

FINAL SUBMITTAL

CATAWBA EXAM
50-413, 414/2001-301

APRIL 2 - 6 & 16 - 20, 2001

FINAL RO AND SRO
WRITTEN EXAM WITH ANSWERS

AND LIST OF REFERENCES

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FINAL RO WRITTEN EXAMINATION

*WITH ANSWERS AND LIST
OF REFERENCES*

**Nuclear Regulatory Commission
Reactor Operator Licensing
Examination**

Answer Key

Catawba Nuclear Station

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RO Exam References:

Steam Tables – question 311, 185.2

Tech Specs:

- Tech Spec 3.4.13 - question 480.2

SLCs:

- SLC 16.11-2

EOPs

- E-1 page 5 – question 185b
- ES-0.1 Encl 3 page 21 – question 780

AOPs

- AP/1/A/5500/17 (Loss of Control Room) – question 189a

Other

- Reactor Operating Databook, Sections 4.1 & 4.2 – question 189a

Bank Question: 033**Answer: B**

1 Pt(s)

Unit 1 is in a refueling outage. Given the following events and conditions:

- A full core off-load is in progress
- One spent fuel assembly is in the fuel transfer tube being transported to the spent fuel pool
- The following annunciators alarm:
 - SPENT FUEL POOL LEVEL HI/LO
 - 1EMF-17 REACTOR BLDG REFUEL BRIDGE

Which one of the following correctly describes the type of event and the required operator actions that should be performed first?

- A. **Loss of refueling cavity or spent fuel pool level.**
Install the weir gate and inflate the seals.
- B. **Loss of refueling cavity or spent fuel pool level**
Move the fuel transfer cart to the spent fuel side
- C. **Loss of spent fuel pool level only**
Move the fuel transfer cart to the reactor side.
- D. **Loss of refueling cavity level only**
Close 1KF-122 (KF Fuel Transfer Canal Isolation).

Distracter Analysis:

- A. **Incorrect:** using the weir gate is optional.
Plausible: this is one of the operator follow-up actions.
- B. **Correct:**
- C. **Incorrect:** the cart must be moved to the SFP side.
Plausible: if the problem is on the SFP side it might be reasonable to not to add more fuel to that side.
- D. **Incorrect:** level is dropping on both sides, and you can't close valve with cart in the tube.
Plausible: the candidate may choose this answer due to the EMF alarm and closing the valve is the next action.

Level: RO&SRO

KA: APE 036AA.2.02(3.2/3.9)

Lesson Plan Objective: KF LPRO 15

Source: Mod Ques_033e

Level of knowledge: memory

References:

1. OP-CN-FH-FHS pages 7, 17
2. AP/1/A/5500/26 pages 1-2

Bank Question: 080.1**Answer: D**

1 Pt(s) Which one of the following accidents has the highest severity for pressurized thermal shock (PTS) in the NCS?

- A. Small break LOCA, NCPs running
- B. Large break LOCA, NCPs NOT running
- C. Large break LOCA, NCPs running
- D. Small break LOCA, NCPs NOT running

Distracter Analysis:

- A. **Incorrect:** PTS is worse with NCPs not running.
Plausible: small LOCAs have PTS potential.
- B. **Incorrect:** large break LOCA has little concern for PTS.
Plausible: If candidate misunderstands significance of no pressure versus NCPs not running.
- C. **Incorrect:** large break LOCA has little concern for PTS
Plausible: large break LOCAs with pumps running are more limiting in other respects.
- D. **Correct:**

Level: RO&SRO

KA: EPE 011EK3.10(3.7/3.9)

Lesson Plan Objective: PTS SEQ 13, 14

Source: Mod Ques_080

Level of knowledge: comprehension

References:

1. OP-CN-TA-PTS page 12-18

Bank Question: 104.1**Answer: C**

1 Pt(s)

Unit 1 is operating at 100% power. Given the following events and conditions:

- Pressurizer pressure and level controls are in the 1-2 position.
- NCS pressure is 2200 psig
- NCS temperature is 560 °F.
- Charging flow increases
- Pressurizer level increases
- PZR low level deviation alarms.
- All pressurizer heaters remain energized throughout the event

What is the cause of these indications?

- A. **Pressurizer level master controller output fails high**
- B. **Pressurizer level channel I fails low**
- C. **NCS Loop C narrow range T_c channel fails high**
- D. **Pressurizer level channel II fails low**

Distracter Analysis: Tcold failing high causes reference level to fail high. This causes the master level controller output to go high on reference level. This causes increased charging and increased PZR level.

- A. **Incorrect:** would not cause DEV-LO alarm – not controlled by the master level output.
Plausible: would cause all other indications
- B. **Incorrect:** charging flow decreases and heaters would trip off
Plausible: will cause other symptoms.
- C. **Correct:** Heaters on due to current NCS pressure.
- D. **Incorrect:** heaters would trip off
Plausible: will cause other symptoms

Level: RO&SRO

KA: APE 028AA1.02(3.4/3.4)

Lesson Plan Objective: ILE LPSO 6

Source: Mod Ques_104

Level of knowledge: comprehension

References:

1. OP-CN-PS-ILE page 15-17, 21

Bank Question: 124.1**Answer: B**

1 Pt(s)

A team of workers must repack the seals on a pump in a 1500 mrem/hr high radiation area.

Which one of the following work teams and estimated repair times would maintain total worker exposure ALARA?

- A. 10 people working for 20 minutes
- B. 6 people working for 30 minutes
- C. 4 people working for 1 hour
- D. 3 people working for 1.5 hours

Distracter Analysis:

$N \text{ (persons)} \times T \text{ (time)} \times R/\text{hr (dose rate)} = \text{total person-dose} - \text{to be minimized to maintain exposure ALARA}$

- A. **Incorrect:** 10 people will incur 5 Rem – 6 people can accomplish the job with only 4.5 Rem.
Plausible: Each worker would have the least individual exposure – only 0.5 Rem
- B. **Correct:** total of 4.5 Rem incurred to all
- C. **Incorrect:** 4 people would incur 6 Rem - 6 people can accomplish the job with only 4.5 Rem.
Plausible: This case represents the least number of individuals not exceeding the admin dose limit.
- D. **Incorrect:** 3 people would incur 6.7 Rem - 6 people can accomplish the job with only 4.5 Rem.
Plausible: Exposes the fewest individuals.

Level: RO&SRO

KA: G2.3.2 (2.5/2.9)

Lesson Plan Objective: HP LPRO 10

Source: Mod Ques_124e

Level of knowledge: comprehension

References:

1. OP-CN-RAD-HP page 19

Bank Question: 162.1**Answer: B**

1 Pt(s)

Unit 1 is purging containment while in mode 5.

Which one of the following instruments will prevent the release of radioactivity outside containment by completing the corresponding sequence of actions?

- A. **EMF-36 (UNIT VENT GAS) will secure VP and VQ, and stops any waste gas release in progress.**
- B. **EMF-39 (CONTAINMENT GAS) will secure VP and initiate containment ventilation isolation.**
- C. **EMF-40 (CONTAINMENT IODINE) will initiate containment ventilation isolation, and shutoff containment sump pump and ventilation drain headers.**
- D. **EMF-53A/B (CONTAINMENT TRN A(B) HI RANGE) will secure VP and VQ, and shutoff containment sump pump and ventilation drain headers.**

Distracter Analysis:

- A. **Incorrect:** EMF-36 does not secure VP.
Plausible: EMF-36 monitors the final VP release and secures the others.
- B. **Correct answer**
- C. **Incorrect:** EMF-40 does not isolate containment drains.
Plausible: EMF-40 will isolate the VP release.
- D. **Incorrect:** EMF-53 will not secure VP.
Plausible: EMF-53 is a containment radiation monitor, and isolates the containment drains.

Level: RO&SRO

KA: SYS 029A3.01(3.8/4.0)

Lesson Plan Objective: EMF LPRO 2

Source: Mod Ques_162

Level of knowledge: memory

References:

1. OP-CN-WE-EMF pages 17-18

Bank Question: 185.2**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power when a steam line rupture occurred inside containment. The operators responded by entering:

- E-0 (*Reactor Trip or Safety Injection*) followed by
- E-2 (*Faulted Steam Generator Isolation*) where they isolated the rupture and then transitioned to
- E-1 (*Loss of Reactor or Secondary Coolant*).

Given the following conditions at the following times:

| Time | 0200 | 0205 | 0210 | 0215 |
|-----------------------------|------|------|------|------|
| Subcooling [°F] | +9 | +6 | +5 | +2 |
| S/G A (NR) [%] | 5 | 7 | 9 | 11 |
| S/G B (NR) [%] | 8 | 10 | 16 | 20 |
| S/G C (NR) [%] | 0 | 0 | 0 | 0 |
| S/G D (NR) [%] | 9 | 15 | 21 | 30 |
| Feed Flow A S/G [GPM] | 135 | 135 | 145 | 130 |
| Feed Flow B S/G [GPM] | 150 | 130 | 160 | 160 |
| Feed Flow C S/G [GPM] | 0 | 0 | 0 | 0 |
| Feed Flow D S/G [GPM] | 170 | 180 | 150 | 155 |
| NC pressure [psig] | 1710 | 1725 | 1750 | 1765 |
| Pzr Level [%] | 15 | 18 | 21 | 25 |
| Containment pressure [psig] | 3.2 | 2.9 | 2.5 | 2.4 |

At 0200, the operators are at step 12 of E-1.

What is the earliest time that the operators can transition to ES-1.1 (*Safety Injection Termination*)?

REFERENCES PROVIDED

E-1 page 5, Steam Tables

- A. 0200
- B. 0205
- C. 0210
- D. 0215

Distracter Analysis:

- A. **Incorrect:** PZR level does not meet the ACC of 20%.

- Plausible:** If the candidate uses non-ACC value of 11%.
- B. Incorrect:** PZR and SG levels do not meet the ACC of 20% and 29%
Plausible: If the candidate uses non-ACC values due to Cont Press <3.0
- C. Correct:** AFW flow >450gpm and PZR level and subcooling above limits.
- D. Incorrect:** Meets the criteria for termination later in time.
Plausible: Based on miscalculating the AFW flow for C.

Level: RO&SRO

KA: WE 02AA2.1 (3.3/4.2)

Lesson Plan Objective: EP2 LPRO 8, 9

Source: Bank 185

Level of knowledge: analysis

References:

1. OP-CN-EP-EP2 page 8
2. E-1 page 5 - PROVIDED
3. OMP 1-7 page 7

Bank Question: 189.1**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power when a toxic gas accident caused the operators to evacuate the control room and take control at the Auxiliary Shutdown Panel (ASP)

Given the following conditions:

- When the reactor tripped, 2 control rod bottom lights failed to light
- Pressurizer pressure stabilized at 2235 psig
- Safety injection has not occurred
- $T_{\text{cold}} = 500\text{ }^{\circ}\text{F}$
- Core burn up = 90 EFPD
- Boron concentration = 1200 ppm
- The OAC is out of service

How much boric acid must be added in accordance with AP/1/A/5500/17 (Loss of Control Room) to maintain shutdown margin?

REFERENCES PROVIDED

Reactor Operating Databook, Sections 4.1 & 4.2

AP/1/A/5500/17 (Loss of Control Room)

- A. 2850±10 gallons
- B. 10565±25 gallons
- C. 20550±50 gallons
- D. 24025±75 gallons

Distracter Analysis: AP/17 Enclosure 7, step 1.b requires boration to 2850 ppm. This will require 20553 gallons of boric acid.

- A. **Incorrect:** 20553 gallons of boric acid required
Plausible: if the candidate misreads the AP/17 step to add 2850gal of boric acid instead of enough acid to raise boron by 2850 ppm.
- B. **Incorrect:** 20553 gallons of boric acid required
Plausible: if the candidate does not calculate the addition properly with a psychometrically balanced error band.
- C. **Correct Answer:** borate to 2850 ppm – which requires 20553 gallons to go from 1200 ppm to 2850 ppm. The 50 gal error band discriminates interpolation errors.
- D. **Incorrect:** 20553 gallons of boric acid required

Plausible: if the candidate uses the wrong table, (this is the required addition for a cold NCS). The error band accommodates interpolation errors.

Level: RO&SRO

KA: G2.2.34 (2.8/3.2)

Lesson Plan Objective: RT-RB LPRO 4

Source: Mod Ques_189

Level of knowledge: analysis

References:

1. OP-CN-RT-RB page 9, 10
2. AP/1/A/5500/17 - PROVIDED
3. Reactor Operating Databook Sections 4.1 & 4.2 - PROVIDED

Bank Question: 190.1**Answer: A**

1 Pt(s)

Unit 1 is in a refueling outage with the following plant conditions:

- NC system is in mid-loop
- ND is in operation
- Refueling has been completed

If there are no other exceptions to the containment closure verification, which one of the following statements correctly describes the required status of the containment equipment hatch?

- A. **Must be kept closed at all times while the NC system is in mid-loop.**
- B. **May be open provided a Watch is stationed to immediately close the hatch in the event of a loss of ND.**
- C. **Must be fastened by at least 4 bolts in mode 6.**
- D. **May be open provided contingency plans are in place and equipment is staged to close the hatch prior to core boiling in the event of a loss of ND.**

Distracter Analysis: As explained by Mr. David Thomas and relayed by Mr. Steve Tripi.

This question was a modified NRC question that was used on the McGuire Exam in 1997 (not the last 2 exams). Although the stem of the question has not been changed, the answer to the question is different between Catawba and McGuire. McGuire allows their containment equipment hatch to remain open when in mid-loop, low decay heat rate. They justify this difference between the sites because McGuire has spent the time, effort and money to put contingency plans into place that assure they can close the containment equipment hatch within 45 minutes. These plans include a contingency procedure and a dedicated small generator to assure continuity of power.

Catawba chooses not to spend the resources to allow the containment equipment hatch to remain open under these conditions.

- A. **Correct:**
- B. **Incorrect:** it takes more than one person to close this hatch
Plausible: based on misconstruing equipment vs. personnel hatches
- C. **Incorrect:** the equipment hatch may be open in mode 6 if core alterations are not in progress

- D.** **Plausible:** this is the TS requirement for core alterations in mode 6.
Incorrect: exceptions may NOT be authorized in mid-loop per SD 3.1.30.

Plausible: if the candidate misunderstands the containment closure program.

Level: RO Only

KA: APE 069AK2.03(2.8 / 2.9)

Lesson Plan Objective: CNT-CNT SEQ 23

Source: Bank Ques_190

Level of knowledge: memory

References:

1. OP-CN-CNT-CNT page 22
2. Site Directive 3.1.30 page 19 - 20

Bank Question: 193.1**Answer: A**

1 Pt(s)

E-3 (Steam Generator Tube Rupture), enclosure 5 (NC Pressure and Makeup Control to Minimize Leakage) directs operators to energize pressurizer heaters if the ruptured S/G level is decreasing and pressurizer level is greater than 25%.

What steady state conditions should be established in this procedure?

- A. **Maintain pressurizer temperature equal to the saturation temperature corresponding to the ruptured S/G pressure.**
- B. **Maintain pressurizer temperature below the saturation temperature corresponding to the S/G PORV pressure setpoint.**
- C. **Maintain pressurizer temperature above the saturation temperature corresponding to the ruptured S/G pressure.**
- D. **Maintain NCS pressure above ruptured S/G pressure.**

Distracter Analysis: The purpose of this question is to determine if the candidate understands that thermal hydraulic equilibrium that is established between the NCS and the ruptured S/G. No references are provided because the candidate should be able to answer the question by simply comprehending the pressures and reasons for this equilibrium.

- A. **Correct Answer:**
- B. **Incorrect:** energizing heaters will not reduce (or hold down) pressure.
Plausible: it is another requirement to maintain NCS pressure below the PORV setpoint.
- C. **Incorrect:** required to maintain NCS pressure equal to ruptured S/G pressure
Plausible: condition will address decreasing S/G level but overcompensate.
- D. **Incorrect:** required to maintain NCS pressure equal to ruptured S/G pressure.
Plausible: condition will address decreasing S/G level but overcompensate.

Level: RO&SRO

KA: EPE 038EA1.38(3.3/3.3)

Lesson Plan Objective: EP-EP4 Obj: 7

Source: Bank McGuire Exam 1997

Level of knowledge: comprehension

References:

1. OP-CN-EP-EP4 page 8
2. E-3 page 61
4. ERG Background document E-3 pages 48-49

Bank Question: 263**Answer: A**

1 Pt(s)

Unit 1 is shutdown in mode 6 with fuel movement in progress. Given the following events and conditions:

- The new fuel elevator fails to operate in the up direction

Which one of the following statements describes the cause of this problem?

- A. **1EMF-15 (SPENT FUEL BLDG REFUEL BRIDGE) has failed high.**
- B. **1EMF-20 (NEW FUEL STOR 1A) has failed high.**
- C. **The load in the new fuel elevator weighs 1100 lbs.**
- D. **The spent fuel pool crane is located over the spent fuel pool.**

Distracter Analysis:

- A. **Correct answer**
- B. **Incorrect:** does not have an interlock with the new fuel elevator
Plausible: new fuel vault monitor sounds like it "fits" with new fuel monitor if candidate does not know answer
- C. **Incorrect:** If load exceeds 1200 lbs., will prevent movement
Plausible: this is a valid interlock but the weight is insufficient to actuate it
- D. **Incorrect:** there is no interlock to prevent moving the new fuel elevator
Plausible: there is an interlock to prevent moving the new fuel elevator if the spent fuel pool crane is indexed over the new fuel elevator.

Level: RO&SRO

KA: SYS 072G2.28 (2.6/3.5)

Lesson Plan Objective: FHS LPRO 8, 10

Source: NRC Catawba Exam 1999 Ques_263

Level of knowledge: memory

References:

1. OP-1/B/6100/010Z C/5

2. OP-CN-FH-FHS page 17

Bank Question: 282.1**Answer: B**

1 Pt(s)

Which of the following describes the plant response to decreasing VI system pressure?

- A. • 86 psig - Standby Compressor starts
 - 80 psig - VI-78 (VS AUTO BACKUP TO VI) opens.
 - 76 psig - VI-500 (VI COMPRESSOR D TO VS HEADER BACKPRESSURE CONTROL) closes.
- B. • 86 psig - Standby Compressor starts
 - 80 psig - VI-500 closes.
 - 76 psig - VI-78 opens.
- C. • 86 psig- Backup Temporary/ Diesel VI Compressor starts
 - 80 psig - VI-500 closes.
 - 76 psig - VI-78 opens.
- D. • 86 psig- Backup Temporary/ Diesel VI Compressor starts
 - 80 psig - VI-78 opens.
 - 76 psig -. VI-500 closes

Distracter Analysis:

Loss of VI (Obj. #5, 8)

Automatic actions:

- 86 psig - Standby Compressor starts
- 80 psig - 'LO VI PRESS' Alarm in Control Room.
- 80 psig – VI 670 'VI Dryer Auto Bypass' opens
- 80 psig - VI500 'VI supply to VS' closes. (Tag label in answers)
- 76 psig - VS78 'VS supply to VI' opens - VS provides instrument air via oil removal filters. (Tag label in answers)

A. **Incorrect:** VI 500 and VI 78 actions are in reverse order

Plausible: If candidate reverses the order

B. **Correct:**

C. **Incorrect:**

Plausible: backup compressor does not automatically start

D. **Incorrect:**

Plausible: backup compressor does not automatically start

Level: RO&SRO

KA: SYS 079A2.01(2.9/3.2)

Lesson Plan Objective: VI SEQ 5, 8

Source: NRC Catawba Exam 1999 Ques_282

Level of knowledge: memory

References:

1. VI lesson plan page 19 of 36

Bank Question: 300.2**Answer: A**

1 Pt(s)

Unit 1 was operating at 100% power when a 5 gpm S/G tube leak occurred in the B S/G. Given the following events and conditions:

- The operators implement AP/10 (REACTOR COOLANT LEAK).
- The steam supply to the turbine driven CA pump must be isolated

Which one of the following statements describes the correct method and location for isolating B S/G steam supply to the turbine drive CA pump?

- A. **Manually close the isolation valve (1SA-1) in the doghouse.**
- B. **Manually close the stop-check valve (1SA-3) in the doghouse.**
- C. **Manually close the isolation valve (1SA-4) in the mechanical penetration room.**
- D. **Manually close the stop-check valve (1SA-6) in the mechanical penetration room.**

Distracter Analysis:

- A. **Correct:**
- B. **Incorrect:** wrong location – 1SA-3 is located in the aux building mechanical penetration area - not the doghouse.
Plausible: 1SA-3 is the RNO action if 1SA-1 does not close.
- C. **Incorrect:** 1SA-4 isolates the steam supply from the C S/G - not located in the mechanical penetration area.
Plausible: if the candidate does not recognize the wrong valve
- D. **Incorrect:** will not isolate steam to the B S/G
Plausible: 1SA-6 is the RNO action if 1SA-4 does not close. Valve is located in the mechanical penetration area.

Level: RO&SRO

KA: APE 037G2.4.34 (3.8/3.6)

Lesson Plan Objective: none

Source: Mod Catawba Exam 1997 Ques_300

Level of knowledge: memory

References:

1. AP-10 page 21
1. OP-CN-STM-SM page 13, 18

Bank Question: 311**Answer: A**

1 Pt(s) Unit 1 is operating at 50% power. Given the following conditions:

- Pressurizer pressure is 2235 psig
- Pressurizer Relief Tank (PRT) pressure is 21 psig
- PRT temperature is 125 °F
- PRT level is 81%
- A pressurizer code safety valve is suspected of leaking by it's seat

What temperature would be indicated on the associated safety valve discharge RTD if the code safety were leaking by?

REFERENCES PROVIDED: Steam Tables

- A. 258-262 °F
- B. 227-231 °F
- C. 161-165 °F
- D. 123 -127°F

Distracter Analysis: This answer is determined by the following method:
The steam that passes through the seat leak on the pressurizer safety undergoes an adiabatic throttle process. This implies that the enthalpy of the steam does not change as it passed from the high pressure, high temperature conditions in the pressurizer into the low pressure, low temperature conditions in the PRT.

The steam in the PRT achieves equilibrium with the PRT pressure at:
 $21 \text{ psig} + 14.6 \text{ psig} = 35.6 \text{ psia}$.
Interpolating for saturation temperature
 $35.6 \text{ psia} = 5.6 \text{ psi}/10 \text{ psi} \times 17 \text{ °F} = 9.5 \text{ °F} + 250.3 \text{ °F} = 259.8 \text{ °F} \sim 260 \text{ °F}$

- A. **Correct:** steam temperature = 260 °F
- B. **Incorrect:** Temp is too low - the correct temp is 260 °F
Plausible: If the candidate makes the mistake of not correcting for atmospheric pressure by failing to adding 14.6 psi to the PRT pressure and uses 20 psia.
- C. **Incorrect:** Temp is too low - the correct temp is 260 °F
Plausible: If the candidate reverses the correction for atmospheric pressure by subtracting 14.6 psi from PRT pressure of 20 psig to get 5 psia.

- D.** **Incorrect:** Temp is too low - the correct temp is 260 °F
 Plausible: If the candidate thinks that the discharge temperature will be at the same temperature as the PRT fluid.

Level: RO&SRO

KA: APE 008AK1.01(3.2/3.7)

Lesson Plan Objective: FLO SEQ 8

Source: NRC Catawba Exam 1999 Ques_311

Level of knowledge: analysis

References:

1. OP-CN-THF-FLO pages 17-18
2. Steam Tables - PROVIDED

Bank Question: 339.1**Answer: D**

1 Pt(s)

E-3, (Steam Generator Tube Rupture), step #21.b reads as follows:

**“IF AT ANY TIME ruptured S/G(s) pressure is decreasing...,
THEN perform Step 21.”**

Which one of the following statements is correct with regards to this step?

- A. The step is applicable continuously unless it is determined not to be pertinent to the recovery effort.
 - B. The step is applicable while in E-3 and after transition to subsequent procedures until alternative guidance is provided.
 - C. The step is only applicable until another continuous action step is reached in E-3.
 - D. The step is only applicable while in E-3.
-

Distracter Analysis:

- A. **Incorrect:** step applicable only in E-3
Plausible: this is the construct for When ... then actions
- B. **Incorrect:** step applicable only in E-3
Plausible: this is an alternate construct for If at any time actions
- C. **Incorrect:** step applicable only in E-3
Plausible: this is the construct for generalized continuous action steps.
- D. **Correct:**

Level: RO&SRO

KA: G2.4.19 (2.7 / 3.7)

Lesson Plan Objective: ADM-OP SEQ 21

Source: NRC Catawba Exam 97 Ques_339

Level of knowledge: memory

References:

- 1. OP-CN-ADM-OP page 10
- 2. OMP 1-7 page 7
- 3. EP/1/A/5000/E-3 page 22

Bank Question: 343**Answer: B**

1 Pt(s) Unit 1 is responding to a LOCA inside containment.

Which one of the following situations describes the case where the operators should use ES-1.2 (Post LOCA Cooldown and Depressurization) to bring the plant into cold shutdown?

- A. A small break LOCA with inadequate containment sump level due to a ruptured FWST.
- B. A small break LOCA where NC system pressure is above shutoff head for the ND pumps.
- C. A large break LOCA where NC system pressure is below shutoff head for the ND pumps.
- D. A large break LOCA with a loss of both NI pumps.

Distracter Analysis:

- A. **Incorrect:** would use ECA-1.1 (Loss of Emergency Coolant Recirc)
Plausible: if the candidates do not recognize that a loss of containment sump level causes a loss of recirc capability
- B. **Correct Answer:** ES-1.2 is used for small or intermediate break LOCAs where the plant can be repressurized
- C. **Incorrect:** remain in E-1
Plausible: if the candidates do not understand the major actions categories for E-1
- D. **Incorrect:** ES-1.2 is entered from ES-1.1 when NC pressure is less than shutoff head for NI pumps – requires NI pumps to be injecting
Plausible: if the candidates do not recall that they remain in E-1 for large break LOCAs

Level: RO Only

KA: WE 03EK3.4(3.5 / 3.9)

Lesson Plan Objective: EP-EP2 SEQ 3

Source: NRC Catawba Exam 97, Ques_343

Level of knowledge: memory

References:

1. OP-CN-EP-EP2 page 10

Bank Question: 371**Answer: C**

1 Pt(s)

In the event of a steamline rupture that cannot be isolated, FR-P.2 (*Response to Anticipated Pressurized Thermal Shock Condition*) could be implemented due to an excessive cooldown.

What is the limiting component for this PTS event and what is the best indication of the temperature of this component?

| | <u>Limiting Component</u> | <u>Best Indication</u> |
|----|----------------------------|------------------------------------|
| A. | Steam generator tube sheet | T_{cold} |
| B. | Pressurizer spray nozzle | $T_{\text{PZR}} - T_{\text{cold}}$ |
| C. | Reactor vessel wall | T_{cold} |
| D. | Reactor vessel downcomer | T_{hot} |

Distracter Analysis:

- A. **Incorrect:** - the steam generator tube sheet is not the limiting component for a steam leak event
Plausible: - if the candidate corresponds the steam leak to the steam generator and thinks that this is limiting due to the large pressure difference across the steam generator from the rupture (PTS)
- B. **Incorrect:** - the pressurizer spray nozzle is not limiting for this event
Plausible: - if the candidate confuses this event with other events where the pressurizer delta Temp is limiting
- C. **Correct answer**
- D. **Incorrect:** - the reactor vessel downcomer is not generally limiting
Plausible: - if the candidate does not recognize that T_{hot} is not the most limiting temperature. The Rx vessel wall and the Rx vessel downcomer are essentially synonymous for the same region.

Level: RO Only

KA: WE 08EK1.1(3.5 / 3.8)

Lesson Plan Objective: TA-PTS SEQ 2, 13

Source: NRC; McGuire Exam 99, Ques_371

Level of knowledge: memory

References:

1. OP-CN-TA-PTS pages 7, 12-13, 20

Bank Question: 380**Answer: C**

1 Pt(s)

Which one of the following statements is a correct description of the capabilities of EMF-48 (*Reactor Coolant*) at 100% power?

- A. Detects beta flux from the NC system coolant. This prevents the detector falsely responding to N16 gamma radiation, which would mask a failed fuel event.
- B. Detects the N16 gamma flux from the NC system coolant, which is proportional to the amount of failed fuel cladding.
- C. Detects total gamma flux from NC system coolant after a one minute sample delay time to allow N16 gamma radiation to decay away.
- D. Detects total gamma flux from NC system coolant. The gamma source term from a clad failure would be much greater than the N16 gamma flux at power.

Distracter Analysis:

- A. **Incorrect:** - EMF-48 does not detect beta radiation
Plausible: - the detector could function if designed this way because N16 gamma would mask the failed fuel problems.
- B. **Incorrect:** - N16 gamma is proportional to reactor power level and does not correlate to failed cladding.
Plausible: - if the candidate was confused over the correlation between N16 gamma levels and power levels.
- C. **Correct answer**
- D. **Incorrect:** - The gamma flux from N16 is >> failed fuel at power
Plausible: - if the candidate did not know that N16 gamma was >> than failed fuel source term levels.

Level: RO&SRO

KA: APE 076AK2.01(2.6/3.0)

Lesson Plan Objective: none

Source: NRC McGuire Exam 1999 Ques_380

Level of knowledge: memory

References:

1. OP-CN-WE-EMF page 11

Bank Question: 387.1**Answer: B**

1 Pt(s)

Enclosure 1 to E-1 (Loss of Reactor or Secondary Coolant) provides foldout page actions to close NV-202B and NV-203A (NV PUMPS A&B RECIRC ISOL) when NC pressure is less than 1500 psig.

Which one of the following statements correctly describes the operator response and reason for this response when pressurizer pressure is 1495 psig?

- A. Notify the SRO of the need to close the valves to prevent NV pump runout at low pressures.
- B. Close the valves to prevent a reduction of full SI flow to the core.
- C. Close the valves to prevent overheating the NV pumps.
- D. Notify the SRO of the need to close the valves to prevent a reduction of full SI flow to the core.

Distracter Analysis:

- A. **Incorrect:** - pump runout is not a concern and the actions are automatic.
Plausible: if the candidate does not know that foldout actions are independent - pump runout can be a concern for situations where the pump discharge pressure is very low.
- B. **Correct answer** - maximizes flow into the core.
- C. **Incorrect:** - pump runout is not a concern.
Plausible: pump runout can be a concern for situations where the pump discharge pressure is very low, approximately 600 psig for NV pumps.
- D. **Incorrect:** - the actions are automatic.
Plausible: - if the candidate does not know that foldout actions are independent.

Level: RO&SRO

KA: G2.4.15 (3.0/3.5)

Lesson Plan Objective: EP-INTRO LPRO 12

Source: Mod McGuire Exam 1999 Ques_387

Level of knowledge: memory

References:

1. OP-CN-EP-INTRO page 8
2. E-1 Foldout page 2
3. OMP 1-7 page 20-21
4. Background Document E-1 page 30

Bank Question: 388**Answer: A**

1 Pt(s)

Unit 1 is responding to a LOCA in the auxiliary building. The operators have implemented ECA-1.2, (*LOCA Outside of Containment*). Step 2 guides the operators to attempt to find and isolate the leak. Step 2C requires the following sequence:

- 1) Verify following NI pump miniflow valves – OPEN
 - 1NI-115A (*NI Pump 1A Miniflow Isol*)
 - 1NI-144A (*NI Pump 1B Miniflow Isol*)
 - 1NI-147B (*NI Pump Miniflow Isol*)
- 2) Place the “PWR DISCON FOR 1NI-162A” in “ENABLE”
- 3) Close 1NI-162A (*NI To C- Legs Inj Hdr Isol*)

What is the correct reason for verifying the mini flow valves are open?

- A. **Protect the NI pumps from operating against shutoff head.**
- B. Isolation of a potential LOCA path to the FWST.
- C. Protect the NI pumps from runout conditions upon restart.
- D. Provide a diversion path to prevent high pressure water from over-pressurizing the ND system during leak isolation procedures.

Distracter Analysis:

- A. **Correct answer**
- B. **Incorrect:** - the mini flow valves will not isolate any potential path in the injection mode.
Plausible: - in ES-1.3 (and some other EOPs), the NI mini flow valves are closed to prevent pumps from recirculating radioactive water back to the FWST - right reason, wrong procedure
- C. **Incorrect:** - Opening mini flow valves will not protect against runout
Plausible: - if the candidate is confused over the difference between runout conditions and shutoff head conditions
- D. **Incorrect:** - this will not create a diversion path - it will align the NI recirc line to the FWST. The ND system is protected by check valves and in this case by the closed 1NI-162A.
Plausible: - the ND system has a design pressure of 600 psig and if NC system pressure was applied, it would rupture. Setting up a diversion path would be a reasonable thing to do. This alignment does not accomplish this goal.

Level: RO&SRO

KA: WE04EK2.1(3.5/3.9)

Lesson Plan Objective: EP-E2 SEQ 14

Source: NRC McGuire Exam 1999 Ques_388

Level of knowledge: memory

References:

1. OP-CN-EP-E2 pages 13-14
2. ECA-1.2 page 6
3. OP-CN-CN-NI pages 7-8, 18

Bank Question: 393**Answer: C**

1 Pt(s)

Unit 1 was in mode 3 with the shutdown banks fully withdrawn, preparing to conduct a reactor startup when source range channel N-31 failed. Given the following conditions and events:

- No reactor trip has occurred prior to this point
- AP/16 (*Malfunction of Nuclear Instrumentation System*) has been completed
- N-31 repairs have been made
- N-31 is being returned to service
- N-32 = 10^1 CPS
- Immediately upon taking the "level trip" switch to the "normal" position a reactor trip occurred

Which of the following operator errors would explain this event?

- A. The "Operation selector" switch was left in "level adj." position with level potentiometer set at a level of 10^6 CPS after retesting
- B. The "High-flux at shutdown" switch left in the "normal" position
- C. The instrument power fuse blew when the N-31 channel was reenergized.
- D. The source range detector instrument discriminator voltage was set too high.

Distracter Analysis:

- A. **Incorrect:** - the *operation selector* switch is taken out of the circuit when the *level trip* switch is taken to *normal*
Plausible: - if the candidate thinks that a test signal can be inserted with *level trip* switch in the *normal* position
- B. **Incorrect:** - no effect – this is a normal switch alignment - only blocks out high flux alarm at 10^5 CPS - trip is separate from level trip function
Plausible: - if the candidate does not understand that the *level trip* switch in *bypass* does not effect the high flux at shutdown trip – the high flux at shutdown switch will be in the blocked position under these circumstances.
- C. **Correct answer**
- D. **Incorrect:** - if discriminator voltage is too high, less neutrons will be passed, signal will be lower.

Plausible: - if the candidate does not understand how the pulse height discriminator circuit operates.

Level: RO&SRO

KA: APE 032AA.101(3.1/3.4)

Lesson Plan Objective: ENB LPRO 9

Source: NRC McGuire Exam 1999 Ques_393

Level of knowledge: comprehension

References:

1. OP-CN-IC-ENB page 5, 9-10, 26

Bank Question: 437.1**Answer: B**

1 Pt(s)

The operator is investigating a suspected ground on the negative leg of a 125VDC bus. The Battery to Ground Volt Meter Selector Switch is in the "NEG" position.

Which one of the following indications is correct for the existence of a substantial ground on the negative leg of the 125 VDC electrical system?

- A. **Battery ground negative leg light burns dimly
Battery to Ground Volt Meter reads bus voltage minus the ground voltage.**
- B. **Battery ground negative leg light burns brightly
Battery to Ground Volt Meter reads the ground voltage.**
- C. **Battery ground negative leg light burns dimly.
Battery to Ground Volt Meter reads the ground voltage.**
- D. **Battery ground negative leg light burns brightly
Battery to Ground Volt Meter reads bus voltage minus the ground voltage.**

Distracter Analysis:

- A. **Incorrect:** - a brightly burning lamp = grounded condition
Plausible: - believes dim light = ground
- B. **Correct:** - the negative leg light is brightly lit.
If a ground exists, the Volt Meter will indicate the amount of volts to ground when this switch is taken to the NEG (measures volts to ground on the negative leg)
- C. **Incorrect Answer:**
Plausible if candidate reverses the correct answer in his/her mind - a grounded condition often leads to a reduction in voltage and lamps glow dimly
- D. **Incorrect:**
Plausible: - candidate believes voltmeter reads bus voltage, less the ground.

Level: RO&SRO

KA: SYS 063A3.01 (2.7/3.1)

Lesson Plan Objective: EPL SEQ 15, 16

Source: Mod - McGuire Exam 1999 Ques_437

Level of knowledge: memory

References:

1. Lesson plan pages 16 and 17

Bank Question: 439**Answer: B**

1 Pt(s)

What automatic actions will occur if radioactive particulate levels exceed the 1EMF-35(L) (*Unit Vent PART HI RAD*) trip 2 alarm set points in the unit vent exhaust flow stream?

- A. Stops containment purge (VP) supply fans
- B. Stops unit-related unfiltered exhaust (VA) fans
- C. Stops spent fuel pool ventilation exhaust (VF) fans
- D. Stops containment annulus ventilation (VE) fans

Distracter Analysis:

- A. **Incorrect:** - does not stop VP supply fans
Plausible: - trip 2 alarm on EMF-39 (L) (containment gas monitor) causes this action
- B. **Correct answer** - 1EMF-35(L) monitors this exhaust stream
- C. **Incorrect:** - does not stop these fans – shifts VF to filter mode – VF exhaust fans continue to run but filter train is shifted into the exhaust line.
Plausible: - EMF-35 monitors exhaust from Spent Fuel Pool area
- D. **Incorrect:** - does not stop VE fans
Plausible: - monitors VE exhaust

Level: RO Only

KA: SYS 073A1.01(3.2/3.5)

Lesson Plan Objective: WL-EMF LPRO 2

Source: NRC McGuire Exam 1999 Ques_439

Level of knowledge: memory

References:

1. OP-CN-WL-EMF pages 9

Bank Question: 444.1**Answer: B**

1 Pt(s)

Which one of the following statements describes the operation of the Containment Annulus Ventilation System (VE) during a large break LOCA into containment?

- A. VE fans start in the exhaust mode at +3.0 psig in containment
VE fans stop running when annulus pressure reaches -1.5 in. H₂O
VE fans cycle on and off between -1.5 in H₂O and +3 psig
- B. VE fans start in the exhaust mode at +1.2 psig in containment
VE shifts into recirc mode when annulus pressure reaches -1.5 in. H₂O
VE modulates dampers between recirc and exhaust modes to maintain -1.5 in. H₂O in the annulus
- C. VE fans start on an EMF-38, 39, 40 trip 2 (containment monitors)
VE fans stop running when annulus pressure reaches -1.5 in. H₂O
VE fans cycle on and off between -1.5 in Hg and +3.0 psig
- D. VE fans start on an EMF-38, 39, 40 trip 2 (containment monitors)
VE shifts into recirc mode when annulus pressure reaches -1.5 in. H₂O
VE modulates dampers between recirc and exhaust modes to maintain -1.5 in. H₂O in the annulus

Distracter Analysis:

- A. **Incorrect:** - VE Fans are not designed to cycle on and off to maintain annulus pressure. They would not recirc through the filter trains if they tripped off to maintain pressure and Iodine removal would not be as effective
Plausible: - tripping at 3 psig would be consistent with the initiation point. This is a plausible safety trip to ensure annulus pressure is not dropped too low
- B. **Correct answer**
- C. **Incorrect:** - EMF monitors do not start VE fans; VE Fans are not designed to cycle on and off to maintain annulus
Plausible: - VP and VQ systems are controlled by EMF 38, 39, 40
- D. **Incorrect:** - EMF monitors do not start VE fans
Plausible: - EMF 38, 39, 40, controls VP and VQ systems

Level: RO&SRO

KA: SYS 027A4.03(3.3/3.2)

Lesson Plan Objective: VE LPRO 9

Source: NRC McGuire Exam 1999 Ques_444

Level of knowledge: memory

References:

1. OP-CN-CNT-VE pages 8-9

Bank Question: 453.1**Answer: C**

1 Pt(s)

Unit 1 was operating at 70% power when a loss of condenser vacuum occurred. Given the following events and conditions:

- Reactor power, 68%
- Turbine load, 66% based on turbine impulse pressure
- Turbine exhaust hood temperature is 225 °F
- The operators are rapidly decreasing turbine load
- The operator reports that condenser vacuum is 23.2 in Hg and is continuing to decrease.

Which one of the following statements correctly describes the required action(s)?

- A. **Immediately manually trip the reactor.**
- B. **Immediately manually trip the reactor and then manually trip the turbine in anticipation of reaching the trip setpoint.**
- C. **Continue to monitor condenser vacuum, if vacuum decreases to 21.8 inches Hg, manually trip turbine.**
- D. **Continue to monitor condenser vacuum, if vacuum decreases to 21.8 inches Hg, first manually trip the reactor then manually trip the turbine.**

Distracter Analysis:

Turbine Trip Criteria: IF condenser vacuum decreases to less than 21.8 in. Hg, THEN:

- a. IF reactor power is greater than or equal to 69%, THEN manually trip reactor.
- b. Ensure turbine - TRIPPED.
- c. IF reactor is tripped, THEN GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection). –
- d. REFER TO AP/1/A/5500/02 (Turbine Generator Trip).

IF turbine exhaust hood temperature is greater than 2250 F AND turbine load is less than 60% ~based on impulse pressure equal to 370 PSIG), THEN:

- a. Ensure turbine - TRIPPED.

- A. **Incorrect:** Tripping the reactor is not a required action below 69%
Plausible: If unfamiliar with the 69% reactor trip criteria.
- B. **Incorrect:** Do not trip the reactor before tripping the turbine

Plausible: tripping the turbine is not **required** until the set point is reached – but is **allowed** by OMP 1-8 - if the candidate does not recognize that power is below 69%

C. Correct:

D. Incorrect: should not immediately trip the reactor.

Plausible: If the candidate does not recognize that power is below 69%

Level: RO&SRO

KA: APE 051 AA2.02 (3.9/4.1)

Lesson Plan Objective: ZM SEQ 17

Source: mod Catawba Exam 1999 Ques_453

Level of knowledge: memory

References:

1. AP/1/5500/23 Loss of Condenser Vacuum
2. OMP 1-8 page 3

Bank Question: 480.2**Answer: D**

1 Pt(s)

Unit 1 is operating at 100% power. Given the following events and conditions:

- Isotopic analysis of S/G samples indicated the following primary to secondary leak rates:
 - S/G A = 0.097 gpm
 - S/G B = 0.11 gpm
 - S/G C = 0.08 gpm
 - S/G D = 0.103 gpm

Which one of the following statements correctly describes the status of Technical Specification LCOs and the classification of the leakage?

REFERENCES PROVIDED - Tech Spec 3.4.13

- A. No Tech Spec LCOs are exceeded - classified as primary to secondary leakage
- B. Exceeds a Tech Spec LCO – classified as NCS pressure boundary leakage
- C. Exceeds a Tech Spec LCO – classified as NCS unidentified leakage
- D. Exceeds a Tech Spec LCO – classified as NCS identified leakage

Distracter Analysis:

Leakage from the B S/G = $0.11 \text{ gpm} \times 60 \text{ min/hr} \times 24 \text{ hr/day} = 158.4 \text{ gpd}$

Combined leakage from all 4 S/Gs

S/G A = $0.097 \text{ gpm} \times 60 \text{ min/hr} \times 24 \text{ hr/day} = 139.7 \text{ gpd}$

S/G B = $0.11 \text{ gpm} \times 60 \text{ min/hr} \times 24 \text{ hr/day} = 158.4 \text{ gpd}$

S/G C = $0.08 \text{ gpm} \times 60 \text{ min/hr} \times 24 \text{ hr/day} = 115.2 \text{ gpd}$

S/G D = $0.103 \text{ gpm} \times 60 \text{ hr/min} \times 24 \text{ hr/day} = 148.3 \text{ gpd}$

561.6 gpd total leakage

Each S/G must be $< 150 \text{ gpd}$ and (Tech Spec 3.4.13)

Combined leakage through all 4 S/Gs $< 576 \text{ gpd}$ (Tech Spec 3.4.13)

RCS leakage through a steam generator into the secondary system is considered to be identified leakage per Tech Spec definition on "Leakage"

- A. **Incorrect:** Exceeds identified leakage

- Plausible:** if candidate miscalculates S/G leakage
- B. Incorrect:** steam generator leakage is not pressure boundary leakage
Plausible: The definition of pressure boundary leakage is “LEAKAGE except (SG LEAKAGE) through a nonisolable fault in an RCS component body, pipe wall, or vessel wall”. This description would apply to the SG leakage except for the specific exception.
- C. Incorrect:** SG leakage is identified leakage
Plausible: if the candidate does not know the tech spec definitions for the various leakages from memory
- D. Correct answer:** SG leakage = identified leakage

Level: RO Only

KA: SYS 002A2.01 (4.3 / 4.6)

Lesson Plan Objective: PS-NC SEQ 10

Source: Mod McGuire Exam 1999 Ques_480

Level of knowledge: comprehension

References:

1. Tech Spec 3.4.13 - PROVIDED

Bank Question: 503.1**Answer: A**

1 Pt(s)

Unit 2 was operating at 80% power. Given the following events and conditions:

- Turbine impulse pressure instrument Channel I failed low
- Operators perform all actions in AP-15 (*Rod Control Malfunctions*) Case II (*Continuous Rod Movement*).
- Tave is maintained by adjusting turbine load

Which one of the following statements correctly describes the consequences of the Reactor Operator returning the CRD Bank Select switch to the Automatic position 10 minutes later?

