus power supplies to the following:	Emergency/essential SWS pumps

K/A# K2.03 **K/A Importance** 2.6* **Exam Level** RO

References provided to Candidate None **Technical References:** 2OM-30.3.C Rev. 15, Pg. 8 & 10
3SQS-36.1 PPNT U2 Rev. 12 Iss. 1 Slide 10

Question Source: Bank – 1LOT8 NRC Exam (Q64)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7)

Objective:

66. The plant is in Mode 5 preparing to enter Mode 4.

- Valve alignments are being performed on a Safety-Related system
- The REQUIRED NSA position of a manually operated globe valve is OPEN
- The valve must be in this position PRIOR to Mode 4 entry
- The Independent Verifier will receive 8 mR performing the Independent Verification (IV)

IAW the guidance provided in NOP-OP-1002, Conduct of Operations, how could the Independent Verification for this valve be addressed?

A. The Operations Manager has the authority to waive the IV for equipment concerns.

B. The IV may be performed by using the Plant Computer System (PCS) if "Not Closed" is indicated.

C. The Shift Manager can waive the IV due to dose limits.

D. The IV may be performed by a functional test that can prove the valve is open.

Answer: D

Explanation/Justification: K/A is met by demonstrating the knowledge of alternative independent verification means for a valve lineup in accordance with the Conduct of Operations manual.

A. Incorrect. Plausible distractor because it may be assumed that the Operations Manager would have this authority, but that is not correct.
B. Incorrect. Plausible distractor but not a reliable alternative to hands on verification. The valve is required to be OPEN, but the remote indication of NOT-CLOSED only means that the valve is not fully closed.
C. Incorrect. Plausible distractor because the SM can waive the IV if it would result in a radiation exposure greater than 10 mRem.
D. Correct. A functional test may be used for an IV iaw NOP-OP-1002 sect. 4.18.2.6.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc

K/A# 2.1.29 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate None **Technical References:** NOP-OP-1002 Rev. 9 pg. 82

Question Source: Bank - 2LOT6 NRC Exam (Q66) Modified

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 45.1 / 45.12)

Objective:

67. Given the following plant conditions:

- The plant is operating at 90%
- VCT level is 38%
- VCT Level Transmitter, 2CHS*LT112 fails HIGH

Which of the following completes the statements below?
(Assume NO operator action)

1) VCT level on 2CHS*LT115 will _____(1)_____.

2) VCT Auto Makeup will be _____(2)_____.

A. 1) lower
2) available

B. 1) lower
2) unavailable

C. 1) remain unchanged
2) available

D. 1) remain unchanged
2) unavailable

Answer: A

Explanation/Justification: K/A is met by the candidate recognizing how the system will respond to one VCT level control indication failing high, and validating how the other VCT control indication will respond to this failure.

A. Correct. With LT112 failing high, both LCV112 and LCV115A will reposition to divert and lower the actual level. As VCT level lowers to 20%, LT115 will start Auto Makeup and try to maintain level 20-40%.
B. Incorrect. Actual level will lower. LT115 is unaffected, therefore as actual level lowers, Auto Makeup will start to maintain level 20-40%.
C. Incorrect. Actual level remaining unchanged would be true if LT112 failed low. It is correct that auto makeup will be available.
D. Incorrect. Actual level remaining unchanged would be true if LT112 failed low. It is incorrect that auto makeup will be available.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to identify and interpret diverse indications to validate the response of another indication.

K/A# 2.1.45 **K/A Importance** 4.3 **Exam Level** RO
References provided to Candidate None **Technical References:** 2OM-7.4.IF Rev. 3 Att. 1
Question Source: Bank - Harris 2012 NRC Exam (Q67)
Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.7 / 43.5 / 45.4)
Objective:

68. You are performing a procedure out in the plant and you note a typographical error in the step you are about to perform. In accordance with NOP-LP-2601, 'Procedure/Work Instruction Use and Adherence', what action are you required to perform.

A. No action is required, continue with the procedure, and inform your supervisor upon completion.

B. Contact your supervisor, identify the typographical error, have the supervisor annotate issue in the procedure, and then continue with the activity.

C. Contact your supervisor, identify the typographical error, and perform a Limited Use Change.

D. Contact your supervisor, identify the typographical error, and Revise the procedure.

Answer: B

Explanation/Justification: K/A is met with the knowledge of the expected response when a procedure is found to have a typographical error, and how to make the necessary changes to the procedure prior to completing work.

A. Incorrect. By continuing on in the procedure without discussing it with the authorizing authority or responsible supervisor would be a violation of NOP-OP-2601.
B. Correct. Per NOP-LP-2601, if a typo is discovered, the performer must stop the work, ensure equipment is in a safe condition, and contact they're supervisor. Clearly identify typo by annotating the procedure and then continue with the activity.
C. Incorrect. A Limited Use Change is not required for a typographical error
D. Incorrect. A procedure Revision is not required for a typographical error.

Sys #	System	Category			KA Statement
N/A	N/A	Generic			Knowledge of the process for making changes to procedures.
K/A#	2.2.6	**K/A Importance**	3.0	**Exam Level**	RO
References provided to Candidate		None		**Technical References:**	NOP-LP-2601 rev.5, pg.15 & 16
Question Source:	New				
Question Cognitive Level:		Lower – Memory or Fundamental		**10 CFR Part 55 Content:**	(CFR: 41.10 / 43.3 / 45.13)
Objective:					

69. Given the following plant conditions:

- The Unit is operating at 100%.
- You have just returned from a day off and are reviewing the narrative logs.
- 36 hours ago, a valve was repositioned out of NSA and selected as an OPEN item using the Short Term Configuration Change Process.

Based on the requirements of NOP-OP-1014, "Plant Status Control", does this comply with the Short Term Configuration Change Process?

A. Yes; a clearance will only be necessary if restoration does not occur within the next 12 hours.

B. Yes; a system status print sheet will be necessary if restoration does not occur within the next 12 hours.

C. No; a clearance should have been posted 12 hours ago.

D. No; a system status print sheet should have been issued 12 hours ago.

Answer: C

Explanation/Justification: K/A is met by the ability to determine a valve has exceeded the short term configuration change process, and identify the correct actions that should have been take in accordance with NOP-OP-1014, Plant Status Control procedure.

A. Incorrect. Refer to correct answer explanation. The candidate may believe the requirement is 48 hours as opposed to 24 hours.
B. Incorrect. Refer to incorrect choice D explanation. Plausible and balanced distractor.
C. Correct. According to NOP-OP-1014, if a component is not restored to its normal configuration within 24 hours, then a clearance is hung to provide a plant status control tracking method and documentation of the deviation from the components normal alignment. A clearance should have been posted 12 hours ago.
D. Incorrect. Correct that it does not comply with the short term configuration control process. A System Status Print is required to be filled out at all times reflecting system status conditions, if the system is deemed necessary by the Ops Manager. If it was not deemed necessary, the system status print would not be required. If it was deemed necessary, then it should have been filled out 36 hours ago.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc.

K/A# 2.2.15 **K/A Importance** 3.9 **Exam Level** RO
References provided to Candidate None **Technical References:** NOP-OP-1014, Rev. 3, pg. 14
Question Source: Bank – 1LOT8 NRC EXAM (Q96)
Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 43.3 / 45.13)
Objective:

70. The plant is at 100% power.

Which of the following conditions or events (considered individually) will require Technical Specification action(s) to be performed within one hour or less?

A. RWST borated water temperature drops to 50 °F.

B. One Containment Pressure Transmitter fails to zero.

C. RWST borated water volume drops to 840,200 gallons.

D. BOTH Train "A" – Phase B (CIB) manual Control Switches are declared inoperable.

Answer: C

Explanation/Justification: K/A is met by the knowledge required to recognize the RWST level is below Tech Spec require level and is a ≤ 1 hr. TS action statement.

A. Incorrect. TS 3.5.4 Surveillance requires RWST borated water temperature to be ≥45 F and ≤ 65 F. therefore there is no TS LCO entry required for this distractor.
B. Incorrect. TS 3.3.2 Condition D & E apply. The channel is required to be placed in trip/bypass within 72 hrs.
C. Correct. TS 3.5.4 Condition B states that if RWST is inoperable for reasons other than boron concentration or temperature (Condition A), then a 1 hour action statement is applicable. SR 3.5.4.2 requires Unit 2 RWST level to be ≥ 859248 gallons. If this surveillance is not met then TS LCO actions apply. RO's are required to know ≤ 1hour TS LCO's from memory.
D. Incorrect. TS 3.3.2 Condition B applies. This is a 48 hour action statement.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of less than or equal to one hour Technical Specification action statements for systems.

K/A# 2.2.39 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** BVPS TS pg. 3.5.4.1 & 2 Amend. 278/161

Question Source: Bank- 1LOT8 NRC Exam (Q41)

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 41.10 / 43.2 / 45.13)

Objective: 2SQS-13.1 Rev. 18 Obj. 18 - For a given set of plant conditions, determine if the condition meets the criteria for entry into a one hour or less action statement in accordance with the Technical Specifications.

71. You are going into a contaminated area, which has the following radiological characteristics to perform a valve lineup.

- Your current exposure for the year is 938 mrem
- The RWP states:
  - General area dose rate = 30 mrem/hr
  - Airborne contamination concentration = 10.0 DAC

- The valve lineup will take you 2 hours if you wear a full-face respirator.
- The valve lineup will only take you 1 hour if you do **NOT** wear the respirator.

1) Which of the following choices for completing this job would maintain your exposure within the station administrative requirements and the principles of ALARA?

2) Why is this action appropriate?

A. 1) You must wear the respirator.
   2) You will exceed DAC limits if you do **NOT** wear a respirator.

B. 1) You must wear the respirator.
   2) Your calculated TEDE dose received will be less than if you do **NOT** wear a respirator.

C. 1) You should **NOT** wear the respirator.
   2) Your calculated TEDE dose received will be less than if you do wear a respirator.

D. 1) You should **NOT** wear the respirator.
   2) Your dose received wearing a respirator will exceed the site annual personnel dose limits.

Answer: C

Explanation/Justification: K/A is met by demonstrating the ability to comply with an RWP to determine dose received with or without a respirator to achieve the lowest possible dose for a job.

A. Incorrect. This answer is plausible if the applicant does not understand the concept of DAC-hours and DAC-hour limits.
B. Incorrect. This answer is plausible if the applicant incorrectly calculates the exposure.
C. Correct. Without respirator: TEDE = 30 mrem/hr x 1 hr = 30 mrem, From airborne contamination: TEDE = 10 DACx1 hr x 2.5 mrem/DAC-hr = 25 mrem, TEDE = 30 + 25 = 55 mrem from job, Total exposure for year = 938 + 55 = 993 mrem
With respirator, TEDE = 30 mrem/hr x 2 hr = 60 mrem TEDE = 60 mrem, Total exposure for year = 938 + 60 = 998 mrem
TEDE = 60 mrem-vs-55 mrem = do not use a respirator
D. Incorrect. This answer is plausible if the applicant miscalculates the dose.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to comply with radiation work permit requirements during normal or abnormal conditions.