- A. Rods will move in because Tref is less than Tave.
- B. Rods will move in because impulse pressure is less than nuclear power.
- C. Rods will not move in because low impulse pressure blocks rod movement.
- D. Rods will not move in because the impulse pressure input to power mismatch is not changing.

Distracter Analysis:

- A. **Correct:**
- B. **Incorrect:** The derivative of the Imp Press change has timed out.
Plausible: based on misunderstanding the derivative function of the power mismatch circuit.
- C. **Incorrect:** C-5 only blocks rod withdrawal.
Plausible: based on misunderstanding the C-5 rod stop function.
- D. **Incorrect:** The temperature mismatch function has an error signal at this time.
Plausible: If the candidate does not recognize the cumulative nature of both error signals.

Level: RO&SRO

KA: APE 001G2.1.32(3.4/3.8)

Lesson Plan Objective: IC-IRX LPRO 5

Source: Mod Catawba exam 1999

Level of knowledge: analysis

References:

1. OP-CN-IC-IRX pages 9-10, 13-15
2. OP-CN-IC-IPX page 20

Bank Question: 518.1**Answer: D**

1 Pt(s)

Why do some of the phase A containment isolation valves located in lower containment for the KC system have a separate manual reset on 1MC7?

- A. The valves use air operators, which are not subject to spurious repositioning should they be submerged during containment flooding therefore they may be reset and repositioned if required by procedure.
- B. The valves are all above the containment flooding level and are not subject to spurious repositioning during containment flooding therefore they may be reset and repositioned if required by procedure.
- C. A separate reset is required because a containment phase A signal removes power from these valves causing them to fail closed to prevent them from spuriously repositioning due to containment flooding.
- D. A separate reset is required because a containment phase A signal disables the open circuits for these valves to prevent them from spuriously repositioning due to containment flooding.

Distracter Analysis:

- A. **Incorrect:** Valves have MOVs not AOVs
Plausible: Some plants have mainly AOVs in containment for this reason
- B. **Incorrect:** Valves are located below flooding plane
Plausible: This is one way of preventing the problem
- C. **Incorrect:** Valves do not have closing power removed or this would prevent actuation in response to a valid ESF signal
Plausible: This would prevent the valves from spuriously opening. Some ECCS valves are protected this way.
- D. **Correct:**

Level: RO&SRO

KA: WE15 EK2.1 (2.8/2.9)

Lesson Plan Objective: CNT LPRO 13

Source: mod Catawba Exam 1999 Ques_518

Level of knowledge: memory

References:

1. OP-CN-CNT-CNT page 16
2. OP-CN-EP-FRZ pages 5, 7

Bank Question: 547**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power when main condenser vacuum dropped from 25 inches of Hg to 23 inches of Hg.

Which one of the following statements correctly describes the cause of this problem?

- A. Condenser water boxes are full
- B. RC system flow has increased
- C. CM flow to CSAE inter-cooler has been obstructed
- D. Condensate depression has increased.

Distracter Analysis:

- A. **Incorrect:** Will not reduce condenser vacuum - full is a normal condition for the water boxes.
Plausible: If the ZP water boxes are NOT full, air can accumulate in the upper tubes and interfere with the heat transfer across the tubes
- B. **Incorrect:** Increased RC flow will improve vacuum
Plausible: Decreased RC flow will degrade vacuum
- C. **Correct answer** - reduces effectiveness of steam jets
- D. **Incorrect:** - if condensate depression increases, the condensate temperature becomes lower than saturation temperature for the condenser pressure - vacuum would increase
Plausible: Condenser thermodynamic efficiency decreases

Level: RO&SRO

KA: SYS 055K3.01 (2.5 / 2.7)

Lesson Plan Objective: MT-ZM SEQ 9, 14

Source: NRC Catawba Exam 99 Ques_547

Level of knowledge: comprehension

References:

1. OP-CN-MT-ZM pages 5-8

Bank Question: 556**Answer: D**

- 1 Pt(s) Unit 2 is operating at 100% power when containment parameters vary as shown below:

| Containment | 1200 | 1500 | 1800 | 2100 | 2400 |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|
| Temperature (°F) | | | | | |
| Upper | 85 | 86 | 87 | 86 | 85 |
| Lower | 105 | 107 | 106 | 105 | 106 |
| Humidity (% rel) | | | | | |
| Upper | 25 | 26 | 25 | 26 | 25 |
| Lower | 15 | 15 | 18 | 14 | 15 |
| Containment pressure (psig) | 0.11 | 0.13 | 0.15 | 0.18 | 0.19 |
| Aux. Bldg. pressure (in Hg) | 29.1 | 29.2 | 29.3 | 29.4 | 29.5 |

Which one of the following statements correctly describes the cause of the trends in the containment atmospheric parameters?

- A. Normal external heating from the sun.
- B. Auxiliary Building pressure has increased.
- C. A packing leak on the letdown backpressure control valve.
- D. An air leak on the AOV for PORV 2NC-36.

Distracter Analysis:

- A. **Incorrect:** pressure not following temperature
Plausible: temperature increases then decreases
- B. **Incorrect:** An increase in Auxiliary Building pressure would cause a drop in containment pressure as the containment pressure instrument is referenced to external Aux. Bldg. pressure
Plausible: pressure is increasing - if the candidate reverses the effect of barometric pressure on containment pressure
- C. **Incorrect:** temperature and humidity are not increasing
Plausible: pressure is increasing but not following temperature - the difference between upper and lower containment is normal.
- D. **Correct answer:** cont. pressure increasing without other cont. parameters increasing

Level: RO&SRO

KA: G2.1.7 (3.7/4.4)

Lesson Plan Objective: VQ LPRO 2

Source: NRC Catawba 1999 Ques_556

Level of knowledge: analysis

References:

1. OP-CN-CNT-VQ page 6

Bank Question: 580**Answer: D**

1 Pt(s)

Which one of the following statements correctly describes the biological hazard of Tritium in the liquid RadWaste system?

- A. Tritium emits a low-energy gamma that can cause whole body dose as well as an internal hazard with a 12-year biological half-life if ingested.
- B. Tritium emits a low-energy alpha that is an internal hazard with a 12-day biological half-life if ingested.
- C. Tritium emits a low-energy beta that can cause both a skin dose as well as an internal hazard with a 12-day biological half-life if ingested.
- D. Tritium emits a low-energy beta that is an internal hazard with a 12-day biological half-life if ingested.

Distracter Analysis:

- A. **Incorrect:** emits low energy beta only, not gamma - radiological half life is 12 years
Plausible: Tritium is an internal hazard with a 12-day biological half-life
- B. **Incorrect:** emits low energy beta only - radiological half life is 12 years
Plausible: Tritium is an internal hazard with a 12-day biological half-life
- C. **Incorrect:** It is not hazardous to the skin as the beta energy is too low
Plausible: Tritium is an internal hazard with a 12-day biological half-life
- D. **Correct answer**

Level: RO Only

KA: SYS 068K5.04 (3.2/3.5)

Lesson Plan Objective: WL LPRO 13

Source: NRC Catawba Exam 1999 Ques_580

Level of knowledge: memory

References:

1. OP-CN-CH-PC pages 11-13

Bank Question: 596.1**Answer: B**

1 Pt(s) Units 1 and 2 were operating at 100% power when a fire broke out in the back of the control room.

Given the following conditions:

- The fire has not yet affected or degraded any control systems
- Heavy black smoke is throughout the control room
- The SRO implements AP/17 (*Loss of Control Room*)

Which one of the following statements correctly describes the operator response to this event?

- A. Swap control to the auxiliary shutdown panels, then trip both unit reactors and turbines, and evacuate the control room.
- B. Dispatch RO's to the auxiliary shutdown panels, trip both unit reactors, turbines and feed pumps, then evacuate the control room.
- C. Evacuate the control room; trip both unit turbines and reactors on the way to the auxiliary shutdown panel.
- D. Immediately trip both unit reactors and turbines and evacuate the control room to the standby shutdown facility.

Distracter Analysis:

- A. **Incorrect:** control is not swapped until after the CR is evacuated.
Plausible: this is a more controlled approach to CR evacuation?
- B. **Correct:**
- C. **Incorrect:** Reactor and turbines tripped from the CR.
Plausible: This is a reasonable approach assuming operators can no longer function in the CR.
- D. **Incorrect:** Evacuate to the ASP not the SSF
Plausible: if the candidate confuses the SSF with ASP.

Level: RO&SRO

KA: APE 068AK3.12(4.1 / 4.5)

Lesson Plan Objective: CP-RSS SEQ 9

Source: Mod McGuire Exam 2000 Ques_596

Level of knowledge: memory

References:

1. OP-CN-CP-RSS page 13
2. AP/1/A/5500/17 pages 2-3

Bank Question: 647.1**Answer: D**

1 Pt(s) Unit 1 was operating at 100% power. The following trends were noted:

| | <u>0200</u> | <u>0205</u> | <u>0210</u> |
|--|-------------|-------------|-------------|
| 1A-1D NCP#1 seal outlet temp (°F) | 100 | 130 | 145 |
| 1A-1D NCP #1 seal leakoff flow (gpm) | 3.0 | 3.5 | 4.0 |
| 1A-1D NCP #1 seal d/p (psid) | >400 | >400 | >400 |
| 1A-1D NCP seal water inj filter d/p (psid) | 10.0 | 2.0 | 1.0 |
| 1A-1D NCP seal injection (gpm) | 8.0 | 1.5 | <1.0 |
| VCT Level | 50% | 49% | 50% |
| Pressurizer level | 55% | 56% | 55% |
| Charging Flow (gpm) | 87 | 88 | 87 |
| Letdown Flow (gpm) | 75 | 75 | 75 |

Which one of the following conditions would cause these parameter trends?

- A. #1 seal injection filter clogged
- B. 1NV-294, (NV PMPS A&B DISCH FLOW CTRL), failed closed
- C. The VCT depressurized
- D. 1NV-309, (SEAL WATER INJECTION FLOW), failed open

Distracter Analysis: Seal injection filter d/p and seal injection flow are decreasing which indicates loss of seal injection. Seal leakoff is increasing as indicated by leakoff flow and leakoff temp increasing. Pressurizer level stays about the same as seal injection flow is diverted into the NC system – total charging flow remains stable as corrected by pressurizer level control.

- A. **Incorrect:** seal injection filter d/p would increase
Plausible: most other parameters would trend as indicated except seal filter d/p would increase.
- B. **Incorrect:** closing 1NV-294 would stop charging and result in opposite trends in PZR & VCT
Plausible: if the candidate focuses only on NCP seal parameters.
- C. **Incorrect:** VCT depressurization would result in increased seal injection flow.
Plausible: if the candidate focuses only on seal leakoff flow and temperature.
- D. **Correct Answer:** seal injection flow and d/p decreasing

Level: RO&SRO

KA: APE 022AA1.09(3.2/3.3)

Lesson Plan Objective: NCP LPRO 3; NV LPRO 6, 7

Source: Mod McGuire Exam 2000 Ques_647

Level of knowledge: analysis

References:

1. OP-CN-PS-NV pages 26-27, 32- 34, 59, 61
2. OP-CN-PS-NCP pages 13, 22

Bank Question: 661.1**Answer: B**

1 Pt(s)

Units 1 and 2 are at 100% power. Given the following conditions:

- Unit 2 has experienced 2 fuel pin failures.
- The mechanical seal has failed on NI pump 2B.
- The NI-2B pump room general area is 400 mrem/hr.
- In order to reach the NI-2B pump room the worker must transit for 2 minutes through a 6 Rem/hr high radiation area and return through the same area.
- The worker has an accumulated annual dose of 400 mrem, respectively.

What is the maximum allowable time that the worker can participate in the seal repair on NI Pump 2B without exceeding the exclusion flag exposure limit for external exposure?

- A. No longer than 2 hours
- B. No longer than 2.5 hours
- C. No longer than 3 hours
- D. No longer than 3.5 hours

Distracter Analysis:

The candidate should determine that the exclusion flag exposure limit is 90% of 2000 mrem admin limit = 1800 mrem

Transient exposure is 400 mrem (6000mrem/hr x 4/60hr). (During transit to and from the job).

$$400 \text{ mrem} + 400 \text{ mrem} = 800 \text{ mrem}$$

$$1800 \text{ mrem} - 800 \text{ mrem} = 1000 \text{ mrem allowable before reaching exclusion flag exposure admin limit}$$

$$1000 \text{ mrem} / 400 \text{ mrem/hr} = 2.5 \text{ hours}$$

- A. **Incorrect:** The answer is 2.5 hours.
Plausible: based on using alert flag limit (1600) versus exclude flag.
- B. **Correct:**
- C. **Incorrect:** The answer is 2.5 hours.
Plausible: based on calculating a one-way transit dose.
- D. **Incorrect:** The answer is 2.5 hours.
Plausible: based on using admin limit (2000) and a one-way transit dose.

Level: RO&SRO

KA: G2.3.4 (2.5/3.1)

Lesson Plan Objective: HP LPRO 2, 11

Source: Mod McGuire Exam 2000 Ques_661

Level of knowledge: comprehension

References:

1. NSD 507.6 page 10
2. GET Rad Worker Training pages 33, 34, 45

Bank Question: 671.1**Answer: D**

1 Pt(s)

Unit 1 was releasing the contents of a waste gas decay tank in accordance with an approved release permit. 1EMF-50(L) (*Waste Gas Disch*) failed high during the release, and will not be repaired for 3 days.

Which one of the following actions (if any) can be taken to release the waste gas decay tank today?

- A. The release cannot be restarted today. No release can be started until the repairs on 1EMF-50(L) (*Waste Gas Disch*) are completed.
- B. Recalculate the trip set points using 1EMF-50(H) (*Waste Gas Disch*) as the release path monitor, then restart the release after a new GWR form has been approved.
- C. Continue the release using 1EMF-36(L) (*Unit Vent Gas*) as the backup release path monitor.
- D. Recalculate the trip set points using 1EMF-36(L) (*Unit Vent Gas*) as the release path monitor, then restart the release after a new GWR form has been approved.

Distracter Analysis:

- A. **Incorrect:** not required to use 1EMF-50(L) as the only qualified release path monitor
Plausible: if the candidate does not recognize that 1EMF-36(L) can be used to monitor the release path
- B. **Incorrect:** 1EMF-50(H) does not automatically trip WG-160 and cannot be used as a waste gas release path monitor
Plausible: if the candidate thinks that substituting the high range of 1EMF-50(L) provides the same automatic protection
- C. **Incorrect:** the release would be terminated when 1EMF-50(L) tripped
Plausible: if the candidate did not recognize that 1EMF-50(L) provided an automatic trip of WG-160 to terminate the release.
- D. **Correct answer**

Level: RO&SRO

KA: G2.3.11 (2.7/3.2)

Lesson Plan Objective: WE-WG LPRO 4

Source: NRC McGuire Exam 2000 Ques_671

Level of knowledge: memory

References:

1. OP-CN-WE-EMF pages 9, 11
2. OP-CN-WE-WG page 9

Bank Question: 714**Answer: C**

1 Pt(s)

Unit 1 was in mode 2 preparing for a plant startup when an electrical transient occurred. Given the following events and conditions:

- Steam dumps are in steam pressure control
- Reactor power is 2%
- Tave decreases
- Rods have sequenced normally during the startup.
- Bank D group step counter indicates 200 steps
- DRPI indication for Bank D rods reads 198 steps
- Rod bottom light H-8 is illuminated
- DRPI indication for rod H-8 reads 0 steps
- DRPI indication for rod D-2 reads 192 steps

Which one of the following actions best describes the correct action that should be taken by the crew and the reason for this action?

- A. **Trip the plant because a dropped rod below mode one is not an analyzed condition.**
- B. **Trip the plant because greater than 2 rods are misaligned.**
- C. **Ensure CRD BANK SELECT switch is selected to MANUAL to prevent rod motion.**
- D. **Ensure that CRD BANK SELECT switch is in AUTOMATIC to allow Tave to recover to Tref.**

Distracter Analysis:

- A. **Incorrect:** Not required to trip the reactor unless > 2 rods are dropped or misaligned – one dropped rod is an analyzed condition
Plausible: If the candidate thinks that the AP14 case II immediate actions for a single dropped rod only applies to mode 1 conditions
- B. **Incorrect:** Rod H-8 is not
Plausible: Plant trip is the preferred method of shutting the reactor and ensuring the reactor is subcritical.
- C. **Correct:** Immediate action per AP/14 step 2
- D. **Incorrect:** Switch must be in manual
Plausible: AP/14 step 3 requires the operator to match Tave to Tref

Level: RO&SRO

KA: 001G4.22(3.0/4.0)

Lesson Plan Objective: IRE SEQ 20

Source: New

Level of knowledge: memory

References:

1. AP/14 Case II page 5

Bank Question: 715**Answer: D**

1 Pt(s)

Unit 1 was operating at 30% power. Given the following events and conditions:

- “A” NC pump trips
- No operator action has been taken
- All safety systems operate as designed

While the plant is still at power, which one of the following parameters will initially INCREASE?

- A. “A” steam generator level.
- B. Loop cold leg temperatures in the B, C and D loops.
- C. Steam generator pressures in the B, C and D loops.
- D. Steam generator steam flows in the B, C and D loops.

Distracter Analysis: The reactor will not trip below P-8.

- A. **Incorrect:** A S/G level will decrease
Plausible: when the pump trips, steam flow in the steam generator will decrease, level will “shrink” – the candidate may reverse this cause and effect.
- B. **Incorrect:** Unaffected Tcolds will decrease
Plausible: Steam flow in the unaffected loops will increase, heat removal from the RCS will increase, and cold leg temperature will decrease – the candidate may reverse this cause and effect or become confused with the reverse flow in the A loop
- C. **Incorrect:** Unaffected S/G pressures will decrease
Plausible: Unaffected steam generators will increase steaming, pressure will decrease – the candidate may reverse this cause and effect.
- D. **Correct:** Steam flow in the affected steam generator will decrease, load does not change, the remaining steam generators will increase their steam rates, steam flow in those steam generators will increase.

Level: RO&SRO

KA: SYS003K5.04(3.2/3.5)

Lesson Plan Objective: none

Source: New

Level of knowledge: analysis

References:

1. OP-CN- THF-FF page 15
2. OP-CN-CF-IFE page 6

Bank Question: 716**Answer: A**

1 Pt(s)

Unit 1 is responding to a large break LOCA inside containment. Given the following condition:

- The "*C-Leg Recirc FWST To CONT SUMP SWAP ENABLE TRN A*" light is lit on MC-11.

This light will light when swapover is not defeated and which one of the following events occurs?

- A. **Safety Injection.**
- B. **FWST level reaches the swapover setpoint.**
- C. **Safety Injection occurs and FWST level reaches the swapover setpoint.**
- D. **1 NI-185A (*ND PUMP 1A CONT SUMP SUCT*) opens.**

Distracter Analysis:

- A. **Correct:** The light is lit IF Safety Injection has occurred and the DEFEAT pushbutton has not been depressed
- B. **Incorrect:** FWST level does not input into the logic for the light
Plausible: FWST level does input into the logic for opening the sump isolation valves.
- C. **Incorrect:** Does not indicate that FWST level has reached the swapover setpoint
Plausible: Both of these conditions must exist to open the sump isolation valves.
- D. **Incorrect:** The valves open when SI has occurred, (even if reset) and FWST reaches 37%, they are not part of the light.
Plausible: If the candidate confuses the enable feature with the actuation.

Level: RO&SRO

KA: 013A3.02(4.1/4.2)

Lesson Plan Objective: ISE SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-CN-ECCS-ISE page 25

Bank Question: 717**Answer: C**

1 Pt(s)

Which of the following describes the expected response of AFD over core life? Assume all rods out (ARO) conditions are maintained throughout core life.

- A. Becomes more negative throughout core life.
- B. Remains relatively unchanged throughout core life.
- C. Initially moves more negative, becomes less negative over the remainder of core life.
- D. Initially moves less negative, becomes more negative over the remainder of core life.

Distracter Analysis:

- A. **Incorrect:** becomes less negative after first month
Plausible: Operator fails to understand the effect over core life of fuel burnup
- B. **Incorrect:** changes substantially over core life
Plausible: operator feels that the competing effects of boron, MTC and burnup offset each other to lead to no net effect.
- C. **Correct:** Boron depletion and MTC becoming negative will push flux to the bottom of the core early in core life. After that, because some fuel is already depleted in the bottom of the core, flux will tend to shift to the top and AFD will become less negative.
- D. **Incorrect:** opposite to the actual conditions
Plausible: Operator confuses the effect of MTC on AFD.

Level: RO Only

KA: SYS 015A1.06(2.5/2.9)

Lesson Plan Objective: PD Obj 9

Source: Mod PD-18-D

Level of knowledge: memory

References:

1. OP-CN-CTH-PD pages 14-15

Bank Question: 718**Answer: B**

1 Pt(s) Unit 2 is conducting a plant shutdown from 100% power. Given the following events and conditions:

- Reactor power is 6%
- All manual actions have been taken as required in the procedures
- Intermediate Range channel N-36 fails HIGH.

Which of the following statements correctly describes how this failure affects the reactor shutdown and subsequent operation of the Nuclear Instrumentation System?

- A. The reactor will trip; the source range detectors will reenergize when N-35 decreases to the proper setpoint.
- B. The reactor will trip; the source range detectors will have to be manually reenergized.
- C. The reactor will not trip; the source ranges will reenergize when N-35 decreases to the proper setpoint.
- D. The reactor will not trip; the source ranges will have to be manually reenergized.

Distracter Analysis:

- A. **Incorrect:** The source range instruments will not automatically reenergize
Plausible: If the operator believes the remaining IR energizes the Source Ranges, but knows the reactor trips.
- B. **Correct:** The IR trip will occur when either IR channel increases to > 25% equivalent. However this trip is blocked manually when P-10 is satisfied. Since reactor power is given as 6%, when N-36 fails high, the IR high flux trip will occur.
The Source Range instruments will automatically reenergize when:
 - 1. P-10 is not satisfied, 3/4 NIS PR < 10% and
 - 2. P-6, both IR < 10^{-10} ampsOtherwise they will need to be MANUALLY reenergized. With a high failure of IR N-36, they will not automatically reenergize.
- C. **Incorrect:** The reactor will trip and the source range instruments will not automatically reenergize
Plausible: Operator believes the IR trip is blocked and only one IR is necessary to energize the SR

- D.** **Incorrect:** The reactor will trip and the source range instruments will not automatically reenergize
 Plausible: Operator believes the IR trip is blocked but knows both IR are necessary to energize the SR.

Level: RO&SRO

KA: SYS 015KG2.2(4.0/3.5)

Lesson Plan Objective: ENB SEQ 9

Source: New

Level of knowledge: analysis

References:

1. OP-CN-IC-ENB page 10, 13

Bank Question: 720**Answer: C**

1 Pt(s)

Unit 2 was operating at 100% power. Given the following events and conditions:

- The transmitter for channel I of Containment pressure has failed.
- The appropriate bistables have been tripped.
- Subsequently, the vital 120VAC power supply for instrument bus channel IV, (ERPD) fails
- All instruments powered from the bus are de-energized.

Which one of the following correctly describes the status of the containment spray system?

- A. Bistable for channel IV has tripped; containment spray actuated when power was lost.**
- B. Bistable for channel IV has tripped; containment spray will actuate if containment pressure exceeds 0.4 psig.**
- C. Bistable for channel IV has not tripped; containment spray will actuate if containment pressure exceeds 3.0 psig.**
- D. Bistable for channel IV has not tripped; containment spray auto actuation is prevented from occurring.**

Distracter Analysis:

Containment Spray actuation is normally 2 of 4 channel coincidence. One channel was tripped when it failed earlier making the coincidence 1/3. The loss of power to the second channel does not trip a second bistable because they are energize-to-actuate. Of the two remaining channels, one tripping will result in auto actuation at the setpoint of 1 psig.

- A. Incorrect:** The bistable for channel IV has not tripped since the bistables are energize-to-actuate
Plausible: If the candidate thinks that the bistables are tripped when they are deenergized – like most other protection bistables – and forgets about the CCPS enable signal.
- B. Incorrect:** Bistables are energize-to-actuate.
Plausible: If the candidate reverses the energize-to-actuate logic, the CCPS enables containment spray actuation at 0.4 psig.
- C. Correct:** One bistable is tripped; only one more needs to trip above the 0.4 psig CCPS interlock – trips at 3.0 psig in containment.

- D.** **Incorrect:** The loss of channel IV does not preclude containment spray actuation.
 Plausible: One bistable is tripped only one additional channel needs to trip.

Level: RO&SRO

KA: SYS 022 A3.01 (4.1/4.3)

Lesson Plan Objective: ISE Obj 4

Source: New

Level of knowledge: analysis

References:

1. OP-CN-ECCS-ISE pages 10 and 20

Bank Question: 721**Answer: C**

1 Pt(s)

Unit 1 was shutdown in mode 5 following refueling operations preparing to commence a plant heat up to mode 4. Given the following events and conditions:

- Alarm 1AD-13 B/7 (ICE COND ACCESS DOOR OPEN) annunciates
- Containment divider barrier integrity has been established

Which one of the following conditions could cause this alarm?

- A. **Malfunction of the containment air return system.**
- B. **Malfunction of the containment pressure control system.**
- C. **The door's inflatable rubber boot develops a leak.**
- D. **Increasing containment pressure.**

Distracter Analysis: containment divider barrier integrity would require that the NF access doors be closed and the seal inflated.

- A. **Incorrect:** would not effect the access doors.
Plausible: this is a cause for ice condenser lower inlet doors to open.
- B. **Incorrect:** would not effect the access doors
Plausible: this is a cause for ice condenser lower inlet doors to open.
- C. **Correct:** For the door to indicate closed, it must be latched and the inflatable rubber boot must be inflated.
- D. **Incorrect:** containment pressure would not cause the access door to open
Plausible: increasing containment pressure causes other ice condenser doors to open if a D/P develops between upper and lower containment.

Level: RO Only

KA: SYS 025 K6.01 (3.4/3.6)

Lesson Plan Objective: none

Source: New

Level of knowledge: comprehension

References:

1. OP/1/B/6100/010N B/7
2. NF lesson plan page 10
3. Tech Spec 3.6.14 page 1-3
4. Tech Spec 3.6.14 bases page 1

Bank Question: 722**Answer: B**

1 Pt(s)

Unit 2 is operating at 100% power. Given the following events and conditions:

- A turbine control valve closes
- Reactor power drops to 65%.

What action should the crew take to prevent possibly deadheading the condensate booster pumps?

- A. Start the standby hotwell pump.**
- B. Stop the "C" heater drain tank pumps.**
- C. Open the "C" heaters bypass valve.**
- D. Ensure 2CM-83 (*GEN LOAD REJECT BYPASS*) is modulating to maintain 150 psig.**

Distracter Analysis:

An engineering evaluation of CNS Unit 1 and 2 reactor trips showed that the Heater Drain Tank pumps develop sufficient discharge pressure to deadhead the condensate system. This phenomenon lasts until the drain flow to the tanks decreases and level control closes places the pumps in recirculation. This was observed to last up to 2.5 minutes. (PIP 98-1726).

K/A match justification:

The condensate system consists of 3 (50% capacity each) Condensate Hotwell Pumps taking a suction from the Hotwell and delivering the water through the Polishing Demineralizers, Condensate Air Ejectors, Gland Steam condenser, and "G" and "F" low pressure Heaters to the suction of the 3 (50% capacity each) Condensate Booster Pumps. The Condensate Booster Pumps deliver water through the "E", "D" & "C" intermediate pressure Heaters to the suction of the Main Feedwater Pumps. If flow out of the booster pumps is low for 20 seconds, they will trip. Therefore, to prevent a loss of condensate flow and potential main feed pump trip, when power is less than 70%, the heater drain pumps are tripped.

The premise of the question is to ask the operators what action they take when power is below 65% to prevent essentially a loss of condensate flow to the feed pumps.

Therefore, this question fits with the K/A SYS 056 A2.04 (2.6/2.8*) – “The ability to predict and monitor changes in parameters (to prevent exceeding design limits) associated with operating the Condensate System controls including – loss of condensate pumps.”

- A. **Incorrect:** This action while possibly appropriate does not address the deadheading issue.
Plausible: This will change the condensate flow and the candidate may think that this will prevent deadheading.
- B. **Correct:** To avoid the problem of deadheading, heater drain tank pumps are shutdown by procedure anytime the unit operates below 70% power.
- C. **Incorrect:** Opening the heater bypass valve would not prevent deadheading.
Plausible: This action would be taken if there was a problem with the heater, it does not address deadheading the condensate system.
- D. **Incorrect:** This has no effect on deadheading the condensate system
Plausible: This was the correct answer to a previous NRC question on load rejection.

Level: RO&SRO

KA: SYS 056A2.04(2.6/2.8)

Lesson Plan Objective: CM Obj 5

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-CF-CM page 14

Bank Question: 723**Answer: C**

1 Pt(s)

Unit 2 was operating at 45% power. Given the following events and conditions:

- Problems with feedwater control result in overfeeding all steam generators
- S/G NR levels increased to 80%
- No operator action has been taken.

Which one of the following statements correctly describes the automatic actions (if any) that should have already occurred?

- A. No automatic actions should have occurred at this time.**
- B. Turbine trip, feedwater isolation.**
- C. Turbine trip, feedwater isolation, CF pumps tripped.**
- D. Reactor trip, turbine trip, feedwater isolation, CF pumps tripped.**

Distracter Analysis:

- A. Incorrect:** turbine tripped, feedwater isolated and CF pumps tripped
Plausible: possible if operator believes P14 setpoint is 84% (unit 1 setpoint is 84% - unit 2 setpoint is 77%)
- B. Incorrect:** CF pumps are tripped
Plausible: if operator realizes CF isolation occurs but does not realize the CF pumps also trip.
- C. Correct:** P-14 causes CF isolation, main turbine trip and CF pump trip.
- D. Incorrect:** reactor would not trip – power below 48% P8
Plausible: operator believes turbine trip will cause a reactor trip.

Level: RO&SRO

KA: SYS 059A4.12(3.4/3.5)

Lesson Plan Objective: CF Obj 10

Source: New

Level of knowledge: analysis

References:

1. OP-CN-MC-CF page 24
2. OP-CN-IC-IPX page 19

Bank Question: 724**Answer: D**

1 Pt(s)

The crew is performing a cooldown in accordance with EP/1/A/5000/ES-0.2 (*Natural Circulation Cooldown*).

Which of the following actions will cause both the cooldown rate and the NC system flow rate to **increase**?

- A. Starting more CRDM fans.
- B. Increasing the setpoint on the steam dumps, if in automatic.
- C. Decreasing the output of the steam dump controller, if in manual.
- D. Increasing auxiliary feedwater flow to the steam generators.

Distracter Analysis:

The NC system flow rate increases as the temperature difference between the S/G and reactor vessel increases – causing the thermal driving head to increase.

- A. **Incorrect:** while starting more fans enhances head cooling, it will reduce the temperature difference between the S/G and reactor vessel and thereby reduce the thermal driving head and decreasing the NC system flow rate.
Plausible: Starting more CRDM fans will increase the cooldown rate.
- B. **Incorrect:** increasing the setpoint will raise the pressure setpoint, if in auto; the dumps will close, decreasing the cooldown rate and NC system flow rate.
Plausible: if the candidate reverses the effects that steam pressure has on the thermal driving head.
- C. **Incorrect:** decreasing the output closes steam dumps and reduces the cooldown rate on the S/G, which causes the delta temp to reduce, and decreases NC system flow.
Plausible: if the candidate reverses the effect of the reduction in S/G cooldown rate.
- D. **Correct:** increased CA flow will have the effect of increased steam flow, a decrease in NC temperature and will increase the cooldown rate.

Level: RO&SRO

KA: SYS 061K5.01(3.6/3.9)

Lesson Plan Objective: EP1 Obj 21

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-THF-HT pages 10 and 11

Bank Question: 725**Answer: B**

1 Pt(s)

Unit 1 was operating at 100% power. Given the following events and conditions:

- The feeder breaker to 600VAC MCC-1EMXA opens and the MCC is deenergized.

Which of the following NV loads have been lost?

- A. Reactor makeup pump 1A and boric acid pump 1A.**
- B. Boric acid pump 1A only.**
- C. Reactor makeup pump 1A only.**
- D. Centrifugal charging pump A auxiliary lube oil pump only.**

Distracter Analysis:

- A. Incorrect:** power supply is MXW to the reactor makeup pump
Plausible: 600 V load
- B. Correct:** power supply is EMXA
- C. Incorrect:** power supply is MXW to the reactor makeup pump
Plausible: 600 V load
- D. Incorrect:** power supply is MXK
Plausible: 600 V load

Level: RO&SRO

KA: 004 K2.02 (2.9/3.1)

Lesson Plan Objective: NV SEQ 17

Source: New

Level of knowledge: memory

References:

1. OP-CN-0157-01.03 (Not provided - large drawing size)
2. NV lesson plan pages 28, 37 & 38

Bank Question: 726**Answer: A**

1 Pt(s)

Unit 2 is operating at 100%. Given the following events and conditions:

- A planned release is in progress from the waste gas system.
- Plant Vent monitor, EMF-35 (L) (Unit Vent Part) reaches the trip 2 setpoint.

Which one of the following automatic actions should occur?

- A. 1WG-160, (*WG Decay Tank Outlet to Unit Vent Control*), will close.
- B. Containment Ventilation Isolation signal will be generated.
- C. 1WL-124, (*Waste Monit Tnk Pmps Disch*), will close.
- D. Fuel Pool Ventilation (VF) Filter Train will be tripped.

Distracter Analysis:

EMF-35, 36, and 37

Automatic functions:

Trips unit related unfiltered exhaust fans.

Aligns VF filter train to the filtered mode.

Secures WG release (shuts 1WG-160).

Secures cont air release (shuts VQ-10).

A. **Correct:**B. **Incorrect:** not generated by EMF-35(L)**Plausible:** this is generated by emf-38, 39 or 40C. **Incorrect:** not generated by EMF-35(L)**Plausible:** closed by emf-49D. **Incorrect:** not generated by EMF-35(L)**Plausible:** VF not tripped, it is aligned to filtered mode

Level: RO&SRO

KA: SYS 071K4.04(2.9/3.4)

Lesson Plan Objective: EMF SEQ 2

Source: New

Level of knowledge: memory

References:

1. OP-CN-MC-EMF page 9 and 11
2. OP/1/B/6100/010Y A/1
3. OP/1/B/6100/010X C/5

Bank Question: 728**Answer: B**

1 Pt(s)

Unit 2 is in mode 4. The crew is preparing to start all the NCPs.

Which one of the following would satisfy the oil lift system interlock and allow the starting of the NCPs?

- A. Start both oil lift pumps, when oil lift pressure is greater than 500 psig, start the NCP.
- B. Start one oil lift pump, when oil lift pressure is greater than 500 psig, start the NCP.
- C. Start both oil lift pumps, when oil lift pressure is greater than 200 psig, start the NCP.
- D. Start one oil lift pump, when oil lift pressure is greater than 200 psig, start the NCP.

Distracter Analysis:

- A. **Incorrect:**
Plausible: Only one lift pump can be started at a time.
- B. **Correct:**
Plausible: One lift pump started, when pressure is greater than 500 psig, the NCP can be started.
- C. **Incorrect:**
Plausible: Only one lift pump can be started and the pressure is 500 psig.
- D. **Incorrect:**
Plausible: Pressure setpoint is 500 psig.

Level: RO&SRO

KA: SYS 003A4.03(2.8/2.5)

Lesson Plan Objective: NCP SEQ 10

Source: New

Level of knowledge: memory

References:

1. OP-CN-PS-NCP page 11

Bank Question: 729**Answer: A**

1 Pt(s)

Unit 1 was operating at 100% when a control rod M-4 became misaligned. Given the following events and conditions:

- The crew has entered AP/14, Case 1, (*Control Rod Misalignment*).
- Data B Failure lights are lit on the DRPI panel.
- The DRPI position for Rod M-4 in Control Bank D is 204 steps
- The group step counter for Control Bank D is at 218 steps
- There is a General Warning alarm for Rod M-4
- There are no Urgent Failure lights lit
- No operator action has been taken at this time

What is the position of the misaligned rod?

- A. Between 208 and 194 steps
- B. Between 216 and 192 steps
- C. Between 214 and 194 steps
- D. Between 214 and 200 steps

Distracter Analysis:

Due to the calculation method in half accuracy mode (one Data Cabinet not supplying accurate data) the system accuracy is reduced.

With a Data A Failure, the system accuracy is +10, -4 steps.

With a Data B Failure, the system accuracy is -10, +4 steps.

Note in AP states: If either Data A or Data B Failure lights are flashing and the Urgent Failure lights are dark, then the individual rod position indication will be in the "half accuracy" mode providing 12 step increment position indication instead of 6. Individual rod position indication may differ by as much as 10 steps from group step counter indication.

- A. **Correct:** Correct accuracy is -10/+4 due to data B failure; the rod is at 208 to 194 steps
- B. **Incorrect:** Correct accuracy is -10/+4 due to data B failure; the rod is at 208 to 194 steps
Plausible: if the candidate assumes accuracy assumed is +/-10 steps, which is the procedural warning for rod misalignment

- C.** **Incorrect:** Correct accuracy is $-10/+4$ due to data B failure; the rod is at 208 to 194 steps
Plausible: if the candidate assumes that accuracy is $+10/-4$ steps – would be true if this was a data A failure.
- D.** **Incorrect:** Correct accuracy is $-10/+4$ due to data B failure; the rod is at 208 to 194 steps
Plausible: Accuracy assumed is ± 12 – tech spec limit for rod alignment

Level: RO Only

KA: SYS 001A2.17(3.3/3.8)

Lesson Plan Objective: EDA SEQ 3

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-MC-EDA page 10
2. AP/14 case I page 2-3

Bank Question: 730**Answer: B**

1 Pt(s)

Unit 1 is operating at 100% power, with the makeup system in automatic control. Given the following events and conditions:

- An 8 gpm leak develops downstream of 1NV-294 (*NV PMPS A & B FLO CTRL*)

Which one of the following statements correctly describes the plant indications several hours after the leak starts?

- A. Increased VCT makeup and pressurizer level decreasing.**
- B. Increased VCT makeup and pressurizer level constant.**
- C. VCT level constant and pressurizer level decreasing.**
- D. VCT level decreasing to the FWST swapover setpoint and pressurizer level constant.**

Distracter Analysis:

- A. Incorrect:** pressurizer level will not decrease
Plausible operator believes that due to the leak, level will continue to decrease.
- B. Correct:** Initially pressurizer level will decrease, which will cause charging to increase and return level to program. Pressurizer level will remain on program since the leak is within the capacity of the charging pumps. Because charging is greater than letdown, but within the capability of the makeup system, VCT will decrease to the makeup setpoint and be returned to program (this will repeat for as long as the leak exists).
- C. Incorrect:** VCT level does not remain constant
Plausible: operator fails to realize that a constant mass loss out of the VCT exists.
- D. Incorrect:** VCT level will not decrease to the swapover setpoint
Plausible: operator believes that makeup will not keep pace with the leak.

Level: RO Only

KA: SYS 004K3.05(3.7/4.1)

Lesson Plan Objective: none

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-PS-ILE pages 11, 15-17

Bank Question: 731**Answer: A**

1 Pt(s)

Federal Regulations require the emergency core cooling system to be designed to maintain peak cladding temperature below 2200 °F.

Which one of the following statements correctly describes the basis for this design criterion?

- A. To prevent acceleration of the zircalloy-water reaction.**
- B. To prevent exceeding the zircalloy clad melting point.**
- C. To prevent exceeding the fuel melting point.**
- D. To prevent the onset of full film boiling and DNB.**

Distracter Analysis:

- A. Correct:** The zirconium-water reaction is described by the following chemical equation: $\text{Zr} + 2\text{H}_2\text{O} \rightarrow \text{ZrO}_2 + 2\text{H}_2 + \text{HEAT}$. The rate of this reaction is highly dependent upon clad temperature, such that above approximately 1800°F the reaction becomes significant. It becomes accelerated at 2200°F and auto-catalytic (self-sustaining) at 4800°F.
- B. Incorrect:** Zircalloy will melt at approximately 3400 °F.
Plausible: its approximately 900 degrees below the melting point.
- C. Incorrect:** fuel melt is a much higher temperature. ~5000 °F.
Plausible: a logical answer if the candidate doesn't know the answer
- D. Incorrect:** these are event specific mechanisms rather analysis criteria.
Plausible: If the candidate confuses heat transfer mechanisms with ECCS criteria.

Level: RO Only

KA: SYS 013G2.1.32(3.4/3.8)

Lesson Plan Objective: TA-AM SEQ 10

Source: New

Level of knowledge: memory

References:

1. OP-CN-IC-ISE page 5

2. OP-CN-TA-AM pages 7-9
3. 10CFR50.46

Bank Question: 732**Answer: B**

1 Pt(s) Unit 1 is performing a plant shutdown.

Given the following events and conditions in the following sequence:

- Turbine load is currently at 300Mwe.
- 1A CF pump is running.
- 1B CF pump has been shutdown per procedure.
- A problem with the feed system causes the "B" S/G CF control valve to close.
- The running CF pump trips.
- The operator manually trips the reactor.

Assuming systems operate as designed, when did the CA system receive a start signal?

- A. When the CF control valve was closed for more than 30 seconds.
- B. When the CF pump tripped.
- C. When the B S/G NR level decreased below 37%.
- D. When the manual reactor trip occurs.

Distracter Analysis:

- A. **Incorrect:** trips upon loss of CF pumps
Plausible: This signal is in effect only when load is greater than 40%
- B. **Correct:** The AMSAC signal to start CA on loss of both MFPs is always in service
- C. **Incorrect:** trips upon loss of CF pumps
Plausible: 37% is the unit 2 setpoint
- D. **Incorrect:** trips upon loss of CF pumps
Plausible: a reactor trip causes a CA start signal.

Level: RO Only

KA: SYS 059A2.01(3.4*/3.6*)

Lesson Plan Objective: CF SEQ 13

Source: New

Level of knowledge: analysis

References:

1. OP-CN-MC-CF page 9-10, 27-28

Bank Question: 733**Answer: A**

1 Pt(s)

Unit 2 is responding to a large break LOCA with a failure of safety injection. Given the following events and conditions:

- The reactor vessel level drops below the top of active fuel and continues to decrease in a uniform manner,

Which one of the following statements correctly describes the expected response of the Source Range instruments as core voiding occurs?

- A. Initially increase with increased voiding fraction and then decrease when the effects of loss of moderator override the effects of leakage.**
- B. Initially decrease due to the effect of the loss of moderator and then increase due to the increased voiding fraction.**
- C. Continually increase due to the increase in fast neutron leakage.**
- D. Continually decrease due to the effects of the loss of moderator.**

Distracter Analysis:

- A. Correct:**
- B. Incorrect:** The SR count rate increases then decreases
Plausible: If the candidate reverses the effects
- C. Incorrect:** The SR count rate will decrease after loss of moderator overrides voiding fraction effects
Plausible: Initially, the SR response will increase – half correct
- D. Incorrect:** The SR will initially increase
Plausible: The SR response will decrease after a certain point – half correct

Level: RO Only

KA: SYS 015K1.04(3.5/3.5)

Lesson Plan Objective: ENB SEQ 13

Source: New

Level of knowledge: memory

References:

1. OP-CN-IC-ENB page 28-29

Bank Question: 735**Answer: C**

1 Pt(s)

Which of the following is a characteristic of both NI pumps running as compared to just one NI pump running?

- A. Pump head loss is approximately halved for each pump.**
- B. Pump running amps are approximately halved for each pump.**
- C. Injection flow is approximately doubled.**
- D. Discharge pressure is approximately doubled.**

Distracter Analysis:

- A. Incorrect:** Total system head loss is increased.
Plausible: System head loss increases as total flow rate increases
- B. Incorrect:** Running amps are slightly reduced – but not by one half.
Plausible: If the candidate does not know pump laws.
- C. Correct:** The flow is additive for parallel pumps.
- D. Incorrect:** Discharge pressure will be increased but not doubled
Plausible: if the candidate reverses the pump laws for flow and pressure.

Level: RO Only

KA: SYS 006K5.08(2.9*/3.1*)

Lesson Plan Objective: FF Obj 16, 17

Source: New

Level of knowledge: memory

References:

1. OP-CN-THF-FF page 9-12

Bank Question: 736**Answer: C**

1 Pt(s)

Unit 2 is in the process of conducting a plant startup. Given the following events and conditions:

- Power range channels indicate the following:
 - PR N41 = 8%
 - PR N42 = 8%
 - PR N43 = 10%
 - PR N44 = 8%

Which of the following conditions would result in an Automatic Reactor Trip?

- A. All four RCPs trip.
- B. Pressurizer level increases to 94%.
- C. RCS pressure decreases to 1840 psig.
- D. One turbine impulse pressure channel fails high.

Distracter Analysis:

- A. **Incorrect:** all loop flow trips are automatically blocked below P-7
Plausible: if the candidate does not recall that the NCP trip is blocked by P-7
- B. **Incorrect:** Pressurizer High Level, Pressurizer Low Pressure, blocked by P-7
Plausible:
- C. **Correct:** As pressure decreases to 1845 psig, SI is actuated. The SI signal generates a Reactor Trip Signal
- D. **Incorrect:** P-7 would be enabled, but this does not cause a trip
Plausible: if the candidate is confused over the effect of turbine impulse on main generator trip

Level: RO&SRO
KA: SYS 010K1.02(3.9/4.1)

Lesson Plan Objective: ISE SEQ 4
Source: New

Level of knowledge: comprehension

References:
1. OP-CN-ECCS-ISE page 14

Bank Question: 737**Answer: B**

1 Pt(s)

Unit 2 is at 100% power. PZR level and pressure control are selected to channels 1 and 2.

Which of the following failures will result in the pressurizer backup heaters immediately de-energizing?

- A. Controlling pressurizer pressure channel fails low.
- B. Backup pressurizer level channel fails low.
- C. Controlling pressurizer level channel fails high.
- D. Backup pressurizer pressure channel fails high.

Distracter Analysis:

- A. **Incorrect:** result is the heaters energize
Plausible: a low pressure condition may raise concerns of saturation margin
- B. **Correct:** letdown isolates, heaters de-energize
- C. **Incorrect:** Heaters energize (on deviation)
Plausible: high level may elicit concern regarding over-pressurizing a solid pressurizer due to heat up.
- D. **Incorrect:** only input to PORV
Plausible: high level may elicit concern regarding over-pressurizing a solid pressurizer due to heat up.

Level: RO&SRO

KA:SYS 011K3.03(3.2/3.7)

Lesson Plan Objective: ILE SEQ 6

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-PS-ILE pages 15-16

Bank Question: 738**Answer: A**

1 Pt(s)

Unit 2 is at full power. Reactor Trip breakers A (RTA) and B (RTB) are closed, bypass breakers (RYA, RYB) are open.

Which one of the following statements correctly describes how a loss of EPA would effect the operation of Reactor Trip breaker A from the control room?

- A. RTA would still open from either a manual or automatic signal.
- B. RTA would not open in response to a manual reactor trip signal; an automatic trip would still open the breaker.
- C. RTA would not open in response to either an automatic or manual reactor trip signal.
- D. RTA would immediately trip open because the shunt trip coil would deenergize.

Distracter Analysis:

- A. **Correct:** EPA powers the shunt trip coil on RTA. This coil energizes to trip RTA. This function would be lost. However, a manual reactor trip signal will also trip the UV coils from SSPS.
- B. **Incorrect:** A manual reactor trip signal will trip the UV coils from SSPS.
Plausible: if the candidate does not recognize that SSPS train A provides power to the UV coils – which deenergize from the manual trip signal to trip RTA. SSPA train A is powered from an auctioneered circuit from ERPA and ERPB.
- C. **Incorrect:** Both Rx trips would still function – the UV coil is unaffected.
Plausible: if the candidate does not recognize that a manual Rx trip sends a trip signal to the UV coils – which are powered from SSPS train A – which receives power from an auctioneering circuit from ERPA and ERPB.
- D. **Incorrect:** The ST coil energizes to trip.
Plausible: if the candidate confuses the UV coil and the ST functions – ST coil is normally deenergized

Level: RO&SRO

KA: SYS 012A2.07(3.2/3.7)

Lesson Plan Objective: IPX SEQ 2, 4, 6

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-MC-IPX pages 7, 8 23, 24, 25, 27
2. OP-CN-EL-EPL page 27

Bank Question: 739**Answer: C**

1 Pt(s)

During a reactor startup, when should the "RPI at Bottom Rod Drop" (annunciator D/9 on 1AD-2) clear?

- A. When the rod position startup push button is depressed.
- B. Once all the shutdown banks are fully withdrawn.
- C. Once shutdown banks are withdrawn and control bank A is greater than 6 steps off the bottom.
- D. Once control bank D rods are off the bottom

Distracter Analysis:

The "RPI at Bottom Rod Drop" annunciator will be activated if any of the following conditions are met:

- Any Shutdown or Control Bank A rod has a calculated position which gives a rod bottom LED.
- Any Control Bank B, C, or D has a calculated position which gives a rod bottom LED and the other rods in the same bank and group do not have rod bottom LED's.

Any Control Bank B, C and D rod has a calculated position, which gives a rod bottom LED, and rods that should be sequenced out after that rod, are off the bottom. (this is not the case during a startup, so the alarm should remain clear)

- A. **Incorrect:** the pushbutton resets all the alarms associated with rod control – but not alarms associated with DRPI
Plausible: if the candidate does not recognize that DRPI alarms are not reset.
- B. **Incorrect:** Also requires control bank A to be withdrawn
Plausible: If the candidate thinks that only the SD banks need to be withdrawn.
- C. **Correct:** Alarm should clear once Bank A is off the bottom.
- D. **Incorrect:** Annunciator will clear when Bank A lifts off the bottom.
Plausible: At full accuracy, the rod bottom LED for control bank D rods will extinguish and the six-step position LED will light when the rods are approximately three steps from the bottom.

Level: RO&SRO

KA: SYS 014K4.02(2.5*/2.7*)

Lesson Plan Objective: EDA SEQ 4, 5

Source: New

Level of knowledge: memory

References:

1. OP-CN-IC-EDA page 12

Bank Question: 741**Answer: D**

1 Pt(s)

A LOCA has occurred on Unit 2. The crew has determined that train A of the ND system must be used to supply containment spray.

Which one of the following statements correctly describes one of the electrical interlocks that must be satisfied to allow an operator to open 2NS-43A (*ND PMP 2A TO CONT SPRAY HDR*)?

- A. Both 2ND-1B, and 2 ND-2A (*ND PUMP 2A SUCT FRM LOOP B*) must be closed.
- B. Either 2ND-36B or 2ND-37A (*ND PUMP 2B SUCT FROM LOOP C*) must be closed.
- C. Train B of the ND system must be operating in the Cold Leg Recirculation mode.
- D. CPCS signal must be present.

Distracter Analysis:

Interlocks to open 2NS-43A

- 1. 2ND-1B or 2ND-2A closed
- 2. 2NI-185A open
- 3. CPCS > 0.4 psig

- A. **Incorrect:** Only one valve of these 2 valves must be closed.
Plausible: if the operator does not recognize that only 1 of these 2 valves is necessary to satisfy the interlock.
- B. **Incorrect:** These are the train B interlocks for 2ND-36B/37A.
Plausible: operator reverses the trains
- C. **Incorrect:** Does not electrically interlock containment spray. Either train may be aligned for cold leg recirc.
Plausible: This is an administrative requirement prior to opening 2NS-43A.
- D. **Correct:**

Level: RO&SRO

KA: SYS 026K4.07(3.8*/4.1*)

Lesson Plan Objective: NS SEQ 8, 9 ND SEQ 8

Source: New

Level of knowledge: memory

References:

1. ND system page 14
2. FR-Z.1

Bank Question: 743**Answer: B**

1 Pt(s)

Unit 1 is in the process of offloading the core to the spent fuel pool. Spent fuel pool temperature is 120°F.

Which of the following could cause indicated spent fuel pool level to suddenly decrease?

- A. The containment purge exhaust flow rate is set less than supply flow rate.
- B. The spent fuel building running filter exhaust fan trips but the supply fan continues to run.
- C. After shutting down the containment purge system, the operator places the "MODE SELECTOR" switch on 1RB-CP-1 in the "NORM" position.
- D. The running spent fuel pool cooling pump trips.

Distracter Analysis: With core offload in progress, containment integrity must be established per Tech Specs. While refueling is in progress, the refueling canal is open and any changes in pressure between containment and the spent fuel pool will result in a manometer effect between the refueling cavity and the SFP.

- A. **Incorrect:** exhaust flow < supply flow will cause pressure in containment to increase, causing SFP level to increase.
Plausible: if the candidate reverses the effects of supply and exhaust flows on level.
- B. **Correct:** Continuing to supply outside air will increase pressure in the SFP building, increasing pressure, forcing level to shift to containment.
- C. **Incorrect:** This switch realignment will have no effect on containment pressure after the containment purge system has been shut down,
Plausible: If this switch was realigned as described when the purge system was in operation, it would cause pressure in upper containment to increase. There a precaution dealing with the mode selector switch, however, placing it in NORM at this time will have zero effect on containment pressure, and therefore no effect on levels.
- D. **Incorrect:** this will not suddenly change level in the spent fuel pool
Plausible: It takes hours to reach boiling conditions in the SFP and then it would be a very gradual decrease.

Level: RO&SRO

KA: SYS 033A1.01(2.7/3.3)

Lesson Plan Objective: VF SEQ 3, 4 VP SEQ 3

Source: New

Level of knowledge: comprehension

References:

1. OP/1/6450/015 enclosure 4.1 and 4.2
2. Lesson plan VF page 5
3. Lesson plan VP page 15

Bank Question: 744.1 Answer: C

1 Pt(s) Unit 1 was operating at 100% power when a tube rupture occurred in the A S/G.

Current conditions:

- A S/G pressure is 1000 psig.
- A S/G NR level is 100%
- A S/G WR level is approximately 74% and steady
- NC pressure is 1500 psig

Which one of the following statements correctly explains why the narrow and wide range level indications are not the same?

- A. The narrow range upper level taps are at a higher elevation inside the S/G than the wide range taps; therefore the wide range instrument will always read lower than the narrow range instrument has reached the upper level tap.
- B. The wide range upper level taps are at a higher elevation inside the S/G than the narrow range taps; therefore the wide range instrument will continue to show level indication after the narrow range instrument has reached the upper level tap.
- C. The wide range and narrow range upper level taps are at the same elevation inside the S/G but the wide range level instrument is cold calibrated; therefore it will always read less than narrow range level until the steam generator is cooled down.
- D. The wide range and narrow range upper level taps are at the same elevation inside the S/G but the wide range level instrument has conservative instrument errors to prevent feeding a hot dry S/G; therefore the WR instrument will always read less than narrow range level until the steam generator is cooled down.

Distracter Analysis:

- A. **Incorrect:** NR and WR upper level taps are at the same elevation
Plausible: The candidate may think that placing the upper level tap higher causes the WR S/G level to read lower than NR
- B. **Incorrect:** NR and WR upper level taps are at the same elevation
Plausible: operator believes that the WR level instruments are at a different location.

- C. **Correct:** Since the WR and NR Level Instruments upper taps are located at the same elevation, a NR indication of greater than 100% indicates both the NR and WR upper taps are submerged.
- ACTUAL Wide Range Level must therefore be 100%, an indicated level of ~ 74% is expected.
- As ACTUAL Level in the ruptured S/G continues to increase, the Wide Range Level will continue to indicate ~ 74%. Wide Range Level indication will only increase further if the S/G is cooled down.
- D. **Incorrect:** There is no conservative instrument error inserted in the WR SG level instrument to prevent feeding a hot dry S/G
- Plausible:** partially correct – the instrument taps are at the same elevation – using conservative instrument error offset would be a plausible way of preventing feeding a hot dry S/G

Level: RO&SRO

KA: SYS 035K6.03(2.6/3.0)

Lesson Plan Objective: SG SEQ 7

Source: Bank (from SG lesson plan page 12, 13)

Level of knowledge: memory

References:

1. data book
2. SG lesson page 12&13

Bank Question: 745**Answer: B**

1 Pt(s)

Unit 1 was operating at 100% power when a sudden loss of VI supply pressure to the MSIVs occurred.

Which one of the following statements correctly describes the MSIV response?

- A. MSIVs will close immediately without operator action.
- B. MSIVs will close without operator action in approximately 15 minutes.
- C. MSIVs will not close until after the operator manually presses the closed pushbutton.
- D. MSIVs will not close because they require VI pressure to actuate.

Distracter Analysis:

- A. **Incorrect:** there is a backup tank that supplies air pressure.
Plausible: if the candidate does not recall that the back up tank will
- B. **Correct:**
- C. **Incorrect:** The valves will close without operator action
Plausible: if the candidate thinks that operator action is required to initiate closure with spring pressure
- D. **Incorrect:** MSIVs will close after ~ 15 minutes
Plausible: if the candidate thinks that they fail open and require VI pressure to close.

Level: RO Only

KA: SYS 039A4.01(2.9/2.8)

Lesson Plan Objective: SM Obj 12

Source: New

Level of knowledge: memory

References:

1. OP-CN-STM-SM page 12

Bank Question: 747**Answer: D**

1 Pt(s)

Unit 1 is operating at 10% power conducting a plant shutdown. Given the following events and conditions:

- The tie breakers for 6.9KV buses 1TA, 1TB, 1TC and 1TD are open
- The main turbine is not synchronized to the grid
- The automatic fast transfer switch for each 6.9 KV bus is in the DEFEAT position
- RC pumps A and C are running.
- A fault occurs on transformer 1T2B and the transformer is deenergized.

Which one of the following statements correctly describes the RC pump response?

- A. No RC pumps would trip.
- B. Only RC pump A would trip.
- C. Only RC pump C would trip.
- D. RC pumps A and C would trip.

Distracter Analysis:

The long sides of 1TA and 1TC both are fed from 1T2B. Loss of 1T2B would result in a loss of RC pumps A and C. The fast or hot transfer would not occur because the fast transfer is defeated – a slow or dead bus transfer would occur.

- A. **Incorrect:** RC pumps A and C would trip
Plausible: - if candidate thinks that a slow bus transfer would prevent loss of RC pumps
- B. **Incorrect:** RC pump C will also trip
Plausible: RC pump A will trip – if the candidate believes 1T2B feeds only 1TA long side and forgets about 1TC long side
- C. **Incorrect:** RC pump A will also trip
Plausible: – if the candidate believes 1T2B feeds 1TC long side and forgets about 1TA long side.
- D. **Correct:**

Level: RO&SRO

KA: SYS 062K2.01(3.3/3.4)

Lesson Plan Objective: EP SEQ 11

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-EL-EP pages 23, 27-30
2. OP-CN-MT-RC page 6

Bank Question: 748**Answer: B**

1 Pt(s)

An Emergency Diesel Generator is running in parallel with offsite power. The operator is preparing to shutdown the diesel.

In accordance with OP/1(2)/A/6350/002, ENC 4.10, when manually unloading the Emergency Diesel Generator, the output breaker should be opened after load is reduced to 200 KW while maintaining a lagging power factor.

Which one of the following statements correctly describes the basis for this requirement?

- A. Diesel overspeed when the breaker is opened.
- B. Breaker trip on reverse power.
- C. Loss of power to the bus.
- D. Breaker trip on Generator Differential.

Distracter Analysis:

- A. **Incorrect:** While possible if breaker is opened under greater load, this is not the reason for minimum load and lagging pf
Plausible: the DG will pick up speed if suddenly unloaded – overspeed is a valid concern to protect the diesel against.
- B. **Correct:** leading pf and low load could motor the machine leading to reverse power condition.
- C. **Incorrect:** Unlikely since a breaker failure would have to occur.
Plausible: if there was no reverse power trip, this condition could cause a loss of power to the bus if the DG acted as a motor and tripped the offsite power breaker on over-current.
- D. **Incorrect:** An unbalance does not exist, Gen Diff should not occur.
Plausible: This is a valid DG trip

Level: RO&SRO

KA: SYS 064A1.08(3.1/3.4)

Lesson Plan Objective: DG3 SEQ 17

Source: bank DG 3-027-D

Level of knowledge: memory

References:

1. OP-/1/A/6350/002 Encl 4.10

Bank Question: 749**Answer: C**

1 Pt(s)

Which of the following is performed when starting the RC system to prevent pump runout?

- A. Limiting the number of pumps that can be started based on the number of cooling towers available.
- B. Limiting the number of pumps that can be started based on the number of condensers available.
- C. Not operating a single pump with the discharge valve fully open.
- D. Not allowing the first pump to be started unless the main condenser is isolated.

Distracter Analysis:

- A. **Incorrect:**
Plausible: confuses start interlocks with runout protection.
- B. **Incorrect:**
Plausible: knows that this is a requirement for pump starts.
- C. **Correct:**
Plausible: "Norm"- "T/V" key switch and valve selector switch is provided for the discharge valves of the RC pumps to limit discharge valve to 52 degrees open following the start of the pump, for the valve selected, to prevent runout of the first pump started
System procedure cautions that the pump cannot operate with its discharge valve fully open to prevent runout.
- D. **Incorrect:**
Plausible: confuses caution, (no pump can be started if the condenser is isolated).

Level: RO&SRO

KA: SYS 075K4.01(3.2/3.5)

Lesson Plan Objective: RC SEQ 14, 18

Source: New

Level of knowledge: memory

References:

- 1. OP-CN-RC 6400/001A
- 2. RC system lesson plan, page 7

Bank Question: 751**Answer: B**

1 Pt(s)

Unit 1 was operating at 100% power when a large break LOCA occurred. Given the following sequence of events:

- Time 1: Safety Injection occurs
- Time 2: Containment phase B isolation signal generated
- Time 3: FWST low level alarm occurs
- Time 4: Containment Sump Isolation valves opened

At what time did KC flow start to the ND heat exchangers?

- A. Time 1
- B. Time 2
- C. Time 3
- D. Time 4

Distracter Analysis:

- A. **Incorrect:**
Plausible: operator believes KC auto aligns on S signal
- B. **Correct:** KD will fail open on either phase B or S signal with low FWST level.
- C. **Incorrect:**
Plausible: operator fails to realize the KC valves opened on Sp
- D. **Incorrect:**
Plausible: operator believes valves are interlocked with aligning ND to the sumps

Level: RO&SRO

KA: 005 K1.10 (3.2/3.4)

Lesson Plan Objective: ND SEQ 8

Source: New

Level of knowledge: memory

References:

1. Lesson plan ND page 18

Bank Question: 752**Answer: B**

1 Pt(s)

Unit 2 is operating at 100% power. Given the following events and conditions:

- KC cooling is lost to an NCP.
- No operator action is taken.

Which one of the following conditions will first occur and require the NCP to be tripped?

- A. High # 1 seal leakoff discharge temperature.**
- B. High motor bearing temperature.**
- C. High radial bearing temperature.**
- D. High pump shaft vibration.**

Distracter Analysis:

- A. Incorrect:** seal leakoff temperature is not cooled by KC
Plausible: Loss of seal injection would cause the discharge temperature to increase.
- B. Correct:** A loss of KC cooling to the NC pumps results in a gradual approach to an overheated condition prior to a possible shaft seizure. The duration of the heatup phase, estimated to be approximately ten minutes, provides a sufficient time for operator recognition and response. Additional time exists between exceeding the **high bearing temperature** limit and the conditions required for shaft seizure.
NCP is tripped at 195 degrees (motor bearing)
- C. Incorrect:** KC does not cool the radial bearing – this is cooled by seal injection flow.
Plausible: the operator may confuse seal injection with KC cooling.
- D. Incorrect:** KC flow does not affect the pump vibration
Plausible: high shaft vibration will occur if the motor bearing overheats – but this will happen long after the high temperature alarm is received.

Level: RO&SRO

KA: SYS 008K3.03(4.1/4.2)

Lesson Plan Objective: KC SEQ 7, 14

Source: New

Level of knowledge: comprehension

References:

1. AP-21 page ?

Bank Question: 754**Answer: A**

1 Pt(s)

Unit 1 is conducting a reactor startup. Given the following conditions and events:

- Steam dumps are in Auto in the Steam Pressure mode.
- The Train "A" P-12 solenoids lose power.

Which one of the following statements correctly describes the operation of the steam dumps?

- A. All the steam dumps will close and cannot be re-opened.**
- B. All the steam dumps will close; the cooldown bank can be used by going to BYPASS.**
- C. No effect, P-12 does not input to steam dump operation in the Steam Pressure mode.**
- D. No effect, however, if Tave decreases below the P-12 setpoint, the dumps will not close.**

Distracter Analysis:

- A. Correct:** The P-12 solenoids are in series and energized above P-12. If Tave decreases below the setpoint or the solenoids lose power, the valves close. However, without power, the solenoids cannot be re-energized.
- B. Incorrect:** The solenoids cannot be bypassed.
Plausible: Operator may believe BYPASS will allow the valves to be opened.
- C. Incorrect:** P-12 solenoids will prevent the valves from opening
Plausible: Operator may believe P-12 only affects Tave operation.
- D. Incorrect:** P-12 solenoids will prevent the valves from opening
Plausible: Operator may believe P-12 does not affect operation unless necessary below 553.

Level: RO&SRO

KA: 041 G2.1 (3.7/3.6)

Lesson Plan Objective: IDE SEQ 8

Source: New

Level of knowledge: comprehension

References:

1. Lesson plan IDE page 6 and 27

Bank Question: 755**Answer: D**

1 Pt(s)

Which one of the following conditions will cause 2RN47A (*RN SUPPLY X-OVER ISOL*) to automatically close?

- A. Phase B on either unit or emergency low level in either pump house pit.
- B. Unit 2 phase B or emergency low level in pump house pit A.
- C. Phase B on either unit or emergency start of either unit 2 emergency Diesel generator.
- D. Unit 2 phase B or emergency low level in pump house pit B.

Distracter Analysis:

RN Supply Crossover Isolation Valves (1&2RN47A and 48B)

The RN supply crossover isolation valves are normally open to supply cooling water to the non-essential header. Each valve closes upon a "S_p" Phase B Isolation signal from its respective unit.

The RN supply crossover isolation valves are also equipped with safety related interlocks to close upon emergency low level in the pump house pits.

Pit A Emergency Low Level will close: 1 and 2 RN48B

Pit B Emergency Low Level will close: 1 and 2 RN47A

- A. **Incorrect:** Phase B on Unit 1 will not cause isolation
Plausible: believes either unit or pit level isolates the non-essential header.
- B. **Incorrect:** emergency low level on pump house pit A will not cause isolation
Plausible: partially correct – if candidate believes 47A isolated due to pit A
- C. **Incorrect:** emergency DG start will not cause isolation
Plausible: partially correct - if the candidate thinks that an emergency start of the DG should result in isolating the non-essential header
- D. **Correct:**

Level: RO Only

KA: 076 K4.06 (2.8/3.2)

Lesson Plan Objective: RN SEQ 12

Source: New

Level of knowledge: memory

References:

1. OP-CN-PSS-RN page 17

Bank Question: 756**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power when a LOCA occurred. Given the following events and conditions:

- 0200 = LOCA occurs inside containment, reactor trip
- 0201 = loss of offsite power,
- 0202 = Emergency diesels start and energize emergency buses
- 0203 = Safety Injection occurs
- 0204 = Containment pressure exceeds 1.2 psig
- 0210 = Containment pressure exceeds 3.0 psig
- 0215 = Instrument air decreases to 75 psig

At what point did Instrument Air to containment isolate?

- A. 0200 - 0202
- B. 0203 - 0204
- C. 0205 - 0210
- D. 0211 - 0220

Distracter Analysis:

- A. **Incorrect:** instrument air isolation is not caused by the LOOP
Plausible: operator believes the valves are closed on LOOP
- B. **Incorrect:** VI isolation is not caused by either the safety injection or the phase "A" isolation signal, St
Plausible: Breathing air isolates on St
- C. **Correct:** VI isolates on a phase B containment isolation signal, Sp
- D. **Incorrect:** VI already isolated
Plausible: If operator feels VI isolates on decreasing pressure (vice the cross tie opening)

Level: RO Only

KA: 078 K3.01 (3.1/3.4)

Lesson Plan Objective: VI LPRO 25

Source: New

Level of knowledge: comprehension

References:

1. Lesson plan VI page 9-10,34
2. OP-CN-ECCS-ISE page 18

Bank Question: 757**Answer: B**

1 Pt(s)

Units 1 and 2 are operating at 100% power with a normal service water line-up and RN pump 2A running. Given the following conditions and indications:

- RN pumps 1A, 1B and 2B start.
- 1 and 2 RN-48B (RN SUPPLY X-OVER ISOL) close
- 1 and 2 RN-47A (RN SUPPLY X-OVER ISOL) remain open
- RN suction and discharge valves swap to the SNSWP.

Which one of the following conditions correctly describes the cause of this condition?

- A. The Lake Wylie dam failed.
- B. RN pump intake pit A screens are clogged.
- C. The Unit 1 RN pump intake pit A level indicator failed low.
- D. There was a spurious containment phase B actuation on Unit 1.

Distracter Analysis:

- A. **Incorrect:** low lake level would cause a low level in both RN pump pits A and B, which would close valves 1/2RN-47A
Plausible: Partially correct – all other actuations would occur
- B. **Correct:**
- C. **Incorrect:** requires 2 of 3 level instruments to fail to get the actions.
Plausible: if the candidate does not know the coincidence logic.
- D. **Incorrect:** would not cause RN suction valves to swap to the SNSWP – would cause 1RN-47A to close and would not cause 2RN-48B to close
Plausible: partially correct – would cause all other conditions

Level: RO&SRO

KA: APE 062 AA2.02 (2.9 / 3.6)

Lesson Plan Objective: PSS-RN SEQ12

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-PSS-RN pages 14, 31-33

Bank Question: 758**Answer: C**

- 1 Pt(s) Unit 2 was operating at 50% power. During surveillance testing of CA pump 2A, a large fire started in a CA pump room, causing a local alarm and an OAC alarm in the control room. Which one of the following describes the reason for these alarms?
- A. The alarm sounds in the affected pump cubicle to warn personnel of the electric shock hazard of the pending sprinkler actuation in 1.5 minutes.
 - B. The alarm sounds in the control room to notify operators to actuate the affected pump CO₂ system after the personnel have been safely evacuated from the pump room.
 - C. The alarm sounds in the affected pump cubicle to warn personnel of the asphyxiation hazard of the pending CO₂ actuation in 6.5 minutes.
 - D. The alarm sounds in the control room to notify operators to actuate the affected pump deluge system after the personnel have been safely evacuated from the pump room.

Distracter Analysis:

- A. **Incorrect:** There is no time delay in sprinkler system actuation.
Plausible: if the candidate does not understand the protection provided for this fire area.
- B. **Incorrect:** the system actuates automatically.
Plausible: Some fire systems are manually actuated.
- C. **Correct:**
- D. **Incorrect:** There is no deluge protection for CA pumps.
Plausible: MFPs have deluge protection.

Level: RO Only

KA: APE 067AK3.02(2.5 / 3.3)

Lesson Plan Objective: SS-RFY SEQ 36

Source: New

Level of knowledge: memory

References:

1. OP-CN-SS-RFY pages 13, 21-22

Bank Question: 763**Answer: C**

1 Pt(s)

Unit 2 is responding to a small break LOCA. The operators have entered FR-C.2 (*Response to Degraded Core Cooling*) due to failure of the NI and NV systems to inject. The note at the start of FR-C.2 states:

Normal conditions for running NC pumps are desired, but NC pumps should not be tripped if normal conditions cannot be established or maintained.

Which one of the following best describes the operator response and basis if the lower bearing temperature on all four NCP's is 300°F and increasing?

- A. **A and D NCP's should be tripped to prevent imminent failure of the NCP seals. B and C NCPs should remain in operation to assure rapid depressurization to accumulator injection pressure.**
- B. **Three NCP's should be tripped to prevent imminent failure of the NCP seals. Either B or C NCP should remain in operation to facilitate two-phase flow through the core.**
- C. **All four NCP's should remain in operation to facilitate two-phase flow through the core.**
- D. **All four NCP's should remain in operation to assure rapid depressurization to accumulator injection pressure.**

Distracter Analysis:

- A. **Incorrect:** All 4 NCPs should remain in operation
Plausible: B and C NCPs provide flow to the pressurizer spray nozzles and would provide a method of depressurization
- B. **Incorrect:** All 4 NCPs should remain in operation
Plausible: partially correct – the bases for the step is correct - B and C NCPs provide flow to the pressurizer spray nozzles
- C. **Correct:**
- D. **Incorrect:** the reason for tripping the pumps is incorrect
Plausible: partially correct – all 4 NCPs are tripped. Depressurizing the NCS to allow CLA injection is the bases for steps in other EOPs

Level: RO Only

KA: 000074EK3.08(4.1 / 4.2)

Lesson Plan Objective: EP-FRC SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-CN-EP-FRC page 5
2. ERG Basis Document FR-C.2 page 1
3. EP/1/A/5000/FR-C.2 page 2
4. Ep/1/A/5000/F-0 page 3

Bank Question: 764**Answer: D**

1 Pt(s)

Unit 2 was operating at 100% power. Given the following events and conditions:

- At 0200, NCP 2C tripped on an electrical fault.
- Reactor power is 96% and the reactor trip breakers are closed.
- The operators implement FR-S.1, (*Response to Nuclear Power Generation/ATWS*).
- Safety injection has not actuated.
- NV pump 1B is running, NV pump 1A is not running
- Both boric acid pumps are running

If all other valves are in their normal full power lineup, which one of the following valve lineups provides adequate boration flow to the NCS?

- A. **CLOSED:** -2NV-312A (*CHRG LINE CONT ISOL*)
 -2NV-186A (*B/A TO BLENDER OTLT TO VCT OTLT*)
 -2NV-238A (*B/A TO BLENDER CTRL VLV*)
 OPENED: -2NV-314B (*CHRG LINE CONT ISOL*)
 - 2NV-188A & 189B (*VCT OTLT ISOL*)
 - 2NV-236B (*BORIC ACID TO NV PUMPS SUCT*)
- B. **CLOSED:** -2NV-252A (*NV PUMPS SUCT FROM FWST*)
 -2NV-181A (*B/A BLENDER OTLT TO VCT*)
 -2NV-186A (*B/A TO BLENDER OTLT TO VCT OTLT*)
 OPENED: -2NV-253B (*NV PUMPS SUCT FROM FWST*)
 -2NV-188A & 189B (*VCT OTLT ISOL*)
 -2NI-10B (*NV PMP C/L INJ ISOL*)
- C. **CLOSED:** -2NV-314B (*CHRG LINE CONT ISOL*)
 -2NV-188A & 189B (*VCT OTLT ISOL*)
 -2NV-236B (*BORIC ACID TO NV PUMPS SUCT*)
 OPENED: -2NV-312A (*CHRG LINE CONT ISOL*)
 -2NV-186A (*B/A TO BLENDER OTLT TO VCT OTLT*)
 -2NV-238A (*B/A TO BLENDER CTRL VLV*)
- D. **CLOSED:** -2NV-252A (*NV PUMPS SUCT FROM FWST*)
 -2NV-188A (*VCT OTLT ISOL*)
 -2NI-9A (*NV PMP C/L INJ ISOL*)
 OPENED: -2NV-253B (*NV PUMPS SUCT FROM FWST*)
 -2NV-189B (*VCT OTLT ISOL*)
 -2NI-10B (*NV PMP C/L INJ ISOL*)

Distracter Analysis:

- A. **Incorrect:** No emergency boration flow path because 2NV-312A is closed.
Plausible: because all the other valve positions are normal for this condition.
- B. **Incorrect:** No emergency boration flow path because 2NV-188A&189B are open, preventing full low from the FWST.
Plausible: there's a flow path from the FWST to the running NV pump.
- C. **Incorrect:** No emergency boration flow path because 2NV-314B is closed.
Plausible: there will be boron flow from the blender to the VCT in this lineup.
- D. **Correct:** - this describes the B train valve lineup prescribed by the RNO for step 4.d.

Level: RO&SRO

KA: APE 024G4.1(4.3/4.6)

Lesson Plan Objective: EP-FRS SEQ 5

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-EP-FRS page 6
2. EP/1/A/5000/FR-S.1 pages 2-3

Bank Question: 766**Answer: B**

1 Pt(s)

Unit 2 was operating at 75% power with rod control in automatic. A Rod Control Urgent Failure alarm is received on 2AD-2. Given the following events and conditions:

- | | |
|---------------------------------------|----------------------------|
| • Control rod bank D | No motion |
| • PR instruments | decreasing |
| • Tave | decreasing |
| • Tref / Tauct deviation | increasing |
| • All control rod groups | At programmed withdrawal |
| • All shutdown rod groups | Fully withdrawn except one |
| • 2AD-2, D/9 "RPI at Bottom Rod Drop" | LIT |

Which of the following statements correctly describes the required immediate actions for the reactor operator?

- A. **Verify only one rod dropped or misaligned, and that reactor power stabilizes; perform subsequent actions of AP/14 (*Control Rod Misalignment*) as directed by the SRO.**
- B. **Verify only one rod dropped or misaligned, and switch rod control to manual; perform subsequent actions of AP/14 as directed by the SRO.**
- C. **Verify only one rod dropped or misaligned, and switch rod control to manual; perform subsequent actions of AP/15 (*Rod Control Malfunction*) as directed by the SRO.**
- D. **Verify no rod movement and switch rod control to manual; perform subsequent actions of AP/15 as directed by the SRO.**

Distracter Analysis:

- A. **Incorrect:** Does not switch rod control to manual.
Plausible: Reasonable actions if the candidate forgets the immediate actions.
- B. **Correct:** Immediate actions of AP/14, Case II.
- C. **Incorrect:** Does not verify another misalignment, and wrong AP.
Plausible: If the candidate misses the misalignment verification, and/or chooses the wrong AP based on its title.
- D. **Incorrect:** Correct answer for the wrong AP.
Plausible: If the candidate chooses AP/15 based on its title.

Level: RO&SRO

KA: APE 003G2.4.1(4.3/4.6)

Lesson Plan Objective: IRE SEQ 20

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-IC-IRE pages 10, 13, 21
2. AP/1/A/5500/14 page 6

Bank Question: 767**Answer: D**

1 Pt(s)

Unit 1 is responding to a small-break loss of coolant accident inside containment. Given the following events and conditions:

- Operators have implemented E-0 (*REACTOR TRIP*), and E-1 (*LOSS OF REACTOR OR SECONDARY COOLANT*) through step 10.
- Bus 1ETB is deenergized
- NI pump 1A has failed.
- Containment hydrogen concentration is 7%
- The TSC has recommended purging containment to reduce hydrogen concentration to 3.5% before starting the recombiners.

Which one of the following statements correctly describes the method for performing this evolution to minimize the off-site dose?

- A. **Containment air is exhausted to the auxiliary building where it is filtered prior to release to the unit vent stack.**
- B. **Containment air is exhausted to the containment air release system where it is filtered prior to release to the unit vent stack.**
- C. **Containment air is exhausted to the annulus where it is continuously recirculated and filtered, and retained for release after airborne contamination has been reduced below 10CFR20 limits.**
- D. **Containment air is exhausted to the annulus where it is continuously recirculated and filtered, while at the same time being exhausted via the unit vent stack.**

Distracter Analysis:

- A. **Incorrect:** Air is released to the annulus area.
Plausible: This could be a way to filter the release if the air was vented to the auxiliary building.
- B. **Incorrect:** Air is released to the annulus area.
Plausible: If the candidate confuses the VQ and VY systems.
- C. **Incorrect:** The air is released to the vent stack.
Plausible: If the candidate does not remember that VE releases to the stack to maintain negative pressure in the annulus.
- D. **Correct:**

Level: RO&SRO

KA: EPE 009G2.3.9(2.5/3.9)

Lesson Plan Objective: VX SEQ 4

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-CNT-VE pages 5- 7
2. OP-CN-CNT-VX pages 6, 9-10
3. OP-CN-CNT-VQ pages 7, 9
4. OP-CN-PSS-VA page 23

Bank Question: 768**Answer: B**

1 Pt(s) Unit 1 is at 25% power when a loss of main feedwater occurs. Given the following events and conditions:

- The main turbine trips.
- CA pumps 1A and 1B start automatically.
- CA flow to the S/Gs was throttled when the S/G A N/R level was greater than 11%.
- Control valve 1CA-62A to S/G A cannot be closed.

Assuming no operator action, which one of the following statements correctly describes the consequences of failing to mitigate this malfunction?

- A. The reactor will be overcooled causing a criticality concern.
- B. S/G A will be overfilled causing a main steam pipe stress concern.
- C. The reactor will be overcooled causing a pressurized thermal shock concern.
- D. S/G A will be overfilled causing a feed ring thermal stress concern.

Distracter Analysis:

- A. **Incorrect:** The reactor remains critical and maintains programmed Tave.
Plausible: could be a concern if the reactor tripped.
- B. **Correct:**
- C. **Incorrect:** The reactor does not see a significant cooldown.
Plausible: could be a concern if the reactor tripped.
- D. **Incorrect:** The feed rings are designed to withstand the shock of CA flow.
Plausible: A possible concern if the candidate does not understand S/G design.

Level: RO&SRO

KA: APE 054AK3.03(3.8/4.1)

Lesson Plan Objective: SM LPRO 25

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-STM-SM pages 16-17
2. AP/1/A/550/06 page 2
3. OP-CN-TA-PTS pages 18, 20, 22
4. OP-CN-CF-CA pages 10,11,15

Bank Question: 769**Answer: C**

1 Pt(s)

Unit 1 is recovering from a loss of secondary coolant accident. Safety injection initiated properly. A total loss of feedwater has caused the operators to implement FR-H.1, (*Loss of Secondary Heat Sink*). Given the following plant conditions:

- | | |
|-----------------------------|----------|
| • NCS Pressure | 2335psig |
| • NCS Temperature | 565°F |
| • S/G 1A, 1B, 1C Pressure | 1180psig |
| • S/G 1A, 1B, 1C Level (WR) | 2% |
| • S/G 1D Pressure | 100psig |
| • S/G 1D Level (WR) | 35% |
| • VI system pressure | 10psig |
| • Containment pressure | 3.4psig |

Which one of the following actions is initially required to assure the maintenance of adequate core cooling?

- A. Depressurize S/G 1A, 1B, and 1C to allow feeding the S/G using the condensate system.
- B. Reset the CAPT and align it to feed S/G's 1A, 1B and 1C.
- C. Open 1NC-32B (*PZR PORV*) and 1NC-34A (*PZR PORV*) using nitrogen pressure.
- D. Reset safety injection and containment phase "A" isolation signals to re-establish instrument air pressure to open 1NC-32B and 1NC-34A.

Distracter Analysis:

- A. **Incorrect:** Can't feed dry S/G's
Plausible: if the candidate does not recognize dry S/G criteria met, this is one FR-Z.1 recovery method.
- B. **Incorrect:** Can't feed dry S/G's
Plausible: if the candidate does not recognize dry S/G criteria met, this is one FR-Z.1 recovery method.
- C. **Correct:**
- D. **Incorrect:** Must reset S_p to reopen VI valves.
Plausible: if the candidate thinks that VI is a phase "A" isolated system.

Level: RO&SRO

KA: WE05AA1.1(4.1/4.0)

Lesson Plan Objective: FRH LPRO 5

Source: New

Level of knowledge: analysis

References:

1. OP-CN-EP-FRH page 6

Bank Question: 771**Answer: D**

1 Pt(s)

Unit 1 is operating at 100% power and Unit 2 is refueling. Unit 1 is releasing a waste gas decay tank when a significant leak develops on a piping flange upstream of the isolation valve.

Which one of the following statements correctly describes the automatic and/or manual actions required to assure that the airborne contamination from the leak is contained and filtered in the auxiliary building?

- A. **1EMF-50 (*Waste Gas Disch*) automatically stops the auxiliary building ventilation unfiltered exhaust fans. Auxiliary building filtered exhaust and supply fans continue to operate.**
- B. **1EMF-41 (*Aux Bldg Vent Hi Rad*) will trip the auxiliary building supply fans. The operators must manually trip the auxiliary building unfiltered exhaust fans and start the filtered exhaust fans.**
- C. **1EMF-37 (*Unit Vent Iodine*) automatically stops the auxiliary building ventilation unfiltered exhaust fans and starts the filtered exhaust fans. The operators must manually stop the supply fans.**
- D. **1EMF-35 (*Unit Vent Part Hi Rad*) automatically stops the auxiliary building ventilation unfiltered exhaust fans, which trips the auxiliary building supply fans. The auxiliary building filtered exhaust fans continue to run.**

Distracter Analysis:

- A. **Incorrect:** EMF-50 does not secure the VA UF fans. Loss of the UF exhaust fans would trip the supply fans.
Plausible: partially correct – filtered exhaust fans would continue to run. 1EMF-50 sounds like a monitor that could be relied upon to terminate a release to a leak in the Aux Bldg.
- B. **Incorrect:** There are automatic actions associated with 1EMF-41 to terminate a release into the auxiliary building (AB).
Plausible: EMF-41 is an ARM that will alarm under these conditions.
- C. **Incorrect:** EMF-37 will not cause the filtered exhaust fans to start - the supply fans will automatically trip when the unfiltered exhaust fans trip
Plausible: partially correct – EMF 37-stops the VA UF exhaust fans.
- D. **Correct:** EMF-35 trips the ABUF exhaust fans – which in turn trips the AB supply fans. The AB filtered exhaust fans continue to run.

Level: RO&SRO

KA: APE 060AK3.02(3.3/3.3)

Lesson Plan Objective: VA LPRO 9

Source: New

Level of knowledge: analysis

References:

1. OP-CN-PSS-VA pages 8, 13, 14, 16, 23
2. OP-CN-WE-EMF pages 9, 10, 17-18

Bank Question: 773**Answer: D**

1 Pt(s)

You are manually preparing a red tag Removal and Restoration (R&R). You notice a red stamp on the electrical one-line drawing you are using that reads 'Interim As Built' along with 'CNEE-05163' written in the space next to the stamp.

What is the next action that is required prior to using this drawing to complete the R&R?

- A. **Note the modification number on the R&R Record Sheet for tracking purposes.**
- B. **Go to the WCC to verify that the modification changes do not affect the R&R.**
- C. **Notify the NSM Coordinator that the drawing needs to be updated prior to completing the R&R preparation.**
- D. **Go to the Control Room to verify that the modification changes do not affect the R&R.**

Distracter Analysis:

- A. **Incorrect:** the drawing accuracy must be verified
Plausible: a reasonable answer if the notation were only administrative
- B. **Incorrect:** the WCC does not maintain as-built information for electrical drawings.
Plausible: WCC does maintain flow diagrams.
- C. **Incorrect:** this will not get the tags hung – it is not enough to notify the NSM Coordinator.
Plausible: This would be the correct action if the drawing modification number on the red-marked as-built does not match the control room copy of the affected VTO drawing. The NSM is responsible for the accuracy of drawing database.
- D. **Correct:**

Level: RO&SRO

KA: Admin G2.1.24(2.8/3.1)

Lesson Plan Objective: ADM-NSO2 SEQ 2

Source: New

Level of knowledge: memory

References:

1. OMP 2.10 pages 3, 5-6
2. OP-CN-AD-NSO2 page 8

Bank Question: 774**Answer: C**

1 Pt(s)

Unit 2 is in a refueling outage with core alterations in progress. IAE is performing a calibration of source range detector N-31.