K/A# 2.3.7 **K/A Importance** 3.5 **Exam Level** RO

References provided to Candidate None **Technical References:** NOP-OP-4201 Rev. 2 pg. 20
FENRWT Rev 3 CNRR 08-08-14 Handout pg.26 & 64

Question Source: Bank-McGuire 2012 NRC Exam (Q72) MOD

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.12 / 45.10)

Objective:

72. The following conditions exist:

- Plant is operating at 100% power
- Radiation level is 1,324 mrem/hr at 30 centimeters from the Letdown piping
- You have been assigned to enter the Letdown cubicle and hang a clearance

Which of the following identifies the radiation area posting at the cubicle entrance, and the minimum approval authority for entry in accordance with NOP-OP-4101, 'Access Controls for Radiologically Controlled Areas'?

	Letdown Cubicle Posting	Minimum Approval
A.	High Radiation Area (HRA)	Radiation Protection Manager
B.	High Radiation Area (HRA)	Radiation Protection Supervisor
C.	Locked High Radiation Area (LHRA)	Radiation Protection Manager
D.	Locked High Radiation Area (LHRA)	Radiation Protection Supervisor

Answer: D

Explanation/Justification: K/A is met by identifying the area as a LHRA and determine who must give permission to enter the LHRA in order to hang a clearance.

A. Incorrect. HRA is An accessible area in which radiation levels could result in an individual receiving a deep-dose equivalent in excess of ≥100 mrem/hr at a distance of 30 centimeters or more from a radiation source or from any surface that the radiation penetrates. The RPM approval is only required if the gen area dose was >2.5 rem/hr, or it was a Very High Rad Area.

B. Incorrect. For posting, see explanation above. Radiation Protection Supervisor is the correct authorization.

C. Incorrect. LHRA is the correct posting. It is incorrect that the RPM must give permission. The RPM approval is only required if the gen area dose was >2.5 rem/hr, or it was a Very High Rad Area.

D. Correct. LHRA is A locked area with an accessible area to individuals, in which radiation levels could result in dose rates ≥1,000 mrem/hr at a distance of 30 centimeters from a radiation source or from any surface that the radiation penetrates. The RP Supervisor must give approval for entry into the LHRA as long as the general area dose rate is <2.5Rem/hr.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

K/A# 2.3.13 **K/A Importance** 3.4 **Exam Level** RO

References provided to Candidate None **Technical References:** NOP-OP-4101 Rev. 11 Pg. 5 & 17

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.12 / 43.4 / 45.9 / 45.10)

Objective:

73. The plant is operating at 100% power.

- A Small Break LOCA occurs.
- The crew is performing the actions of ES-1.2, "Post LOCA Cooldown and Depressurization".
- All SI pumps are running.
- All RCPs are running.
- RCS cooldown via Condenser Steam Dumps is ongoing.
- RCS Tavg is 510°F and lowering at a rate of 50°F/Hr.
- RCS pressure is 1350 psig and stable.
- Pressurizer (PRZR) level indicates 38% and rising.

Which of the following describes the **NEXT MAJOR** action to be implemented in the EOP to mitigate the current conditions?

A. Depressurize the RCS using normal spray to minimize RCS subcooling.

B. Stop the cooldown. Energize all PRZR heaters to collapse voids and stabilize PRZR level.

C. Transition to ES-1.1, "SI Termination" and begin the SI flow reduction sequence by stopping ECCS pumps.

D. Stop RCP's NOT needed for PRZR Spray and begin the SI flow reduction sequence by stopping ECCS pumps.

Answer: D

Explanation/Justification: K/A is met by demonstrating the knowledge of the major action steps of ES-1.2, Post LOCA Cooldown and Depressurization to mitigate the event.

A. Incorrect. This is the fifth major action step (EOP step 23) performed after normal charging has been re-established. Plausible because the plant has just been depressurized to raise przr level to >31% (EOP step 15) by understanding the stem information.

B. Incorrect. ES-0.1 cools the plant down to mode 5 condition so there is no need to stop cooldown unless 100F/hr was exceeded. No voids exist at the current time with RCPs running. This would be performed if a void existed in ES-0.2 or ES-0.3.

C. Incorrect. ES-1.1 is a plausible distract since it terminates SI. In the case of ES-1.2, the steps to terminate Si are incorporated in EOP steps 17-21.Candidate must know that reducing SI is a major action of the procedure.

D. Correct. The depressurization to raise przr level to >31% is complete (major action step 2), therefore the next major action step is to stop all but one RCP and reduce RCS injection flow (steps 3 & 4)

Sys #	System	Category			KA Statement
N/A	N/A	Generic			Knowledge of EOP mitigation strategies.
K/A#	2.4.6	K/A Importance	3.7	Exam Level	RO
References provided to Candidate	None			Technical References:	2OM-53A.1.ES-1.2 Iss. 2, Rev. 1, steps 16 & 17
Question Source:	Bank – 2LOT8 Audit Exam (Q58)				
Question Cognitive Level:	Higher – Comprehension or Analysis			10 CFR Part 55 Content:	(CFR: 41.10 / 43.5 / 45.13)
Objective:					

74. Given the following conditions:

- A small fire was discovered in the Unit 2 Control Room
- AOP-2.33.1A, "CONTROL ROOM INACCESSIBILITY" has been implemented
- All Control Room actions are complete
- All equipment operated as expected

In accordance with AOP-2.33.1A, what is the Balance of Plant (BOP) role during this event?

A. Emergency Squad

B. Communicator / NO#3

C. Alternate Shutdown Panel (ASP)

D. Emergency Shutdown Panel (SDP)

Answer: B

Explanation/Justification: K/A is met by demonstrating the knowledge of the licensed operator rules during a fire in the control room in accordance with the Control Room Inaccessibility AOP.

A. Incorrect. Emergency Squad is the required role of the Turbine & PAB Operators.
B. Correct. BOP Operator is required to be the Communicator/Nuclear Operator #3 in accordance with Attachment 6 of AOP-2.33.1A.
C. Incorrect. Alternate Shutdown Panel is not manned during this event. It could be applicable if 2OM-56C was implemented.
D. Incorrect. Emergency Shutdown Panel is manned by the Unit Supervisor and Reactor Operator.

Sys #	System	Category			KA Statement
N/A	N/A	Generic			Knowledge of fire protection procedures.
K/A#	2.4.25	**K/A Importance**	3.3	**Exam Level**	RO
References provided to Candidate	None			**Technical References:**	2OM-53C.4.2.33.1A Rev. 15 pg. 35
Question Source:	New				
Question Cognitive Level:	Lower – Memory or Fundamental			**10 CFR Part 55 Content:**	(CFR: 41.10 / 43.5 / 45.13)
Objective:					

75. The Plant was operating at 100% power:

- At time 1205 a Reactor Trip and several events occurred
- At time 1215 an ALERT is declared by the Shift Manager
- At time 1225 the Initial Notification Form is completed and approved by the Shift Manager

Which of the following identifies the LATEST time that the initial notification to State and County officials is due?

A. 1220

B. 1230

C. 1235

D. 1240

Answer: B

Explanation/Justification: K/A is met with Licensed Operator knowledge of the CR Communicator responsibilities and the required times to complete the initial notification to state and county officials.

A. Incorrect. This is the time at which the declaration must be made by the Shift Manager (SM).

B. Correct. Per 1/2-EPP-IP-1.1, Initial Notifications are to be made to the first six (6) listed Agencies of the Emergency Notification Call List (State and County), and MUST be made within 15 minutes of the event declaration.

C. Incorrect. The SM has 15 minutes to declare the event and then 15 minutes from declaration to notify the state and counties. This theoretically gives them 30 minutes to make a notification. However, since the declaration was made at 1215 the notification must be made by 1230. This distractor is based on 30 minutes from 1205.

D. Incorrect. This distractor is based on 15 minutes incorrectly added to the time the INF form was completed and approved. The notification must be made within 15 minutes of the event declaration.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of RO responsibilities in emergency plan implementation.

K/A# 2.4.39 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate none **Technical References:** 1/2-EPP-IP-1.1 Rev. 51; 1/2-EPP-IP-1.1.F02 Rev.18

Question Source: Bank - Robinson NRC 2011 (Q74)

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 45.11)

Objective:

Cover Sheet

U. S. Nuclear Regulatory Commission

Site-Specific SRO Written Examination

BV2LOT15 SRO Written Examination

Applicant Information

Name:	
Date:	Facility/Unit: **Beaver Valley Unit 2**
Region: I ☒ II ☐ III ☐ IV ☐	Reactor Type: W ☒ CE ☐ BW ☐ GE ☐
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 / SRO-Only / Total Examination Values	75 / 25 / 100 Points
Applicant's Scores	___ / ___ / ___ Points
Applicant's Grade	___ / ___ / ___ Percent

76. The crew is performing ES-0.1, 'Reactor Trip Response' after an inadvertent Reactor trip from 100% power.

10 minutes after the Reactor Trip:

- A 200 gpm small break LOCA occurs
- The ATC operator notes PRZR level is at 20% and lowering
- 2CHS*FCV122 'Charging Pumps Disch Flow Control Vlv' is in MANUAL and Full OPEN
- 2CHS*FI122 indicates 150 gpm and steady
- Net Charging on PCS indicates 60 gpm
- Assume RCS Pressure remains constant during the event
- No automatic ESF actuation conditions are met
- All systems operate as designed

1) Approximately, how long before the PRZR level indicates 0%?

2) The Unit Supervisor will transition from ES-0.1 to which of the following procedures?

A. 1) 15 minutes
   2) E-1, "Loss of Reactor or Secondary Coolant"

B. 1) 45 minutes
   2) E-0, "Reactor Trip or Safety Injection"

C. 1) 15 minutes
   2) E-1, "Loss of Reactor or Secondary Coolant"

D. 1) 45 minutes
   2) E-0, "Reactor Trip or Safety Injection"

Question 76

Answer: D

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .E page 21 second bullet. SRO is required to have knowledge of the content of the procedures. Specifically the SRO must evaluate the plant status and determine which procedure to transition too based upon the LHP criteria of the procedure. Detailed knowledge of the procedure is required to select the correct procedure actions.
K/A is met by determining how the PRZR level control system will operate during a SBLOCA, and determine how long it will take for the PRZR to indicate empty. SRO level of knowledge of LHP to initiate SI at 4% and transition to E-0.

A. Incorrect. This would be the time if letdown didn't isolate at 14%. Incorrect procedure transition. Plausible procedure choice if candidate is thinking of the LHP requirements of ES-1.1 SI Termination, which states to manually start SI and transition to E-1, Loss of Reactor or Secondary Coolant at 17% PRZR level.

B. Incorrect. This is the correct time with L/D isolating at 14%. Correct procedure transition per ES-0.1 LHP.

C. Incorrect. This would be the time if letdown didn't isolate at 14%. 20-0% (2000 gal) @ 140 gpm=14.3 min. Incorrect procedure transition. Plausible procedure choice if candidate is thinking of the LHP requirements of ES-1.1 SI Termination, which states to manually start SI and transition to E-1, Loss of Reactor or Secondary Coolant at 17% PRZR level.

D. Correct. Candidate must evaluate the initial net charging and the leak rate to determine the RCS is losing 140gpm. After letdown isolates at 14%, net charging will rise to 165 gpm, with RCS losing 35gpm. 20-14% (600gal) @ 140gpm=4.3 min until L/D isolates, then 14-0% (1400 gal) @ 35 gpm = ~40 min. In ES-0.1 LHP states to actuate SI and go to E-0 if PRZR level cannot be maintained >4%.

Sys #	System	Category	KA Statement
000009	Small Break LOCA / 3	EA2 Ability to determine or interpret the following as they apply to a small break LOCA:	The time available for action before PZR is empty, given the rate of decrease of PZR level

K/A# EA2.05 **K/A Importance** 3.9 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53A.1.ES-0.1 Iss. 2 Rev. 3

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR 43.5 / 45.13)

Objective:

77. The plant was operating at 100% power when a large break LOCA occurred coincident with a Loss of 4KV Bus DF.

The follow conditions exist:

- 'A' Quench Spray Pump [2QSS-P21A] tripped on startup
- 3 Max CETs indicate 810°F
- RCS is superheated
- CNMT Pressure is 31 psig
- CNMT Temperature is 240°F
- All RCPs have been tripped
- RVLIS Full Range indicates 35%

Based on the above conditions, which answer below completes the following statements?

The required EAL classification is _____(1)_____.

An Offsite Protective Action Recommendation (PAR) _____(2)_____ required.

A. 1) Site Area Emergency
   2) is

B. 1) Site Area Emergency
   2) is NOT

C. 1) General Emergency
   2) is

D. 1) General Emergency
   2) is NOT

Question 77

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II E page 21 third bullet. SRO is required to have knowledge of the Emergency Classifications and PAR requirements. This is a SRO position function only.

K/A is met by demonstrating the knowledge to determine the event classification based on the conditions given using the provided EPP classification chart.

General Emergency declared based on the following conditions.
FC – Loss due to FR-C.1 Red Path Entry
RCS - Loss RCS leak rate greater than available makeup capacity as indicated by RCS subcooling < 46° F adverse containment.
CT – Potential Loss due to Cnmt pressure >11 psig AND less than one full train of depressurization equipment operating.

A. Incorrect. Plausible if it is not recognized that FR-C.1 entry conditions have been met for Fuel Clad failure. PAR is required.
B. Incorrect. Plausible if it is not recognized that FR-C.1 entry conditions have been met for Fuel Clad failure. Plausible that PAR is not required if Site Area Emergency is the declaration.
C. Correct. GE based on answer explanation above. IAW 1/2-EPP-IP-4.1, when a GE is declared, a PAR must be provided to State/County within 15 minutes.
D. Incorrect. GE is correct based on answer explanation above. Plausible that a PAR is not required if the candidate thinks that a radiological release had not occurred.

Sys #	System	Category	KA Statement
000011	Large Break LOCA / 3	Generic	Knowledge of the emergency action level thresholds and classifications.

K/A# 2.4.41 **K/A Importance** 4.6 **Exam Level** SRO

References provided to Candidate EPP Chart

Technical References: 2OM-53A.1.F-0.2 Iss. 2 Rev. 1
EPP-I-1b.F01 Rev. 0
1/2-EPP-IP-4.1, Offsite Protective Actions rev. 31

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis

10 CFR Part 55 Content: (CFR: 41.10 / 43.5 / 45.11)

Objective:

78. Given the following conditions:
    - A reactor trip and safety injection have occurred
    - The crew is performing the actions of E-2, "Faulted Steam Generator Isolation" due to the uncontrolled depressurization of 'A' SG.
    - The crew is evaluating if SI flow should be reduced.
    - The following conditions exist:
        - RCS temperature is 460°F
        - RCS pressure is 1650 psig and slowly rising
        - Containment pressure is 23 psig
        - SG 21B and 21C NR levels are 15% and rising
        - AFW flow is 375 gpm
        - PRZR level is 20%

Based on the conditions above, when may the crew enter ES-1.1, "SI Termination"?

A. Immediately.

B. After transition to E-1, when RCS subcooling criteria is met.

C. After transition to E-1, when PRZR level criteria is met.

D. After transition to E-1, when Secondary heat sink criteria is met.

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .E page 21 second bullet. SRO is required to have knowledge of the content of the procedures. Specifically the SRO must evaluate the plant status and determine if the conditions are met to terminate Safety Injection and the required procedure transitions within the EOP network. Detailed knowledge of the procedure is required to select the correct transition and the requirements for SI termination.
K/A is met by interpreting the given conditions to determine when SI Termination is permitted. Detailed knowledge of SI Terminations and procedural transitions is required for the SRO.

A. Incorrect. PRZR level criteria is not high enough for the adverse CNMT conditions (38% req.). Plausible distractor because transition to ES-1.1 from E-2 occurs immediately after checking PRZR level. Evaluation of adverse CNMT must be determined.

B. Incorrect. It is correct that a transition to E-1 is required from E-2, because ES-1.1 requirements were not met at the step in E-2. E-1 continuous action step 8 is the only transition to ES-1.1 from E-1. Since it is a faulted SG, subcooling requirements were easily met, but PRZR level is not.

C. Correct. It is correct that a transition to E-1 is required from E-2, because ES-1.1 requirements were not met at the step in E-2. E-1 continuous action step 8 is the only transition to ES-1.1 from E-1. Since PRZR level is still low for adverse CNMT (38% req.) a transition to ES-1.1 must wait until PRZR level is met in E-1.

D. Incorrect. It is correct that a transition to E-1 is required from E-2, because ES-1.1 requirements were not met at the step in E-2. E-1 continuous action step 8 is the only transition to ES-1.1 from E-1. Since SG level does not meet the adverse requirement of 31% this is a plausible distractor. Heat sink is met with AFW flow >340 gpm, but PRZR level is not.

Sys #	System	Category	KA Statement
000040	Steam Line Rupture / 4	AA2 Ability to determine and interpret the following as they apply to the Steam Line Rupture:	When ESFAS systems may be secured

K/A# AA2.05 **K/A Importance** 4.5 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53A.1.E-2 Iss. 2 Rev 0
2OM-53A.1.E-1 Iss. 2 Rev. 1

Question Source: Bank - 2LOT5 NRC Exam (Q47)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective:

79. The plant is in Mode 3 with all systems in normal alignment for this Mode.

- Battery Breaker 2-1 [BAT*BKR2-1] is on Clearance for Electrical Maintenance to replace the Battery Breaker for maintenance.
- Annunciator A8-9A, "125V DC Bus 2-1 TROUBLE" re-flashes due to Battery Charger 2-1 AC Input Breaker tripping open.

Which of the following Tech Spec LCOs will be applicable?

1) 3.8.1, AC Sources - Operating
2) 3.8.7, Inverters - Operating
3) 3.8.9, Distribution Systems - Operating

A. None

B. 1 & 2 ONLY

C. 2 & 3 ONLY

D. 1, 2, 3

Answer: D

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .B page 17 third bullet. SRO is required to have knowledge of the TS bases. Specifically the SRO must evaluate the plant status and determine which TS are applicable. Detailed knowledge of the bases is required to determine the impact of the loss of the power supplies and which TS are applicable.
K/A is met by demonstrating Tech Spec bases knowledge for the effected equipment when a loss of DC bus occurs. DC bus loss will effect Inverters, and the EDG start capabilities. This is TS bases knowledge.

A. Incorrect. Plausible distractor because TS 3.8.4, DC Sources Operating was intentionally omitted from the above list. Candidate must know the TS bases for all the listed TSs to correctly answer the question.

B. Incorrect. Plausible distractor if the bases for TS. 3.8.9 is not known. The bases states that DC subsystems require the associated buses and distribution panels to be energized to their correct voltage from either the associated battery or charger.

C. Incorrect. Plausible distractor if the bases for TS 3.8.1 is not known. The bases states that each DG must be capable of starting and loading. With DC bus 1 de-energized, the diesel starting circuits and load sequencer are not capable of performing their function.

D. Correct. All of the TSs are applicable. The bases for TS 3.8.1 and 3.8.9 are described above. TS 3.8.7 bases states that an inverter can be supplied from an internal AC source via a rectifier as long as the battery is available. However, in the stem it stated that the 2-1 battery breaker was on clearance for maintenance.

Sys #	System	Category	KA Statement
000058	Loss of DC Power / 6	Generic	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

K/A# 2.2.25 **K/A Importance** 4.2 **Exam Level** SRO

References provided to Candidate None **Technical References:** U2 RE-0001AR Rev. 22; TS bases 3.8.1, 3.8.7, 3.8.9

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 41.7 / 43.2)

Objective:

80. The plant was operating at 100% power.

- A LOCA OUTSIDE containment occurs
- At step 21 of E-0, Reactor Trip Or Safety Injection, the crew enters ECA-1.2, LOCA Outside Containment
- At the completion of ECA-1.2, the crew has been **UNABLE** to locate and isolate the break

The following plant conditions exist:

- All SG pressures are 800 psig and stable
- All SG NR levels are 35% and slowly rising
- All Secondary radiation monitors are consistent with pre-event values
- CNMT parameters are consistent with pre-event
- RCS Subcooling is 40°F and slowly dropping
- RCS Pressure is 1125 psig and slowly dropping
- PRZR level is 12% and slowly dropping
- Auxiliary Building Radiation levels are rising
- Auxiliary Building sump levels are rising

A seismic event of 0.07g has just occurred, resulting in damage to the switchyard and a Loss of Offsite Power

Based on these conditions and events:

1) What procedural transition from ECA-1.2 is **REQUIRED**?

2) Which of the following Abnormal Operating Procedures will be performed in conjunction with EOP network?

A. 1) ECA-1.1, Loss Of Emergency Coolant Recirculation
   2) AOP-2.36.1, Loss Of All AC Power When Shutdown

B. 1) ECA-1.1, Loss Of Emergency Coolant Recirculation
   2) AOP-1/2.75.3, Acts of Nature - Seismic Event

C. 1) E-1, Loss Of Reactor Or Secondary Coolant
   2) AOP-2.36.1, Loss Of All AC Power When Shutdown

D. 1) E-1, Loss Of Reactor Or Secondary Coolant
   2) AOP-1/2.75.3, Acts of Nature - Seismic Event

Question 80

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .E page 21 second bullet. SRO is required to have knowledge of the content of the procedures. Specifically the SRO must evaluate the plant conditions and determine which the procedure transition based upon the ineffective break isolation steps. This evaluation requires detailed knowledge of the EOP procedure flow-paths of sub procedures. Detailed knowledge of the procedure is required to select the correct transition.

K/A is met by demonstrating knowledge of entry conditions into abnormal operating procedures based on given indications while responding to a LOCA Outside Containment. In the question the SRO is given a seismic indication greater than the Alarm Response Procedure (ARP) entry setpoint, and must determine that the ARP is an entry condition into the Seismic Event Abnormal Operating Procedure. This AOP is performed in conjunction with the EOP network.

A. Incorrect. Correct EOP transition. Incorrect AOP. AOP-2.36.1, Loss Of All AC Power When Shutdown is a plausible distractor with the crew performing ECA-1.2, LOCA Outside CNMT, then losing offsite power. The candidate must determine that entry conditions are not met for entry into this AOP.