Which one of the following statements correctly describes the actions required when BDMS channel B fails low?

- A. Suspend core alterations until the RMW pump capacity is verified to be less than COLR limits.
- B. Core alterations may continue because one channel of BDMS and channel N-32 remain operable.
- C. Suspend core alterations and verify that unborated water sources are isolated.
- D. Core alterations may continue because channel N-32 remains operable and the RMW pump capacity was verified to be less than COLR limits during refueling prerequisites.

Distracter Analysis:

- A. **Incorrect:** the unborated sources must be verified closed.
Plausible: this would be true if both SR instruments were in service.
- B. **Incorrect:** core alterations must be suspended, must have both SR's or both BDMS.
Plausible: a reasonable approach considering many plants don't have to have BDMS.
- C. **Correct:**
- D. **Incorrect:** core alterations must be suspended.
Plausible: an even more reasonable approach considering many plants don't have to have BDMS

Level: RO Only

KA: G2.2.22 (3.4 / 4.1)

Lesson Plan Objective: FH-FHS SEQ 6

Source: New

Level of knowledge: memory

References:

1. OP-CN-FH-FHS page 21
2. Tech Spec 3.9.2

Bank Question: 775**Answer: C**

1 Pt(s)

Unit 1 is conducting a refueling outage. A large pump motor has been removed from containment to a tent enclosure in a maintenance shop for overhaul on the back shift. Given the following events and conditions:

- Radiation Protection has authorized work to be conducted to disassemble this motor under RWP-XXXX on the back shift.
- The radiological conditions stated in this RWP do NOT include working in high airborne contamination areas.
- The disassembly of the motor causes internal contamination to become airborne inside the tent enclosure that surrounds the motor at 0200.
- Shift workers evacuate the tent and reassess their options in order to resume the work.
- All of the workers are qualified to use respirators.
- RP cannot support issuing a new RWP until the day shift arrives.
- This job is on the critical path for the outage and must be resumed as soon as possible.

Which one of the following statements correctly describes the correct procedure for resuming work on this motor that will also minimize job down time?

- A. **Workers may continue to work under RWP-XXXX as long as they wear respirators and do not incur any internal contamination.**
- B. **Workers may continue to work under any standing (S) RWP that allows access to airborne contamination areas and authorizes use of respirators.**
- C. **Workers may continue to work for the remainder of this shift provided that RP is advised of the changed conditions and authorizes the work under RWP-XXXX with proper respiratory protection.**
- D. **Workers may not continue to work until the day shift when a new RWP can be issued that includes precautions for access to airborne contamination areas.**

Distracter Analysis:

- A. **Incorrect:** cannot resume work under RWP-XXXX because this RWP does not authorize work in airborne contamination areas.

Plausible: respirators would protect the workers from inhaling the airborne contamination.

- B. Incorrect:** Cannot use SRWPs for work that is being tracked under an RWP. The dose for the job would not be properly tracked or reported.

Plausible: Some SRWPs may allow access to contaminated areas.

- C. Correct:** Work may continue under the current RWP for one shift if authorized by RP.

- D. Incorrect:** Work may continue under the current RWP for one shift if authorized by RP.

Plausible: Work could be resumed under a new RWP but this would not be the quickest way to resume the work.

Level: RO&SRO

KA: Admin G2.3.10 (2.9/3.3)

Lesson Plan Objective: RAD-HP LPRO 9

Source: New

Level of knowledge: comprehension

References:

1. GET Radiation Worker Training pages 95-96
1. OP-CN-RAD-HP pages 18, 25, 28

Bank Question: 776**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% when a LOCA with loss of offsite power occurs. Given the following events and conditions:

- DG 1A fails to start.
- The operators are entering E-1, (*Loss of Reactor or Secondary Coolant*).

Given the following critical safety function status indications:

- Containment – RED
- Core Cooling – ORANGE
- Heat Sink – RED
- NC Integrity – GREEN
- NC Inventory - GREEN
- Subcriticality – GREEN

What procedure should the operator implement?

- A. Transition to FR-Z.1, (*Response to High Containment Pressure*).
- B. Transition to FR-C.2, (*Response to Degraded Core Cooling*).
- C. Transition to FR-H.1, (*Response to Loss of Secondary Heat Sink*).
- D. Transition to ECA-0.0 (*Loss of all AC Power*)

Distracter Analysis:

- A. **Incorrect:** heat sink is the highest priority RED
Plausible: if the candidate picks the first RED condition on the list.
- B. **Incorrect:** heat sink is the highest priority RED
Plausible: core cooling has priority over heat sink – but orange path is subordinated to any red path.
- C. **Correct:** Heat sink has priority over containment – red path has priority over all other paths.
- D. **Incorrect:** heat sink is the highest priority RED
Plausible: ECA-0.0 is the correct answer if 1ETB was not energized.

Level: RO&SRO

KA: G2.4.17 (3.1/3.8)

Lesson Plan Objective: EP-INTRO LPRO 1

Source: Bank Ques_776

Level of knowledge: memory

References:

1. OP-CN-EP-INTRO page 6, 8
2. OMP 1-7 pages 9-10

Bank Question: 779**Answer: C**

1 Pt(s)

The crew is realigning a control bank C, group 1 rod in accordance with OP/1/A/6150/008, (*Rod Control*), Enclosure 4.6, (*Rod Retrieval (>12 Steps Misaligned)*). The RO has been directed to operate the lift coil disconnect switches in accordance with the enclosure. Given the following events and conditions:

- The lift coil disconnect switches for the unaffected rods in control bank C group 1 are in the DISCONNECTED position
- The misaligned rod lift coil disconnect switch is in the CONNECTED position.

Which of the following additional actions (if any) must be performed to correctly realign the affected control rod?

- A. **Place the misaligned rod lift coil disconnect switch to DISCONNECTED and return the unaffected group 1 rods to CONNECTED.**
- B. **Place all the lift coil disconnect switches for control banks A, B, D and control bank C group 2 rods in DISCONNECTED.**
- C. **Place all lift coil disconnect switches for control bank C Group 2 rods in DISCONNECTED.**
- D. **No additional actions are necessary; continue with the misaligned rod alignment.**

Distracter Analysis: The next step in the procedure reads:

2.10 Disconnect all lift coils in the affected bank, except for the affected rod, by placing the control rod disconnect switches in the "DISCONNECTED" position.

- A. **Incorrect:** This action would further exacerbate the misaligned rod
Plausible: operator feels the action taken is backwards from what's required
- B. **Incorrect:** not correct to disconnect rods that are not part of bank C
Plausible: operator feels all the control bank rods, except the misaligned one should be in disconnect.
- C. **Correct:** if group 2 is not disconnected – then they will move when the misaligned rod is realigned.
Plausible: all the control rods in the bank, group 1 and 2, except the misaligned one should be in disconnect

- D.** **Incorrect:** this will cause group 2 of bank C rods to move.
 Plausible: operator believes the actions taken are correct.

Level: RO&SRO

KA: APE 005 EA1.2 (3.7/3.5)

Lesson Plan Objective: IRE SEQ 10, 17

Source: New

Level of knowledge: comprehension

References:

1. OP-6150/008
2. Lesson IRE page 12

Bank Question: 780**Answer: A**

1 Pt(s)

Unit 1 was operating at 100% power when a reactor trip occurred. The crew is verifying natural circulation in ES-0.1 (*Reactor Trip Response*).

Given the following events and conditions:

- NC WR Thot 580°F, stable
- NC WR Tcold 555°F, stable
- NC Pressure 1920 psig
- Core Exit Thermocouples 585°F, stable
- Steam Generator pressure 1090 psig, stable
- Steam Generator narrow range level off scale low
- Steam Generator wide range level 70%
- CA flow 400 gpm per steam generator

Which one of the following statements correctly describes the status of natural circulation?

REFERENCES PROVIDED: Databook Curve 1.4

- A. All conditions are met; natural circulation is established.
- B. Natural circulation is not established; subcooling is insufficient.
- C. Natural circulation is not established; heat sink is insufficient.
- D. Natural circulation is not established; NC delta T is insufficient.

Distracter Analysis:

Objective: Explain the bases of Enclosure 1 (Foldout Page) actions of EP/1/A/5000/ES-0.1 (*Reactor Trip Response*).

- A. **Correct:**
- B. **Incorrect:** subcooling is greater than 0 °F
Plausible: operator error determining subcooling
- C. **Incorrect:** heat sink is satisfactory – have SG WR level = 70% with 400 gpm CA flow
Plausible: operator believes NR level required for heat sink
- D. **Incorrect:**
Plausible: operator looks for normal at power delta T

Level: RO Only

KA: WE 09 EK2.1 (3.2/3.4)

Lesson Plan Objective: EP1 SEQ 15

Source: New

Level of knowledge: analysis

References:

1. OP-CN-EP-EP1 pages 6-7
2. ES-0.1 page 21

Bank Question: 782**Answer: B**

1 Pt(s)

Which one of the following statements correctly describes the purpose of the time delay associated with the "KC HX A RN Outlet Flow-Lo" Annunciator on 1AD-12 following a safety injection signal?

- A. To allow time for the 1A RN pump to reach full speed and flow following a sequencer start.
- B. To allow time for 1RN-291 (KC HX 1A OUTLET THROTTLE) to stroke open.
- C. To allow time for 1RN-287A (KC HX 1A INLET ISOL) to stroke open.
- D. To allow time for the 1KC-C37A (TRAIN A MINIFLOW ISOL) to stroke open.

Distracter Analysis:

- A. **Incorrect:** the RN pump starts without a time delay
Plausible: pumps start on Ss signal.
- B. **Correct:** The "KC HX A(B) RN Outlet Flow-Lo" Annunciator (OBJ #15,) is interlocked with an Ss signal such that the alarm will only be enabled while a Ss signal is present. It also provides a 72 second time delay after the Ss signal to allow the RN valve to stroke full open.
- C. **Incorrect:** These valves do not move.
Plausible: If the candidate confuses the inlet isolation valves with the throttle valves
- D. **Incorrect:** These valves do not affect RN flow to the heat exchanger.
Plausible: if the candidate confuses the miniflow isolation valves with the heat exchanger isolation valves – some miniflow valves have automatic actions.

Level: RO&SRO

KA: APE 026 AA1.07 (2.9/3.0)

Lesson Plan Objective: KC SEQ 15

Source: New

Level of knowledge: memory

References:

1. KC lesson page 8 of 26
2. OP/1/A/6100/010M 1AD-12 D/2

Bank Question: 783**Answer: C**

1 Pt(s)

Unit 2 is operating at 100% power. Given the following events and conditions:

- Pressurizer pressure control is in automatic
- One set of backup heaters is energized in "ON"
- Actual pressurizer pressure is 2270 psig

The pressurizer master pressure controller malfunctions and the setpoint is step changed from 2235 psig to 2335 psig.

Which one of the following statements correctly describes the initial automatic responses in the pressurizer pressure control system as a result of this failure?

- A. PORV 2NC-34A opens, spray valves open, and pressurizer heaters deenergize
- B. PORV 2NC-32B and 2NC-36B open, spray valves open, and pressurizer heaters deenergize
- C. Spray valves close and pressurizer heaters energize
- D. All PORVs remain closed, spray valves open and pressurizer heaters energize

Distracter Analysis:

In this question, the step change in the pressurizer master controller initially makes it appear as if the plant is below the proper setpoint for pressure. The initial response will be to increase pressure – and pressure will slowly increase until actual pressure is high.

- A. **Incorrect:** Not the initial response - this is the response to an actual high-pressure condition
Plausible: operator believes that the setpoint of 2335 psig will open the PORV – this series of events would occur after pressure has increased
- B. **Incorrect:** Not the initial response - this is the response to an actual high-pressure condition
Plausible: operator believes setpoint increase causes spray valves to open, and the other two PORV respond to a “high” pressure condition.

- C. **Correct:** system responds to “low” pressure condition. Heaters energize, spray valves that were open, will close.
- D. **Incorrect:** spray valves will not open
Plausible: partially correct – PORV remain closed and pressurizer heater will energize

Level: RO&SRO

KA: APE 027 AK2.03 (2.6/2.8)

Lesson Plan Objective: IPE SEQ 8, 10

Source: New

Level of knowledge: analysis

References:

1. IPE pages 8, 14, 15

Bank Question: 786**Answer: B**

1 Pt(s)

Which of the following conditions would be consistent with excessive number 2 seal leakage on an operating NCP?

- A. 1AD-7, C/2, "NCP #1 SEAL LEAKOFF LO FLOW" and 1AD-7, B/3 "NCP #1 SEAL LO D/P" annunciators lit.
- B. 1AD-7, C/2, "NCP #1 SEAL LEAKOFF LO FLOW" annunciator lit, only.
- C. 1AD-7, C/1, "NCP #1 SEAL LEAKOFF HI FLOW" and 1AD-7, B/3, "NCP #1 SEAL LO D/P" annunciators lit.
- D. 1 AD-7, B/1 "NCP #1 SEAL OUTLET HI TEMP" annunciator lit, only.

Distracter Analysis:

- A. **Incorrect:** C/2 cause is #1 seal damage or #2 seal failure, B/3 cause is loss of #1 seal.
Plausible: operator believes that the failure of the number 2 seal will cause seal d/p to decrease.
- B. **Correct:**
Plausible: Number 2 seal leakoff increasing will rob flow from the number 1 seal, leakoff will decrease.
- C. **Incorrect:** cause for C/1 is damaged or cocked #1 seal.
Plausible: as stated previously, operator feels the failure will decrease number 1 d/p.
- D. **Incorrect:** B/1 caused by insufficient cooling water.
Plausible: operator feels the failure will cause a seal outlet temperature to increase.

Level: RO&SRO

KA: APE 015 AK2.07 (2.9/2.9)

Lesson Plan Objective: NCP SEQ 12

Source: New

Level of knowledge: comprehension

References:

1. OP/1/B/6100/010H annunciators B/1, B/3, C/1, C,2

Bank Question: 788**Answer: D**

1 Pt(s)

Unit 1 was operating at 100% power when a total loss of offsite and onsite AC electrical power occurred. Given the following events and conditions:

- The crew is performing the actions of ECA-0.0 (*LOSS OF ALL AC POWER*).
- Power has not been restored.
- The operator reports core exit thermocouples read 1200°F and increasing.

Which one of the following statements correctly describes the actions the crew should take?

- A. **Immediately go to FR-C.1 (*RESPONSE TO INADEQUATE CORE COOLING*).**
- B. **Remain in ECA-0.0 until after power is restored to at least one emergency bus then transition to FR-C.1**
- C. **Complete ECA-0.0 and when directed to implement monitoring CSF status trees in the appropriate recovery procedure, verify a valid RED path exists and transition to FR-C.1.**
- D. **Immediately transition to EG/1/A/CSAM/SACRG1 (*SEVERE ACCIDENT CONTROL ROOM GUIDELINE INITIAL RESPONSE*).**

Distracter Analysis:

Step 30, IF core exit temperatures greater than 1200 °F AND increasing, THEN GO TO EG/1/A/CSAM/SACRG1 (Severe Accident Control Room Guideline Initial Response).

- A. **Incorrect:** must immediately transition to SACRG1
Plausible: operator knows an immediate transition is necessary but believes C.1 is appropriate.
- B. **Incorrect:** must immediately transition to SACRG1
Plausible: operator believes one emergency bus must be restored prior to addressing the inadequate core cooling condition.
- C. **Incorrect:** must immediately transition to SACRG1
Plausible: operator follows the normal rules of usage regarding Red and Orange paths in ECA-0.0
- D. **Correct:** efforts to adequately cool the core have failed, SAMG usage is appropriate

Level: RO&SRO

KA: APE 055 EA1.01 (3.7/3.9)

Lesson Plan Objective: CRG-1 SEQ 2

Source: New

Level of knowledge: memory

References:

1. ECA-0.0 page 23 step 30
2. OP-CN-EP-CRG-1 page 6

Bank Question: 789**Answer: C**

1 Pt(s)

Unit 1 was shutdown for refueling in mode 6.

IAE was calibrating set points on various area radiation monitors when the following occurred:

- 1WL-867A, (*VUCDT CONT ISOL*) closed
- 1WL-825A, (*CONT SMP PMPS DISCH CONT ISOL*) closed

Which one of the following EMFs caused this action?

- A. 1EMF-49(L) (*Liquid Waste Discharge Monitor*)
- B. 1EMF-52 (*Clean Area Floor Drain Monitor*)
- C. 1EMF-53(A) (*Containment Hi Range Monitor*)
- D. 1EMF-54 (*Unit Vent Hi Range Monitor*)

Distracter Analysis:

- A. **Incorrect:** does not automatically isolate 1WL-867A and 1WL-825A
Plausible: 1EMF-49 provides automatic isolation signal to 1WL-124 to terminate a liquid release
- B. **Incorrect:** does not automatically isolate 1WL-867A and 1WL-825A
Plausible: 1EMF-52 automatically diverts flow from turb bldg sump to ND and NS sump.
- C. **Correct:**
- D. **Incorrect:** does not automatically isolate 1WL-867A and 1WL-825A
Plausible: Automatically trips sample pump supplying EMF-35, 36 and 37

Level: RO&SRO

KA: SYS 072A4.01(3.0*/3.3)

Lesson Plan Objective: WE-EMF LPRO 2

Source: New

Level of knowledge: memory

References:

1. OP-CN-WE-EMF page 11, 12
2. OAC alarm response

Bank Question: 790**Answer: C**

1 Pt(s)

Unit 1 is operating at 100% power and is preparing to discharge a waste monitor tank (WMT). Given the following events and conditions:

- IAE has been unable to adjust the 1EMF-49 (*LIQUID WASTE DISCH*) to the required trip 2 setpoint specified on the discharge permit.
- 1EMF-49 operates properly in all other calibration tests
- 1EMF-57, (*WMT LIQUID DISCHARGE*) is operable
- Secondary coolant activity is 0.005 micro curies/gram dose equivalent Iodine 131.

Which one of the following statements correctly describes the complete set of actions that must be completed before releasing contents of the WMT?

REFERENCES PROVIDED: - SLC 16.11-2**A.**

- The release may proceed for up to 30 days provided that the flow rate is estimated once every four hours.
- 1EMF-57 can be used to monitor the release path.

B.

- The release may proceed for up to 30 days provided that the flow rate is estimated once every four hours.
- A dedicated operator must be stationed at 1EMF-49 to monitor the release rates and ensure that the setpoint is not exceeded.

C.

- Two independent analyses of the WMT contents must be performed prior to the start of the release.
- The discharge permit calculations and the release path valve line-up must be independently verified.

D.

- The release may proceed for up to 14 days provided that grab samples are taken once per 24 hours.
- 1EMF-57 can be used to monitor the release path.

Distracter Analysis:**A.**

Incorrect: need to IV the calculations and the release path.

Plausible: Partially correct – This is part of action statement D – the candidate may mistakenly refer to 3.d (monitor tank building waste liquid effluent line) -which is the discharge line in use. 1EMF-57 is used to monitor the release.

- B. Incorrect:** Cannot use a dedicated operator to monitor the release – need to IV the calculations and the release path and two analyses of RMT are required.
Plausible: This is part of action statement D – the candidate may mistakenly refer to 3.d (monitor tank building waste liquid effluent line) -which is the discharge line in use.
- C. Correct:** action statement C in SLC 16.11-2
- D. Incorrect:** Grab sample are not required - need to IV the calculations and the release path and two analyses of WMT are required.
Plausible: First action is the corrective action for loss of IEMF-31 in the same SLC table. If the candidate refers to the wrong corrective action, this is possible. This is action statement E of the SLC –may select this statement if the candidate mistakenly references 1.b – IEMF-57 is used to monitor the release.

Level: RO Only

KA: SYS 068A2.04 (3.3 / 3.3)

Lesson Plan Objective: WE-WL SEQ 16

Source: New

Level of knowledge: comprehension

References:

1. SLC 16.11-2 - PROVIDED

Bank Question: 791**Answer: B**

1 Pt(s)

Unit 1 was operating at 100% power when a reactor trip occurred on low pressurizer pressure. Given the following events and conditions:

- Main steamlines isolated
- Safety injection actuated
- NC temperature initially decreased to 400°F then increased rapidly
- NC pressure initially decreased to 1700 psig then increased rapidly
- Pressurizer level initially decreased to 0% then increased rapidly
- Containment temperature is 100°F
- Pressurizer tailpipe temperatures 120°F
- Containment EMF trip 1 lights are dark
- All steam generator pressures approximately 700 psig and stable
- All steam generator narrow range levels are off scale low, wide range levels are increasing

Based on these indications, which of the following events has occurred?

- A. Pressurizer safety or PORV has failed open.
- B. Steam line break downstream of the MSIVs.
- C. Small break LOCA
- D. Steam line break upstream of the MSIVs.

Distracter Analysis:

- A. **Incorrect:** tailpipe temps are normal, as is containment parameters
Plausible: candidate misinterprets the pressure and temperature response and holds to the increasing pressurizer level.
- B. **Correct:** when isolated, NC pressure and temperature will begin to increase.
- C. **Incorrect:** normal containment conditions
Plausible: operator believes NI flow is causing the system to recover.
- D. **Incorrect:** system would not recover as described
Plausible: candidate confuses upstream and downstream of the MSIVs

Level: RO&SRO

KA: APE 040 AA1.12 (4.2/4.2)

Lesson Plan Objective: EP1 SEQ 23

Source: New

Level of knowledge: analysis

References:

1. E-0, steps 24, 25, 26

Bank Question: 792**Answer: C**

1 Pt(s)

Unit 1 is operating at 100% power. The spare battery charger (1ECS) is being aligned to replace charger 1ECA.

How would the operators know if 1ECS was being supplied by motor control center 1EMXJ in this lineup?

- A. **1AD-11 H/1 (125 VDC ESS PWR CHANNEL A TROUBLE) will clear when the 1EDA tie breaker to 1EDC is closed.**
- B. **1AD-11 H/1 (125 VDC ESS PWR CHANNEL A TROUBLE) will alarm when the 1EDS output breaker to 1EDA/C is closed.**
- C. **1AD-11 I/6 (STBY CHARGER 1ECS INPUT/OUTPUT TRAINS X-CONNECTED) will alarm when the 1EDS output breaker to 1EDA/C is closed.**
- D. **1 SI-14 STANDBY CHARGER ECS TRAIN A BKRS CLOSED status light will light when the 1EDA tie breaker to 1EDC is closed.**

Distracter Analysis:

- A. **Incorrect:** the 125VDC trouble annunciator will light.
Plausible: this would eliminate the CR alarm caused when the spare charger is in service.
- B. **Incorrect:** the trouble annunciator will alarm when the 1EDA tie breaker is closed.
Plausible: if the candidate confuses this annunciator with the cross-train alarm.
- C. **Correct:**
- D. **Incorrect:** the status light for B train will light when 1EMXJ power to 1ECS is aligned.
Plausible: if the candidate does not understand the power supply status light monitoring.

Level: RO&SRO

KA: G2.1.31(4.2 / 3.9) aware of the control room

Lesson Plan Objective: EL-EPL SEQ 3

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-EL-EPL pages 9, 15-16, 24
2. ARP 1AD-11; I/6
3. ARP 1AD-11; H/1

Bank Question: 793**Answer: D**

1 Pt(s)

Unit 2 is operating at 100% power with all rods out.

An operator notices that one core exit thermocouple for quadrant II on the plasma display indicates 2200°F.

Which of the following correctly describes a reason for this thermocouple to be much higher than the other thermocouples?

- A. The thermocouple reference junction temperature has increased.
- B. The thermocouple reference junction temperature has decreased.
- C. The thermocouple measuring junction has an open circuit.
- D. The thermocouple measuring junction has shorted.

Distracter Analysis: The voltage across a thermocouple junction increases as the temperature of that junction increases. A shorted measuring junction will cause the temperature to fail high.

- A. **Incorrect:** the temperature measured is based on the difference on voltage between the reference junction (at 165 °F) and the T/C. If the reference junction is heated above 165 °F, then the voltage difference will decrease and the temperature signal will decrease.
Plausible: if the candidate reverses the effects
- B. **Incorrect:** the temperature measured is based on the difference on voltage between the reference junction (at 165 °F) and the T/C. If the reference junction is cooled below 165 °F, then the voltage difference will increase and the temperature signal will increase. However, the increase of 1600 °F is not possible because the reference junction temperature cannot be cooled enough.
Plausible: the effect of a decrease in reference junction temperature will be to make the measured temperature increase.
- C. **Incorrect:** an open measuring junction causes the temperature indication to fail LOW not high.
Plausible: if candidate believes that like an RTD and open causes a high reading
- D. **Correct:** a shorted thermocouple causes the removal of the difference in EMF, the TC will read high.

Level: RO&SRO

KA: 017 A2.01 (3.1/3.5)

Lesson Plan Objective: IG SEQ 2

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-SS-IG page 10
2. OP-CN-TA-AM page 26
3. OP-CN-PS-CCM page 15

Bank Question: 794**Answer: C**

1 Pt(s)

There is a fire in the Unit 1 B-train blackout switchgear room. In accordance with the site fire plan, the fire brigade captain has decided to isolate the B-train blackout bus electrically and attack the fire with hoses.

Which of the following correctly describes the impact of these events and conditions on the plant's ability to combat this fire?

- A. The fire brigade will be able to spray down the fire because fire hoses can be pressurized from the A-train fire header.
- B. The fire brigade will be able to spray down the fire but with reduced fire main capacity. Only one of the fire pumps will be available from an operable power supply.
- C. The fire brigade will be able to spray down the fire. Two of the fire pumps will be available from an operable power supply.
- D. The fire brigade will not be able to spray down the fire. The blackout bus provides power to the fire pumps.

Distracter Analysis:

- A. **Incorrect:** there is only one fire main with redundant pumps.
Plausible: if the candidate thinks that the fire main has train separation.
- B. **Incorrect:** there will be 2 pumps running, not only one.
Plausible: if the candidate thinks both Unit 1 fire pumps are powered from the same bus.
- C. **Correct:** 3 fire pumps are powered from 1TC, 1FTB and 2FTA – only 1FTB is deenergized.
- D. **Incorrect:** there will be water available.
Plausible: if the candidate does not know that redundant blackout power supplies are available.

Level: RO Only

KA: SYS 086K3.01(2.7 / 3.2)

Lesson Plan Objective: SS-RFY SEQ 2

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-SS-RFY page 8

Bank Question: 795**Answer: D**

1 Pt(s)

Unit 1 is operating at 100% power with rod control in manual. Given the following events and conditions:

- Maintenance is conducting a valve stroke test on 1NI-147B (*NI PMP RECIRC TO FWST*) with the plant at full power.
- The SRO directs the balance of plant (BOP) operator to operate 1NI-147B in support of the maintenance procedure.

While the valve is stroking (both indicating lights on), an annunciator 1AD-7 F/3 (*LETDN HX OUTLET HI TEMP*) alarms.

Which of the following actions describes BOP's actions in response to this condition?

- A. The BOP should immediately ensure correct letdown and KC flow to the letdown heat exchanger.
- B. The BOP should ensure 1NI-147B is closed, and then ensure correct KC flow to the letdown heat exchanger.
- C. The BOP should immediately verify letdown heat exchanger outlet temperature and ensure correct letdown and KC flow.
- D. The BOP should ensure 1NI-147B is open and then verify letdown and KC flow to the letdown heat exchanger.

Distracter Analysis:

- A. **Incorrect:** BOP must first address NI inoperability due to 147 not open.
Plausible: These are the ARP immediate actions.
- B. **Incorrect:** 1NI-147 needs to be open to restore operability.
Plausible: If the operator incorrectly assesses operability.
- C. **Incorrect:** BOP must first address NI inoperability due to 1NI-147 not open.
Plausible: a more correct description of BOP response than A.
- D. **Correct:**

Level: RO Only

KA: G2.2.23(2.6 / 3.8)

Lesson Plan Objective: ADM-TS SEQ 5

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-ADM-TS page 22
2. OMP 1.7 page 9
3. ARP 1AD-7; F/3

Bank Question: 796**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power. Given the following events and conditions:

- 1 AD-6 F/10, (*PRT HI TEMP*) in alarm
- 1 AD-6 F/11 (*PRT HI PRESS*) in alarm
- Lower containment temperature = 124 °F
- The NC system is at normal operating temperature
- Letdown is in service

Which one of the following statements correctly describes a condition that could cause these alarms?

- A. The PRT has heated up due to ambient containment temperature.
- B. 1 ND-14, (*ND SUCTION RELIEF VALVE*) has lifted.
- C. 1 NV-15B, (*LETDN CONT ISOL*), has spuriously closed.
- D. The reactor vessel inner O-ring has leaked.

Distracter Analysis:

- A. **Incorrect:** Containment temperature is less than PRT temperature.
Plausible: Heat up from containment ambient conditions can cause this to occur if containment temperature is high enough.
- B. **Incorrect:** the ND system is too low in temperature and isolated from the NC system, to cause this to occur even if the ND suction relief were to lift.
Plausible: the ND suction relief line goes to the PRT.
- C. **Correct:** if 1NV-15B closes, the letdown relief valve 1NV-14 will lift and relieve to the PRT.
- D. **Incorrect:** the reactor vessel inner O-ring leaks to the NCDT.
Plausible: if the candidate thinks that this leaks to the PRT

Level: RO Only

KA: SYS 007A1.03(2.6/2.7)

Lesson Plan Objective: PS-NC LPRO3

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-PS-NC pages 12, 21-22, 25-26
2. OP-CN-PS-NV pages 11-13
3. OP-CN-PS-NC page 31
4. OP/1/B/6100/010G F/10, F/11

Bank Question: 797**Answer: D**

1 Pt(s)

Unit 1 is in mode 6. Given the following events and conditions:

- Both trains of SSPS are in "TEST".
- Window A/2 annunciator is received on Panel 1RAD-1

"1EMF-39 CONTAINMENT GAS HI RAD"

- 1EMF-39 is the only monitor in alarm.

Which one of the following statements correctly describes the automatic actions (if any) that should occur?

- A. 1EMF-39 has no auto actions with both trains of SSPS in test.
- B. 1EMF-39 will generate a containment evacuation alarm only.
- C. 1EMF-39 will generate a containment evacuation alarm and generate a containment ventilation isolation (S_H) signal.
- D. 1EMF-39 will generate a containment evacuation alarm and isolate containment purge.

Distracter Analysis:

- A. **Incorrect:** EMF-39 actions are not blocked by SSPS
Plausible: candidate may confuse EMF 39 with either 38 or 40, which are blocked by both trains of SSPS. Additionally, the containment evacuation alarm is only blocked by P-6
- B. **Incorrect:** will also isolate containment purge
Plausible: This is true for EMF 38 and 40
- C. **Incorrect:** will not generate containment ventilation isolation with SSPS in test.
Plausible: This is true if one train of SSPS is not in test.
- D. **Correct:** EMF-39 will directly close down VP if it goes into high alarm and both trains of SSPS are in test.

Level: RO&SRO

KA: WE 016 EK2.1 (3.0/3.1)

Lesson Plan Objective: VP SEQ 7

Source: New

Level of knowledge: memory

References:

1. OP-CN-OP/1/B/6100/010X, annunciators A/1, A/2, A/3

Bank Question: 798**Answer: A**

1 Pt(s)

Which of the following is the power supply to the unit 2 "A" Hydrogen Recombiner?

- A. 2EMXK
- B. 2SMXW
- C. 2MXW
- D. 2EMXL

Distracter Analysis: This question tests the candidates' knowledge of the thumb rules for labeling power supplies as well as the type of power provided to the recombiners. 2EMXK is the ONLY train A emergency power supply in the list.

- A. **Correct:** A and B Hydrogen recombiners are from essential power supplies, (EMXK and EMXJ)
- B. **Incorrect:** Hydrogen recombiners are powered from EMXK
Plausible: 2SMXW is a shared power supply - candidate may believe it's a shared power supply
- C. **Incorrect:** Hydrogen recombiners are powered from EMXK
Plausible: 2MXW is a blackout power supply - candidate may believe it's a blackout power supply
- D. **Incorrect:** Hydrogen recombiners are powered from EMXK
Plausible: 2EMXL is a train B power supply - candidate may confuse the A vs. B trains.

Level: RO&SRO

KA: 028 K2.01 (2.5/2.8)

Lesson Plan Objective: none

Source: New

Level of knowledge: memory

References:

1. DBD Unit 2 System and Equipment Description - section 32.4 page 55

Bank Question: 856**Answer: D**

1 Pt(s)

Units 1 and 2 were operating at 100% power when a toxic gas problem in the control room caused the operators to evacuate and establish control at the ASPs.

Which one of the following statements correctly describes the operation of Unit 1 NCP seal injection flow from the ASP(s)?

- A. Unit 1 seal injection flow can only be controlled in manual from only the Unit 1 train A ASP.
- B. Unit 1 seal injection can only be controlled in manual from both the Unit 1 train A and B ASPs.
- C. Unit 1 seal injection can be controlled in either manual or automatic from only the Unit 1 train A ASP.
- D. Unit 1 seal injection can be controlled in either manual or automatic from both the Unit 1 train A and train B ASPs.

Distracter Analysis:

- A. **Incorrect:** Seal injection flow can be controlled in both manual and automatic from both the 1A and 1B ASPs.
Plausible: partially correct
- B. **Incorrect:** Seal injection flow can be controlled in both manual and automatic from both the 1A and 1B ASPs.
Plausible: partially correct
- C. **Incorrect:** Seal injection flow can be controlled in both manual and automatic from both the 1A and 1B ASPs.
Plausible: partially correct
- D. **Correct:**

Level: RO&SRO

KA: SYS 016 K4.01 (2.8*/2.9*)

Lesson Plan Objective: RSS LPRO 13

Source: New

Level of knowledge: memory

References:

1. OP-CN-CP-RSS pages 11-12

Bank Question: 857**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power when battery charger ECA failed.

Which one of the following lineups correctly describes the proper method of providing power to EDA?

- A. Crosstie EDB directly to EDA via EDS
- B. EDD will power EDA through auctioneering diode assemblies
- C. Start ECS from EMXA and crosstie to EDA
- D. Start ECS from EMXJ and crosstie to EDA

Distracter Analysis:

- A. **Incorrect:** not physically possible – prevented by Kirk key interlock
Plausible: if candidate confuses EDB with EDC – which could be cross-tied
- B. **Incorrect:** not physically possible – this only works for EDE and EDF
Plausible: if candidate confuses EDE / EDF with EDA
- C. **Correct:** maintains train separation – protection provided by Kirk key interlock
- D. **Incorrect:** will crosstie trains A and B – prohibited by tech specs and Kirk key interlock
Plausible: this appears physically possible on the system description diagram

Level: RO Only

KA: APE 058 AK1.01 (3.4*/3.5)

Lesson Plan Objective: EPL LPRO 9

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-EP-EPL page 18, 21

FINAL RO LICENSE EXAM
REFERENCE MATERIAL

CATAWBA INITIAL EXAM
50-413, 414/2001-301

APRIL 2 - 6 & 16 - 20, 2001

Technical Specifications

3.4.13 RCS Operational LEAKAGE, Amend. 173/165

Technical Specification Bases

B 3.4.13 RCS Operational LEAKAGE, Rev. 0

Site License Commitments

16.11-2 Radioactive Liquid Effluent Monitoring Instrumentation, Rev. 9/20/99

Emergency Procedures

EP/1/A/5000/E-1 Loss of Reactor or Secondary Coolant, Rev. 12 (page 5 only)
EP/1/A/5000/ES-0.1 Reactor Trip Response, Rev. 17 (page 21 only)

Abnormal Procedures

AP/1/A/5500/17 Loss of Control Room, Rev. 41

Reactor Operating Data Book

Section 4.1 Boration and Dilution Tables - Hot RCS (Modes 1, 2 and 3), Rev. 243
Section 4.2.1 Boration and Dilution Tables - Cold RCS (Modes 4 and 5), Rev. 243
Section 4.2.2 Boration Tables - Cold RCS (Modes 4 and 5) with Makeup from FWST,
Rev. 159

FINAL SUBMITTAL

CATAWBA EXAM
50-413, 414/2001-301

APRIL 2 - 6 & 16 - 20, 2001

FINAL SRO WRITTEN EXAMINATION

*WITH ANSWERS AND LIST
OF REFERENCES*

**Nuclear Regulatory Commission
Senior Reactor Operator Licensing
Examination**

Answer Key

Catawba Nuclear Station

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April 24, 2001

SRO Examination Exam

Steam Tables – Questions 185b, 311,

Tech Specs

- 3.1.4 – question 765
- 3.4.5 – question 096.1
- 3.4.6 – question 096.1
- 3.4.13 – question 734
- 3.5.1 – question 697.1
- 3.5.2 – question 096.1
- 3.6.1 – question 515.1
- 3.6.2 – question 515.1, 762
- 3.6.13 – question 589.2
- 3.7.1 pages 1-3 – question 217.1
- 3.7.8 – Question 778
- 3.8.4 – question 770
- 3.8.7 – question 770
- 3.8.9 – question 770

SLCs:

- 16.7-10 – Question 515.1
- 16.9-3 – question 759
- 16.11-1 – Question 575

EOPs:

- E-1 page 5 – question 185.2

AOPs:

- AP/17 – question 189.1
- AP-29 enclosures 14-17 only – question 760

Other

- Reactor Operating Databook, Sections 4.1 & 4.2 – question 189.1
- 10CFR20 Appendix B Ni⁵⁶, Fe⁵⁵ and Co⁶⁰ Limits – question 575
- Curve Book curve 7.30.2 – question 697.1
- COLR Rev 17 – page 21 – question 697.1
- NSD-200 – question 121.2
- OP/0/A/6400/006/C Encl 4.12A – question 778

Bank Question: 033**Answer: B**

1 Pt(s)

Unit 1 is in a refueling outage. Given the following events and conditions:

- A full core off-load is in progress
- One spent fuel assembly is in the fuel transfer tube being transported to the spent fuel pool
- The following annunciators alarm:
 - SPENT FUEL POOL LEVEL HI/LO
 - 1EMF-17 REACTOR BLDG REFUEL BRIDGE

Which one of the following correctly describes the type of event and the required operator actions that should be performed first?

- A. **Loss of refueling cavity or spent fuel pool level.**
Install the weir gate and inflate the seals.
- B. **Loss of refueling cavity or spent fuel pool level**
Move the fuel transfer cart to the spent fuel side
- C. **Loss of spent fuel pool level only**
Move the fuel transfer cart to the reactor side.
- D. **Loss of refueling cavity level only**
Close 1KF-122 (KF Fuel Transfer Canal Isolation).

Distracter Analysis:

- A. **Incorrect:** using the weir gate is optional.
Plausible: this is one of the operator follow-up actions.
- B. **Correct:**
- C. **Incorrect:** the cart must be moved to the SFP side.
Plausible: if the problem is on the SFP side it might be reasonable to not to add more fuel to that side.
- D. **Incorrect:** level is dropping on both sides, and you can't close valve with cart in the tube.
Plausible: the candidate may choose this answer due to the EMF alarm and closing the valve is the next action.

Level: RO&SRO

KA: APE 036AA.2.02(3.2/3.9)

Lesson Plan Objective: KF LPRO 15

Source: Mod Ques_033e

Level of knowledge: memory

References:

1. OP-CN-FH-FHS pages 7, 17
2. AP/1/A/5500/26 pages 1-2

Bank Question: 051**Answer: A**

1 Pt(s)

Unit 1 was operating at 100% power when a large break LOCA occurred. Given the following events and conditions:

- ND pump 1A is tagged out for maintenance
- Containment pressure increased to 16 psig
- The operators performed FR-Z.1, (*Response to High Containment Pressure*) upon exiting E-0, (*Reactor Trip or Safety Injection*) and then transitioned to E-1 (*Loss of Reactor or Secondary Coolant*)
- Later when shifting to cold leg recirc using ES-1.3, (*Transfer to Cold Leg Recirculation*), valve 1NI-184B (*Containment Sump to Train 1B ND & NS*) fails to open
- The operators are currently implementing ECA-1.1 (*Loss of Emergency Coolant Recirculation*)
- The *Containment* critical safety function shows a valid orange path as containment pressure remains above 3 psig.

FR-Z.1 required both NS pumps to be in operation. However, ECA-1.1 limits the operators to only one NS pump in step 11.

Which one of these two procedures takes priority and what is the basis for this requirement?

- A. ECA-1.1 takes priority because it conserves FWST water level as long as possible for injection and spray flow.
- B. FR-Z.1 takes priority because it was implemented in response to a valid red path and FRPs always have priority over ECA procedures.
- C. ECA-1.1 takes priority because ECA procedures always have priority over FRPs.
- D. FR-Z.1 takes priority because the orange path for *Containment* has not been cleared.

Distracter Analysis:

- A. **Correct answer**
- B. **Incorrect:** ECA-1.1 takes priority over FR-Z.1
Plausible: FRPs normally take priority over most EOPs. There is still a valid orange path for containment
- C. **Incorrect:** wrong reason - ECAs do not always have priority over FRPs.

- Plausible:** Some ECAs take priority e.g. ECA-0.0 has priority over FRPs in that F-0 is not applicable until transition out of ECA-0.0.
- D. Incorrect:** ECA-1.1 takes priority over FR-Z.1.
- Plausible:** This is a true statement except that loss of ND suction would be a loss of core cooling rather than NCS inventory.

Level: SRO Only

KA: WE11EA2.1(3.4/4.2)

Lesson Plan Objective: FRZ LPSO 4

Source: NRC McGuire Exam 2000 Ques_051

Level of knowledge: memory

References:

1. ERG Background Document FRZ page 3
2. OMP 1-7 page 11
3. F-0 page 8

Bank Question: 080.1**Answer: D**

1 Pt(s)

Which one of the following accidents has the highest severity for pressurized thermal shock (PTS) in the NCS?

- A. Small break LOCA, NCPs running
- B. Large break LOCA, NCPs NOT running
- C. Large break LOCA, NCPs running
- D. Small break LOCA, NCPs NOT running

Distracter Analysis:

- A. **Incorrect:** PTS is worse with NCPs not running.
Plausible: small LOCAs have PTS potential.
- B. **Incorrect:** large break LOCA has little concern for PTS.
Plausible: If candidate misunderstands significance of no pressure versus NCPs not running.
- C. **Incorrect:** large break LOCA has little concern for PTS
Plausible: large break LOCAs with pumps running are more limiting in other respects.
- D. **Correct:**

Level: RO&SRO

KA: EPE 011EK3.10(3.7/3.9)

Lesson Plan Objective: PTS SEQ 13, 14

Source: Mod Ques_080

Level of knowledge: comprehension

References:

1. OP-CN-TA-PTS page 12-18

Bank Question: 096.1**Answer: B**

1 Pt(s)

Unit 1 is operating in mode 3 preparing for a reactor startup following a refueling outage. Given the following events and conditions:

- NC Pump 1C is running.
- Reactor trip breakers are tagged open.
- Maintenance determines that the MOV test data from the outage indicates that the torque switches for 1ND-65B (*TR B ND to HOT LEG ISOL*) have been set too low.
- The SWM requests OSM approval to tag shut 1ND-65B for repairs.

What one of the following statements correctly describes the operating implications or restrictions of tagging shut 1ND-65B?

REFERENCES PROVIDED: - Tech Spec's 3.4.5, 3.4.6, 3.5.2

- A. 1ND-65B may be tagged shut for 72 hours, if the steam generator in the running NC loop is operable.
- B. 1ND-65B may not be tagged shut because this would make both trains of ND inoperable.
- C. 1ND-65B may not be tagged shut, unless two NCPs are running with operable steam generators.
- D. 1ND-65B may be tagged shut, if 1ND-65B is restored to operation prior to transitioning to mode 2.

Distracter Analysis:

- A. **Incorrect:** Both trains of ND will be inoperable.
Plausible: If the candidate assumes 1 S/G and the A ND loop.
- B. **Correct:** ND-65 prevents ND flow to all 4 loops.
- C. **Incorrect:** Both trains of ND will be inoperable.
Plausible: If the candidate focuses only on decay heat removal.
- D. **Incorrect:** Both trains of ND will be inoperable.
Plausible: If the candidate assumes that one ND train is sufficient in mode 3.