B. Correct. If RCS pressure is not rising, then IAW ECA-1.2 step 4 RNO transition must be made to ECA1.1. Seismic Event AOP is correct due to the event registered 0.07g which is greater than ARP setpoints (A10-5H). Entry into the Seismic Event AOP is required based upon annunciator A10-5H, a report from NEIC, or felt or observed ground movement by plant personnel, none of which are given.

C. Incorrect. Plausible since E-1 would be the appropriate entry if RCS pressure were rising. Incorrect AOP as explained in answer 'A'.

D. Incorrect. Plausible since E-1 would be the appropriate entry if RCS pressure were rising. Correct AOP entry.

Sys #	System	Category		KA Statement
W/E04	LOCA Outside Containment / 3	Generic		Knowledge of abnormal condition procedures.
K/A# 2.4.11	**K/A Importance**	4.2	**Exam Level**	SRO
References provided to Candidate	None		**Technical References:**	2OM-53A.1.ECA-1.2 Iss. 2 Rev. 0, pg. 3 2OM-45B.4.AAA Rev. 8, pg. 3 2OM-53C.4A.75.3 Rev. 19, pg. 1

Question Source: Bank – 2LOT6 NRC Exam (Q81) Modified

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective:

81. The plant is at 100% power.

- A loss of all Feedwater occurs
- The crew enters FR-H.1, Response to Loss of Secondary Heat Sink

The following conditions now exist:

- FR-H.1 Step 6 Stop All RCPs has just been completed
- 'A' SG Wide Range Level is 10%, pressure is 1000 psig and stable
- 'B' SG Wide Range Level is 19%, pressure is 975 psig and stable
- 'C' SG Wide Range Level is 12%, pressure is 600 psig and lowering
- Containment Pressure is 4.0 psig and stable

(1) Which of the following actions are **REQUIRED** based upon these indications?

(2) Per **Tech. Specs.,** with the plant in Mode 3, what is the **MINIMUM** water level required to consider a Steam Generator OPERABLE as a heat sink?

A. (1) Transition to E-2, Faulted Steam Generator Isolation
(2) 12% Narrow Range

B. (1) Initiate RCS Bleed and Feed
(2) 12% Narrow Range

C. (1) Transition to E-2, Faulted Steam Generator Isolation
(2) 15.5% Narrow Range

D. (1) Initiate RCS Bleed and Feed
(2) 15.5% Narrow Range

Answer: D

Explanation/Justification: Meets NUREG-1021 Rev. 10, Att.2 Sect. II.E pg 6 and SRO level knowledge of TS bases for the Surveillance requirements. The first part requires an understanding of the EOP mitigation strategy which is RO level knowledge, however the SRO must assess plant conditions, apply adverse criteria and select the section of the procedure to mitigate the event. The TS minimum level is SRO level knowledge since the level required for operability is NOT addressed in the LCO rather is addressed in the bases and the surveillance requirement.
K/A is met by interpreting the given conditions of a loss of secondary heat sink, then determining the appropriate procedural actions based on the conditions.

A. Incorrect. This transition is possible since the 'C' SG pressure is lowering, however Bleed and Feed criteria are met. EOP Rules of usage does not allow for exit until FR-H.1 is complete. This SG NR level is the minimum in the EOP network not TS.

B. Incorrect. Bleed and Feed criteria are met. This SG NR level is the minimum in the EOPs not TS

C. Incorrect. This transition is possible since the 'C' SG pressure is lowering, however Bleed and Feed criteria are met. EOP Rules of usage does not allow for exit until FR-H.1 is complete. Correct TS SG level.

D. Correct. Bleed and Feed criteria are met per continuous action step 3, which states WR level in at least 2 SGs <14% go to the RNO for Feed and Bleed actions. Correct TS bases setpoint per SR 3.4.5.2 bases.

Sys #	System	Category	KA Statement
W/E05	Loss of Secondary Heat Sink / 4	EA2 Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink)	Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

K/A# EA2.1 **K/A Importance** 4.4 **Exam Level** SRO

References provided to Candidate None **Technical References:** FR-H.1 pg 2 Rev. 1 Iss. 2
TS Bases 3.4.5.2 pg b 3.4.5-5

Question Source: Bank - 1LOT14 NRC Exam (Q80)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective:

82. I&C is requesting Operations place control rods on DC Hold in accordance with 2OM-1.4.O, "Placing a Control Rod Power Cabinet Group on DC Hold", to perform maintenance in a rod control power cabinet.

    1) What is the MAXIMUM number of rods capable of being placed on DC Hold?

    2) What is the OPERABILITY status of the rods when the rods are on DC Hold?

A. 1) 4 rods
   2) Operable

B. 1) 8 rods
   2) Operable

C. 1) 4 rods
   2) Inoperable

D. 1) 8 rods
   2) Inoperable

Answer: A

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .B page 17 third bullet. SRO is required to have knowledge of the TS bases. Specifically the SRO must evaluate the Operability of the Control Rods while they are on DC hold. The OPERABILITY requirement is satisfied provided the rod will fully insert in the required rod drop time assumed in the safety analysis. Rod control malfunctions that result in the inability to move a rod (e.g., rod lift coil failures), but that do not impact trippability, do not result in rod inoperability. Detailed knowledge of the bases is required to determine the impact of the loss of the power supplies and Operability of the Control Rods.
K/A is met by analyzing the effect of the rods being placed on DC hold for maintenance will have on the operability of the rods. Rods on DC hold are still operable (trippable) per the Tech Spec Bases.

A. Correct. The maximum number of rods is 4 (1 group). Tech Spec bases defines a rod as operable if it is trippable. The DC hold cabinet is in parallel with the rod control power cabinets, both being powered through the reactor trip bkrs. When the Rx trip bkrs open, the rods will insert.

B. Incorrect. Plausible is the candidate thinks DC Hold can maintain a bank of rods (2 groups). It is correct that they are operable.

C. Incorrect. The maximum number of rods is 4 (1 group). Inoperable is not correct because when the DC Hold cabinet loses power (ie. Rx trip) the rods will insert.

D. Incorrect. Plausible is the candidate thinks DC Hold can maintain a bank of rods (2 groups). Inoperable is not correct because when the DC Hold cabinet loses power (ie. Rx trip) the rods will insert.

Sys #	System	Category			KA Statement
000003	Dropped Control Rod / 1	Generic			Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.
K/A#	2.2.36	**K/A Importance**	4.2	**Exam Level**	SRO
References provided to Candidate	None			**Technical References:**	2OM-1.4.O Rev. 0 Iss. 1 pg. 1 TS Bases pg. B 3.1.4-5 rev. 0

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 43.2 / 45.13)

Objective: 3SQS-1.3 Obj 9 Explain the function, operation, location and limitations of the DC Hold Cabinet.

3SQS-1.3 Obj. 28 Using a copy of Technical Specifications or the Licensing Requirements Manual, assess a given set of plant conditions for compliance with the licensing requirements, including the determination of equipment operability and applicable action statements.

83. Initial conditions:
    - The reactor failed to trip after receiving a trip signal
    - SRO transitioned from E-0, Reactor Trip or Safety Injection, to FR-S.1, Response to Nuclear Power Generation/ATWS
    - Reactor Power is 23% and decreasing

    Current conditions:
    - Emergency Boration was initiated
    - Safety injection did not actuate
    - Reactor power is 3% and decreasing
    - Intermediate range channels indicate negative SUR
    - Operators are verifying the reactor subcritical at step 7 of FR-S.1

    Based on the current plant conditions:

    (1) Boration _____ required to continue after verifying the reactor is subcritical.

    (2) Which of the following describes the required procedural flowpath?

A. 1) is
   2) Return to E-0.

B. 1) is
   2) Remain in FR-S.1

C. 1) is **not**
   2) Return to E-0.

D. 1) is **not**
   2) Remain in FR-S.1

Question 83

Answer: A

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .E page 21 second bullet. SRO is required to have knowledge of the content of the procedures. Specifically the SRO must evaluate the plant conditions and determine which the procedure transition based upon the existing power level and SUR. This evaluation requires detailed knowledge of the EOP procedure content and transition criteria. Additionally, the SRO must decide what action is required related to continuing the boration flow. Knowledge of the procedure steps is required to make the decision and select the correct transition.

K/A is met with the EOP background knowledge that emergency boration is required to continue to ensure adequate shutdown margin during future cooldown. The candidate must also determine if conditions are satisfied to transition back to E-0, or stay in FR-S.1.

A. Correct: In FR-S.1, after verifying the Rx is subcritical in step 7, step 7c states "Continue boration as necessary to obtain adequate shutdown margin during subsequent actions." Per the background this is to ensure adequate S/D margin during the future plant cooldown. When power < 5% and negative IR SUR is achieved in FR-S.1, step 7d directs returning to the procedure and step in effect which is E-0.

B. Incorrect: Boration is required to continue to obtain adequate shutdown margin during subsequent actions. It is not required to remain in FR-S.1 once it has been verified that the reactor is subcritical. Step 7d directs returning to the procedure and step in effect which is E-0.

C. Incorrect: step 7c states "Continue boration as necessary to obtain adequate shutdown margin during subsequent actions. Returning to E-0 is correct since the reactor is subcritical.

D. Incorrect: step 7c states "Continue boration as necessary to obtain adequate shutdown margin during subsequent actions. It is not required to remain in FR-S.1 once it has been verified that the reactor is subcritical. Step 7d directs returning to the procedure and step in effect which is E-0.

Sys #	System	Category	KA Statement
000024	Emergency Boration / 1	Generic	Ability to perform specific system and integrated plant procedures during all modes of plant operation.

K/A# 2.1.23 **K/A Importance** 4.4 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53A.1.FR-S.1 Iss. 2 Rev. 0
2OM-53B.4.FR-S.1 Iss. 2 Rev. 0

Question Source: Bank – Surry 2010 NRC Exam (Q82) Modified

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.2 / 45.6)

Objective:

84. Initial conditions:
    - Core Cooling CSFST is ORANGE
    - FR-C.2, Response to Degraded Core Cooling is in progress

    Current conditions:
    - Steam Generator depressurization to 100 psig is in progress
    - A validated Orange Path on the CSFSTs points to FR-P.1, Response to Imminent Pressurized Thermal Shock Condition

    1) What is the purpose of depressurizing all intact SGs to 100 psig in FR-C.2?

    2) How must the Unit Supervisor respond to the Orange path on FR-P.1?

A. 1) To assist in core recovery by injecting the Safety Injection Accumulators.
   2) Remain in FR-C.2 until completion, then transition to FR-P.1.

B. 1) To assist in core recovery by injecting the Safety Injection Accumulators.
   2) Immediately transition to FR-P.1.

C. 1) To assist in core recovery by injecting using the Low Head Safety Injection Pumps.
   2) Remain in FR-C.2 until completion, then transition to FR-P.1.

D. 1) To assist in core recovery by injecting using the Low Head Safety Injection Pumps.
   2) Immediately transition to FR-P.1.

Question 84

Answer: A

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .E page 21 second bullet. SRO is required to have knowledge of the content of the procedures. Specifically the SRO must evaluate the plant conditions and determine which the procedure transition based upon the rules of use and hierarchy for the Function Restoration Procedures. This evaluation requires detailed knowledge of the EOP procedure flow-paths. Additional knowledge of the procedure step bases is required, beyond the high level action steps for FR-C.2.
K/A is met with the knowledge of the bases for depressurizing the SGs in Orange path FR-C.2, Response to Degraded Core Cooling, and accessing the transition to an Orange path FR-P.1 cause by SI accumulators injecting.