Level: SRO Only

KA: G2.4.9 (3.3/3.9)

Lesson Plan Objective: ND LPSO 11

Source: Mod Ques_96e

Level of knowledge: comprehension

References:

1. OP-CN-PS-ND page 13
2. Tech Spec 3.4.5 - PROVIDED
3. Tech Spec 3.4.6 - PROVIDED
4. Tech Spec 3.5.2 - PROVIDED

Bank Question: 104.1**Answer: C**

1 Pt(s)

Unit 1 is operating at 100% power. Given the following events and conditions:

- Pressurizer pressure and level controls are in the 1-2 position.
- NCS pressure is 2200 psig
- NCS temperature is 560 °F.
- Charging flow increases
- Pressurizer level increases
- PZR low level deviation alarms.
- All pressurizer heaters remain energized throughout the event

What is the cause of these indications?

- A. **Pressurizer level master controller output fails high**
- B. **Pressurizer level channel I fails low**
- C. **NCS Loop C narrow range T_c channel fails high**
- D. **Pressurizer level channel II fails low**

Distracter Analysis: Tcold failing high causes reference level to fail high. This causes the master level controller output to go high on reference level. This causes increased charging and increased PZR level.

- A. **Incorrect:** would not cause DEV-LO alarm – not controlled by the master level output.
Plausible: would cause all other indications
- B. **Incorrect:** charging flow decreases and heaters would trip off
Plausible: will cause other symptoms.
- C. **Correct:** Heaters on due to current NCS pressure.
- D. **Incorrect:** heaters would trip off
Plausible: will cause other symptoms

Level: RO&SRO

KA: APE 028AA1.02(3.4/3.4)

Lesson Plan Objective: ILE LPSO 6

Source: Mod Ques_104

Level of knowledge: comprehension

References:

1. OP-CN-PS-ILE page 15-17, 21

Bank Question: 121.2**Answer: D**

1 Pt(s)

The night Shift Work Manager (SWM) provides a record of work hours as listed below:

3/19

1900

Started Shift Turnover

1930

Assumed shift duties

3/20

0730

Relieved of duties

0800

Departed site

1530

Called in to relieve the day shift due to illness

1600

Assumed shift duties

3/21

0730

Relieved of duties

0800

Departed site

When, if at all, was the latest possible time that a Request for Works Hours Extension could be approved?

REFERENCES PROVIDED:**NSD-200**

- A. No "*Request for Work Hours Extension*" form was needed for the operator to work the scheduled hours.
- B. A "*Request for Work Hours Extension*" form must have been completed and approved prior to the operator reporting to work at 1600 on 3/20.
- C. A "*Request for Work Hours Extension*" form must have been completed and approved prior to the operator working past 0000 on 3/21.
- D. A "*Request for Work Hours Extension*" form must have been completed and approved prior to the operator working past 0400 on 3/21.

Distracter Analysis:

NSD 200 requires that a Request for Work Hours Extension From must be submitted and approved prior to exceeding the applicable time limits – which are:

Not more than:

- 16 straight hours - not exceeded
- 16 in 24 hours - not exceeded (excludes turnover time). Worked 15.5 hours from 1930 3/19 to 1930 3/20
- 24 hours in 48 hours - exceeded. From 1930 3/19 to 1930 3/21, worked 27.5 hours.
- Less than 8 hour break - not exceeded, 8.5 hours from end of shift 0730 3/20 to assuming the shift at 1600 on 3/20

- A. **Incorrect:** operator will work greater than 24 hours in a 48 hour period.
Plausible: candidate miscalculates the limits.
- B. **Incorrect:** does not exceed 8 hours for the break.
Plausible: using the call in time, candidate might assume the break was less than 8 hours.
- C. **Incorrect:** does not exceed 16 hours in a 24 hour period
Plausible: If the candidate thinks he exceeds 16 in 24 criteria by including turnover time or uses 1930 on 3/20 to midnight 3/21 as the day.
- D. **Correct Answer:** If the operator works past 0400 on 3/21, an extension is needed due to exceeding 24 hours of work in a 48 hour period.

Level: SRO Only

KA: G2.1.5 (2.3/3.4)

Lesson Plan Objective: ADM-NS05 LPSO 8

Source: Mod Ques_121

Level of knowledge: comprehension

References:

1. OP-CN-ADM-NS05 page 8-9
2. NSD-200 - PROVIDED

Bank Question: 124.1**Answer: B**

1 Pt(s)

A team of workers must repack the seals on a pump in a 1500 mrem/hr high radiation area.

Which one of the following work teams and estimated repair times would maintain total worker exposure ALARA?

- A. 10 people working for 20 minutes
- B. 6 people working for 30 minutes
- C. 4 people working for 1 hour
- D. 3 people working for 1.5 hours

Distracter Analysis:

$N \text{ (persons)} \times T \text{ (time)} \times R/\text{hr (dose rate)} = \text{total person-dose} - \text{to be minimized to maintain exposure ALARA}$

- A. **Incorrect:** 10 people will incur 5 Rem – 6 people can accomplish the job with only 4.5 Rem.
Plausible: Each worker would have the least individual exposure – only 0.5 Rem
- B. **Correct:** total of 4.5 Rem incurred to all
- C. **Incorrect:** 4 people would incur 6 Rem - 6 people can accomplish the job with only 4.5 Rem.
Plausible: This case represents the least number of individuals not exceeding the admin dose limit.
- D. **Incorrect:** 3 people would incur 6.7 Rem - 6 people can accomplish the job with only 4.5 Rem.
Plausible: Exposes the fewest individuals.

Level: RO&SRO

KA: G2.3.2 (2.5/2.9)

Lesson Plan Objective: HP LPRO 10

Source: Mod Ques_124e

Level of knowledge: comprehension

References:

1. OP-CN-RAD-HP page 19

Bank Question: 162.1**Answer: B**

1 Pt(s)

Unit 1 is purging containment while in mode 5.

Which one of the following instruments will prevent the release of radioactivity outside containment by completing the corresponding sequence of actions?

- A. **EMF-36 (UNIT VENT GAS) will secure VP and VQ, and stops any waste gas release in progress.**
- B. **EMF-39 (CONTAINMENT GAS) will secure VP and initiate containment ventilation isolation.**
- C. **EMF-40 (CONTAINMENT IODINE) will initiate containment ventilation isolation, and shutoff containment sump pump and ventilation drain headers.**
- D. **EMF-53A/B (CONTAINMENT TRN A(B) HI RANGE) will secure VP and VQ, and shutoff containment sump pump and ventilation drain headers.**

Distracter Analysis:

- A. **Incorrect:** EMF-36 does not secure VP.
Plausible: EMF-36 monitors the final VP release and secures the others.
- B. **Correct answer**
- C. **Incorrect:** EMF-40 does not isolate containment drains.
Plausible: EMF-40 will isolate the VP release.
- D. **Incorrect:** EMF-53 will not secure VP.
Plausible: EMF-53 is a containment radiation monitor, and isolates the containment drains.

Level: RO&SRO

KA: SYS 029A3.01(3.8/4.0)

Lesson Plan Objective: EMF LPRO 2

Source: Mod Ques_162

Level of knowledge: memory

References:

1. OP-CN-WE-EMF pages 17-18

Bank Question: 185.2**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power when a steam line rupture occurred inside containment. The operators responded by entering:

- E-0 (*Reactor Trip or Safety Injection*) followed by
- E-2 (*Faulted Steam Generator Isolation*) where they isolated the rupture and then transitioned to
- E-1 (*Loss of Reactor or Secondary Coolant*).

Given the following conditions at the following times:

| Time | 0200 | 0205 | 0210 | 0215 |
|-----------------------------|------|------|------|------|
| Subcooling [°F] | +9 | +6 | +5 | +2 |
| S/G A (NR) [%] | 5 | 7 | 9 | 11 |
| S/G B (NR) [%] | 8 | 10 | 16 | 20 |
| S/G C (NR) [%] | 0 | 0 | 0 | 0 |
| S/G D (NR) [%] | 9 | 15 | 21 | 30 |
| Feed Flow A S/G [GPM] | 135 | 135 | 145 | 130 |
| Feed Flow B S/G [GPM] | 150 | 130 | 160 | 160 |
| Feed Flow C S/G [GPM] | 0 | 0 | 0 | 0 |
| Feed Flow D S/G [GPM] | 170 | 180 | 150 | 155 |
| NC pressure [psig] | 1710 | 1725 | 1750 | 1765 |
| PZR Level [%] | 15 | 18 | 21 | 25 |
| Containment pressure [psig] | 3.2 | 2.9 | 2.5 | 2.4 |

At 0200, the operators are at step 12 of E-1.

What is the earliest time that the operators can transition to ES-1.1 (*Safety Injection Termination*)?

REFERENCES PROVIDED

E-1 page 5, Steam Tables

- A. 0200
- B. 0205
- C. 0210
- D. 0215

Distracter Analysis:

- A. **Incorrect:** PZR level does not meet the ACC of 20%.

- Plausible:** If the candidate uses non-ACC value of 11%.
- B. Incorrect:** PZR and SG levels do not meet the ACC of 20% and 29%
Plausible: If the candidate uses non-ACC values due to Cont Press <3.0
- C. Correct:** AFW flow >450gpm and PZR level and subcooling above limits.
- D. Incorrect:** Meets the criteria for termination later in time.
Plausible: Based on miscalculating the AFW flow for C.

Level: RO&SRO

KA: WE 02AA2.1 (3.3/4.2)

Lesson Plan Objective: EP2 LPRO 8, 9

Source: Bank 185

Level of knowledge: analysis

References:

1. OP-CN-EP-EP2 page 8
2. E-1 page 5 - PROVIDED
3. OMP 1-7 page 7

Bank Question: 189.1**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power when a toxic gas accident caused the operators to evacuate the control room and take control at the Auxiliary Shutdown Panel (ASP)

Given the following conditions:

- When the reactor tripped, 2 control rod bottom lights failed to light
- Pressurizer pressure stabilized at 2235 psig
- Safety injection has not occurred
- $T_{\text{cold}} = 500^{\circ}\text{F}$
- Core burn up = 90 EFPD
- Boron concentration = 1200 ppm
- The OAC is out of service

How much boric acid must be added in accordance with AP/1/A/5500/17 (Loss of Control Room) to maintain shutdown margin?

REFERENCES PROVIDED

Reactor Operating Databook, Sections 4.1 & 4.2
AP/1/A/5500/17 (Loss of Control Room)

- A. 2850±10 gallons
- B. 10565±25 gallons
- C. 20550±50 gallons
- D. 24025±75 gallons

Distracter Analysis: AP/17 Enclosure 7, step 1.b requires boration to 2850 ppm. This will require 20553 gallons of boric acid.

- A. **Incorrect:** 20553 gallons of boric acid required
Plausible: if the candidate misreads the AP/17 step to add 2850gal of boric acid instead of enough acid to raise boron by 2850 ppm.
- B. **Incorrect:** 20553 gallons of boric acid required
Plausible: if the candidate does not calculate the addition properly with a psychometrically balanced error band.
- C. **Correct Answer:** borate to 2850 ppm – which requires 20553 gallons to go from 1200 ppm to 2850 ppm. The 50 gal error band discriminates interpolation errors.
- D. **Incorrect:** 20553 gallons of boric acid required

Plausible: if the candidate uses the wrong table, (this is the required addition for a cold NCS). The error band accommodates interpolation errors.

Level: RO&SRO

KA: G2.2.34 (2.8/3.2)

Lesson Plan Objective: RT-RB LPRO 4

Source: Mod Ques_189

Level of knowledge: analysis

References:

1. OP-CN-RT-RB page 9, 10
2. AP/1/A/5500/17 - PROVIDED
3. Reactor Operating Databook Sections 4.1 & 4.2 - PROVIDED

Bank Question: 193.1**Answer: A**

- 1 Pt(s) E-3 (Steam Generator Tube Rupture), enclosure 5 (NC Pressure and Makeup Control to Minimize Leakage) directs operators to energize pressurizer heaters if the ruptured S/G level is decreasing and pressurizer level is greater than 25%.

What steady state conditions should be established in this procedure?

- A. **Maintain pressurizer temperature equal to the saturation temperature corresponding to the ruptured S/G pressure.**
- B. **Maintain pressurizer temperature below the saturation temperature corresponding to the S/G PORV pressure setpoint.**
- C. **Maintain pressurizer temperature above the saturation temperature corresponding to the ruptured S/G pressure.**
- D. **Maintain NCS pressure above ruptured S/G pressure.**

Distracter Analysis: The purpose of this question is to determine if the candidate understands that thermal hydraulic equilibrium that is established between the NCS and the ruptured S/G. No references are provided because the candidate should be able to answer the question by simply comprehending the pressures and reasons for this equilibrium.

- A. **Correct Answer:**
- B. **Incorrect:** energizing heaters will not reduce (or hold down) pressure.
Plausible: it is another requirement to maintain NCS pressure below the PORV setpoint.
- C. **Incorrect:** required to maintain NCS pressure equal to ruptured S/G pressure
Plausible: condition will address decreasing S/G level but overcompensate.
- D. **Incorrect:** required to maintain NCS pressure equal to ruptured S/G pressure.
Plausible: condition will address decreasing S/G level but overcompensate.

Level: RO&SRO

KA: EPE 038EA1.38(3.3/3.3)

Lesson Plan Objective: EP-EP4 Obj: 7

Source: Bank McGuire Exam 1997

Level of knowledge: comprehension

References:

1. OP-CN-EP-EP4 page 8
2. E-3 page 61
4. ERG Background document E-3 pages 48-49

Bank Question: 195.2**Answer: B**

1 Pt(s)

Unit 1 was conducting a plant start up. At 1% power, an instrument malfunction caused an inadvertent reactor trip. Given the following indications:

- One rod bottom light is NOT lit
- Only one reactor trip breaker is open
- Both reactor trip bypass breakers are open
- IR amps = 2×10^{-8}
- IR SUR = -0.3 DPM

Which one of the following response actions is required?

- A. **Implement AP/05, (Reactor Trip or Inadvertent S/I), and AP/14, (Control Rod Misalignment).**
- B. **Implement E-0, (Reactor Trip or Safety Injection), and then transition to ES-0.1, (Reactor Trip Response).**
- C. **Implement E-0, (Reactor Trip or Safety Injection) and immediately transition to FR-S.1, (Response to Nuclear Power Generation/ATWS).**
- D. **Implement E-0, (Reactor Trip or Safety Injection), and immediately transition to FR-S.2, (Response to Loss of Core Shutdown).**

Distracter Analysis:

- A. **Incorrect:** Above P-11 must use E-0.
Plausible: This is the correct answer for initiating below P-11.
- B. **Correct:**
- C. **Incorrect:** No ATWS because 3 RTB's are open and only one rod stuck.
Plausible: If the candidate makes a literal reading of E-0 without knowledge of the ERG background positions on what constitutes a tripped reactor.
- D. **Incorrect:** There is no yellow path because SUR < -0.2dpm. in addition, F-0 is not in effect at this point in the procedure
Plausible: If the candidate is looking for an FR-S response to the stuck rod and breaker

Level: SRO Only

KA: EPE 007EA1.06(4.4/4.5)

Lesson Plan Objective: EP1 LPRO 18

Source: Mod Ques_195a

Level of knowledge: comprehension

References:

1. OP-CN-EP-EP1 page 6
2. ERG Background Document E.0 page 2
3. EP/1/A/5000/F-0 page 2 - PROVIDED

Bank Question: 217.1**Answer: B**

1 Pt(s)

Unit 1 was operating at 50% power in Mode 1. Given the following conditions:

- 1 main steam safety valve (MSSV) on the 1D S/G has been gagged shut to prevent chattering
- 2 main steam safety valves (MSSVs) on the 1B S/G have been gagged shut to prevent chattering

Which one of the following statements describes the required action(s) and a basis for these actions?

REFERENCES PROVIDED**Tech Spec 3.7.1 pages 1-3**

- A. Power must be reduced below 24% to ensure that the reactor coolant pressure boundary is not over-pressurized.
- B. Power must be reduced below 41% to ensure that the reactor coolant pressure boundary is not over-pressurized.
- C. Power must remain less than 58% to ensure that the S/G's are not over-pressurized.
- D. Power must be reduced below 24% to ensure that the S/G's are not over-pressurized.

Distracter Analysis:

- A. **Incorrect:** power level too low – 41% is correct
Plausible: basis is correct, will select 24% power if they look up tech spec actions required for 2 safety valves operable (3 total inoperable MSSV's)
- B. **Correct Answer:**
- C. **Incorrect:** wrong power limit and incorrect basis
Plausible: if the candidate does not understand the content of TS.
- D. **Incorrect:** power level too low – 41% is correct, basis is incorrect
Plausible: at least 2MSSV's are needed for over-pressure protection of the S/G's

Level: SRO Only

KA: SYS 039A4.01 (2.9 / 2.8)

Lesson Plan Objective: STM-SM SEQ 26

Source: Mod; Ques_217

Level of knowledge: comprehension

References:

1. OP-CN-STM-SM pages 11, 16
2. Tech Spec 3.7.1 pages 1-3 - PROVIDED

Bank Question: 263**Answer: A**

1 Pt(s)

Unit 1 is shutdown in mode 6 with fuel movement in progress. Given the following events and conditions:

- The new fuel elevator fails to operate in the up direction

Which one of the following statements describes the cause of this problem?

- A. 1EMF-15 (*SPENT FUEL BLDG REFUEL BRIDGE*) has failed high.
- B. 1EMF-20 (*NEW FUEL STOR 1A*) has failed high.
- C. The load in the new fuel elevator weighs 1100 lbs.
- D. The spent fuel pool crane is located over the spent fuel pool.

Distracter Analysis:

- A. **Correct answer**
- B. **Incorrect:** does not have an interlock with the new fuel elevator
Plausible: new fuel vault monitor sounds like it "fits" with new fuel monitor if candidate does not know answer
- C. **Incorrect:** If load exceeds 1200 lbs., will prevent movement
Plausible: this is a valid interlock but the weight is insufficient to actuate it
- D. **Incorrect:** there is no interlock to prevent moving the new fuel elevator
Plausible: there is an interlock to prevent moving the new fuel elevator if the spent fuel pool crane is indexed over the new fuel elevator.

Level: RO&SRO

KA: SYS 072G2.28 (2.6/3.5)

Lesson Plan Objective: FHS LPRO 8, 10

Source: NRC Catawba Exam 1999 Ques_263

Level of knowledge: memory

References:

1. OP-1/B/6100/010Z C/5

2. OP-CN-FH-FHS page 17

Bank Question: 282.1**Answer: B**

1 Pt(s)

Which of the following describes the plant response to decreasing VI system pressure?

- A. • 86 psig - Standby Compressor starts
• 80 psig - VI-78 (VS AUTO BACKUP TO VI) opens.
• 76 psig - VI-500 (VI COMPRESSOR D TO VS HEADER BACKPRESSURE CONTROL) closes.
- B. • 86 psig - Standby Compressor starts
• 80 psig - VI-500 closes.
• 76 psig - VI-78 opens.
- C. • 86 psig- Backup Temporary/ Diesel VI Compressor starts
• 80 psig - VI-500 closes.
• 76 psig - VI-78 opens.
- D. • 86 psig- Backup Temporary/ Diesel VI Compressor starts
• 80 psig - VI-78 opens.
• 76 psig -. VI-500 closes

Distracter Analysis:

Loss of VI (Obj. #5, 8)

Automatic actions:

- 86 psig - Standby Compressor starts
- 80 psig - 'LO VI PRESS' Alarm in Control Room.
- 80 psig – VI 670 'VI Dryer Auto Bypass' opens
- 80 psig - VI500 'VI supply to VS' closes. (Tag label in answers)
- 76 psig - VS78 'VS supply to VI' opens - VS provides instrument air via oil removal filters. (Tag label in answers)

A. **Incorrect:** VI 500 and VI 78 actions are in reverse order

Plausible: If candidate reverses the order

B. **Correct:**

C. **Incorrect:**

Plausible: backup compressor does not automatically start

D. **Incorrect:**

Plausible: backup compressor does not automatically start

Level: RO&SRO

KA: SYS 079A2.01(2.9/3.2)

Lesson Plan Objective: VI SEQ 5, 8

Source: NRC Catawba Exam 1999 Ques_282

Level of knowledge: memory

References:

1. VI lesson plan page 19 of 36

Bank Question: 300.2**Answer: A**

1 Pt(s)

Unit 1 was operating at 100% power when a 5 gpm S/G tube leak occurred in the B S/G. Given the following events and conditions:

- The operators implement AP/10 (REACTOR COOLANT LEAK).
- The steam supply to the turbine driven CA pump must be isolated

Which one of the following statements describes the correct method and location for isolating B S/G steam supply to the turbine drive CA pump?

- A. **Manually close the isolation valve (1SA-1) in the doghouse.**
- B. **Manually close the stop-check valve (1SA-3) in the doghouse.**
- C. **Manually close the isolation valve (1SA-4) in the mechanical penetration room.**
- D. **Manually close the stop-check valve (1SA-6) in the mechanical penetration room.**

Distracter Analysis:

- A. **Correct:**
- B. **Incorrect:** wrong location – 1SA-3 is located in the aux building mechanical penetration area - not the doghouse.
Plausible: 1SA-3 is the RNO action if 1SA-1 does not close.
- C. **Incorrect:** 1SA-4 isolates the steam supply from the C S/G - not located in the mechanical penetration area.
Plausible: if the candidate does not recognize the wrong valve
- D. **Incorrect:** will not isolate steam to the B S/G
Plausible: 1SA-6 is the RNO action if 1SA-4 does not close. Valve is located in the mechanical penetration area.

Level: RO&SRO

KA: APE 037G2.4.34 (3.8/3.6)

Lesson Plan Objective: none

Source: Mod Catawba Exam 1997 Ques_300

Level of knowledge: memory

References:

1. AP-10 page 21
1. OP-CN-STM-SM page 13, 18

Bank Question: 301.1**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power three days after restarting from a refueling outage. Given the following events and conditions:

- A loss of all AC power occurred
- The operators are at step 23 of ECA-0.0, (*Loss of All AC Power*):

Depressurize intact S/Gs to 165 psig as follows: ...

- *Verify all NC T-Colds – GREATER THAN 280°F.*

Which one of the following statements correctly describes the basis for maintaining T-Colds above 280 °F?

- A. To prevent Nitrogen injection into the NCS.
- B. To prevent a return to criticality.
- C. To prevent a challenge to NCS integrity from PTS.
- D. To prevent a loss of natural circulation.

Distracter Analysis:

- A. **Incorrect:** Nitrogen injection avoidance is accomplished by maintaining SG pressure greater than 165 psig
Plausible: The candidate knows nitrogen is a concern, but is not sure of the steps to assure it does not happen.
- B. **Incorrect:** this concern is covered in almost all cases by the SG pressure limit.
Plausible: candidate links the reactivity added by the cooldown to a possible return to criticality.
- C. **Correct:** cold leg temperatures should be monitored to ensure that the depressurization does not impose a challenge to the integrity CSF. This check is included in step 23 since procedure ECA-0.0 has priority over the FRPs. Consequently, step 23d implicitly protects the integrity CSF. The depressurization should not approach the T2 limit at which a challenge would exist
- D. **Incorrect:** Natural circulation will exist.
Plausible: if the candidate does not understand the restrictions of natural circulation flow

Level: SRO Only

KA: WE 08EK1.1 (3.5/3.8)

Lesson Plan Objective: EP5 SEQ 10

Source: mod Catawba Exam 1997 Ques_301

Level of knowledge: memory

References:

1. ECA-0.0 background, step 23

Bank Question: 311**Answer: A**

1 Pt(s)

Unit 1 is operating at 50% power. Given the following conditions:

- Pressurizer pressure is 2235 psig
- Pressurizer Relief Tank (PRT) pressure is 21 psig
- PRT temperature is 125 °F
- PRT level is 81%
- A pressurizer code safety valve is suspected of leaking by it's seat

What temperature would be indicated on the associated safety valve discharge RTD if the code safety were leaking by?

REFERENCES PROVIDED: Steam Tables

- A. 258-262 °F
- B. 227-231 °F
- C. 161-165 °F
- D. 123 -127°F

Distracter Analysis: This answer is determined by the following method:
The steam that passes through the seat leak on the pressurizer safety undergoes an adiabatic throttle process. This implies that the enthalpy of the steam does not change as it passed from the high pressure, high temperature conditions in the pressurizer into the low pressure, low temperature conditions in the PRT.

The steam in the PRT achieves equilibrium with the PRT pressure at:

$$21 \text{ psig} + 14.6 \text{ psig} = 35.6 \text{ psia.}$$

Interpolating for saturation temperature

$$35.6 \text{ psia} = 5.6 \text{ psi}/10 \text{ psi} \times 17 \text{ °F} = 9.5 \text{ °F} + 250.3 \text{ °F} = 259.8 \text{ °F} \sim 260 \text{ °F}$$

- A. **Correct:** steam temperature = 260 °F
- B. **Incorrect:** Temp is too low - the correct temp is 260 °F
Plausible: If the candidate makes the mistake of not correcting for atmospheric pressure by failing to adding 14.6 psi to the PRT pressure and uses 20 psia.
- C. **Incorrect:** Temp is too low - the correct temp is 260 °F
Plausible: If the candidate reverses the correction for atmospheric pressure by subtracting 14.6 psi from PRT pressure of 20 psig to get 5 psia.

- D.** **Incorrect:** Temp is too low - the correct temp is 260 °F
 Plausible: If the candidate thinks that the discharge temperature will be at the same temperature as the PRT fluid.

Level: RO&SRO

KA: APE 008AK1.01(3.2/3.7)

Lesson Plan Objective: FLO SEQ 8

Source: NRC Catawba Exam 1999 Ques_311

Level of knowledge: analysis

References:

1. OP-CN-THF-FLO pages 17-18
2. Steam Tables - PROVIDED

Bank Question: 339.1**Answer: D**

1 Pt(s) E-3, (Steam Generator Tube Rupture), step #21.b reads as follows:

**“IF AT ANY TIME ruptured S/G(s) pressure is decreasing...,
THEN perform Step 21.”**

Which one of the following statements is correct with regards to this step?

- A. The step is applicable continuously unless it is determined not to be pertinent to the recovery effort.
- B. The step is applicable while in E-3 and after transition to subsequent procedures until alternative guidance is provided.
- C. The step is only applicable until another continuous action step is reached in E-3.
- D. The step is only applicable while in E-3.

Distracter Analysis:

- A. **Incorrect:** step applicable only inE-3
Plausible: this is the construct for When ... then actions
- B. **Incorrect:** step applicable only inE-3
Plausible: this is an alternate construct for If at any time actions
- C. **Incorrect:** step applicable only inE-3
Plausible: this is the construct for generalized continuous action steps.
- D. **Correct:**

Level: RO&SRO

KA: G2.4.19 (2.7 / 3.7)

Lesson Plan Objective: ADM-OP SEQ 21

Source: NRC Catawba Exam 97 Ques_339

Level of knowledge: memory

References:

- 1. OP-CN-ADM-OP page 10
- 2. OMP 1-7 page 7
- 3. EP/1/A/5000/E-3 page 22

Bank Question: 357.1**Answer: D**

1 Pt(s)

Unit 1 is responding to a LOCA into containment. Given the following events and conditions:

- The operators completed E-0 (*Reactor Trip and Safety Injection*) and transitioned to E-1 (*Loss of Reactor or Secondary Coolant*)
- The operators completed E-1 through step 13 and transitioned to ES-1.2 (*Post LOCA Cooldown and Depressurization*)
- At step 10 of ES-1.2, the STA reported:
 - A valid ORANGE PATH on Containment existed
 - A valid RED PATH on Heat Sink existed
- The operators transitioned to FR-H.1 (*Response to Loss of Heat Sink*) from step 10 of ES-1.2.
- The operators performed all required actions in FR-H.1, which placed feedwater back in service.
- Upon completion of FR-H.1, the STA reports that all CSFs are now GREEN (including Containment).

Which one of the following describes the correct procedure flow path?

- A. Go to ES-0.0 (*Rediagnosis*) and rediagnose the situation.
- B. Return to ES-1.2 step 1 and continue.
- C. Complete FR-Z.1 (*Response to High Containment Pressure*) and then return to ES-1.2 step 1.
- D. Return to ES-1.2 step 10 and continue.

Distracter Analysis:

- A. **Incorrect:** Not in accordance with rules of usage.
Plausible: Rediagnosis is appropriate if the rule of usage do not cover the correct procedure to implement.
- B. **Incorrect:** Not in accordance with rules of usage.
Plausible: The orange path for containment no longer is valid, makes sense to return to the last procedure transition completed.
- C. **Incorrect:** Not in accordance with rules of usage.
Plausible: The orange path for containment was valid, makes sense to implement the procedure. This is a modification of a previously used question from the 1999 NRC exam. If the candidates have simply memorized that question/answer, they will select C.
- D. **Correct:** - The operators never entered FR-Z.1 so it is not required to enter at this time.

Level: SRO Only

KA: WE03EK3.4(3.5/3.9)

Lesson Plan Objective: EP2 LPRO 29, OP LPRO 28

Source: Mod Catawba Exam 1999 Ques_357

Level of knowledge: comprehension

References:

1. OMP 1-7 page 8-13

Bank Question: 380**Answer: C**

1 Pt(s)

Which one of the following statements is a correct description of the capabilities of EMF-48 (*Reactor Coolant*) at 100% power?

- A. Detects beta flux from the NC system coolant. This prevents the detector falsely responding to N16 gamma radiation, which would mask a failed fuel event.
- B. Detects the N16 gamma flux from the NC system coolant, which is proportional to the amount of failed fuel cladding.
- C. Detects total gamma flux from NC system coolant after a one minute sample delay time to allow N16 gamma radiation to decay away.
- D. Detects total gamma flux from NC system coolant. The gamma source term from a clad failure would be much greater than the N16 gamma flux at power.

Distracter Analysis:

- A. **Incorrect:** - EMF-48 does not detect beta radiation
Plausible: - the detector could function if designed this way because N16 gamma would mask the failed fuel problems.
- B. **Incorrect:** - N16 gamma is proportional to reactor power level and does not correlate to failed cladding.
Plausible: - if the candidate was confused over the correlation between N16 gamma levels and power levels.
- C. **Correct answer**
- D. **Incorrect:** - The gamma flux from N16 is >> failed fuel at power
Plausible: - if the candidate did not know that N16 gamma was >> than failed fuel source term levels.

Level: RO&SRO

KA: APE 076AK2.01(2.6/3.0)

Lesson Plan Objective: none

Source: NRC McGuire Exam 1999 Ques_380

Level of knowledge: memory

References:

1. OP-CN-WE-EMF page 11

Bank Question: 387.1**Answer: B**

1 Pt(s)

Enclosure 1 to E-1 (Loss of Reactor or Secondary Coolant) provides foldout page actions to close NV-202B and NV-203A (NV PUMPS A&B RECIRC ISOL) when NC pressure is less than 1500 psig.

Which one of the following statements correctly describes the operator response and reason for this response when pressurizer pressure is 1495 psig?

- A. Notify the SRO of the need to close the valves to prevent NV pump runout at low pressures.
- B. Close the valves to prevent a reduction of full SI flow to the core.
- C. Close the valves to prevent overheating the NV pumps.
- D. Notify the SRO of the need to close the valves to prevent a reduction of full SI flow to the core.

Distracter Analysis:

- A. **Incorrect:** - pump runout is not a concern and the actions are automatic.
Plausible: if the candidate does not know that foldout actions are independent - pump runout can be a concern for situations where the pump discharge pressure is very low.
- B. **Correct answer** - maximizes flow into the core.
- C. **Incorrect:** - pump runout is not a concern.
Plausible: pump runout can be a concern for situations where the pump discharge pressure is very low, approximately 600 psig for NV pumps.
- D. **Incorrect:** - the actions are automatic.
Plausible: - if the candidate does not know that foldout actions are independent.

Level: RO&SRO

KA: G2.4.15 (3.0/3.5)

Lesson Plan Objective: EP-INTRO LPRO 12

Source: Mod McGuire Exam 1999 Ques_387

Level of knowledge: memory

References:

1. OP-CN-EP-INTRO page 8
2. E-1 Foldout page 2
3. OMP 1-7 page 20-21
4. Background Document E-1 page 30

Bank Question: 388**Answer: A**

1 Pt(s)

Unit 1 is responding to a LOCA in the auxiliary building. The operators have implemented ECA-1.2, (*LOCA Outside of Containment*). Step 2 guides the operators to attempt to find and isolate the leak. Step 2C requires the following sequence:

- 1) Verify following NI pump miniflow valves – OPEN
 - 1NI-115A (*NI Pump 1A Miniflow Isol*)
 - 1NI-144A (*NI Pump 1B Miniflow Isol*)
 - 1NI-147B (*NI Pump Miniflow Isol*)
- 2) Place the “PWR DISCON FOR 1NI-162A” in “ENABLE”
- 3) Close 1NI-162A (*NI To C- Legs Inj Hdr Isol*)

What is the correct reason for verifying the mini flow valves are open?

- A. **Protect the NI pumps from operating against shutoff head.**
- B. **Isolation of a potential LOCA path to the FWST.**
- C. **Protect the NI pumps from runout conditions upon restart.**
- D. **Provide a diversion path to prevent high pressure water from over-pressurizing the ND system during leak isolation procedures.**

Distracter Analysis:

- A. **Correct answer**
- B. **Incorrect:** - the mini flow valves will not isolate any potential path in the injection mode.
Plausible: - in ES-1.3 (and some other EOPs), the NI mini flow valves are closed to prevent pumps from recirculating radioactive water back to the FWST - right reason, wrong procedure
- C. **Incorrect:** - Opening mini flow valves will not protect against runout
Plausible: - if the candidate is confused over the difference between runout conditions and shutoff head conditions
- D. **Incorrect:** - this will not create a diversion path - it will align the NI recirc line to the FWST. The ND system is protected by check valves and in this case by the closed 1NI-162A.
Plausible: - the ND system has a design pressure of 600 psig and if NC system pressure was applied, it would rupture. Setting up a diversion path would be a reasonable thing to do. This alignment does not accomplish this goal.

Level: RO&SRO

KA: WE04EK2.1(3.5/3.9)

Lesson Plan Objective: EP-E2 SEQ 14

Source: NRC McGuire Exam 1999 Ques_388

Level of knowledge: memory

References:

1. OP-CN-EP-E2 pages 13-14
2. ECA-1.2 page 6
3. OP-CN-CN-NI pages 7-8, 18

Bank Question: 393**Answer: C**

1 Pt(s)

Unit 1 was in mode 3 with the shutdown banks fully withdrawn, preparing to conduct a reactor startup when source range channel N-31 failed. Given the following conditions and events:

- No reactor trip has occurred prior to this point
- AP/16 (*Malfunction of Nuclear Instrumentation System*) has been completed
- N-31 repairs have been made
- N-31 is being returned to service
- N-32 = 10^1 CPS
- Immediately upon taking the "level trip" switch to the "normal" position a reactor trip occurred

Which of the following operator errors would explain this event?

- A. The "Operation selector" switch was left in "level adj." position with level potentiometer set at a level of 10^6 CPS after retesting
- B. The "High-flux at shutdown" switch left in the "normal" position
- C. The instrument power fuse blew when the N-31 channel was reenergized.
- D. The source range detector instrument discriminator voltage was set too high.

Distracter Analysis:

- A. **Incorrect:** - the *operation selector* switch is taken out of the circuit when the *level trip* switch is taken to *normal*
Plausible: - if the candidate thinks that a test signal can be inserted with *level trip* switch in the *normal* position
- B. **Incorrect:** - no effect – this is a normal switch alignment - only blocks out high flux alarm at 10^5 CPS - trip is separate from level trip function
Plausible: - if the candidate does not understand that the *level trip* switch in *bypass* does not effect the high flux at shutdown trip – the high flux at shutdown switch will be in the blocked position under these circumstances.
- C. **Correct answer**
- D. **Incorrect:** - if discriminator voltage is too high, less neutrons will be passed, signal will be lower.

Plausible: - if the candidate does not understand how the pulse height discriminator circuit operates.

Level: RO&SRO

KA: APE 032AA.101(3.1/3.4)

Lesson Plan Objective: ENB LPRO 9

Source: NRC McGuire Exam 1999 Ques_393

Level of knowledge: comprehension

References:

1. OP-CN-IC-ENB page 5, 9-10, 26

Bank Question: 437.1**Answer: B**

1 Pt(s)

The operator is investigating a suspected ground on the negative leg of a 125VDC bus. The Battery to Ground Volt Meter Selector Switch is in the "NEG" position.

Which one of the following indications is correct for the existence of a substantial ground on the negative leg of the 125 VDC electrical system?

- A. **Battery ground negative leg light burns dimly**
Battery to Ground Volt Meter reads bus voltage minus the ground voltage.
- B. **Battery ground negative leg light burns brightly**
Battery to Ground Volt Meter reads the ground voltage.
- C. **Battery ground negative leg light burns dimly.**
Battery to Ground Volt Meter reads the ground voltage.
- D. **Battery ground negative leg light burns brightly**
Battery to Ground Volt Meter reads bus voltage minus the ground voltage.

Distracter Analysis:

- A. **Incorrect:** - a brightly burning lamp = grounded condition
Plausible: - believes dim light = ground
- B. **Correct:** - the negative leg light is brightly lit.
If a ground exists, the Volt Meter will indicate the amount of volts to ground when this switch is taken to the NEG (measures volts to ground on the negative leg)
- C. **Incorrect Answer:**
Plausible if candidate reverses the correct answer in his/her mind - a grounded condition often leads to a reduction in voltage and lamps glow dimly
- D. **Incorrect:**
Plausible: - candidate believes voltmeter reads bus voltage, less the ground.

Level: RO&SRO

KA: SYS 063A3.01 (2.7/3.1)

Lesson Plan Objective: EPL SEQ 15, 16

Source: Mod - McGuire Exam 1999 Ques_437

Level of knowledge: memory

References:

1. Lesson plan pages 16 and 17

Bank Question: 444.1**Answer: B**

1 Pt(s)

Which one of the following statements describes the operation of the Containment Annulus Ventilation System (VE) during a large break LOCA into containment?

- A. VE fans start in the exhaust mode at +3.0 psig in containment
VE fans stop running when annulus pressure reaches -1.5 in. H₂O
VE fans cycle on and off between -1.5 in H₂O and +3 psig
- B. VE fans start in the exhaust mode at +1.2 psig in containment
VE shifts into recirc mode when annulus pressure reaches -1.5 in. H₂O
VE modulates dampers between recirc and exhaust modes to maintain -1.5 in. H₂O in the annulus
- C. VE fans start on an EMF-38, 39, 40 trip 2 (containment monitors)
VE fans stop running when annulus pressure reaches -1.5 in. H₂O
VE fans cycle on and off between -1.5 in Hg and +3.0 psig
- D. VE fans start on an EMF-38, 39, 40 trip 2 (containment monitors)
VE shifts into recirc mode when annulus pressure reaches -1.5 in. H₂O
VE modulates dampers between recirc and exhaust modes to maintain -1.5 in. H₂O in the annulus

Distracter Analysis:

- A. **Incorrect:** - VE Fans are not designed to cycle on and off to maintain annulus pressure. They would not recirc through the filter trains if they tripped off to maintain pressure and Iodine removal would not be as effective
Plausible: - tripping at 3 psig would be consistent with the initiation point. This is a plausible safety trip to ensure annulus pressure is not dropped too low
- B. **Correct answer**
- C. **Incorrect:** - EMF monitors do not start VE fans; VE Fans are not designed to cycle on and off to maintain annulus
Plausible: - VP and VQ systems are controlled by EMF 38, 39, 40
- D. **Incorrect:** - EMF monitors do not start VE fans
Plausible: - EMF 38, 39, 40, controls VP and VQ systems

Level: RO&SRO

KA: SYS 027A4.03(3.3/3.2)

Lesson Plan Objective: VE LPRO 9

Source: NRC McGuire Exam 1999 Ques_444

Level of knowledge: memory

References:

1. OP-CN-CNT-VE pages 8-9

Bank Question: 453.1**Answer: C**

1 Pt(s)

Unit 1 was operating at 70% power when a loss of condenser vacuum occurred. Given the following events and conditions:

- Reactor power, 68%
- Turbine load, 66% based on turbine impulse pressure
- Turbine exhaust hood temperature is 225 °F
- The operators are rapidly decreasing turbine load
- The operator reports that condenser vacuum is 23.2 in Hg and is continuing to decrease.

Which one of the following statements correctly describes the required action(s)?

- A. **Immediately manually trip the reactor.**
- B. **Immediately manually trip the reactor and then manually trip the turbine in anticipation of reaching the trip setpoint.**
- C. **Continue to monitor condenser vacuum, if vacuum decreases to 21.8 inches Hg, manually trip turbine.**
- D. **Continue to monitor condenser vacuum, if vacuum decreases to 21.8 inches Hg, first manually trip the reactor then manually trip the turbine.**

Distracter Analysis:

Turbine Trip Criteria: IF condenser vacuum decreases to less than 21.8 in. Hg, THEN:

- a. IF reactor power is greater than or equal to 69%, THEN manually trip reactor.
- b. Ensure turbine - TRIPPED.
- c. IF reactor is tripped, THEN GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection). –
- d. REFER TO AP/1/A/5500/02 (Turbine Generator Trip).

IF turbine exhaust hood temperature is greater than 2250 F AND turbine load is less than 60% ~based on impulse pressure equal to 370 PSIG), THEN:

- a. Ensure turbine - TRIPPED.

- A. **Incorrect:** Tripping the reactor is not a required action below 69%
Plausible: If unfamiliar with the 69% reactor trip criteria.
- B. **Incorrect:** Do not trip the reactor before tripping the turbine

Plausible: tripping the turbine is not **required** until the set point is reached – but is **allowed** by OMP 1-8 - if the candidate does not recognize that power is below 69%

C. Correct:

D. Incorrect: should not immediately trip the reactor.

Plausible: If the candidate does not recognize that power is below 69%

Level: RO&SRO

KA: APE 051 AA2.02 (3.9/4.1)

Lesson Plan Objective: ZM SEQ 17

Source: mod Catawba Exam 1999 Ques_453

Level of knowledge: memory

References:

1. AP/1/5500/23 Loss of Condenser Vacuum
2. OMP 1-8 page 3

Bank Question: 503.1**Answer: A**

1 Pt(s)

Unit 2 was operating at 80% power. Given the following events and conditions:

- Turbine impulse pressure instrument Channel I failed low
- Operators perform all actions in AP-15 (*Rod Control Malfunctions*) Case II (*Continuous Rod Movement*).
- Tave is maintained by adjusting turbine load

Which one of the following statements correctly describes the consequences of the Reactor Operator returning the CRD Bank Select switch to the Automatic position 10 minutes later?

- A. Rods will move in because Tref is less than Tave.
- B. Rods will move in because impulse pressure is less than nuclear power.
- C. Rods will not move in because low impulse pressure blocks rod movement.
- D. Rods will not move in because the impulse pressure input to power mismatch is not changing.

Distracter Analysis:

- A. **Correct:**
- B. **Incorrect:** The derivative of the Imp Press change has timed out.
Plausible: based on misunderstanding the derivative function of the power mismatch circuit.
- C. **Incorrect:** C-5 only blocks rod withdrawal.
Plausible: based on misunderstanding the C-5 rod stop function.
- D. **Incorrect:** The temperature mismatch function has an error signal at this time.
Plausible: If the candidate does not recognize the cumulative nature of both error signals.