A. Correct. Depressurization of the SGs to 100 psig is required to lower RCS pressure low enough to inject SI Accumulators and cover the core. It is correct to remain in FR-C.2 if a Orange path in FR-P.1 is created when the SI accumulators inject. It is an expected condition stated by a CAUTION prior to SG depressurization step.

B. Incorrect. It is correct that depressurization of the SGs to 100 psig is required to lower RCS pressure low enough to inject SI Accumulators and cover the core. It would be incorrect to immediately transition to FR-P.1 due to the note prior to the depressurization step. This is a plausible distractor if candidate has a misconception of the hierarchy for the Function Restoration Procedures.

C. Incorrect. Plausible because after the accumulators are isolated at 100 psig SG pressure, continued SG depressurization to atmospheric pressure allows the RCS pressure to be low enough for LHSI to inject into the core (step 17). It is correct to complete FR-C.2 prior to going to FR-P.1.

D. Incorrect. Plausible because after the accumulators are isolated at 100 psig SG pressure, continued SG depressurization to atmospheric pressure allows the RCS pressure to be low enough for LHSI to inject into the core (step 17). It would be incorrect to immediately transition to FR-P.1 due to the note prior to the depressurization step. This is a plausible distractor if candidate has a misconception of the hierarchy for the Function Restoration Procedures.

Sys #	System	Category	KA Statement
W/E06	Degraded Core Cooling / 4	EA2 Ability to determine and interpret the following as they apply to the (Degraded Core Cooling)	Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

K/A# EA2.1 **K/A Importance** 4.2 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53A.1.FR-C.2 Iss. 2 Rev. 2
2OM-53B.4.FR-C.2 Iss. 2 Rev. 2

Question Source: Bank – Vogtle 2012 NRC exam (Q99) Modified

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective:

85. The plant is at 100% power.

- A reactor trip occurs coincident with a loss of all offsite power
- The operators have verified natural circulation flow and are cooling down the plant per ES-0.2, Natural Circulation Cooldown
- Train A RVLIS is OOS for Maintenance

The following plant conditions now exist:

- RCS Pressure is 1940 psig and stable
- RCS Hot Leg temperatures are 540 °F and lowering
- RCS Cooldown rate based upon Cold Leg temperatures is currently 30 °F/Hr and CANNOT be reduced

Which of the following procedures will be entered and what is the MAXIMUM allowable RCS Cooldown rate?

A. ES-0.3, Natural Circulation Cooldown with Steam Void in Vessel (With RVLIS); 50 °F/Hr

B. ES-0.3, Natural Circulation Cooldown with Steam Void in Vessel (With RVLIS); 100 °F/Hr

C. ES-0.4, Natural Circulation Cooldown with Steam Void in Vessel (Without RVLIS); 50 °F/Hr

D. ES-0.4, Natural Circulation Cooldown with Steam Void in Vessel (Without RVLIS); 100 °F/Hr

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Answer: B

Explanation/Justification: Meets NUREG-1021 Rev. 10, Att.2 Sect. II.E pg 7 which requires the knowledge of diagnostics steps and decision points in EOPs that involve transitions to event specific sub-procedures The SRO must be aware of sub-procedures for Natural Circulation Cooldown, if the C/D rate cannot be maintained less than 25 °F/Hr. Detailed procedure knowledge is required for C/D rate.
K/A is met by interpreting the conditions given in the question, then based on this knowledge, transition to the appropriate procedure due to Cooldown rate limitations and RVLIS availability.

A. Incorrect. Correct procedure. Cooldown rate is incorrect. ES-03 allows a cooldown rate of <100F/hr.

B. Correct. With pressure <1950psig and Thot <550F, conditions are met to maintain 25F/hr cooldown rate. If <25F/hr cannot be maintained, the RNO step transitions the crew to ES-03 with RVLIS. In the stem of the question only one train of RVLIS is OOS, therefore RVLIS is available. The cooldown rate in ES-03 is 100F/hr.

C. Incorrect. Procedure is incorrect. Plausible distractor with one train of RVLIS OOS. The SRO must know that one train on RVLIS is still available, and a transition to ES-04 would not be correct. Cooldown rate is correct for ES-0.4 when >500F..

D. Incorrect. Procedure is incorrect. Plausible distractor with one train of RVLIS OOS. The SRO must know that one train on RVLIS is still available, and a transition to ES-04 would not be correct. 100F/hr is the correct cooldown rate for ES-04 when Thot is between 500-450F.

Sys #	System	Category	KA Statement
W/E09	Natural Circulation Operations / 4	EA2 Ability to determine and interpret the following as they apply to the (Natural Circulation Operations)	Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

K/A# EA2.2 **K/A Importance** 3.8 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53A.1.ES-0.2 Iss. 2 Rev. 1 pg.16
2OM-53A.1.ES-0.3 Iss. 2 Rev. 1 pg.3

Question Source: Bank - 1LOT14 NRC Exam (Q85) Modified

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective:

(SRO ONLY)

Beaver Valley Unit 2 NRC Written Exam (2LOT15)

86. Given the following conditions:
    - The plant is operating at 20% power
    - AOP 2.6.8, 'Abnormal RCP Operation' has been entered due to rising temperatures on the 'B' RCP

The following conditions exist:

Time	RCS*P21B MTR LWR RADIAL [T0435A]	RCS*P21B MTR UPR THRUST [T0434A]
1000	181°F	184°F
1005	189°F	188°F
1010	197°F	194°F
1015	204°F	201°F

1) Which Motor Bearing reaches the RCP trip setpoint **FIRST** in accordance with AOP-2.6.8?

2) What actions will be directed by the Unit Supervisor?

A. 1) Motor Lower RADIAL Bearing
   2) Shutdown 'B' RCP, go to AOP-2.51.1, Unplanned Power Reduction, and perform a controlled plant shutdown.

B. 1) Motor Lower RADIAL Bearing
   2) Trip the reactor, go to E-0, complete the IOAs, then shutdown 'B' RCP.

C. 1) Motor Upper THRUST Bearing
   2) Shutdown 'B' RCP, go to AOP-2.51.1, Unplanned Power Reduction, and perform a controlled plant shutdown.

D. 1) Motor Upper THRUST Bearing
   2) Trip the reactor, go to E-0, complete the IOAs, then shutdown 'B' RCP.

Question 86

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .E page 21 third bullet. SRO is required to have knowledge of the content of the procedures and transitions between Abnormal and EOPs. The SRO must evaluate the plant conditions and determine which setpoint has been exceeded for continued RCP operation. Then the SRO must determine the specific sequence of actions to take when securing the RCP, the sequence of actions are listed as sub-steps in the Abnormal Operating Procedure. Additionally directing the action to secure the pump is to occur following completion of the IOAs, which is SRO knowledge of the AOP procedure content.

K/A is met by demonstrating the ability to predict the impact of a rising RCP bearing temperature, then based on reaching a required RCP immediate shutdown setpoint, chose the appropriate procedure to shutdown the Rx and the RCP. This is an abnormal RCP shutdown sequence in that the Rx is tripped, then the RCP is tripped. Normally RCP shutdowns occur prior to the Rx being critical during plant heat up, or after plant cooldown.

A. Incorrect. Correct bearing. Incorrect RCP shutdown sequence and procedure for shutting down the plant. Plausible distractor because tripping of an RCP when power is <30% (P-8) does not generate a Rx trip, and a controlled shutdown would be plausible, but not permitted.
B. Correct. IAW the AOP, motor bearing temperature setpoint for trip criteria is >195F which is met at 1010 by the MTR LWR RADIAL BEARING at 197F. AOP-2.6.8 Continuous action step 1 directs tripping the Rx, E-0, IOAs, then tripping RCP.
C. Incorrect. Incorrect bearing. Incorrect RCP shutdown sequence and procedure for shutting down the plant. Plausible distractor because tripping of an RCP when power is <30% (P-8) does not generate a Rx trip, and a controlled shutdown would be plausible, but not permitted.
D. Incorrect. Incorrect bearing. Correct Rx trip, IOAs, and RCP shutdown sequence.

Sys #	System	Category	KA Statement
003	Reactor Coolant Pump System (RCPS)	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Conditions which exist for an abnormal shutdown of an RCP in comparison to a normal shutdown of an RCP

K/A# A2.02 **K/A Importance** 3.9 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.6.8 Rev. 12

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5/ 45.3 / 45/13)

Objective:

87. Given the following initial conditions:
    - Rx power is 100% and stable
    - Control rods are in MANUAL for I&C maintenance
    - Chemistry requested Cation bed demineralizer [2CHS-DEMIN22] be placed in service to lower RCS pH
    - Cation bed demineralizer [2CHS-DEMIN22] was placed in service in accordance with 2OM-7.4.C2, "Lowering RCS PH"

    One hour after the Cation bed demineralizer was placed in service, the Reactor Operator reports Reactor power has **SLOWLY** trended up to 100.1%.

    Which of the following is the reason for the power rise, AND the appropriate procedure for the Unit Supervisor to implement?

    A Cation Demineralizer was placed in service with a _____(1)_____ boron concentration than the RCS.

    The Unit Supervisor will implement _____(2)_____.

A. 1) LOWER
   2) AOP-2.51.2, "Reactor Overpower"

B. 1) LOWER
   2) 2OM-52.4.B.1, "Turbine Load Changes"

C. 1) HIGHER
   2) AOP-2.51.2, "Reactor Overpower"

D. 1) HIGHER
   2) 2OM-52.4.B.1, "Turbine Load Changes"

Question 87

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .E page 21 third bullet. SRO is required to have knowledge of the content of the procedures related to coordination with normal procedures. Specifically the SRO must evaluate the plant conditions and determine which the procedure to implement. The slow power rise warrants the use of the normal Turbine Load Change procedure versus the Abnormal Reactor Overpower procedure. . Detailed knowledge of the content is required to select the correct procedure.
K/A is met by predicting the effect of placing a cation demineralizer in service with a lower boron concentration than the RCS (dilution event), and determine the correct procedure to use to mitigate the power change.

A. Incorrect. Correct that the demineralizer had a lower boron concentration than the RCS. Incorrect to use Reactor Overpower because power was not rapidly rising.

B. Correct. The given conditions indicate there is an RCS dilution in progress. If a Cation Demineralizer were placed in service with a boron concentration lower than the RCS, it would remove boron from the RCS resulting in a dilution event. With it being a slow rise in power the SRO would use the Turbine Load Changes procedure to control power. A note in the Reactor Overpower states this procedure is intended for use when power is rapidly rising. Conditions given had power rise 0.4% over an hour.

C. Incorrect. If the demineralizer was higher than the RCS, power would decrease, not rise as the conditions given. Incorrect to use Reactor Overpower because power was not rapidly rising.

D. Incorrect. If the demineralizer was higher than the RCS, power would decrease, not rise as the conditions given. Correct procedure to use for slowly rising power.

Sys #	System	Category	KA Statement
004	Chemical and Volume Control System	A2 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:	Fact that isolating cation demineralizer stops boron dilution and enables restoration of normal boron concentration

K/A# A2.33 **K/A Importance** 3.3 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.51.2 Rev. 2 pg 1
2OM-52.4.B.1 Rev. 1 pg. 3

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5/ 43/5 / 45/3 / 45/5)

Objective:

88. The plant has tripped from 100% power, due to an inadvertent Safety Injection.

When resetting the Safety Injection Signal, how would the operators determine that a single reactor trip breaker failed to open following the trip?

Annunciator A12-1C, Auto Safety Injection Blocked will _____(1)_____.

(Assume SI signal has been reset and both Rx Trip Breakers are OPEN)

Immediately after the Safety Injection Signal has been reset, a Loss of Offsite Power occurs and RCS pressure lowers below the Safety Injection setpoint.

How will the Safety Injection Signal actuate?

The Safety Injection Signal will be _____(2)_____ actuated.

A. (1) intermittently flash
(2) automatically

B. (1) intermittently flash
(2) manually

C. (1) not illuminate
(2) automatically

D. 1) not illuminate
(2) manually

Question 88

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .E page 21 second bullet. SRO is required to have knowledge of the procedure caution related to the ESFAS signals and action required to initiate the ESF signal per the procedure bases. The caution alters the SRO that the SI signal would have to be manually initiated to restart the safeguards equipment should the EDGs start and energize the bus, after the SI signal has been reset. The knowledge of the plant response to a failure of a single train of SI to reset is background knowledge in the EOP.
K/A is met by demonstrating the knowledge of the Caution in ES-1.1 regarding manual actuation of Safety Injection if a LOOP event occurs.

A. Incorrect, the annunciator response is correct. The SI signal will not automatically actuate and load SI equipment on the EDG.

B. Correct, The Caution prior to step 1 of procedure ES-1.1 alerts the operator that a SI signal will not Automatically occur on a LOOP, manual action to initiate SI or load equipment will be required to start equipment when the EDG re-energizes the bus. The operator must have the knowledge of how the SI blocked annunciator responds if a single RTB does not open on the trip. When resetting the SI signal the alarm will flash in and out as one train of SI is not reset.

C. Incorrect, the annunciator response is not correct, the alarm will flash as the two trains of SSPS compare inputs. The manual SI signal will allow the EDG to start ESF loads.

D. Incorrect, the annunciator response is not correct, the alarm will flash as the two trains of SSPS compare inputs. The SI signal will not automatically actuate and load SI equipment on the EDG

Sys #	System	Category	KA Statement
013	Engineered Safety Features Actuation System (ESFAS)	Generic	Knowledge of the operational implications of EOP warnings, cautions, and notes.

K/A# 2.4.20 **K/A Importance** 4.3 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53A.1.ES-1.1 Iss. 2 Rev. 0
2OM-53B.4.ES-1.1 Iss. 2 Rev. 0

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective:

89. The plant is operating at 50% power with all systems in normal alignment for this power level.

The following conditions exist:

- A1-4H, Service Water System Trouble annunciator is LIT
- [2SWS-PI113A and PI113B], Service Water Header Pressures are 48 psig and stable
- [2SWS*MOV107A, B, C, D], 'Sec Comp Clg Wtr Hx Serv Water Supply Hdr Isol Vlvs' are OPEN
- NO other Annunciators are currently LIT
- AOP-2.30.1, Service Water/Main Intake Structure Loss has been entered

Based on the above conditions, what could cause this Service Water System condition, and what would be the correct procedure to mitigate the condition?

The above conditions could indicate a _____(1)_____, and would be mitigated by _____(2)_____.

A. 1) Service Water Pump trip
   2) continuing in AOP-2.30.1, Service Water/Main Intake Structure Loss ONLY

B. 1) Service Water Pump trip
   2) manually tripping the reactor, and entering E-0, Reactor Trip or Safety Injection

C. 1) Service Water System leak
   2) continuing in AOP-2.30.1, Service Water/Main Intake Structure Loss ONLY

D. 1) Service Water System leak
   2) manually tripping the reactor, and entering E-0, Reactor Trip or Safety Injection

Question 89

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .E page 21 third bullet. SRO is required to have knowledge of the content of the procedures. Specifically the SRO must evaluate the plant conditions and determine that the SWS pressure is low due to a leak and not due to the pump trip. Since pressure remains high, reactor trip is not warranted, the response is to continue with the AOP to respond to the leak. Detailed knowledge of the content is required to select the correct procedural direction.

K/A is met by the ability to predict a Service Water leak malfunction based on lower than normal service water header pressure and other conditions given, and use the Service Water AOP to mitigate the lower Service Water header pressure.

A. Incorrect. No indication of pump trip exists in the stem. Pressure is lower, but annunciators which indicate a pump trip or a stby pump start do not exist. The AOP is the correct procedure.

B. Incorrect. No indication of pump trip exists in the stem. Pressure is lower, but annunciators which indicate a pump trip or a stby pump start do not exist. With SW pressure >34 psig or CCS is not isolated (107s are open) entry conditions to E-0 do not exist per the AOP.

C. Correct. This is an indication of a service water leak due to pressure being lower and equal in both headers (headers cross tied in NSA and normal pressure ~70 psig). Pressure is not, and was not low enough to start a stby SW pump (34 psig) which would cause Ann. A1-5F, 'Stby SW Pump Auto start/Auto stop' to alarm. Also, A1-4F, 'SW Pump Auto start/Auto stop' is not LIT. The correct procedural guidance is in AOP-2.30.1 because pressure is not below 34 psig or CCS is not isolated (107s are open).

D. Incorrect. This is an indication of a service water leak. With SW pressure >34 psig or CCS is not isolated (107s are open) entry conditions to E-0 do not exist per the AOP.

Sys #	System	Category	KA Statement
076	Service Water System (SWS)	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Service water header pressure

K/A#	A2.02	**K/A Importance**	3.1	**Exam Level**	SRO
References provided to Candidate		None		**Technical References:**	2OM-53C.4.2.30.1 Rev. 9
Question Source:	New				
Question Cognitive Level:		Higher – Comprehension or Analysis		**10 CFR Part 55 Content:**	(CFR: 41.5 / 43.5 / 45/3 / 45/13)

Objective:

90. A fire has occurred in the Cable Tunnel. The Unit Supervisor directs an Operator to perform 2OM-56C.4.D, "Nuclear Operator #1 Procedure".

2OM-56C.4.D requires 2CHS*HCV186, 'RCP Seal Hdr Flow Control Valve' to be failed _____(1)_____ within 10 minutes of entering 2OM-56C.4.B, "Unit Supervisor Procedure".

The reason for this action is to _____(2)_____.

A. 1) Closed
   2) ensure the valve remains in the required position

B. 1) Closed
   2) prevent thermal shock to the RCP seals

C. 1) Open
   2) provide an RCS inventory control flow path

D. 1) Open
   2) supply seal injection flow to the running RCP seals

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .E page 21 second bullet. SRO is required to have knowledge of the methodology of the alternate shutdown procedures intent and methodology. The bases for the actions taken in this procedure are specific to the SRO position. Detailed knowledge of the procedure content is required.
K/A is met with the knowledge that a Licensed Operator will be isolating Instrument Air to fail open 2CHS-HCV186 during the performance of Alternate Safe Shutdown From Outside Control Room, and identify the operational effects of this evolution.

A. Incorrect. Closed is the incorrect failure position. Plausible distractor since air operated valves are place in their desired positions to prevent spurious fire induced operation.

B. Incorrect. Closed is the incorrect failure position. Preventing thermal shock is a plausible distractor, but there is a caution in 2OM-56C.4.B (US procedure) stating that thermal shock to the seal may occur and cause increased RCP seal leak rates.

C. Correct. Locally failing 2CHS*HCV186 open within 10 minutes is the correct action taken by the BOP Operator when performing 2OM-56C.4.D. Providing an inventory flow path is identified in the Intent and Methodology procedure 2OM-56C.4.A. The valve is failed open to prevent spurious fire induced operation.

D. Incorrect. Failing 2CHS*HCV186 open is correct. Seal injection flow is plausible if the candidate thinks the RCPs are running and seal inj flow is required. The 3rd CR action for the ATC Operator is to trip the RCPs, therefore there are no RCPs running.

Sys #	System	Category	KA Statement
078	Instrument Air System (IAS)	Generic	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.

K/A# 2.4.34 **K/A Importance** 4.1 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-56C4.A rev. 14 pg.2 & 4
2OM-56C4.D rev. 24 pg.2

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective:

91. Given the following plant conditions:

- Unit 2 is currently in Mode 6
- Fuel movement is in progress
- Spent Fuel Pool (SFP) boron concentration (Cb) sample results have significantly dropped since last sample and are currently at the Technical Specification limit of 2000 PPM

If SFP Cb continues to drop, what is the impact on shutdown margin, AND what will be the Technical Specification required action?

A 5% (Keff < .95) shutdown margin will be ____(1)____.

The Technical Specification required action will be that fuel movement in the SFP ____(2)____.

A. (1) maintained regardless of SFP Cb
(2) can continue as long as fuel is moved into proper SFP regions

B. (1) **no longer** maintained regardless of SFP Cb
(2) must be immediately suspended and boron concentration restored within limits

C. (1) maintained as long as no credible boron dilution event reduces SFP Cb < 495 PPM
(2) can continue as long as fuel is moved into proper SFP regions

D. (1) maintained as long as no credible boron dilution event reduces SFP Cb < 495 PPM
(2) must be immediately suspended and boron concentration restored within limits

Question 91

Answer: D

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .B page 17 third bullet. SRO is required to have knowledge of the TS bases. Specifically the SRO must evaluate the plant status and determine the impact on SDM per the TS bases and TS action required. Detailed knowledge of the bases is required to determine the impact of the boron dilution and which TS actions are applicable.

K/A is met by predicting the impact of SFP Boron concentration lowering on the SFP shutdown margin, and in accordance with Tech Specs, stop fuel movement and raise Boron concentration.

A. Incorrect. Keff cannot be maintained < .95 for a credible dilution event. (refer to correct answer explanation)
B. Incorrect. It is not correct that Keff < .95 is maintained regardless of SFP Cb in Unit 2. The second part of the statement is correct.
C. Incorrect. First part is correct (refer to correct answer explanation). Second part is incorrect action statement for Unit 2 but plausible for Unit 1.
D. Correct. According to TS 3.7.16 and its associated bases, the >2000 PPM limit conservatively assures Keff is maintained within the limit (Keff <.95) for the worst case misplaced fuel assembly accident. In addition, this limit ensures no credible boron dilution event will reduce Cb < 495 ppm required during non-accident conditions to maintain Keff < .95. TS 3.7.16 required action is to immediately restore SFP Cb to > 2000 ppm and suspend fuel movement within the SFP.