Level: RO&SRO

KA: APE 001G2.1.32(3.4/3.8)

Lesson Plan Objective: IC-IRX LPRO 5

Source: Mod Catawba exam 1999

Level of knowledge: analysis

References:

1. OP-CN-IC-IRX pages 9-10, 13-15
2. OP-CN-IC-IPX page 20

Bank Question: 505**Answer: D**

1 Pt(s)

Unit 2 is responding to a small break LOCA in E-1, (*Loss of Reactor or Secondary Coolant*). Given the following plant events and conditions:

- NCPs tripped
- Pressurizer level is steady
- Only one train of ECCS is injecting
- Loop A temperatures are representative of all 4 loops
- Steam generator pressures are the same as steam header pressure

Which one of the following sets of plant parameters is indicative of gas induced flow blockage in the steam generators?

| | Time | 0200 | 0205 | 0210 | 0215 |
|----|------------------------------|------|------|------|------|
| A. | Steam Header Pressure (psig) | 1042 | 1009 | 976 | 945 |
| | NC System Pressure (psig) | 1968 | 1964 | 1960 | 1958 |
| | Loop A Thot (°F) | 579 | 574 | 569 | 564 |
| | Loop A Tcold (°F) | 548 | 544 | 540 | 536 |
| B. | Steam Header Pressure (psig) | 1042 | 1009 | 976 | 945 |
| | NC System Pressure (psig) | 1968 | 1972 | 1975 | 1981 |
| | Loop A Thot (°F) | 579 | 574 | 569 | 564 |
| | Loop A Tcold (°F) | 548 | 544 | 540 | 536 |
| C. | Steam Header Pressure (psig) | 1042 | 1047 | 1050 | 1052 |
| | NC System Pressure (psig) | 1968 | 1964 | 1960 | 1958 |
| | Loop A Thot (°F) | 579 | 579 | 578 | 580 |
| | Loop A Tcold (°F) | 548 | 549 | 548 | 550 |
| D. | Steam Header Pressure (psig) | 1042 | 1009 | 976 | 945 |
| | NC System Pressure (psig) | 1968 | 1972 | 1975 | 1981 |
| | Loop A Thot (°F) | 579 | 582 | 585 | 595 |
| | Loop A Tcold (°F) | 548 | 544 | 540 | 536 |

Distracter Analysis:

- A. **Incorrect:** This shows indication of natural circulation flow occurring - decreasing S/G pressure, Tcold at S/G saturation conditions and decreasing, Thot decreasing.
Plausible: If the candidate does not understand how to analyze for gas binding conditions.
- B. **Incorrect:** Natural circulation is occurring

- Plausible:** NC pressure is increasing - unrelated to S/G gas binding conditions - this is an indication of gas binding but not with the associated S/G conditions.
- C. **Incorrect:** Steam pressure is increasing and loop temperatures are tracking along with this trend. Temperature difference is constant indicating that heat removal rate is constant. Indicates plant is heating up - likely due to a heat removal problem in the SDV system
- Plausible:** Does not show the classic indications of natural circulation.
- D. **Correct answer:** Steam pressure is decreasing, NC pressure is increasing, Thot is increasing, Tcold is decreasing.

Level: SRO Only

KA: WE09 EK2.1 (3.2/3.4)

Lesson Plan Objective: TA-AM LPRO 7

Source: NRC Catawba Exam 1999 Ques_505

Level of knowledge: analysis

References:

1. OP-CN-TA-AM page 15

Bank Question: 515.1**Answer: D**

1 Pt(s) Unit 1 was cooling down in mode 4 in preparation for starting a refueling outage. Given the following plant conditions:

- Containment has not been entered for this outage
- Containment purge and exhaust valves are locked shut
- The Outage Coordinator requests that personnel be allowed to enter containment to conduct a 15-minute walk-down for an outage work package.

| Containment | Activity (CPM) | Trip 2 setpoint (CPM) |
|--|-----------------------|------------------------------|
| 1EMF-38(L) (<i>CONTAINMENT PART</i>) | 13,400 | 45,000 |
| 1EMF-39(L) (<i>CONTAINMENT GAS</i>) | 12,400 | 40,000 |
| 1EMF-40(L) (<i>CONTAINMENT IODINE</i>) | 5,200 | 15,000 |

Which one of the following statements correctly describes the required action(s) to comply with Tech Specs or SLCs?

REFERENCES PROVIDED: SLC 16.7-10, Tech Specs 3.6.1, 3.6.2

- A. Perform a required air lock leakage rate test in accordance with 10CFR50 Appendix J within 24 hours of entry.
- B. Unlock containment purge and isolation valves and purge containment to reduce gaseous activity prior to personnel entry.
- C. Perform a source check surveillance test on 1EMF 38, 39, & 40 prior to entering containment.
- D. Reset the alarm setpoint on 1EMF-39(L).

Distracter Analysis:

- A. **Incorrect:** Appendix J testing required for air locks 72 hours after entry.
Plausible: 24 hours afterward is a reasonable Appendix J leak rate test frequency.
- B. **Incorrect:** Purge valves must remain locked shut in mode 4
Plausible: This action could reduce personnel exposure- but is not required.
- C. **Incorrect:** This source check test is required every 12 hours - not prior to opening the containment.
Plausible: Testing the containment radiation monitors would be prudent - but not required
- D. **Correct answer** Required by SLC 16.7-10 - reduce below 37,200 CPM

Level: SRO Only

KA: SYS 073A1.01 (3.2 / 3.5)

Lesson Plan Objective: WE-EMF SEQ 4

Source: NRC Catawba exam 1999 Ques_515

Level of knowledge: analysis

References:

1. OP-CN-WE-EMF page 9
2. SLC 16.7-10 - PROVIDED
3. Tech Spec 3.6.1 - PROVIDED
4. Tech Spec 3.6.2 - PROVIDED

Bank Question: 518.1**Answer: D**

1 Pt(s)

Why do some of the phase A containment isolation valves located in lower containment for the KC system have a separate manual reset on IMC7?

- A. The valves use air operators, which are not subject to spurious repositioning should they be submerged during containment flooding therefore they may be reset and repositioned if required by procedure.
- B. The valves are all above the containment flooding level and are not subject to spurious repositioning during containment flooding therefore they may be reset and repositioned if required by procedure.
- C. A separate reset is required because a containment phase A signal removes power from these valves causing them to fail closed to prevent them from spuriously repositioning due to containment flooding.
- D. A separate reset is required because a containment phase A signal disables the open circuits for these valves to prevent them from spuriously repositioning due to containment flooding.

Distracter Analysis:

- A. **Incorrect:** Valves have MOVs not AOVs
Plausible: Some plants have mainly AOVs in containment for this reason
- B. **Incorrect:** Valves are located below flooding plane
Plausible: This is one way of preventing the problem
- C. **Incorrect:** Valves do not have closing power removed or this would prevent actuation in response to a valid ESF signal
Plausible: This would prevent the valves from spuriously opening. Some ECCS valves are protected this way.
- D. **Correct:**

Level: RO&SRO

KA: WE15 EK2.1 (2.8/2.9)

Lesson Plan Objective: CNT LPRO 13

Source: mod Catawba Exam 1999 Ques_518

Level of knowledge: memory

References:

1. OP-CN-CNT-CNT page 16
2. OP-CN-EP-FRZ pages 5, 7

Bank Question: 547**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power when main condenser vacuum dropped from 25 inches of Hg to 23 inches of Hg.

Which one of the following statements correctly describes the cause of this problem?

- A. Condenser water boxes are full
- B. RC system flow has increased
- C. CM flow to CSAE inter-cooler has been obstructed
- D. Condensate depression has increased.

Distracter Analysis:

- A. **Incorrect:** Will not reduce condenser vacuum - full is a normal condition for the water boxes.
Plausible: If the ZP water boxes are NOT full, air can accumulate in the upper tubes and interfere with the heat transfer across the tubes
- B. **Incorrect:** Increased RC flow will improve vacuum
Plausible: Decreased RC flow will degrade vacuum
- C. **Correct answer** - reduces effectiveness of steam jets
- D. **Incorrect:** - if condensate depression increases, the condensate temperature becomes lower than saturation temperature for the condenser pressure - vacuum would increase
Plausible: Condenser thermodynamic efficiency decreases

Level: RO&SRO

KA: SYS 055K3.01 (2.5 / 2.7)

Lesson Plan Objective: MT-ZM SEQ 9, 14

Source: NRC Catawba Exam 99 Ques_547

Level of knowledge: comprehension

References:

1. OP-CN-MT-ZM pages 5-8

Bank Question: 556**Answer: D**

- 1 Pt(s) Unit 2 is operating at 100% power when containment parameters vary as shown below:

| Containment | 1200 | 1500 | 1800 | 2100 | 2400 |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|
| Temperature (°F) | | | | | |
| Upper | 85 | 86 | 87 | 86 | 85 |
| Lower | 105 | 107 | 106 | 105 | 106 |
| Humidity (% rel) | | | | | |
| Upper | 25 | 26 | 25 | 26 | 25 |
| Lower | 15 | 15 | 18 | 14 | 15 |
| Containment pressure (psig) | 0.11 | 0.13 | 0.15 | 0.18 | 0.19 |
| Aux. Bldg. pressure (in Hg) | 29.1 | 29.2 | 29.3 | 29.4 | 29.5 |

Which one of the following statements correctly describes the cause of the trends in the containment atmospheric parameters?

- A. Normal external heating from the sun.
- B. Auxiliary Building pressure has increased.
- C. A packing leak on the letdown backpressure control valve.
- D. An air leak on the AOV for PORV 2NC-36.

Distracter Analysis:

- A. **Incorrect:** pressure not following temperature
Plausible: temperature increases then decreases
- B. **Incorrect:** An increase in Auxiliary Building pressure would cause a drop in containment pressure as the containment pressure instrument is referenced to external Aux. Bldg. pressure
Plausible: pressure is increasing - if the candidate reverses the effect of barometric pressure on containment pressure
- C. **Incorrect:** temperature and humidity are not increasing
Plausible: pressure is increasing but not following temperature - the difference between upper and lower containment is normal.
- D. **Correct answer:** cont. pressure increasing without other cont. parameters increasing

Level: RO&SRO

KA: G2.1.7 (3.7/4.4)

Lesson Plan Objective: VQ LPRO 2

Source: NRC Catawba 1999 Ques_556

Level of knowledge: analysis

References:

1. OP-CN-CNT-VQ page 6

Bank Question: 575.1**Answer: A**

1 Pt(s)

Unit 1 was operating at 100% power. The Radwaste system operator has requested SRO approval to release 1000 gals of wastewater from the monitor tank building (MTB) and has recommended that the trip 2 setpoint for 1EMF-57 (*WMT LIQUID DISCH*) be set at 2.3E4 CPM.

Which one of the following statements correctly describes the basis for the trip setpoint for 1EMF-57 to assure automatic isolation if the release limits are exceeded?

**REFERENCES PROVIDED: SLC 16.11-1,
10CFR20 Appendix B – Ni⁵⁶, Fe⁵⁵ and Co⁶⁰ Limits**

- A. To prevent exceeding a concentration of 2×10^{-4} $\mu\text{Ci/ml}$ for dissolved or entrained noble gases.
- B. To prevent exceeding a concentration of 8×10^{-7} $\mu\text{Ci/ml}$ for Nickel 56.
- C. To prevent exceeding a concentration of 6×10^{-9} $\mu\text{Ci/ml}$ for Iron 55.
- D. To prevent exceeding a concentration of 2×10^{-10} $\mu\text{Ci/ml}$ for Cobalt 60.

Distracter Analysis:

The 1EMF-57 trip-2 setpoint is based on limiting the concentration of radionuclides into the environment to less than 10 X the 10CFR20 Appendix B values. SLC 16.11-1 limits this total discharge to 2×10^{-4} $\mu\text{Ci/ml}$ for all isotopes for dissolved or entrained noble gases. 10CFR20 Appendix B contains tables of isotopes with a number of limits.

- A. **Correct answer**
- B. **Incorrect:** This value is $\sim E-7$ x less than the applicable limits
Plausible: if the candidate uses the value from 10CFR20 Appendix B Ni⁵⁶ in air (Table 1 col. 3)
- C. **Incorrect:** This value is $\sim E6$ x less than the applicable limits for Fe⁵⁵
Plausible: if the candidate uses the value from 10CFR20 Appendix B Fe⁵⁵ in air (Table 2 col. 1)
- D. **Incorrect:** This value is 10 x less than the applicable limits
Plausible: If the candidate uses the 10CFR20 Appendix B table 2 column 2 limits for Cobalt 60 in water

Level: SRO Only

KA: SYS 068A2.04(3.3/3.3)

Lesson Plan Objective: WE-WL LPRO 16

Source: mod Catawba Exam 1999 Ques_575

Level of knowledge: comprehension

References:

1. OP-CN-WE-WL page 14-15
2. SLC 16.11-1 pages 1-7 - PROVIDED

Bank Question: 585.1**Answer: B**

1 Pt(s)

Unit 1 is in mode 5 with a NC system hydrostatic test in progress. Given the following events and conditions:

- Plant pressure is 2445 psig as indicated on the hydrostatic test skid.

At 0200, Plant Engineering stated that the hydrostatic test vendor confirmed that the calibration standards used to calibrate the hydrostatic test gages are in error by 300 psig and actual plant pressure is 2745 psig.

Which one of the following statements correctly describes the crew response to this condition?

- A. **No action required; consult with the duty engineer and recalibrate NC system pressure gages prior to completing the hydro.**
- B. **Reduce NC system indicated pressure below 2435 psig within 5 minutes.**
- C. **Reduce NC system indicated pressure below 2435 psig within 1 hour.**
- D. **Reduce NC system indicated pressure below 2235 psig within 1 hour.**

Distracter Analysis:

- A. **Incorrect:** actual pressure is still below the SL of 2735 psig.
Plausible: if the candidate does not think that a calibration error is sufficient grounds to enter safety limits action statements.
- B. **Correct:** required if above 2735 psig in mode 3, 4 or 5.
- C. **Incorrect:** must reduce pressure below safety limits within 5 minutes
Plausible: this is the correct answer if the plant is above mode 3.
- D. **Incorrect:** must reduce pressure below safety limits within 5 minutes
Plausible: if the candidate thinks that pressure must be reduced to normal operating pressure, 2235 psig.

Level: SRO Only

KA: G2.2.22 (3.4/4.1)

Lesson Plan Objective: ADM LPSO 8

Source: mod Ques_585

Level of knowledge: memory

References:

1. OP-CN-ADM-TS page 15
2. Tech Spec 2.1.2

Bank Question: 589.2**Answer: D**

1 Pt(s)

Unit 1 is in mode 5. Engineering reported the following results from completion of shutdown surveillances on ice condenser doors.

| <u>Inlet doors:</u> | <u>Door 1</u> | <u>Door 2</u> | <u>Door 3</u> | <u>Door 4</u> |
|-------------------------|---------------|---------------|---------------|---------------|
| Closing torque (in-lb.) | 79 | 96 | 114 | 113 |
| Opening torque (in-lb.) | 150 | 175 | 191 | 190 |

| <u>Intermediate Doors</u> | <u>Lifting Force</u> |
|---|----------------------|
| Adjacent to crane wall | 36 lb. |
| Paired with door adjacent to crane wall | 33 lb. |
| Adjacent to containment wall | 30 lb. |
| Pair with door adjacent to containment wall | 29 lb. |

Plant heat-up is proceeding with entry into mode 4 scheduled in 16 hours.

If ice bed temperature remains less than 27 °F, which one of the following statements correctly describes the Tech Spec or SLC action (if any) required?

REFERENCES PROVIDED: Tech Spec 3.6.13

- A. The heat-up cannot be allowed until intermediate door movement has been restored.
- B. The heat-up can proceed as long as inlet door torque values are restored to Tech Spec requirements within 16 days.
- C. The heat-up cannot be allowed until inlet door frictional torque values are within Tech Spec requirements.
- D. The heat-up can proceed without restrictions.

Distracter Analysis:

- A. **Incorrect:** Intermediate door lifting force is within specs
Plausible: If the candidate does not correctly compare these values
- B. **Incorrect:** Cannot change modes if inlet door torque values were out of spec for mode 4.
Plausible: If the candidate thinks that door torque values are high, and does not recognize that mode changes are prohibited - there are 16 days (14 + 48 hrs) to take action to correct the torque in mode 4 - but NOT to enter mode 4.

- C.** **Incorrect:** The frictional torque values on Ice condenser doors meet the tech spec limit.
Plausible: If the candidate does not correctly apply or compute TS values.

D. **Correct answer**

Level: SRO Only

KA: SYS 025K6.01 (3.4 / 3.6)

Lesson Plan Objective: CNT-NF SEQ 9

Source: Mod Catawba Exam 1999 Ques_589

Level of knowledge: analysis

References:

1. OP-CN-CNT-NF page 8
2. Tech Spec 3.6.13 - PROVIDED

Bank Question: 596.1**Answer: B**

1 Pt(s) Units 1 and 2 were operating at 100% power when a fire broke out in the back of the control room.

Given the following conditions:

- The fire has not yet affected or degraded any control systems
- Heavy black smoke is throughout the control room
- The SRO implements AP/17 (*Loss of Control Room*)

Which one of the following statements correctly describes the operator response to this event?

- A. Swap control to the auxiliary shutdown panels, then trip both unit reactors and turbines, and evacuate the control room.
- B. Dispatch RO's to the auxiliary shutdown panels, trip both unit reactors, turbines and feed pumps, then evacuate the control room.
- C. Evacuate the control room; trip both unit turbines and reactors on the way to the auxiliary shutdown panel.
- D. Immediately trip both unit reactors and turbines and evacuate the control room to the standby shutdown facility.

Distracter Analysis:

- A. **Incorrect:** control is not swapped until after the CR is evacuated.
Plausible: this is a more controlled approach to CR evacuation?
- B. **Correct:**
- C. **Incorrect:** Reactor and turbines tripped from the CR.
Plausible: This is a reasonable approach assuming operators can no longer function in the CR.
- D. **Incorrect:** Evacuate to the ASP not the SSF
Plausible: if the candidate confuses the SSF with ASP.

Level: RO&SRO

KA: APE 068AK3.12(4.1 / 4.5)

Lesson Plan Objective: CP-RSS SEQ 9

Source: Mod McGuire Exam 2000 Ques_596

Level of knowledge: memory

References:

1. OP-CN-CP-RSS page 13
2. AP/1/A/5500/17 pages 2-3

Bank Question: 647.1**Answer: D**

1 Pt(s) Unit 1 was operating at 100% power. The following trends were noted:

| | <u>0200</u> | <u>0205</u> | <u>0210</u> |
|--|-------------|-------------|-------------|
| 1A-1D NCP#1 seal outlet temp (°F) | 100 | 130 | 145 |
| 1A-1D NCP #1 seal leakoff flow (gpm) | 3.0 | 3.5 | 4.0 |
| 1A-1D NCP #1 seal d/p (psid) | >400 | >400 | >400 |
| 1A-1D NCP seal water inj filter d/p (psid) | 10.0 | 2.0 | 1.0 |
| 1A-1D NCP seal injection (gpm) | 8.0 | 1.5 | <1.0 |
| VCT Level | 50% | 49% | 50% |
| Pressurizer level | 55% | 56% | 55% |
| Charging Flow (gpm) | 87 | 88 | 87 |
| Letdown Flow (gpm) | 75 | 75 | 75 |

Which one of the following conditions would cause these parameter trends?

- A. #1 seal injection filter clogged
- B. 1NV-294, (NV PMPS A&B DISCH FLOW CTRL), failed closed
- C. The VCT depressurized
- D. 1NV-309, (SEAL WATER INJECTION FLOW), failed open

Distracter Analysis: Seal injection filter d/p and seal injection flow are decreasing which indicates loss of seal injection. Seal leakoff is increasing as indicated by leakoff flow and leakoff temp increasing. Pressurizer level stays about the same as seal injection flow is diverted into the NC system – total charging flow remains stable as corrected by pressurizer level control.

- A. **Incorrect:** seal injection filter d/p would increase
Plausible: most other parameters would trend as indicated except seal filter d/p would increase.
- B. **Incorrect:** closing 1NV-294 would stop charging and result in opposite trends in PZR & VCT
Plausible: if the candidate focuses only on NCP seal parameters.
- C. **Incorrect:** VCT depressurization would result in increased seal injection flow.
Plausible: if the candidate focuses only on seal leakoff flow and temperature.
- D. **Correct Answer:** seal injection flow and d/p decreasing

Level: RO&SRO

KA: APE 022AA1.09(3.2/3.3)

Lesson Plan Objective: NCP LPRO 3; NV LPRO 6, 7

Source: Mod McGuire Exam 2000 Ques_647

Level of knowledge: analysis

References:

1. OP-CN-PS-NV pages 26-27, 32- 34, 59, 61
2. OP-CN-PS-NCP pages 13, 22

Bank Question: 659**Answer: B**

1 Pt(s)

Unit 1 is at 1% power, starting up from a plant trip due to multiple power range nuclear instrument failures. Unit 2 is shutting down (30% power) to Mode 3, to investigate the potential common mode failure mechanism. The Unit 2 power range nuclear instrument channel N41 has been removed from service in preparation for the investigation.

Which of the following correctly describes the TSAIL entry for power range nuclear instrument inoperability during this maintenance for Unit 2?

- A. No TSAIL entry is required because N41 will not be required to be operable in Mode 3.
- B. A TSAIL entry is required because N41 is inoperable in Mode 1.
- C. No TSAIL entry is required because N41 will be within the action statement time limits.
- D. A TSAIL entry is required for tracking only

Distracter Analysis:

- A. **Incorrect:** A TSAIL entry is required.
Plausible: based on knowledge that no entry would be required in Mode 3.
- B. **Correct:** tagging N41 out of service makes N41 inoperable regardless of the outcome of the investigation into the common mode failure.
- C. **Incorrect:** A TSAIL entry is required.
Plausible: based on misunderstanding of TSAIL entry requirements.
- D. **Incorrect:** A TSAIL entry is required due to N41 inoperability in Mode 1.
Plausible: based on the requirement for a “tracking only” entry.

Level: SRO Only

KA: G2.2.23 (2.6/3.8)

Lesson Plan Objective: ADM-TS LPRO 5

Source: NRC McGuire 2000 Ques_659

Level of knowledge: memory

References:

1. OP-CN-ADM-TS page 22
2. Tech Specs 3.3.1 pages 1-2, 14
3. OMP 2-29 pages 2-3

Bank Question: 661.1**Answer: B**

1 Pt(s)

Units 1 and 2 are at 100% power. Given the following conditions:

- Unit 2 has experienced 2 fuel pin failures.
- The mechanical seal has failed on NI pump 2B.
- The NI-2B pump room general area is 400 mrem/hr.
- In order to reach the NI-2B pump room the worker must transit for 2 minutes through a 6 Rem/hr high radiation area and return through the same area.
- The worker has an accumulated annual dose of 400 mrem, respectively.

What is the maximum allowable time that the worker can participate in the seal repair on NI Pump 2B without exceeding the exclusion flag exposure limit for external exposure?

- A. No longer than 2 hours
- B. No longer than 2.5 hours
- C. No longer than 3 hours
- D. No longer than 3.5 hours

Distracter Analysis:

The candidate should determine that the exclusion flag exposure limit is 90% of 2000 mrem admin limit = 1800 mrem

Transient exposure is 400 mrem (6000mrem/hr x 4/60hr). (During transit to and from the job).

$400 \text{ mrem} + 400 \text{ mrem} = 800 \text{ mrem}$

$1800 \text{ mrem} - 800 \text{ mrem} = 1000 \text{ mrem}$ allowable before reaching exclusion flag exposure admin limit

$1000 \text{ mrem} / 400 \text{ mrem/hr} = 2.5 \text{ hours}$

- A. **Incorrect:** The answer is 2.5 hours.
Plausible: based on using alert flag limit (1600) versus exclude flag.
- B. **Correct:**
- C. **Incorrect:** The answer is 2.5 hours.
Plausible: based on calculating a one-way transit dose.
- D. **Incorrect:** The answer is 2.5 hours.
Plausible: based on using admin limit (2000) and a one-way transit dose.

Level: RO&SRO

KA: G2.3.4 (2.5/3.1)

Lesson Plan Objective: HP LPRO 2, 11

Source: Mod McGuire Exam 2000 Ques_661

Level of knowledge: comprehension

References:

1. NSD 507.6 page 10
2. GET Rad Worker Training pages 33, 34, 45

Bank Question: 663.1**Answer: A**

1 Pt(s)

With the plant at 10% power, an Instrument Technician was allowed to adjust the limit switches on 1NI-152B (*B NI PUMP DISCH TO HOT LEGS*) without a tag-out. He cycled the valve using the manual hand wheel to set up the limit switches. Upon completion of the work, the worker manually closed 1NI-152B and disengaged the manual hand wheel.

Which one of the following statements is correct at the end of the maintenance activity?

- A. **"B" NI train was inoperable while 1NI-152B was being manually cycled and remains inoperable until 1NI-152B has been cycled electrically to comply with requirements of OMP 2-33 (Valves).**
- B. **"B" NI train remained operable provided that the worker was present to position the valve, but now requires an R&R (info sticker on control switch) to document manual positioning.**
- C. **"B" NI train remained operable provided that the worker was present to position the valve, but 1NI-152B must be cycled electrically to comply with requirements of OMP 2-33 (Valves).**
- D. **"B" NI train was inoperable while 1NI-152B was being manually cycled but is now operable after the valve handwheel was disengaged.**

Distracter Analysis:

- A. **Correct:**
- B. **Incorrect:** NI train is inoperable
Plausible: partially correct – must document with an R&R and info sticker.
- C. **Incorrect:** NI train is inoperable
Plausible: partially correct – must electrically cycle the valve per OMP.
- D. **Incorrect:** Not operable until after 1NI-152B is cycled electrically.
Plausible: partially correct – 1NI-152B was inoperable while it was being manually cycled.

Level: SRO Only

KA: G2.2.19(2.1/3.1)

Lesson Plan Objective: SS-VVO NLO 5

Source: NRC McGuire 2000 Ques_663

Level of knowledge: comprehension

References:

1. OMP 2-33 page 5

Bank Question: 671.1**Answer: D**

1 Pt(s)

Unit 1 was releasing the contents of a waste gas decay tank in accordance with an approved release permit. 1EMF-50(L) (*Waste Gas Disch*) failed high during the release, and will not be repaired for 3 days.

Which one of the following actions (if any) can be taken to release the waste gas decay tank today?

- A. **The release cannot be restarted today. No release can be started until the repairs on 1EMF-50(L) (*Waste Gas Disch*) are completed.**
- B. **Recalculate the trip set points using 1EMF-50(H) (*Waste Gas Disch*) as the release path monitor, then restart the release after a new GWR form has been approved.**
- C. **Continue the release using 1EMF-36(L) (*Unit Vent Gas*) as the backup release path monitor.**
- D. **Recalculate the trip set points using 1EMF-36(L) (*Unit Vent Gas*) as the release path monitor, then restart the release after a new GWR form has been approved.**

Distracter Analysis:

- A. **Incorrect:** not required to use 1EMF-50(L) as the only qualified release path monitor
Plausible: if the candidate does not recognize that 1EMF-36(L) can be used to monitor the release path
- B. **Incorrect:** 1EMF-50(H) does not automatically trip WG-160 and cannot be used as a waste gas release path monitor
Plausible: if the candidate thinks that substituting the high range of 1EMF-50(L) provides the same automatic protection
- C. **Incorrect:** the release would be terminated when 1EMF-50(L) tripped
Plausible: if the candidate did not recognize that 1EMF-50(L) provided an automatic trip of WG-160 to terminate the release.
- D. **Correct answer**

Level: RO&SRO

KA: G2.3.11 (2.7/3.2)

Lesson Plan Objective: WE-WG LPRO 4

Source: NRC McGuire Exam 2000 Ques_671

Level of knowledge: memory

References:

1. OP-CN-WE-EMF pages 9, 11
2. OP-CN-WE-WG page 9

Bank Question: 697.1**Answer: B**

- 1 Pt(s) Unit 1 is operating at 100% power on 3/19. 1NI-59 (*A CL ACCUM CHECK VLV*) has been leaking. Given the following accumulator indications:

| <u>Time</u> | <u>0200</u> | <u>0300</u> | <u>0400</u> | <u>0500</u> |
|-----------------|-------------|-------------|-------------|-------------|
| Level (%) | 82% | 90% | 98% | 100% |
| Pressure (psig) | 603 | 635 | 680 | 710 |
| Boron (ppm) | 2560 | 2540 | 2510 | 2490 |

Assuming no operator action, what is the latest time that the plant can enter mode 3 and still comply with Tech Spec or SLC requirements?

REFERENCES PROVIDED:*ITS 3.5.1**Curve Book curve 7.30.2**COLR Rev 17 – page 21*

- A. Before 1000 on 3/19
- B. Before 1100 on 3/19
- C. Before 0900 on 3/22
- D. Before 1000 on 3/22

Distracter Analysis: Tech Spec values for CLA parameters are:

Volume ≥ 7630 but ≤ 8079 gal – exceeded at 0500

Pressure ≥ 585 but ≤ 678 psig – exceeded at 0400

Boron concentration ≥ 2550 but < 2975 ppm – exceeded at 0300

The accumulator exceeds the pressure limits at 0400 – so:

1 hours to repair – by 0500 on 3/19

6 hours to Mode 3 – by 1100 on 3/19 - ANSWER

12 hours to reduce RCS pressure below 1000 psig – by 2300 3/19

- A. **Incorrect:** can wait until 1100 on 3/19
Plausible: if the candidate applies the 6 + 1 hours from exceeding the boron limit cause of the problem – this is at 1000 or 7 hours from exceeding the boron limit at 0300.
- B. **Correct:**
- C. **Incorrect:** must be in Mode 3 by 1100 on 3/19.
Plausible: if the candidate misreads the cause of the problem – this is 72 + 6 hours from exceeding the boron limit at 0300.
- D. **Incorrect:** must be in Mode 3 by 1100 on 3/19

Plausible: if the candidate applies the allowable correction time incorrectly – if he adds 72 hours to fix the pressure problem and 6 hours to be in Mode 3.

Level: SRO Only

KA: G2.1.12 (2.9/4.0)

Lesson Plan Objective: ECC-CLA LPSO 6

Source: Mod Ques_697

Level of knowledge: analysis

References:

1. Tech Specs 3.5.1 pages 1-2 - PROVIDED
2. COLR page 21 - PROVIDED
3. Curve Book 7.30.2 - PROVIDED

Bank Question: 714**Answer: C**

1 Pt(s)

Unit 1 was in mode 2 preparing for a plant startup when an electrical transient occurred. Given the following events and conditions:

- Steam dumps are in steam pressure control
- Reactor power is 2%
- Tave decreases
- Rods have sequenced normally during the startup.
- Bank D group step counter indicates 200 steps
- DRPI indication for Bank D rods reads 198 steps
- Rod bottom light H-8 is illuminated
- DRPI indication for rod H-8 reads 0 steps
- DRPI indication for rod D-2 reads 192 steps

Which one of the following actions best describes the correct action that should be taken by the crew and the reason for this action?

- A. Trip the plant because a dropped rod below mode one is not an analyzed condition.
- B. Trip the plant because greater than 2 rods are misaligned.
- C. Ensure CRD BANK SELECT switch is selected to MANUAL to prevent rod motion.
- D. Ensure that CRD BANK SELECT switch is in AUTOMATIC to allow Tave to recover to Tref.

Distracter Analysis:

- A. **Incorrect:** Not required to trip the reactor unless > 2 rods are dropped or misaligned – one dropped rod is an analyzed condition
Plausible: If the candidate thinks that the AP14 case II immediate actions for a single dropped rod only applies to mode 1 conditions
- B. **Incorrect:** Rod H-8 is not
Plausible: Plant trip is the preferred method of shutting the reactor and ensuring the reactor is subcritical.
- C. **Correct:** Immediate action per AP/14 step 2
- D. **Incorrect:** Switch must be in manual
Plausible: AP/14 step 3 requires the operator to match Tave to Tref

Level: RO&SRO

KA: 001G4.22(3.0/4.0)

Lesson Plan Objective: IRE SEQ 20

Source: New

Level of knowledge: memory

References:

1. AP/14 Case II page 5

Bank Question: 715**Answer: D**

1 Pt(s)

Unit 1 was operating at 30% power. Given the following events and conditions:

- “A” NC pump trips
- No operator action has been taken
- All safety systems operate as designed

While the plant is still at power, which one of the following parameters will initially **INCREASE**?

- A. “A” steam generator level.
- B. Loop cold leg temperatures in the B, C and D loops.
- C. Steam generator pressures in the B, C and D loops.
- D. Steam generator steam flows in the B, C and D loops.

Distracter Analysis: The reactor will not trip below P-8.

- A. **Incorrect:** A S/G level will decrease
Plausible: when the pump trips, steam flow in the steam generator will decrease, level will “shrink” – the candidate may reverse this cause and effect.
- B. **Incorrect:** Unaffected Tcolds will decrease
Plausible: Steam flow in the unaffected loops will increase, heat removal from the RCS will increase, and cold leg temperature will decrease – the candidate may reverse this cause and effect or become confused with the reverse flow in the A loop
- C. **Incorrect:** Unaffected S/G pressures will decrease
Plausible: Unaffected steam generators will increase steaming, pressure will decrease – the candidate may reverse this cause and effect.
- D. **Correct:** Steam flow in the affected steam generator will decrease, load does not change, the remaining steam generators will increase their steam rates, steam flow in those steam generators will increase.

Level: RO&SRO

KA: SYS003K5.04(3.2/3.5)

Lesson Plan Objective: none

Source: New

Level of knowledge: analysis

References:

1. OP-CN- THF-FF page 15
2. OP-CN-CF-IFE page 6

Bank Question: 716**Answer: A**

1 Pt(s)

Unit 1 is responding to a large break LOCA inside containment. Given the following condition:

- The "*C-Leg Recirc FWST To CONT SUMP SWAP ENABLE TRN A*" light is lit on MC-11.

This light will light when swapover is not defeated and which one of the following events occurs?

- A. **Safety Injection.**
- B. **FWST level reaches the swapover setpoint.**
- C. **Safety Injection occurs and FWST level reaches the swapover setpoint.**
- D. **1 NI-185A (*ND PUMP 1A CONT SUMP SUCT*) opens.**

Distracter Analysis:

- A. **Correct:** The light is lit IF Safety Injection has occurred and the DEFEAT pushbutton has not been depressed
- B. **Incorrect:** FWST level does not input into the logic for the light
Plausible: FWST level does input into the logic for opening the sump isolation valves.
- C. **Incorrect:** Does not indicate that FWST level has reached the swapover setpoint
Plausible: Both of these conditions must exist to open the sump isolation valves.
- D. **Incorrect:** The valves open when SI has occurred, (even if reset) and FWST reaches 37%, they are not part of the light.
Plausible: If the candidate confuses the enable feature with the actuation.

Level: RO&SRO

KA: 013A3.02(4.1/4.2)

Lesson Plan Objective: ISE SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-CN-ECCS-ISE page 25

Bank Question: 718**Answer: B**

1 Pt(s) Unit 2 is conducting a plant shutdown from 100% power. Given the following events and conditions:

- Reactor power is 6%
- All manual actions have been taken as required in the procedures
- Intermediate Range channel N-36 fails HIGH.

Which of the following statements correctly describes how this failure affects the reactor shutdown and subsequent operation of the Nuclear Instrumentation System?

- A. The reactor will trip; the source range detectors will reenergize when N-35 decreases to the proper setpoint.
- B. The reactor will trip; the source range detectors will have to be manually reenergized.
- C. The reactor will not trip; the source ranges will reenergize when N-35 decreases to the proper setpoint.
- D. The reactor will not trip; the source ranges will have to be manually reenergized.

Distracter Analysis:

- A. **Incorrect:** The source range instruments will not automatically reenergize
Plausible: If the operator believes the remaining IR energizes the Source Ranges, but knows the reactor trips.
- B. **Correct:** The IR trip will occur when either IR channel increases to > 25% equivalent. However this trip is blocked manually when P-10 is satisfied. Since reactor power is given as 6%, when N-36 fails high, the IR high flux trip will occur.
The Source Range instruments will automatically reenergize when:
 - 1. P-10 is not satisfied, 3/4 NIS PR < 10% and
 - 2. P-6, both IR < 10^{-10} ampsOtherwise they will need to be MANUALLY reenergized. With a high failure of IR N-36, they will not automatically reenergize.
- C. **Incorrect:** The reactor will trip and the source range instruments will not automatically reenergize
Plausible: Operator believes the IR trip is blocked and only one IR is necessary to energize the SR

- D.** **Incorrect:** The reactor will trip and the source range instruments will not automatically reenergize
 Plausible: Operator believes the IR trip is blocked but knows both IR are necessary to energize the SR.

Level: RO&SRO

KA: SYS 015KG2.2(4.0/3.5)

Lesson Plan Objective: ENB SEQ 9

Source: New

Level of knowledge: analysis

References:

1. OP-CN-IC-ENB page 10, 13

Bank Question: 720**Answer: C**

1 Pt(s)

Unit 2 was operating at 100% power. Given the following events and conditions:

- The transmitter for channel I of Containment pressure has failed.
- The appropriate bistables have been tripped.
- Subsequently, the vital 120VAC power supply for instrument bus channel IV, (ERPD) fails
- All instruments powered from the bus are de-energized.

Which one of the following correctly describes the status of the containment spray system?

- A. Bistable for channel IV has tripped; containment spray actuated when power was lost.**
- B. Bistable for channel IV has tripped; containment spray will actuate if containment pressure exceeds 0.4 psig.**
- C. Bistable for channel IV has not tripped; containment spray will actuate if containment pressure exceeds 3.0 psig.**
- D. Bistable for channel IV has not tripped; containment spray auto actuation is prevented from occurring.**

Distracter Analysis:

Containment Spray actuation is normally 2 of 4 channel coincidence. One channel was tripped when it failed earlier making the coincidence 1/3. The loss of power to the second channel does not trip a second bistable because they are energize-to-actuate. Of the two remaining channels, one tripping will result in auto actuation at the setpoint of 1 psig.

- A. Incorrect:** The bistable for channel IV has not tripped since the bistables are energize-to-actuate
Plausible: If the candidate thinks that the bistables are tripped when they are deenergized – like most other protection bistables – and forgets about the CCPS enable signal.
- B. Incorrect:** Bistables are energize-to-actuate.
Plausible: If the candidate reverses the energize-to-actuate logic, the CCPS enables containment spray actuation at 0.4 psig.
- C. Correct:** One bistable is tripped; only one more needs to trip above the 0.4 psig CCPS interlock – trips at 3.0 psig in containment.

- D.** **Incorrect:** The loss of channel IV does not preclude containment spray actuation.
 Plausible: One bistable is tripped only one additional channel needs to trip.

Level: RO&SRO

KA: SYS 022 A3.01 (4.1/4.3)

Lesson Plan Objective: ISE Obj 4

Source: New

Level of knowledge: analysis

References:

1. OP-CN-ECCS-ISE pages 10 and 20

Bank Question: 722**Answer: B**

1 Pt(s)

Unit 2 is operating at 100% power. Given the following events and conditions:

- A turbine control valve closes
- Reactor power drops to 65%.

What action should the crew take to prevent possibly deadheading the condensate booster pumps?

- A. Start the standby hotwell pump.**
- B. Stop the "C" heater drain tank pumps.**
- C. Open the "C" heaters bypass valve.**
- D. Ensure 2CM-83 (GEN LOAD REJECT BYPASS) is modulating to maintain 150 psig.**

Distracter Analysis:

An engineering evaluation of CNS Unit 1 and 2 reactor trips showed that the Heater Drain Tank pumps develop sufficient discharge pressure to deadhead the condensate system. This phenomenon lasts until the drain flow to the tanks decreases and level control closes places the pumps in recirculation. This was observed to last up to 2.5 minutes. **(PIP 98-1726).**

K/A match justification:

The condensate system consists of 3 (50% capacity each) Condensate Hotwell Pumps taking a suction from the Hotwell and delivering the water through the Polishing Demineralizers, Condensate Air Ejectors, Gland Steam condenser, and "G" and "F" low pressure Heaters to the suction of the 3 (50% capacity each) Condensate Booster Pumps. The Condensate Booster Pumps deliver water through the "E", "D" & "C" intermediate pressure Heaters to the suction of the Main Feedwater Pumps. If flow out of the booster pumps is low for 20 seconds, they will trip. Therefore, to prevent a loss of condensate flow and potential main feed pump trip, when power is less than 70%, the heater drain pumps are tripped.

The premise of the question is to ask the operators what action they take when power is below 65% to prevent essentially a loss of condensate flow to the feed pumps.

Therefore, this question fits with the K/A SYS 056 A2.04 (2.6/2.8*) – “The ability to predict and monitor changes in parameters (to prevent exceeding design limits) associated with operating the Condensate System controls including – loss of condensate pumps.”

- A. **Incorrect:** This action while possibly appropriate does not address the deadheading issue.
Plausible: This will change the condensate flow and the candidate may think that this will prevent deadheading.
- B. **Correct:** To avoid the problem of deadheading, heater drain tank pumps are shutdown by procedure anytime the unit operates below 70% power.
- C. **Incorrect:** Opening the heater bypass valve would not prevent deadheading.
Plausible: This action would be taken if there was a problem with the heater, it does not address deadheading the condensate system.
- D. **Incorrect:** This has no effect on deadheading the condensate system
Plausible: This was the correct answer to a previous NRC question on load rejection.

Level: RO&SRO

KA: SYS 056A2.04(2.6/2.8)

Lesson Plan Objective: CM Obj 5

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-CF-CM page 14

Bank Question: 723**Answer: C**

1 Pt(s)

Unit 2 was operating at 45% power. Given the following events and conditions:

- Problems with feedwater control result in overfeeding all steam generators
- S/G NR levels increased to 80%
- No operator action has been taken.

Which one of the following statements correctly describes the automatic actions (if any) that should have already occurred?

- A. No automatic actions should have occurred at this time.
- B. Turbine trip, feedwater isolation.
- C. Turbine trip, feedwater isolation, CF pumps tripped.
- D. Reactor trip, turbine trip, feedwater isolation, CF pumps tripped.

Distracter Analysis:

- A. **Incorrect:** turbine tripped, feedwater isolated and CF pumps tripped
Plausible: possible if operator believes P14 setpoint is 84% (unit 1 setpoint is 84% - unit 2 setpoint is 77%)
- B. **Incorrect:** CF pumps are tripped
Plausible: if operator realizes CF isolation occurs but does not realize the CF pumps also trip.
- C. **Correct:** P-14 causes CF isolation, main turbine trip and CF pump trip.
- D. **Incorrect:** reactor would not trip – power below 48% P8
Plausible: operator believes turbine trip will cause a reactor trip.

Level: RO&SRO

KA: SYS 059A4.12(3.4/3.5)

Lesson Plan Objective: CF Obj 10

Source: New

Level of knowledge: analysis

References:

1. OP-CN-MC-CF page 24
2. OP-CN-IC-IPX page 19

Bank Question: 724**Answer: D**

1 Pt(s)

The crew is performing a cooldown in accordance with EP/1/A/5000/ES-0.2 (*Natural Circulation Cooldown*).

Which of the following actions will cause both the cooldown rate and the NC system flow rate to **increase**?

- A. Starting more CRDM fans.
- B. Increasing the setpoint on the steam dumps, if in automatic.
- C. Decreasing the output of the steam dump controller, if in manual.
- D. Increasing auxiliary feedwater flow to the steam generators.

Distracter Analysis:

The NC system flow rate increases as the temperature difference between the S/G and reactor vessel increases – causing the thermal driving head to increase.

- A. **Incorrect:** while starting more fans enhances head cooling, it will reduce the temperature difference between the S/G and reactor vessel and thereby reduce the thermal driving head and decreasing the NC system flow rate.
Plausible: Starting more CRDM fans will increase the cooldown rate.
- B. **Incorrect:** increasing the setpoint will raise the pressure setpoint, if in auto; the dumps will close, decreasing the cooldown rate and NC system flow rate.
Plausible: if the candidate reverses the effects that steam pressure has on the thermal driving head.
- C. **Incorrect:** decreasing the output closes steam dumps and reduces the cooldown rate on the S/G, which causes the delta temp to reduce, and decreases NC system flow.
Plausible: if the candidate reverses the effect of the reduction in S/G cooldown rate.
- D. **Correct:** increased CA flow will have the effect of increased steam flow, a decrease in NC temperature and will increase the cooldown rate.

Level: RO&SRO

KA: SYS 061K5.01(3.6/3.9)

Lesson Plan Objective: EP1 Obj 21

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-THF-HT pages 10 and 11

Bank Question: 725**Answer: B**

1 Pt(s)

Unit 1 was operating at 100% power. Given the following events and conditions:

- The feeder breaker to 600VAC MCC-1EMXA opens and the MCC is deenergized.

Which of the following NV loads have been lost?

- A. Reactor makeup pump 1A and boric acid pump 1A.**
- B. Boric acid pump 1A only.**
- C. Reactor makeup pump 1A only.**
- D. Centrifugal charging pump A auxiliary lube oil pump only.**

Distracter Analysis:

- A. Incorrect:** power supply is MXW to the reactor makeup pump
Plausible: 600 V load
- B. Correct:** power supply is EMXA
- C. Incorrect:** power supply is MXW to the reactor makeup pump
Plausible: 600 V load
- D. Incorrect:** power supply is MXK
Plausible: 600 V load

Level: RO&SRO

KA: 004 K2.02 (2.9/3.1)

Lesson Plan Objective: NV SEQ 17

Source: New

Level of knowledge: memory

References:

1. OP-CN-0157-01.03 (Not provided - large drawing size)
2. NV lesson plan pages 28, 37 & 38

Bank Question: 726**Answer: A**

1 Pt(s) Unit 2 is operating at 100%. Given the following events and conditions:

- A planned release is in progress from the waste gas system.
- Plant Vent monitor, EMF-35 (L) (Unit Vent Part) reaches the trip 2 setpoint.