Sys #	System	Category	KA Statement
033	Spent Fuel Pool Cooling System (SFPCS)	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Inadequate SDM

K/A# A2.01 **K/A Importance** 3.5 **Exam Level** SRO

References provided to Candidate None **Technical References:** TS 3.7.16, Amend. 278/161
TS 3.7.16 Bases, Rev. 5

Question Source: Bank - 2LOT7 NRC Exam (Q93)

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Objective:

92. The plant was operating at 100% power when a SGTR occurred on 'B' Steam Generator.
    - The reactor was manually tripped
    - Condenser Vacuum is 18" Hg Vac and stable
    - The crew has progressed up through step 6, 'Initiating RCS Cooldown' of E-3, "Steam Generator Tube Rupture"
    - All previous EOP steps, including local Operator actions, have been completed

    How many steam relief flow paths are available to MANUALLY cooldown the RCS in accordance with E-3 step 6?

A. 1

B. 2

C. 3

D. 4

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .E page 21 second bullet. SRO is required to have knowledge of the content of the EOP procedures. The loss of condenser vacuum will disable the condenser steam dumps as a possible flowpath. The procedure steps in E-3 will isolate the ruptured SG steam supply to the common RHR valve so it will be available at this time. Also the procedure cautions against use of the ruptured SG atmospheric, so 3 steam flowpaths are available. Detailed knowledge of the procedure actions to the step to cooldown is required to select the correct answer.

K/A is met by demonstrating the ability to cooldown the plant after a SGTR in conjunction with a low vacuum condition. The low vacuum condition must be identified by the candidate as a valid Condenser NOT Available (C-9) alarm causing condenser steam dumps from being available.

A. Incorrect. Plausible distractor if candidate doesn't recognize that C-9 is in, and thinks the condenser steam dumps are available. This is the preferred steam relief flowpath.

B. Incorrect. Plausible distractor if candidate thinks only the 2 atmospheric valves from the intact SGs are available.

C. Correct. 2 atmospheric dumps (A & C) from the intact SGs, and the RHR valve can be used since it was isolated from the rupture SG in step 4b. The condenser steam dumps are not available due to condenser vacuum at 18" is above the C-9 setpoint of 19.5" and annunciator A12-4C 'Condenser Unavailable (C-9)' would be lit. C-9 blocks condenser steam dump operation.

D. Incorrect. Plausible distractor if candidate thinks 2 atmospheric dump valves, the RHR valve, and the condenser steam dumps are available or the ruptured SG could be used. Step 6 states go to ECA-3.1 is the ruptured SG must be used.

Sys #	System	Category	KA Statement
041	Steam Dump System (SDS)/Turbine Bypass Control	Generic	Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.

K/A# 2.4.50 **K/A Importance** 4.0 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53A.1.E-3 Iss. 2 Rev. 4, pgs 4 & 10; 2OM-1.5.B.3 rev. 1 pg. 2; 2OM-26.4.ABM Rev. 2 pg. 3

Question Source: New

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.3)

Objective:

93. The plant is operating at 100% power.

- The crew is implementing AOP-2.34.1 "LOSS OF STATION/CNMT INSTRUMENT AIR"
- [2SAS-C21A] STATION AIR COMPRESSOR TRIPPED
- [2IAS-PI106] STA INSTR AIR HEADER PRESSURE is 80 psig and LOWERING
- [2SAS-C22] CONDENSATE POLISHING AIR COMPRESSOR is RUNNING
- [2IAS-C21] DIESEL DRIVEN AIR COMPRESSOR failed to start
- [2SAS-AOV105] SAS MAIN HEADER TO SERVICE AIR HEADER AOV is OPEN

[2IAS-PI106] STA INSTR AIR HEADER PRESSURE is currently 72 psig and lowering

1) What is the next action required to be taken in accordance with AOP-2.34.1?

2) At what pressure will a Manual Reactor Trip, and transition to E-0, "Reactor Trip or Safety Injection" be required?

A. 1) CLOSE [2SAS-AOV105] SAS MAIN HEADER TO SERVICE AIR HEADER AOV
2) 55 psig

B. 1) ISOLATE [2IAS-DRY23A & 23B] INSTR AIR DRYERS
2) 55 psig

C. 1) CLOSE [2SAS-AOV105] SAS MAIN HEADER TO SERVICE AIR HEADER AOV
2) 65 psig

D. 1) ISOLATE [2IAS-DRY23A & 23B] INSTR AIR DRYERS
2) 65 psig

Question 93

Answer: C

Explanation/Justification: Meets NUREG-1021 Rev. 10, Att.2 Sect. II E. SRO is required to have knowledge of the content of the procedure versus knowledge of the overall mitigative strategy or purpose, Knowledge of diagnostic steps and decision points in the emergency operating procedures (EOP) that involve transitions to event specific sub-procedures or emergency contingency procedures. The knowledge of the procedural sequence is required based on the continuous action step 5 which checks SIA header pressure >86 psig, since it is not, the RNO of the step must be completed. This directs the closing of 2SAS-AOV105. The knowledge of tripping the Rx at 65 psig is contained within the AOP step RNO and is detailed procedural knowledge for the SRO. It is stated in a NOTE in the AOP attachments that at 65 psig, the MFW Regulating Valves will fail closed.

K/A is met the ability to predict the effects of an air leak in the station air system with a failure of redundant air compressors, and recognize that the station to Instrument Air header cross connection valve has failed to close. Then determine that based on an air pressure <65 psig, that a Rx trip and entry into E-0 is required.

A. Incorrect. It is correct to close AOV105, but incorrect Inst Air pressure for manually tripping the Rx and transitioning to E-0. 55 psig is a plausible distractor because this was the old AOP value.
B. Incorrect. Isolation of the Station Air system from the Inst Air header is performed prior to bypassing around and isolating the Inst Air Dryers procedurally. 55 psig is a plausible distractor because this was the old AOP value.
C. Correct. Closing AOV105 is required per the AOP because it should have automatically closed at 86 psig and isolated Station Air from Inst Air. 65 psig is the correct value requiring a manual Rx trip and transition to E-0, per continuous action step 5 when 2IAS-PI106 is ≤65 psig. This basis is stated in a NOTE in the AOP attachments stating that 65 psig the MFW Regulating Valves will fail closed.
D. Incorrect. Isolation of the Station Air system from the Inst Air header is performed prior to bypassing around and isolating the Inst Air Dryers procedurally. Correct air pressure for manually tripping Rx and transitioning to E-0.

Sys #	System	Category	KA Statement
079	Station Air System (SAS)	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the SAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Cross-connection with IAS

K/A# A2.01 **K/A Importance** 3.2 **Exam Level** SRO

References provided to Candidate None **Technical References:** 2OM-53C.4.2.34.1 Rev. 18

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Objective:

94. Crew composition may be less than the minimum requirement of 10CFR50.54 for a period of time not to exceed _____(1)_____, in order to accommodate an unexpected absence of an on-duty shift crew member.

If you are unable to fill the vacant position within the required time, plant shutdown _____(2)_____ required in accordance with Tech Spec 5.2.2.

A. 1) 1 hour
2) is

B. 1) 1 hour
2) is **not**

C. 1) 2 hours
2) is

D. 1) 2 hours
2) is **not**

Answer: D

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .A page 17 third bullet. SRO is required to have knowledge of the TS section 5 and 6 actions related to plant staffing. Additionally the SRO is required to know the administrative procedure content related to not meeting staffing requirements.

K/A is met with the knowledge of how long an on-duty shift position may be unfilled, and the requirements of Tech Specs and Plant Procedures to maintain safe plant operation.

A. Incorrect. See correct answer.
B. Incorrect. See correct answer.
C. Incorrect. See correct answer.
D. Correct. In accordance with TS 5.2.2, 2 hours is the expected time to fill the required position provided immediate action is taken to restore shift composition to minimum. BVPS has incorporated Licensing position on TS 5.2.2 into NOP-OP-1002, which states it is not conservative to place the plant into a transient due to staffing, therefore maintain the unit in a steady state condition and continue calling out personnel.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.

K/A# 2.1.4 **K/A Importance** 3.8 **Exam Level** SRO

References provided to Candidate None **Technical References:** T.S. 5.2.2 Amend 278/161 pg. 5.2-1
NOP-OP-1002 Rev. 10 sect. 4.1.13

Question Source: New

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 43.2)

Objective: 3SQS-48.1 Obj. 3 From memory, describe the required actions if less than the minimum shift staffing complement exists.

95. The plant is operating in Mode 6 with all systems in normal alignment for this Mode.

- Core Off-Loading activities are in progress and core off-load is half complete
- Source Range Channel N31 fails LOW
- Source Range Channel N32 remains OPERABLE
- Refuel cavity water clarity is murky
- Gamma Metrics detectors N52A and N52B are Out of Service

Which of the following activities can be performed **WITHOUT** violating the Technical Specification required actions for Source Range Instrumentation?

A. Install a temporary secondary source into a core location.

B. Latch and move a spent fuel assembly from the core to the Spent Fuel Pool.

C. Latch and move a spent fuel assembly from the upender to the Spent Fuel Pool.

D. Add Hydrogen Peroxide mixed with primary grade water to the refueling cavity for cleanup.

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .B page 17 first and third bullet. SRO must have knowledge of the TS bases to answer this question. Specifically, SRO must know and apply the TS definition of core alteration and be familiar with the TS bases discussion on what is allowed and not allowed, with respect to compliance with the action statements. Additionally, the SRO must be knowledgeable of the "safe" locations defined in TSs and will be responsible for directing the operator actions to comply with the TS actions.

K/A is met with the knowledge of permissible actions iaw Tech Specs during core alterations when a Source Range detector is inoperable.

A. Incorrect. Plausible that operationally an alternative source could be installed, however, it is not allowed by the definition for what constitutes a Core Alteration.

B. Incorrect. Latching and moving a fuel assembly from the core would not be allowable by definition. Removing the assembly would not be considered placing the assembly in a safe location. This is plausible because some TS such as TS 3.9.4 LCO preclude core onload but do allow core offload to continue.

C. Correct. The SRO must understand that a loss of N31 puts them into AOP-2.2.1A 'SR Channel Malfunction' and TS 3.9.2. Both the AOP & TS direct that core alterations are immediately suspended. Core alterations are defined as movement of any fuel, sources, or reactivity components, within the reactor vessel with the vessel head removed and with fuel in the vessel. The SRO must have knowledge of the administrative requirements associated with refueling activities and have knowledge of TS bases. In order to answer this question the SRO must know the definition of Core Alterations and be able to apply this definition to a set of plant conditions. The movement of a Spent Fuel Assembly from the upender to the SFP is allowable because it is not within the reactor vessel.

D. Incorrect. Plausible that hydrogen peroxide is added to the water for clarity and cleanliness. However, the addition of primary grade water into the RCS would violate the second part of TS 3.9.2 since primary grade water could reduce boron concentration and is not allowed.

Sys #	System	Category		KA Statement
N/A	Generic	Conduct Of Operations		Knowledge of procedures and limitations involved in core alterations.
K/A# 2.1.36	**K/A Importance** 4.1		**Exam Level**	SRO
References provided to Candidate	None		**Technical References:**	2OM-53C.4.2.2.1A, Rev. 9, Pg. 8; TS Definitions Pg. 1.1-2; TS B3.9.2 Pg. B3.9.2-2

Question Source: Bank – 1LOT8 NRC Exam (Q95)

Question Cognitive Level: Higher – Comprehension or Analysis **10 CFR Part 55 Content:** (CFR: 41.10 / 43.6 / 45.7)

Objective:

96. Given the following:

- Following a turbine runback, the crew is stabilizing the plant in accordance with the appropriate procedure.
- Control Bank "D" Group Counters are at 180 steps.
- On DRPI, one Control Bank "D" rod indicates 196 steps; all others indicate 182 steps.
- The affected rod has a blown movable gripper fuse and has been determined to be trippable.