Which one of the following automatic actions should occur?

- A. 1WG-160, (*WG Decay Tank Outlet to Unit Vent Control*), will close.**
- B. Containment Ventilation Isolation signal will be generated.**
- C. 1WL-124, (*Waste Monit Tnk Pmps Disch*), will close.**
- D. Fuel Pool Ventilation (VF) Filter Train will be tripped.**

Distracter Analysis:

EMF-35, 36, and 37

Automatic functions:

Trips unit related unfiltered exhaust fans.

Aligns VF filter train to the filtered mode.

Secures WG release (shuts 1WG-160).

Secures cont air release (shuts VQ-10).

- A. Correct:**
- B. Incorrect:** not generated by EMF-35(L)
Plausible: this is generated by emf-38, 39 or 40
- C. Incorrect:** not generated by EMF-35(L)
Plausible: closed by emf-49
- D. Incorrect:** not generated by EMF-35(L)
Plausible: VF not tripped, it is aligned to filtered mode

Level: RO&SRO

KA: SYS 071K4.04(2.9/3.4)

Lesson Plan Objective: EMF SEQ 2

Source: New

Level of knowledge: memory

References:

1. OP-CN-MC-EMF page 9 and 11
2. OP/1/B/6100/010Y A/1
3. OP/1/B/6100/010X C/5

Bank Question: 728**Answer: B**

1 Pt(s)

Unit 2 is in mode 4. The crew is preparing to start all the NCPs.

Which one of the following would satisfy the oil lift system interlock and allow the starting of the NCPs?

- A. Start both oil lift pumps, when oil lift pressure is greater than 500 psig, start the NCP.
- B. Start one oil lift pump, when oil lift pressure is greater than 500 psig, start the NCP.
- C. Start both oil lift pumps, when oil lift pressure is greater than 200 psig, start the NCP.
- D. Start one oil lift pump, when oil lift pressure is greater than 200 psig, start the NCP.

Distracter Analysis:

- A. **Incorrect:**
Plausible: Only one lift pump can be started at a time.
- B. **Correct:**
Plausible: One lift pump started, when pressure is greater than 500 psig, the NCP can be started.
- C. **Incorrect:**
Plausible: Only one lift pump can be started and the pressure is 500 psig.
- D. **Incorrect:**
Plausible: Pressure setpoint is 500 psig.

Level: RO&SRO

KA: SYS 003A4.03(2.8/2.5)

Lesson Plan Objective: NCP SEQ 10

Source: New

Level of knowledge: memory

References:

1. OP-CN-PS-NCP page 11

Bank Question: 734**Answer: C**

1 Pt(s)

Unit 2 is operating at 100% power. Given the following events and conditions:

Known leakage is as follows:

- Total RCS leakage = 10.5 gpm
- Secondary leakage:
 - A steam generator = 0.10 gpm
 - B steam generator = 0.10 gpm
 - B steam generator = 0.08 gpm
 - D steam generator = 0.05 gpm
- Leakage into the PRT = 4.5 gpm
- Leakage into the Reactor Coolant Drain Tank = 4.5 gpm
- Leakage into the Containment Floor and Equipment Sumps = 0.8 gpm
- No known pressure boundary leakage

Which of the following RCS Leakage Technical Specifications or Site Licensing Commitments, if any, have been exceeded?

REFERENCES PROVIDED: Tech Spec 3.4.13

- A. None, all leakages are within Technical Specifications.
- B. Primary to Secondary.
- C. Unidentified.
- D. Identified.

Distracter Analysis:

S/G leakage = $.1 + .1 + .08 + .05 = 0.33$ gpm $\times 60 \times 24 = 475.2$ gpd < 576 gpd LCO
Highest S/G leakage is 0.1 gpm $\times 60 \times 24 = 144.0$ gpd < 150 gpd tech spec
Identified leakage = $4.5 + 4.5 + 0.33 = 9.33$ gpm $< \text{Tech Spec LCO } 10$ gpm
Unidentified leakage = 10.5 gpm $- 9.33$ gpm = 1.17 gpm $> \text{Tech Spec LCO } 1.0$ gpm

- A. **Incorrect:** Unidentified leakage exceeds tech specs
Plausible: if the candidate adds the containment floor and equipment sump leakage (0.8 gpm) to the other identified leakage, then the unidentified leakage will not exceed tech specs.
- B. **Incorrect:** S/G leakage is within Tech Spec LCOs
Plausible: If the candidate does not properly convert S/G gpm to gpd, can determine that identified leakage $>$ tech specs

- C. Correct:** Total leakage is given as 10.5 gpm therefore unidentified leakage is total leakage – identified leakage:
 $10.5 \text{ gpm} - (4.5 + 4.5 + 0.33) = 1.17 \text{ gpm} > 1.0 \text{ gpm}$ (Tech Spec)
- D. Incorrect:** Identified leakage is 9.33 gpm ($4.5 + 4.5 + 0.33$), TS requires greater than 10 gpm, so D is incorrect.
Plausible: if the candidate adds the 0.8 gpm from the containment floor and equipment sumps to the other identified leakage, he/she will determine that identified leakage $> 10 \text{ gpm}$. This leakage cannot be added unless the leakage is specifically located and known not to interfere with the operation of the leakage detection system – and not to be pressure boundary leakage.

Level: SRO Only

KA: SYS 002A2.01(4.3/4.4)

Lesson Plan Objective: NC SEQ 10

Source: New

Level of knowledge: analysis

References:

1. Tech Spec 3.4.13 (PROVIDED)
2. Tech Spec definitions page 1.1-3

Bank Question: 736**Answer: C**

1 Pt(s)

Unit 2 is in the process of conducting a plant startup. Given the following events and conditions:

- Power range channels indicate the following:
 - PR N41 = 8%
 - PR N42 = 8%
 - PR N43 = 10%
 - PR N44 = 8%

Which of the following conditions would result in an Automatic Reactor Trip?

- A. All four RCPs trip.**
- B. Pressurizer level increases to 94%.**
- C. RCS pressure decreases to 1840 psig.**
- D. One turbine impulse pressure channel fails high.**

Distracter Analysis:

- A. Incorrect:** all loop flow trips are automatically blocked below P-7
Plausible: if the candidate does not recall that the NCP trip is blocked by P-7
- B. Incorrect:** Pressurizer High Level, Pressurizer Low Pressure, blocked by P-7
Plausible:
- C. Correct:** As pressure decreases to 1845 psig, SI is actuated. The SI signal generates a Reactor Trip Signal
- D. Incorrect:** P-7 would be enabled, but this does not cause a trip
Plausible: if the candidate is confused over the effect of turbine impulse on main generator trip

Level: RO&SRO

KA: SYS 010K1.02(3.9/4.1)

Lesson Plan Objective: ISE SEQ 4

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-ECCS-ISE page 14

Bank Question: 737**Answer: B**

- 1 Pt(s) Unit 2 is at 100% power. PZR level and pressure control are selected to channels 1 and 2.
- Which of the following failures will result in the pressurizer backup heaters immediately de-energizing?
- A. Controlling pressurizer pressure channel fails low.**
 - B. Backup pressurizer level channel fails low.**
 - C. Controlling pressurizer level channel fails high.**
 - D. Backup pressurizer pressure channel fails high.**

Distracter Analysis:

- A. Incorrect:** result is the heaters energize
Plausible: a low pressure condition may raise concerns of saturation margin
- B. Correct:** letdown isolates, heaters de-energize
- C. Incorrect:** Heaters energize (on deviation)
Plausible: high level may elicit concern regarding over-pressurizing a solid pressurizer due to heat up.
- D. Incorrect:** only input to PORV
Plausible: high level may elicit concern regarding over-pressurizing a solid pressurizer due to heat up.

Level: RO&SRO

KA:SYS 011K3.03(3.2/3.7)

Lesson Plan Objective: ILE SEQ 6

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-PS-ILE pages 15-16

Bank Question: 738**Answer: A**

1 Pt(s)

Unit 2 is at full power. Reactor Trip breakers A (RTA) and B (RTB) are closed, bypass breakers (RYA, RYB) are open.

Which one of the following statements correctly describes how a loss of EPA would effect the operation of Reactor Trip breaker A from the control room?

- A. RTA would still open from either a manual or automatic signal.**
- B. RTA would not open in response to a manual reactor trip signal; an automatic trip would still open the breaker.**
- C. RTA would not open in response to either an automatic or manual reactor trip signal.**
- D. RTA would immediately trip open because the shunt trip coil would deenergize.**

Distracter Analysis:

- A. Correct:** EPA powers the shunt trip coil on RTA. This coil energizes to trip RTA. This function would be lost. However, a manual reactor trip signal will also trip the UV coils from SSPS.
- B. Incorrect:** A manual reactor trip signal will trip the UV coils from SSPS.
Plausible: if the candidate does not recognize that SSPS train A provides power to the UV coils – which deenergize form the manual trip signal to trip RTA. SSPA train A is powered from an auctioneered circuit from ERPA and ERPB.
- C. Incorrect:** Both Rx trips would still function – the UV coil is unaffected.
Plausible: if the candidate does not recognize that a manual Rx trip sends a trip signal to the UV coils – which are powered from SSPS train A – which receives power from an auctioneering circuit from ERPA and ERPB.
- D. Incorrect:** The ST coil energizes to trip.
Plausible: if the candidate confuses the UV coil and the ST functions – ST coil is normally deenergized

Level: RO&SRO

KA: SYS 012A2.07(3.2/3.7)

Lesson Plan Objective: IPX SEQ 2, 4, 6

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-MC-IPX pages 7, 8 23, 24, 25, 27
2. OP-CN-EL-EPL page 27

Bank Question: 739**Answer: C**

1 Pt(s)

During a reactor startup, when should the "RPI at Bottom Rod Drop" (annunciator D/9 on 1AD-2) clear?

- A. When the rod position startup push button is depressed.
- B. Once all the shutdown banks are fully withdrawn.
- C. Once shutdown banks are withdrawn and control bank A is greater than 6 steps off the bottom.
- D. Once control bank D rods are off the bottom

Distracter Analysis:

The "RPI at Bottom Rod Drop" annunciator will be activated if any of the following conditions are met:

- Any Shutdown or Control Bank A rod has a calculated position which gives a rod bottom LED.
- Any Control Bank B, C, or D has a calculated position which gives a rod bottom LED and the other rods in the same bank and group do not have rod bottom LED's.

Any Control Bank B, C and D rod has a calculated position, which gives a rod bottom LED, and rods that should be sequenced out after that rod, are off the bottom. (this is not the case during a startup, so the alarm should remain clear)

- A. **Incorrect:** the pushbutton resets all the alarms associated with rod control – but not alarms associated with DRPI
Plausible: if the candidate does not recognize that DRPI alarms are not reset.
- B. **Incorrect:** Also requires control bank A to be withdrawn
Plausible: If the candidate thinks that only the SD banks need to be withdrawn.
- C. **Correct:** Alarm should clear once Bank A is off the bottom.
- D. **Incorrect:** Annunciator will clear when Bank A lifts off the bottom.
Plausible: At full accuracy, the rod bottom LED for control bank D rods will extinguish and the six-step position LED will light when the rods are approximately three steps from the bottom.

Level: RO&SRO

KA: SYS 014K4.02(2.5*/2.7*)

Lesson Plan Objective: EDA SEQ 4, 5

Source: New

Level of knowledge: memory

References:

1. OP-CN-IC-EDA page 12

Bank Question: 741**Answer: D**

1 Pt(s)

A LOCA has occurred on Unit 2. The crew has determined that train A of the ND system must be used to supply containment spray.

Which one of the following statements correctly describes one of the electrical interlocks that must be satisfied to allow an operator to open 2NS-43A (*ND PMP 2A TO CONT SPRAY HDR*)?

- A. Both 2ND-1B, and 2 ND-2A (*ND PUMP 2A SUCT FRM LOOP B*) must be closed.
- B. Either 2ND-36B or 2ND-37A (*ND PUMP 2B SUCT FROM LOOP C*) must be closed.
- C. Train B of the ND system must be operating in the Cold Leg Recirculation mode.
- D. CPCS signal must be present.

Distracter Analysis:

Interlocks to open 2NS-43A

- 1. 2ND-1B or 2ND-2A closed
- 2. 2NI-185A open
- 3. CPCS > 0.4 psig

- A. **Incorrect:** Only one valve of these 2 valves must be closed.
Plausible: if the operator does not recognize that only 1 of these 2 valves is necessary to satisfy the interlock.
- B. **Incorrect:** These are the train B interlocks for 2ND-36B/37A.
Plausible: operator reverses the trains
- C. **Incorrect:** Does not electrically interlock containment spray. Either train may be aligned for cold leg recirc.
Plausible: This is an administrative requirement prior to opening 2NS-43A.
- D. **Correct:**

Level: RO&SRO

KA: SYS 026K4.07(3.8*/4.1*)

Lesson Plan Objective: NS SEQ 8, 9 ND SEQ 8

Source: New

Level of knowledge: memory

References:

1. ND system page 14
2. FR-Z.1

Bank Question: 743**Answer: B**

1 Pt(s)

Unit 1 is in the process of offloading the core to the spent fuel pool. Spent fuel pool temperature is 120°F.

Which of the following could cause indicated spent fuel pool level to suddenly decrease?

- A. The containment purge exhaust flow rate is set less than supply flow rate.
- B. The spent fuel building running filter exhaust fan trips but the supply fan continues to run.
- C. After shutting down the containment purge system, the operator places the "MODE SELECTOR" switch on 1RB-CP-1 in the "NORM" position.
- D. The running spent fuel pool cooling pump trips.

Distracter Analysis: With core offload in progress, containment integrity must be established per Tech Specs. While refueling is in progress, the refueling canal is open and any changes in pressure between containment and the spent fuel pool will result in a manometer effect between the refueling cavity and the SFP.

- A. **Incorrect:** exhaust flow < supply flow will cause pressure in containment to increase, causing SFP level to increase.
Plausible: if the candidate reverses the effects of supply and exhaust flows on level.
- B. **Correct:** Continuing to supply outside air will increase pressure in the SFP building, increasing pressure, forcing level to shift to containment.
- C. **Incorrect:** This switch realignment will have no effect on containment pressure after the containment purge system has been shut down,
Plausible: If this switch was realigned as described when the purge system was in operation, it would cause pressure in upper containment to increase. There a precaution dealing with the mode selector switch, however, placing it in NORM at this time will have zero effect on containment pressure, and therefore no effect on levels.
- D. **Incorrect:** this will not suddenly change level in the spent fuel pool
Plausible: It takes hours to reach boiling conditions in the SFP and then it would be a very gradual decrease.

Level: RO&SRO

KA: SYS 033A1.01(2.7/3.3)

Lesson Plan Objective: VF SEQ 3, 4 VP SEQ 3

Source: New

Level of knowledge: comprehension

References:

1. OP/1/6450/015 enclosure 4.1 and 4.2
2. Lesson plan VF page 5
3. Lesson plan VP page 15

Bank Question: 744.1 Answer: C

1 Pt(s)

Unit 1 was operating at 100% power when a tube rupture occurred in the A S/G.

Current conditions:

- A S/G pressure is 1000 psig.
- A S/G NR level is 100%
- A S/G WR level is approximately 74% and steady
- NC pressure is 1500 psig

Which one of the following statements correctly explains why the narrow and wide range level indications are not the same?

- A. The narrow range upper level taps are at a higher elevation inside the S/G than the wide range taps; therefore the wide range instrument will always read lower than the narrow range instrument has reached the upper level tap.
- B. The wide range upper level taps are at a higher elevation inside the S/G than the narrow range taps; therefore the wide range instrument will continue to show level indication after the narrow range instrument has reached the upper level tap.
- C. The wide range and narrow range upper level taps are at the same elevation inside the S/G but the wide range level instrument is cold calibrated; therefore it will always read less than narrow range level until the steam generator is cooled down.
- D. The wide range and narrow range upper level taps are at the same elevation inside the S/G but the wide range level instrument has conservative instrument errors to prevent feeding a hot dry S/G; therefore the WR instrument will always read less than narrow range level until the steam generator is cooled down.

Distracter Analysis:

- A. **Incorrect:** NR and WR upper level taps are at the same elevation
Plausible: The candidate may think that placing the upper level tap higher causes the WR S/G level to read lower than NR
- B. **Incorrect:** NR and WR upper level taps are at the same elevation
Plausible: operator believes that the WR level instruments are at a different location.

- C. **Correct:** Since the WR and NR Level Instruments upper taps are located at the same elevation, a NR indication of greater than 100% indicates both the NR and WR upper taps are submerged.
ACTUAL Wide Range Level must therefore be 100%, an indicated level of ~ 74% is expected.
As ACTUAL Level in the ruptured S/G continues to increase, the Wide Range Level will continue to indicate ~ 74%. Wide Range Level indication will only increase further if the S/G is cooled down.
- D. **Incorrect:** There is no conservative instrument error inserted in the WR SG level instrument to prevent feeding a hot dry S/G
Plausible: partially correct – the instrument taps are at the same elevation – using conservative instrument error offset would be a plausible way of preventing feeding a hot dry S/G

Level: RO&SRO

KA: SYS 035K6.03(2.6/3.0)

Lesson Plan Objective: SG SEQ 7

Source: Bank (from SG lesson plan page 12, 13)

Level of knowledge: memory

References:

1. data book
2. SG lesson page 12&13

Bank Question: 747**Answer: D**

1 Pt(s)

Unit 1 is operating at 10% power conducting a plant shutdown. Given the following events and conditions:

- The tie breakers for 6.9KV buses 1TA, 1TB, 1TC and 1TD are open
- The main turbine is not synchronized to the grid
- The automatic fast transfer switch for each 6.9 KV bus is in the DEFEAT position
- RC pumps A and C are running.
- A fault occurs on transformer 1T2B and the transformer is deenergized.

Which one of the following statements correctly describes the RC pump response?

- A. No RC pumps would trip.
- B. Only RC pump A would trip.
- C. Only RC pump C would trip.
- D. RC pumps A and C would trip.

Distracter Analysis:

The long sides of 1TA and 1TC both are fed from 1T2B. Loss of 1T2B would result in a loss of RC pumps A and C. The fast or hot transfer would not occur because the fast transfer is defeated – a slow or dead bus transfer would occur.

- A. **Incorrect:** RC pumps A and C would trip
Plausible: - if candidate thinks that a slow bus transfer would prevent loss of RC pumps
- B. **Incorrect:** RC pump C will also trip
Plausible: RC pump A will trip – if the candidate believes 1T2B feeds only 1TA long side and forgets about 1TC long side
- C. **Incorrect:** RC pump A will also trip
Plausible: – if the candidate believes 1T2B feeds 1TC long side and forgets about 1TA long side.
- D. **Correct:**

Level: RO&SRO

KA: SYS 062K2.01(3.3/3.4)

Lesson Plan Objective: EP SEQ 11

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-EL-EP pages 23, 27-30
2. OP-CN-MT-RC page 6

Bank Question: 748**Answer: B**

1 Pt(s)

An Emergency Diesel Generator is running in parallel with offsite power. The operator is preparing to shutdown the diesel.

In accordance with OP/1(2)/A/6350/002, ENC 4.10, when manually unloading the Emergency Diesel Generator, the output breaker should be opened after load is reduced to 200 KW while maintaining a lagging power factor.

Which one of the following statements correctly describes the basis for this requirement?

- A. Diesel overspeed when the breaker is opened.**
- B. Breaker trip on reverse power.**
- C. Loss of power to the bus.**
- D. Breaker trip on Generator Differential.**

Distracter Analysis:

- A. Incorrect:** While possible if breaker is opened under greater load, this is not the reason for minimum load and lagging pf
Plausible: the DG will pick up speed if suddenly unloaded – overspeed is a valid concern to protect the diesel against.
- B. Correct:** leading pf and low load could motor the machine leading to reverse power condition.
- C. Incorrect:** Unlikely since a breaker failure would have to occur.
Plausible: if there was no reverse power trip, this condition could cause a loss of power to the bus if the DG acted as a motor and tripped the offsite power breaker on over-current.
- D. Incorrect:** An unbalance does not exist, Gen Diff should not occur.
Plausible: This is a valid DG trip

Level: RO&SRO

KA: SYS 064A1.08(3.1/3.4)

Lesson Plan Objective: DG3 SEQ 17

Source: bank DG 3-027-D

Level of knowledge: memory

References:

1. OP-/1/A/6350/002 Encl 4.10

Bank Question: 749**Answer: C**

1 Pt(s)

Which of the following is performed when starting the RC system to prevent pump runout?

- A. Limiting the number of pumps that can be started based on the number of cooling towers available.
- B. Limiting the number of pumps that can be started based on the number of condensers available.
- C. Not operating a single pump with the discharge valve fully open.
- D. Not allowing the first pump to be started unless the main condenser is isolated.

Distracter Analysis:

- A. **Incorrect:**
Plausible: confuses start interlocks with runout protection.
- B. **Incorrect:**
Plausible: knows that this is a requirement for pump starts.
- C. **Correct:**
Plausible: "Norm"- "T/V" key switch and valve selector switch is provided for the discharge valves of the RC pumps to limit discharge valve to 52 degrees open following the start of the pump, for the valve selected, to prevent runout of the first pump started
System procedure cautions that the pump cannot operate with its discharge valve fully open to prevent runout.
- D. **Incorrect:**
Plausible: confuses caution, (no pump can be started if the condenser is isolated).

Level: RO&SRO

KA: SYS 075K4.01(3.2/3.5)

Lesson Plan Objective: RC SEQ 14, 18

Source: New

Level of knowledge: memory

References:

- 1. OP-CN-RC 6400/001A
- 2. RC system lesson plan, page 7

Bank Question: 751**Answer: B**

1 Pt(s)

Unit 1 was operating at 100% power when a large break LOCA occurred. Given the following sequence of events:

- Time 1: Safety Injection occurs
- Time 2: Containment phase B isolation signal generated
- Time 3: FWST low level alarm occurs
- Time 4: Containment Sump Isolation valves opened

At what time did KC flow start to the ND heat exchangers?

- A. Time 1
- B. Time 2
- C. Time 3
- D. Time 4

Distracter Analysis:

- A. **Incorrect:**
Plausible: operator believes KC auto aligns on S signal
- B. **Correct:** KC will fail open on either phase B or S signal with low FWST level.
- C. **Incorrect:**
Plausible: operator fails to realize the KC valves opened on Sp
- D. **Incorrect:**
Plausible: operator believes valves are interlocked with aligning ND to the sumps

Level: RO&SRO

KA: 005 K1.10 (3.2/3.4)

Lesson Plan Objective: ND SEQ 8

Source: New

Level of knowledge: memory

References:

1. Lesson plan ND page 18

Bank Question: 752**Answer: B**

1 Pt(s)

Unit 2 is operating at 100% power. Given the following events and conditions:

- KC cooling is lost to an NCP.
- No operator action is taken.

Which one of the following conditions will first occur and require the NCP to be tripped?

- A. High # 1 seal leakoff discharge temperature.
- B. High motor bearing temperature.
- C. High radial bearing temperature.
- D. High pump shaft vibration.

Distracter Analysis:

- A. **Incorrect:** seal leakoff temperature is not cooled by KC
Plausible: Loss of seal injection would cause the discharge temperature to increase.
- B. **Correct:** A loss of KC cooling to the NC pumps results in a gradual approach to an overheated condition prior to a possible shaft seizure. The duration of the heatup phase, estimated to be approximately ten minutes, provides a sufficient time for operator recognition and response. Additional time exists between exceeding the **high bearing temperature** limit and the conditions required for shaft seizure.
NCP is tripped at 195 degrees (motor bearing)
- C. **Incorrect:** KC does not cool the radial bearing – this is cooled by seal injection flow.
Plausible: the operator may confuse seal injection with KC cooling.
- D. **Incorrect:** KC flow does not affect the pump vibration
Plausible: high shaft vibration will occur if the motor bearing overheats – but this will happen long after the high temperature alarm is received.

Level: RO&SRO

KA: SYS 008K3.03(4.1/4.2)

Lesson Plan Objective: KC SEQ 7, 14

Source: New

Level of knowledge: comprehension

References:

1. AP-21 page ?

Bank Question: 754**Answer: A**

1 Pt(s)

Unit 1 is conducting a reactor startup. Given the following conditions and events:

- Steam dumps are in Auto in the Steam Pressure mode.
- The Train "A" P-12 solenoids lose power.

Which one of the following statements correctly describes the operation of the steam dumps?

- A. All the steam dumps will close and cannot be re-opened.**
- B. All the steam dumps will close; the cooldown bank can be used by going to BYPASS.**
- C. No effect, P-12 does not input to steam dump operation in the Steam Pressure mode.**
- D. No effect, however, if Tave decreases below the P-12 setpoint, the dumps will not close.**

Distracter Analysis:

- A. Correct:** The P-12 solenoids are in series and energized above P-12. If Tave decreases below the setpoint or the solenoids lose power, the valves close. However, without power, the solenoids cannot be re-energized.
- B. Incorrect:** The solenoids cannot be bypassed.
Plausible: Operator may believe BYPASS will allow the valves to be opened.
- C. Incorrect:** P-12 solenoids will prevent the valves from opening
Plausible: Operator may believe P-12 only affects Tave operation.
- D. Incorrect:** P-12 solenoids will prevent the valves from opening
Plausible: Operator may believe P-12 does not affect operation unless necessary below 553.

Level: RO&SRO

KA: 041 G2.1 (3.7/3.6)

Lesson Plan Objective: IDE SEQ 8

Source: New

Level of knowledge: comprehension

References:

1. Lesson plan IDE page 6 and 27

Bank Question: 757**Answer: B**

1 Pt(s)

Units 1 and 2 are operating at 100% power with a normal service water line-up and RN pump 2A running. Given the following conditions and indications:

- RN pumps 1A, 1B and 2B start.
- 1 and 2 RN-48B (RN SUPPLY X-OVER ISOL) close
- 1 and 2 RN-47A (RN SUPPLY X-OVER ISOL) remain open
- RN suction and discharge valves swap to the SNSWP.

Which one of the following conditions correctly describes the cause of this condition?

- A. The Lake Wylie dam failed.
- B. RN pump intake pit A screens are clogged.
- C. The Unit 1 RN pump intake pit A level indicator failed low.
- D. There was a spurious containment phase B actuation on Unit 1.

Distracter Analysis:

- A. **Incorrect:** low lake level would cause a low level in both RN pump pits A and B, which would close valves 1/2RN-47A
Plausible: Partially correct – all other actuations would occur
- B. **Correct:**
- C. **Incorrect:** requires 2 of 3 level instruments to fail to get the actions.
Plausible: if the candidate does not know the coincidence logic.
- D. **Incorrect:** would not cause RN suction valves to swap to the SNSWP – would cause 1RN-47A to close and would not cause 2RN-48B to close
Plausible: partially correct – would cause all other conditions

Level: RO&SRO

KA: APE 062 AA2.02 (2.9 / 3.6)

Lesson Plan Objective: PSS-RN SEQ12

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-PSS-RN pages 14, 31-33

Bank Question: 759**Answer: D**

1 Pt(s)

Unit 1 is operating at 100% power. Given the following events and conditions:

- Fire protection systems are in their normal alignment.
- CA Pump Room CO₂ suppression system main bank CO₂ cylinders A and D have pressure readings of 0 psig
- All reserve bank cylinders pressure read 600 psig.

Which one of the following correctly describes the CA CO₂ system status, and required operator actions (if any)?

REFERENCES PROVIDED: SLC 16.9-3

- A. The CA CO₂ system is operable because the NLO can serve as a fire watch until the A and D main cylinders are replaced with the A and D reserve cylinders.
- B. The CA CO₂ system is inoperable, but can be restored if the NLO manually cuts in the A and D reserve cylinders.
- C. The CA CO₂ system is operable, because the reserve bank automatically provides a 100% back up supply of CO₂. No action is required.
- D. The CA CO₂ system is inoperable, but can be restored if the NLO manually switches the system from the main to the reserve bank.

Distracter Analysis:

- A. **Incorrect:** The system is inoperable.
Plausible: a fire watch is an acceptable comp measure for this inoperability.
- B. **Incorrect:** The reserve tanks are put on line as a bank, with the flip of a switch.
Plausible: some gas supplies are replaced this way.
- C. **Incorrect:** The system is inoperable.
Plausible: if the candidate thinks the reserve supply aligns automatically.
- D. **Correct:**

Level: SRO Only

KA: 000067AK3.02(2.5 / 3.3)

Lesson Plan Objective: SS-RFY SEQ 40

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-SS-RFY pages 21-22
2. SLC 16.9-3 - PROVIDED

Bank Question: 760**Answer: B**

1 Pt(s)

Unit 1 is operating at 60% power. Given the following events and conditions:

- Inverter 1EIA output breaker fails open.
- Valve 1NV-252A (*NV PUMPS SUCTION FROM FWST*) opens.

Assuming no operator action, which one of the following statements correctly describes the observed conditions caused by the loss of vital AC power?

REFERENCES PROVIDED: AP-29, Enclosures 14 - 17

- A. 1NV-252A failed open on loss of power to its solenoid.
- B. VCT level decreases to the FWST swapover point due to loss of reactor coolant makeup.
- C. 1NV-252A opened due to loss of power to the BDMS system.
- D. VCT level instrument failed low causing FWST swapover.

Distracter Analysis: 1NV-252A is the FWST suction valve to the charging pumps

- A. **Incorrect:** 1NV-252A opens due to low VCT level.
Plausible: because 1NV-252A is a fail-open AOV.
- B. **Correct:** lost makeup capacity to the VCT due to loss of 1EIA
- C. **Incorrect:** 1NV-252A opens due to low VCT level.
Plausible: because 1NV-252A opens on a BDMS alarm.
- D. **Incorrect:** 1NV-252A opens due to actual low VCT level
Plausible: because a low level can cause 1NV-252A to open - if the candidate does not recall this is a 2 of 2 logic.

Level: SRO Only

KA: 000057AA2.07(3.3 / 3.5)

Lesson Plan Objective: EP-EPL SEQ14

Source: New

Level of knowledge: memory

References:

1. OP-CN-EP-EPL pages 13, 27
2. OP-CN-PS-NV page 25
3. AP/1/A/5500/29 pages 105-120 - PROVIDED

Bank Question: 761**Answer: A**

1 Pt(s)

Both units are shutdown for maintenance. Unit 1 is discharging a recycle monitor tank. The OSM has authorized radiography to be performed in the vicinity of 1EMF-49 (*LIQUID WASTE DISCH*), 1EMF-50 (*WASTE GAS DISCH*), and 1EMF-57 (*WMT LIQUID DISCH*).

Which one of the following statements correctly describes the response (if any) of the recycle monitor tank release if the radiography source is inadvertently pointed at the EMF?

- A. The recycle monitor tank release would be automatically terminated because 1WL-124 (*WASTE MONIT TNK PMPS DISCH*) will close.
- B. The recycle monitor tank release would be automatically terminated because 1WL-X28 (*MTB DISCHARGE TO RL ISOLATION*) will close.
- C. The recycle monitor tank release would be automatically terminated because 1WG-160 (*DECAY TANK OUTLET TO UNIT VENT CONTROL*) will close.
- D. Radiographic sources will not cause EMFs to increase because they are shielded against the effects of external radiation.

Distracter Analysis:

Radiographic sources are intense emitters of gamma rays. Most EMFs will respond these gamma rays by increasing signal level and exceeding a trip 2 condition. The recycle monitor tank release path is monitored by 1EMF-49 that trips 1WL-124 to automatically terminate the release.

- A. **Correct:**
- B. **Incorrect:** closing 1WL-X28 will not terminate this release
Plausible: 1EMF-57 will close 1WL-X28 – this will terminate a liquid release from the waste monitor tank (WMT) building. The recycle monitor tank is not in the WMT building
- C. **Incorrect:** closing 1WG-160 will not terminate this release
Plausible: 1EMF-50 will close 1WG-160 – to terminate a waste gas release.
- D. **Incorrect:** Although some accident EMFs may be heavily shielded, these process EMFs do not have sufficient shielding to prevent a radiography source from causing a trip 2.
Plausible: If the candidate misunderstands detection theory.

Level: SRO Only

KA: APE 059AK1.03(2.3/2.9)

Lesson Plan Objective: none

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-WL-EMF page 11

Bank Question: 762**Answer: A**

1 Pt(s)

Unit 2 is operating at 100% power. Given the following conditions:

- IAE made several containment entries this week to recalibrate the pressurizer level instruments in accordance with the following schedule:

| <u>Entered</u> | <u>Exited</u> |
|----------------|---------------|
| 2300 4/05/01 | 0200 4/06/01 |
| 1600 4/06/01 | 1730 4/06/01 |

- No maintenance has been conducted on the air locks.
- The last containment air lock door seal leakage tests were completed at 1400 on Wednesday 4/04/01 following the weekly containment rounds.

Which one of the following statements correctly describes the completion time for the air lock seal test to comply with Tech Spec requirements following this evolution?

REFERENCES PROVIDED
TECH SPEC 3.6.2 & Bases

- A. 1400 on 4/07/01
- B. 2300 on 4/08/01
- C. 0200 on 4/09/01
- D. 0300 on 4/09/01

Distracter Analysis:

It should be noted that the 72-hour requirement to conduct the leak test of the door seals is not clearly stated up front in Tech Spec 3.6.2, nor is it contained in the surveillance section of this Tech Spec. The 72-hour leak test requirement is in the bases for Tech Spec 3.6.2. Distracter D is plausible if the candidate does not look at the bases section.

- A. **Correct:** A door seal test is required at least every 72 hrs during multiple entries.
- B. **Incorrect:** a door seal test is required no later than 1400 on 4/07/01
Plausible: this is 72 hours from the time that containment is first opened
- C. **Incorrect:** a door seal test must be completed by 1400 on 04/07/01.
Plausible: this is 72 hours from the last containment entry
- D. **Incorrect:** the test must be completed by 1400 on 04/07/01.

Plausible: if the candidate thinks that the 1 hour completion time for action A.1 (to verify the operable door is closed) implies that the leak test must be completed to verify that the door is closed.

Level: SRO Only

KA: APE0 69AK2.03(2.8 / 2.9)

Lesson Plan Objective: CNT-CNT SEQ 19

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-CNT-CNT pages 13-14
2. Tech Spec 3.6.2 & Bases - PROVIDED

Bank Question: 764**Answer: D**

1 Pt(s)

Unit 2 was operating at 100% power. Given the following events and conditions:

- At 0200, NCP 2C tripped on an electrical fault.
- Reactor power is 96% and the reactor trip breakers are closed.
- The operators implement FR-S.1, (*Response to Nuclear Power Generation/ATWS*).
- Safety injection has not actuated.
- NV pump 1B is running, NV pump 1A is not running
- Both boric acid pumps are running

If all other valves are in their normal full power lineup, which one of the following valve lineups provides adequate boration flow to the NCS?

- A. **CLOSED:** -2NV-312A (*CHRG LINE CONT ISOL*)
 -2NV-186A (*B/A TO BLENDER OTLT TO VCT OTLT*)
 -2NV-238A (*B/A TO BLENDER CTRL VLV*)
 OPENED: -2NV-314B (*CHRG LINE CONT ISOL*)
 - 2NV-188A & 189B (*VCT OTLT ISOL*)
 - 2NV-236B (*BORIC ACID TO NV PUMPS SUCT*)
- B. **CLOSED:** -2NV-252A (*NV PUMPS SUCT FROM FWST*)
 -2NV-181A (*B/A BLENDER OTLT TO VCT*)
 -2NV-186A (*B/A TO BLENDER OTLT TO VCT OTLT*)
 OPENED: -2NV-253B (*NV PUMPS SUCT FROM FWST*)
 -2NV-188A & 189B (*VCT OTLT ISOL*)
 -2NI-10B (*NV PMP C/L INJ ISOL*)
- C. **CLOSED:** -2NV-314B (*CHRG LINE CONT ISOL*)
 -2NV-188A & 189B (*VCT OTLT ISOL*)
 -2NV-236B (*BORIC ACID TO NV PUMPS SUCT*)
 OPENED: -2NV-312A (*CHRG LINE CONT ISOL*)
 -2NV-186A (*B/A TO BLENDER OTLT TO VCT OTLT*)
 -2NV-238A (*B/A TO BLENDER CTRL VLV*)
- D. **CLOSED:** -2NV-252A (*NV PUMPS SUCT FROM FWST*)
 -2NV-188A (*VCT OTLT ISOL*)
 -2NI-9A (*NV PMP C/L INJ ISOL*)
 OPENED: -2NV-253B (*NV PUMPS SUCT FROM FWST*)
 -2NV-189B (*VCT OTLT ISOL*)
 -2NI-10B (*NV PMP C/L INJ ISOL*)

Distracter Analysis:

- A. **Incorrect:** No emergency boration flow path because 2NV-312A is closed.
Plausible: because all the other valve positions are normal for this condition.
- B. **Incorrect:** No emergency boration flow path because 2NV-188A&189B are open, preventing full low from the FWST.
Plausible: there's a flow path from the FWST to the running NV pump.
- C. **Incorrect:** No emergency boration flow path because 2NV-314B is closed.
Plausible: there will be boron flow from the blender to the VCT in this lineup.
- D. **Correct:** - this describes the B train valve lineup prescribed by the RNO for step 4.d.

Level: RO&SRO

KA: APE 024G4.1(4.3/4.6)

Lesson Plan Objective: EP-FRS SEQ 5

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-EP-FRS page 6
2. EP/1/A/5000/FR-S.1 pages 2-3

Bank Question: 765**Answer: B**

1 Pt(s)

A Unit 1 was operating at 100% power. Given the following events and conditions:

- 0200 - A load rejection causes reactor power to decrease to 80%.
- Power is increased – but control rod H-8 in control rod bank D is noted to be lagging behind the rest of the control bank as rods are withdrawn.
- 0530 - Power reaches 95%.
 - Group step counters for Control Bank D indicate a rod position of 194 steps.
 - DRPI indication for control bank D rods is at 192 steps (except for rod H-8).
 - DRPI indication for control rod H-8 (in control bank D) indicates a rod position of 180 steps.
 - Plant computer trends indicate that the differences in rod position first started occurring 3 hours ago but the magnitude of the difference between rod H-8 and bank indication has just reached the current maximum value.
 - IAE has determined that rod H-8 is trippable.
- Management has directed that power should be maximized for the next 24 hours due to a grid capacity emergency and if possible wants the unit returned to full power as soon as possible.

Which of the following correctly describes the required operator response to this occurrence within the next hour?

REFERENCES PROVIDED: Tech Spec 3.1.4

- A. Power ascension may continue to 100% with no restrictions as long as control rod H-8 remains within 12 steps of control bank D DRPI position.
- B. Because the rod was misaligned for less than 24 hours, power ascension may continue after manually withdrawing rod H-8 to DRPI position of 192 steps.
- C. Reduce power to 75%, and perform flux maps to verify that core power peaking factors remain within design limits and verify SDM is within COLR limits then resume the power ascension.
- D. Verify shutdown margin and shutdown the reactor because the core power peaking factors can no longer be assumed to be within safety analysis criteria.

Distracter Analysis:

- A. **Incorrect:** a The Tech Spec criterion for rod misalignment is > 12 steps from the group step counter – not the DRPI rod position.
Plausible: If the candidate does not recognize the LCO for rod misalignment.
- B. **Correct:** Tech Spec 3.1.4 condition B
- C. **Incorrect:** cannot resume power ascension unless rod is realigned
Plausible: partially correct – these are alternative tech spec actions – if the candidate thinks that the SDM time period has already expired – or misreads the actions statements.
- D. **Incorrect:** Not required to shutdown for a misaligned rod.
Plausible: if the candidate thinks that the Tech Spec time of the misalignment is 3 hours ago rather than at the time that the condition is discovered, this would be correct under TS3.1.4.

Level: SRO Only

KA: APE 005AK1.04(3.0 / 3.4)

Lesson Plan Objective: IC-IRE SEQ 17, 19

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-IC-IRE page 22
2. Tech Spec 3.1.4 - PROVIDED
3. Tech Spec 1.3 page 1.3-1

Bank Question: 766**Answer: B**

1 Pt(s)

Unit 2 was operating at 75% power with rod control in automatic. A Rod Control Urgent Failure alarm is received on 2AD-2. Given the following events and conditions:

- | | |
|---------------------------------------|----------------------------|
| • Control rod bank D | No motion |
| • PR instruments | decreasing |
| • Tave | decreasing |
| • Tref / Tauct deviation | increasing |
| • All control rod groups | At programmed withdrawal |
| • All shutdown rod groups | Fully withdrawn except one |
| • 2AD-2, D/9 "RPI at Bottom Rod Drop" | LIT |

Which of the following statements correctly describes the required immediate actions for the reactor operator?

- A. **Verify only one rod dropped or misaligned, and that reactor power stabilizes; perform subsequent actions of AP/14 (*Control Rod Misalignment*) as directed by the SRO.**
- B. **Verify only one rod dropped or misaligned, and switch rod control to manual; perform subsequent actions of AP/14 as directed by the SRO.**
- C. **Verify only one rod dropped or misaligned, and switch rod control to manual; perform subsequent actions of AP/15 (*Rod Control Malfunction*) as directed by the SRO.**
- D. **Verify no rod movement and switch rod control to manual; perform subsequent actions of AP/15 as directed by the SRO.**

Distracter Analysis:

- A. **Incorrect:** Does not switch rod control to manual.
Plausible: Reasonable actions if the candidate forgets the immediate actions.
- B. **Correct:** Immediate actions of AP/14, Case II.
- C. **Incorrect:** Does not verify another misalignment, and wrong AP.
Plausible: If the candidate misses the misalignment verification, and/or chooses the wrong AP based on its title.
- D. **Incorrect:** Correct answer for the wrong AP.
Plausible: If the candidate chooses AP/15 based on its title.

Level: RO&SRO

KA: APE 003G2.4.1(4.3/4.6)

Lesson Plan Objective: IRE SEQ 20

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-IC-IRE pages 10, 13, 21
2. AP/1/A/5500/14 page 6

Bank Question: 767**Answer: D**

1 Pt(s)

Unit 1 is responding to a small-break loss of coolant accident inside containment. Given the following events and conditions:

- Operators have implemented E-0 (*REACTOR TRIP*), and E-1 (*LOSS OF REACTOR OR SECONDARY COOLANT*) through step 10.
- Bus 1ETB is deenergized
- NI pump 1A has failed.
- Containment hydrogen concentration is 7%
- The TSC has recommended purging containment to reduce hydrogen concentration to 3.5% before starting the recombiners.

Which one of the following statements correctly describes the method for performing this evolution to minimize the off-site dose?

- A. **Containment air is exhausted to the auxiliary building where it is filtered prior to release to the unit vent stack.**
- B. **Containment air is exhausted to the containment air release system where it is filtered prior to release to the unit vent stack.**
- C. **Containment air is exhausted to the annulus where it is continuously recirculated and filtered, and retained for release after airborne contamination has been reduced below 10CFR20 limits.**
- D. **Containment air is exhausted to the annulus where it is continuously recirculated and filtered, while at the same time being exhausted via the unit vent stack.**

Distracter Analysis:

- A. **Incorrect:** Air is released to the annulus area.
Plausible: This could be a way to filter the release if the air was vented to the auxiliary building.
- B. **Incorrect:** Air is released to the annulus area.
Plausible: If the candidate confuses the VQ and VY systems.
- C. **Incorrect:** The air is released to the vent stack.
Plausible: If the candidate does not remember that VE releases to the stack to maintain negative pressure in the annulus.
- D. **Correct:**

Level: RO&SRO

KA: EPE 009G2.3.9(2.5/3.9)

Lesson Plan Objective: VX SEQ 4

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-CNT-VE pages 5- 7
2. OP-CN-CNT-VX pages 6, 9-10
3. OP-CN-CNT-VQ pages 7, 9
4. OP-CN-PSS-VA page 23

Bank Question: 768**Answer: B**

1 Pt(s)

Unit 1 is at 25% power when a loss of main feedwater occurs. Given the following events and conditions:

- The main turbine trips.
- CA pumps 1A and 1B start automatically.
- CA flow to the S/Gs was throttled when the S/G A N/R level was greater than 11%.
- Control valve 1CA-62A to S/G A cannot be closed.

Assuming no operator action, which one of the following statements correctly describes the consequences of failing to mitigate this malfunction?

- A. The reactor will be overcooled causing a criticality concern.
- B. S/G A will be overfilled causing a main steam pipe stress concern.
- C. The reactor will be overcooled causing a pressurized thermal shock concern.
- D. S/G A will be overfilled causing a feed ring thermal stress concern.

Distracter Analysis:

- A. **Incorrect:** The reactor remains critical and maintains programmed Tave.
Plausible: could be a concern if the reactor tripped.
- B. **Correct:**
- C. **Incorrect:** The reactor does not see a significant cooldown.
Plausible: could be a concern if the reactor tripped.
- D. **Incorrect:** The feed rings are designed to withstand the shock of CA flow.
Plausible: A possible concern if the candidate does not understand S/G design.

Level: RO&SRO

KA: APE 054AK3.03(3.8/4.1)

Lesson Plan Objective: SM LPRO 25

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-STM-SM pages 16-17
2. AP/1/A/550/06 page 2
3. OP-CN-TA-PTS pages 18, 20, 22
4. OP-CN-CF-CA pages 10,11,15

Bank Question: 769**Answer: C**

1 Pt(s)

Unit 1 is recovering from a loss of secondary coolant accident. Safety injection initiated properly. A total loss of feedwater has caused the operators to implement FR-H.1, (*Loss of Secondary Heat Sink*). Given the following plant conditions:

- NCS Pressure 2335psig
- NCS Temperature 565°F
- S/G 1A, 1B, 1C Pressure 1180psig
- S/G 1A, 1B, 1C Level (WR) 2%
- S/G 1D Pressure 100psig
- S/G 1D Level (WR) 35%
- VI system pressure 10psig
- Containment pressure 3.4psig

Which one of the following actions is initially required to assure the maintenance of adequate core cooling?

- A. **Depressurize S/G 1A, 1B, and 1C to allow feeding the S/G using the condensate system.**
- B. **Reset the CAPT and align it to feed S/G's 1A, 1B and 1C.**
- C. **Open 1NC-32B (*PZR PORV*) and 1NC-34A (*PZR PORV*) using nitrogen pressure.**
- D. **Reset safety injection and containment phase "A" isolation signals to re-establish instrument air pressure to open 1NC-32B and 1NC-34A.**

Distracter Analysis:

- A. **Incorrect:** Can't feed dry S/G's
Plausible: if the candidate does not recognize dry S/G criteria met, this is one FR-Z.1 recovery method.
- B. **Incorrect:** Can't feed dry S/G's
Plausible: if the candidate does not recognize dry S/G criteria met, this is one FR-Z.1 recovery method.
- C. **Correct:**
- D. **Incorrect:** Must reset S_p to reopen VI valves.
Plausible: if the candidate thinks that VI is a phase "A" isolated system.

Level: RO&SRO

KA: WE05AA1.1(4.1/4.0)

Lesson Plan Objective: FRH LPRO 5

Source: New

Level of knowledge: analysis

References:

1. OP-CN-EP-FRH page 6

Bank Question: 770**Answer: B**

1 Pt(s) Unit 1 is starting-up in mode 1. Given the following conditions and events:

- Battery charger 1ECB is out of service.
- Battery charger 1ECS is supplying bus 1EDB.
- Annunciator 1AD-11, H/3 (125VDC ESS PWR CHANNEL C TROUBLE) alarms due to the loss of power from battery charger 1ECC.
- The battery charger 1ECC output breaker is faulted.

Which of the following describes operator action needed in response to these conditions?

REFERENCES PROVIDED: - Tech Spec's 3.8.4, 3.8.7, 3.8.9

- A. Switch inverter 1EIC to the regulated power supply, and be in mode 3 within 6 hours.
- B. Crosstie bus 1EDC to bus 1EDA, and fix one of the chargers within 10 days.
- C. Switch inverter 1EIC to the regulated power supply, and fix one of the chargers within 24 hours.
- D. Crosstie bus 1EDC to bus 1EDA, and fix one of the chargers or be in mode 3 within 6 hours.

Distracter Analysis:

- A. **Incorrect:** they would have 14 hours if the buses were not cross-tied.
Plausible: This is a possible action if the buses could not be cross-tied.
- B. **Correct:**
- C. **Incorrect:** They still have to cross-tie or shutdown within 14 hours..
Plausible: If the candidate focuses on inverter vs DC source TS.
- D. **Incorrect:** the busses can be cross-tied for 10 days.
Plausible: If the candidate thinks more than one train is affected.

Level: SRO Only

KA: APE 058AA1.01(3.4/3.5)

Lesson Plan Objective: EPL LPRO 9, 19

Source: New

Level of knowledge: memory

References:

1. OP-CN-EL-EPL page 19
2. Tech Spec's 3.8.4, 3.8.7, 3.8.9 - PROVIDED

Bank Question: 771**Answer: D**

1 Pt(s)

Unit 1 is operating at 100% power and Unit 2 is refueling. Unit 1 is releasing a waste gas decay tank when a significant leak develops on a piping flange upstream of the isolation valve.

Which one of the following statements correctly describes the automatic and/or manual actions required to assure that the airborne contamination from the leak is contained and filtered in the auxiliary building?

- A. **1EMF-50 (*Waste Gas Disch*) automatically stops the auxiliary building ventilation unfiltered exhaust fans. Auxiliary building filtered exhaust and supply fans continue to operate.**
- B. **1EMF-41 (*Aux Bldg Vent Hi Rad*) will trip the auxiliary building supply fans. The operators must manually trip the auxiliary building unfiltered exhaust fans and start the filtered exhaust fans.**
- C. **1EMF-37 (*Unit Vent Iodine*) automatically stops the auxiliary building ventilation unfiltered exhaust fans and starts the filtered exhaust fans. The operators must manually stop the supply fans.**
- D. **1EMF-35 (*Unit Vent Part Hi Rad*) automatically stops the auxiliary building ventilation unfiltered exhaust fans, which trips the auxiliary building supply fans. The auxiliary building filtered exhaust fans continue to run.**

Distracter Analysis:

- A. **Incorrect:** EMF-50 does not secure the VA UF fans. Loss of the UF exhaust fans would trip the supply fans.
Plausible: partially correct – filtered exhaust fans would continue to run. 1EMF-50 sounds like a monitor that could be relied upon to terminate a release to a leak in the Aux Bldg.
- B. **Incorrect:** There are automatic actions associated with 1EMF-41 to terminate a release into the auxiliary building (AB).
Plausible: EMF-41 is an ARM that will alarm under these conditions.
- C. **Incorrect:** EMF-37 will not cause the filtered exhaust fans to start - the supply fans will automatically trip when the unfiltered exhaust fans trip
Plausible: partially correct – EMF 37-stops the VA UF exhaust fans.
- D. **Correct:** EMF-35 trips the ABUF exhaust fans – which in turn trips the AB supply fans. The AB filtered exhaust fans continue to run.

Level: RO&SRO

KA: APE 060AK3.02(3.3/3.3)

Lesson Plan Objective: VA LPRO 9

Source: New

Level of knowledge: analysis

References:

1. OP-CN-PSS-VA pages 8, 13, 14, 16, 23
2. OP-CN-WE-EMF pages 9, 10, 17-18

Bank Question: 772**Answer: B**

1 Pt(s)

Unit 2 is refueling with ND train "A" in operation. Given the following events and conditions:

- NCS temperature is 110°F.
- Valves 2ND -36B & 37A (*ND PUMPS 2B SUCT FRM LOOP C*) are closed.
- All busses are energized except MCCs 2EMXJ & 2EMXD, which are out of service for maintenance.
- B wide range loop pressure instrument has failed high.

Maintenance has requested permission to perform valve stroke testing on valve 2NI-185A (*ND PUMP 1A CONT SUMP SUCT*).

What action should the Shift Manager take?

- A. **Deny permission to perform the work; 2NI-185A could be opened by swapping to its alternate power supply.**
- B. **Deny permission to perform the work; 2NI-185A cannot be opened because this could cause loss of refueling cavity water to the containment sump.**
- C. **Deny permission to perform the work; 2NI-185A cannot be opened because its power supply is out of service.**
- D. **Approve the work; 2NI-185A could be opened because the B loop wide range pressure instrument interlock affects valve 2NI-184B.**

Distracter Analysis: The power supply to 2NI-185A is train A essential power. MCC EMXJ is train B essential power and EMXD is train B essential power. 2NI-185A does NOT have an alternate power supply – although 2ND-1B and 2ND-37A DO have alternate power supplies

- A. **Incorrect:** 2NI-185A does not have an alternate power supply.
Plausible: The candidate could confuse this valve with 2ND-1B or 2ND-37A, which have this alternate power supply.
- B. **Correct:** Opening the containment sump isolation valve provides a path for water from the ND pump suction to the sump.
- C. **Incorrect:** 2NI-185A has an A train power supply.
Plausible: The candidate could confuse MCC 2EMXD with A train power supply 2EMXS.
- D. **Incorrect:** 2NI-185A does not have a low pressure interlock.

Plausible: The candidate could confuse this valve with 2ND-37A, which has a low pressure interlock supplied from C-loop wide range pressure.

Level: SRO Only

KA: APE 025AK2.05(2.6/2.6)

Lesson Plan Objective: ECCS-NI LPSO 8

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-PS-ND pages 8-10
2. OP-CN-ECCS-NI pages 12, 19

Bank Question: 773**Answer: D**

1 Pt(s)

You are manually preparing a red tag Removal and Restoration (R&R). You notice a red stamp on the electrical one-line drawing you are using that reads 'Interim As Built' along with 'CNEE-05163' written in the space next to the stamp.

What is the next action that is required prior to using this drawing to complete the R&R?

- A. **Note the modification number on the R&R Record Sheet for tracking purposes.**
- B. **Go to the WCC to verify that the modification changes do not affect the R&R.**
- C. **Notify the NSM Coordinator that the drawing needs to be updated prior to completing the R&R preparation.**
- D. **Go to the Control Room to verify that the modification changes do not affect the R&R.**

Distracter Analysis:

- A. **Incorrect:** the drawing accuracy must be verified
Plausible: a reasonable answer if the notation were only administrative
- B. **Incorrect:** the WCC does not maintain as-built information for electrical drawings.
Plausible: WCC does maintain flow diagrams.
- C. **Incorrect:** this will not get the tags hung – it is not enough to notify the NSM Coordinator.
Plausible: This would be the correct action if the drawing modification number on the red-marked as-built does not match the control room copy of the affected VTO drawing. The NSM is responsible for the accuracy of drawing database.
- D. **Correct:**

Level: RO&SRO

KA: Admin G2.1.24(2.8/3.1)

Lesson Plan Objective: ADM-NSO2 SEQ 2

Source: New

Level of knowledge: memory

References:

1. OMP 2.10 pages 3, 5-6
2. OP-CN-AD-NSO2 page 8

Bank Question: 775**Answer: C**

1 Pt(s)

Unit 1 is conducting a refueling outage. A large pump motor has been removed from containment to a tent enclosure in a maintenance shop for overhaul on the back shift. Given the following events and conditions:

- Radiation Protection has authorized work to be conducted to disassemble this motor under RWP-XXXX on the back shift.
- The radiological conditions stated in this RWP do NOT include working in high airborne contamination areas.
- The disassembly of the motor causes internal contamination to become airborne inside the tent enclosure that surrounds the motor at 0200.
- Shift workers evacuate the tent and reassess their options in order to resume the work.
- All of the workers are qualified to use respirators.
- RP cannot support issuing a new RWP until the day shift arrives.
- This job is on the critical path for the outage and must be resumed as soon as possible.

Which one of the following statements correctly describes the correct procedure for resuming work on this motor that will also minimize job down time?

- A. **Workers may continue to work under RWP-XXXX as long as they wear respirators and do not incur any internal contamination.**
- B. **Workers may continue to work under any standing (S) RWP that allows access to airborne contamination areas and authorizes use of respirators.**
- C. **Workers may continue to work for the remainder of this shift provided that RP is advised of the changed conditions and authorizes the work under RWP-XXXX with proper respiratory protection.**
- D. **Workers may not continue to work until the day shift when a new RWP can be issued that includes precautions for access to airborne contamination areas.**

Distracter Analysis:

- A. **Incorrect:** cannot resume work under RWP-XXXX because this RWP does not authorize work in airborne contamination areas.

Plausible: respirators would protect the workers from inhaling the airborne contamination.

- B. Incorrect:** Cannot use SRWPs for work that is being tracked under an RWP. The dose for the job would not be properly tracked or reported.

Plausible: Some SRWPs may allow access to contaminated areas.

- C. Correct:** Work may continue under the current RWP for one shift if authorized by RP.

- D. Incorrect:** Work may continue under the current RWP for one shift if authorized by RP.

Plausible: Work could be resumed under a new RWP but this would not be the quickest way to resume the work.

Level: RO&SRO

KA: Admin G2.3.10 (2.9/3.3)

Lesson Plan Objective: RAD-HP LPRO 9

Source: New

Level of knowledge: comprehension

References:

1. GET Radiation Worker Training pages 95-96
1. OP-CN-RAD-HP pages 18, 25, 28

Bank Question: 776**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% when a LOCA with loss of offsite power occurs. Given the following events and conditions:

- DG 1A fails to start.
- The operators are entering E-1, (*Loss of Reactor or Secondary Coolant*).

Given the following critical safety function status indications:

- Containment – RED
- Core Cooling – ORANGE
- Heat Sink – RED
- NC Integrity – GREEN
- NC Inventory - GREEN
- Subcriticality – GREEN

What procedure should the operator implement?

- A. Transition to FR-Z.1, (*Response to High Containment Pressure*).
- B. Transition to FR-C.2, (*Response to Degraded Core Cooling*).
- C. Transition to FR-H.1, (*Response to Loss of Secondary Heat Sink*).
- D. Transition to ECA-0.0 (*Loss of all AC Power*)

Distracter Analysis:

- A. **Incorrect:** heat sink is the highest priority RED
Plausible: if the candidate picks the first RED condition on the list.
- B. **Incorrect:** heat sink is the highest priority RED
Plausible: core cooling has priority over heat sink – but orange path is subordinated to any red path.
- C. **Correct:** Heat sink has priority over containment – red path has priority over all other paths.
- D. **Incorrect:** heat sink is the highest priority RED
Plausible: ECA-0.0 is the correct answer if IETB was not energized.

Level: RO&SRO

KA: G2.4.17 (3.1/3.8)

Lesson Plan Objective: EP-INTRO LPRO 1

Source: Bank Ques_776

Level of knowledge: memory

References:

1. OP-CN-EP-INTRO page 6, 8
2. OMP 1-7 pages 9-10

Bank Question: 778**Answer: B**

1 Pt(s)

Unit 1 is at 100% power, and Unit 2 is in mode 5. Given the following events and conditions:

- RN pump 2A has been out of service for 48 hours.
- Maintenance has just reported that the motor for RN pump 2A has to be rewound. This job is estimated to take 3 weeks.
- There are no other TSAIL entries

Which one of the following statements correctly describes the required actions (if any) to comply with Tech Specs or SLCs for Units 1 and 2 while minimizing unit down time?

**REFERENCES PROVIDED - TECH SPEC 3.7.8 & Bases
OP/0/A/6400/006/C Encl 4.12A**

- A. Unit 1 may continue to operate without any restrictions. Unit 2 is already in mode 5 and therefore in compliance with the action statement for the LCO.
- B. Unit 1 must commence a shutdown within 24 hours unless the Unit 2 RN non-essential header, train A supply to CA pumps, and NS heat exchanger are isolated.
- C. Unit 1 must commence a shutdown if RN pump 2A is not restored to an operable status within 72 hours.
- D. Unit 1 must commence a shutdown and be in mode 3 in 6 hours and mode 5 in 36 hours.

Distracter Analysis:

- A. **Incorrect:** Must align components on the Unit 2 non-essential header – cannot continue unrestricted operation of Unit 1 because RN is a shared system between units.
Plausible: If the candidate applies the normal ECCS logic and thinks that having 1A and 1B RN pumps operable means that he has 2 trains of RN for unit 1.
- B. **Correct:**
- C. **Incorrect:** Unit 1 may continue to operate provided components on the Unit 2 non-essential header are isolated.
Plausible: if the candidate forgets that the pump has been inoperable for 48 hours already and does not understand the LCO a.2 requirement in the bases section of tech specs.

- D.** **Incorrect:** Unit 1 may continue to operate provided components on the Unit 2 non-essential header are isolated.
 Plausible: This is the TS required action if the isolation can't be done.

Level: SRO Only

KA: SYS 076 K4.06 (2.8 / 3.2)

Lesson Plan Objective: PSS-RN SEQ 20

Source: New

Level of knowledge: memory

References:

1. OP-CN-PSS-RN page 28
2. Tech Spec 3.7.8 - PROVIDED

Bank Question: 779**Answer: C**

1 Pt(s)

The crew is realigning a control bank C, group 1 rod in accordance with OP/1/A/6150/008, (*Rod Control*), Enclosure 4.6, (*Rod Retrieval (>12 Steps Misaligned)*). The RO has been directed to operate the lift coil disconnect switches in accordance with the enclosure. Given the following events and conditions:

- The lift coil disconnect switches for the unaffected rods in control bank C group 1 are in the DISCONNECTED position
- The misaligned rod lift coil disconnect switch is in the CONNECTED position.

Which of the following additional actions (if any) must be performed to correctly realign the affected control rod?

- A. **Place the misaligned rod lift coil disconnect switch to DISCONNECTED and return the unaffected group 1 rods to CONNECTED.**
- B. **Place all the lift coil disconnect switches for control banks A, B, D and control bank C group 2 rods in DISCONNECTED.**
- C. **Place all lift coil disconnect switches for control bank C Group 2 rods in DISCONNECTED.**
- D. **No additional actions are necessary; continue with the misaligned rod alignment.**

Distracter Analysis: The next step in the procedure reads:

2.10 Disconnect all lift coils in the affected bank, except for the affected rod, by placing the control rod disconnect switches in the "DISCONNECTED" position.

- A. **Incorrect:** This action would further exacerbate the misaligned rod
Plausible: operator feels the action taken is backwards from what's required
- B. **Incorrect:** not correct to disconnect rods that are not part of bank C
Plausible: operator feels all the control bank rods, except the misaligned one should be in disconnect.
- C. **Correct:** if group 2 is not disconnected – then they will move when the misaligned rod is realigned.
Plausible: all the control rods in the bank, group 1 and 2, except the misaligned one should be in disconnect

- D.** **Incorrect:** this will cause group 2 of bank C rods to move.
 Plausible: operator believes the actions taken are correct.

Level: RO&SRO

KA: APE 005 EA1.2 (3.7/3.5)

Lesson Plan Objective: IRE SEQ 10, 17

Source: New

Level of knowledge: comprehension

References:

1. OP-6150/008
2. Lesson IRE page 12

Bank Question: 782**Answer: B**

1 Pt(s)

Which one of the following statements correctly describes the purpose of the time delay associated with the "KC HX A RN Outlet Flow-Lo" Annunciator on 1AD-12 following a safety injection signal?

- A. To allow time for the 1A RN pump to reach full speed and flow following a sequencer start.
- B. To allow time for 1RN-291 (KC HX 1A OUTLET THROTTLE) to stroke open.
- C. To allow time for 1RN-287A (KC HX 1A INLET ISOL) to stroke open.
- D. To allow time for the 1KC-C37A (TRAIN A MINIFLOW ISOL) to stroke open.

Distracter Analysis:

- A. **Incorrect:** the RN pump starts without a time delay
Plausible: pumps start on Ss signal.
- B. **Correct:** The "KC HX A(B) RN Outlet Flow-Lo" Annunciator (OBJ #15,) is interlocked with an Ss signal such that the alarm will only be enabled while a Ss signal is present. It also provides a 72 second time delay after the Ss signal to allow the RN valve to stroke full open.
- C. **Incorrect:** These valves do not move.
Plausible: If the candidate confuses the inlet isolation valves with the throttle valves
- D. **Incorrect:** These valves do not affect RN flow to the heat exchanger.
Plausible: if the candidate confuses the miniflow isolation valves with the heat exchanger isolation valves – some miniflow valves have automatic actions.

Level: RO&SRO

KA: APE 026 AA1.07 (2.9/3.0)

Lesson Plan Objective: KC SEQ 15

Source: New

Level of knowledge: memory

References:

1. KC lesson page 8 of 26
2. OP/1/A/6100/010M 1AD-12 D/2

Bank Question: 783**Answer: C**

1 Pt(s)

Unit 2 is operating at 100% power. Given the following events and conditions:

- Pressurizer pressure control is in automatic
- One set of backup heaters is energized in "ON"
- Actual pressurizer pressure is 2270 psig

The pressurizer master pressure controller malfunctions and the setpoint is step changed from 2235 psig to 2335 psig.

Which one of the following statements correctly describes the initial automatic responses in the pressurizer pressure control system as a result of this failure?

- A. PORV 2NC-34A opens, spray valves open, and pressurizer heaters deenergize
- B. PORV 2NC-32B and 2NC-36B open, spray valves open, and pressurizer heaters deenergize
- C. Spray valves close and pressurizer heaters energize
- D. All PORVs remain closed, spray valves open and pressurizer heaters energize

Distracter Analysis:

In this question, the step change in the pressurizer master controller initially makes it appear as if the plant is below the proper setpoint for pressure. The initial response will be to increase pressure – and pressure will slowly increase until actual pressure is high.

- A. **Incorrect:** Not the initial response - this is the response to an actual high-pressure condition
Plausible: operator believes that the setpoint of 2335 psig will open the PORV – this series of events would occur after pressure has increased
- B. **Incorrect:** Not the initial response - this is the response to an actual high-pressure condition
Plausible: operator believes setpoint increase causes spray valves to open, and the other two PORV respond to a “high” pressure condition.

- C. **Correct:** system responds to “low” pressure condition. Heaters energize, spray valves that were open, will close.
- D. **Incorrect:** spray valves will not open
Plausible: partially correct – PORV remain closed and pressurizer heater will energize

Level: RO&SRO

KA: APE 027 AK2.03 (2.6/2.8)

Lesson Plan Objective: IPE SEQ 8, 10

Source: New

Level of knowledge: analysis

References:

1. IPE pages 8, 14, 15

Bank Question: 786**Answer: B**

1 Pt(s)

Which of the following conditions would be consistent with excessive number 2 seal leakage on an operating NCP?

- A. 1AD-7, C/2, "NCP #1 SEAL LEAKOFF LO FLOW" and 1AD-7, B/3 "NCP #1 SEAL LO D/P" annunciators lit.
- B. 1AD-7, C/2, "NCP #1 SEAL LEAKOFF LO FLOW" annunciator lit, only.
- C. 1AD-7, C/1, "NCP #1 SEAL LEAKOFF HI FLOW" and 1AD-7, B/3, "NCP #1 SEAL LO D/P" annunciators lit.
- D. 1 AD-7, B/1 "NCP #1 SEAL OUTLET HI TEMP" annunciator lit, only.

Distracter Analysis:

- A. **Incorrect:** C/2 cause is #1 seal damage or #2 seal failure, B/3 cause is loss of #1 seal.
Plausible: operator believes that the failure of the number 2 seal will cause seal d/p to decrease.
- B. **Correct:**
Plausible: Number 2 seal leakoff increasing will rob flow from the number 1 seal, leakoff will decrease.
- C. **Incorrect:** cause for C/1 is damaged or cocked #1 seal.
Plausible: as stated previously, operator feels the failure will decrease number 1 d/p.
- D. **Incorrect:** B/1 caused by insufficient cooling water.
Plausible: operator feels the failure will cause a seal outlet temperature to increase.

Level: RO&SRO

KA: APE 015 AK2.07 (2.9/2.9)

Lesson Plan Objective: NCP SEQ 12

Source: New

Level of knowledge: comprehension

References:

1. OP/1/B/6100/010H annunciators B/1, B/3, C/1, C,2

Bank Question: 788**Answer: D**

1 Pt(s)

Unit 1 was operating at 100% power when a total loss of offsite and onsite AC electrical power occurred. Given the following events and conditions:

- The crew is performing the actions of ECA-0.0 (*LOSS OF ALL AC POWER*).
- Power has not been restored.
- The operator reports core exit thermocouples read 1200°F and increasing.

Which one of the following statements correctly describes the actions the crew should take?

- A. **Immediately go to FR-C.1 (*RESPONSE TO INADEQUATE CORE COOLING*).**
- B. **Remain in ECA-0.0 until after power is restored to at least one emergency bus then transition to FR-C.1**
- C. **Complete ECA-0.0 and when directed to implement monitoring CSF status trees in the appropriate recovery procedure, verify a valid RED path exists and transition to FR-C.1.**
- D. **Immediately transition to EG/1/A/CSAM/SACRG1 (*SEVERE ACCIDENT CONTROL ROOM GUIDELINE INITIAL RESPONSE*).**

Distracter Analysis:

Step 30, IF core exit temperatures greater than 1200 °F AND increasing, THEN GO TO EG/1/A/CSAM/SACRG1 (Severe Accident Control Room Guideline Initial Response).

- A. **Incorrect:** must immediately transition to SACRG1
Plausible: operator knows an immediate transition is necessary but believes C.1 is appropriate.
- B. **Incorrect:** must immediately transition to SACRG1
Plausible: operator believes one emergency bus must be restored prior to addressing the inadequate core cooling condition.
- C. **Incorrect:** must immediately transition to SACRG1
Plausible: operator follows the normal rules of usage regarding Red and Orange paths in ECA-0.0
- D. **Correct:** efforts to adequately cool the core have failed, SAMG usage is appropriate

Level: RO&SRO

KA: APE 055 EA1.01 (3.7/3.9)

Lesson Plan Objective: CRG-1 SEQ 2

Source: New

Level of knowledge: memory

References:

1. ECA-0.0 page 23 step 30
2. OP-CN-EP-CRG-1 page 6

Bank Question: 789**Answer: C**

1 Pt(s)

Unit 1 was shutdown for refueling in mode 6.

IAE was calibrating set points on various area radiation monitors when the following occurred:

- 1WL-867A, (*VUCDT CONT ISOL*) closed
- 1WL-825A, (*CONT SMP PMPS DISCH CONT ISOL*) closed

Which one of the following EMFs caused this action?

- A. **1EMF-49(L) (*Liquid Waste Discharge Monitor*)**
- B. **1EMF-52 (*Clean Area Floor Drain Monitor*)**
- C. **1EMF-53(A) (*Containment Hi Range Monitor*)**
- D. **1EMF-54 (*Unit Vent Hi Range Monitor*)**

Distracter Analysis:

- A. **Incorrect:** does not automatically isolate 1WL-867A and 1WL-825A
Plausible: 1EMF-49 provides automatic isolation signal to 1WL-124 to terminate a liquid release
- B. **Incorrect:** does not automatically isolate 1WL-867A and 1WL-825A
Plausible: 1EMF-52 automatically diverts flow from turb bldg sump to ND and NS sump.
- C. **Correct:**
- D. **Incorrect:** does not automatically isolate 1WL-867A and 1WL-825A
Plausible: Automatically trips sample pump supplying EMF-35, 36 and 37

Level: RO&SRO

KA: SYS 072A4.01(3.0*/3.3)

Lesson Plan Objective: WE-EMF LPRO 2

Source: New

Level of knowledge: memory

References:

1. OP-CN-WE-EMF page 11, 12
2. OAC alarm response

Bank Question: 791**Answer: B**

1 Pt(s)

Unit 1 was operating at 100% power when a reactor trip occurred on low pressurizer pressure. Given the following events and conditions:

- Main steamlines isolated
- Safety injection actuated
- NC temperature initially decreased to 400°F then increased rapidly
- NC pressure initially decreased to 1700 psig then increased rapidly
- Pressurizer level initially decreased to 0% then increased rapidly
- Containment temperature is 100°F
- Pressurizer tailpipe temperatures 120°F
- Containment EMF trip 1 lights are dark
- All steam generator pressures approximately 700 psig and stable
- All steam generator narrow range levels are off scale low, wide range levels are increasing

Based on these indications, which of the following events has occurred?

- A. **Pressurizer safety or PORV has failed open.**
- B. **Steam line break downstream of the MSIVs.**
- C. **Small break LOCA**
- D. **Steam line break upstream of the MSIVs.**

Distracter Analysis:

- A. **Incorrect:** tailpipe temps are normal, as is containment parameters
Plausible: candidate misinterprets the pressure and temperature response and holds to the increasing pressurizer level.
- B. **Correct:** when isolated, NC pressure and temperature will begin to increase.
- C. **Incorrect:** normal containment conditions
Plausible: operator believes NI flow is causing the system to recover.
- D. **Incorrect:** system would not recover as described
Plausible: candidate confuses upstream and downstream of the MSIVs

Level: RO&SRO

KA: APE 040 AA1.12 (4.2/4.2)

Lesson Plan Objective: EP1 SEQ 23

Source: New

Level of knowledge: analysis

References:

1. E-0, steps 24, 25, 26

Bank Question: 792**Answer: C**

1 Pt(s)

Unit 1 is operating at 100% power. The spare battery charger (1ECS) is being aligned to replace charger 1ECA.

How would the operators know if 1ECS was being supplied by motor control center 1EMXJ in this lineup?

- A. **1AD-11 H/1 (125 VDC ESS PWR CHANNEL A TROUBLE) will clear when the 1EDA tie breaker to 1EDC is closed.**
- B. **1AD-11 H/1 (125 VDC ESS PWR CHANNEL A TROUBLE) will alarm when the 1EDS output breaker to 1EDA/C is closed.**
- C. **1AD-11 I/6 (STBY CHARGER 1ECS INPUT/OUTPUT TRAINS X-CONNECTED) will alarm when the 1EDS output breaker to 1EDA/C is closed.**
- D. **1 SI-14 STANDBY CHARGER ECS TRAIN A BKRS CLOSED status light will light when the 1EDA tie breaker to 1EDC is closed.**

Distracter Analysis:

- A. **Incorrect:** the 125VDC trouble annunciator will light.
Plausible: this would eliminate the CR alarm caused when the spare charger is in service.
- B. **Incorrect:** the trouble annunciator will alarm when the 1EDA tie breaker is closed.
Plausible: if the candidate confuses this annunciator with the cross-train alarm.
- C. **Correct:**
- D. **Incorrect:** the status light for B train will light when 1EMXJ power to 1ECS is aligned.
Plausible: if the candidate does not understand the power supply status light monitoring.

Level: RO&SRO

KA: G2.1.31(4.2 / 3.9) aware of the control room

Lesson Plan Objective: EL-EPL SEQ 3

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-EL-EPL pages 9, 15-16, 24
2. ARP 1AD-11; I/6
3. ARP 1AD-11; H/1

Bank Question: 793**Answer: D**

1 Pt(s) Unit 2 is operating at 100% power with all rods out.

An operator notices that one core exit thermocouple for quadrant II on the plasma display indicates 2200°F.

Which of the following correctly describes a reason for this thermocouple to be much higher than the other thermocouples?

- A. The thermocouple reference junction temperature has increased.
- B. The thermocouple reference junction temperature has decreased.
- C. The thermocouple measuring junction has an open circuit.
- D. The thermocouple measuring junction has shorted.

Distracter Analysis: The voltage across a thermocouple junction increases as the temperature of that junction increases. A shorted measuring junction will cause the temperature to fail high.

- A. **Incorrect:** the temperature measured is based on the difference on voltage between the reference junction (at 165 °F) and the T/C. If the reference junction is heated above 165 °F, then the voltage difference will decrease and the temperature signal will decrease.
Plausible: if the candidate reverses the effects
- B. **Incorrect:** the temperature measured is based on the difference on voltage between the reference junction (at 165 °F) and the T/C. If the reference junction is cooled below 165 °F, then the voltage difference will increase and the temperature signal will increase. However, the increase of 1600 °F is not possible because the reference junction temperature cannot be cooled enough.
Plausible: the effect of a decrease in reference junction temperature will be to make the measured temperature increase.
- C. **Incorrect:** an open measuring junction causes the temperature indication to fail LOW not high.
Plausible: if candidate believes that like an RTD and open causes a high reading
- D. **Correct:** a shorted thermocouple causes the removal of the difference in EMF, the TC will read high.

Level: RO&SRO

KA: 017 A2.01 (3.1/3.5)

Lesson Plan Objective: IG SEQ 2

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-SS-IG page 10
2. OP-CN-TA-AM page 26
3. OP-CN-PS-CCM page 15

Bank Question: 797**Answer: D**

1 Pt(s) Unit 1 is in mode 6. Given the following events and conditions:

- Both trains of SSPS are in "TEST".
- Window A/2 annunciator is received on Panel 1RAD-1

"1EMF-39 CONTAINMENT GAS HI RAD"

- 1EMF-39 is the only monitor in alarm.

Which one of the following statements correctly describes the automatic actions (if any) that should occur?

- A. 1EMF-39 has no auto actions with both trains of SSPS in test.
- B. 1EMF-39 will generate a containment evacuation alarm only.
- C. 1EMF-39 will generate a containment evacuation alarm and generate a containment ventilation isolation (S_H) signal.
- D. 1EMF-39 will generate a containment evacuation alarm and isolate containment purge.

Distracter Analysis:

- A. **Incorrect:** EMF-39 actions are not blocked by SSPS
Plausible: candidate may confuse EMF 39 with either 38 or 40, which are blocked by both trains of SSPS. Additionally, the containment evacuation alarm is only blocked by P-6
- B. **Incorrect:** will also isolate containment purge
Plausible: This is true for EMF 38 and 40
- C. **Incorrect:** will not generate containment ventilation isolation with SSPS in test.
Plausible: This is true if one train of SSPS is not in test.
- D. **Correct:** EMF-39 will directly close down VP if it goes into high alarm and both trains of SSPS are in test.

Level: RO&SRO

KA: WE 016 EK2.1 (3.0/3.1)

Lesson Plan Objective: VP SEQ 7

Source: New

Level of knowledge: memory

References:

1. OP-CN-OP/1/B/6100/010X, annunciators A/1, A/2, A/3

Bank Question: 798**Answer: A**

1 Pt(s)

Which of the following is the power supply to the unit 2 "A" Hydrogen Recombiner?

- A. 2EMXK
- B. 2SMXW
- C. 2MXW
- D. 2EMXL

Distracter Analysis: This question tests the candidates' knowledge of the thumb rules for labeling power supplies as well as the type of power provided to the recombiners. 2EMXK is the ONLY train A emergency power supply in the list.

- A. **Correct:** A and B Hydrogen recombiners are from essential power supplies, (EMXK and EMXJ)
- B. **Incorrect:** Hydrogen recombiners are powered from EMXK
Plausible: 2SMXW is a shared power supply - candidate may believe it's a shared power supply
- C. **Incorrect:** Hydrogen recombiners are powered from EMXK
Plausible: 2MXW is a blackout power supply - candidate may believe it's a blackout power supply
- D. **Incorrect:** Hydrogen recombiners are powered from EMXK
Plausible: 2EMXL is a train B power supply - candidate may confuse the A vs. B trains.

Level: RO&SRO

KA: 028 K2.01 (2.5/2.8)

Lesson Plan Objective: none

Source: New

Level of knowledge: memory

References:

1. DBD Unit 2 System and Equipment Description - section 32.4
page 55

Bank Question: 799**Answer: C**

1 Pt(s)

Unit 1 is responding to a loss of core cooling in FR-C.1 (*INADEQUATE CORE COOLING*). Step 17 requires the operators to stop all NCPs immediately prior to depressurizing the steam generators to atmospheric pressure.

Which one of the following statements correctly describes the reason for this step?

- A. To minimize the heat input from the NCPs.
- B. To prevent PTS to the NC system due to the elevated NCS temperatures.
- C. To prevent loss of the #1 NCP seal requirements due to the loss of subcooling from the depressurization.
- D. To prevent loss of subcooling in the NCS due to the reduction in NCS pressure.

Distracter Analysis:

- A. **Incorrect:** loss of #1 NCP seal is the correct basis
Plausible: This is a correct basis for stopping NCPs in FR-H.1
- B. **Incorrect:** PTS is not a concern in FR-C.1
Plausible: if the candidates think that higher NCS temperatures mean a more rapid cooldown with the NCPs operating – this is specifically called out as a concern in FR-C.2.
- C. **Correct:**
- D. **Incorrect:** Depressurizing to atmospheric pressure will deliberately induce a loss of subcooling
Plausible: loss of subcooling is an NCP trip criterion in other EOPs

Level: SRO Only

KA: EPE 074EK3.08 (4.1/4.2)

Lesson Plan Objective: EP-FRC SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-CN-EP-FRC page 5, 6
2. ERG Background Document FR-C.1 page 19
3. FR-C.1 pages 15-16

Bank Question: 800**Answer: B**

1 Pt(s)

Unit 1 was operating at 100% power when a pressurizer level master controller failed low followed by a reactor trip signal because of a delayed operator response. Given the following subsequent events and conditions:

- The reactor trip failed and the plant operated at high power levels on the steam dumps for several minutes
- The turbine tripped
- The crew has just initiated emergency boration in accordance with FR-S.1, (*Response to Nuclear Power Generation/ATWS*).
- NC average temperature is 580°F.
- NC system pressure is 2300 psig.
- Pressurizer level is 95%.
- One boric acid pump is running.
- Emergency boration flow indicated on 1 NVP 5440, (*EMER BORATE FLOW*) is 40 gpm.
- Charging flow indicated on 1 NVP 5630, (*CHRG LINE FLOW*) is 32 gpm.
- 1NV-309 (*SEAL WATER INJECTION FLOW*) is closed.

Which of the following describes the status of the boric acid flow into the NC system at this time?

- A. The NV pump is not delivering any boric acid flow to the NC system.
- B. The NV pump is delivering approximately 20 gpm of the boric acid flow to the NC system.
- C. The NV pump is delivering approximately 32 gpm of boric acid to the NC system.
- D. The NV pump is delivering 40 gpm of boric acid to the NC system.

Distracter Analysis:

- A. **Incorrect:** The NV pump is capable of delivering flow to 2600 psig – the NV pump is capable of delivering sufficient flow up to the PORV setpoint at 2335 psig.
Plausible: if the candidate does not know the basis for emergency boration in step 4 of FR-S.1 and thinks that the NV pump could be deadheaded

- B. Correct:** the high pressurizer level causes charging flow to be reduced to 32 gpm. NV-309 is closed due to maximize charging flow to the NCP seals and thus 32 gpm charging is going entirely to the NCP seals. The flow divides with $\sim 3 \times 4 = 12$ gpm going to the seal return line (to the VCT) and the remaining flow $\sim 5 \times 4 = 20$ gpm going into the NCS.
- C. Incorrect:** only 20 gpm flow will go into the NCS.
Plausible: if the candidate assumes that the flow meter is truly charging flow and 32 gpm is charging flow to the NC system.
- D. Incorrect:** only 20 gpm flow will go into the NCS.
Plausible: if the candidate assumes 32 gpm is charging and assumes 20 would be going in thru the seals, (more charging than boric acid flow), therefore all 40 gpm is being delivered – or if the candidate assumes that all 40 gpm boric acid flow is delivered by the charging pumps

Level: SRO Only

KA: EPE 29 EA2.04 (3.2/3.3)

Lesson Plan Objective: NV SEQ 3, 6, 7

Source: New

Level of knowledge: analysis

References:

1. OP-CN-PS-NV page 24-26
2. FR-S.1 Background document page 4

Bank Question: 856**Answer: D**

1 Pt(s)

Units 1 and 2 were operating at 100% power when a toxic gas problem in the control room caused the operators to evacuate and establish control at the ASPs.

Which one of the following statements correctly describes the operation of Unit 1 NCP seal injection flow from the ASP(s)?

- A. Unit 1 seal injection flow can only be controlled in manual from only the Unit 1 train A ASP.
- B. Unit 1 seal injection can only be controlled in manual from both the Unit 1 train A and B ASPs.
- C. Unit 1 seal injection can be controlled in either manual or automatic from only the Unit 1 train A ASP.
- D. Unit 1 seal injection can be controlled in either manual or automatic from both the Unit 1 train A and train B ASPs.

Distracter Analysis:

- A. **Incorrect:** Seal injection flow can be controlled in both manual and automatic from both the 1A and 1B ASPs.
Plausible: partially correct
- B. **Incorrect:** Seal injection flow can be controlled in both manual and automatic from both the 1A and 1B ASPs.
Plausible: partially correct
- C. **Incorrect:** Seal injection flow can be controlled in both manual and automatic from both the 1A and 1B ASPs.
Plausible: partially correct
- D. **Correct:**

Level: RO&SRO

KA: SYS 016 K4.01 (2.8*/2.9*)

Lesson Plan Objective: RSS LPRO 13

Source: New

Level of knowledge: memory

References:

1. OP-CN-CP-RSS pages 11-12

FINAL SRO LICENSE EXAM
REFERENCE MATERIAL

CATAWBA INITIAL EXAM
50-413, 414/2001-301

APRIL 2 - 6 & 16 - 20, 2001

Technical Specifications

- 3.1.4 Rod Group Alignments, Amend. 173/165
- 3.4.5 RCS Loops - Mode 3, Amend. 173/165
- 3.4.6 RCS Loops - Mode 4, Amend. 173/165
- 3.4.13 RCS Operational LEAKAGE, Amend. 173/165
- 3.5.1 Accumulators, Amend. 173/165
- 3.5.2 ECCS - Operating, Amend. 189/182
- 3.6.1 Containment, Amend. 173/165
- 3.6.2 Containment Air Locks, Amend. 173/165
- 3.6.13 Ice Condenser Doors, Amend. 173/165
- 3.7.1 Main Steam Safety Valves (MSSVs), Amend. 173/165 (pages 1-3 only)
- 3.7.8 Nuclear Service Water (NSWS), Amend. 189/182
- 3.8.4 DC Sources - Operating, Amend. 183/175
- 3.8.7 Inverters - Operating, Amend. 173/165
- 3.8.9 Distribution Systems - Operating, Amend. 173/165

Technical Specification Bases

- B 3.1.4 Rod Group Alignments, Rev. 0
- B 3.4.5 RCS Loops - Mode 3, Rev. 1
- B 3.4.6 RCS Loops - Mode 4, Rev. 0
- B 3.4.13 RCS Operational LEAKAGE, Rev. 0
- B 3.5.1 Accumulators, Rev. 2
- B 3.5.2 ECCS - Operating, Rev. 1
- B 3.6.1 Containment, Rev. 0
- B 3.6.2 Containment Air Locks, Rev. 0
- B 3.6.13 Ice Condenser Doors, Rev. 1
- B 3.7.8 Nuclear Service Water (NSWS), Rev. 1
- B 3.8.4 DC Sources - Operating, Rev. 2
- B 3.8.7 Inverters - Operating, Rev. 1
- B 3.8.9 Distribution Systems - Operating, Rev. 1

Site License Commitments

- 16.7-10 Radiation Monitoring for Plant Operations, Rev. 11/30/00
- 16.9-3 CO₂ Systems, Rev. 6/10/99
- 16.11-1 Liquid Effluents, Rev. 9/20/99

Emergency Procedures

EP/1/A/5000/E-1 Loss of Reactor or Secondary Coolant, Rev. 12 (page 5 only)

Abnormal Procedures

AP/1/A/5500/17 Loss of Control Room, Rev. 41
AP/1/A/5500/29 Loss of Vital or Aux Control Power, Rev. 1 (pages 1-2, Encl. 14, 15, 16 and 17 only)

Reactor Operating Data Book

Section 4.1 Boration and Dilution Tables - Hot RCS (Modes 1, 2 and 3), Rev. 243
Section 4.2.1 Boration and Dilution Tables - Cold RCS (Modes 4 and 5), Rev. 243
Section 4.2.2 Boration Tables - Cold RCS (Modes 4 and 5) with Makeup from FWST, Rev. 159

10 CFR 20

Appendix B Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage, Rev. 4/23/01

Curve Book

Curve 7.30.2 Cold Leg Accumulator Tank, Rev. 4/13/98

Core Operating Limits Report

Sections 2.9, 2.10 and 2.11, Rev. 17 (page 21 only)

Nuclear Policy Manual

NSD 200 Overtime Control, Rev. 7

Operating Procedures

OP/0/A/6400/C (Encl. 4.12A only) Alignment for Single Pump Flow Balance due to One Train "A" RN Pump and/or Its Associated D/G Inoperable (no revision number)