Which of the following describes the technical specification implications of this event?

A. The rod is INOPERABLE.
Realign the rod within 1 hour to ensure acceptable power distribution limits are maintained.

B. The rod is INOPERABLE.
Realign the rod within 1 hour to ensure Shutdown Margin is maintained.

C. The rod is OPERABLE.
Realign the rod within 1 hour to ensure acceptable power distribution limits are maintained.

D. The rod is OPERABLE.
Realign the rod within 1 hour to ensure Shutdown Margin is maintained.

Answer: C

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II .B page 17 third bullet. SRO is required to have knowledge of the TS bases. Specifically the SRO must evaluate the plant status and determine the impact on Rod alignment and TS action required. Detailed knowledge of the bases is required to determine which TS actions are applicable. This item meets the 10CFR55.43 (b) 2 SRO criteria because it requires the applicant to apply technical specification action with knowledge of the bases for that action.

K/A is met by demonstrating the ability to recognize that a rod exceeds alignment limits, but is still operable due to it being trippable. Knowledge of the TS bases is required to know why this is an undesired condition.

A. Incorrect. 1 hour is required by T.S. 3.1.4 Condition A, but rod is not inoperable if it is trippable iaw TS 3.1.4 bases. If the rod were untrippable, then SDM would be affected. Power distribution limits are the correct reason for misaligned rods.
B. Incorrect. Would be true if the rod were untrippable.
C. Correct. Since the rod is trippable it is operable. Restore rod to within alignment limits within 1 hour is required by T.S. 3.1.4 Condition B. Misalignment limits are based on impact on power distribution limits iaw with TS 3.1.4 bases.
D. Incorrect. Correct, the rod is operable, but the concern for the situation presented is not shutdown margin.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to recognize system parameters that are entry-level conditions for Technical Specifications.

K/A# 2.2.42 **K/A Importance** 4.6 **Exam Level** SRO

References provided to Candidate None **Technical References:** TS 3.1.14, condition B, and basis

Question Source: Bank-1LOT7 NRC Exam (Q91)

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.7 / 41.10 / 43.2 / 43.3 / 45.3)

Objective:

97. In accordance with 1/2-EPP-IP-5.3, "Emergency Exposure Criteria And Control", whose authorization is required to exceed the emergency exposure limits of 10 CFR 20 "Standards For Protection Against Radiation" to save a life during an emergency, and what TEDE limit is this authorization limited to?

1) Who is authorized to grant exceeding the 10 CFR 20 limits during a declared emergency?

2) This authorization is limited to what maximum TEDE limit?

A. 1) Emergency Director
2) 10 Rem TEDE

B. 1) Emergency Director
2) 75 Rem TEDE

C. 1) Radiological Controls Coordinator
2) 10 Rem TEDE

D. 1) Radiological Controls Coordinator
2) 75 Rem TEDE

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II E page 21 third bullet. SRO is required to have knowledge of the Emergency Plan and position responsibilities for the Emergency Director. This is a SRO position function only.

K/A met with knowledge of 10CFR20 emergency limits, and who may authorize emergency exposure limits, and what the limit is for saving a human life.

A. Incorrect. The ED is the only individual authorized to grant exceeding 10CFR20 emergency limits up to 75 Rem at which the Senior Vice President must give concurrence. 10 Rem is a plausible distractor because it is the 10CFR20 emergency exposure limit for preventing the failure of equipment necessary to protect the public health and safety.

B. Correct. The ED is the only individual authorized to grant exceeding 10CFR20 emergency limits up to 75 Rem at which time the Senior Vice President must give concurrence.

C. Incorrect. Plausible because the Radiological Controls Coordinator will advise the ED, but ONLY the ED is authorized to grant exceeding 10CFR20 emergency limits. 10 Rem is a plausible distractor because it is the 10CFR20 emergency exposure limit for preventing the failure of equipment necessary to protect the public health and safety.

D. Incorrect. Plausible because the Radiological Controls Coordinator will advise the ED, but ONLY the ED is authorized to grant exceeding 10CFR20 emergency limits. The expose limit of 75 Rem is the maximum allowed to be granted by the ED when the above stated conditions exist. Above 75 Rem requires the Senior Vice Presidents concurrence.

Sys #	System	Category			KA Statement
N/A	N/A	Generic			Knowledge of radiation exposure limits under normal or emergency conditions.
K/A# 2.3.4		**K/A Importance**	3.7	**Exam Level**	SRO
References provided to Candidate		none		**Technical References:**	1/2-EPP-IP-5.3, Rev. 11 pg. 3, 4, 9
Question Source:	New				
Question Cognitive Level:		Lower – Memory or Fundamental		**10 CFR Part 55 Content:**	(CFR: 41.12 / 43.4 / 45.10)
Objective:					

98. The Plant is operating at 100% power.
    - Unit 2 is discharging the contents of the Gaseous Waste Storage tanks IAW 1/2OM-19.4A.B, 'Unit 2 GW Storage Tk Disch To Unit 1 Atmos Vent'
    - Rad Monitor RM-1GW-108B, Gaseous Waste Gas fails downscale and is declared inoperable
    - The crew terminates the discharge

    In order to re-start the discharge, what 1/2-ODC-3.03, 'ODCM: Controls for RETS and REMP Programs' actions will be **REQUIRED**?

    (Refer to attached reference)

A. The system/process flow rate is estimated at least once per 4 hours (or assumed to be at the ODCM design value).

B. At least two independent samples of the tank's content are analyzed and at least two technically qualified members of the Facility Staff independently verify the release rate calculations and discharge valve lineup.

C. Grab samples (or local monitor readings) are taken at least once per 12 hours. If grab samples are taken, these samples are to be analyzed for gross activity within 24 hours.

D. Samples are continuously collected with auxiliary sampling equipment as required in ODCM Control 3.11.2.1, Table 4.11-2, or sampled and analyzed once every 12 hours.

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II D page 20 first bullet. SRO is required to have knowledge of the Offsite Dose Calculation Manual and actions required for failed monitoring equipment. This is a SRO position function only.

K/A is met by identifying what controls must be used for radioactive releases if a Gaseous Waste gas detector is inoperable during a Gaseous Waste discharge.

A. Incorrect. Plausible distractor because this is a required action if FR-GW-108 is OOS (Action 28A) not RM-GW-108B.
B. Correct. IAW ODCM 1/2-ODC-3.03 Att.F page 38 and action 27 on page 42.
C. Incorrect. Plausible distractor because this is the required action for all continuous releases thru this pathway. (Action 29)
D. Incorrect. Plausible distractor because this is the required action for continuous releases if the alt channel 109 is also not available (Action 32). For Batch release alt. RM-1GW-109 shall not be used as a comparable alternate monitoring channel iaw Att. F page 2.

Sys #	System	Category		KA Statement
N/A	N/A	Generic		Ability to control radiation releases.
K/A# 2.3.11		K/A Importance 4.3	Exam Level	SRO
References provided to Candidate		½-ODC-3.03	Technical References:	ODCM ½-ODC-3.03 Rev. 13 Att.F pages 38 & 42
Question Source:		Bank – 2LOT8 NRC Exam (Q98)		
Question Cognitive Level:		Higher – Comprehension or Analysis	10 CFR Part 55 Content:	(CFR: 41.11 / 43.4 / 45.10)
Objective:				

99. A Site Area Emergency has been declared. In accordance with 1/2-EPP-IP-3.2, 'Site Assembly and Personnel Accountability', which of the following members of the Emergency Response Organization can order a Site Assembly and/or Personnel Accountability?

A. Emergency Director

B. Emergency/Recovery Manager

C. Security Coordinator

D. Operations Coordinator

Answer: A

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II E page 21 third bullet. SRO is required to have knowledge of the Emergency Plan and position responsibilities for the Emergency Director. This is a SRO position function only.

K/A is met with the knowledge of whose authority is required to order site assembly and/or personnel accountability.

A. Correct. ED responsible for ordering Site Assembly and Site Accountability when a Site Area or General Emergency which mandates Personnel Accountability is declared. The ED may also order Accountability if the situation warrants.
B. Incorrect. ERM is stationed at the EOF at a SAE or GE, and will assume primary responsibility for offsite emergency response activities by FENOC personnel during an emergency.
C. Incorrect. Security Coordinator is responsible for the actions pertaining to Site Assembly and Site Accountability.
D. Incorrect. Operations Coordinator remains cognizant of control room and in-plant activities, and matters concerning plant operations.

Sys #	**System**	**Category**			**KA Statement**
N/A	N/A	Generic			Knowledge of the emergency plan.
K/A#	2.4.29	**K/A Importance**	4.4	**Exam Level**	SRO
References provided to Candidate		None		**Technical References:**	1/2-EPP-IP-3.2 rev. 19

Question Source: New
Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.11)
Objective:

(SRO ONLY)
Beaver Valley Unit 2 NRC Written Exam (2LOT15)

100. Given the following plant conditions:

- The Emergency Director declared a Site Area Emergency at 1215
- The initial report to state and local government was completed at 1227
- An upgrade to General Emergency was declared at 1245
- The Initial Protective Action Recommendation (PAR) was made without a dose projection
- At 1255 a Valid dose projection is available which requires an upgraded PAR

The Initial **AND** Upgraded (PAR) to the State/County Agencies **must be** given by which of the following times?

	INITIAL	UPGRADED
A.	1245	1255
B.	1300	1310
C.	1300	1345
D.	1327	1355

Answer: B

Explanation/Justification: Meets the requirements of the SRO only guidance of ES-401 Attachment 2 per section II E page 21 third bullet. SRO is required to have knowledge of the Emergency Plan and notification requirements. This is a SRO position function only.

K/A is met with the knowledge of the time requirements of the initial PAR, and the upgraded PAR after a dose projection is available.

A. Incorrect. All distractors are plausible but incorrect as they are intervals of the given time in the question stem.
B. Correct. The Initial PAR must be declared within 15 minutes of declaration of a GE. The upgraded PAR does not change emergency classification status. Upgraded PAR determination must be completed within 15 minutes of assessment being available (ie: dose projection) This is SRO level knowledge only.
C. Incorrect. All distractors are plausible but incorrect as they are intervals of the given time in the question stem.
D. Incorrect. All distractors are plausible but incorrect as they are intervals of the given time in the question stem.

Sys #	System	Category	KA Statement
N/A	N/A	Emergency Procedures/Plan	Knowledge of emergency plan protective action recommendations.

K/A# 2.4.44 **K/A Importance** 4.4 **Exam Level** SRO

References provided to Candidate None **Technical References:** 1/2-EPP-IP-4.1, Rev. 31, pg. 10 & 13

Question Source: Bank - 1LOT8 NRC Exam (#100)

Question Cognitive Level: Lower – Memory or Fundamental **10 CFR Part 55 Content:** (CFR: 41.10 / 41.12 / 43.5 / 45.11)

Objective: