

# Draft Submittal

(Pink Paper)

1. Reactor Operator Written Exam

## **MCGUIRE EXAM**

**50-369, 370/2002-301  
FEBRUARY 11 - 15, 2002**

**Nuclear Regulatory Commission  
Reactor Operator Licensing  
Examination**

**ANSWER KEY**

**McGuire Nuclear Station**

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**Bank Question: 037.1****Answer: A**

1 Pt(s)

Unit 1 was conducting a reactor startup following a refueling outage. Given the following conditions during the reactor startup:

- N-31 indicates  $2.1 \times 10^4$  cps
- N-32 indicates  $2.0 \times 10^4$  cps
- N-35 indicates  $5.5 \times 10^{-11}$  amps
- N-36 indicates  $1.0 \times 10^{-10}$  amps
- Rods are in manual with no rod motion
- SR and IR NIs are slowly increasing
- $T_{ave}$  is holding steady

Which one of the following best explains the indications?

- A. **N-35 compensating voltage is set too high**
- B. **N-35 compensating voltage is set too low**
- C. **N-36 compensating voltage is set too high**
- D. **N-36 compensating voltage is set too low**

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**Distracter Analysis:**

- A. **Correct:** N-35 reads too low for the conditions given, compensating voltage is too high.
- B. **Incorrect:** N-35 reads too low.  
**Plausible:** candidate reverses the effect of compensation.
- C. **Incorrect:** overlap is proper for N-36  
**Plausible:** If candidate does not know that  $P6 = 1 \times 10^{-10}$  IR is about  $2 \times 10^4$  CPS SR.
- D. **Incorrect:** overlap is proper for N-36  
**Plausible:** If candidate does not know that  $P6 = 1 \times 10^{-10}$  IR is about  $2 \times 10^4$  CPS SR.

Level: RO&SRO

KA: APE 033AK1.01(2.7/3.0)

Lesson Plan Objective: IC-ENB SEQ 7

Source: Mod Ques\_037, Catawba NRC 1999

Level of Knowledge: analysis

References:

1. OP-MC-IC-ENB pages 25, 69, 79

**Bank Question: 048****Answer: D**

1 Pt(s) Which one of the following selections correctly matches the reactor trip signals to their limiting accident?

	<u>Reactor Trip Signal</u>	<u>Limiting Accident/Protection</u>
A.	OPΔT OTΔT Pzr High Level Pzr Low Pressure	DNB Excessive fuel centerline temperature NC system integrity DNB
B.	OPΔT OTΔT Pzr High Level Pzr Low Pressure	Excessive fuel centerline temperature DNB DNB NC system integrity
C.	OPΔT OTΔT Pzr High Level Pzr Low Pressure	DNB Excessive fuel centerline temperature NC system integrity DNB
D.	OPΔT OTΔT Pzr High Level Pzr Low Pressure	Excessive fuel centerline temperature DNB NC system integrity DNB

**Distracter Analysis:**

- A. **Incorrect:** OPΔT and OTΔT are reversed.  
**Plausible:** PZR low pressure and high level are correct.
- B. **Incorrect:** All are incorrect.  
**Plausible:** Provided for psychometric balance.
- C. **Incorrect:** OPΔT and OTΔT are reversed.  
**Plausible:** PZR low pressure and high level are correct.
- D. **Correct:**

Level: RO&amp;SRO

KA: SYS 012K5.01(3.3/3.8)

Lesson Plan Objective: IC-IPE SEQ 2

Source: Bank; Ques48e, McGuire NRC 1996

Level of knowledge: memory

References:

1. OP-MC-IC-IPE pages 19, 45

**Bank Question: 051.2****Answer: C**

1 Pt(s)

Unit 1 is responding to a LOCA. The crew has entered ECA-1.1, (*Loss of Emergency Coolant Recirc*). Given the following events and conditions:

- 1A ND pump is tagged out
- 1B ND stopped when 1NI-184B (*1B ND PUMP SUCT FROM CONT SUMP ISOL*) could not be opened
- Containment pressure is 11 psig
- NCS pressure is 1200 psig
- FWST level is 40 inches
- Both NI pumps are off, but available
- Both NV pumps are running

The crew has reached step 17, “*Check if an NC pump should be started*”. At this point in the procedure, what pumps should be running?

**REFERENCES PROVIDED: ECA 1.1 Steps 1-17**

- A. An NV pump only.
- B. An NV pump and an NS pump only.
- C. An NV pump, an NI pump and an NS pump only.
- D. An NV pump, an NI pump and both NS pumps.

**Distracter Analysis:**

One NS pumps is stopped at step 11b when according to the table, one NS pump is required. One NV pump is stopped in subsequent steps. One NI pump is started at step 15 c (pressure is less than 1600 psig)

- A. **Incorrect:** insufficient – there will be 1 NV, 1 NI and 1 NS pump running  
**Plausible:** candidate believes both NS pumps are stopped and misses the NI pump start
- B. **Incorrect:** insufficient – there will be 1 NV, 1 NI and 1 NS pump running  
**Plausible:** candidate misses NI pump start
- C. **Correct:** one train is aligned, one NV and NI required, one NS pump due to containment pressure.
- D. **Incorrect:** Only 1 NS pump will be running  
**Plausible:** candidate misses step to stop NS pump

Level: RO Only 10CFR55.41(b)10

KA: WE 11 G2.1.7 (3.7/3.4)

Lesson Plan Objective: E1 SEQ 3, 6

Source: New

Level of knowledge: analysis

References:

1. OP-MC-EP-E1 page 225
2. ECA-1.1 pages 1-15, 43 - PROVIDED

**Bank Question: 124****Answer: B**

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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 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. 2 people working for 2 hours
- 

**Distracter Analysis:**

- A. **Incorrect:** six people can accomplish the job with 4 1/2 Rem.  
**Plausible:** Each individual would have the least exposure.
- B. **Correct:**
- C. **Incorrect:** six people can accomplish the job with 4 1/2 Rem.  
**Plausible:** fewest individuals not exceeding the admin dose limit.
- D. **Incorrect:** six people can accomplish the job with 4 1/2 Rem.  
**Plausible:** Exposes the fewest individuals.

Level: RO&SRO

KA: G2.3.2 (2.5/2.9)

Lesson Plan Objective: RAD-RP SEQ 135

Source: Bank; Ques\_124, Catawba NRC 2001

Level of knowledge: comprehension

References:

1. OP-MC-RAD-RP page 135

**Bank Question: 137.1****Answer: A**

1 Pt(s)

Unit 2 refueling is in progress. Given the following plant alarms:

- 2EMF-3 (*Containment Refueling Bridge*) trip 2 alarm.
- 2EMF-39 (*Containment Gas*) trip 2 alarm.
- 2EMF-40 (*Containment Iodine*) trip 2 alarm.

Which one of the following procedures should be implemented?

- A. **AP-25 (*Spent Fuel Damage*)**
- B. **FR-Z.3 (*Response to High Containment Radiation Level*)**
- C. **AP-40 (*Loss of Refueling Canal Level*)**
- D. **AP-18 (*High Activity in Reactor Coolant*)**

**Distracter Analysis:**

- A. **Correct:** Per the entry conditions indications are consistent with a dropped and damaged fuel element.
- B. **Incorrect:** Must implement AP-25.  
**Plausible:** There is indication of high containment radiation level.
- C. **Incorrect:** unless accompanied with failed fuel, gas/iodine monitors should not go into alarm.  
**Plausible:** for lowering cavity level, the bridge alarm would be in alarm.
- D. **Incorrect:** Must implement AP-25.  
**Plausible:** the monitor alarms could be consistent with failed fuel at power.

Level: RO&amp;SRO

KA: SYS 034A2.01 (3.6/4.4)

Lesson Plan Objective: FH-FC SEQ 6

Source: Bank; Ques137a, McGuire NRC 1997

Level of knowledge: comprehension

References:

1. OP-MC-FH-FC pages 17 -19

**Bank Question: 143.1****Answer: C**

1 Pt(s)

On January 26<sup>th</sup>, you are directed to complete a valve lineup on Unit 1 in accordance with enclosure 4.10 to OP/1/A/6200/005, *Spent Fuel Cooling System*. The controlled copy of the procedure has a restricted change noted for valve 1KF-145. This normally open valve has been locked open in accordance with a special order that remains in effect until February 1<sup>st</sup>.

Which one of the following statements describes the correct action needed to validate your working copy of the procedure? (Your copy of the procedure is in other respects identical to the controlled copy.)

- A. **Replace your working copy with an updated procedure printed from the NEDL system.**
- B. **Annotate the working copy with just the restricted change number (as a cross reference) next to the 1KF-145 line item, and initial the change.**
- C. **Annotate the working copy with a pen and ink change for the valve position for 1KF-145; change to "Locked Open", annotate the restricted change number and initial the change.**
- D. **Use the working copy as is since restricted changes of this nature are not required to be written into working copies.**

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**Distracter Analysis:**

- A. **Incorrect:** Cannot print because NEDL will not list this procedure as issued.  
**Plausible:** NEDL is an approved source of working copies for non-changed procedures.
- B. **Incorrect:** Must write in the actual change language.  
**Plausible:** The controlled copy is annotated with only the restricted change #.
- C. **Correct:**
- D. **Incorrect:** Must write in the actual change language.  
**Plausible:** It is not necessary to annotate working copies if the change does not affect the job or no longer applies – would be true after FEB 1<sup>st</sup>.

Level: RO&amp;SRO

KA: G2.1.21 (3.1/3.2)

Lesson Plan Objective: ADM-OP SEQ 8

Source: Mod; Ques\_143, McGuire NRC 1997

Level of knowledge: memory

References:

1. OMP 4-1 pages 11-12

**Bank Question: 158****Answer: A**

- 1 Pt(s)      What design features protect the turbine driven auxiliary feedwater (CA) pump against minimum flow conditions and runout?
- A.      **Minimum flow protection provided by recirc valves, runout protection provided by max flow travel stops on discharge control valves.**
  - B.      **Minimum flow protection provided by recirc valves, runout protection provided by flow restricting orifices in feedwater lines.**
  - C.      **Minimum flow protection provided by governor control settings, runout protection provided by max flow travel stops on discharge control valves.**
  - D.      **Minimum flow protection provided by governor control settings runout protection provided by flow restricting orifices in feedwater lines.**

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**Distracter Analysis:**

- A.      **Correct answer**
- B.      **Incorrect:** there are no flow restricting orifices  
**Plausible:** partially correct – the recirc valves provide minimum flow protection
- C.      **Incorrect:** minimum flow protection is not provided by the governor control settings  
**Plausible:** partially correct – runout protection is provided by the discharge control valves
- D.      **Incorrect:** no flow restricting orifices – governor setting do not provide protection against low flow  
**Plausible:** provided for psychometric balance

Level: RO Only

KA: SYS 061K5.03(2.6/2.9)

Lesson Plan Objective: CF-CA SEQ 5

Source: Bank; Ques\_158, McGuire NRC 1997

Level of knowledge: memory

References:

1. OP-MC-CF-CA pages 29, 31

**Bank Question: 164.1****Answer: C**

1 Pt(s)

Unit 1 was operating at 100% when a pipe break occurred on the 1D S/G steam header. The operators are responding in E-2 (*Faulted Steam Generator Isolation*). The following sequence of events occurred:

- Isolation of the 1D S/G
- PZR level dropped to 0% and was restored to 20%
- NCS pressure is 1900 psig
- Safety Injection has not been reset

What are the correct panel actions for the restoration of power to pressurizer back-up heater bank D?

- A. **Reset safety injection on 1MC-11**  
**Ensure AUTO is selected on the heater mode switch on 1MC-10**  
**Select CLOSED on the heater breaker switch on 1MC-5**
- B. **Ensure AUTO is selected on the heater mode switch on 1MC-5**  
**Select CLOSED on the heater breaker switch on 1MC-10**  
**Select ON for the heater control switch on 1MC-5**
- C. **Select MANUAL on the heater mode switch on 1MC-10**  
**Select CLOSED on the heater breaker switch on 1MC-5**  
**Select ON for the heater control switch on 1MC-10**
- D. **Reset safety injection on 1MC-6**  
**Select MANUAL on the heater mode switch on 1MC-5**  
**Select CLOSED on the heater breaker switch on 1MC-10**  
**Select ON for the heater control switch on 1MC-5**

**Distracter Analysis:** The B/U heater breakers will not close unless the mode selector switch is in MANUAL.

- A. **Incorrect:** insufficient action, SI reset is unnecessary, and mode switch to MANUAL.  
**Plausible:** if the candidate is not familiar with the interlocks on the PZR heater circuit, the locations are correct.
- B. **Incorrect:** must turn the heater mode switch to MANUAL, and the locations are incorrect.  
**Plausible:** if the candidate reverses the panel locations and knows that SI reset is unnecessary, it would appear that this is the best answer.
- C. **Correct answer:** Bank D does not require SI reset

- D. Incorrect:** Not necessary to reset safety injection and wrong locations for SI reset and heater controls.  
**Plausible:** If the candidate does not know the panel locations, this is the right method for Banks A&B (and would work for D) and was correct in the prior version of the question.

Level: RO&SRO

KA: G2.1.31 (4.2/3.9)

Lesson Plan Objective: PS-IPE SEQ 10/11

Source: Mod; Ques\_164, McGuire NRC 1997

Level of knowledge: comprehension

References:

1. OP-MC-PS-IPE page 23
2. EP/1/A/5000/ES-1.1 page 19

**Bank Question: 177****Answer: B**

- 1 Pt(s) Units 1 and 2 are at full power when a loss of offsite power occurs on Unit 2. Which one of the following main turbine overspeed protective devices/features will be the FIRST to actuate to prevent a turbine overspeed condition?
- A. At a speed of 103%, the turbine throttle valves will close.
  - B. GBX relay will close the governor and intercept valves.
  - C. At a speed of 110%, the governor and intercept valves will close.
  - D. GBX relay will close the turbine throttle valves.

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**Distracter Analysis:**

- A. **Incorrect:** The governor and intercept valves close.  
**Plausible:** 103% is an overspeed setpoint.
- B. **Correct:** GBX relay initiates when the switchyard breakers open. The governor and intercept valves close.
- C. **Incorrect:** Valves trip at 103%.  
**Plausible:** 110% is an overspeed protection setpoint, and these valves will close.
- D. **Incorrect:** GBX relay does not close the throttle valves.  
**Plausible:** GBX relay does actuate.

Level: RO&amp;SRO

KA: SYS 045 A4.02 (2.7/2.6)

Lesson Plan Objective: MT-MT SEQ 3

Source: Mod; Ques\_177, McGuire NRC 1997

Level of knowledge: memory

**References:**

1. OP-MC-MT-MT page 27, 29, 31, 39

**Bank Question: 181****Answer: D**

1 Pt(s)

Step 5d of FR-S.1 (*Response to Nuclear Power Generation / ATWS*) requires the operators to check Pzr pressure less than 2335 psig after initiating emergency boration flow to the reactor. If pressure exceeds 2335 psig, the contingency action is to open PORVs as required to rapidly depressurize to 2135 psig.

What is the EOP basis for this step?

- A. To reduce NC pressure below the PORV setpoint to prevent cycling the PORVs.
- B. To reduce NC pressure to allow closing of NV pump recirc valves to maximize emergency boration flow.
- C. To ensure control of NC pressure to prevent lifting a code safety relief valve.
- D. To ensure that the boration flow rate is sufficient for emergency boration.

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**Distracter Analysis:**

- A. **Incorrect:** Since this is the PORV setpoint, the action assures boron flow rate.  
**Plausible:** This would be a plausible action to prevent an automatic actuation.
- B. **Incorrect:** The recirc valves could not be closed at 2135 psig.  
**Plausible:** The purpose does involve enhancing boron flow.
- C. **Incorrect:** The purpose is to ensure adequate boron flow.  
**Plausible:** This is the function of the PORVs.
- D. **Correct answer**

Level: RO&SRO

KA: APE 024AK3.02(4.2/4.4)

Lesson Plan Objective: EP-FRS SEQ 4

Source: Bank; McGuire NRC 1997

Level of knowledge: memory

References:

1. OP-MC-EP-FRS page 27
2. EP/1/A/5000/FR-S.1

**Bank Question: 191.1****Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power when a total loss of feedwater occurred. Following initiation of feed and bleed, the Operators reached step 34 of FR-H.1 (*Response to Loss of Secondary Heat Sink*) that requires feeding the S/Gs.

Given the following conditions:

	Loop A	Loop B	Loop C	Loop D
S/G (WR) [%]	18	9	10	13
NC T <sub>Hot</sub> [°F]	545	542	549	555

- Core exit T/Cs are trending UP.
- Containment pressure is 2.8 psig and increasing.
- VI pressure is 120 psig.

Which one of the following statements correctly describes the initial restrictions for restoring feedwater flow in FR-H.1 when the 1B CA pump has been restarted?

**REFERENCES PROVIDED: FR-H.1 with Enclosure 10**

- A. Feedwater may be restored to 1A S/G but limited to a feed rate required to lower core exit T/Cs.
- B. Feedwater may be restored to 1C and 1D S/G but must be limited to a 100 GPM flow rate to each S/G.
- C. Feedwater may be restored to 1D S/G but must be limited to feed rate required to lower core exit T/Cs.
- D. Feedwater may be restored to 1A and 1D S/Gs but limited to a 100 GPM flow rate to each S/G.

**Distracter Analysis:** There was a change in this procedure since the prior question. The previous guidance was not to feed a S/G when T-hot > 550 °F and to select the B and C S/Gs for restoration of flow. Now the guidance is to select the S/G that has the highest apparent level and to preferentially select the B or C S/G.

- A. **Incorrect:** 1A S/G is limited to < 100 gpm feed rate because it is < 12% level and 1B CA pump will not feed 1A S/G.  
**Plausible:** This would be partially correct be if level was <12%.
- B. **Incorrect:** Must feed 1D S/G at rate high enough to lower core exit T/Cs. Limiting feed rate to 100 gpm will not prevent core damage.

- Plausible:** partially correct - feeding SG 1B is preferable because it provided steam for the TDCA pump.
- C.** **Correct answer:** feed the S/G's > 12% level (A&D) at whatever rate is needed to turn the CET trend is the appropriate choice. But 1B CA pump cannot feed 1A S/G
- D.** **Incorrect:** The 100 gpm limit is not appropriate since CET's are increasing and level is greater than 12%. The 1A S/G cannot be fed.  
**Plausible:** 1A & 1D S/Gs are the appropriate choice based on > 12%.

Level: RO&SRO

KA: SYS 061K3.02(4.2/4.4)

Lesson Plan Objective: EP-FRH SEQ 6

Source: Mod; Ques191a, McGuire NRC 1997

Level of knowledge: comprehension

References:

1. OP-MC-EP-FRH page 77
2. EP/1/A/5000/FR-H.1 page 29 and Enclosure 10 - PROVIDED

**Bank Question: 260.1****Answer: D**

1 Pt(s)

Unit 2 is responding to a loss of main feedwater event from 100% power. Given the following events and conditions:

- The reactor has tripped
- The 2A and 2B Motor-driven CA (MDCA) pumps started in auto
- The Turbine-driven CA pump (TDCA) started in auto
- CA suction pressure slowly drops to 4 psig

Which one of the following automatic system responses (if any) will occur at this time?

- A. **2A CA pump suction remains aligned to the CA storage tanks  
The TDCA pump suction shifts to the RN system  
2B CA pump suction shifts to the RN system**
- B. **2A CA pump suction remains aligned to the CA storage tank  
The TDCA pump suction remains aligned to the CA storage tank  
2B CA pump suction remains aligned to the CA storage tank**
- C. **2A CA pump suction shifts to the RN system  
The TDCA pump suction shifts to the RN system  
2B CA pump suction shifts to the RN system**
- D. **2A CA pump suction shifts to the RN system  
The TDCA pump suction remains aligned to the CA storage tank  
2B CA pump suction remains aligned to the CA storage tank**

**Distracter Analysis:** Unit 2 A train valves RN-69A and CA-15A opens at 4.5 psig and B train valves including the TDCA A train supply opens at 3.5 psig.

- A. **Incorrect:** 2A CA pump shifts suctions to the RN system and TDCA and 2B CA pumps do not shift  
**Plausible:** if the candidate reverses the train relation of the unit difference.
- B. **Incorrect:** 2A CA pump shifts suctions to the RN system.  
**Plausible:** if the candidate does not know the auto-swap setpoints. This is the correct answer for Unit 1
- C. **Incorrect:** 2B CA and TDCA pumps do not shift suctions to the RN system.  
**Plausible:** if the candidate does not know the swap over setpoints
- D. **Correct Answer:**

Level: RO&SRO

KA: GEN G2.2.4 (2.8/3.0)

Lesson Plan Objective: CF-CA SEQ 10

Source: Mod; Ques\_260, Catawba NRC 1997

Level of knowledge: analysis

References:

1. OP-MC-CF-CA pages 21, 63

**Bank Question: 321****Answer: A**

1 Pt(s)

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

What is the purpose for this action?

- A. **Maintain pressurizer saturation temperature corresponding to ruptured S/G pressure to minimize S/G leakage into the NC system.**
- B. **Maintain pressurizer saturation temperature corresponding to intact S/G pressure to minimize primary leakage into the S/G.**
- C. **Maintain pressurizer saturation temperature above the corresponding ruptured S/G pressure to ensure S/G water does not flow into the NC system.**
- D. **Maintain pressurizer saturation temperature corresponding to intact S/G pressure to minimize NC pressure transients.**

**Distracter Analysis:** The purpose of this question is to determine if the candidate understands that thermal hydraulic equilibrium (temp/press/leak rate) needs to be 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:** required to maintain NCS pressure equal to ruptured S/G pressure, not the intact S/G - Intact S/G pressure < ruptured S/G pressure would not reduce NCS to S/G leakage  
**Plausible:** if the candidate is confused over the thermal hydraulics
- C. **Incorrect:** required to maintain NCS pressure equal to ruptured S/G pressure  
**Plausible:** partially correct – do not want leakage from S/G to NCS or NCS to S/G
- D. **Incorrect:** required to maintain NCS pressure equal to ruptured S/G pressure, not the intact S/G  
**Plausible:** this would be a reasonable basis for monitoring intact S/G pressure if that were the correct answer.

Level: RO&SRO

KA: EPE 038EK1.02(3.2/3.5)

Lesson Plan Objective: EP-EP3 SEQ 4

Source: Bank; Ques\_321, Catawba NRC 1997

Level of knowledge: comprehension

References:

1. OP-MC-EP-EP3 pages 19, 101, 123
2. EP/1/A/5000/E-3 pages 44, 57

**Bank Question: 328.3****Answer: A**

1 Pt(s)

Unit 2 is shutdown in mode 5 on the midnight shift. The control room operators consist of the following personnel:

- The OSM
- The Control Room SRO
- The Unit 1 and Unit 2 ROs – who are also the OATCs
- The Unit 1 BOP operator is currently securing a containment air release.
- All other on-shift operators are out of the control room at the present time.

An IAE Tech asks the Unit 2 RO to reset the trip 2 setpoint on 2EMF-36 (*UNIT VENT GAS*).

Which one of the following statements is correct in regard to the RO's ability to comply with this request?

- A. **The RO may perform this action because it is within the surveillance area of the control room for shutdown operations.**
- B. **The RO may perform this action if he/she temporarily turns over the OATC position to the SRO.**
- C. **The RO may not enter this area because it is outside the front control board area.**
- D. **The RO may not enter this area unless there is an emergency condition.**

**Distracter Analysis:**

- A. **Correct answer** - this is part of the shutdown surveillance area.
- B. **Incorrect:** Can't turnover to SRO, and not necessary.  
**Plausible:** if the candidate does not know the limits of the shutdown surveillance area, and the SRO can act as an RO under some circumstances.
- C. **Incorrect:** Can leave the front area during shutdown periods.  
**Plausible:** if the candidate does not know the limits of the shutdown surveillance area.
- D. **Incorrect:** not part of the emergency response area  
**Plausible:** if the candidate does not know the limits of the shutdown surveillance area. This was the answer to the prior version of the question.

Level: RO Only

KA: ADM G 2.1.1 (3.7/3.8)

Lesson Plan Objective: ADM-OMP SEQ 2

Source: Mod; Ques\_328.2, Catawba NRC 1997

Level of knowledge: memory

References:

1. OMP 2-2 pages 9-11, Attachment 1

**Bank Question: 331.1****Answer: D**

1 Pt(s)

An operator is performing a procedure, which requires a series of approximately 10 sequential steps to be performed while standing in a contaminated area. He/she is in direct communications with another qualified operator, who holds the procedure outside the contaminated area and reads each step sequentially.

If the performer does not have the procedure in hand as he/she performs the steps, what are the requirements of OMP 4-1 (*Use of Operating and Periodic Test Procedures*) regarding the sign off for each step?

- A. **The performer signs off the steps using his/her own initials, upon completion of the task after leaving the contaminated area.**
- B. **The documenter checks off each step as the step is completed. The performer initials each step upon completion of the task.**
- C. **The documenter signs off each step as the step is completed using his/her own initials.**
- D. **The documenter signs off each step as the step is completed using his/her own initials and the initials of the performer.**

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**Distracter Analysis:**

- A. **Incorrect:** Both initials must be entered on each step.  
**Plausible:** this is a logical albeit incorrect choice.
- B. **Incorrect:** Both initials must be entered on each step.  
**Plausible:** this is a logical albeit incorrect choice.
- C. **Incorrect:** Both initials must be entered on each step.  
**Plausible:** this is a logical albeit incorrect choice.
- D. **Correct:**

Level: RO&amp;SRO

KA: ADM G 2.1.23(3.9 / 4.0)

Lesson Plan Objective: ADM-OP SEQ 13/14

Source: Bank; Ques\_331, Catawba NRC 1997

Level of knowledge: memory

References:

1. OMP 4-1 page 15

**Bank Question: 359.2****Answer: D**

1 Pt(s)

Unit 1 is responding to a small break LOCA using E-1 (*Loss of Reactor or Secondary Coolant*). Given the following events and conditions:

- FWST Level = 340 inches
- Containment pressure = 1.5 psig
- Containment Sump Level = 1.05 ft
- EMF-41 (*AUX BLDG VENTILATION*) = trip 2
- Aux Building area radiation monitors are in alarm
- EMF-51A and B (*CONTAINMENT TRN A & B*) = 25 R/Hr
- Hydrogen Analyzer = 0.7% in containment
- NLO's report significant leakage at the seals of the 1A ND pump

Which one of the following procedures should the operator transition into from E-1?

- A. **FR-Z.3 (*Response to High Containment Radiation Level*)**
- B. **ECA-1.1 (*Loss of Emergency Coolant Recirculation*)**
- C. **FR-Z.4 (*Response to High Containment Hydrogen*)**
- D. **ECA-1.2 (*LOCA Outside Containment*)**

**Distracter Analysis:** The initial conditions provide a LOCA into containment and a leakage path outside of containment. The question is which of the problems take priority? The purpose is not to memorize procedure steps but to answer this from a broader perspective.

- A. **Incorrect:** Cont RAD levels < 35 R/hr and this would be a YELLOW path that does NOT require priority action.  
**Plausible:** If the candidate thinks that the abnormal radiation level requires priority action.
- B. **Incorrect:** Still in injection phase of SI – have failed to isolate leak outside containment.  
**Plausible:** if candidate is not familiar with the entry conditions for ECA 1.1 (after failure to isolate leak outside containment).
- C. **Incorrect:** Cont H2 > 0.5 %, but this is a YELLOW path not requiring priority action.  
**Plausible:** If the candidate fails to recognize the leak in the auxiliary bldg and/or the fact that E-1 takes care of the cont H2 problem.
- D. **Correct:**

Level: RO&SRO

KA: WE 04EK3.2 (3.4 /4.0)

Lesson Plan Objective: EP-E1 SEQ 2

Source: Mod; Ques\_359.1, Catawba NRC 1997

Level of knowledge: comprehension

References:

1. OP-MC-EP-E1 page 45
2. EP/1/A/5000/E-1 pages 12-13
3. EP/1/A/5000/F-0 page 9

**Bank Question: 370****Answer: B**

1 Pt(s)

Unit 2 was operating at 100% power with pressurizer pressure channels in a (1-2) lineup and NC pressure in the normal operating band when an instrument failure occurred. Given the following plant conditions and events:

- 1NC-32B and 1NC-36B (PZR PORV) open causing NC pressure to decrease
- PORVs close at 2185 psig
- Backup heaters energize and pressure increases
- PORVs reopen at 2189 psig
- A reactor trip does not occur
- This cycle continues until operator action is taken

Assuming no operator action to realign (or swap) instrument channel lineups, which one of the following events would cause these actions?

- A. PZR pressure channel I fails high
- B. PZR pressure channel II fails high
- C. PZR pressure channel III fails high
- D. PZR pressure channel IV fails high

**Distracter Analysis:**

- A. **Incorrect:** - channel I does not control PORVs 32 and 36  
**Plausible:** - plant response is very similar except PORV 34 opens and pressure continues to decrease below 2185 until a plant trip occurs due to spray valves being full open
- B. **Correct answer** - PZR channel III is the interlock channel to channel II
- C. **Incorrect:** - PORVs do not open - interlock channel only  
**Plausible:** - if candidates do not recall that this is an interlock channel or think that it controls the interlocked PORVs
- D. **Incorrect:** - PORVs do not open - interlock channel only  
**Plausible:** - if candidates do not recall that this is an interlock channel or think that it controls the interlocked PORVs

Level: RO Only

KA: APE 027 AK3.03 (3.7/4.1)

Lesson Plan Objective: PS-IPE SEQ 12

Source: Bank; Ques\_370, McGuire NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-PS-IPE page 35

**Bank Question: 380****Answer: D**

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 corrosion product beta flux from the coolant in the A loop of the NC system.
- B. Detects fission product gamma flux from the coolant in the B loop of the NC system.
- C. Detects corrosion product beta flux from the coolant in the C loop of the NC system.
- D. Detects fission product gamma flux from the coolant in the D loop of the NC system.

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**Distracter Analysis:**

- A. **Incorrect:** - EMF-48 does not detect beta radiation  
**Plausible:** - If the candidate believes that the reason CRUD bursts is detected by EMF-48 is the beta flux.
- B. **Incorrect:** - EMF-48 does not sample the B loop.  
**Plausible:** - if the candidate does not recognize that it samples A & D loops.
- C. **Incorrect:** - EMF-48 does not detect beta radiation, and loop C is not a sample point.  
**Plausible:** - If the candidate believes that the reason CRUD bursts are detected by EMF-48 is the beta flux, and does not recognize that it samples A & D loops.
- D. **Correct answer**

Level: RO&amp;SRO

KA: APE 076AA2.01(2.7/3.2)

Lesson Plan Objective: PSS-NM SEQ 2

Source: Bank; Ques\_380 McGuire NRC 1999

Level of knowledge: memory

References:

1. OP-CN-PSS-NM pages 15, 21

**Bank Question: 387****Answer: B**

1 Pt(s)

Enclosure 1 to E-1 (*Loss of Reactor or Secondary Coolant*) provides foldout page actions to close 1NV-150B and 1NV-151A (*NV PUMPS RECIRCULATION*) 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 NV pump runout at low pressures.**
- 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 at this pressure.  
**Plausible:** pump runout can be a concern for situations where the pump discharge pressure is very low.
- D. **Incorrect:** - the actions are automatic.  
**Plausible:** - if the candidate does not know that foldout actions are independent.

Level: RO&amp;SRO

KA: EPE 011EK3.07 (3.5/3.6)

Lesson Plan Objective: EP-E1 SEQ 5

Source: Bank; Ques\_387a, Catawba NRC 2001

Level of knowledge: memory

References:

1. OP-MC-EP-INTRO pages 33, 35
2. OP-MC-EP-E1 page 59

**Bank Question: 391****Answer: D**

1 Pt(s)

Which one of the following ND pump operating conditions would be most likely to experience cavitation?

- A. **ND pumps running with both trains crosstied and NC pressure is 290 psig**
- B. **ND pump running in mid loop operations and reactor vessel level is low**
- C. **ND pump running in a shutdown cooling lineup and the discharge header ruptures**
- D. **ND pump running and the suction valve closes part way (pump does not trip)**

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**Distracter Analysis:**

- A. **Incorrect:** - this is an example of pump deadheading  
**Plausible:** - if the candidate does not understand centrifugal pump operating conditions
- B. **Incorrect:** - this is an example of conditions for pump vortexing. Vortexing and cavitation are have similar indications but they are different operating situations. Vortexing is the entrainment of air in the suction path due to a low level condition. Cavitation is the loss of NPSH due to a low pressure condition.  
**Plausible:** - if the candidate does not understand centrifugal pump operating conditions and this is the condition that the candidates are primarily trained to avoid.- they will be most familiar with this condition
- C. **Incorrect:** - this would be an example of conditions for pump runout  
**Plausible:** - if the candidate does not understand centrifugal pump operating conditions
- D. **Correct answer**

Level: RO&amp;SRO

KA: APE 025 G2.1.7 (3.7/4.4)

Lesson Plan Objective: THF-FF LPRO 7, 8

Source: Bank; NRC McGuire 1999 Ques\_391

Level of Knowledge: memory

References:

1.OP-MC-THF-FF pages 21-23

**Bank Question: 398****Answer: B**

1 Pt(s)

Unit 2 is in the process of starting up the reactor in accordance with all controlling procedures. Given the following conditions and events:

- 2 EMF-3 (*CONTAINMENT REFUELING BRIDGE MONITOR*) trip 1 setpoint is  $7 \times 10^1$  mR/hr and trip 2 setpoint is  $1.5 \times 10^2$  mR/hr.

	<b>0200</b>	<b>0205</b>	<b>0210</b>	<b>0215</b>
2EMF 3 (mR/hr)	$5 \times 10^1$	$1.1 \times 10^2$	$1.6 \times 10^2$	$2.7 \times 10^2$
N-31 (CPS)	$1.2 \times 10^4$	$1.7 \times 10^4$	$2 \times 10^4$	0
N-32 (CPS)	$9.2 \times 10^3$	$1.1 \times 10^4$	0	0
N-35 (amps)	$9.1 \times 10^{-11}$	$1.0 \times 10^{-10}$	$1.2 \times 10^{-10}$	$1.2 \times 10^{-10}$
N-36 (amps)	$9.3 \times 10^{-11}$	$1.1 \times 10^{-10}$	$1.3 \times 10^{-10}$	$1.3 \times 10^{-10}$

If channel N-32 is deenergized due to a SR detector failure at 0210, what is the earliest time (if any) that the containment evacuation alarm will actuate in Unit 2 during the startup?

- A. 0205
- B. 0210
- C. 0215
- D. The containment evacuation alarm will not actuate

**Distracter Analysis:**

- A. **Incorrect:** - both SR high flux trips are active, but the EMF is still below Trip 2.  
**Plausible:** - if the candidate thinks that Trip 1 actuation causes the alarm
- B. **Correct answer**
- C. **Incorrect:** Both SR high flux trips are blocked  
**Plausible:** - if the candidate reverses the logic that BOTH SR high flux trips must be blocked
- D. **Incorrect:** - alarm actuates at 0210  
**Plausible:** - if candidate thinks that some other action or interlock blocks the alarm

Level: RO&amp;SRO

KA: APE 061AA1.01(3.6/3.6)

Lesson Plan Objective: WE-EMF SEQ 3

Source: Mod; Ques\_398, McGuire NRC 1999

Level of knowledge: analysis

References:

1. OP-MC-WE-EMF page 43
2. OP-MC-IC-ENB pages 21-23

**Bank Question: 400****Answer: A**

1 Pt(s)

Unit 2 is conducting a plant shutdown. The S/G's are being filled to wet lay-up. Given the following plant conditions and events:

- 2D S/G pressure = 5 psig (all channels indicating the same)
- 2D S/G NR level = 95%
- 2D S/G WR level = 75%
- No S/G PORVs are open
- Operators are performing OP/2/A/6100/02 (*Controlling Procedure for Unit Shutdown*) and SO-4D (*Filling S/G 2D*)
- NCS temperature = 195°F

Which one of the following statements represents actual level conditions for the 2D S/G under these conditions?

- A. **Approximately 75%**
- B. **Approximately 85%**
- C. **Approximately 95%**
- D. **>100%**

**Distracter Analysis:** Narrow range SG level detectors are calibrated for normal (hot) operating conditions. Wide range SG level detectors are calibrated for cold (shutdown) conditions. This means that the narrow range instrument will read higher than actual level under cold conditions because variable leg water density is greater than the calibrated setting.

- A. **Correct answer:** SO4 procedures use only the WR level when filling the S/Gs.
- B. **Incorrect:** Actual level is about 75%  
**Plausible:** - if the candidate is confused over which of the S/G level instruments is cold calibrated and gets the effect reversed
- C. **Incorrect:** - SG level is about 75 %  
**Plausible:** - if the candidate is confused over which of the S/G level instruments is cold calibrated.
- D. **Incorrect:** - SG level is about 75 %  
**Plausible:** If the candidate believes at low temperature, inaccuracy has increased level indication.

Level: RO&SRO

KA: SYS 035A1.01(3.6/3.8)

Lesson Plan Objective: STM-SG SEQ 5

Source: Mod; Ques\_400, McGuire NRC 1999

Level of knowledge: analysis

References:

1. OP-MC-STM-SG pages 21, 23
2. OP/1/A/6100/SO-2D pages 6, 11

**Bank Question: 407****Answer: D**

1 Pt(s)

Unit 1 has initiated a liquid radioactive waste release from the Ventilation Unit Condensate Drain Tank (VUCDT) through the RC system. All lineups and authorizations have been properly made in accordance with OP/0/B/6200/35 using the normal path. Two RC pumps are the minimum required under the LWR document.

Given the following initial conditions:

- 3 RC pumps are running
- 1EMF-44 (*CONT VENT DRN TANK OUT*) correctly set for trip 1 and trip 2 activity limits
- MRIRR = 75 GPM based on boron concentration
- No other releases are in progress

If the release automatically terminates 40 seconds after initiation, which one of the following conditions could have terminated the release?

- A. **1WM-46 (*LIQUID WASTE DISCH VALVE*) closing automatically if 1 RC pump tripped**
- B. **1WM-46 closing automatically if 1EMF-44 reached the trip 2 setpoint**
- C. **1WP-35 (*WMT & VUCDT TO RC CNTRL*) closing automatically if 1 RC pump tripped**
- D. **1WP-35 closing automatically if 1EMF-44 reached the trip 2 setpoint**

**Distracter Analysis:**

- A. **Incorrect:** - RC pump interlock will not actuate - set at 2 pumps (minimum required on LWR document). WM-46 is isolated and not used anymore as a release path.  
**Plausible:** - this was formerly the normal release path
- B. **Incorrect:** - WM-46 receives a closing signal from EMF-44 but this is not the normal path for a release. WM-46 is isolated and not used anymore.  
**Plausible:** - this was formerly the normal release path
- C. **Incorrect:** - RC pump interlock will not actuate - set at 2 pumps (minimum required on LWR document).  
**Plausible:** - if the candidate misunderstands the RC pump interlock-- this was the correct answer on a prior NRC exam -

**D. Correct answer**

Level: RO & SRO

KA: SYS 68A4.03 (3.9/3.8)

Lesson Plan Objective: WE-WL SEQ 3

Source: Bank; McGuire NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-WE-WL pages 21, 27, 59
2. OP-MC-WE-EMF page 31

**Bank Question: 415.1****Answer: B**

1 Pt(s)

Unit 1 is operating at 80% power when an electrical transient causes several condensate system pumps to trip. Given the following conditions and events:

	<u>Start</u>	<u>10 sec</u>	<u>20 sec</u>	<u>30 sec</u>
CF pump 1A Suction Pressure (psig)	451	238	232	229
CF pump 1B Suction Pressure (psig)	448	227	224	240
# Hotwell Pumps running	2	2	3	2
# Condensate Booster Pumps running	2	1	0	2

What is the earliest time (if any) that BOTH main feedwater pumps will have tripped?

- A. 10 seconds
- B. 20 seconds
- C. 30 seconds
- D. At least one feedwater pump will continue to run

**Distracter Analysis:** This is the 1999 version of the question with slight modifications. It was used in different versions in 2000 and 2001(Catawba).

- A. **Incorrect:** - CF pump 1A continues to run as suction pressure remains > 230 psig  
**Plausible:** - CF pump 1B will trip on low suction pressure
- B. **Correct answer:** - both CF pumps trip when 3/3 condensate booster pumps trip - trip is irrespective of suction pressure
- C. **Incorrect:** - CF pump 1b trip criteria met but trip occurred earlier at 20 sec.  
**Plausible:** - if candidate does not know that the CBPs are interlocked with the CF pumps
- D. **Incorrect:** - tripping criteria are met at 20 sec  
**Plausible:** - if candidate does not know CF pump trips

Level: RO&SRO

KA: SYS 056K1.03 (2.6/2.6)

Lesson Plan Objective: CF SEQ 4

Source: Bank; Ques\_415, McGuire NRC 2000

Level of knowledge: analysis

References:

1. OP-MC-CF-CF page 19

**Bank Question: 432.1****Answer: C**

1 Pt(s)

Unit 1 has just entered mode 5 in preparation for refueling. Given the following conditions and events:

- A lower containment entry is planned for the next shift.
- The SRO directs the RO to purge the containment in preparation for the containment entry.
- The VP system is secured with all fans off and containment purge and exhaust valves closed

Which one of the following failures would severely compromise the operator's ability to perform the containment purge?

- A. **The *NORMAL-REFUEL SELECTOR* switch is stuck in the "*NORM*" position.**
- B. **Containment isolation valve 1VP-4A (*VP TO UPPER CONT INSD ISOL*) will not open.**
- C. **Damper 1RBPS-D9 (*VP to Lower Cont*) is stuck in its "*REFUEL*" (4 to 1) position.**
- D. **Containment isolation valve 1VP-6B (*VP to Lower Cont Otsd Isol*) will not open.**

**Distracter Analysis:**

- A. **Incorrect:** - this is the proper position for this operation.  
**Plausible:** - if the candidate misunderstands the VP operations in this mode - this was the correct answer in a prior version.
- B. **Incorrect:** - any loss of flow to the upper containment will have no effect on the lower containment entry.  
**Plausible:** - if the candidate assumes there is an interlock that precludes fan operation with an isolation valve closed.
- C. **Correct answer:** - this will over-pressurize the upper containment
- D. **Incorrect:** - should not significantly reduce purge flow to lower containment due to a parallel path.  
**Plausible:** - if the candidate presumes a loss of a flow path to lower containment will reduce purge effectiveness or over-pressurize upper containment.

Level: RO&amp;SRO

KA: SYS 029K3.02(2.9\*/3.5\*)

Lesson Plan Objective: CNT-VP SEQ 2

Source: Mod; Ques\_432, McGuire NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-CNT-VP pages 19, 21, 23, 27

**Bank Question: 451****Answer: B**

1 Pt(s) Unit 1 is shutdown in a refueling outage. Given the following events and conditions:

- The VI system was in a normal lineup.
- The VS system was in a normal lineup.
- A VI header rupture occurs.
- The VI system completely depressurizes.

What effect does a total loss of the VI system have on the VS system?

- A. **VI-820 will auto-close as VI header pressure decreases below 82 psig and the VS air compressor will start automatically to maintain VS header pressure.**
- B. **VI-820 will auto-close as VI header pressure decreases below 90 psig and the VS air compressor must be manually started to maintain VS header pressure.**
- C. **Check valves in the VI - VS cross-connect line will close to isolate VS system pressure before it drops below 90 psig.**
- D. **VS pressure in the Fire Protection Pressurizer Tank will be lost until a VS air compressor can be started.**

---

**Distracter Analysis:**

- A. **Incorrect:** - the VS air compressor does not automatically start to maintain pressure  
**Plausible:** - The VI system is safety significant, VI-820 used to close 82 psig but the setpoint was recently changed from 82 psig to 90 psig. There is a separate VS air compressor, which has an automatic startup feature – but it is normally in “off” and requires operator action to start.
- B. **Correct answer**
- C. **Incorrect:** - there are no check valves in this line  
**Plausible:** - this is another possible method to prevent depressurizing the VS header at some plants.
- D. **Incorrect:** - the RF system tank is pressurized with VS air - but is maintained isolated from the VI header  
**Plausible:** - if the candidate does not know that the RF system air tank is isolated from the VS header.

Level: RO&SRO

KA: SYS 078 K4.01 (2.7/2.9)

Lesson Plan Objective: SS-VI LPRO 7

Source: Bank; NRC McGuire 1999 Ques\_451

Level of Knowledge: comprehension

References:

1. OP-MC-SS-VI page 67

**Bank Question: 453.2****Answer: A**

1 Pt(s)

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

- The operators initiated AP/04 (*Rapid Downpower*)
- Reactor power dropped to 47%
- Turbine load dropped to 45% based on turbine impulse pressure
- The operator reports that condenser vacuum is 18 inches vacuum and is continuing to decrease slowly.

Which one of the following statements correctly describes the required action?

- A. **Manually trip the reactor and enter E-0 (*Reactor Trip or Safety Injection*)**
- B. **Manually trip the turbine and enter AP/2 (*Turbine Generator Trip*)**
- C. **Wait for the automatic turbine trip to actuate and then enter E-0.**
- D. **Wait for the automatic turbine trip to actuate and then enter AP/2.**

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**Distracter Analysis:**

Turbine Trip Criteria: IF condenser vacuum decreases to less than 20 in Hg or turbine exhaust hood temperature is greater than 250 °F, THEN: Trip the reactor and enter E-0.

This is a modified question from the last Catawba Exam.

- A. **Correct:** The turbine trip setpoint (23-20 inches of vacuum) was exceed – OMP4-3 and OMP 2-2 require the operator to manually trip the turbine – but the reactor is < P8 so instead, the operator must manually trip the reactor because the turbine trip will not cause an automatic reactor trip.
- B. **Incorrect:** Manually tripping the turbine will not cause a reactor trip – the reactor will remain at power.  
**Plausible:** if the candidate recognizes that a reactor trip is not automatic below 48% power, and forgets that the dumps will not operate below C-9.

- C. **Incorrect** Waiting for an automatic trip is incorrect because the auto turbine trip setpoint (23-20 inches vacuum) has already been exceeded and failed to actuate the turbine trip.  
**Plausible:** if the candidate recognizes that a reactor trip is not automatic below 48% power but forgets that the turbine trip setpoint is 23-20 inches of vacuum
- D. **Incorrect:** Waiting for an automatic trip is incorrect because the auto turbine trip setpoint (23-20 inches vacuum) has already been exceeded and failed to actuate the turbine trip.  
**Plausible:** If the candidate does not recognize that the turbine trip setpoint is 23-20 inches of vacuum or does not

Level: RO&SRO

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

Lesson Plan Objective: AP-23 SEQ 1/2

Source: Mod; Ques\_453a, Catawba NRC 2001

Level of knowledge: memory

References:

1. AP/1/5500/23 pages 2-4
2. OMP 2-2 pages 6-7
3. OMP 4-3 page 8
4. OP-MC-MT-ZM page 21
5. OP-MC-MT-MT page 55

**Bank Question: 460****Answer: B**

1 Pt(s)

If a fire was reported in the McGuire Office Complex (MOC), which one of the following responses is correct by station procedures?

- A. **Offsite fire departments are responsible for all fire suppression activities at the scene. The Fire Brigade must be held in reserve for station fires inside the protected area.**
- B. **Offsite fire departments are responsible for all fire suppression activities at the scene. The Fire Brigade may provide limited support if resources allow.**
- C. **The Fire Brigade is responsible for the initial response at the scene. They are required to turn over control of the scene as soon as an offsite fire department arrives and immediately return to the protected area.**
- D. **The Fire Brigade is responsible for fire suppression activities at the scene. An offsite fire department may be called to provide support if additional resources are required.**

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**Distracter Analysis:**

- A. **Incorrect:** - the Fire Brigade is allowed to leave the protected area.  
**Plausible:** - they have restrictions regarding leaving the site.
- B. **Correct answer**
- C. **Incorrect:** - the Fire Brigade is not responsible for initial response and they are not required to return to the protected area.  
**Plausible:** - if the candidate thinks that they cannot remain outside the protected area.
- D. **Incorrect:** - The Fire Brigade is not primarily responsible to fight fire outside the protected area.  
**Plausible:** - If the candidate does not understand fire brigade responsibilities.

Level: RO&amp;SRO

KA: SYS 086 G2.4.12(3.4/3.9)

Lesson Plan Objective: None

Source: Bank; Ques\_460, McGuire NRC 1999

Level of knowledge: memory

References:

1. RP/1/A/5700/025 Enclosure 4.1 page 5

**Bank Question: 503.2****Answer: D**

1 Pt(s)

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

- Turbine impulse pressure instrument channel I fails low.
- The operators have performed the actions of AP-14 (*Rod Control Malfunctions*).
- $T_{ave}$  has been adjusted to within 1°F of program by adjusting turbine load and power is 95%.
- 10 minutes later, the RO misunderstands an order and places the rod control selector switch in *AUTO*.

Which one of the following statements correctly describes the response of the rod control system?

- A. Rods will not move because all auto rod motion is still blocked.**
- B. Rods will move in because the power mismatch circuit still has an error signal present.**
- C. Rods will not move because there is no demand signal calling for rod motion.**
- D. Rods will move in because  $T_{ave}$  is greater than  $T_{ref}$ .**

**Distracter Analysis:**

- A. Incorrect:** Auto rod motion will begin in an attempt to match  $T_{ave}$  with program  $T_{ref}$  (557, zero power value)  
**Plausible:** if the candidate believes auto motion is blocked and remembers the turbine impulse mismatch circuit is no longer active.
- 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:**  $T_{ref}$  is still low.  
**Plausible:** if the candidate forgets the impulse signal locks in.
- D. Correct:** The temperature mismatch function has an error signal at this time.

Level: RO Only

KA: SYS 001K4.03 (3.5/3.8)

Source: Mod; Ques\_503a, Catawba NRC 2001

Lesson Plan Objective: IC-IRX 11

Level of knowledge: analysis

References:

1. OP-MC-IC-IRX pages 39, 41, 33

**Bank Question: 510****Answer: D**

1 Pt(s)

Unit 1 is cooling down in mode 4. Given the following plant conditions:

- LTOPs key switches for PORVs are selected to "NORM" position
- NC pressure = 380 psig
- NC temp = 340 °F
- ND system is in service

Which one of the following components would open to mitigate a pressure transient to protect the NC system?

- A. **PORVs 32/34**
- B. **ND hot leg discharge relief valve**
- C. **ND cold leg discharge relief valve**
- D. **ND pump suction relief valves**

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**Distracter Analysis:**

- A. **Incorrect:** PORVs are not in low pressure mode - not placed in LTOP mode until <360 psig.  
**Plausible:** Normal over pressure protection in mode 4 is provided by LTOPs and PORVs
- B. **Incorrect:** - ND pump suction will open at 450 psig - will not relieve sufficient flow to protect system  
**Plausible:** Opens at 600 psig to relieve 585 gpm - protects against back leakage through the NC system check valves
- C. **Incorrect:** - ND pump suction will open at 450 psig - will not relieve sufficient flow to protect system  
**Plausible:** - Opens at 600 psig to relieve 585 gpm - protects against back leakage through the NC system check valves
- D. **Correct answer** - will relieve sufficient flow (>both NV pumps) at 450 psig

Level: RO&amp;SRO

KA: SYS 005 A2.02 (3.5/3.7)

Lesson Plan Objective: PS-ND LPRO 6, PS-IPE LPRO 12

Source: Bank; NRC McGuire / Catawba year

Level of Knowledge: comprehension

References:

1. OP-MC-PS-ND page 21
2. OP-MC-PS-IPE page 27

**Bank Question: 540****Answer: C**

1 Pt(s)

Unit 2 is responding to a large LOCA when a loss of the 2ETA bus occurred. Given the following events and conditions:

- A reactor trip and safety injection occurred
- All NV, NI, ND, and CA pumps sequenced on properly
- SI was reset
- Sequencers were reset
- The 2ETA bus subsequently lost power but was re-energized by the 2A D/G

Which one of the following statements correctly describes the restoration process for the train A NV, NI, ND, and CA pumps?

- A. **2A NV and 2A NI pumps must be restarted by operator action  
2A ND and 2A CA pumps will automatically restart**
- B. **2A NV and 2A NI pumps will automatically restart  
2A ND and 2A CA pumps must be restarted by operator action**
- C. **2A NV and 2A CA pumps will automatically restart  
2A NI and 2A ND pumps must be restarted by operator action**
- D. **2A NV and 2A CA pumps must be restarted by operator action  
2A NI and 2A ND pumps automatically restart**

**Distracter Analysis:**

Both the ECCS and blackout sequencers control NV and CA pumps. The ECCS sequencer controls NI and ND pumps only

- A. **Incorrect:** NI and ND pumps do not automatically restart, NV and CA pumps will auto restart.  
**Plausible:** If the candidate misunderstands the SI and SBO functions of the components. NI pumps must be restarted and the CA pumps will automatically restart.
- B. **Incorrect:** NI and ND pumps do not automatically restart, NV and CA pumps will auto restart.  
**Plausible:** If the candidate misunderstands the SI and SBO functions of the components. ND pumps must be restarted and the NV pumps will automatically restart.
- C. **Correct answer**
- D. **Incorrect:** NI and ND pumps do not automatically restart, NV and CA pumps will auto restart.  
**Plausible:** Starting the ND and NI pumps automatically would be a desired state for a large LOCA.

Level: RO&SRO

KA: SYS 013A2.01(4.6/4.8)

Lesson Plan Objective: DG-EQB SEQ 8

Source: Mod; Ques\_540, Catawba NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-DG-EQB pages 29, 39, 41, 43

**Bank Question: 547.1****Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power when main condenser vacuum dropped suddenly from 25 inches vacuum to 23 inches vacuum. Given the following events and conditions:

- All 3 condenser steam air ejectors (CSAEs) are in service
- Both primary and secondary jets are operating
- The system lineup is in the normal configuration

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

- A. **Loss of YM supply to the condenser boot seals**
- B. **Loss of the main steam supply to the CSAEs**
- C. **CM flow to all CSAE inter-coolers has been obstructed**
- D. **A CSAE drain was left open**

---

**Distracter Analysis:**

- A. **Incorrect:** A recent change no longer runs seals water to the condenser boot seals.  
**Plausible:** Seal water to the boot seals was originally designed to prevent condenser leakage
- B. **Incorrect:** Main steam does not supply the CSAEs  
**Plausible:** There are physical connections for main steam to be the back up supply for aux steam – but these connections are not used.
- C. **Correct answer** - reduces effectiveness of steam jets and causes vacuum to decrease.
- D. **Incorrect:** CSAE drains are normally open to allow condensate to drain out of the air ejectors.  
**Plausible:** If the drain is left closed, the condensate will build up and flood out the CSAE, which could cause a loss of vacuum. This is the reverse of the distracter.

Level: RO&amp;SRO

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

Lesson Plan Objective: MT-ZM SEQ 4, 5, 9

Source: Mod; Ques\_547, Catawba NRC 2001

Level of knowledge: comprehension

References:

1. OP-MC-MT-ZM pages 11, 13, 15, 23, 27

**Bank Question: 548****Answer: A**

1 Pt(s)

Unit 1 was operating in mode 3 during a plant shut down for a refueling outage. If a safety injection signal is received, which one of the following events will occur to protect the vital AC busses from overload?

- A. **Only non-LOCA loads will be shed. The accelerated sequence will sequence remaining loads on after checking for adequate bus voltage.**
- B. **A complete load shed will occur. The accelerated sequence will sequence LOCA loads on after checking for adequate bus voltage and DG speed.**
- C. **A complete load shed will occur. The accelerated sequence will sequence LOCA loads on after checking for adequate bus voltage.**
- D. **Only non-LOCA loads will be shed. The accelerated sequence will sequence remaining loads on after checking for adequate bus voltage and DG speed.**

---

**Distracter Analysis:**

- A. **Correct answer**
- B. **Incorrect:** only non-LOCA loads are shed, the accelerated sequence does not check for DG speed during a LOCA  
**Plausible:** DG speed is checked when the sequencer is actuated during a blackout signal
- C. **Incorrect:** only non-LOCA loads are shed  
**Plausible:** the remaining part of the answer is correct
- D. **Incorrect:** the accelerated sequence does not check for DG speed during a LOCA  
**Plausible:** DG speed is checked when the sequencer is actuated during a blackout signal

Level: RO Only

KA: SYS 013K4.11(3.2/3.8)

Lesson Plan Objective: DG-EQB SEQ 6

Source: Bank; Ques\_548, McGuire NRC 1999

Level of knowledge: memory

References:

1. OP-MC-DG-EQB page 25

**Bank Question: 563.2****Answer: A**

1 Pt(s)

Unit 1 was operating at 100%, all rods out. Given the following events and conditions:

- The RO is performing PT/1/A/4600/01 (*RCCA Movement Test*) for control bank D
- The RO selects **CBD** on the **CRD Bank Selector Switch** and drives rods IN to 216 steps
- An upset occurred and the RO selects **MANUAL** on the **CRD Bank Selector Switch** and restores rods to 226 steps (ARO)

If this condition is left uncorrected, control bank C rods will begin to drive in when control bank D is at \_\_\_\_\_?

**REFERENCES PROVIDED: COLR Table 1**

- A. 100 steps
- B. 106 steps
- C. 110 steps
- D. 120 steps

**Distracter Analysis:**

The Bank Overlap Unit (BOU) will not count the -10 steps on bank D when the bank was inserted in "CBD" position. This means that bank D rods will be sequenced 10 steps lower than normal on the BOU counter when bank C rods begin their insertion sequence during the next shutdown. There are 116 steps of overlap between control banks D and C. 226 steps is all rods out (ARO). Bank C rods will begin to insert when bank D is at  $226 - 116 - 10 = 100$  steps.

- A. **Correct:** 100 steps is correct:  $226 - 116 - 10 = 100$  steps.
- B. **Incorrect:** 100 steps is correct  
**Plausible:** If the candidate uses 116 steps as the bank overlap setting instead of subtracting  $226 - 116 = 110$  as the point where bank C rods begin to sequence in on a shutdown.
- C. **Incorrect:** 100 steps is correct  
**Plausible:** if the candidate does not recognize that the BOU counter is effected by the individual withdrawal of bank D - or if he thinks that the -10 steps in manual will offset the +10 steps in "Bank D"
- D. **Incorrect:** 102 steps is correct  
**Plausible:** If the candidate reverses the overlap error – adds +10 steps to 110 instead of subtracting 10 steps.

Level: RO&SRO

KA: G2.2.33 (2.5/2.9)

Lesson Plan Objective: IC-IRE SEQ 5

Source: Mod; Ques563a; McGuire NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-IC-IRE page 13
2. COLR Table 1 - PROVIDED  
COLR Enclosure 4.3 Section 1.13

**Bank Question: 564****Answer: B**

1 Pt(s)

Match the following radiation exposure administrative guides with the applicable annual limits for non-pregnant radiation workers.

Guides/Limits in TEDE (Rem)

	Alert	Exclude	Basic Admin	10CFR20
A.	1.5	1.6	2.0	4.5
B.	1.6	1.8	2.0	5.0
C.	1.8	2.0	4.5	4.5
D.	2.0	3.6	4.5	5.0

**Distracter Analysis:**

- A. **Incorrect:** Alert, Exclude and 10CFR20 all too low  
**Plausible:** Basic Admin is correct
- B. **Correct answer**
- C. **Incorrect:** Exclude, Basic Admin are too high, 10CFR20 is too low  
**Plausible:** Alert is correct
- D. **Incorrect:** Alert, Exclude and Basic Admin are too high  
**Plausible:** 10CFR20 is correct

Level: RO Only

KA: G2.3.1 (2.6/3.0)

Lesson Plan Objective: RAD-RP Seq 18, 19

Source: Bank Catawba NRC 1999

Level of knowledge: memory

References:

1. GET Radiation Worker Training pages 32, 34

**Bank Question: 571****Answer: B**

1 Pt(s)

Unit 2 is responding to a small break LOCA in ES-1.2, (*Post LOCA Cooldown and Depressurization*). Step 15 of ES-1.2 requires the operators to depressurize the NC system.

Which one of the following statements correctly describes the reasons for using the prescribed methods of depressurizing the NC system?

A.

1. Pressurizer spray - preferred method to be used if NC pump is running
2. Auxiliary Spray - alternate method - better control over depressurization rate
3. PORV - method of last resort - lack of control of depressurization rate - results in rupturing the PRT

B.

1. Pressurizer spray - preferred method to be used if NC pump is running
2. PORV - alternate method - better than auxiliary spray
3. Auxiliary Spray - method of last resort - too slow and may thermal shock the spray nozzles and degrade regenerative Hx

C.

1. PORV - preferred method - rapid depressurization rate
2. Pressurizer spray - alternative method - next most rapid depressurization rate
3. Auxiliary spray - method of last resort - too slow and may thermal shock the spray nozzles

D.

1. Auxiliary spray - preferred method - does not degrade containment
2. Pressurizer spray - alternative method - will not work if NC pump is not running
3. PORV - method of last resort - will rupture PRT and degrade containment environment

**Distracter Analysis:**

- A. **Incorrect:** PORV is the alternative method - aux spray is the last resort  
**Plausible:** Pressurizer spray is the priority
- B. **Correct answer**

- C. Incorrect:** Pressurizer spray preferred over PORV  
**Plausible:** Aux spray is last resort
- D. Plausible:** Aux spray is the last resort  
**Plausible:** Pressurizer spray preferred over PORV

Level: RO&SRO

KA: WE 03EK2.1 (3.6 / 4.0)

Lesson Plan Objective: EP-E1 SEQ 4

Source: Bank; Ques\_571, Catawba NRC 1999

Level of knowledge: memory

References:

1. OP-MC-EP-E1 page 123
2. ES-1.2 page 12, 13

**Bank Question: 593****Answer: B**

1 Pt(s) Unit 2 was operating at 99% power when a steamline break occurred. Given the following events and conditions:

- 0200 The operators enter AP/01 (*Steam Leak*)
- 0200 The operators start reducing turbine load to match  $T_{ave}$  and  $T_{ref}$
- 0201 The operators start a second NV pump and isolate letdown
- 0202 NLOs start investigating for the location of the steam leak
- 0203 *P/R OVER POWER ROD STOP* alarms – the RO reports that power is now going down.
- 0204 STA reports pressurizer level is decreasing and cannot be maintained
- 0205 The turbine building operator reports that the line to the atmospheric dump valves has a steam leak and cannot be isolated

If no safety injection has occurred and pressurizer pressure is maintained, which one of the following operator responses is correct?

- A. **Manually trip the reactor at 0203**
- B. **Manually trip the reactor at 0204**
- C. **Manually trip the reactor at 0205**
- D. **Commence a rapid down power using AP/04 (*Rapid Downpower*) at 0205**

**Distracter Analysis:**

- A. **Incorrect:** no requirement to trip the reactor because reactor power has turned and is decreasing. Not approaching the overpower automatic reactor trip at 109% in 2 of 4 channels.  
**Plausible:** shows a power mismatch – reactor power reaches 103% on 1 of 4 PR channels to cause C-2. OMP 4-3 (*Use of Abnormal and Emergency Procedures*) requires the operator to trip when an automatic safeguards action setpoint is approached to avoid challenging the automatic safeguards function.
- B. **Correct answer** required to trip under AP/01 (and many other procedures) if you cannot maintain pressurizer level with 2 NV pumps
- C. **Incorrect:** required to trip when PZR level cannot be maintained  
**Plausible:** if the candidate thinks that a reactor trip is required because the steam leak was not isolated.
- D. **Incorrect:** required to trip when PZR level cannot be maintained

**Plausible:** this would be the correct answer if not required to trip at 0204.

Level: RO&SRO

KA: APE 040AA2.02(4.6/4.7)

Lesson Plan Objective: AP-1 SEQ 4

Source: Bank; Ques\_593, McGuire NRC 2000

Level of knowledge: comprehension

References:

1. AP/1/A/5500/01 page 3
2. OP-MC-IC-IPE page 45
3. OMP 4-3, page 8

**Bank Question: 605****Answer: B**

1 Pt(s)

Unit 2 was operating at 100% power, middle of core life. Given the following events and conditions:

- A reactor trip occurred due to a loss of both main feed pumps
- The trip transient caused a 100 gpm tube leak in the 2B S/G
- 2EMF-33 (*Condenser Air Ejector Exhaust*) alarmed in trip 2

Which one of the following indications will provide the best indication (most sensitive and timely) to confirm that a S/G tube leak has occurred?

- A. S/G feed flow to steam flow mismatch
- B. 2EMF-10, 11, 12 and 13 (*STEAMLINE HI RAD*)
- C. 2EMF-34 (*S/G SAMPLE*)
- D. 2EMF-71, 72, 73, and 74 (*N16 LEAKAGE*)

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**Distracter Analysis:**

- A. **Incorrect:** Not a sensitive method of comparison – requires large gpm leak rates before this is noticeable.  
**Plausible:** This method will show gross SGTRs – good indication at power.
- B. **Correct answer:** normally, EMF-71-74 are the most sensitive monitors. But these monitors detect  $N^{16}$   $\gamma$  radiation that has a high energy (7 MeV)  $\gamma$  that only is generated when the reactor is operating at power (requires a neutron flux).
- C. **Incorrect:** The correct monitors are EMF 10 - 13.  
**Plausible:** EMF-34 has no flow because the reactor trip would cause an AFW auto-start – which would isolate blowdown and EMF-34 would not have any flow.
- D. **Incorrect:** most sensitive method as it detects  $N^{16}$   $\gamma$  radiation  
**Plausible:** This was the correct answer for the 1997 NRC exam – when the premise of the question had the reactor was operating at 100% power. In this question, the reactor has tripped and neutron flux has decreased – causing the  $N^{16}$   $\gamma$  to decay off ( $T_{1/2}$  is 7 seconds) so that by the time that the steam line monitors see the contents of the S/G, the  $N^{16}$   $\gamma$  has decayed away.

Level: RO Only

KA: SYS 039A1.09(2.5\*/2.7\*)

Lesson Plan Objective: EP-E3 SEQ 3

Source: Bank; Ques\_605, McGuire NRC 2000

Level of knowledge: comprehension

References:

1. OP-MC-WE-EMF pages 45, 47
2. AP-10 page 7
3. OP-MC-EP-E3 page 43

**Bank Question: 613****Answer: B**

1 Pt(s)

Unit 2 was operating at 100% with normal charging and letdown in service. Given the following indications:

- Pressurizer level began decreasing
- The 2A NV pump ammeter showed running amps decreased

If all automatic control systems operated normally, which one of the following conditions would cause the 2A NV pump running amps to decrease to the lowest value?

- A. 2NV-238 (*CHARGING LINE FLOW CONTROL*) failed open
- B. 2NV-238 (*CHARGING LINE FLOW CONTROL*) failed closed
- C. 2NV-241 (*SEAL INJ FLOW CONTROL*) failed open
- D. 2NV-241 (*SEAL INJ FLOW CONTROL*) failed closed

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**Distracter Analysis:**

- A. **Incorrect:** pump amps and pressurizer level would initially increase  
**Plausible:** If the candidate does not understand the charging flow path or does not understand the relationship between pump amps and flow.
- B. **Correct answer:** This would block the charging flow path and pumps amps would reduce to minimum as the reduced charging flow was diverted through the NV-150 and NV-151 mini-flow valves
- C. **Incorrect:** this would increase charging flow, which would increase charging pump amps. It would also increase pressurizer level, which would cut back on charging flow and stabilize the pressurizer level. Pump amps would not go to minimum value.  
**Plausible:** If the candidate thought that this could divert charging flow or did not understand the relationship between pump amps and flow.
- D. **Incorrect:** NV-241 closing would increase backpressure on the charging system, which would divert more charging flow through the NCP seals. However, the drop in pressurizer level would act to open 2NV-238 to compensate for the flow reduction. The overall effect would be to increase pump amps as flow tried to remain the same but at a higher backpressure.  
**Plausible:** If the candidate does not consider the effect of the PZR level control circuit.

Level: RO Only

KA: SYS 004K6.04(2.8/3.1)

Lesson Plan Objective: PS-NV SEQ 5/6

Source: Bank; Ques\_613, McGuire NRC 2000

Level of knowledge: comprehension

References:

1. OP-MC-PS-NV pages 37, 115

**Bank Question: 649.1****Answer: D**

1 Pt(s)

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

- CF pumps 2A and 2B are running
- Hotwell pumps 2A and 2C are running
- Condensate booster pumps 2A and 2C are running
- Heater drain pump 2C1 is out of service
- Heater drain pump 2C3 trips on overload

Assuming no operator actions are taken, which one of the following statements correctly describes a plant response to this event?

- A. **Heater drain pump 2C2 starts.**
- B. **CF pump 2A trips.**
- C. **The reactor/turbine trips.**
- D. **Condensate booster pump 2B starts.**

**Distracter Analysis:**

- A. **Incorrect:** Heater drain pump 2C2 is already running.  
**Plausible:** based on misunderstanding the normal 100% capacity of the pumps (2 - 50% capacity).
- B. **Incorrect:** CF pumps do not trip because a third CBP and HW pump will start on low suction pressure to makeup the 15% loss in condensate flow.  
**Plausible:** If the candidate thinks that 2C-2 heater drain pump not providing full heater drain flow would cause one CF pump to trip on low suction pressure.
- C. **Incorrect:** The reactor does not trip because condensate pumps can produce 150% flow.  
**Plausible:** If the candidate thinks that 2C-2 heater drain pump not providing full heater drain flow would cause both CF pumps to trip on low suction pressure.
- D. **Correct:**

Level: RO&amp;SRO

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

Lesson Plan Objective: CF-CM SEQ 12

Source: New; Parked Ques\_649

Level of knowledge: comprehension

References:

1. OP-MC-CF-CM pages 33, 37

**Bank Question: 671.2****Answer: D**

1 Pt(s)

Unit 1 was releasing the contents of a waste gas decay tank in accordance with an approved release permit. If the detector power supply for 1EMF-36(L) (*UNIT VENT GAS*) failed during the release, which one of the following actions must be taken?

**REFERENCES PROVIDED: SLC 16.11.7**

- A. Stop the release and complete repairs on 1EMF-36(L) before restarting.
- B. Recalculate the trip set points using 1EMF-36(H) as the release path monitor.
- C. Restart the release using 1EMF-50(L) (*WASTE GAS DISCH*) as the release path monitor.
- D. Continue the release using 1EMF-50(L) as the release path monitor.

**Distracter Analysis:**

- A. **Incorrect:** not required to use 1EMF-36(L) as the release path monitor.  
**Plausible:** if the candidate does not recognize that 1EMF-50(L) is normally used to monitor the release path.
- B. **Incorrect:** 1EMF-36(H) does not automatically trip 1WG-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) is necessary and provides the same automatic protection.
- C. **Incorrect:** the release would NOT be terminated when 1EMF-36(L) failed low due to detector failure.  
**Plausible:** if the candidate did not recognize that 1EMF-36(L) fails low on detector failure and would not trip 1WG-160.
- D. **Correct answer**

Level: RO Only

KA: SYS 073A4.01(3.9/3.9)

Lesson Plan Objective: WE-RGR SEQ 4

Source: Mod; Ques\_671 McGuire NRC 2000

Level of knowledge: memory

References:

1. OP-MC-WE-RGR page 15
2. OP-MC-WE-EMF pages 21, 23, 37
3. SLC 16.11.7 - PROVIDED

**Bank Question: 681****Answer: C**

1 Pt(s)

Unit 2 was operating at 100% when a floor cooling glycol high temperature alarm is received. A review of the RTD panel reveals that several ice condenser floor slabs have high temperature indications.

Which one of the following statements correctly describes the operational concern raised by this alarm?

- A. **High glycol temperatures will cause the in-service glycol compressor to trip causing a loss of NF cooling and excessive ice sublimation.**
- B. **Low floor cooling glycol temperatures could cause cracks in the ice condenser thermal barrier.**
- C. **Slab freeze and thaw cycles could result in floor buckling that could interfere with lower door operation.**
- D. **Slab freeze and thaw cycles could cause gaps between the floor and the intermediate deck doors resulting in a bypass flow path.**

---

**Distracter Analysis:**

- A. **Incorrect:** none of the compressors trip on high glycol temperature  
**Plausible:** if the candidate does not know the basis for the temperature limits - low glycol temperature can cause a compressor trip.
- B. **Incorrect:** not the problem – glycol floor cooling does not effect the thermal barrier.  
**Plausible:** low temperatures can cause cracks in some systems due to thermal stress
- C. **Correct Answer:** this has been a problem as described in PIP 2-M97-2686 (July 1997)
- D. **Incorrect:** the intermediate deck doors are not physically located near the floor slab.  
**Plausible:** if the candidate does not know the mechanism for floor buckling.

Level: RO&amp;SRO

KA: SYS 025A2.02(2.7/2.5)

Lesson Plan Objective: CNT-NF SEQ 15

Source: Bank; Ques\_681, McGuire Audit 2000

Level of knowledge: memory

References:

1. OP-MC-CNT-NF pages 21, 37, 41

**Bank Question: 684****Answer: A**

1 Pt(s)

Unit 2 was operating at 100% power when a loss of power to 2B NCP occurred and was compounded by an ATWS event. Given the following events and conditions:

- Control rods were locally tripped five minutes after the NCP lost power.
- Emergency boration increased NC boron concentration by 15 ppm.
- Tave stabilized at 557°F following the trip.
- The 2B NCP has been restarted.
- Containment radiation levels have doubled as indicated by:
  - 2EMF-2 (RX BLDG INCORE INST RM)
  - 2EMF-3 (RX BLDG REFUEL BRDG)
  - 2EMF-5 (NC FLT.2A)

Which of the following correctly describes the primary cause of the increase in containment radiation levels following the event?

- A. NCS activity has increased due to mechanical shock.
- B. NCS activity has increased due to the boron concentration change.
- C. NCS activity has increased due to thermal shock.
- D. NCS activity has increased due to a loss of letdown flow.

---

**Distracter Analysis:**

- A. **Correct:** Mechanical shock (reactor trip and NCP cycling) causes a crud burst.
- B. **Incorrect:** Activity increases are primarily due to mechanical shock. **Plausible:** based on the amount of boric acid, the NCS will not change enough to see any difference in activity. A larger pH change can cause a crud burst (chemical shock) – but this emergency boration will not cause a significant pH change.
- C. **Incorrect:** Activity increases are primarily due to mechanical shock – the temperature change is not enough to cause thermal shock because the reactor remains at power for 5 minutes. **Plausible:** a larger temperature change can cause a thermal shock, which will cause a crud burst.
- D. **Incorrect:** Activity increases are primarily due to mechanical shock. **Plausible:** loss of letdown will stop the filtration of crud and fission products and is the action required to return the activity to normal

following a crud burst – but will not result in a rapid change of activity because it is not the predominant causal mechanism.

Level: RO&SRO

KA: WE 16EK3.1 (2.9/3.1)

Lesson Plan Objective: CH-PC SEQ 4

Source: Bank; McGuire Audit 2000

Level of knowledge: comprehension

References:

1. OP-MC-CH-PC pages 23-25
2. OP-MC-WE-EMF page 119

**Bank Question: 697.2****Answer: A**

1 Pt(s)

Unit 2 is operating at 100% power on 2/19. 2NI-59 (cold leg accumulator check valve) begins to leak at 0200. Given the following accumulator indications:

<u>Time</u>	<u>0200</u>	<u>0300</u>	<u>0400</u>	<u>0500</u>
Level (%)	11%	21%	31%	41%
Pressure (psig)	586	613	640	667
Boron (ppm)	2485	2470	2455	2440

When does the accumulator first exceed a limiting condition for operation?

**REFERENCES PROVIDED:***Tech Spec 3.5.1**Unit 1 Data Book curve 7.4**Unit 1 Cycle 15 COLR – pages 23*

- A. 0200
- B. 0300
- C. 0400
- D. 0500

**Distracter Analysis:** Tech Spec values for CLA parameters are:

Volume  $\geq 6870$  (12.3%) but  $\leq 7342$  gal (38.7%) – exceeded at 0200 (low) and again at 0500 (high)

Pressure  $\geq 585$  but  $\leq 639$  psig – exceeded at 0400

Boron concentration  $\geq 2475$  ppm but  $\leq 2875$  ppm – exceeded at 0300

- A. **Correct Answer:** The accumulator first exceeds the LCO at 0200 for the low level limit (<12.3%)
- B. **Incorrect:** The accumulator first exceeds the LCO at 0200 for the low level limit (<12.3%)  
**Plausible:** if the candidate misreads the cold leg accumulator level curve – first exceeds Boron concentration (<2475 ppm) at 0300
- C. **Incorrect:** The accumulator first exceeds the LCO at 0200 for the low level limit (<12.3%)  
**Plausible:** if the candidate misreads the cold leg accumulator level curve – first exceeds high-pressure limit (>639 psig) at 0400
- D. **Incorrect:** The accumulator first exceeds the LCO at 0200 for the low level limit (<12.3%)

**Plausible:** if the candidate misreads the cold leg accumulator level curve – first exceeds high-level limit (>38.7%) at 0400.

Level: RO Only

KA: SYS 016G2.1.25(2.8/3.1)

Lesson Plan Objective: ECC-CLA SEQ 7

Source: Mod; Ques\_697, Catawba NRC 2000

Level of knowledge: comprehension

References:

1. OP-MC-ECC-CLA page 23
2. Tech Spec 3.5.1 - PROVIDED
3. Unit 1 Data Book Curve 7.4 - PROVIDED
4. Unit 1 Cycle 15 COLR - PROVIDED

**Bank Question: 703.1****Answer: C**

1 Pt(s)

While performing a valve lineup in the boric acid mixing room, an air line failure caused a severe airborne beta contamination problem. A worker received both internal and external contamination that was detected upon exiting the RCA.

Which one of the exposures would exceed the 10CFR20 limit for the worker's annual shallow dose equivalent (SDE) exposure?

- A. 55 Rem external dose to the lens of the eye.
- B. 17 Rem internal dose equivalent to the lens of the eye.
- C. 55 Rem external dose to the leg below the knee.
- D. 17 Rem internal dose to the right forearm.

---

**Distracter Analysis:**

- A. **Incorrect:** skin dose equivalent  
**Plausible:** 50 Rem is correct limit for SDE – may confuse with LDE eye dose
- B. **Incorrect:** SDE is an external skin or extremity dose not an internal dose  
**Plausible:** this is the correct LDE limit (lens of the eye).
- C. **Correct:** 50 Rem SDE limit to the extremities (below forearm and below knee) or skin.
- D. **Incorrect:** SDE is an external dose not an internal dose  
**Plausible:** the right forearm is the correct part of the anatomy for an SDE - based on confusion of external/internal

Level: RO&amp;SRO

KA: G2.3.4(2.5/3.1)

Lesson Plan Objective: RAD-RP SEQ 19

Source: Mod; Ques\_703, McGuire NRC 2000

Level of knowledge: memory

References:

1. GET Training Manual pages 31-32

**Bank Question: 715.1****Answer: A**

1 Pt(s) Unit 2 was operating at 45% power. Given the following events and conditions:

- 2A 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 **DECREASE**?

- A. Steam generator 2A level.
- B. Steam generator 2B hot leg temperature.
- C. Steam generator 2A pressure.
- D. Steam generator 2B feed flow.

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

- A. **Correct:** A S/G level will decrease as pressure increases due to decreased steam flow
- B. **Incorrect:** That will initially increase as heat removal increases  
**Plausible:** candidate may decide that B loop will follow the overall decrease in temperature of the A loop – or may think that the reactor trips
- C. **Incorrect:** pressure will increase as steam flow decreases  
**Plausible:** candidate may reverse the effects – or may think that the reactor trips.
- D. **Incorrect:** Feed flow will increase as power drawn from this S/G increases,  
**Plausible:** candidate may reverse the effects – or may think that the reactor trips.

Level: RO Only

KA: SYS 003 K3.02 (3.5/3.8)

Lesson Plan Objective: TA-AT SEQ 4/5/6

Source: Mod; Ques\_715, Catawba NRC 2001

Level of knowledge: analysis

References:

1. OP-MC- TA-AT page 121
2. OP-MC-THF-FF pages 30-31

**Bank Question: 748.1****Answer: A**

1 Pt(s)

The 1B emergency diesel generator has been manually started and has been idling for 15 minutes. The operator is preparing to parallel the diesel to the grid.

In accordance with OP/1/A/6350/002 (*Diesel Generator*) Enclosure 4.2 (*1B D/G Startup*) when manually loading the emergency diesel generator, the operator should raise load to 1000 KW quickly after closing the D/G output breaker while maintaining a lagging power factor.

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

- A. Prevent motoring the D/G.
- B. Prevent diesel overspeed if the breaker opens on reverse power.
- C. Prevent turbocharger fire due to excess lube oil collection.
- D. Prevent D/G breaker trip on generator differential.

---

**Distracter Analysis:**

- A. **Correct:** leading pf and low load could lead to reverse power condition motorizing the machine.
- B. **Incorrect:** D/G breaker does not have reverse power protection.  
**Plausible:** the D/G will pick up speed if suddenly unloaded – overspeed is a valid concern for heavily loaded D/G's.
- C. **Incorrect:** This is the reason for slow D/G loading.  
**Plausible:** This is a valid concern when a D/G has run at idle for a long time.
- D. **Incorrect:** An unbalance does not exist, Gen Diff should not occur.  
**Plausible:** This is a valid D/G trip

Level: RO&amp;SRO

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

Lesson Plan Objective: DG-DG SEQ 8

Source: Mod; Ques\_748, Catawba NRC 2001

Level of knowledge: memory

References:

1. OP/1/A/6350/002 Encl 4.2 page 5

**Bank Question: 767.1****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 or Safety Injection*), and E-1 (*Loss of Reactor or Secondary Coolant*) through step 11.
- Bus 1ETA is de-energized.
- The 1B NI pump has failed.
- The 1B Hydrogen recombiner is out of service.
- Containment hydrogen concentration is 7%.
- The TSC has recommended purging containment to reduce hydrogen concentration to 3.5% before energizing the igniters.

Which one of the following statements correctly describes the method for performing this evolution to control 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 through the containment air release system where it is filtered prior to release to the unit vent stack.**
- C. **Containment air is exhausted through the incore instrument ventilation system where it is filtered prior to release to the unit vent stack.**
- D. **Containment air is exhausted to the annulus where it is filtered prior to release to 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 VE 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: SYS 028K6.01(2.6/3.1)

Lesson Plan Objective: VE SEQ 11

Source: Mod; Ques\_767, Catawba NRC 2001

Level of knowledge: comprehension

References:

1. OP-MC-CNT-VE pages 11, 19, 31

**Bank Question: 771.1****Answer: D**

1 Pt(s)

Unit 1 is operating at full power and Unit 2 is refueling. Unit 1 is releasing a minimally decayed waste gas decay tank when a significant packing leak starts on isolation valve 1WG-160, (*WG Decay Tank Outlet to Unit Vent Control*).

Which one of the following statements correctly describes the automatic actions required to assure that the leak is contained and filtered?

- A. **1EMF-50 (*WASTE GAS DISCH HI RAD*) automatically closes 1WG-160, and 1EMF-41 (*AUX BLDG VENT HI RAD*) automatically stops the auxiliary building ventilation unfiltered exhaust fans.**
- B. **1EMF-41 automatically stops the auxiliary building ventilation unfiltered exhaust fans, and 1EMF-36 (*UNIT VENT HI RAD*) automatically closes 1WG-160.**
- C. **1EMF-36 automatically closes 1WG-160, and 1EMF-35 (*UNIT VENT PART HI RAD*) automatically aligns the auxiliary building ventilation filter trains.**
- D. **1EMF-35 automatically stops the auxiliary building ventilation unfiltered exhaust fans, and 1EMF-41 automatically aligns the auxiliary building ventilation filter trains.**

**Distracter Analysis:**

- A. **Incorrect:** EMF-50 will not get to Trip 2 because it is set for the activity being released, and EMF-41 does not automatically stop these fans.  
**Plausible:** These are valid automatic actions for EMF monitors.
- B. **Incorrect:** EMF-41 does not automatically stop these fans.  
**Plausible:** if the candidates do not recognize that this is not an automatic action for EMF-41 but for 35/37.
- C. **Incorrect:** EMF-35 does not realign ventilation filters.  
**Plausible:** partially correct – EMF 36-will close 1WG-160.
- D. **Correct answer:** EMF-35 will secure VA fans, and EMF-41 will realign filter trains to contain and filter the release in the Aux Bldg.

Level: RO&amp;SRO

KA: SYS 071K1.06(3.1\*/3.1)

Lesson Plan Objective: WE-EMF SEQ 2,3

Source: Mod; Ques 771, Catawba NRC 2001

Level of knowledge: comprehension

References:

1. OP-MC-PSS-VA pages 29, 45
2. OP-MC-WE-EMF pages 21 - 27

**Bank Question: 776****Answer: C**

1 Pt(s)

Unit 1 was operating at 100% when a LOCA with loss of offsite power occurs. One diesel generator fails to start. The operators are entering E-1 (*Loss of Reactor or Secondary Coolant*).

Given the following critical safety function status indications:

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

Which one of the following describes the highest priority problem, and the appropriate operator action?

- A. **Core cooling; Transition to FR-C.2, (*Response to Degraded Core Cooling*).**
- B. **Core cooling; Transition to FR-C.1, (*Response to Inadequate Core Cooling*).**
- C. **Heat Sink; Transition to FR-H.1, (*Response to Loss of Secondary Heat Sink*).**
- D. **Containment; Transition to FR-Z.1, (*Response to High Containment Pressure*).**

**Distracter Analysis:**

- A. **Incorrect:** heat sink is the highest priority RED  
**Plausible:** if the candidate picks the first item requiring transition from E-1.
- B. **Incorrect:** heat sink is the highest priority RED  
**Plausible:** if the candidate picks the first RED condition and does not recognize that the wrong procedure is listed.
- C. **Correct:**
- D. **Incorrect:** heat sink is the highest priority RED  
**Plausible:** if the candidate picks the first RED condition.

Level: RO Only 10CFR55.41(b)10

KA: WE 05 EA 2.2 (3.7/4.3)

Lesson Plan Objective: EP-F0 SEQ 2, 3

Source: Bank; Ques\_776, Catawba NRC 2001

Level of knowledge: memory

References:

1. OP-MC-EP-F0 pages 13, 15
2. OMP 4-3 pages 15-16

**Bank Question: 857****Answer: D**

1 Pt(s)

Unit 1 is operating at 65% power with pressurizer level on program, and normal charging and letdown flow through a 75 gpm orifice. Given the following events and conditions:

- 1NV-245B (*CHARGING LINE CONT OUTSIDE ISOL*) spuriously closes
- Flashing in the letdown line reduces letdown flow to 5 gpm
- The operators take no actions

How long before the pressurizer high level alarm actuates?

**REFERENCES PROVIDED: Unit 1 Databook Curve 7.38**

- A. Less than 2 hours
- B. 2 to 2.5 hours
- C. Greater than 2.5 hours to 3.5 hours
- D. Greater than 3.5 hours

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**Distracter Analysis:**

Charging flow is reduced to the minimum value – goes to 32 gpm to the NCP seals. 12 gpm seal flow goes to the VCT.

PZR level starts at 44.5% ( $.65 * (55\% - 25\%) + 25\% = 44.5\%$ ).

PZR level increases to the high level alarm at 70%.

The reduction in charging flow into the NCS causes charging flow to reduce to minimum (32 gpm) as the PZR fills up. NCP Seal flow continues (12 gpm). Letdown flow drops to 5 gpm because of high regen HX outlet temperature (flashing at the orifices). Net charging flow drops to +15 gpm ( $32 - 12 - 5$ )

Per tank curve: 70%=9800 gal, 44.5%=6500 gal, 17%=2800 gal.

$3300\text{gal} (9800 - 6500) / (15\text{gpm}) = 220 \text{ minutes} = 3.67 \text{ hours}$

- A. **Incorrect:** There are more than 3.5 hours.  
**Plausible:** If candidate neglects to subtract seal flow and letdown flow  $3300 \text{ gal} / 32 \text{ gpm} = 103 \text{ minutes} = 1.7 \text{ hours}$  – or misreads tank curves / miscalculates pressurizer level
- B. **Incorrect:** There are more than 3.5 hours.  
**Plausible:** If the candidate includes the loss of letdown but neglects seal return flow:  $3300 \text{ gal} / (32 - 5) \text{ gpm} = 122 \text{ min} = 2.03 \text{ hours}$ . – or misreads tank curves / miscalculates pressurizer level
- C. **Incorrect:** There are more than 3.5 hours.

**Plausible:** Assuming loss of letdown, if the candidate does not include seal return flow:  $3300\text{gal} / (32 - 12) \text{ gpm} = 165 \text{ min} = 2.75 \text{ hours}$  – or misreads tank curves / miscalculates pressurizer level

**D. Correct answer:** 3.67 hours

Level: RO&SRO

KA: APE 022AA2.04(2.9/3.8)

Lesson Plan Objective: PS-NV SEQ 6

Source: New

Level of knowledge: analysis

References:

1. OP-MC-PS-NV pages 17, 39
2. OP-MC-PS-ILE page 35
3. Unit 1 Databook Curve 7.38 - PROVIDED

**Bank Question: 858****Answer: B**

1 Pt(s)

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

- The following fans were in operation:
  - S/G booster fans
  - Return air fans
  - Lower containment fans
  - Incore instrument area fans
- A main steam line break occurred inside containment
- All systems functioned as designed

Which one of the following containment cooling systems will stop operating?

- A. **S/G Booster Fans.**
- B. **Return Air Fans.**
- C. **Lower Containment Fans.**
- D. **Incore Instrument Area Fans.**

---

**Distracter Analysis:**

- A. **Incorrect:** These fans will continue to operate since no LOOP.  
**Plausible:** These fans lose power during a LOOP.
- B. **Correct**<sub>{BCH1}</sub>:
- C. **Incorrect:** These fans automatically restart on S<sub>s</sub>.  
**Plausible:** If the candidate confuses with the upper fans, which lose power.
- D. **Incorrect:** These fans automatically restart on S<sub>s</sub>.  
**Plausible:** these fans are not required by TS to be operable.

Level: RO&amp;SRO

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

Lesson Plan Objective: CNT-VUL SEQ 5

Source: New

Level of knowledge: memory

References:

1. OP-MC-CNT-VUL, page 39, 41

**Bank Question: 859.1****Answer: A**

1 Pt(s)

Unit 2 is in mode 6 with refueling activities in progress. Given the following events and conditions:

- A containment purge is in progress
- A fuel element was rammed into the side of the reactor vessel
- 2EMF-3 (*CONTAINMENT REFUELING BRIDGE*) and 2EMF-38 (*CONTAINMENT PARTICULATE*) are in trip 2 condition

Which one of the following actions should occur, assuming that operators follow the required procedure steps?

- A. **The containment evacuation alarm sounds automatically.  
The containment purge stops automatically.**
- B. **The containment evacuation alarm is actuated by the control room.  
The containment purge stops automatically.**
- C. **The containment evacuation alarm sounds automatically.  
The containment purge is stopped manually.**
- D. **The containment evacuation alarm is actuated by the control room.  
The containment purged is stopped manually.**

---

**Distracter Analysis:**

- A. **Correct:** Containment purge will stop and containment alarm will actuate when the EMF goes into trip 2.
- B. **Incorrect:** a plant page is made by the control room.  
**Plausible:** If the candidate confuses the plant page with the containment evacuation.
- C. **Incorrect:** containment purge stops automatically  
**Plausible:** candidate knows the alarm, but fails to realize purge will stop automatically.
- D. **Incorrect:** both occur automatically  
**Plausible:** candidate does not know the auto actions for the EMFs

Level: RO&amp;SRO

KA: SYS 103 A2.04 (3.5/3.6)

Lesson Plan Objective: WE-EMF SEQ 3

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-WE-EMF pages 43, 105
2. OP-MC-CNT-VP page 21
3. AP/2/A/5500/25 page 2-3
4. GET RAD Worker Training Manual page 124

**Bank Question: 860****Answer: D**

1 Pt(s)

Unit 1 has experienced four CRUD bursts this month. Given the following events and conditions:

- 1A reactor coolant filter d/p was indicating 40 psid.
- 1EMF-18 (*REACTOR COOLANT FILTER 1A*) reads 5 times its normal value.
- 1A reactor coolant filter was taken out of service.
- 1B reactor coolant filter was placed in service.
- 1B reactor coolant filter d/p is 10 psid.
- 1A mixed bed demineralizer is in service.
- 1EMF-48 (*REACTOR COOLANT*) reads its normal value.
- Local radiation readings near reactor coolant filter 1B are 3 times normal.

If the detector for 1EMF-19 (*REACTOR COOLANT FILTER 1B*) fails, what actions (if any) are the operators required to take in response to these conditions?

- A. **Switch mixed bed demineralizers.**
- B. **Shift back to 1A reactor coolant filter until 1EMF-19 is returned to service.**
- C. **Place both mixed bed demineralizers in service until 1EMF-19 is returned to service.**
- D. **No action is required.**

---

**Distracter Analysis:**

- A. **Incorrect:** No action is required.  
**Plausible:** If the candidate believes that the filters and demineralizers are train related.
- B. **Incorrect:** No action is required.  
**Plausible:** If the candidate thought that procedures called for using a filter with an operable RAD monitor.
- C. **Incorrect:** No action is required. EMF-48 indicates no crud burst  
**Plausible:** This action would be required if another crud burst were to occur.
- D. **Correct answer**

Level: RO&amp;SRO

KA: SYS 072A2.02(2.8/2.9)

Lesson Plan Objective: None

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-WE-EMF pages 43, 45
2. OP/1/A/6100/010S window D4

**Bank Question: 861****Answer: D**

1 Pt(s)

Unit 2 is responding to a large LOCA with 10 % failed fuel. Given the following events and conditions:

- 2ETA is faulted.
- 2NI-184B (*1B ND PUMP SUCTION FROM CONT SUMP ISOL*) would not open during FWST swapover
- 2NI-184B breaker has tripped and will not reset
- 1EMF-10 (*AUX BLDG COR / EL 750*) and 2EMF-9 (*AUX BLDG COR / EL 767*) read > 10E4 mR/hr.
- The TSC is not yet manned.
- RP projects that expected dose rates in the area of the 2NI-184B will be very high, possibly exceeding 150 Rem/hr.
- The OSM has determined that manual alignment of 2NI-184B is required for lifesaving protection of the general public inside the 10 mile EPZ (public health and safety).

Which of the following exposure limits would apply to a worker who volunteered to manually open 2NI-184B?

- A. Do not exceed 5 Rem TEDE.
- B. Do not exceed 10 Rem TEDE.
- C. Do not exceed 25 Rem TEDE.
- D. The worker(s) may exceed 25 Rem TEDE.

---

**Distracter Analysis:**

- A. **Incorrect:** The operator is allowed to exceed 25 Rem TEDE.  
**Plausible:** This is the maximum allowable TEDE for non-emergency conditions.
- B. **Incorrect:** The operator is allowed to exceed 25 Rem TEDE.  
**Plausible:** This is the maximum allowable annual TEDE for equipment protection during accident conditions.
- C. **Incorrect:** The operator is allowed to exceed 25 Rem TEDE.  
**Plausible:** This is the maximum allowable annual TEDE for life saving or public safety on a non-volunteer basis.
- D. **Correct:** greater than 25 Rem is allowed on a volunteer basis for protection of the public health and safety.

Level: RO&SRO

KA: SYS 006G2.3.4(2.5/3.1)

Lesson Plan Objective: EP-EMP SEQ 5; TA-AM SEQ 30

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-EMP page 31
2. OP-MC-TA-AM page 67
4. GET RAD Worker Training Manual page 32

**Bank Question: 862****Answer: B**

1 Pt(s) Unit 1 is responding to a LOCA from a trip at full power. Given the following events and conditions:

- A safety injection occurred at 0200.
- Bus 1ETB is faulted.
- The 1A NS pump started automatically
- The 1A NS pump was stopped by CPCS signal at 0235.
- The S<sub>s</sub> signal and sequencer have been reset
- The train A S<sub>p</sub> signal has not been reset
- 1NS-29A (*A NS PUMP DISCH CONT OUTSIDE ISOL*) and 32A (*A NS PUMP DISCH OUTSIDE ISOL*) failed to operate (mechanically stuck)
- Containment pressure reached 5 psig at 0305
- FWST level reaches 33 in. at 0306.

Which one of the following operator actions is required to address the containment pressure problem?

**REFERENCES PROVIDED: ES-1.3**

- A. **Immediately open 1NS-43A (*CONT OUTSIDE ISOL*) to supply spray from the ND pumps.**
- B. **After switchover to cold leg recirculation, close 1NI-173A (*TR A ND TO A & B CL*) and open 1NS-43A to supply spray from the ND pumps.**
- C. **50 minutes after switchover to cold leg recirculation, open 1NS-43A to supply spray from the ND pumps.**
- D. **50 minutes after switchover to cold leg recirculation, close 1NI-173A and open 1NS-43A to supply spray from the ND pumps.**

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**Distracter Analysis:**

- A. **Incorrect:** Must close 1NI-173A after switchover.  
**Plausible:** If the candidate does not recognize the effect on the ND system.
- B. **Correct:**
- C. **Incorrect:** Must close 1NI-173A w/o waiting 50 minutes.

**Plausible:** If the candidate does not recognize the effect on the ND system, and procedures call for waiting 50 minutes after the trip before Aux spray.

**D. Incorrect:** Don't wait 50 minutes.

**Plausible:** Procedures call for waiting 50 minutes after the trip before Aux spray.

Level: RO&SRO

KA: SYS 026K3.02(4.2\*/4.3)

Lesson Plan Objective: ECC-NS SEQ 8, EP-E1 SEQ 6

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-ECC-NS pages 21, 37
2. OP-MC-PS-ND page 71
3. OP-MC-EP-E1 page 257
4. EP/1/A/5000/ES-1.3 pages 10-11

**Bank Question: 865.1****Answer: D**

1 Pt(s)

Unit 2 is operating at 55% power when the 2C NCP trips on breaker overload. Given the following events and conditions:

- Loop C low flow trip annunciator alarms.
- Both main feed pump turbines are tripped.
- Reactor power is 50%, decreasing.
- $T_{ave}$  is 575°F, increasing.
- The main turbine throttle valves are open.
- The main turbine governor valves are open.
- Rod control bank D is automatically inserting.

Which immediate action must be implemented under these conditions?

- A. **Start emergency boration of the NCS.**
- B. **Trip the main steam isolation valves.**
- C. **Trip the rod control motor generator breakers.**
- D. **Trip the main turbine.**

**Distracter Analysis:** Maintenance of adequate heat sink is critical to the ATWS with loss of feedwater. This overrides the adverse consequences of a turbine trip for other cases.

- A. **Incorrect:** Reactor shutdown is not time critical.  
**Plausible:** This is an action of FR-S.1 with power reduction the goal.
- B. **Incorrect:** The MSIV's do not need to be closed unless the turbine will not manually trip. Closing the MSIVs precludes steam dump operation, making the event worse.  
**Plausible:** This is an immediate RNO action of FR-S.1.
- C. **Incorrect:** Reactor shutdown is not time critical.  
**Plausible:** This is an action of FR-S.1.
- D. **Correct:**

Level: RO Only

KA: EPE 029EK3.06(4.2/4.3)

Lesson Plan Objective: EP-FRS SEQ 4

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-EP-FRS pages 23, 25
2. EP/2/A/5000/FR-S.1 page 2

**Bank Question: 866****Answer: B**

1 Pt(s)

Unit 1 is conducting a reactor startup in accordance with plant procedures. The operator is pulling the control rods.

Which one of the following indications should the operator **primarily** depend on for determining when the reactor achieves criticality?

- A. When control rods exceed the ECP position.
- B. When the reactor nuclear instrumentation indicates a stable, positive startup rate and increasing flux levels with no control rod motion.
- C. When  $T_{ave}$  is increasing steadily with no control rod motion.
- D. When the  $1/m$  plot (Co/C) is approaching zero.

**Distracter Analysis:**

- A. **Incorrect:** Not the primary indication - the ECP is only a benchmark for the operator to use for when the reactor is predicted to go critical, however, several possible errors could make the ECP significantly inaccurate  
**Plausible:** Candidate locks on to the fact that the ECP is the estimated critical position and is used during a reactor startup.
- B. **Correct:** actual reactor response is the only true method of determining the reactor is critical
- C. **Incorrect:**  $T_{ave}$  does not increase when the reactor reaches criticality  
**Plausible:** Indication the reactor is at the POAH
- D. **Incorrect:** Not the primary indication  
**Plausible:** Like the ECP, the  $1/m$  is a tool to predict criticality, but not 100% accurate.  $1/m$  is calculated regularly during startup to predict criticality.

Level: RO&amp;SRO

KA: SYS 001 A3.08 (3.9/4.0)

Lesson Plan Objective: RT-RB 13, ADM-RM SEQ 8

Source: New

Level of knowledge: memory

References:

1. OP-MC-RT-RB page 24

**Bank Question: 867****Answer: A**

1 Pt(s)

Unit 1 is in the process of starting the first NCP in accordance with OP/1/A/6250/02A (*Reactor Coolant Pump Operation*) during a plant startup. Given the following conditions and events:

- The operator starts the 1A2 lift oil pump.
- Lift oil pressure reaches 650 psig
- 5 minutes later, as the crew is ready to start the 1A NCP, the operator notices 1A2 lift oil pump was no longer running.

Which one of the following statements correctly explains the reason why the pump is not running?

- A. **The lift oil pump tripped on overload.**
- B. **The one minute timer for the lift oil pump timed out and stopped the pump.**
- C. **The lift oil pump stopped as soon as lift oil pressure reached 600 psi.**
- D. **The lift oil pump stopped 1 minute after lift oil pressure reached 600 psi.**

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**Distracter Analysis:**

- A. **Correct:** the pump will trip on overload
- B. **Incorrect:** this condition does not cause the lift oil pump to trip  
**Plausible:** the one-minute timer opens the lift oil pump breaker 1 minute **after** the NCP breaker is closed.
- C. **Incorrect:** this condition does not cause the lift oil pump to trip  
**Plausible:** lift oil pressure must be 600 psi to start the NCP; the candidate may assume the lift oil pump stops at the setpoint.
- D. **Incorrect:** this condition does not cause the lift oil pump to trip  
**Plausible:** candidate could assume that once lift oil pressure has been sufficient for 1 minute, the pump turns off.

Level: RO&amp;SRO

KA: SYS 003 K6.14 (2.6/2.9)

Lesson Plan Objective: NCP SEQ 6

Source: New

Level of knowledge: comprehension

References:

1. OP-MN-PS-NCP page 19
2. OP-MN-PS-NCP figure 7.12 page 79

**Bank Question: 869****Answer: A**

1 Pt(s)

Unit 1 is operating at 85% power following a transient. Given the following events and conditions:

- A control bank "D" rod is found to be misaligned.
- The misaligned rod is at 200 steps
- The remaining control bank "D" rods are at 220 steps.
- Troubleshooting by Reactor Engineering determines that the control rod will move in the inward direction but will not move outward.
- The misaligned rod is found to have an electrical problem and is declared inoperable.

Which one of the following statements correctly describes the effect (if any) that the inoperable rod will have on shutdown margin (SDM) prior to the transient?

- A. **SDM does not change because the stuck rod is trippable.**
- B. **SDM does not change because the rod is not trippable.**
- C. **SDM decreases by the worth of the immovable rod.**
- D. **SDM increases by the worth of the immovable rod.**

**Distracter Analysis:**

- A. **Correct:** the problem is electrical and rods are above the RIL, therefore SDM is unaffected.
- B. **Incorrect:** if the rod were not trippable, SDM would decrease  
**Plausible:** backwards logic from the correct answer.
- C. **Incorrect:** SDM has not changed  
**Plausible:** partially correct - if candidate believes the rod is not trippable, SDM decreases for a stuck rod.
- D. **Incorrect:** SDM has not changed  
**Plausible:** if candidate assumes that the rod is not trippable and that SDM increases (vice decreases) when determining SDM for stuck rods

Level: RO Only

KA: APE 005 AK1.05 (3.3/4.1)

Lesson Plan Objective: AP14 SEQ 3

Source: New

Level of knowledge: comprehension

References:

1. OP-MN-AP-14 background ENC. 2 step 5 page 32
2. AP-14 page 19
2. OP-MN-RT-RB page 27

**Bank Question: 870****Answer: A**

1 Pt(s) Unit 1 was operating at 100% power. Given the following trends on the 1A NCP:

<u>Time</u>	<u>0200</u>	<u>0205</u>	<u>0210</u>	<u>0215</u>
Motor bearing temp (°F)	180	184	186	195
Lower pump bearing temp (°F)	221	225	228	231
Seal outlet temp (°F)	205	227	235	251
Motor winding temp (°F)	312	314	316	323

What is the earliest time at which the 1A NCP must be secured?

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

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**Distracter Analysis:**

- A. **Correct:** NCP must be stopped if motor winding temperature reaches 311 degrees at 0200
- B. **Incorrect:** NCP must be stopped at 0200  
**Plausible:** reaches the temperature for securing NCP on lower bearing
- C. **Incorrect:** NCP must be stopped at 0200  
**Plausible:** reach the limit for securing NCP on seal outlet temp at 0210
- D. **Incorrect:** NCP must be stopped at 0200  
**Plausible:** reach the temperature for stopping NCP on motor bearing at 0215

Level: RO&SRO

KA: APE 015 AA2.09 (3.4/3.5)

Lesson Plan Objective: NCP SEQ 15

Source: New

Level of knowledge: memory

References:

1. OP-MC-PS-NCP page 37

**Bank Question: 871.1****Answer: B**

1 Pt(s)

The crew has entered ES-0.2, (*Natural Circulation Cooldown*). NCS temperature is 557°F and pressure is 2235 psig. Both emergency buses are energized from their respective emergency diesel generators.

Which of the following conditions would require the crew to immediately exit ES-0.2?

- A. Loss of 1ETA occurs.
- B. NCS pressure drops to 1800 psig.
- C. Reactor vessel UR level indicates less than 100%.
- D. All conditions except seal cooling are established for starting an NCP.

---

**Distracter Analysis:**

- A. **Incorrect:** loss of a single bus will not require exit  
**Plausible:** candidate believes entry into ECA-0.0 is required.
- B. **Correct:** SI will actuate, since ES-0.2 is not set up for accident conditions, the crew must return to E-0. (foldout page criteria)
- C. **Incorrect:** if it is determined later that the cooldown must continue with a void in the reactor vessel, then transition to ES-0.3 is made, however, if there is no rush, then the depressurization is stopped and the void collapsed in ES-0.2  
**Plausible:** this could result in a transition to ES-0.3
- D. **Incorrect:** no pump would be started until management makes a status evaluation. The desire is to start the NCP with normal parameters. Since this is not an accident condition, there is no need to run NCPs unless normal conditions are met  
**Plausible:** in some procedures, such as C.1, NCPs are run without all normal conditions established.

Level: RO Only 10CFR55.41(b)10

KA: W/E 09 EA2.1 (3.1/3.8)

Lesson Plan Objective: E0 SEQ 3, 4, 5, 8

Source: New

Level of knowledge: memory

References:

1. OP-MN-EP-ES-0.2, page 12, 25 (foldout)

**Bank Question: 873****Answer: C**

1 Pt(s)

Unit 1 is in mode 3 responding to a loss of off-site power.

Given the following parameters at the indicated times:

<u>Parameter</u>	<u>0200</u>	<u>0300</u>	<u>0400</u>	<u>0500</u>
• NCS pressure (psig)	1956	1905	1855	1805
• T <sub>ave</sub> (°F)	400	390	375	350
• Pressurizer level (%)	27	23	26	25
• Containment pressure (psig)	0.5	0.6	0.8	1.0

Which one of the following is the **earliest** action required to ensure a controlled transition to mode 4?

- A. **Block SI actuation at 0200.**
- B. **Terminate SI flow at 0300.**
- C. **Block SI actuation at 0400.**
- D. **Terminate SI flow at 0500.**

**Distracter Analysis:**

- A. **Incorrect:** Must be <1955 to block SI.  
**Plausible:** if the candidate thinks that SI is blockable because this is the numerical P-11 setpoint.
- B. **Incorrect:** SI has not actuated.  
**Plausible:** - if the candidate thinks that SI actuated at 1945 psig.
- C. **Correct answer:** this is the first time and action possible to prevent uncontrolled cooldown due to SI actuation.
- D. **Incorrect:** SI blocked at 0400.  
**Plausible:** - if the candidate does not understand P-11 and recognizes that SI actuates at 1845 psig.

Level: RO&amp;SRO

KA: SYS 002A2.02(4.2/4.4)

Lesson Plan Objective: ECC-ISE SEQ 8/9/10

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-ECC-ISE pages 21, 23

**Bank Question: 874****Answer: C**

1 Pt(s)

Unit 1 is at full power with all systems selected to automatic. Given the following event:

- Bus 1EVKA was deenergized.

Why would the crew have to switch the suction source for the NV pumps to the FWST?

- A. VCT level indication is lost.
- B. Control power to the boric acid pumps is lost.
- C. Auto makeup capability to the VCT is lost.
- D. VCT makeup cannot keep up with charging flow.

---

**Distracter Analysis:**

- A. **Incorrect:** VCT level transmitters remain powered.  
**Plausible:** if the candidate thought level indication is lost, then it would seem prudent to switch to the FWST.
- B. **Incorrect:** BA pumps can be manually operated.  
**Plausible:** candidate may know blended makeup is lost but not sure why. Loss of boric acid pumps would seem like a likely reason to switch to the FWST.
- C. **Correct:** the modulating signal for NV-252 and 267 is lost. Auto blended makeup to the VCT is lost.
- D. **Incorrect:** makeup capacity is matched to charging capacity.  
**Plausible:** if the candidate is aware of the loss of makeup control, this would be the reason for swapping to the FWST.

Level: RO&SRO

KA: APE 057AK1.04(3.5/3.6)

Lesson Plan Objective: AP-15 SEQ 2

Source: New

Level of knowledge: comprehension

References:

1. AP-15 Background Document page 21
2. AP-15 page 8, 130

**Bank Question: 875****Answer: B**

1 Pt(s)

Which one of the following indications would be consistent with valve 2NV-7B(*LETDOWN CONT OUTSIDE ISOL*) closing while the plant was at power?

- A. **Letdown system flashing.**
- B. **PRT level increasing.**
- C. **Valve 2NV-124 (*LETDOWN PRESSURE CONTROL*) full open.**
- D. **Regenerative HX high temperature alarm on 2AD-7 (*REGEN HX LETDN HI TEMP*).**

**Distracter Analysis:**

- A. **Incorrect:** Letdown temperature is decreasing.  
**Plausible:** if the candidate confuses the loss of letdown with loss of charging.
- B. **Correct:** closure of the valve will quickly pressurize the letdown system to the lift setpoint of the letdown line relief valve, as a result PRT level will increase.
- C. **Incorrect:** NV-124 will close to try to increase backpressure.  
**Plausible:** candidate reverses the action of NV124 as it attempts to maintain system pressure.
- D. **Incorrect:** Letdown temperature is decreasing.  
**Plausible:** if the candidate believes letdown temperature will increase as a result of the valve closing.

Level: RO Only

KA: SYS 007A3.01(2.7/2.9)

Lesson Plan Objective: PS-NV SEQ 2

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-PS-NV pages 23, 115

**Bank Question: 876****Answer: C**

1 Pt(s)

Unit 1 is operating at 100% power, steady state when a *PZR SPRAY LINE LO TEMP* alarm annunciates. No other abnormal annunciators are alarming. Which one of the following statements is the most likely explanation for this alarm?

- A. **Pressurizer heater bank C is off.**
- B. **Lack of insurge/outsurge cycles has allowed ambient cooling.**
- C. **Spray valve orifice fouling problems.**
- D. **1B NCP has tripped.**

---

**Distracter Analysis:**

- A. **Incorrect:** heater loss could cause low PZR pressure and temperature but will not affect Tcold flow from NCPs.  
**Plausible:** heaters can be energized to maximize mixing of NCS and pressurizer, when heaters are on, there will be more spray.
- B. **Incorrect:** Spray temperature is not affected by PZR surges.  
**Plausible:** this could be a partial answer to a surge line low temperature, which the minimum spray flow also addresses.
- C. **Correct:**
- D. **Incorrect:** There will be other alarms if an NCP trips.  
**Plausible:** this could cause a low spray temperature alarm.

Level: RO&amp;SRO

KA: SYS 010K4.01(2.7/2.9)

Lesson Plan Objective: PS-NC SEQ 9

Source: New

Level of knowledge: memory

References:

1. OP-MC-PS-NC page 31

**Bank Question: 877****Answer: B**

1 Pt(s)

Unit 1 is at full power. Pressurizer level is on program. All systems are in automatic.

Which one of the following statements correctly describes the relationship between the charging and letdown flow?

- A. **Charging flow through the regenerative heat exchanger equals letdown flow + seal return.**
- B. **Charging flow through the regenerative heat exchanger is less than letdown flow.**
- C. **Charging flow through 1NV-241 (SEAL INJ FLOW CONTROL) equals letdown flow.**
- D. **Charging flow through 1NV-241 + seal injection equals letdown flow.**

---

**Distracter Analysis:**

- A. **Incorrect:** charging flow through the regenerative heat exchanger will be approximately 55 gpm. Letdown + seal return is 87 gpm.  
**Plausible:** if the candidate misunderstands or misapplies the flow balance.
- B. **Correct:** charging flow through the regenerative heat exchanger will be approximately 55 gpm. Letdown flow is 75 gpm.
- C. **Incorrect:** Charging flow through NV-241 will be 55 gpm, letdown is 75 gpm.  
**Plausible:** if the candidate misunderstands or misapplies the flow balance.
- D. **Incorrect:** 55 gpm + 32 gpm is 87 gpm, letdown is 75 gpm. The balance is charging + seal injection = letdown + seal return  
**Plausible:** if the candidate misunderstands or misapplies the flow balance.

Level: RO&amp;SRO

KA: SYS 011K5.06(2.9/3.2)

Lesson Plan Objective: PS-NV SEQ 3

Source: New

Level of knowledge: memory

References:

1. OP-MC-PS-NV page 117

**Bank Question: 878****Answer: D**

1 Pt(s)

A Unit 1 startup is in progress. Given the following events and conditions:

- Reactor is critical in the source range.
- Power Range channel N41 is removed from service for zero power physics testing.
- A loss of power to bus EKVB occurs.

Which one of the following actions would occur?

- A. **Reactor trips and source range channel N32 is deenergized. Source range channel N31 is still in operation.**
- B. **The reactor is critical and both source range channels are de-energized.**
- C. **The reactor is critical and source range channel N32 is de-energized. Source range channel N31 is still in operation.**
- D. **Reactor trips and both source range channels are de-energized.**

**Distracter Analysis:**

- A. **Incorrect:** P-10 will be met, both SR's will de energize.  
**Plausible:** if the candidate does not realize P-10 will turn off both source ranges and recognizes the reactor trips when SR 32 de energizes.
- B. **Incorrect:** Reactor trips on a number of PR/SR trip setpoints.  
**Plausible:** if the candidate does not realize at power trips (or SR 32 loss of power) will cause a reactor trip but fails to realize P-10 will turn off the SR (loss of power actuates P-10 bistable on N42).
- C. **Incorrect:** Reactor trips on a number of PR/SR trip setpoints. Also, P-10 will turn off both SR's.  
**Plausible:** if the candidate thinks that the loss of the bus will turn off the SR-32 without actuating the trip bistable.
- D. **Correct:**

Level: RO&amp;SRO

KA: SYS 015K4.01(3.1/3.3)

Lesson Plan Objective: IC-ENB SEQ 12

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-IC-ENB pages 51, 61
2. OP-MC-IC-IPE page 83

**Bank Question: 880****Answer: A**

1 Pt(s)

Unit 1 was preparing to synchronize and load the main generator onto the grid. Given the following conditions:

- The appropriate generator voltage conditions have been established.
- The *GEN AUTO/MANUAL SYNC SWITCH* has been placed in the *MAN* position

If the operators have been directed to manually synchronize the generator, which one of the following actions are correct to close breaker 1A?

- A. **Press and hold the *SYNC* button. When the synchroscope is rotating slowly in the fast direction, then press the *CLOSE* button for the 1A breaker at 5 minutes to 12 o'clock.**
- B. **Press and hold the *AUTO SYNC* button on the DEH panel until the 1A generator breaker is closed.**
- C. **Rotate the main generator *GEN AUTO/MANUAL SYNC SWITCH* to the *AUTO 1A BREAKER* position, and press the *SYNC* button for breaker 1A.**
- D. **Press and hold the *AUTO SYNC* button on the DEH panel. When the synchroscope is rotating slowly in the fast direction, press the *CLOSE* button for the 1A breaker at 5 minutes to 12 o'clock.**

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**Distracter Analysis:**

- A. **Correct:** to manually close, the pushbutton is depressed until the breaker is closed
- B. **Incorrect:** *AUTO SYNC* button only works for auto-synchronization. The *GEN* switch would have to be placed in the *Auto 1A* position.  
**Plausible:** this partially reflects the auto-closure mode (breaker 1A position).
- C. **Incorrect:** the *SYNC* button will not close the breaker.  
**Plausible:** this partially reflects the auto-closure mode (*AUTO SYNC* vs. *SYNC*).
- D. **Incorrect:** *AUTO SYNC* button only works for auto-synchronization.  
**Plausible:** synchroscope rotation is a requirement for closing the breaker.

Level: RO&amp;SRO

KA: SYS 062K4.05(2.7/3.2)

Lesson Plan Objective: GEN-MG SEQ 6

Source: New

Level of knowledge: memory

References:

1. OP-MC-GEN-MG page 71, 111
2. OP/1/A/6300/001 pages 11, 12

**Bank Question: 881****Answer: B**

1 Pt(s)

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

- 1EVDA is supplying normal full power loads,
- No battery charger is available,
- Systems operate normally

Which one of the following statements correctly describes the minimum length of time that bus 1EVDA is designed to sustain loads and what action will protect the DC bus loads?

- A. After 1 hour, the vital battery bus breaker will open automatically when bus voltage falls to 105 volts.**
- B. After 1 hour, the vital battery breaker must be manually opened when bus voltage falls to 105 volts.**
- C. After 4 hours, the vital battery breaker will open automatically when bus voltage falls to 107 volts.**
- D. After 4 hours, the vital battery breaker must be manually opened when bus voltage falls to 107 volts.**

---

**Distracter Analysis:**

- A. Incorrect:** the vital battery breaker does not automatically open  
**Plausible:** partially correct – the design time for sustaining loads is 1 hour
- B. Correct:** below this value the battery could be damaged or components will begin to fail.
- C. Incorrect:** the battery is expected to last for 1 hour and there is no automatic trip associated with low voltage  
**Plausible:** the 4 hour requirement for battery performance is typical of the aux batteries – voltage limit is 107 volts.
- D. Incorrect:** the vital batteries are not designed to sustain loads for 4 hours  
**Plausible:** partially correct – DC bus protection is achieved by manually opening the breaker – voltage limit is 107 volts.

Level: RO&amp;SRO

KA: SYS 063A4.03(3.0/3.1)

Lesson Plan Objective: AP-15 SEQ 2

Source: New

Level of knowledge: memory

References:

1. AP-15 Background Document pages 4, 40
2. AP/1/A/5500/015 page 49

**Bank Question: 882****Answer: B**

1 Pt(s)

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

- Operators started RV pumps A & B due to rising containment temperatures.
- Containment Upper temperature is 90 °F, decreasing.
- Containment Lower temperature is 128 °F, decreasing.
- At 0200, a loss of off-site power occurs on Units 1 and 2
- Operators implement the appropriate procedures.

Which one of the following pumps provides the assured source of cooling water to maintain containment temperature within Tech Spec limits?

- A. 2C RV pump
- B. 2A RN pump
- C. 2B RN pump
- D. 2A or 2B RN pumps.

**Distracter Analysis:**

- A. **Incorrect:** RN pump 2A supplies. RV pumps could lose power post blackout.  
**Plausible:** RV pump C could be considered the supply since it will try to start on loss of cooling water pressure.
- B. **Correct:** on blackout signal, B train RN supply valves close, but the 42A does not, leaving cooling from the A RN pump.
- C. **Incorrect:** RN pump 2A supplies RV post blackout.  
**Plausible:** if the candidate thinks supply comes from the B RN train.
- D. **Incorrect:** RN pump 2A supplies RV post blackout.  
**Plausible:** if the candidate does not realize one train of valves close on blackout.

Level: RO Only

KA: SYS 076 K2.04 (2.5/2.6)

Lesson Plan Objective: CNT-RV SEQ 13

Source: New

Level of knowledge: memory

References:

1. OP-MC-PSS-RN pages 57, 85
2. OP-MC-CNT-RV page 29

**Bank Question: 884****Answer: D**

1 Pt(s)

Which one of the following statements correctly describes how the train B manual reactor trip and automatic reactor trip signals input to the train B reactor trip bypass breaker?

- A. **The manual trip signal de-energizes the bypass breaker UV coil through SSPS.  
The automatic trip signals do not input to the bypass breaker circuit.**
- B. **The manual trip signal energizes the bypass breaker shunt coil.  
The automatic trip signals de-energize the bypass breaker UV coil through the SSPS.**
- C. **The manual trip signal de-energizes the bypass breaker UV coil through SSPS.  
The automatic trip signals energize the bypass breaker shunt coil.**
- D. **The manual trip signal energizes the bypass breaker shunt coil.  
The automatic trip signals do not input to the bypass breaker circuit.**

---

**Distracter Analysis:**

- A. **Incorrect:** manual trip energizes the shunt trip coil.  
**Plausible:** if the candidate knows that automatic trips do not input to the circuitry, but confuses which action the manual trip performs.
- B. **Incorrect:** automatic trips de-energize the opposite bypass breaker UV coil.  
**Plausible:** close to the normal RTB response to trip signals.
- C. **Incorrect:** manual trip energizes the shunt trip coil, and automatic trips perform no function for the corresponding train.  
**Plausible:** automatic trips perform this action for the opposite train bypass breaker.
- D. **Correct:**

Level: RO&amp;SRO

KA: EPE 007EK2.02 (2.6/2.8)

Lesson Plan Objective: IC-RTB SEQ 8

Source: New

Level of knowledge: memory

References:

1. OP-MC-IC-RTB page 29, 31, 65

**Bank Question: 885****Answer: D**

1 Pt(s)

Unit 1 is operating at 60% power. PZR level and pressure control are selected to the (3-2) combination. Given the following events and conditions:

- Inverter 1EVID fails.

Assuming no operator action, which one of the following statements correctly describes the effect of this failure on charging and letdown control?

- A. 1NV-238 (*CHARGING LINE FLOW CONTROL*) opens, 1NV-2A (*NC L/D ISOL TO REGEN HX*) closes, and actual PZR level increases.
- B. 1NV-238 closes, 1NV-1A (*NC L/D ISOL TO REGEN HX*) closes, and actual PZR level increases.
- C. 1NV-238 closes, 1NV-1&2A close, and actual PZR level decreases.
- D. Charging and letdown control do not change – remain as before the loss of EVID.

**Distracter Analysis:** The common terminology used for vital AC inverters is:  
 Channel 1 = EVIA – inputs to pressurizer level channel 1  
 Channel 2 = EVIB – inputs to pressurizer level channel 2  
 Channel 3 = EVIC – inputs to pressurizer level channel 3  
 Channel 4 = EVID – has no inputs to pressurizer level channel instrument

- A. **Incorrect:** A loss of EVID does not effect the controlling channel 3 for pressurizer level  
**Plausible:** This is the response to a controlling channel failed low.
- B. **Incorrect:** A loss of EVID does not effect the backup channel 2 for pressurizer level  
**Plausible:** This is the response to a backup channel failed low.
- C. **Incorrect:** A loss of EVID does not effect the pressurizer level control  
**Plausible:** if the candidate thinks that the output fails high on loss of power and thinks that the loss of EVID effects the controlling channel.
- D. **Correct:** A loss of EVID does not effect the controlling channel for pressurizer level

Level: RO&SRO

KA: SYS 004K2.06(2.6/2.7)

Lesson Plan Objective: EP-EPL SEQ 6

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-PS-ILE pages 15, 23, 25
2. AP/1/A/5500/15 pages 135-138

**Bank Question: 886****Answer: A**

1 Pt(s)

Unit 2 is operating at 100% power on 8/3/01. Given the following events and conditions:

- All systems are aligned for normal operation.
- A waste monitoring tank is being released with 4 RC pumps in operation.
- The RS pump is tagged for seal replacement.

Assuming no operator action, which one of the following statements correctly describes the plant response to a massive debris entrainment of the Unit 2 intake structure?

- A. **The unit will trip on low condenser vacuum due to loss of RC flow.**
- B. **The unit would continue to operate because the screen wash flow will be supplied from the RF system.**
- C. **The unit would trip when the RC pumps cavitate at 745' level in the intake structure.**
- D. **The unit would continue to operate due to circulating water being supplied by the low level water supply system.**

**Distracter Analysis:**

- A. **Correct:** Intake level will drop due to clogging, causing loss of RC flow.
- B. **Incorrect:** There is no procedural methodology to supply RS from the RF system.  
**Plausible:** The piping exists to perform this crossover.
- C. **Incorrect:** pump cavitation will not cause the unit to trip.  
**Plausible:** The pumps will cavitate at about the 745' level.
- D. **Incorrect:** There is no low level supply for unit 2.  
**Plausible:** If the candidate does not know the unit 2 RC system alignment.

Level: RO Only

KA: SYS 075A2.01(3.0/3.2)

Lesson Plan Objective: MT-RC SEQ 7

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-MT-RC pages 21, 23, 29, 31, 43

**Bank Question: 887****Answer: B**

1 Pt(s)

Unit 1 is conducting a reactor startup following a plant trip due to an IAE error during instrument calibration. Given the following data:

- Time of shutdown 1520 on 01/27/02
- Anticipated time of criticality 0100 on 01/28/02
- Core burnup 250 EFPD
- NCS Boron 750 ppm
- Estimated critical position 105 steps on Bank C
- Control rod position at 0200 40 steps on Bank C

Which one of the following statements correctly describes the required operator actions?

**REFERENCES PROVIDED**

**: Unit 1 Databook Table 6.3B and Graph 1.2,  
OP/0/A/6100/006**

- A. **Recalculate the ECP if the reactor is not yet critical at 175 steps of Bank C before 0230.**
- B. **Insert the rods and recalculate the ECP if criticality will be achieved at 40 steps of Bank C at 0200.**
- C. **Recalculate the ECP because it is now one hour past the anticipated criticality time at 0200.**
- D. **Insert the rods and recalculate the ECP because it is past the anticipated criticality time at 0100.**

**Distracter Analysis:** TSIL = 47 steps on Bank C. ECP +750 pcm = 195 steps on Bank C. ECP - 750 pcm = 25 steps on Bank C.

- A. **Incorrect:** Can pull rods to 195 steps before recalculating.  
**Plausible:** partially correct - no need to recalculate the ECP until 0300. Could select this answer if the candidate misreads the integral rod worth table for the +750 pcm rod position.
- B. **Correct:** Critical rod position at 40 steps is < TSIL at 47 steps.
- C. **Incorrect:** The ECP is good for 2 hours past the anticipated criticality time. No need to recalculate the ECP until 0300.  
**Plausible:** This could be the answer at 0300, if Xenon was not decaying rapidly.

**D. Incorrect:** The ECP is good for 2 hours past the anticipated criticality time. No need to insert the rods and recalculate the ECP until 0300.

**Plausible:** This could be the answer at 0300.

Level: RO Only 10CFR55.41(b)1

KA: G2.2.34 (2.8/3.2)

Lesson Plan Objective: RT-RB SEQ 4

Source: New

Level of knowledge: analysis

References:

1. OP-MC-RT-RB pages 8-9, 16, 18
2. OP/O/A/6100/006 pages 2, 3 - PROVIDED
3. Unit 1 Databook Graph 1.2 and Table 6.3B - PROVIDED

**Bank Question: 888****Answer: B**

1 Pt(s)

Unit 1 is responding to a steam break inside containment from full power. Given the following events and conditions:

- All systems operate as designed.
- Narrow range S/G level is 15% for each intact S/G
- CA flow is 100 GPM to each intact S/G.
- The NCPs were tripped.
- The crew entered FR-P.1 (*Response to Imminent Pressurized Thermal Shock Condition*) due to low temperature.
- NCS temperature is now stable.
- NCS pressure is stable with only the control group of pressurizer heaters energized.
- Letdown has been restored

If the crew has determined that a 1 hour soak is required, which of the following evolutions could be performed by the crew in the next hour while continuing on through the EP procedures?

- A. Start 1D NCP
- B. Place auxiliary spray in service
- C. Increase CA flow to one intact S/G to raise NR level to 50%
- D. Commence a 25-degree/hour cooldown to Mode 5

**Distracter Analysis:**

- A. **Incorrect:** Starting a NCP will cause a pressure transient and could cause further cooldown.  
**Plausible:** If the candidate does not understand the limitations during the soak or the effects of NCP start.
- B. **Correct:** Any actions that will not cause either a cooldown or a pressure rise and are specified by any other procedure in effect are permitted during this "soak" period.
- C. **Incorrect:** Increases cooldown stressing the vessel.  
**Plausible:** The candidate may not link raising S/G level with a cooldown.
- D. **Incorrect:** Cooldown is not allowed.  
**Plausible:** The candidate may recall that a cooldown at less than 50/hr is directed after the soak.

Level: RO&SRO

KA: W/E 08 EK 3.3 (3.7/3.8)

Lesson Plan Objective: EP-FRP SEQ 3

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-FRP pages 17, 43
2. EP/1/A/5000/FR-P.1 page 28

**Bank Question: 889****Answer: C**

1 Pt(s)

A small fire has broken out in the incore instrument room as a result of welding on a thimble support. Given the following events and conditions:

- The control room isolated the VT systems (breakers are tagged open).
- The fire watch exhausted a portable CO<sub>2</sub> fire extinguishers on the burning insulation before leaving the area,
- The area is posted as a radiological surface contamination area with the maximum level of 10E5 dpm/100 cm<sup>2</sup>

Which one of the following would be the preferred method for the fire brigade to extinguish this fire?

- A. Actuate the incore instrument room Halon system**
- B. Portable CO<sub>2</sub> extinguishers due to the potential for electrical hazards in the area.**
- C. Portable water extinguishers because of their better quenching capability in this low combustible loading area.**
- D. Portable dry chemical extinguishers because of their better smothering capability.**

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**Distracter Analysis:**

- A. Incorrect:** There is no Halon system in this room  
**Plausible:** Some areas are equipped with Halon fire protection systems.
- B. Incorrect:** Portable water extinguishers would be preferred.  
**Plausible:** CO<sub>2</sub> is preferred for electrical fires.
- C. Correct:** A hose would be overkill and spread contamination.
- D. Incorrect:** Portable water extinguishers would be preferred.  
**Plausible:** Dry chemical extinguishers smother oil fires better.

Level: RO&amp;SRO

KA: G2.4.26 (2.9/3.3)

Lesson Plan Objective: None

Source: New

Level of knowledge: memory

References:

1. None

**Bank Question: 890****Answer: C**

1 Pt(s)

Unit 2 was operating at 85 % power. Given the following events and conditions:

- Loop C  $T_{ave}$  is bypassed due to a failed  $T_c$  RTD
- Loop A  $T_{hot}$  fails high causing a reactor trip
- All other systems perform their design functions

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

- A. The MSIVs close.
- B. All steam dumps close when actual  $T_{ave}$  reaches 557°F.
- C. FWI occurs when actual  $T_{ave}$  reaches 553°F.
- D. The main feed pumps trip.

**Distracter Analysis:**

- A. **Incorrect:** MSIVs do not close.  
**Plausible:** This would be a prudent response to excess steam demand due to  $T_{ave}$  failures
- B. **Incorrect:** All dumps are closed at 553°F by the P12 interlock.  
**Plausible:** If the candidate overlooks FWI and/or the RTD failures' affect on the trip controller (uses auctioneered high  $T_{ave}$ ).
- C. **Correct:**
- D. **Incorrect:** No SI or Hi-Hi S/G level  
**Plausible:** If the candidate does not remember the initial conditions

Level: RO Only

KA: SYS 059K1.05(3.1/3.2)

Lesson Plan Objective: CF-CF SEQ 12

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-CF-CF page 33
2. OP-MC-STM-IDE pages 21, 23, and 27

**Bank Question: 891****Answer: D**

1 Pt(s)

Unit 1 has experienced a rupture of the RN piping inside containment. Emergency procedures prescribe successful response mechanisms if containment water level remains between 3.5 and 10.5 feet.

Why is safe plant recovery is not assured for a design basis large break LOCA when containment water level exceeds 10.5 feet?

- A. **Operation of the ND system is compromised by high suction pressure.**
- B. **Operation of the NS pumps is endangered by excess debris fouling the containment suction strainers.**
- C. **Operation of the hydrogen purge system is compromised by loss of direct access to the containment atmosphere.**
- D. **Operation of critical ECCS components needed for safe recovery is endangered by submersion.**

**Distracter Analysis:**

- A. **Incorrect:** 10.5 feet of water will not lift the ND suction relief, or if it did the relief returns to the PRT.  
**Plausible:** High containment level increases ND suction pressure.
- B. **Incorrect:** Submergence beyond the reference flood plane will not cause excess debris nor will it transport debris to the suction strainers, which are at the very bottom of the containment sump. Debris is generated by impingement of high energy releases against containment SSCs – the design basis will prevent excess debris if containment is maintained free of foreign material.  
**Plausible:** Clogged suction strainers could occur if submergence of components was a mechanism, which could lift debris. This is a reason to keep foreign material out of containment.
- C. **Incorrect:** The hydrogen purge system is far above the 10.5 ft flood plane and would not be compromised.  
**Plausible:** If the hydrogen purge system was submerged, it would fail to operate.
- D. **Correct:** The containment flood plane reference is at 10.5 ft. Submersion beyond this level will expose unqualified components to a hostile environment that they are not qualified for.

Level: RO&SRO

KA: EPE WE 15 EK2.2 (2.7/2.9)

Lesson Plan Objective: EP-FRZ SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-FRZ page 47

**Bank Question: 892****Answer: A**

1 Pt(s)

Unit 1 is operating at 100% power when the OAC registers a low spent fuel pool level alarm. Given the following events and conditions:

- The operators read –2.1 ft SFP level and steady on the main control board.
- The operating KF pump has tripped.
- An NLO reports a large leak in the auxiliary building.
- Normal SFP makeup is not available.

Which one of the following statements correctly describes the corrective action for this event?

- A. **Find and isolate the leak on the KF discharge piping.**
- B. **Find and isolate the leak on the KF suction piping.**
- C. **Initiate assured makeup due a leak on the discharge piping.**
- D. **Initiate assured makeup due to a leak on the suction piping.**

---

**Distracter Analysis:**

- A. **Correct:**
- B. **Incorrect:** The leak is on the discharge piping.  
**Plausible:** If the candidate confuses the piping immersion depth with the suction pipes, which are at 4 feet.
- C. **Incorrect:** Do not use assured source unless radiological hazard is imminent.  
**Plausible:** If the candidate does not recognize the hazard associated with adding raw water to the SFP.
- D. **Incorrect:** Do not use the assured source, and the leak is on the discharge piping.  
**Plausible:** If the candidate does not recognize the hazard associated with adding raw water to the SFP, and confuses the piping immersion depth with the suction pipes.

Level: RO Only

KA: SYS 033A3.02(2.9/3.1)

Lesson Plan Objective: FH-KF SEQ 5/14

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-FH-KF pages 19, 23, 41, 49

**Bank Question: 893.1****Answer: C**

1 Pt(s) Unit 1 is operating at 80 % power, steady state. Given the following events and conditions:

- Rod control is in manual for testing.
- Control bank D is at 155 steps.
- 1AD-2, A9 & B9 (*CONTROL BANK LO & LO-LO LIMIT*) alarms actuate.

Which one of the following conditions could be the cause of these two alarms?

- A. Turbine impulse pressure channel failed high.
- B. NIS channel N42 failed high.
- C. Loop 1B  $T_n$  instrument failed high.
- D. Loop 1A  $T_{ave}$  failed high.

---

**Distracter Analysis:**

- A. **Incorrect:** D/T controls RIL.  
**Plausible:** Impulse pressure ( $T_{ref}$ ) is proportional to power and could be used to calculate RIL.
- B. **Incorrect:** D/T controls RIL.  
**Plausible:** NIS power could be used to calculate RIL (and is at some plants).
- C. **Correct:** Control bank D is above the RIL alarms, but when D/T goes high, RIL goes to 161 and the alarms actuate.
- D. **Incorrect:** D/T controls RIL.  
**Plausible:**  $T_{ave}$  is proportional to power and could be used to calculate RIL.

Level: RO&SRO

KA: SYS 014K1.02(3.0/3.3)

Lesson Plan Objective: IC-IRE SEQ 11

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-IC-IRE pages 17, 37, 55, 63
2. OP-MC-PS-NC pages 45, 47
3. Unit 1 Databook Graph 1.2
4. OP/1/A/6100/010C, A9 Control Bank Lo Limit
5. OP/1/A/6100 /010C, B9 Control Bank Lo-Lo Limit

**Bank Question: 894****Answer: A**

1 Pt(s)

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

- “B” essential train is in service.
- 2A RN train is in operation for testing.
- The RN trains are split with 2RN-41B, (*TRAIN B TO NON-ESS HDR ISOL*) closed.

Which one of the following statements correctly describes the potential consequence if 2RN-190B (*RN TO B KC HX CONTROL*) failed to perform its automatic function associated with decreasing B train RN flow?

- A. **Overheating 2B RN pump.**
- B. **Flashing in the 2B KC heat exchanger.**
- C. **Overheating the running B train KC pumps.**
- D. **2RN-41B will open to restore flow to the heat exchanger.**

**Distracter Analysis:**

- A. **Correct:** Lose mini-flow protection for RN pump 2B.
- B. **Incorrect:** no flashing should occur, pressure is not changing.  
**Plausible:** candidate believes that like the letdown regen heat exchanger, flashing on loss of cooling could occur
- C. **Incorrect:** B train pumps cooled by separate supply.  
**Plausible:** candidate believes heat exchanger and pump cooling come from the same place.
- D. **Incorrect:** no auto open signal for RN41B.  
**Plausible:** candidate feels there is some reason for the stated position of 41B in the setup and guesses it can auto open. Valve closes on blackout signal.

Level: RO&amp;SRO

KA: APE 062AK3.04(3.5/3.7)

Lesson Plan Objective: PSS-RN SEQ 7

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-PSS-RN pages 23, 41, 73, 85
2. OP-MC-PSS-KC page 39

**Bank Question: 895****Answer: A**

1 Pt(s)

Unit 1 is operating at 100% power. The battery charger 1EDGA for the 1A emergency diesel generator battery has failed and will not provide a DC output.

Which one of the following statements correctly describes the status of the 1A emergency diesel generator?

- A. **The 1A emergency diesel generator is inoperable because the D/G will not continue to run for its design basis committed time period without the battery charger in service.**
- B. **The 1A emergency diesel generator is inoperable because the D/G will not start without the battery charger in service.**
- C. **The 1A emergency diesel generator is operable because the battery charger has a vital DC backup power supply, and will automatically supply the vital loads after starting.**
- D. **The 1A emergency diesel generator is operable because all safety grade auxiliary loads are supplied from the 600VAC motor control center supplied from 1ELXA.**

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**Distracter Analysis:**

- A. **Correct:** The D/G will start because the D/G battery will supply all starting loads. However, without the charger, the battery will expire and power will be lost to the governor, voltage regulator and other vital DC loads.
- B. **Incorrect:** The D/G will start without the charger – power will be supplied from the D/G battery.  
**Plausible:** if the candidate does not know that removing the inverter does not remove the battery from service. This would be true if the D/G control power breaker was opened.
- C. **Incorrect:** DG is inoperable without the battery charger.  
**Plausible:** Some batteries have this feature.
- D. **Incorrect:** DG is inoperable without the battery charger.  
**Plausible:** The battery will provide power to DG auxiliaries for some period of time – some vital D/G auxiliaries are supplied from the 600 VAC control center.

Level: RO Only 10CFR55.41(b)10

KA: APE 056 G2.2.23 (2.6/3.8)

Lesson Plan Objective: DG-DG SEQ 11

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-DG-DG pages 29, 31, 49, 79
2. Tech Spec 3.8.1

**Bank Question: 896.1****Answer: C**

1 Pt(s)

Unit 1 is operating in mode 5. Given the following events and conditions:

- All steam generator narrow range levels are approximately 15%
- The A trains of ND, KC and RN are in service.
- The B trains of ND, KC and RN are operable but secured.
- NCS temperature currently at 175°F
- All NCPs are secured.
- RN cooling water is lost to the 1A KC heat exchanger.

What immediate action (if any) is required by Tech Specs?

- A. **Start one NCP**
- B. **Raise the level in at least 2 S/Gs 17%**
- C. **Start the B train ND, KC and RN systems**
- D. **No immediate action is required.**

**Distracter Analysis:**

- A. **Incorrect:** This will not satisfy Tech Spec 3.4.7.  
**Plausible:** This would be correct if in mode 4 - per Tech Spec 3.4.6.
- B. **Incorrect:** S/G levels must be above 12% NR for a NCS loop to be operable per tech spec 3.4.7.  
**Plausible:** if the candidate thinks that the minimum level is 17% - which is a S/G level requirement for other EOPs
- C. **Correct:** per tech spec 3.4.7
- D. **Incorrect:** Without an RHR train in operation, Tech Spec 3.4.7 is not met.  
**Plausible:** If the candidate does not recognize that Tech Spec 3.4.7 requires one RHR train to be operable (which it is ) AND in operation (which it is not).

Level: RO&amp;SRO 10CFR55.41(b)10

KA: APE 026 G2.2.23 (2.6/3.8)

Lesson Plan Objective: PSS-KC SEQ 15

Source: New

Level of knowledge: comprehension

References:

1. Tech Spec 3.7.6
2. Tech Spec 3.4.6
3. OP-MC-PS-ND page 13, 67
4. OP-MC-PSS-KC pages 11, 13, 15, 25, 27, 49

**Bank Question: 897.1****Answer: B**

1 Pt(s)

Unit 1 is about to commence refueling. Given the following conditions at 0100:

- Fuel is being moved.
- Source range channels N31 and N32 are operable
- Channels 1A and 1B wide range neutron flux monitoring system are operable.

Given the following events and times:

- 0200 Source range channel N32 instrument power fuse blows.
- 0300 Source range channel N31 control power fuse blows.
- 0400 Wide range neutron flux monitor channel 1B fails.
- 0500 Wide range neutron flux monitor channel 1A fails.

What is the earliest time that refueling must be halted?

- A. 0200
- B. 0300
- C. 0400
- D. 0500

---

**Distracter Analysis:** Tech Spec 3.9.3 requires 2 operable source range channels. Wide range flux monitors (gamma metrics) are allowed to substitute for NIS source flux monitors per tech spec 3.9.3 bases. BUT the gamma metrics do not provide an input to the containment evacuation alarm or the CNMT audible count instrument – which are required by admin controls for refueling operations. Candidates are required to know Tech Spec LCOs with immediate action statements.

- A. **Incorrect:** Still have 3 qualified NI channels plus containment evacuation alarm operable.  
**Plausible:** if the candidate is unaware that gamma metrics monitors can substitute for source range channels for Tech Spec 3.9.3
- B. **Correct:** Although there are still 2 qualified channels, the containment evacuation alarm is not operable. Must have the containment evacuation alarm to be able to conduct refueling operations per administrative control requirements.
- C. **Incorrect:** Must halt refueling at 0300

**Plausible:** Still have 1 qualified NI channels operable – if candidate does not know Tech Spec 3.9.3 requires 2 channels for fuel movement – would be OK if not moving fuel.

**D. Incorrect:** Must halt refueling at 0300

**Plausible:** no operable source range channels – no way to monitor core.

Level: RO Only

KA: SYS 015 K3.03 (2.7/3.4)

Lesson Plan Objective: ENB SEQ 21

Source: New

Level of knowledge: comprehension

References:

1. AP-16 Background Document pages 4 and 6
2. Tech Spec 3.9.3 and Bases
3. OP-MC-IC-ENB pages 19, 21, 23, 41, 43

**Bank Question: 899****Answer: D**

1 Pt(s)

Unit 1 is at full power. Given the following events and conditions:

- 1NC-34A (PZR PORV) was leaking has been isolated in accordance with Technical Specifications.
- NC pressure is 2345 psig.
- 1NCV-36B (PZR PORV) is slightly open.
- Master controller output is stuck at 83%.

Which one of the following statements correctly describes when 1NC-36B will automatically close and if it does not, what action is required to isolate the valve?

- A. 1NC-36B will not close. The operator must close the block valve by taking the control switch to “CLSD”.
- B. 1NC-36B will not close. The operator must close the block valve by taking the control switch to “OVERRIDE”.
- C. 1NC-36B will close when pressure decreases to 2315 psig. If necessary to close the block valve, take the control switch to “CLSD”.
- D. 1NC-36B will close when pressure decreases to 2315 psig. If necessary to close the block valve, take the control switch to “OVERRIDE”.

---

**Distracter Analysis:**

- A. **Incorrect:** 1NCV-36B will close and must take the block valve to override.  
**Plausible:** if the candidate does recognize the multiple block valve protection and assumes control for 1NV-36B is off the pressure controller.
- B. **Incorrect:** 1NC-36B will close.  
**Plausible:** if the candidate does not realize that control for 1NV-36B is not from the pressure controller.
- C. **Incorrect:** must take the block valve to override.  
**Plausible:** if the candidate does not recognize the multiple block valve protection.
- D. **Correct:**

Level: RO&amp;SRO

KA: APE 008AA1.07 (4.0/4.2)

Lesson Plan Objective: AP-11 SEQ 2

Source: New

Level of knowledge: comprehension

References:

1. AP-11 background document page 5

**Bank Question: 900****Answer: B**

1 Pt(s)

The operator has just opened 1VI-820 (*VI SUPPLY TO VS CONTROL*). The switch is left in the *OPEN* position.

Which one of the following statements correctly describes the adverse effect of leaving the *CLOSE/AUTO/OPEN* switch in the *OPEN* position?

- A. The valve will not close on decreasing VI pressure.
- B. The valve closes on decreasing VI pressure, but immediately reopens if pressure increases above 90 psig.
- C. The valve will not close on decreasing VS pressure.
- D. The valve closes on decreasing VS pressure, but immediately reopens if pressure increases above 90 psig.

---

**Distracter Analysis:**

- A. **Incorrect:** The valve will close.  
**Plausible:** if the candidate believes that if not in auto, the valve will not respond to decreasing pressure.
- B. **Correct:** the opening will not be under the control of the operator.
- C. **Incorrect:** The valve will close on low VI pressure.  
**Plausible:** if the candidate confuses which system is being protected, and believes that if not in auto, the valve will not respond to decreasing pressure.
- D. **Incorrect:** The valve responds to VI pressure.  
**Plausible:** candidate believes that the valve will receive an open signal once it is fully closed

Level: RO&amp;SRO

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

Lesson Plan Objective: SS-VI SEQ 7

Source: New

Level of knowledge: memory

References:

1. OP-MC-SS-VI page 67

**Bank Question: 902****Answer: A**

1 Pt(s)

Unit 2 is at full power preparing to shutdown for refueling. Given the following events and conditions:

- Pressurizer level is on program and in automatic.
- The controlling pressurizer level transmitter fails at its current output.
- No operator action is taken.

Which one of the following statements correctly describes the system response as plant load is reduced?

- A. Charging flow decreases  
Letdown isolates  
Pressurizer heaters turn off**
- B. Charging flow increases  
Pressurizer heaters energize  
Pressurizer level increase to the trip setpoint**
- C. Charging flow decreases  
Letdown will not isolate  
Pressurizer level decreases until the pressurizer is empty**
- D. Charging flow increases  
Pressurizer heaters will not energize  
Pressurizer level increases to the trip setpoint.**

**Distracter Analysis:** As load is reduced, Tave will decrease, Program Pressurizer level will decrease. The system will see the controlling channel maintaining a high level and decrease charging in an effort to reduce level. Actual level will decrease. The backup channel will decrease and at 17%, letdown will isolate and heaters will de energize.

- A. Correct:**
- B. Incorrect:** charging flow will decrease.  
**Plausible:** candidate believes charging flow will increase in an effort to maintain the higher level
- C. Incorrect:** letdown will isolate from the backup channel.  
**Plausible:** if the candidate believes the low level interlock will not be satisfied only from the controlling channel.
- D. Incorrect:** charging flow will decrease.  
**Plausible:** candidate believes charging flow will increase to maintain the higher level

Level: RO&SRO 10CFR55.41(b)7

KA: APE 028 AA2.02 (3.4/3.8)

Lesson Plan Objective: PS-ILE SEQ 12

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-PS-ILE page 33 (Figure 7.2)

**Bank Question: 903****Answer: B**

1 Pt(s)

Why is it important for the source range high voltage to be properly set?

- A. **To ensure that the detector operates in the ionization region where the flow of detector current reflects exactly the flow of ionizing radiation and secondary multiplication is prevented.**
- B. **To ensure the detector operates in the proportional region where secondary ionizations cause gas multiplication to occur.**
- C. **To ensure that detector operates in the recombination region where the recombination effect prevents the smaller pulses from gamma interactions from being detected.**
- D. **To ensure that the detector operates in the Geiger Muller region where each ionization event results in a complete discharge of the detector tube.**

---

**Distracter Analysis:**

- A. **Incorrect:** This describes the ionization range. The SR is a proportional counter.  
**Plausible:** If the candidate does not understand detector theory or confuses what region the SR operate in.
- B. **Correct:** SR operates in the proportional region of the detector curve where gas amplification causes secondary ionizations.
- C. **Incorrect:** This describes the recombination range.  
**Plausible:** Gamma interactions are discriminated by a pulse-height discriminator circuit. If the candidate does not understand detector theory or confuses what region the SR operate in.
- D. **Incorrect:** This describes the G-M region.  
**Plausible:** If the candidate is unfamiliar with what region SR operates in.

Level: RO&amp;SRO

KA: APE 032 AK1.01 (2.5/3.1)

Lesson Plan Objective: IC-ENB SEQ 3

Source: New

Level of knowledge: memory

References:

1. OP-MC-IC-ENB page 17-19

**Bank Question: 904****Answer: D**

1 Pt(s)

The unit 1 operating crew has entered AP-15 (*LOSS OF VITAL OR AUX CONTROL POWER*) due to a loss of 1 EVDA.

Why will the crew have to diligently monitor containment pressure while 1EVDA is de-energized?

- A. **Decreased cooling capacity will allow an increase containment pressure because the A train of the VL and VU system AHUs are inoperable and cannot be used to cool containment.**
- B. **The VCT could overflow and rupture, causing containment pressure to increase. Letdown continues but 1NV-137A (*NC FILTERS OTLT – 3 WAY CNTRL*) failed closed.**
- C. **VI system leaks will increase containment pressure and 1VP-15A (*UNIT 1 CONT OTSD ISOL*) has failed closed without power to provide a path for air release.**
- D. **VI system leaks will increase containment pressure and 1VQ-1A (*CONT AIR REL INSIDE ISOL*) has failed closed without power to provide a path for air release.**

**Distracter Analysis:** Loss of DC control power causes 1VQ-1A to fail closed and prevents using the VQ system for an air release to lower containment pressure. Pressure increases due to VI leaks inside containment.

- A. **Incorrect:** VL and VU systems are operable under these conditions  
**Plausible:** contingency action is to increase cooling flow in an attempt to cool the containment air mass, slowing the pressure increase.
- B. **Incorrect:** There would be other primary indications of a VCT rupture and the VCT does not have enough volume to significantly affect the containment pressure. Letdown will isolate, not continue.  
**Plausible:** partially correct - 1NV-137A will fail closed (to the VCT) on loss of 1EVDA and there is a caution that the VCT could rupture when the charging pump suction is aligned to the FWST to refill the VCT.
- C. **Incorrect:** 1VP-15A is normally locked shut (this is a SLC commitment to NRC) and is not used to vent containment under these circumstances. 1VP-15A is powered from 1EKVD-11 and is not impacted by a loss of 1EVDA.  
**Plausible:** partially correct – it is the leakage of VI into containment that is a problem.
- D. **Correct:** numerous VI leaks inside containment will slowly increase containment pressure with the VQ system unable to release to the unit 1 stack. VQ-1A fails closed due to a loss of power.

Level: RO&SRO

KA: APE 058 AK3.02 (4.0/4.2)

Lesson Plan Objective: AP15 SEQ 3

Source: New

Level of knowledge: memory

References:

1. AP-15 Background Document pages 16, 18, 19
2. AP-15 pages 10, 13, 14

**Bank Question: 905****Answer: A**

1 Pt(s)

The selector switches for the 1A and 1B Boric Acid pumps are in *LOCAL* at the Auxiliary Shutdown Panel (ASP). The operator is starting the 1A Boric Acid pump at the ASP.

Which one of the following statements describes ALL the indication(s) that the operator has at the ASP indicating that the boric acid pump is running?

- A. Red "ON" light LIT.
- B. Red "ON" light LIT and pump amps registering.
- C. Pump amps registering and boric acid flow indicating when 1NV-265B (*BORIC ACID TO NV PUMPS*) is opened.
- D. Red "ON" light LIT and boric acid flow indicating when 1NV-265B is opened.

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**Distracter Analysis:**

- A. **Correct:** Both BA pumps have LOCAL/CR selector switches, Red/green indicator lights, and start controls on the ASP.
- B. **Incorrect:** There are no pump amps indicators on the ASP.  
**Plausible:** These are normal indications checked when a pump is started.
- C. **Incorrect:** There is no flow indication on the ASP.  
**Plausible:** NV-265B is controlled (with Red/Green lights) from the ASP
- D. **Incorrect:** BA flow is not indicated at the ASP  
**Plausible:** This valve can be controlled from the ASP

Level: RO&amp;SRO

KA: APE 068 AA1.19 (3.7/3.9)

Lesson Plan Objective: CP-ASP SEQ 2

Source: New

Level of knowledge: memory

References:

1. OP-MC-CP-ASP page 25, 31

**Bank Question: 906****Answer: C**

1 Pt(s)

A station emergency battery is supplying DC bus loads without a battery charger online. If the load on the DC bus does not change, which one of the following statements correctly describes a vital battery's discharge rate (amps) as the battery is expended?

- A. The discharge rate will be fairly constant until the design battery capacity (amp-hours) is exhausted and then will rapidly decrease.
- B. The discharge rate will decrease steadily until the design battery capacity is exhausted.
- C. The discharge rate will increase steadily until the design battery capacity is exhausted.
- D. The discharge rate will initially decrease until approximately 50% design capacity had been expended and then increase until the battery has been exhausted.

---

**Distracter Analysis:**

- A. **Incorrect:** The discharge rate increases.  
**Plausible:** This is a typical response for many design systems - If the candidate does not recall that  $V = I \times R$ .
- B. **Incorrect:** The discharge rate increases.  
**Plausible:** If the candidate reverses the effect of decreasing voltage on discharge rate.
- C. **Correct:**
- D. **Incorrect:** The discharge rate increases.  
**Plausible:** If the candidate does not understand battery theory.

Level: RO&amp;SRO

KA: EPE 055 EK1.01 (3.3/3.7)

Lesson Plan Objective: EL-EPL SEQ 12/20

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-EPL pages 65-67

**Bank Question: 907****Answer: D**

1 Pt(s)

Unit 1 is implementing FR-C.1 (*Response to Inadequate Core Cooling*).  
Given the following events and conditions:

- P-11 has been blocked.
- Operators are preparing to open the steam dumps to depressurize intact steam generators to 110 psig.

What guidance should be given to the operator opening the steam dumps?

- A. **The steam dumps should be fully opened to depressurize the S/Gs as quickly as possible.**
- B. **A cooldown rate of less than 100 degrees/hour should be established to prevent exceeding Tech Spec limits.**
- C. **A cooldown rate of less than 25 degrees/hour should be established to prevent pressurized thermal shock concerns.**
- D. **The steam dumps should be very slowly opened (<2 psig / sec) to prevent MSIV closure.**

**Distracter Analysis:**

- A. **Incorrect:** The steam dumps should be opened slowly.  
**Plausible:** If the candidate confuses the FR-C guidance with tube rupture guidance.
- B. **Incorrect:** While TS limits apply, the dumps will be isolated long before that limit is approached.  
**Plausible:** This is the TS cooldown limit.
- C. **Incorrect:** PTS is not the immediate concern with CETs >1200 degrees.  
**Plausible:** PTS and limiting cooldown are reasonable concerns for other events.
- D. **Correct:** note in C.1 informs the operator that a depressurization rate of less than 2 psig/second will maintain the MSIVs open.

Level: RO&SRO

KA: EPE 074 EK2.06 (3.5/3.6)

Lesson Plan Objective: EP-FRC SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-FRC page 37
2. EP/1/A/5000/FR-C.1 page 9

**Bank Question: 908****Answer: C**

1 Pt(s)

Unit 1 is in mode 6.

A fire has occurred in a charcoal filter in the containment ventilation system. RP is performing actions necessary to identify the HOT ZONE.

How will the operators identify the HOT ZONE boundaries?

- A. **Yellow and Magenta ropes**
- B. **Red tape**
- C. **RP tape**
- D. **Yellow tape**

---

**Distracter Analysis:**

- A. **Incorrect:** RP tape identifies HOT zone boundaries.  
**Plausible:** Y&M rope is used to identify radiation area boundaries, and RP tape shares those colors.
- B. **Incorrect:** RP tape is used.  
**Plausible:** Red tape marks the WARM zone boundaries.
- C. **Correct:** The Hot zone is identified by RP tape
- D. **Incorrect:** RP tape is used.  
**Plausible:** Yellow tape marks the COLD zone boundaries.

Level: RO&amp;SRO

KA: APE 067 G2.3.10 (2.9/3.3)

Lesson Plan Objective: None

Source: New

Level of knowledge: memory

References:

1. RP/0/A/5700/025 enclosure 4.4

**Bank Question: 909****Answer: A**

1 Pt(s)

Unit 1 is at full power, steady state. Given the following events and conditions:

- Power is lost to all control room annunciators.
- 20 minutes later, the OSM determines that the declaration of an Unusual Event is warranted.
- 5 minutes after declaring the Unusual Event, the Emergency Notification form is completed, and the OSM directs an operator to make the State notification.

From the time of completion of the notification form, how much time does the operator have to make the State notification?

- A. 10 minutes
- B. 15 minutes
- C. 55 minutes
- D. 60 minutes

---

**Distracter Analysis:**

- A. **Correct:** 15 minutes from the time of declaration.
- B. **Incorrect:** 10 minutes to the deadline.  
**Plausible:** If the candidate believes the 15 minute deadline starts with the completion of the form.
- C. **Incorrect:** 10 minutes to the deadline.  
**Plausible:** If the candidate believes that the 1 hour NRC deadline applies to State notification, and that it starts from the time of event declaration.
- D. **Incorrect:** 10 minutes to the deadline.  
**Plausible:** If the candidate believes that the 1 hour deadline starts with the completion of the form.

Level: RO Only 10CFR55.41(b)10

KA: G2.4.29 (2.6/4.0)

Lesson Plan Objective: EP-EAL SEQ 4

Source: New

Level of knowledge: memory

References:

1. RP/O/A/5700/000 enclosure 4.9

**Bank Question: 910****Answer: C**

1 Pt(s)

Which one of the following procedures would be used to bring Unit 1 to cold shutdown after dealing with a fire that results in a loss of plant control from the control room?

- A. AP/1/5500/A/24, (*Loss of Plant Control Due to Fire*)
- B. OP/0/A/6100/20, (*Operational Guidelines Following Fire in Auxiliary Building or Vital Area*)
- C. OP/0/A/6100/21, (*Shutdown Outside the Control Room Following a Fire*)
- D. OP/1/A/6100/04, (*Shutdown Outside the Control Room From Hot Standby to Cold Shutdown*)

---

**Distracter Analysis:**

- A. **Incorrect:** this brings the unit to hot standby  
**Plausible:** candidate believes this procedure will bring the unit to mode 5.
- B. **Incorrect:** this procedure picks up from AP/24 and takes steps to prepare the unit for hot shutdown followed by cold shutdown after a fire in the aux building or vital area  
**Plausible:** candidate unfamiliar with the procedure
- C. **Correct:** procedure provides the steps required to achieve cold shutdown following a fire that renders the control room unusable.
- D. **Incorrect:** used when the control room is uninhabitable.  
**Plausible:** this procedure does bring the unit to cold shutdown, but not applicable if there has been damage to vital equipment due to fire.

Level: RO&amp;SRO

KA: G2.4.25 (2.9/3.4)

Lesson Plan Objective: SS SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-MN-CP-SS pages 11, 13, 25

**Bank Question: 911****Answer: B**

1 Pt(s)

The crew has verified natural circulation in ES-0.1 (*Reactor Trip Response*) based on decreasing core exit thermocouple readings and subcooling  $> 0$  °F. Ten minutes later, the operator notes that the thermocouple input to both plasma displays is malfunctioning.

Which one of the following correctly describes a valid indication that natural circulation is continuing?

- A. S/G saturation temperatures are decreasing and *REACTOR VESSEL UR LEVEL* indication is greater than 100 %.
- B. S/G pressures are decreasing and  $T_{\text{cold}}$  is at S/G saturation temperature.
- C. S/G pressures are decreasing and *REACTOR VESSEL D/P* indication is greater than 100%.
- D. S/G pressure is at saturation pressure for  $T_{\text{cold}}$  and *REACTOR VESSEL D/P* indication is greater than 100 %.

**Distracter Analysis:**

- A. **Incorrect:** There is no indication of coupling between primary and secondary.  
**Plausible:** These are important indications during natural circulation.
- B. **Correct:**
- C. **Incorrect:** RVLIS is unavailable during natural circulation.  
**Plausible:** S/G pressure decreases during natural circulation and RVLIS is one of the other plasma display indications.
- D. **Incorrect:** RVLIS is unavailable during natural circulation.  
**Plausible:** S/G pressure will remain close to saturation for  $T_{\text{cold}}$  during natural circulation and RVLIS is one of the other plasma display indications.

Level: RO&amp;SRO

KA: SYS 017 K3.01 (3.5/3.7)

Lesson Plan Objective: EP-E0 SEQ 6

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-E0 pages 117, 123
2. ES-0.1 page 15
3. ES-0.1 Enclosure 2 page 31

**Bank Question: 913****Answer: D**

1 Pt(s)

Unit 1 was conducting a reactor start up immediately following a refueling outage. Given the following conditions and events:

- NC  $T_{ave} = 551^{\circ}\text{F}$
- The reactor is critical at  $2 \times 10^{-6}$  amps in the intermediate range
- A rod control failure results in control rods being withdrawn from 55 steps to 75 steps in bank C before the withdrawal was stopped
- The reactor is not tripped
- Steam dumps are in manual due an unrelated failure

If the steam dump position is not adjusted, what is the final value of  $T_{ave}$  after the reactivity transient has stabilized?

**REFERENCES PROVIDED: Databook ENCL 4.3  
Table 6.3.B, Table 6.6, Table 6.10**

- A.  $T_{ave}$  will decrease to less than  $550.5^{\circ}\text{F}$
- B.  $T_{ave}$  will remain essentially unchanged between  $550.5$  and  $551.5^{\circ}\text{F}$
- C.  $T_{ave}$  will increase to between  $551.6$  and  $554.0^{\circ}\text{F}$
- D.  $T_{ave}$  will increase to greater than  $554.1^{\circ}\text{F}$

**Distracter Analysis:** Integral Rod Worth (IRW) is defined as the total amount of reactivity added by the rods due to their position in the core (Rod Defect). IRW is zero (0) when rods are fully withdrawn. The addition of positive reactivity will cause the NCS  $T_{ave}$  to increase to offset the positive reactivity with negative reactivity (the Rx is above the point of adding heat at  $1 \times 10^{-6}$  amps). The increase in  $T_{ave}$  will increase steam pressure by  $\sim 50$  psig – which is why the steam dumps must remain in a constant position to avoid compensating for the change.

55 steps = 1812 PCM - Table 6.3B

75 steps = 1630PCM

$\Delta\text{PCM} = +182 \text{ PCM}$  – change in PCM from rod withdrawal

At 0 EFPD and  $550^{\circ}\text{F}$ ,  $\text{PCM/ppmb} = 6.96 \text{ PCM/ppm}$  – from Table 6.10 at 0 EFPD

$182 \text{ PCM} / 6.96 \text{ PCM/ppm} = 26.1 \text{ ppm}$  – change in reactivity

$1372 \text{ ppm} - 26.1 \text{ ppm} = 1345.9 \text{ ppm} > 557^{\circ}\text{F}$  from Table 6.6 at 0 EFPD burnup

- A. **Incorrect:** Temperature increases to slightly above  $557^{\circ}\text{F}$

- Plausible:** If the candidate reverses the logic and applies the temperature defect correction in the opposite direction
- B. Incorrect:** Temperature increases above 557 °F  
**Plausible:** If the candidate thinks that another mechanism will compensate for the positive reactivity addition or does not recognize that the reactor is above the point of adding heat.
- C. Incorrect:** Temperature increases above 557 °F  
**Plausible:** If the candidate makes a mistake on the calculation or uses the wrong curve. Temperature is increasing a small amount - but not enough due to the rod worth added.
- D. Correct:** Temperature increases above 557 °F

Level: RO&SRO

KA: APE 001 AK1.21 (2.9/3.2)

Lesson Plan Objective: RT-RCO SEQ 23

Source: New

Level of knowledge: analysis

References:

1. OP-MN-RT-RCO page 51
2. OP-MN-RT-RCO page 59 (figure 7.2)
3. OP/1/A/6100/022 Encl 4.3  
Table 6.3B - PROVIDED  
Table 6.6 - PROVIDED  
Table 6.10 - PROVIDED
4. OP-MC-IC-ENB page 49

**Bank Question: 914.1****Answer: A**

1 Pt(s)

Unit 1 was conducting a power ascension to 100%. Given the following events and conditions:

- Reactor power = 10%
- 1A S/G water level = 40% for 3 hours
- 1A S/G has been fed through the CA nozzles
- Feedwater flow has been not been initiated through the CF nozzles

Which one of the following statements correctly describes the required operational limitation on the CF nozzles to prevent water hammer in the 1A S/G?

- A. **Reduce power below 1% and forward purge the CF nozzle prior to initiating feedwater flow through the CF nozzles.**
- B. **Prior to exceeding 15% power, initiate feedwater flow through the CF bypass valves for one hour to warm up the gooseneck.**
- C. **Increase 1A S/G level to greater than 45% and immediately initiate feedwater flow the CF nozzles.**
- D. **Prior to exceeding 25% power, initiate feedwater flow through the CF nozzles.**

**Distracter Analysis:**

- A. **Correct:** to prevent water hammer.
- B. **Incorrect:** This will cause water hammer in the gooseneck  
**Plausible:** 15% is the limit for feed flow through the CF bypass valves. The one hour requirement is for the amount of time that the S/G level must be < 45% before a forward purge and power reduction is required.
- C. **Incorrect:** The gooseneck has dried out and must be forward flushed to prevent water hammer. S/G must be  
**Plausible:** If S/G water level had been > 45%, feedwater flow could have been initiated as long as reactor power was < 25%.
- D. **Incorrect:** The gooseneck has dried out and must be forward flushed to prevent water hammer.  
**Plausible:** These are the operating limits to prevent water hammer if the S/G level was > 45% and the gooseneck was not dry.

Level: RO&amp;SRO

KA: SYS 059 K1.03 (3.1/3.3)

Lesson Plan Objective: CF-CF Seq 11, 22

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-CF-CF pages 29, 31, 47
2. OP/1/A/6250/001 page 1

**Bank Question: 957****Answer: D**

1 Pt(s)

Unit 2 was operating at 100% when a complete loss of offsite power (LOOP) occurred. All systems were operable and in a normal alignment.

Which one of the following containment ventilation systems will have all operating fans/air handling units stopped after 5 minutes without any offsite power?

- A. VU ventilation units
- B. Pressurizer booster fans
- C. Pipe tunnel booster fans
- D. Steam generator booster fans

---

**Distracter Analysis:**

- A. **Incorrect:** VU AHUs and return air fans will start on a LOOP/blackout – they have an emergency power supply.  
**Plausible:** They will not start in a safety injection signal
- B. **Incorrect:** Pressurizer booster fans will start on a LOOP from the B/O sequencer – they have an emergency power supply.  
**Plausible:** If the candidate confuses the emergency power supply for the pressurizer booster fans with the steam generator booster fans
- C. **Incorrect:** Pipe tunnel booster fans will start on a LOOP from the B/O sequencer – they have an emergency power supply.  
**Plausible:** They will not start in a safety injection signal
- D. **Correct:** Steam generator booster fans do not restart on a LOOP - B/O signal – they do not have an emergency power supply

Level: RO&amp;SRO

KA: SYS 022 K2.01 (3.0\*/3.1)

Lesson Plan Objective: CNT-VUL LPRO 5

Source: New

Level of Knowledge: memory

References:

1. OP-MC-CNT-VUL pages 35, 39

# Draft Submittal

(Pink Paper)

1. Senior Reactor Operator Written Exam

## **MCGUIRE EXAM**

**50-369, 370/2002-301  
FEBRUARY 11 - 15, 2002**

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

**McGuire Nuclear Station**

**ANSWER KEY**

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**Bank Question: 034****Answer: B**

1 Pt(s)

Unit 1 is heating up in mode 4 with NCS temperature at 230°F.

Which one of the following conditions would violate containment integrity if the condition existed for 42 hours in the current mode?

**REFERENCES PROVIDED: Tech Spec 3.6.1 & 3.6.3**

- A. 1KF-122 (*Fuel Transfer Tube*) is known to be leaking by its seat.
- B. 1RN-253A (*RB Non ESS Sup Cont Inside Isol*) failed its stroke-timing test, but can be closed from the control room.
- C. 1KC-429B (*Rx Bldg Drain Hdr Cont Inside Isol*) power supply has failed, and is closed.
- D. 1VQ-1A (*Cont Air Rel Inside Isol*) has its air supply removed and has failed closed.

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**Distracter Analysis:**

- A. **Incorrect:** 1KF-122 is normally open, and not automatically closed  
**Plausible:** if the candidate does not recognize that integrity is provided by the blind flange.
- B. **Correct:**
- C. **Incorrect:** Closed without power retains containment integrity  
**Plausible:** This is an automatic cont. isolation valve that is inoperable
- D. **Incorrect:** closed with air isolated retains containment integrity.  
**Plausible:** This is an automatic cont. isolation valve that is inoperable

Level: SRO Only 10CFR55.43(b)(2)

KA: APE069A2.01 (3.7 / 4.3)

Lesson Plan Objective: CNT-CNT SEQ 9

Source: Bank; Ques\_34, McGuire NRC 1996

Level of knowledge: comprehension

References:

1. OP-MC-CNT-CNT page 31
2. Tech Spec 3.6.1 and 3.6.3 - PROVIDED

**Bank Question: 037.1****Answer: A**

1 Pt(s)

Unit 1 was conducting a reactor startup following a refueling outage. Given the following conditions during the reactor startup:

- N-31 indicates  $2.1 \times 10^4$  cps
- N-32 indicates  $2.0 \times 10^4$  cps
- N-35 indicates  $5.5 \times 10^{-11}$  amps
- N-36 indicates  $1.0 \times 10^{-10}$  amps
- Rods are in manual with no rod motion
- SR and IR NIs are slowly increasing
- $T_{ave}$  is holding steady

Which one of the following best explains the indications?

- A. N-35 compensating voltage is set too high
- B. N-35 compensating voltage is set too low
- C. N-36 compensating voltage is set too high
- D. N-36 compensating voltage is set too low

---

**Distracter Analysis:**

- A. **Correct:** N-35 reads too low for the conditions given, compensating voltage is too high.
- B. **Incorrect:** N-35 reads too low.  
**Plausible:** candidate reverses the effect of compensation.
- C. **Incorrect:** overlap is proper for N-36  
**Plausible:** If candidate does not know that  $P6 = 1 \times 10^{-10}$  IR is about  $2 \times 10^4$  CPS SR.
- D. **Incorrect:** overlap is proper for N-36  
**Plausible:** If candidate does not know that  $P6 = 1 \times 10^{-10}$  IR is about  $2 \times 10^4$  CPS SR.

Level: RO&SRO

KA: APE 033AK1.01(2.7/3.0)

Lesson Plan Objective: IC-ENB SEQ 7

Source: Mod Ques\_037, Catawba NRC 1999

Level of Knowledge: analysis

References:

1. OP-MC-IC-ENB pages 25, 69, 79

**Bank Question: 048****Answer: D**

1 Pt(s)

Which one of the following selections correctly matches the reactor trip signals to their limiting accident?

	<u>Reactor Trip Signal</u>	<u>Limiting Accident/Protection</u>
A.	OPΔT OTΔT Pzr High Level Pzr Low Pressure	DNB Excessive fuel centerline temperature NC system integrity DNB
B.	OPΔT OTΔT Pzr High Level Pzr Low Pressure	Excessive fuel centerline temperature DNB DNB NC system integrity
C.	OPΔT OTΔT Pzr High Level Pzr Low Pressure	DNB Excessive fuel centerline temperature NC system integrity DNB
D.	OPΔT OTΔT Pzr High Level Pzr Low Pressure	Excessive fuel centerline temperature DNB NC system integrity DNB

**Distracter Analysis:**

- A. **Incorrect:** OPΔT and OTΔT are reversed.  
**Plausible:** PZR low pressure and high level are correct.
- B. **Incorrect:** All are incorrect.  
**Plausible:** Provided for psychometric balance.
- C. **Incorrect:** OPΔT and OTΔT are reversed.  
**Plausible:** PZR low pressure and high level are correct.
- D. **Correct:**

Level: RO&amp;SRO

KA: SYS 012K5.01(3.3/3.8)

Lesson Plan Objective: IC-IPE SEQ 2

Source: Bank; Ques48e, McGuire NRC 1996

Level of knowledge: memory

References:

1. OP-MC-IC-IPE pages 19, 45

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**Bank Question: 051****Answer: C**

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1 Pt(s)

A large break LOCA is in progress and the operators are responding in E-1 (*Loss of Reactor or Secondary Coolant*). Given the following conditions:

- 1A ND pump is tagged out of service for maintenance.
- Containment pressure is 14 psig.
- FWST level is below the swap over setpoint.

When shifting to cold leg recirc using ES-1.3 (*Transfer to Cold Leg Recirc*), valve 1NI-184B (*1B ND Pump Suction From Cont Sump Isol*) fails to open. The operators implement ECA-1.1 (*Loss of Emergency Coolant Recirculation*).

FR-Z.1 (*Response to High Containment Pressure*) requires both NS pumps to be in operation. ECA-1.1 limits the operators to only one NS pump in step 11.

Which of the following describes the correct rationale for NS pump operation in this condition?

- A. **Both NS pumps will operate because a total loss of ND causes the NS system to become relatively more important in reducing containment pressure.**
- B. **Both NS pumps will operate because FR-Z.1 was implemented in response to a red path.**
- C. **One NS pump will operate because this conserves FWST water level as long as possible for injection while providing sufficient NS flow to reduce containment pressure.**
- D. **One NS pump will operate because ECA procedures always have priority over FRPs.**

---

**Distracter Analysis:**

- A. **Incorrect:** ECA-1.1 takes priority over FR-Z.1  
**Plausible:** While the rationale is true, the supply for NS comes from the FWST, which will be drawn down faster until containment sump recirculation can be established.
- B. **Incorrect:** ECA-1.1 takes priority over FR-Z.1  
**Plausible:** FRPs normally take priority over most EOPs
- C. **Correct answer**
- D. **Incorrect:** 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.

Level: SRO Only; 10CFR55.43(b)(5)

KA: WE11 G2.1.7 (3.7/4.4)

Lesson Plan Objective: EP-FRZ SEQ 4

Source: Bank; Ques\_051, McGuire NRC 2000

Level of knowledge: memory

References:

1. OP-MC-EP-FRZ pages 21, 25

**Bank Question: 093****Answer: C**

1 Pt(s)

Unit 1 was responding in E-1 (*Loss of Reactor or Secondary Coolant*) to small break LOCA.

Given the following parameters at the indicated times:

<b>Parameter</b>	<b>0200</b>	<b>0205</b>	<b>0210</b>
• NCS pressure (psig)	1500	1550	1600
• Core exit T/C temp (°F)	576	584	586
• $T_{ave}$ (°F)	567	569	572
• $T_{hot}$ (°F)	570	574	578
• $T_{cold}$ (°F)	563	564	566
• Pressurizer level (%)	10%	19%	28%
• Containment pressure (psig)	0.7	0.9	1.1

CA flow to all 4 S/Gs exceeds 450 gpm from 0200 to 0210.

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

**REFERENCES PROVIDED:**

*E-1 step 7 page 5*  
*Databook Curve 1.10B*  
*Steam Tables*

- A. Transition to ES-1.1 at 2:00
- B. Transition to ES-1.1 at 2:05
- C. Transition to ES-1.1 at 2:10
- D. Remain in E-1, SI flow may be not terminated

**Distracter Analysis:**

The objective of this question is to determine if the candidates can apply the SI termination criteria and assess saturation conditions in the NC system. **Use of the Unit 1 Databook curve 1.10B is NECESSARY.** Accurate use of the steam tables will lead to an incorrect answer due to a failure to consider the instrument errors involved. If Steam Tables are used to determine subcooling, then at 0205 the candidates have met the criteria to terminate SI.

From the steam tables:

$$1500 \text{ psig} + 14.6 = 1514.6 \text{ psia}$$

$$597 \text{ }^\circ\text{F} = 1510 \text{ psia saturation pressure}$$

- A. Incorrect:** Not >11% PZR level. saturated using curve 1.10B, which accounts for instrument error and must be used to determine all EOP transitions.  
**Plausible:** if the candidate uses Databook, this point is subcooled – < 578 °F.
- B. Incorrect:** - not saturated - by curve book - >582 °F  
**Plausible:** - if the candidate does not determine Psat correctly - or if he uses RTD temperatures in place of T/C temperatures for core temperature determination.
- C. Correct answer:** by the curve book, the core is < 588°F.
- D. Incorrect:** meets the criteria at 0210.  
**Plausible:** - if the candidate does not determine P-sat correctly thinks ACC values come in at 1 psig containment pressure.

Level: SRO Only; 10CFR55.43(b)(5)

KA: WE 02 EA2.1 (3.3/4.2)

Lesson Plan Objective: IC-ICM SEQ 9

Source: Mod; Ques\_093, McGuire NRC 1999

Level of knowledge: analysis

References:

1. OP-MC-IC-ICM pages 33, 35
2. EP/1/A/5000/E-1 page 5
3. Unit 1 Databook Curve 1.10B
4. Steam Tables
5. OMP 4-3 page 9

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**Bank Question: 124****Answer: B**

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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 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. 2 people working for 2 hours
- 

**Distracter Analysis:**

- A. **Incorrect:** six people can accomplish the job with 4 1/2 Rem.  
**Plausible:** Each individual would have the least exposure.
- B. **Correct:**
- C. **Incorrect:** six people can accomplish the job with 4 1/2 Rem.  
**Plausible:** fewest individuals not exceeding the admin dose limit.
- D. **Incorrect:** six people can accomplish the job with 4 1/2 Rem.  
**Plausible:** Exposes the fewest individuals.

Level: RO&SRO

KA: G2.3.2 (2.5/2.9)

Lesson Plan Objective: RAD-RP SEQ 135

Source: Bank; Ques\_124, Catawba NRC 2001

Level of knowledge: comprehension

References:

1. OP-MC-RAD-RP page 135

**Bank Question: 137.1****Answer: A**

1 Pt (s)

Unit 2 refueling is in progress. Given the following plant alarms:

- 2EMF-3 (*Containment Refueling Bridge*) trip 2 alarm.
- 2EMF-39 (*Containment Gas*) trip 2 alarm.
- 2EMF-40 (*Containment Iodine*) trip 2 alarm.

Which one of the following procedures should be implemented?

- A. **AP-25 (*Spent Fuel Damage*)**
- B. **FR-Z.3 (*Response to High Containment Radiation Level*)**
- C. **AP-40 (*Loss of Refueling Canal Level*)**
- D. **AP-18 (*High Activity in Reactor Coolant*)**

---

**Distracter Analysis:**

- A. **Correct:** Per the entry conditions indications are consistent with a dropped and damaged fuel element.
- B. **Incorrect:** Must implement AP-25.  
**Plausible:** There is indication of high containment radiation level.
- C. **Incorrect:** unless accompanied with failed fuel, gas/iodine monitors should not go into alarm.  
**Plausible:** for lowering cavity level, the bridge alarm would be in alarm.
- D. **Incorrect:** Must implement AP-25.  
**Plausible:** the monitor alarms could be consistent with failed fuel at power.

Level: RO&amp;SRO

KA: SYS 034A2.01 (3.6/4.4)

Lesson Plan Objective: FH-FC SEQ 6

Source: Bank; Ques137a, McGuire NRC 1997

Level of knowledge: comprehension

References:

1. OP-MC-FH-FC pages 17 -19

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**Bank Question: 143.1****Answer: C**

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1 Pt(s)

On January 26<sup>th</sup>, you are directed to complete a valve lineup on Unit 1 in accordance with enclosure 4.10 to OP/1/A/6200/005, *Spent Fuel Cooling System*. The controlled copy of the procedure has a restricted change noted for valve 1KF-145. This normally open valve has been locked open in accordance with a special order that remains in effect until February 1<sup>st</sup>.

Which one of the following statements describes the correct action needed to validate your working copy of the procedure? (Your copy of the procedure is in other respects identical to the controlled copy.)

- A. **Replace your working copy with an updated procedure printed from the NEDL system.**
- B. **Annotate the working copy with just the restricted change number (as a cross reference) next to the 1KF-145 line item, and initial the change.**
- C. **Annotate the working copy with a pen and ink change for the valve position for 1KF-145; change to "Locked Open", annotate the restricted change number and initial the change.**
- D. **Use the working copy as is since restricted changes of this nature are not required to be written into working copies.**

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**Distracter Analysis:**

- A. **Incorrect:** Cannot print because NEDL will not list this procedure as issued.  
**Plausible:** NEDL is an approved source of working copies for non-changed procedures.
- B. **Incorrect:** Must write in the actual change language.  
**Plausible:** The controlled copy is annotated with only the restricted change #.
- C. **Correct:**
- D. **Incorrect:** Must write in the actual change language.  
**Plausible:** It is not necessary to annotate working copies if the change does not affect the job or no longer applies – would be true after FEB 1<sup>st</sup>.

Level: RO&amp;SRO

KA: G2.1.21 (3.1/3.2)

Lesson Plan Objective: ADM-OP SEQ 8

Source: Mod; Ques\_143, McGuire NRC 1997

Level of knowledge: memory

References:

1. OMP 4-1 pages 11-12

**Bank Question: 164.1****Answer: C**

1 Pt(s) Unit 1 was operating at 100% when a 1D S/G steam header break occurred. The operators are responding in E-2 (*Faulted Steam Generator Isolation*). The following sequence of events occurred:

- Isolation of the 1D S/G
- PZR level dropped to 0% and was restored to 20%
- NCS pressure is 1900 psig
- Safety Injection has not been reset

What are the correct panel actions for the restoration of power to pressurizer back-up heater bank D?

- A. **Reset safety injection on 1MC-10**  
**Select CLOSED on the heater breaker switch on 1MC-5**
- B. **Select CLOSED on the heater breaker switch on 1MC-5**  
**Select ON for the heater control switch on 1MC-10**
- C. **Select MANUAL on the heater mode switch on 1MC-10**  
**Select CLOSED on the heater breaker switch on 1MC-5**  
**Select ON for the heater control switch on 1MC-10**
- D. **Reset safety injection on 1MC-10**  
**Select MANUAL on the heater mode switch on 1MC-11**  
**Select CLOSED on the heater breaker switch on 1MC-5**  
**Select ON for the heater control switch on 1MC-11**

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**Distracter Analysis:**

- A. **Incorrect:** insufficient action, wrong location for SI reset  
**Plausible:** if the candidate is not familiar with the interlocks on the PZR heater circuit. This is the action needed for Bank C.
- B. **Incorrect:** must turn the heater mode switch to MANUAL.  
**Plausible:** partially correct – all other actions are necessary
- C. **Correct answer:** Bank D does not require SI reset
- D. **Incorrect:** Not necessary to reset safety injection and wrong location for SI reset and breaker closure.  
**Plausible:** This is the right method for Banks A&B and the prior version of the question.

Level: RO&SRO

KA: G2.1.31 (4.2/3.9)

Lesson Plan Objective: PS-IPE SEQ 10/11

Source: Mod; Ques\_164, McGuire NRC 1997

Level of knowledge: comprehension

References:

1. OP-MC-PS-IPE page 23
2. EP/1/A/5000/ES-1.1 page 19

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**Bank Question: 177****Answer: B**

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1 Pt(s)

Units 1 and 2 are at full power when a loss of offsite power occurs on Unit 2.

Which one of the following main turbine overspeed protective devices/features will be the FIRST to actuate to prevent a turbine overspeed condition?

- A. At a speed of 103%, the turbine throttle valves will close.
- B. GBX relay will close the governor and intercept valves.
- C. At a speed of 110%, the governor and intercept valves will close.
- D. GBX relay will close the turbine throttle valves.

---

**Distracter Analysis:**

- A. **Incorrect:** The governor and intercept valves close.  
**Plausible:** 103% is an overspeed setpoint.
- B. **Correct:** GBX relay initiates when the switchyard breakers open.  
The governor and intercept valves close.
- C. **Incorrect:** Valves trip at 103%.  
**Plausible:** 110% is an overspeed protection setpoint, and these valves will close.
- D. **Incorrect:** GBX relay does not close the throttle valves.  
**Plausible:** GBX relay does actuate.

Level: RO&amp;SRO

KA: SYS 045 A4.02 (2.7/2.6)

Lesson Plan Objective: MT-MT SEQ 3

Source: Mod; Ques\_177, McGuire NRC 1997

Level of knowledge: memory

**References:**

1. OP-MC-MT-MT page 27, 29, 31, 39

**Bank Question: 181****Answer: B**

1 Pt(s)

Step 5d of FR-H.1 (*Response to Loss of Secondary Heat Sink*) requires the operators to check Pzr pressure less than 2335 psig after initiating emergency boration flow to the reactor. If pressure exceeds 2335 psig, the contingency action is to open a PORV and rapidly depressurize to 2135 psig. What is the basis for this step?

- A. To maintain pressure below the PORV setpoint to prevent cycling the PORVs.
- B. To ensure that the boration flow rate is sufficient for emergency boration.
- C. To maintain positive control of NC pressure to prevent lifting a code safety relief valve.
- D. To reduce NC pressure to allow closing of NV pump recirc valves to maximize emergency boration flow.

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**Distracter Analysis:**

- A. **Incorrect:** This is the PORV setpoint.  
**Plausible:** This would be a plausible action to prevent an automatic actuation.
- B. **Correct answer**
- C. **Incorrect:** The purpose is to ensure adequate boron flow.  
**Plausible:** This is the function of the PORVs.
- D. **Incorrect:** The recirc valves could not be closed at 2135 psig.  
**Plausible:** The purpose does involve enhancing boron flow.

Level: RO&amp;SRO

KA: APE 024AK3.02(4.2/4.4)

Lesson Plan Objective: EP-FRS SEQ 4

Source: Bank; McGuire NRC 1997

Level of knowledge: memory

References:

1. OP-MC-EP-FRS page 27
2. EP/1/A/5000/FR-S.1

**Bank Question: 191.1****Answer: C**

1 Pt(s)

Unit 1 was operating at 100% power when a total loss of feedwater occurred. Following initiation of feed and bleed, the Operators reached step 34 of FR-H.1 (*Response to Loss of Secondary Heat Sink*) that requires feeding the S/Gs.

Given the following conditions:

	Loop A	Loop B	Loop C	Loop D
S/G (WR) [%]	18	9	10	13
NC T <sub>Hot</sub> [°F]	545	542	549	555

- Core exit T/Cs are trending UP.
- Containment pressure is 2.8 psig and increasing.
- VI pressure is 120 psig.

Which one of the following statements correctly describes the initial restrictions for restoring feedwater flow in FR-H.1 when the 1B CA pump has been restarted?

**REFERENCES PROVIDED: EP/1/A/5000/FR-H.1, Page 29 and Enclosure 10**

- A. Feedwater may be restored to 1A S/G but limited to a feed rate required to lower core exit T/Cs.
- B. Feedwater may be restored to 1C and 1D S/G but must be limited to a 100 GPM flow rate to each S/G.
- C. Feedwater may be restored to 1D S/G but must be limited to feed rate required to lower core exit T/Cs.
- D. Feedwater may be restored to 1A and 1D S/Gs but limited to a 100 GPM flow rate to each S/G.

**Distracter Analysis:** There was a change in this procedure since the prior question. The previous guidance was not to feed a S/G when T-hot > 550 °F and to select the B and C S/Gs for restoration of flow. Now the guidance is to select the S/G that has the highest apparent level and to preferentially select the B or C S/G.

- A. **Incorrect:** 1A S/G is limited to < 100 gpm feed rate because it is < 12% level and 1B CA pump will not feed 1A S/G.  
**Plausible:** This would be partially correct be if level was <12%.
- B. **Incorrect:** Must feed 1D S/G at rate high enough to lower core exit T/Cs. Limiting feed rate to 100 gpm will not prevent core damage.

- Plausible:** partially correct - feeding SG 1B is preferable because it provided steam for the TDCA pump.
- C. Correct answer:** feed the S/G's > 12% level (A&D) at whatever rate is needed to turn the CET trend is the appropriate choice. But 1B CA pump cannot feed 1A S/G
- D. Incorrect:** The 100 gpm limit is not appropriate since CET's are increasing and level is greater than 12%. The 1A S/G cannot be fed.  
**Plausible:** 1A & 1D S/Gs are the appropriate choice based on > 12%.

Level: RO&SRO

KA: SYS 061K3.02(4.2/4.4)

Lesson Plan Objective: EP-FRH SEQ 6

Source: Mod; Ques191a, McGuire NRC 1997

Level of knowledge: comprehension

References:

1. OP-MC-EP-FRH page 77
2. EP/1/A/5000/FR-H.1 page 29 and Enclosure 10 - PROVIDED

**Bank Question: 206.1****Answer: D**

1 Pt(s)

Unit 1 is recovering from a total loss of feedwater accident. The following sequence of events occurred:

- The operators implemented E-0 (*Reactor Trip or Safety Injection*) then transitioned to ES-0.1 (*Reactor Trip Response*) at step 5
- Transitioned to FR-H.1 (*Response to Loss of Secondary Heat Sink*) due to a RED PATH for heat sink.
- Feedwater was restored by rapidly depressurizing all 4 S/Gs and establishing CF/CM flow
- Safety injection (SI) did not actuate (not required)
- Pressurizer level is 4%.
- The operators implement FR-H.1 step 18.c.RNO 2) a) which states:

2) **IF** an S/I has not occurred, **THEN**:

— a) **IF** Pzr pressure or level is low due to operator controlled cooldown in this procedure, **THEN** S/I actuation requirements based on Pzr level or pressure do not apply in subsequent procedures unless conditions degrade.

- At step 18.c.RNO 2 c) of FR-H.1, the operators verified feed and bleed was not initiated and returned to ES-0.1 (procedure and step in effect)
- The ES-0.1 foldout criteria states:

1. *S/I Actuation Criteria:*

- **IF** NC Subcooling based on core exit T/Cs is less than 0 °F  
**OR** Pzr level can not be maintained greater than 4%,  
**THEN** initiate S/I and **GO TO** EP/1/A/5000/E-0

Which one of the following statements is the correct interpretation in the EOP bases for this specific situation?

- A. S/I should be actuated because the rapid depressurization of S/Gs in FR-H.1 was not considered an “operator controlled cooldown”.
- B. S/I should be actuated because FR-H.1 guidance no longer applies after transition to ES-0.1.
- C. S/I should not be actuated because the addition of cold water will immediately cause pressurized thermal shock to the NC system.
- D. S/I should not be actuated because this action would cause a loss of heat sink for an expected pressurizer condition.

**Distracter Analysis:** WOG response to DW-92-25 addresses this problem. Actuating S/I would cause a FWI and stop the flow of CF/CM into the S/Gs

- A. Incorrect:** SI should not be actuated.  
**Plausible:** This would be the expected follow the EP's answer, if the candidate does not recognize that feed would be lost. The cooldown / depressurization exceeds the normal limits – but is still considered operator controlled.
- B. Incorrect:** SI should not be actuated.  
**Plausible:** If the candidate thinks that OMP-4.3 procedural guidance states that IF – THEN steps in FRGs do not apply after transition from the FRG.
- C. Incorrect:** PTS is not a concern because the NC pressure has been reduced.  
**Plausible:** The injection of cold water into the NC system would thermally stress the NC system – but pressure is too low for PTS.
- D. Correct:** Actuating S/I would cause a FWI and stop the flow of CF/CM into the S/Gs

Level: SRO Only; 10CFR55.43(b)(5)

KA: WE 05 EA 2.2(3.7/4.3)

Lesson Plan Objective: EP-FRH SEQ 6

Source: Mod; Ques206a, McGuire NRC 1997

Level of knowledge: comprehension

References:

1. OP-MC-EP-FRH page 45
2. EP/1/A/5000/FR-H.1 page 18
3. EP/1/A/5000/ES-0.1 page 30

**Bank Question: 260.1****Answer: B**

1 Pt(s)

Unit 2 is responding to a loss of main feedwater event from 100% power. Given the following events and conditions:

- The reactor has tripped
- The 2A and 2B Motor-driven CA (MDCA) pumps started in auto
- The Turbine-driven CA pump (TDCA) started in auto
- CA suction pressure slowly drops to 4 psig

Which one of the following automatic system responses (if any) will occur at this time?

- A. **2A CA pump suction shifts to the RN system  
#2 TDCA pump suction shifts to the RN system  
2B CA pump suction shifts to the RN system**
- B. **2A CA pump suction shifts to the RN system  
#2 TDCA pump suction remains aligned to the CA storage tank  
2B CA pump suction remains aligned to the CA storage tank**
- C. **2A CA pump suction remains aligned to the CA storage tanks  
#2 TDCA pump suction shifts to the RN system  
2B CA pump suction shifts to the RN system**
- D. **2A CA pump suction remains aligned to the CA storage tank  
#2 TDCA pump suction remains aligned to the CA storage tank  
2B CA pump suction remains aligned to the CA storage tank**

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**Distracter Analysis:** Unit 2 A train valves RN-69A and CA-15A opens at 4.5 psig and B train valves including the TDCA A train supply opens at 3.5 psig.

- A. **Incorrect:** 2B CA and TDCA pumps do not shift suctions to the RN system.  
**Plausible:** if the candidate does not know the swap over setpoints
- B. **Correct Answer:**
- C. **Incorrect:** 2A CA pump shifts suctions to the RN system and TDCA and 2B CA pumps do not shift  
**Plausible:** if the candidate reverses the train relation of the unit difference.
- D. **Incorrect:** 2A CA pump shifts suctions to the RN system.  
**Plausible:** if the candidate does not know the auto-swap setpoints.  
This is the correct answer for Unit 1

Level: RO&SRO

KA: GEN G2.2.4 (2.8/3.0)

Lesson Plan Objective: CF-CA SEQ 10

Source: Mod; Ques\_260, Catawba NRC 1997

Level of knowledge: analysis

References:

1. OP-MC-CF-CA pages 21, 63

**Bank Question: 297****Answer: A**

1 Pt(s)

Unit 1 was operating at 100% power when a 5 gallon per minute tube leak occurred in 1B S/G. The operators responded in AP-10 (*NC System Leakage Within The Capacity Of Both NV Pumps*). Given the following events and conditions:

- The operators were directed to initiate emergency boration in accordance with AP-38 (*Emergency Boration*).
- 1NV-267A (*BORIC ACID TO BLENDER CONTROL*) was mechanically stuck shut
- 1NV-265B (*BORIC ACID TO NV PUMPS*) would not operate from the control room
- 1A Boric Acid Transfer Pump

Which statement correctly describes the required manual action to initiate emergency boration?

- A. **Open 1NV-265B (Boric Acid to NV Pumps) located on the 733' level north of 1A1 KC pump.**
- B. **Open 1NV-269 (BA Supply to NV Pumps Block) located on the 733' level north of 1A1 KC pump.**
- C. **Open 1NV-269 (BA Supply to NV Pumps Block) located on the 733' level north of the boric acid tanks**
- D. **Open 1NV-265B (Boric Acid to NV Pumps) located on the 733' level north of the boric acid tanks**

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**Distracter Analysis:**

With 1NV-267A shut, the only flow path is thru 1NV-265B. Must open 1NV-265B located on the 733' level north of the KC pump 1A1. 1NV-269 is the alternate valve in the system – also located on the 733' level– but 1NV-267A must be open to initiate emergency Boration.

- A. **Correct:**
- B. **Incorrect:** wrong valve  
**Plausible:** The location is correct for 1NV-265B.
- C. **Incorrect:** wrong valve and wrong location  
**Plausible:** answer provided for psychometric balance
- D. **Incorrect:** right valve, wrong location.

**Plausible:** If the candidate does not know where the valve is located.

Level: SRO Only; 10CFR55.43(b)(5)

KA: APE 024AA2.02 (3.9/4.4)

Lesson Plan Objective: PS-NV SEQ 5

Source: Mod Catawba NRC 1999

Level of knowledge: memory

References:

1. OP-MC-PS-NV pages 95, 133
2. AP/1/A/5500/38 page 6

**Bank Question: 320****Answer: D**

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1 Pt(s) Unit 1 was operating at 100% power. Given the following conditions:

- EMF-33 (*Condenser Air Ejector Exhaust*) alarms in trip 2

If all the automatic features operate as designed (without operator intervention), which one of the following indications will provide the best indication (most sensitive and timely) to confirm that a S/G tube leak has occurred?

- A. Comparing S/G feed flow to steam flow mismatch
  - B. Observing EMF-24, 25, 26 and 27 (*STEAMLINE HI RAD*)
  - C. Observing EMF-34 (*S/G SAMPLE*)
  - D. Observing EMF-71, 72, 73, 74 (*N16 LEAKAGE*)
- 

**Distracter Analysis:**

- A. **Incorrect:** Not a sensitive method of comparison  
**Plausible:** This method will show gross SGTRs
- B. **Incorrect:** Not as sensitive as using EMF 71-74  
**Plausible:** This was the correct answer for the 1997 NRC exam - did not have EMF-71-74 operable
- C. **Incorrect:** S/G sample line will isolate at EMF-33 trip 2  
**Plausible:** This would be a good answer if the automatic isolation did not occur
- D. **Correct answer:** most sensitive method as it detects N16  $\gamma$  radiation

Level: SRO Only; 10CFR55.43(b)(5)

KA: APE 037AA2.03(3.4/3.9)

Lesson Plan Objective: WE-EMF SEQ 2

Source: Bank; McGuire NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-WE-EMF pages 45, 47

**Bank Question: 321****Answer: A**

1 Pt(s)

In E-3 (*Steam Generator Tube Rupture*) Enclosure 5 (*NC Pressure and Makeup Control to Minimize Leakage*) the operators are directed to energize pressurizer heaters if the ruptured S/G level is decreasing and pressurizer level is greater than 25%. What is the purpose for this action?

- A. **Maintain pressurizer saturation temperature corresponding to ruptured S/G pressure to minimize S/G leakage into the NC system.**
- B. **Maintain pressurizer saturation temperature corresponding to intact S/G pressure to minimize primary leakage into the S/G.**
- C. **Maintain pressurizer saturation temperature above the corresponding ruptured S/G pressure to ensure S/G water does not flow into the NC system.**
- D. **Maintain pressurizer saturation temperature corresponding to intact S/G pressure to minimize NC pressure transients.**

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**Distracter Analysis:** The purpose of this question is to determine if the candidate understands that thermal hydraulic equilibrium (temp/press/leak rate) needs to be 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:** required to maintain NCS pressure equal to ruptured S/G pressure, not the intact S/G - Intact S/G pressure < ruptured S/G pressure would not reduce NCS to S/G leakage  
**Plausible:** if the candidate is confused over the thermal hydraulics
- C. **Incorrect:** required to maintain NCS pressure equal to ruptured S/G pressure  
**Plausible:** partially correct – do not want leakage from S/G to NCS or NCS to S/G
- D. **Incorrect:** required to maintain NCS pressure equal to ruptured S/G pressure, not the intact S/G  
**Plausible:** this would be a reasonable basis for monitoring intact S/G pressure if that were the correct answer.

Level: RO&amp;SRO

KA: EPE 038EK1.02(3.2/3.5)

Lesson Plan Objective: EP-EP3 SEQ 4

Source: Bank; Ques\_321, Catawba NRC 1997

Level of knowledge: comprehension

References:

1. OP-MC-EP-EP3 pages 19, 101, 123
2. EP/1/A/5000/E-3 pages 44, 57

**Bank Question: 331.1****Answer: B**

1 Pt(s)

A technician is conducting a calibration procedure, which requires a series of approximately 10 sequential steps to be performed while standing in a contaminated area. He/she is in direct communications with an operator, the communicator, who holds the procedure and reads each step sequentially.

If the performer does not have the procedure in hand as he/she performs the steps, what are the requirements of OMP 4-1 (*Use of Operating and Periodic Test Procedures*) regarding the sign off for each step?

- A. **Only the performer can sign off the steps upon completion of the task after leaving the contaminated area.**
- B. **The communicator signs off each step as the step is completed using his/her own initial and the initials of the performer.**
- C. **The communicator signs off each step as the step is completed using his/her own initials and the time.**
- D. **The communicator checks off each step as the step is completed along with the time. The performer initials each step following completion of the task.**

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**Distracter Analysis:**

- A. **Incorrect:** Both initials must be entered on each step.  
**Plausible:** this is a logical albeit incorrect choice.
- B. **Correct:**
- C. **Incorrect:** Both initials must be entered on each step.  
**Plausible:** this is a logical albeit incorrect choice.
- D. **Incorrect:** Both initials must be entered on each step.  
**Plausible:** this is a logical albeit incorrect choice.

Level: RO&amp;SRO

KA: ADM G 2.1.23(3.9 / 4.0)

Lesson Plan Objective: ADM-OP SEQ 13/14

Source: Bank; Ques\_331, Catawba NRC 1997

Level of knowledge: memory

References:

1. OMP 4-1 page 15

**Bank Question: 348.1****Answer: A**

1 Pt(s)

Unit 1 is operating at 100% power when an engineer informs the OSM that he just reviewed a Technical Bulletin for the Diesel Generators that requires replacement of the hydraulic oil in the Woodward governor. The engineer reports that type of oil that is presently installed in both DG governors is known to be too viscous, and will not allow the governor to maintain frequency control during design sequencer loading. The D/G's have passed their monthly surveillance tests.

Which one of the following actions is required of the OSM under the above circumstances?

**REFERENCES PROVIDED: Tech Spec 3.8.1 and NSD 203**

- A. **Immediately declare both D/Gs inoperable, enter Tech Spec 3.8.1 and commence a shutdown. Document the decision by entering the LCO in the TSAIL.**
- B. **Direct the engineer to confirm the problem severity with the vender. Document the problem in the TSAIL and assure that it is logged in the control room logbook.**
- C. **Immediately call the Station Manager and report the problem. Wait for further direction by senior management before taking any action. Document the problem by entering it in the control room logbook, and in the shift turnover worksheet.**
- D. **Begin the operability evaluation process for the D/Gs to determine if an unreviewed safety question has been identified or a Tech Spec LCO has been exceeded. Initiate a PIP to document and control the process.**

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**Distracter Analysis:**

- A. **Correct Answer:**
- B. **Incorrect:** Insufficient action to control the identified problem  
**Plausible:** this may occur as an expedient solution because it does not address the immediate operability question.
- C. **Incorrect:** Insufficient action – it is the SROs' job to implement the TS when required.  
**Plausible:** calling station management is a prudent action after implementing the TSAS - if the candidate does not know the requirements for an operability evaluation

- D. Incorrect:** There is clear indication that the oil would cause the D/Gs not to perform its' function.  
**Plausible:** if the candidate does not understand the criteria for operability. These are supplemental or companion actions.

Level: SRO Only; 10CFR55.43(b)(2)

KA: G2.1.1 (3.7/3.8)

Lesson Plan Objective: ADM-DIR SEQ 11

Source: Mod; Ques\_348, McGuire NRC 1997

Level of knowledge: comprehension

References:

1. NSD 203 page 6
2. Tech Spec 3.8.1- PROVIDED

**Bank Question: 352.1****Answer: B**

1 Pt(s)

Prior to moving fuel assemblies into their final storage positions in the spent fuel pool, the Staff Engineer responsible for refueling needs to troubleshoot a problem on the Spent Fuel Pool Manipulator Crane Bridge. This test will require bypassing the "bridge left interlock".

Which one of the following statements correctly describes the **minimum** approvals needed for bypassing this interlock?

- A. **The Staff Engineer can approve the bypass of interlocks for testing as long as no fuel assemblies, insert components or dummy fuel assemblies are being handled.**
- B. **Approval must be obtained from the Fuel Handling SRO and the interlock bypass must be removed as soon as practicable.**
- C. **Approval must be obtained from the OSM (or designee) and the interlock bypass must be removed prior to shift turnover.**
- D. **A written procedure must be prepared to control and document the performance of this special test.**

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**Distracter Analysis:**

- A. **Incorrect:** The FHSRO or shift supervisor must approve non-proceduralized bypasses.  
**Plausible:** It is reasonable that the engineer could approve the bypass since nothing is being handled.
- B. **Correct:**
- C. **Incorrect:** the bypass may continue on the next shift.  
**Plausible:** The OSM can approve bypasses.
- D. **Incorrect:** A procedure is not required.  
**Plausible:** No further approval is necessary if a procedure is written.

Level: SRO Only; 10CFR55.43(b)(7)

KA: G2.2.28 (2.6/3.5)

Lesson Plan Objective: FH-FC SEQ 5

Source: Mod; Ques352a, Catawba NRC 1997

Level of knowledge: memory

References:

1. OP-MC-FH-FC page 15

**Bank Question: 359.2****Answer: D**

1 Pt(s)

Unit 1 is responding to a small break LOCA using E-1 (*Loss of Reactor or Secondary Coolant*). Given the following events and conditions:

- FWST Level = 340 inches
- Containment pressure = 1.5 psig
- Containment Sump Level = 1.05 ft
- EMF-41 (*AUX BLDG VENTILATION*) = trip 2
- Aux Building area radiation monitors are in alarm
- EMF-51A and B (*CONTAINMENT TRN A & B*) = 25 R/Hr
- Hydrogen Analyzer = 0.7% in containment
- NLO's report significant leakage at the seals of the 1A ND pump

Which one of the following procedures should the operator transition into from E-1?

- A. **FR-Z.3 (*Response to High Containment Radiation Level*)**
- B. **ECA-1.1 (*Loss of Emergency Coolant Recirculation*)**
- C. **FR-Z.4 (*Response to High Containment Hydrogen*)**
- D. **ECA-1.2 (*LOCA Outside Containment*)**

**Distracter Analysis:** The initial conditions provide a LOCA into containment and a leakage path outside of containment. The question is which of the problems take priority? The purpose is not to memorize procedure steps but to answer this from a broader perspective.

- A. **Incorrect:** Cont RAD levels < 35 R/hr and this would be a YELLOW path that does NOT require priority action.  
**Plausible:** If the candidate thinks that the abnormal radiation level requires priority action.
- B. **Incorrect:** Still in injection phase of SI – have failed to isolate leak outside containment.  
**Plausible:** if candidate is not familiar with the entry conditions for ECA 1.1 (after failure to isolate leak outside containment).
- C. **Incorrect:** Cont H2 > 0.5 %, but this is a YELLOW path not requiring priority action.  
**Plausible:** If the candidate fails to recognize the leak in the auxiliary bldg and/or the fact that E-1 takes care of the cont H2 problem.
- D. **Correct:**

Level: RO&SRO

KA: WE 04EK3.4 (3.6 / 3.8)

Lesson Plan Objective: EP-E1 SEQ 2

Source: Mod; Ques\_359.1, Catawba NRC 1997

Level of knowledge: memory

References:

1. OP-MC-EP-E1 page 45
2. EP/1/A/5000/E-1 pages 12-13
3. EP/1/A/5000/F-0 page 9

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**Bank Question: 380****Answer: D**

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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 corrosion product beta flux from the coolant in the A loop of the NC system.
  - B. Detects fission product gamma flux from the coolant in the B loop of the NC system.
  - C. Detects corrosion product beta flux from the coolant in the C loop of the NC system.
  - D. Detects fission product gamma flux from the coolant in the D loop of the NC system.
- 

**Distracter Analysis:**

- A. **Incorrect:** - EMF-48 does not detect beta radiation  
**Plausible:** - If the candidate believes that the reason CRUD bursts is detected by EMF-48 is the beta flux.
- B. **Incorrect:** - EMF-48 does not sample the B loop.  
**Plausible:** - if the candidate does not recognize that it samples A & D loops.
- C. **Incorrect:** - EMF-48 does not detect beta radiation, and loop C is not a sample point.  
**Plausible:** - If the candidate believes that the reason CRUD bursts are detected by EMF-48 is the beta flux, and does not recognize that it samples A & D loops.
- D. **Correct answer**

Level: RO&amp;SRO

KA: APE 076AA2.01(2.7/3.2)

Lesson Plan Objective: PSS-NM SEQ 2

Source: Bank; Ques\_380 McGuire NRC 1999

Level of knowledge: memory

References:

1. OP-CN-PSS-NM pages 15, 21

**Bank Question: 387****Answer: B**

1 Pt(s)

Enclosure I to E-1 (*Loss of Reactor or Secondary Coolant*) provides foldout page actions to close INV-150B and INV-151A (*NV PUMPS RECIRCULATION*) 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 NV pump runout at low pressures.**
- D. **Notify the SRO of the need to close the valves to prevent a reduction of full SI flow to the core.**

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**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 at this pressure.  
**Plausible:** pump runout can be a concern for situations where the pump discharge pressure is very low.
- D. **Incorrect:** - the actions are automatic.  
**Plausible:** - if the candidate does not know that foldout actions are independent.

Level: RO&amp;SRO

KA: EPE 011EK3.07 (3.5/3.6)

Lesson Plan Objective: EP-E1 SEQ 5

Source: Bank; Ques\_387a, Catawba NRC 2001

Level of knowledge: memory

References:

1. OP-MC-EP-INTRO pages 33, 35
2. OP-MC-EP-EI page 59

**Bank Question: 398****Answer: B**

1 Pt(s)

Unit 2 is in the process of starting up the reactor in accordance with all controlling procedures. Given the following conditions and events:

- 2 EMF-3 (*CONTAINMENT REFUELING BRIDGE MONITOR*) trip 1 setpoint is  $7 \times 10^1$  mR/hr and trip 2 setpoint is  $1.5 \times 10^2$  mR/hr.

	<b>0200</b>	<b>0205</b>	<b>0210</b>	<b>0215</b>
2EMF 3 (mR/hr)	$5 \times 10^1$	$1.1 \times 10^2$	$1.6 \times 10^2$	$2.7 \times 10^2$
N-31 (CPS)	$1.2 \times 10^4$	$1.7 \times 10^4$	$2 \times 10^4$	0
N-32 (CPS)	$9.2 \times 10^3$	$1.1 \times 10^4$	0	0
N-35 (amps)	$9.1 \times 10^{-11}$	$1.0 \times 10^{-10}$	$1.210^{-10}$	$1.210^{-10}$
N-36 (amps)	$9.3 \times 10^{-11}$	$1.1 \times 10^{-10}$	$1.3 \times 10^{-10}$	$1.3 \times 10^{-10}$

If channel N-32 is deenergized due to a SR detector failure at 0210, what is the earliest time (if any) that the containment evacuation alarm will actuate in Unit 2 during the startup?

- A. 0205
- B. 0210
- C. 0215
- D. The containment evacuation alarm will not actuate

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**Distracter Analysis:**

- A. **Incorrect:** - both SR high flux trips are active, but the EMF is still below Trip 2.  
**Plausible:** - if the candidate thinks that Trip 1 actuation causes the alarm
- B. **Correct answer**
- C. **Incorrect:** Both SR high flux trips are blocked  
**Plausible:** - if the candidate reverses the logic that BOTH SR high flux trips must be blocked
- D. **Incorrect:** - alarm actuates at 0210  
**Plausible:** - if candidate thinks that some other action or interlock blocks the alarm

Level: RO&SRO

KA: APE 061AA1.01(3.6/3.6)

Lesson Plan Objective: WE-EMF SEQ 3

Source: Mod; Ques\_398, McGuire NRC 1999

Level of knowledge: analysis

References:

1. OP-MC-WE-EMF page 43
2. OP-MC-IC-ENB pages 21-23

**Bank Question: 400****Answer: A**

1 Pt(s)

Unit 2 is conducting a plant shutdown. The S/G's are being filled to wet lay-up. Given the following plant conditions and events:

- 2D S/G pressure = 5 psig (all channels indicating the same)
- 2D S/G NR level = 95%
- 2D S/G WR level = 75%
- No S/G PORVs are open
- Operators are performing OP/2/A/6100/02 (*Controlling Procedure for Unit Shutdown*) and SO-4D (*Filling S/G 2D*)
- NCS temperature = 195°F

Which one of the following statements represents actual level conditions for the 2D S/G under these conditions?

- A. **Approximately 75%**
- B. **Approximately 85%**
- C. **Approximately 95%**
- D. **>100%**

**Distracter Analysis:** Narrow range SG level detectors are calibrated for normal (hot) operating conditions. Wide range SG level detectors are calibrated for cold (shutdown) conditions. This means that the narrow range instrument will read higher than actual level under cold conditions because variable leg water density is greater than the calibrated setting.

- A. **Correct answer:** SO4 procedures use only the WR level when filling the S/Gs.
- B. **Incorrect:** Actual level is about 75%  
**Plausible:** - if the candidate is confused over which of the S/G level instruments is cold calibrated and gets the effect reversed
- C. **Incorrect:** - SG level is about 75 %  
**Plausible:** - if the candidate is confused over which of the S/G level instruments is cold calibrated.
- D. **Incorrect:** - SG level is about 75 %  
**Plausible:** If the candidate believes at low temperature, inaccuracy has increased level indication.

Level: RO&SRO

KA: SYS 035A1.01(3.6/3.8)

Lesson Plan Objective: STM-SG SEQ 5

Source: Mod; Ques\_400, McGuire NRC 1999

Level of knowledge: analysis

References:

1. OP-MC-STM-SG pages 21, 23
2. OP/1/A/6100/SO-2D pages 6, 11

**Bank Question: 407****Answer: D**

1 Pt(s)

Unit 1 has initiated a liquid radioactive waste release from the Ventilation Unit Condensate Drain Tank (VUCDT) through the RC system. All lineups and authorizations have been properly made in accordance with OP/0/B/6200/35 using the normal path. Two RC pumps are the minimum required under the LWR document.

Given the following initial conditions:

- 3 RC pumps are running
- 1EMF-44 (*CONT VENT DRN TANK OUT*) correctly set for trip 1 and trip 2 activity limits
- MRIRR = 75 GPM based on boron concentration
- No other releases are in progress

If the release automatically terminates 40 seconds after initiation, which one of the following conditions could have terminated the release?

- A. **1WM-46 (*LIQUID WASTE DISCH VALVE*) closing automatically if 1 RC pump tripped**
- B. **1WM-46 closing automatically if 1EMF-44 reached the trip 2 setpoint**
- C. **1WP-35 (*WMT & VUCDT TO RC CNTRL*) closing automatically if 1 RC pump tripped**
- D. **1WP-35 closing automatically if 1EMF-44 reached the trip 2 setpoint**

**Distracter Analysis:**

- A. **Incorrect:** - RC pump interlock will not actuate - set at 2 pumps (minimum required on LWR document). WM-46 is isolated and not used anymore as a release path.  
**Plausible:** - this was formerly the normal release path
- B. **Incorrect:** - WM-46 receives a closing signal from EMF-44 but this is not the normal path for a release. WM-46 is isolated and not used anymore.  
**Plausible:** - this was formerly the normal release path
- C. **Incorrect:** - RC pump interlock will not actuate - set at 2 pumps (minimum required on LWR document).  
**Plausible:** - if the candidate misunderstands the RC pump interlock-- this was the correct answer on a prior NRC exam -

**D. Correct answer**

Level: RO & SRO

KA: SYS 68A4.03 (3.9/3.8)

Lesson Plan Objective: WE-WL SEQ 3

Source: Bank; McGuire NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-WE-WL pages 21, 27, 59
2. OP-MC-WE-EMF page 31

**Bank Question: 415.1****Answer: B**

1 Pt(s)

Unit 1 is operating at 80% power when an electrical transient causes several condensate system pumps to trip. Given the following conditions and events:

	<u>Start</u>	<u>10 sec</u>	<u>20 sec</u>	<u>30 sec</u>
CF pump 1A Suction Pressure (psig)	451	238	232	229
CF pump 1B Suction Pressure (psig)	448	227	224	240
# Hotwell Pumps running	2	2	3	2
# Condensate Booster Pumps running	2	1	0	2

What is the earliest time (if any) that BOTH main feedwater pumps will have tripped?

- A. 10 seconds
- B. 20 seconds
- C. 30 seconds
- D. At least one feedwater pump will continue to run

**Distracter Analysis:** This is the 1999 version of the question with slight modifications. It was used in different versions in 2000 and 2001(Catawba).

- A. **Incorrect:** - CF pump 1A continues to run as suction pressure remains > 230 psig  
**Plausible:** - CF pump 1B will trip on low suction pressure
- B. **Correct answer:** - both CF pumps trip when 3/3 condensate booster pumps trip - trip is irrespective of suction pressure
- C. **Incorrect:** - CF pump 1b trip criteria met but trip occurred earlier at 20 sec.  
**Plausible:** - if candidate does not know that the CBPs are interlocked with the CF pumps
- D. **Incorrect:** - tripping criteria are met at 20 sec  
**Plausible:** - if candidate does not know CF pump trips

Level: RO&SRO

KA: SYS 056K1.03 (2.6/2.6)

Lesson Plan Objective: CF SEQ 4

Source: Bank; Ques\_415, McGuire NRC 2000

Level of knowledge: analysis

References:

1. OP-MC-CF-CF page 19

**Bank Question: 432.1****Answer: C**

1 Pt(s)

Unit 1 has just entered mode 5 in preparation for refueling. Given the following conditions and events:

- A lower containment entry is planned for the next shift.
- The SRO directs the RO to purge the containment in preparation for the containment entry.
- The VP system is secured with all fans off and containment purge and exhaust valves closed

Which one of the following failures would severely compromise the operator's ability to perform the containment purge?

- A. **The *NORMAL-REFUEL SELECTOR* switch is stuck in the "*NORM*" position.**
- B. **Containment isolation valve 1VP-4A (*VP TO UPPER CONT INSD ISOL*) will not open.**
- C. **Damper 1RBPS-D9 (*VP to Lower Cont*) is stuck in its "*REFUEL*" (4 to 1) position.**
- D. **Containment isolation valve 1VP-6B (*VP to Lower Cont Otsd Isol*) will not open.**

**Distracter Analysis:**

- A. **Incorrect:** - this is the proper position for this operation.  
**Plausible:** - if the candidate misunderstands the VP operations in this mode - this was the correct answer in a prior version.
- B. **Incorrect:** - any loss of flow to the upper containment will have no effect on the lower containment entry.  
**Plausible:** - if the candidate assumes there is an interlock that precludes fan operation with an isolation valve closed.
- C. **Correct answer:** - this will over-pressurize the upper containment
- D. **Incorrect:** - should not significantly reduce purge flow to lower containment due to a parallel path.  
**Plausible:** - if the candidate presumes a loss of a flow path to lower containment will reduce purge effectiveness or over-pressurize upper containment.

Level: RO&amp;SRO

KA: SYS 029K3.02(2.9\*/3.5\*)

Lesson Plan Objective: CNT-VP SEQ 2

Source: Mod; Ques\_432, McGuire NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-CNT-VP pages 19, 21, 23, 27

**Bank Question: 453.1****Answer: A**

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, 48%.
- Turbine load, 45% based on turbine impulse pressure.
- Turbine exhaust hood temperature is 251 °F.
- The operators are rapidly decreasing turbine load.
- The operator reports that condenser vacuum is 24.2 inches vacuum and is continuing to decrease slowly.

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

**REFERENCES PROVIDED: AP-23 (Loss of Condenser Vacuum)**

- A. **Manually trip the reactor and enter E-0 (Reactor Trip or Safety Injection)**
- B. **Manually trip the turbine in anticipation of reaching the trip setpoint, and enter AP/2 (Turbine Generator Trip)**
- C. **Continue to monitor condenser vacuum, if vacuum decreases to 20 inches vacuum, manually trip the turbine and enter AP/2.**
- D. **Continue to monitor condenser vacuum, if vacuum decreases to 20 inches vacuum manually trip the reactor and enter E-0.**

-----  
**Distracter Analysis:**

Turbine Trip Criteria: IF condenser vacuum decreases to less than 20 in Hg or turbine exhaust hood temperature is greater than 250 °F, THEN: Trip the reactor and enter E-0. This is a modified question from the last Catawba Exam.

- A. **Correct:**
- B. **Incorrect:** Manually tripping the reactor is the only action provided in AP/23.  
**Plausible:** if the candidate recognizes that a reactor trip is not automatic below 48% power, and forgets that the dumps will not operate below C-9.
- C. **Incorrect** Manually tripping the reactor is the only action provided in AP/23.

**Plausible:** if the candidate recognizes that a reactor trip is not automatic below 48% power, and forgets that the turbine trip on exhaust hood temperature is 250 °F.

**D. Incorrect:** must immediately trip the reactor because of the exhaust hood temperature trip.

**Plausible:** If the candidate does not recognize that the turbine' trip on exhaust hood temperature is 250 °F

Level: RO&SRO

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

Lesson Plan Objective: AP-23 SEQ 1/2

Source: Mod; Ques\_453a, Catawba NRC 2001

Level of knowledge: memory

References:

1. AP/1/5500/23 pages 2-4
2. OMP 2-2 pages 6-7
3. OMP 4-3 page 8

**Bank Question: 460****Answer: B**

1 Pt(s)

If a fire was reported in the McGuire Office Complex (MOC), which one of the following responses is correct by station procedures?

- A. **Offsite fire departments are responsible for all fire suppression activities at the scene. The Fire Brigade must be held in reserve for station fires inside the protected area.**
- B. **Offsite fire departments are responsible for all fire suppression activities at the scene. The Fire Brigade may provide limited support if resources allow.**
- C. **The Fire Brigade is responsible for the initial response at the scene. They are required to turn over control of the scene as soon as an offsite fire department arrives and immediately return to the protected area.**
- D. **The Fire Brigade is responsible for fire suppression activities at the scene. An offsite fire department may be called to provide support if additional resources are required.**

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**Distracter Analysis:**

- A. **Incorrect:** - the Fire Brigade is allowed to leave the protected area.  
**Plausible:** - they have restrictions regarding leaving the site.
- B. **Correct answer**
- C. **Incorrect:** - the Fire Brigade is not responsible for initial response and they are not required to return to the protected area.  
**Plausible:** - if the candidate thinks that they cannot remain outside the protected area.
- D. **Incorrect:** - The Fire Brigade is not primarily responsible to fight fire outside the protected area.  
**Plausible:** - If the candidate does not understand fire brigade responsibilities.

Level: RO&amp;SRO

KA: SYS 086 G2.4.12(3.4/3.9)

Lesson Plan Objective: None

Source: Bank; Ques\_460, McGuire NRC 1999

Level of knowledge: memory

References:

1. RP/1/A/5700/025 Enclosure 4.1 page 5

**Bank Question: 479.1****Answer: B**

1 Pt(s)

Unit 1 is in the process of making a radioactive gaseous waste release from the waste gas decay tank in accordance with OP/0/A/6200/18 (*Waste Gas Operation*). Given the following conditions:

- MRIRR = 31 CFM
- MOSRR = 40 CFM
- 1EMF-50 (*WASTE GAS DISCH*) trip 1 setpoint = 2.0E5 CPM
- 1EMF-50 trip 2 = 3.0E5 CPM
- 1EMF-36 (*UNIT VENT GAS*) is in service

<u>Time</u>	<u>0200</u>	<u>0215</u>	<u>0230</u>	<u>0245</u>
Release rate (CFM)	30	32	41	27
EMF-50 (CPM)	2.8E5	3.2E5	3.1E5	4.2E5

If the operators reset 1EMF-50 whenever allowed by procedure, what is the earliest time that the operators are **required** to terminate (and not immediately restart) the gaseous release?

- A. 0200
- B. 0215
- C. 0230
- D. 0245

**Distracter Analysis:**

- A. **Incorrect:** - neither Trip 2 nor MRIRR exceeded at 0200.  
**Plausible:** If candidate thinks Trip 1 is sufficient to terminate.
- B. **Correct:** the release rate (32 CFM) > MRIRR (31 CFM) (most restrictive instantaneous release rate)
- C. **Incorrect:** - exceeded MRIRR at 0215.  
**Plausible:** - exceeded MOSRR (maximum observed system release rate) - if the candidate thinks he/she can reset EMF-50 once before being required to terminate the release - this is the 2<sup>nd</sup> time EMF-50 has reached trip 2.
- D. **Incorrect:** - exceeded MRIRR at 0215  
**Plausible:** - exceeded trip 2 on EMF-50 for the 3<sup>rd</sup> time - allowed to reset this trip 2 times before terminating release

Level: SRO Only; 10CFR55.43(B)(4)

KA: SYS 073A4.01(3.9/3.9)

Lesson Plan Objective: WE-RGR SEQ 5

Source: Mod; Ques\_479, McGuire NRC 2000

Level of knowledge: analysis

References:

1. OP-MC-WE-RGR page 15

**Bank Question: 481****Answer: A**

1 Pt(s)

Unit 1 is shutdown in mode 6 refueling. A Radwaste Operator brings a liquid radiological release permit to the SRO for approval. Given the following information on the permit:

- Release ID = WMT - B
- RC Pumps running = 6
- RC Pumps assigned to release = 1
- Total RC Pumps required = 1
- Allowable release rate = 1.61E+05 gpm
- Recommended release rate = 6.00E+01 gpm
- EMF-49 (L) (*LIQUID WASTE DISCH*) in service = yes
- Monitor background = 4.49E+03
- Trip 1 setpoint = 8.97E+03
- Trip 2 setpoint = 1.34E+04
- Remarks: RC minimum flow interlock operable. 2 RC pumps required for all releases

If no other releases are in progress, which one of the following actions is correct for approval of this release permit?

- A. **The release may not be approved because there is an error in the number of RC pumps required**
- B. **The release may not be approved because the EMF-49(L) trip setpoints are not correct**
- C. **The release may not be approved because the release rate is not correct**
- D. **The release may be approved as presented**

**Distracter Analysis:**

- A. **Correct answer** - the remarks section states 2 RC pumps are required but the number of RC pumps required is listed as 1 in the RC pump data section
- B. **Incorrect**: - nothing wrong with EMF-49L trip setpoints  
**Plausible**: - background < trip 1 < trip 2
- C. **Incorrect**: - allowable release rate < recommended release rate  
**Plausible**: - if candidate does not understand this requirement
- D. **Incorrect**: - the RC pumps required is not correct  
**Plausible**: - if the candidate does not know how to evaluate this data

Level: SRO Only; 10CFR55.43(b)(4)

KA: APE 059AA2.06(3.5/3.8)

Lesson Plan Objective: WE-RLR SEQ 3, 4, 5

Source: Bank; McGuire NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-WE-RLR pages 11-15
2. OP-MC-WE-RL page 27

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**Bank Question: 491.2****Answer: B**

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1 Pt(s)

Unit 1 experienced a LOCA with a breach of containment at 0200. The OSM assumed the duties of the Emergency Coordinator and declared a general emergency at 0210. The initial recommended protective actions at 0225 were as follows:

- Shelter zones E, F, G, H, I, J, K, O, P, Q, R, S
- Evacuate zones A, B, C, D, L, M, N,

At 0235, the initial dose projection information was presented to the OSM. Given the following conditions at 0245:

- Wind direction = 095°
- Wind speed = 4 MPH
- Projected dose at the site boundary
  - TEDE = 250 mrem
  - CDE thyroid = 400 mrem
- Containment radiation levels
  - 1EMF51A (*CONTAINMENT TRN A*) = 850 R/hr
  - 1EMF51B (*CONTAINMENT TRN B*) = 855 R/hr

Which one of the following protective action recommendations are correct in accordance with RP/0/A/5700/04 (*Classification of Emergency*)?

**REFERENCES PROVIDED: RP/0/A/5700/004**

- A. **Change the protective action recommendation in zones A and D from evacuate to shelter.**
- B. **Extend the evacuation to zones O, R.**
- C. **Extend the evacuation to zones O, R, K, P, Q, S.**
- D. **The initial set of protective action recommendations remain in effect with no changes required.**

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**Distracter Analysis:**

- A. **Incorrect:** - wrong zones for evacuation - never reduce actions  
**Plausible:** - will get this answer if the candidate enters the wrong table - the one that has wind speed > 5mph
- B. **Correct answer**
- C. **Incorrect:** - wrong zones for evacuation

**Plausible:** - will get this answer if the candidate enters the PAR table with a gap activity release.

**D. Incorrect:** - wrong zones for evacuation

**Plausible:** - if the candidate thinks that no changes are required to be made because the followup PARs are not URGENT.

Level: SRO Only; 10CFR55.43(b)(5)

KA: ADM G 2.4.44(2.1 / 4.0)

Lesson Plan Objective: EP-EMP SEQ 11

Source: Mod; Ques\_491.1, McGuire NRC 1999

Level of knowledge: analysis

References:

1. OP-MC-EP-EMP page 29
2. RP/0/A/5700/004 - PROVIDED

**Bank Question: 524.1****Answer: A**

1 Pt(s)

Unit 2 was cooling down in mode 3 when 2NV-35A (*VARIABLE L/D ORIFICE OUTLET CONT ISOL*) failed to close. Given the following plant conditions:

- 1B NCP is running
- Excess letdown was placed in service
- Letdown was secured by:
  1. 2NV-35A was tagged open
  2. Valve interlock - [2NV-35A with 2NV-1A / 2NV-2A] was bypassed
  3. The following valves were tagged closed:
    - 2NV-1A (*1A NC L/D ISOL TO REGEN HX*)
    - 2NV-2A (*1A NC L/D ISOL TO REGEN HX*)
    - 2NV-7B (*7B LETDOWN CONT OUTSIDE ISOL*)
  4. All other NV valves positioned as required
- NC pressure = 917 psig
- NC Temperature = 375 °F

If PRT level was noted to be increasing, which one of the following events could cause this to occur?

- A. **Isolation valves 2NV-1A and 2NV-2A leak by their seats**
- B. **Isolation valve 2NV-7B leaks by its seat**
- C. **Loss of VI pressure to valve 2NV-95B (*NC PUMPS SEAL RET CONT OUTSIDE ISOL*)**
- D. **Relief valve 2NV-156 has opened due to backpressure**

**Distracter Analysis:**

- A. **Correct answer:** relief valve 2NV-6 will open at 600 psig to protect the letdown system piping from NC pressure.
- B. **Incorrect:** NV-1A and NV-2A isolate the letdown system, if NV-7B leaks by, it will cause NV-156 to open and relieve to the VCT, not the PRT.  
**Plausible:** If the candidate is not familiar with the letdown system piping layout
- C. **Incorrect:** Valve fails in as-is position which will not lift relief.  
**Plausible:** If the candidate thinks that loss of VI air pressure will cause the isolation valve to close, then seal return would go to the PRT.
- D. **Incorrect:** 2NV-156 relieves to the VCT, not to the PRT.

**Plausible:** If the candidate is not familiar with the letdown system layout.

Level: SRO Only; 10CFR55.43(b)(5)

KA: SYS 007A3.01(2.7/2.9)

Lesson Plan Objective: PS-NV SEQ 2

Source: Bank; Ques\_524a, McGuire NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-PS-NV pages 23, 115

**Bank Question: 540****Answer: B**

1 Pt(s)

Unit 2 is responding to a large LOCA when a loss of the 2ETA bus occurred. Given the following events and conditions:

- A reactor trip and safety injection occurred
- All NV, NI, ND, and CA pumps sequenced on properly
- SI was reset
- Sequencers were reset
- The 2ETA bus subsequently lost power but was re-energized by the 2A D/G

Which one of the following statements correctly describes the restoration process for the train A NV, NI, ND, and CA pumps?

- A. **2A NV and NI pumps must be restarted by operator action  
2A ND and CA pumps will automatically restart**
- B. **2A NV and CA pumps will automatically restart  
2A NI and ND pumps must be restarted by operator action**
- C. **2A NV and NI pumps will automatically restart  
2A ND and CA pumps must be restarted by operator action**
- D. **2A NV and CA pumps must be restarted by operator action  
2A NI and ND pumps automatically restart**

**Distracter Analysis:**

Both the ECCS and blackout sequencers control NV and CA pumps. The ECCS sequencer controls NI and ND pumps only

- A. **Incorrect:** NI and ND pumps do not automatically restart, NV and CA pumps will auto restart.  
**Plausible:** If the candidate misunderstands the SI and SBO functions of the components. NI pumps must be restarted and the CA pumps will automatically restart.
- B. **Correct answer**
- C. **Incorrect:** NI and ND pumps do not automatically restart, NV and CA pumps will auto restart.  
**Plausible:** If the candidate misunderstands the SI and SBO functions of the components. ND pumps must be restarted and the NV pumps will automatically restart.
- D. **Incorrect:** NI and ND pumps do not automatically restart, NV and CA pumps will auto restart.  
**Plausible:** Starting the ND and NI pumps automatically would be a desired state for a large LOCA.

Level: RO&SRO

KA: SYS 013A2.01(4.6/4.8)

Lesson Plan Objective: DG-EQB SEQ 8

Source: Mod; Ques\_540, Catawba NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-DG-EQB pages 29, 39, 41, 43

**Bank Question: 547****Answer: C**

1 Pt(s) Unit 1 was operating at 100% power when main condenser vacuum dropped from 25 inches vacuum to 23 inches vacuum.

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 4/9

Source: Bank; Ques\_547, Catawba NRC 2001

Level of knowledge: comprehension

References:

1. OP-MC-MT-ZM pages 11 - 15, 23, 27

**Bank Question: 563.2****Answer: A**

1 Pt(s)

Unit 1 was operating at 100%, all rods out. Given the following events and conditions:

- The RO is performing PT/1/A/4600/01 (*RCCA Movement Test*) for control bank D
- The RO selects *CBD* on the *CRD Bank Selector Switch* and drives rods IN to 216 steps
- An upset occurred and the RO selects *MANUAL* on the *CRD Bank Selector Switch* and restores rods to 226 steps (ARO)

If this condition is left uncorrected, control bank C rods will begin to drive in when control bank D is at \_\_\_\_\_?

**REFERENCES PROVIDED: COLR Table 1**

- A. 100 steps
- B. 106 steps
- C. 110 steps
- D. 120 steps

**Distracter Analysis:**

The Bank Overlap Unit (BOU) will not count the -10 steps on bank D when the bank was inserted in "CBD" position. This means that bank D rods will be sequenced 10 steps lower than normal on the BOU counter when bank C rods begin their insertion sequence during the next shutdown. There are 116 steps of overlap between control banks D and C. 226 steps is all rods out (ARO). Bank C rods will begin to insert when bank D is at  $226 - 116 - 10 = 100$  steps.

- A. **Correct:** 100 steps is correct:  $226 - 116 - 10 = 100$  steps.
- B. **Incorrect:** 100 steps is correct  
**Plausible:** If the candidate uses 116 steps as the bank overlap setting instead of subtracting  $226 - 116 = 110$  as the point where bank C rods begin to sequence in on a shutdown.
- C. **Incorrect:** 100 steps is correct  
**Plausible:** if the candidate does not recognize that the BOU counter is effected by the individual withdrawal of bank D - or if he thinks that the -10 steps in manual will offset the +10 steps in "Bank D"
- D. **Incorrect:** 102 steps is correct  
**Plausible:** If the candidate reverses the overlap error – adds +10 steps to 110 instead of subtracting 10 steps.

Level: RO&SRO

KA: G2.2.33 (2.5/2.9)

Lesson Plan Objective: IC-IRE SEQ 5

Source: Mod; Ques563a; McGuire NRC 1999

Level of knowledge: comprehension

References:

1. OP-MC-IC-IRE page 13
2. COLR Table 1 - PROVIDED  
COLR Enclosure 4.3 Section 1.13

**Bank Question: 571****Answer: B**

1 Pt(s)

Unit 2 is responding to a small break LOCA in ES-1.2, (*Post LOCA Cooldown and Depressurization*). Step 15 of ES-1.2 requires the operators to depressurize the NC system.

Which one of the following statements correctly describes the reasons for using the prescribed methods of depressurizing the NC system?

**A.**

1. Pressurizer spray - preferred method to be used if NC pump is running
2. Auxiliary Spray - alternate method - better control over depressurization rate
3. PORV - method of last resort - lack of control of depressurization rate - results in rupturing the PRT

**B.**

1. Pressurizer spray - preferred method to be used if NC pump is running
2. PORV - alternate method - better than auxiliary spray
3. Auxiliary Spray - method of last resort - too slow and may thermal shock the spray nozzles and degrade regenerative Hx

**C.**

1. PORV - preferred method - rapid depressurization rate
2. Pressurizer spray - alternative method - next most rapid depressurization rate
3. Auxiliary spray - method of last resort - too slow and may thermal shock the spray nozzles

**D.**

1. Auxiliary spray - preferred method - does not degrade containment
2. Pressurizer spray - alternative method - will not work if NC pump is not running
3. PORV - method of last resort - will rupture PRT and degrade containment environment

---

**Distracter Analysis:**

- A. Incorrect:** PORV is the alternative method - aux spray is the last resort  
**Plausible:** Pressurizer spray is the priority
- B. Correct answer**

- C. **Incorrect:** Pressurizer spray preferred over PORV  
**Plausible:** Aux spray is last resort
- D. **Plausible:** Aux spray is the last resort  
**Plausible:** Pressurizer spray preferred over PORV

Level: RO&SRO

KA: WE 03EK2.1 (3.6 / 4.0)

Lesson Plan Objective: EP-E1 SEQ 4

Source: Bank; Ques\_571, Catawba NRC 1999

Level of knowledge: memory

References:

1. OP-MC-EP-E1 page 123
2. ES-1.2 page 12, 13

**Bank Question: 593****Answer: B**

1 Pt(s)

Unit 2 was operating at 99% power when a steamline break occurred. Given the following events and conditions:

- 0200 The operators enter AP/01 (*Steam Leak*)
- 0200 The operators start reducing turbine load to match  $T_{ave}$  and  $T_{ref}$
- 0201 The operators start a second NV pump and isolate letdown
- 0202 NLOs start investigating for the location of the steam leak
- 0203 *P/R OVER POWER ROD STOP* alarms – the RO reports that power has turned.
- 0204 STA reports pressurizer level is decreasing and cannot be maintained
- 0205 The turbine building operator reports that the line to the atmospheric dump valves has a steam leak and cannot be isolated

If no safety injection has occurred and pressurizer pressure is maintained, which one of the following operator responses is correct?

**REFERENCES PROVIDED: AP-01**

- A. **Manually trip the reactor at 0203**
- B. **Manually trip the reactor at 0204**
- C. **Manually trip the reactor at 0205**
- D. **Commence a rapid down power using AP/04 (*Rapid Downpower*) at 0205**

**Distracter Analysis:**

- A. **Incorrect:** no requirement to trip the reactor because reactor power has turned and is decreasing. Not approaching the overpower automatic reactor trip at 109% in 2 of 4 channels.  
**Plausible:** shows a power mismatch – reactor power reaches 103% on 1 of 4 PR channels to cause C-2. OMP 4-3 (*Use of Abnormal and Emergency Procedures*) requires the operator to trip when an automatic safeguards action setpoint is approached to avoid challenging the automatic safeguards function.
- B. **Correct answer** required to trip under AP/01 (and many other procedures) if you cannot maintain pressurizer level with 2 NV pumps
- C. **Incorrect:** required to trip when PZR level cannot be maintained  
**Plausible:** if the candidate thinks that a reactor trip is required because the steam leak was not isolated.

- D. **Incorrect:** required to trip when PZR level cannot be maintained  
**Plausible:** this would be the correct answer if not required to trip at 0204.

Level: RO&SRO

KA: APE 040AA2.02(4.6/4.7)

Lesson Plan Objective: AP-1 SEQ 4

Source: Bank; Ques\_593, McGuire NRC 2000

Level of knowledge: comprehension

References:

1. AP/1/A/5500/01 page 3
2. OP-MC-IC-IPE page 45
3. OMP 4-3, page 8

**Bank Question: 649.1****Answer: D**

1 Pt(s)

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

- CF pumps 2A and 2B are running
- Hotwell pumps 2A and 2C are running
- Condensate booster pumps 2A and 2C are running
- Heater drain pump 2C1 is out of service
- Heater drain pump 2C3 trips on overload

Assuming no operator actions are taken, which one of the following statements correctly describes a plant response to this event?

- A. **Heater drain pump 2C2 starts.**
- B. **CF pump 2A trips.**
- C. **The reactor/turbine trips.**
- D. **Condensate booster pump 2B starts.**

---

**Distracter Analysis:**

- A. **Incorrect:** Heater drain pump 2C2 is already running.  
**Plausible:** based on misunderstanding the normal 100% capacity of the pumps (2 - 50% capacity).
- B. **Incorrect:** CF pumps do not trip because a third CBP and HW pump will start on low suction pressure to makeup the 15% loss in condensate flow.  
**Plausible:** If the candidate thinks that 2C-2 heater drain pump not providing full heater drain flow would cause one CF pump to trip on low suction pressure.
- C. **Incorrect:** The reactor does not trip because condensate pumps can produce 150% flow.  
**Plausible:** If the candidate thinks that 2C-2 heater drain pump not providing full heater drain flow would cause both CF pumps to trip on low suction pressure.
- D. **Correct:**

Level: RO&amp;SRO

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

Lesson Plan Objective: CF-CM SEQ 12

Source: New; Parked Ques\_649

Level of knowledge: comprehension

References:

1. OP-MC-CF-CM pages 33, 37

**Bank Question: 661.1****Answer: B**

1 Pt(s)

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

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

What is the maximum allowable time that the worker can participate in the seal repair on the 2B NI pump and not exceed the exclude 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: SRO Only; 10CFR55.43(b)(4)

KA: G2.3.1 (2.6/3.0)

Lesson Plan Objective: RAD-RP SEQ 19/22/29

Source: Bank; Ques\_661a, Catawba NRC 2001

Level of knowledge: analysis

References:

1. GET Rad Worker Training Manual pages 32, 34, 44, 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 must be taken to release the waste gas decay tank today?

- A. **The release cannot be restarted until the repairs on 1EMF-50(L) are completed.**
- B. **Recalculate the trip set points using 1EMF-50(H) as the release path monitor, then jumper out 1EMF-50(L) and restart the release after a new GWR form has been approved.**
- C. **Reset 1WG-160 (*DECAY TANK TO UNIT VENT*), jumper out 1EMF-50(L) and 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) as the release path monitor, then jumper out 1EMF-50(L) and 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:** a new GWR is required  
**Plausible:** resetting of WG-160 is permitted if both EMF's are operable.
- D. **Correct answer**

Level: SRO Only; 10CFR55.43(b)(1)

KA: G2.3.8 (2.3/3.2)

Lesson Plan Objective: WE-RGR SEQ 3/5

Source: Bank; Ques\_671a, Catawba NRC 2001

Level of knowledge: memory

References:

1. OP-MC-WE-EMF page 37
2. OP-CN-WE-RGR pages 15, 21

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**Bank Question: 681****Answer: C**

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1 Pt(s)

Unit 2 was operating at 100% when a floor cooling glycol high temperature alarm is received. A review of the RTD panel reveals that several ice condenser floor slabs have high temperature indications.

Which one of the following statements correctly describes the operational concern raised by this alarm?

- A. **High glycol temperatures will cause the in-service glycol compressor to trip causing a loss of NF cooling and excessive ice sublimation.**
- B. **Low floor cooling glycol temperatures could cause cracks in the ice condenser thermal barrier.**
- C. **Slab freeze and thaw cycles could result in floor buckling that could interfere with lower door operation.**
- D. **Slab freeze and thaw cycles could cause gaps between the floor and the intermediate deck doors resulting in a bypass flow path.**

---

**Distracter Analysis:**

- A. **Incorrect:** none of the compressors trip on high glycol temperature  
**Plausible:** if the candidate does not know the basis for the temperature limits - low glycol temperature can cause a compressor trip.
- B. **Incorrect:** not the problem – glycol floor cooling does not effect the thermal barrier.  
**Plausible:** low temperatures can cause cracks in some systems due to thermal stress
- C. **Correct Answer:** this has been a problem as described in PIP 2-M97-2686 (July 1997)
- D. **Incorrect:** the intermediate deck doors are not physically located near the floor slab.  
**Plausible:** if the candidate does not know the mechanism for floor buckling.

Level: RO&amp;SRO

KA: SYS 025A2.02(2.7/2.5)

Lesson Plan Objective: CNT-NF SEQ 15

Source: Bank; Ques\_681, McGuire Audit 2000

Level of knowledge: memory

References:

1. OP-MC-CNT-NF pages 21, 37, 41

**Bank Question: 684****Answer: A**

1 Pt(s)

Unit 2 suffered a spurious loss of offsite power while operating at full power. Given the following events and conditions:

- The control rods did not trip for three minutes.
- Emergency boration increased NC boron concentration by 15 ppm.
- Tave stabilized at 557°F following the trip.
- Two NCPs have been restarted.
- Containment radiation levels have doubled as indicated by:
  - 2EMF-2 (RX BLDG INCORE INST RM)
  - 2EMF-3 (RX BLDG REFUEL BRDG)
  - 2EMF-5 (NC FLT.2A)

Which of the following correctly describes the primary cause of the increase in containment radiation levels following the event?

- A. **NCS activity has increased due to cycling of NCPs.**
- B. **NCS activity has increased due to the boron concentration change.**
- C. **NCS activity has increased due to thermal shock.**
- D. **NCS activity has increased due to a loss of letdown flow.**

---

**Distracter Analysis:**

- A. **Correct:** NCP cycling causes a crud burst.
- B. **Incorrect:** Activity increases are primarily due to NCP cycling.  
**Plausible:** based on the amount of boric acid, the NCS will not dilute by enough to see any difference in activity. Also a larger pH change can cause a crud burst – but this emergency boration will not cause a significant pH change.
- C. **Incorrect:** Activity increases are primarily due to NCP cycling.  
**Plausible:** based on a larger thermal shock can cause a crud burst.
- D. **Incorrect:** Activity increases are primarily due to NCP cycling.  
**Plausible:** based on increased letdown is the action required to return the activity to normal following a crud burst – will result in increased filtration – but not the predominant mechanism.

Level: RO&amp;SRO

KA: WE 16EK3.1 (2.9/3.1)

Lesson Plan Objective: CH-PC SEQ 4

Source: Bank; McGuire Audit 2000

Level of knowledge: comprehension

References:

1. OP-MC-CH-PC pages 23-25
2. OP-MC-WE-EMF page 119

**Bank Question: 703.1****Answer: C**

1 Pt(s)

While performing a valve lineup in the boric acid mixing room, an air line failure caused a severe airborne beta contamination problem. A worker received both internal and external contamination that was detected upon exiting the RCA.

Which one of the exposures would exceed the 10CFR20 limit for the worker's annual shallow dose equivalent (SDE) exposure?

- A. 55 Rem external dose to the lens of the eye.
- B. 17 Rem internal dose equivalent to the lens of the eye.
- C. 55 Rem external dose to the leg below the knee.
- D. 17 Rem internal dose to the right forearm.

---

**Distracter Analysis:**

- A. **Incorrect:** skin dose equivalent  
**Plausible:** 50 Rem is correct limit for SDE – may confuse with LDE eye dose
- B. **Incorrect:** SDE is an external skin or extremity dose not an internal dose  
**Plausible:** this is the correct LDE limit (lens of the eye).
- C. **Correct:** 50 Rem SDE limit to the extremities (below forearm and below knee) or skin.
- D. **Incorrect:** SDE is an external dose not an internal dose  
**Plausible:** the right forearm is the correct part of the anatomy for an SDE - based on confusion of external/internal

Level: RO&amp;SRO

KA: G2.3.4(2.5/3.1)

Lesson Plan Objective: RAD-RP SEQ 19

Source: Mod; Ques\_703, McGuire NRC 2000

Level of knowledge: memory

References:

1. GET Training Manual pages 31-32

**Bank Question: 705.1****Answer: B**

1 Pt(s)

Unit 1 is shutdown in Mode 4 with no TSAIL entries. Given the following events and conditions:

5/19 at 0300 The 1A D/G battery was disconnected from its' battery charger for maintenance

5/21 at 1100 The 1A D/G battery was reconnected to the battery charger

5/21 at 1200 The 1B D/G battery was disconnected from its' battery charger for maintenance

5/21 at 1230 The 1A D/G operability surveillance test was successfully completed

5/24 at 1200 Operators detect an 86N relay actuation on 1ETA

5/24 at 1230 The 1B D/G battery was reconnected to the battery charger

5/24 at 1300 The 1B D/G operability surveillance test was successfully completed

- The 1ETA 86N relay cannot be reset

Which one of the following statements correctly describes when Unit 1 must be in Mode 5?

**REFERENCES PROVIDED: Tech Spec 3.8.1 & 3.8.9**

A. 5/26 at 0100

B. 5/26 at 0800

C. 5/26 at 1500

D. 5/29 at 0000

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**Distracter Analysis:**

A. **Incorrect:** Must be in mode 5 before 5/26 at 0800

**Plausible:** if the candidate uses 37 hours after the second TS 3.0.3 entry at 1200 on 5/24. (loss of 2 D/Gs + 1OS)

B. **Correct Answer:** 8 +36 hours after first entering LCO 3.8.9 at 1200 on 5/24.

- C. **Incorrect:** Must be in mode 5 before 5/26 at 0800.  
**Plausible:** completion time is 6 days + 36 hours after entering TS 3.8.1 for the first time on 5/19 at 0300.
- D. **Incorrect:** Must be in mode 5 before 5/26 at 0800.  
**Plausible:** If the candidate does not recognize the loss of offsite power and distribution system train. (72 hrs + 36 hrs from 5/24 at 1200)

Level: SRO Only; 10CFR55.43(b)(2)

KA: APE 056 G2.2.23 (2.6/3.8)

Lesson Plan Objective: EL-EP SEQ 29/39

Source: Mod; Ques\_705, McGuire Audit 2000

Level of knowledge: analysis

References:

1. OP-MC-DG-EQB page 15
2. Tech Spec 3.8.1 & 3.8.9 - PROVIDED

**Bank Question: 710.1****Answer: B**

1 Pt(s)

Unit 1 was in mode 6 preparing for refueling activities. Given the following events and conditions:

- Reactor head removal was in progress
- NC system temperature is 109 °F.
- Reactor water level is 80 inches above hot leg centerline.
- Time after shutdown is 15 days.
- The thermal margin indication on 1MC-6 is not in service.
- At step 4.c of AP/19 (*Loss of ND*) the SRO directs you to manually determine the core thermal margin.
- A loss of both trains of ND occurred

What is the correct time to core boiling?

**REFERENCES PROVIDED:**

*Databook Section 2.10.1 and curves A-F including A(1)-F(1)*

- A. Less than 35 minutes
- B. 35 to 45 minutes
- C. 45.1 to 55 minutes
- D. Greater than 55 minutes

**Distracter Analysis:** The operators select curve 2.10.1.B from the Databook and determine that there is 0.64 hours = 38.4 minutes before the onset of core boiling. This selection is made using the criterion in “Use of the Curves”, in section 2.10.1 – which requires the candidate NOT to interpolate – but rather to use the closest higher temperature and the closest lowest water level to the levels presented in the curves for conservatism.

- A. **Incorrect:** the time to boiling is 39 minutes  
**Plausible:** If the candidates select curve 2.10.1.A prior to core offload, or 140 °F, they will get < 35 minutes
- B. **Correct Answer:** select curve 2.10.1.B – lowest water level (60 inches) and highest temperature (120 °F)
- C. **Incorrect:** the time to boiling is 37- 40 minutes  
**Plausible:** if the candidate uses 100 °F (closest temp or lower temp) temperature curve. Also if the candidate selects the curve for 84 inches of water in the core.
- D. **Incorrect:** the time to boiling is 37-39 minutes

**Plausible:** if the candidate selects curve 2.10.1.E (for 60 inches of water in the core, after refueling) – for any plausible temperature selected.

Level: RO&SRO

KA: APE 025G2.1.7(3.7/4.4)

Lesson Plan Objective: None

Source: Mod, Ques\_710, McGuire NRC 2000

Level of knowledge: analysis

References:

1. Databook Section 2.10.1, Curves A - F - PROVIDED

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**Bank Question: 748.1****Answer: A**

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1 Pt(s)

The 1B emergency diesel generator has been manually started and has been idling for 15 minutes. The operator is preparing to parallel the diesel to the grid.

In accordance with OP/1/A/6350/002 (*Diesel Generator*) Enclosure 4.2 (*1B D/G Startup*) when manually loading the emergency diesel generator, the operator should raise load to 1000 KW quickly after closing the D/G output breaker while maintaining a lagging power factor.

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

- A. Prevent motoring the D/G.
- B. Prevent diesel overspeed if the breaker opens on reverse power.
- C. Prevent turbocharger fire due to excess lube oil collection.
- D. Prevent D/G breaker trip on generator differential.

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**Distracter Analysis:**

- A. **Correct:** leading pf and low load could lead to reverse power condition motorizing the machine.
- B. **Incorrect:** D/G breaker does not have reverse power protection.  
**Plausible:** the D/G will pick up speed if suddenly unloaded – overspeed is a valid concern for heavily loaded D/G's.
- C. **Incorrect:** This is the reason for slow D/G loading.  
**Plausible:** This is a valid concern when a D/G has run at idle for a long time.
- D. **Incorrect:** An unbalance does not exist, Gen Diff should not occur.  
**Plausible:** This is a valid D/G trip

Level: RO&amp;SRO

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

Lesson Plan Objective: DG-DG SEQ 8

Source: Mod; Ques\_748, Catawba NRC 2001

Level of knowledge: memory

References:

1. OP/1/A/6350/002 Encl 4.2 page 5

**Bank Question: 767.1****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 or Safety Injection*), and E-1 (*Loss of Reactor or Secondary Coolant*) through step 11.
- Bus 1ETA is de-energized.
- The 1B NI pump has failed.
- The 1B Hydrogen recombiner is out of service.
- Containment hydrogen concentration is 7%.
- The TSC has recommended purging containment to reduce hydrogen concentration to 3.5% before energizing the igniters.

Which one of the following statements correctly describes the method for performing this evolution to control 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 through the containment air release system where it is filtered prior to release to the unit vent stack.**
- C. **Containment air is exhausted through the incore instrument ventilation system where it is filtered prior to release to the unit vent stack.**
- D. **Containment air is exhausted to the annulus where it is filtered prior to release to the unit vent stack.**

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**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 VE 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: SYS 028K6.01(2.6/3.1)

Lesson Plan Objective: VE SEQ 11

Source: Mod; Ques\_767, Catawba NRC 2001

Level of knowledge: comprehension

References:

1. OP-MC-CNT-VE pages 11, 19, 31

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**Bank Question: 771.1****Answer: D**

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1 Pt(s)

Unit 1 is operating at full power and Unit 2 is refueling. Unit 1 is releasing a minimally decayed waste gas decay tank when a significant packing leak starts on isolation valve 1WG-160, (*WG Decay Tank Outlet to Unit Vent Control*).

Which one of the following statements correctly describes the automatic actions required to assure that the leak is contained and filtered?

- A. **1EMF-50 (*WASTE GAS DISCH HI RAD*) automatically closes 1WG-160, and 1EMF-41 (*AUX BLDG VENT HI RAD*) automatically stops the auxiliary building ventilation unfiltered exhaust fans.**
- B. **1EMF-41 automatically stops the auxiliary building ventilation unfiltered exhaust fans, and 1EMF-36 (*UNIT VENT HI RAD*) automatically closes 1WG-160.**
- C. **1EMF-36 automatically closes 1WG-160, and 1EMF-35 (*UNIT VENT PART HI RAD*) automatically aligns the auxiliary building ventilation filter trains.**
- D. **1EMF-35 automatically stops the auxiliary building ventilation unfiltered exhaust fans, and 1EMF-41 automatically aligns the auxiliary building ventilation filter trains.**

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**Distracter Analysis:**

- A. **Incorrect:** EMF-50 will not get to Trip 2 because it is set for the activity being released, and EMF-41 does not automatically stop these fans.  
**Plausible:** These are valid automatic actions for EMF monitors.
- B. **Incorrect:** EMF-41 does not automatically stop these fans.  
**Plausible:** if the candidates do not recognize that this is not an automatic action for EMF-41 but for 35/37.
- C. **Incorrect:** EMF-35 does not realign ventilation filters.  
**Plausible:** partially correct – EMF 36-will close 1WG-160.
- D. **Correct answer:** EMF-35 will secure VA fans, and EMF-41 will realign filter trains to contain and filter the release in the Aux Bldg.

Level: RO&amp;SRO

KA: SYS 071K1.06(3.1\*/3.1)

Lesson Plan Objective: WE-EMF SEQ 2,3

Source: Mod; Ques 771, Catawba NRC 2001

Level of knowledge: comprehension

References:

1. OP-MC-PSS-VA pages 29, 45
2. OP-MC-WE-EMF pages 21 - 27

**Bank Question: 837.1****Answer: C**

1 Pt(s)

Unit 1 is shutdown in mode 5 on 2/6/02. Given the following events and conditions:

- Both ND loops are in service.
- PZR level is >95%.
- NC system pressure is 300 psig,
- NC Temperature is 165°F.
- Wide range loop D T<sub>hot</sub> failed high at 0200 on 2/5 and has not been returned to service.

Which one of the following statements correctly describes the required operator action on 2/6 as a result of the T<sub>hot</sub> failure?

**REFERENCES PROVIDED: Tech Spec 3.4-12**

- A. **1ND-3 (ND pump suction relief valve) must be operable and 1ND-1B (IC LOOP TO ND PUMPS ISOL) must be open because 1NC-36B (PZR PORV) is disarmed.**
- B. **1ND-3 must be operable and 1ND-1B and 1ND-2AC (IC NC LOOP TO ND PUMPS CONT INSIDE ISOL) must be open because 1NC-36B is disarmed.**
- C. **1ND-3 must be operable and 1ND-1B and 1ND-2AC must be open because 1NC-34A (PZR PORV) is disarmed.**
- D. **1ND-3 must be operable and 1ND-2AC must be open because 1NC-34A is disarmed.**

**Distracter Analysis:**

- A. **Incorrect:** 1NC-34A is disarmed; need 1ND-2AC open.  
**Plausible:** if the candidate confuses which temperature inputs to which PORV and does not recognize the series isolation valves.
- B. **Incorrect:** 1NC-34A is disarmed.  
**Plausible:** If the candidate confuses which temperature inputs to which PORV. The valve alignment is correct.
- C. **Correct:** temperature greater than 300 degrees disarms the PORV making 1NC-34A inoperable. With the NCS solid, TS 3.4.12 requires one ND suction relief aligned and operable and NC temperature >167 F within 1 hour.
- D. **Incorrect:** 1ND-1B must be open.  
**Plausible:** The inoperable PORV is correct.

Level: RO&SRO

KA: SYS 005A2.02(3.5/3.7)

Lesson Plan Objective: PS-ND SEQ 6, IPE SEQ 11, 13

Source: Mod; Ques\_837, Catawba Audit 2001

Level of knowledge: comprehension

References:

1. OP-MC-PS-IPE page 27, 29, 53
2. Tech Spec 3.4-12 - PROVIDED
3. OP-MC-PS-ND page 67

**Bank Question: 857****Answer: D**

1 Pt(s)

Unit 1 is operating at 65% power with pressurizer level on program, and normal charging and letdown flow through a 75 gpm orifice. Given the following events and conditions:

- 1NV-245B (*CHARGING LINE CONT OUTSIDE ISOL*) spuriously closes
- Flashing in the letdown line reduces letdown flow to 5 gpm
- The operators take no actions

How long before the pressurizer high level alarm actuates?

**REFERENCES PROVIDED: Unit 1 Databook Curve 7.38**

- A. **Less than 2 hours**
- B. **2 to 2.5 hours**
- C. **2.5 hours to 3.5 hours**
- D. **Greater than 3.5 hours**

**Distracter Analysis:**

Charging flow is reduced to the minimum value – goes to 32 gpm to the NCP seals. 12 gpm seal flow goes to the VCT.

PZR level starts at 44.5% ( $.65 * (55\% - 25\%) + 25\% = 44.5\%$ ).

PZR level increases to the high level alarm at 70%.

The reduction in charging flow into the NCS causes charging flow to reduce to minimum (32 gpm) as the PZR fills up. NCP Seal flow continues (12 gpm). Letdown flow drops to 5 gpm because of high regen HX outlet temperature (flashing at the orifices). Net charging flow drops to +15 gpm ( $32 - 12 - 5$ )

Per tank curve: 70%=9800 gal, 44.5%=6500 gal, 17%=2800 gal.

$3300\text{gal} (9800 - 6500) / (15\text{gpm}) = 220 \text{ minutes} = 3.67 \text{ hours}$

- A. **Incorrect:** There are more than 3.5 hours.  
**Plausible:** If candidate neglects to subtract seal flow and letdown flow  $3300 \text{ gal} / 32 \text{ gpm} = 103 \text{ minutes} = 1.7 \text{ hours}$  – or misreads tank curves / miscalculates pressurizer level
- B. **Incorrect:** There are more than 3.5 hours.  
**Plausible:** If the candidate includes the loss of letdown but neglects seal return flow:  $3300 \text{ gal} / (32 - 5) \text{ gpm} = 122 \text{ min} = 2.03 \text{ hours}$ . – or misreads tank curves / miscalculates pressurizer level
- C. **Incorrect:** There are more than 3.5 hours.

**Plausible:** Assuming loss of letdown, if the candidate does not include seal return flow:  $3300\text{gal} / (32 - 12) \text{ gpm} = 165 \text{ min} = 2.75 \text{ hours}$  - or misreads tank curves / miscalculates pressurizer level

**D. Correct answer:** 3.67 hours

Level: RO&SRO

KA: APE 022AA2.04(2.9/3.8)

Lesson Plan Objective: PS-NV SEQ 6

Source: New

Level of knowledge: analysis

References:

1. OP-MC-PS-NV pages 17, 39
2. OP-MC-PS-ILE page 35
3. Unit 1 Databook Curve 7.38 - PROVIDED

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**Bank Question: 858****Answer: B**

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1 Pt(s)

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

- The following fans were in operation:
  - S/G booster fans
  - Return air fans
  - Lower containment fans
  - Incore instrument area fans
- A main steam line break occurred inside containment
- All systems functioned as designed

Which one of the following containment cooling systems will stop operating?

- A. **S/G Booster Fans.**
- B. **Return Air Fans.**
- C. **Lower Containment Fans.**
- D. **Incore Instrument Area Fans.**

---

**Distracter Analysis:**

- A. **Incorrect:** These fans will continue to operate since no LOOP.  
**Plausible:** These fans lose power during a LOOP.
- B. **Correct**<sub>[BCH1]</sub>:
- C. **Incorrect:** These fans automatically restart on S<sub>s</sub>.  
**Plausible:** If the candidate confuses with the upper fans, which lose power.
- D. **Incorrect:** These fans automatically restart on S<sub>s</sub>.  
**Plausible:** these fans are not required by TS to be operable.

Level: RO&amp;SRO

KA: SYS 022G2.4.22(3.0/4.0)

Lesson Plan Objective: CNT-VUL SEQ 5

Source: New

Level of knowledge: memory

References:

1. OP-MC-CNT-VUL page 39, 41

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**Bank Question: 859.1****Answer: A**

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1 Pt(s)

Unit 2 is in mode 6 with refueling activities in progress. Given the following events and conditions:

- A containment purge is in progress
- A fuel element was rammed into the side of the reactor vessel
- 2EMF-3 (*CONTAINMENT REFUELING BRIDGE*) 2EMF-38 (*CONTAINMENT PARTICULATE*) are in trip 2 condition

Which one of the following actions should occur, assuming that operators follow the required procedure steps?

- A. **The containment evacuation alarm sounds automatically.  
The containment purge stops automatically.**
- B. **The containment evacuation alarm is actuated by the control room.  
The containment purge stops automatically.**
- C. **The containment evacuation alarm sounds automatically.  
The containment purge is stopped manually.**
- D. **The containment evacuation alarm is actuated by the control room.  
The containment purged is stopped manually.**

---

**Distracter Analysis:**

- A. **Correct:** Containment purge will stop and containment alarm will actuate when the EMF goes into trip2.
- B. **Incorrect:** a plant page is made by the control room.  
**Plausible:** If the candidate confuses the plant page with the containment evacuation.
- C. **Incorrect:** containment purge stops automatically  
**Plausible:** candidate knows the alarm, but fails to realize purge will stop automatically.
- D. **Incorrect:** both occur automatically  
**Plausible:** candidate does not know the auto actions for the EMF

Level: RO&amp;SRO

KA: SYS 103 A2.04 (3.5/3.6)

Lesson Plan Objective: WE-EMF SEQ 3

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-WE-EMF pages 43, 105
2. OP-MC-CNT-VP page 21
3. AP/2/A/5500/25 page 2-3
4. GET RAD Worker Training Manual page 124

**Bank Question: 860****Answer: D**

1 Pt(s)

Unit 1 has experienced four CRUD bursts this month. Given the following events and conditions:

- 1A reactor coolant filter d/p was indicating 40 psid.
- 1EMF-18 (*REACTOR COOLANT FILTER 1A*) reads 5 times its normal value.
- 1A reactor coolant filter was taken out of service.
- 1B reactor coolant filter was placed in service.
- 1B reactor coolant filter d/p is 10 psid.
- 1A mixed bed demineralizer is in service.
- 1EMF-48 (*REACTOR COOLANT*) reads its normal value.
- Local radiation readings near reactor coolant filter 1B are 3 times normal.

If the detector for 1EMF-19 (*REACTOR COOLANT FILTER 1B*) fails, what actions (if any) are the operators required to take in response to these conditions?

- A. **Switch mixed bed demineralizers.**
- B. **Shift back to 1A reactor coolant filter until 1EMF-19 is returned to service.**
- C. **Place both mixed bed demineralizers in service until 1EMF-19 is returned to service.**
- D. **No action is required.**

---

**Distracter Analysis:**

- A. **Incorrect:** No action is required.  
**Plausible:** If the candidate believes that the filters and demineralizers are train related.
- B. **Incorrect:** No action is required.  
**Plausible:** If the candidate thought that procedures called for using a filter with an operable RAD monitor.
- C. **Incorrect:** No action is required. EMF-48 indicates no crud burst  
**Plausible:** This action would be required if another crud burst were to occur.
- D. **Correct answer**

Level: RO&amp;SRO

KA: SYS 072A2.02(2.8/2.9)

Lesson Plan Objective: None

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-WE-EMF pages 43, 45
2. OP/1/A/6100/010S window D4

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**Bank Question: 861****Answer: D**

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1 Pt(s)

Unit 2 is responding to a large LOCA with 10 % failed fuel. Given the following events and conditions:

- 2ETA is faulted.
- 2NI-184B (*IB ND PUMP SUCTION FROM CONT SUMP ISOL*) would not open during FWST swapover
- 2NI-184B breaker has tripped and will not reset
- 1EMF-10 (*AUX BLDG COR / EL 750*) and 2EMF-9 (*AUX BLDG COR / EL 767*) read > 10E4 mR/hr.
- The TSC is not yet manned.
- RP projects that expected dose rates in the area of the 2NI-184B will be very high, possibly exceeding 150 Rem/hr.
- The OSM has determined that manual alignment of 2NI-184B is required for lifesaving protection of the general public inside the 10 mile EPZ (public health and safety).

Which of the following exposure limits would apply to a worker who volunteered to manually open 2NI-184B?

- A. Do not exceed 5 Rem TEDE.
- B. Do not exceed 10 Rem TEDE.
- C. Do not exceed 25 Rem TEDE.
- D. The worker(s) may exceed 25 Rem TEDE.

---

**Distracter Analysis:**

- A. **Incorrect:** The operator is allowed to exceed 25 Rem TEDE.  
**Plausible:** This is the maximum allowable TEDE for non-emergency conditions.
- B. **Incorrect:** The operator is allowed to exceed 25 Rem TEDE.  
**Plausible:** This is the maximum allowable annual TEDE for equipment protection during accident conditions.
- C. **Incorrect:** The operator is allowed to exceed 25 Rem TEDE.  
**Plausible:** This is the maximum allowable annual TEDE for life saving or public safety on a non-volunteer basis.
- D. **Correct:** greater than 25 Rem is allowed on a volunteer basis for protection of the public health and safety.

Level: RO&SRO

KA: SYS 006G2.3.4(2.5/3.1)

Lesson Plan Objective: EP-EMP SEQ 5; TA-AM SEQ 30

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-EMP page 31
2. OP-MC-TA-AM page 67
4. GET RAD Worker Training Manual page 32

**Bank Question: 862****Answer: B**

1 Pt(s)

Unit 1 is responding to a LOCA from a trip at full power. Given the following events and conditions:

- A safety injection occurred at 0200.
- Bus 1ETB is faulted.
- The 1A NS pump started automatically
- The 1A NS pump was stopped by CPCS signal at 0235.
- The Ss signal and sequencer have been reset
- The train A Sp signal has not been reset
- 1NS-29A (*A NS PUMP DISCH CONT OUTSIDE ISOL*) and 32A (*A NS PUMP DISCH OUTSIDE ISOL*) failed to operate (mechanically stuck)
- Containment pressure reached 5 psig at 0305
- FWST level reaches 33 in. at 0306.

Which one of the following operator actions is required to address the containment pressure problem?

**REFERENCES PROVIDED: ES-1.3**

- A. **Immediately open 1NS-43A (*CONT OUTSIDE ISOL*) to supply spray from the ND pumps.**
- B. **After switchover to cold leg recirculation, close 1NI-173A (*TR A ND TO A & B CL*) and open 1NS-43A to supply spray from the ND pumps.**
- C. **50 minutes after switchover to cold leg recirculation, open 1NS-43A to supply spray from the ND pumps.**
- D. **50 minutes after switchover to cold leg recirculation, close 1NI-173A and open 1NS-43A to supply spray from the ND pumps.**

-----  
**Distracter Analysis:**

- A. **Incorrect:** Must close 1NI-173A after switchover.  
**Plausible:** If the candidate does not recognize the effect on the ND system.
- B. **Correct:**
- C. **Incorrect:** Must close 1NI-173A w/o waiting 50 minutes.  
**Plausible:** If the candidate does not recognize the effect on the ND system, and procedures call for waiting 50 minutes after the trip before Aux spray.

- D. **Incorrect:** Don't wait 50 minutes.  
**Plausible:** Procedures call for waiting 50 minutes after the trip before Aux spray.

Level: RO&SRO

KA: SYS 026K3.02(4.2\*/4.3)

Lesson Plan Objective: ECC-NS SEQ 8, EP-E1 SEQ 6

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-ECC-NS pages 21, 37
2. OP-MC-PS-ND page 71
3. OP-MC-EP-E1 page 257
4. EP/1/A/5000/ES-1.3 pages 10-11

**Bank Question: 863****Answer: A**

1 Pt(s)

Unit 1 is at 50% power. Given the following events and conditions:

- Control rods are in auto
- Control bank D is at 110 steps
- Annunciator 1AD-2, B3 (*P/R CHANNEL DEVIATION*) actuates
- Power range channel N41 reads 20%

Which one of the following statements would be consistent for the N41 indication?

**REFERENCES PROVIDED:***Unit 1 Data Book Diagrams 2.1.1, 2.1.2, 2.1.3, 2.1.4*

- A. **Rod P-4 has dropped as evidenced by a significant temperature deviation on CEC T-63.**
- B. **Rod D-2 has dropped as evidenced by moveable incore flux maps at thimble F-3.**
- C. **Rod M-13 has dropped as evidenced by a significant temperature deviation on CEC T-30.**
- D. **Rod B-13 has dropped as evidenced by moveable incore flux maps at thimble C-4.**

**Distracter Analysis:**

Power range channel N41 is in quadrant 4. Note that the north direction on Diagram 2.1.1 is to the right – not in the normal upward direction.

- A. **Correct:** P-4 is a quadrant 4 rod.
- B. **Incorrect:** this is a quadrant 1 rod.  
**Plausible:** misapplication of figures.
- C. **Incorrect:** M-13 is a quadrant 3 rod  
**Plausible:** misapplication of figures.
- D. **Incorrect:** B-13 is quadrant 1 rod.  
**Plausible:** misapplication of figures.

Level: SRO Only; 10CFR55.43(b)(6)

KA: APE 003AA2.03(3.6/3.8)

Lesson Plan Objective: AP-14 SEQ 2

Source: New

Level of knowledge: analysis

References:

1. AP/1/A/5500/14 page 2

2. Unit 1 Data Book Diagrams 2.1.1 - 2.1.4 - PROVIDED

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**Bank Question: 864****Answer: A**

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1 Pt(s)

Unit 1 was operating at 99% power when a spurious closure of all 4 MSIVs occurred. Given the following events and conditions after the plant trip:

- Two MSSVs (code safety valves) on 1B S/G have stuck open.
- NC temperature is 460°F.
- NC pressure is 1800 psig.
- PZR level is 14 %.
- 1EMF-48 (*REACTOR COOLANT*) is in trip 2.
- Operators have transitioned to E-3 (*Steam Generator Tube Rupture*) due to a tube rupture in 1/B S/G.

Assuming all systems function as designed, which one of the following correctly describes the effluent release indicated by radiation monitors during this event?

- A. **1EMF-25 (*S/G B STEAM LINE HI RAD*) trip 2 indicates a release that could exceed public exposure guidelines.**
- B. **1EMF-34 (*S/G SAMPLE*) trip 2 indicates a release that exceeds effluent release requirements.**
- C. **1EMF-40 (*CONTAINMENT*) trip 2 indicates a release that could exceed public exposure guidelines.**
- D. **1EMF-41 (*AUX BLD VENTILATION*) trip 2 indicates a release that exceeds effluent release requirements.**

---

**Distracter Analysis:** The main steamline monitors provide indication of the direct effluent release during a main steamline rupture. Emergency Plan assumptions for MSLR specify very low secondary activity to minimize public exposure.

- A. **Correct answer**
- B. **Incorrect:** This alarm stops its effluent release.  
**Plausible:** If the candidate assumes the blowdown flow continues.
- C. **Incorrect:** 1EMF-25 would also have to alarm since the containment breach is through the MSSVs.  
**Plausible:** If the candidate recognizes high containment activity with a loss of containment integrity.
- D. **Incorrect:** the plant vent monitor would also have to alarm.  
**Plausible:** If the candidate assumes an unfiltered release from the aux bldg directly to the environment.

Level: SRO Only; 10CFR55.43(b)(4)

KA: SYS 039A1.09(2.5\*/2.7\*)

Lesson Plan Objective: CH-SC SEQ 8

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-WE-EMF page 45
2. Tech Spec 3.7.16 & Bases

**Bank Question: 865****Answer: B**

1 Pt(s)

Unit 2 is at full power when the following events occur:

- Both main feed pumps trip
- Reactor power is approximately 98%
- NCS  $T_{ave}$  is increasing
- Main turbine load is 1150 MWe
- Rods are inserting at 72 steps per minute

Which one of the following statements describes why the EOP basis for immediately tripping turbine?

- A. **Prevent an uncontrolled cooldown and positive reactivity addition.**
- B. **Maintain or extend steam generator inventory.**
- C. **Prevent turbine overspeed when the main generator trips.**
- D. **Place steam dumps in service for additional heat removal.**

---

**Distracter Analysis:**

- A. **Incorrect:** The basis in the EOPs is to maintain or extend SG inventory  
**Plausible:** this is the reason in E-0 for tripping the turbine
- B. **Correct:** if the turbine is tripped within 30 seconds for the loss of feed ATWS, NCS pressure transient, although severe, leads to acceptable results.
- C. **Incorrect:** The basis in the EOPs is to maintain or extend SG inventory  
**Plausible:** concern for the operation of the turbine
- D. **Incorrect:** The basis in the EOPs is to maintain or extend SG inventory  
**Plausible:** may believe steam dumps will yield additional heat removal

Level: SRO Only; 10CFR55.43(b)(5)

KA: EPE 029 EK3.06 (4.2/4.3)

Lesson Plan Objective: FRS SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-MN-EP-FRS pages 13, 23 and 25
2. FR-S.1 page 2

**Bank Question: 866****Answer: B**

1 Pt(s) Unit 1 is conducting a reactor startup in accordance with plant procedures. The operator is pulling the control rods.

Which one of the following indications should the operator **primarily** depend on for determining when the reactor achieves criticality?

- A. When control rods exceed the ECP position.
- B. When the reactor nuclear instrumentation indicates a stable, positive startup rate and increasing flux levels with no control rod motion.
- C. When  $T_{ave}$  is increasing steadily with no control rod motion.
- D. When the  $1/m$  plot (Co/C) is approaching zero.

---

**Distracter Analysis:**

- A. **Incorrect:** Not the primary indication - the ECP is only a benchmark for the operator to use for when the reactor is predicted to go critical, however, several possible errors could make the ECP significantly inaccurate  
**Plausible:** Candidate locks on to the fact that the ECP is the estimated critical position and is used during a reactor startup.
- B. **Correct:** actual reactor response is the only true method of determining the reactor is critical
- C. **Incorrect:**  $T_{ave}$  does not increase when the reactor reaches criticality  
**Plausible:** Indication the reactor is at the POAH
- D. **Incorrect:** Not the primary indication  
**Plausible:** Like the ECP, the  $1/m$  is a tool to predict criticality, but not 100% accurate.  $1/m$  is calculated regularly during startup to predict criticality.

Level: RO&SRO

KA: SYS 001 A3.08 (3.9/4.0)

Lesson Plan Objective: RT-RB 13, ADM-RM SEQ 8

Source: New

Level of knowledge: memory

References:

1. OP-MC-RT-RB page 24

**Bank Question: 867****Answer: A**

1 Pt(s)

Unit 1 is in the process of starting the first NCP in accordance with OP/1/A/6250/02A (*Reactor Coolant Pump Operation*) during a plant startup. Given the following conditions and events:

- The operator starts the 1A2 lift oil pump.
- Lift oil pressure reaches 650 psig
- 5 minutes later, as the crew is ready to start the 1A NCP, the operator notices 1A2 lift oil pump was no longer running.

Which one of the following statements correctly explains the reason why the pump is not running?

- A. **The lift oil pump tripped on overload.**
- B. **The one minute timer for the lift oil pump timed out and stopped the pump.**
- C. **The lift oil pump stopped as soon as lift oil pressure reached 600 psi.**
- D. **The lift oil pump stopped 1 minute after lift oil pressure reached 600 psi.**

---

**Distracter Analysis:**

- A. **Correct:** the pump will trip on overload
- B. **Incorrect:** this condition does not cause the lift oil pump to trip  
**Plausible:** the one-minute timer opens the lift oil pump breaker 1 minute **after** the NCP breaker is closed.
- C. **Incorrect:** this condition does not cause the lift oil pump to trip  
**Plausible:** lift oil pressure must be 600 psi to start the NCP; the candidate may assume the lift oil pump stops at the setpoint.
- D. **Incorrect:** this condition does not cause the lift oil pump to trip  
**Plausible:** candidate could assume that once lift oil pressure has been sufficient for 1 minute, the pump turns off.

Level: RO&amp;SRO

KA: SYS 003 K6.14 (2.6/2.9)

Lesson Plan Objective: NCP SEQ 6

Source: New

Level of knowledge: comprehension

References:

1. OP-MN-PS-NCP page 19
2. OP-MN-PS-NCP figure 7.12 page 79

**Bank Question: 869.1****Answer: B**

1 Pt(s)

Unit 1 is operating at 85% power following a transient. Given the following events and conditions:

- A Control Bank “D” rod is found to be misaligned.
- The misaligned rod is at 130 steps
- The remaining Control Bank “D” rods are at 150 steps.
- Troubleshooting by Reactor Engineering determines that the control rod will move in the inward direction but will not move outward.
- The misaligned rod is found to have an electrical problem and is declared inoperable.

Which one of the following statements correctly describes the required action and the affect on shutdown margin (SDM)?

**REFERENCES PROVIDED: Tech Spec 3.1.4**

- A. The unit must be in mode 3 in 6 hours  
SDM has decreased**
- B. The unit must be at 75 % power in 2 hours  
SDM does not change**
- C. The unit must be at 75 % power in 2 hours  
SDM has increased**
- D. The rod must be realigned within one hour  
SDM does not change**

**Distracter Analysis:** The rod is trippable because it can be driven in.

- A. Incorrect:** the rod is trippable, so SDM has not decreased.  
**Plausible:** This is the correct answer for a non-trippable rod.
- B. Correct:** the problem is electrical and rods are above the RIL, therefore SDM is unaffected.
- C. Incorrect:** SDM has not changed  
**Plausible:** partially correct - if candidate believes the rod is trippable, the power change is applicable.
- D. Incorrect:** The rod can stay misaligned  
**Plausible:** if candidate assumes that the rod is not trippable or does not recognize the OR connectors in the TSAS.

Level: SRO Only; 10CFR55.43(b)(6)

KA: APE 005 AK1.05 (3.3/4.1)

Lesson Plan Objective: AP-14 SEQ 3

Source: New

Level of knowledge: comprehension

References:

1. OP-MN-AP-14 background ENC. 2 step 5 page 32
2. AP-14 page 19
3. OP-MN-RT-RB page 27
4. Tech Spec 3.1.4 - PROVIDED

**Bank Question: 870****Answer: A**

1 Pt(s) Unit 1 was operating at 100% power. Given the following trends on the IA NCP:

<u>Time</u>	<u>0200</u>	<u>0205</u>	<u>0210</u>	<u>0215</u>
Motor bearing temp (°F)	180	184	186	195
Lower pump bearing temp (°F)	221	225	228	231
Seal outlet temp (°F)	205	227	235	251
Motor winding temp (°F)	311	314	316	323

At what time must the IA NCP be secured?

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

**Distracter Analysis:**

- A. **Correct:** NCP must be stopped if motor winding temperature reaches 311 degrees at 0200
- B. **Incorrect:** NCP must be stopped at 0200  
**Plausible:** reaches the temperature for securing NCP on lower bearing
- C. **Incorrect:** NCP must be stopped at 0200  
**Plausible:** reach the limit for securing NCP on seal outlet temp at 0210
- D. **Incorrect:** NCP must be stopped at 0200  
**Plausible:** reach the temperature for stopping NCP on motor bearing at 0215

Level: RO&SRO

KA: APE 015 AA2.09 (3.4/3.5)

Lesson Plan Objective: NCP SEQ 15

Source: New

Level of knowledge: memory

References:

1. OP-MN-PS-NCP page 37

**Bank Question: 871****Answer: D**

1 Pt(s)

Unit 1 has implemented ES-0.3 (*Natural Circulation Cooldown with Steam Void in Vessel*) when a YELLOW path occurs on Reactor Coolant Inventory due to UR level indication < 100 %.

Which one of the following statements correctly describes the reasoning for a decision to address this YELLOW path in FR-I.3 (*Response to Voids in Reactor Vessel*)?

- A. **Transition to FR-I.3 because EOP usage requires transitioning from an ES procedure for a YELLOW path if there are no other higher priority critical safety functions.**
- B. **Transition into FR-I.3 in order to vent the reactor vessel void through the head vent and collapse the void to allow the cooldown to continue.**
- C. **Do not implement FR-I.3 because this procedure requires starting one NCP, which cannot be done with a void in the reactor vessel due to the potential for gas binding.**
- D. **Do not implement FR-I.3 because this would cause a loss of RCS inventory, as the reactor coolant would flash to steam when the reactor vessel head vent was opened.**

---

**Distracter Analysis:**

- A. **Incorrect:** EOP usage allows but does not require transitioning to FR procedures.  
**Plausible:** If candidate is unfamiliar with the EOP usage rules
- B. **Incorrect:** Although this is a true statement for FR-I.3, it does not apply to the case above when conducting a cooldown in ES-0.3.  
**Plausible:** This is the purpose of FR-I.3.
- C. **Incorrect:** An NCP can be started with a void in the reactor vessel and will be started in FR-I.3 if the attempt to collapse the void by repressurizing the system fails.  
**Plausible:** If the candidate is concerned that starting the NCP will destroy the pump.
- D. **Correct:** ES-0.3 maintains a void under controlled conditions. FR-I.3 is prohibited in ES-0.3. If the head were vented, the steam void would not be eliminated. As pressure is decreased, water would flash to steam to replace the steam being vented. Void size would remain essentially the same and the net is a loss of system inventory.

Level: SRO Only; 10CFR55.43(b)(5)

KA: W/E 10 EA2.1 (3.2/3.9)

Lesson Plan Objective: EP-FRI SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-MN-EP-E0 page 197
2. OP-MN-EP-FRI page 53
3. EP/1/A/5000/FR-I.3 page 2

**Bank Question: 872****Answer: B**

1 Pt(s)

Unit 1 was operating at 100% power when a loss of main feedwater occurred due to the failure of a feedwater flow instrument.

Which one of the following represents valid main control board indications of this failure?

- A. **Rapidly decreasing level and a high main steam pressure indication on the steam pressure recorder.**
- B. **Rapidly decreasing level and a high feedwater flow indication on the steam/feed flow recorder.**
- C. **Rapidly decreasing level and a low feedwater flow indication on the steam/feed flow recorder.**
- D. **Rapidly decreasing level and a low main steam pressure indication on the steam pressure recorder.**

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**Distracter Analysis:**

- A. **Incorrect:** Feedwater flow is not density compensated.  
**Plausible:** If the candidate thinks feed flow is density compensated.
- B. **Correct:**
- C. **Incorrect:** Feed flow failing low will not cause a loss of feedwater.  
**Plausible:** If the candidate reads the question to be a feed controller failure.
- D. **Incorrect:** Feedwater flow is not density compensated.  
**Plausible:** If the candidate thinks feed flow is density compensated and memorized the steam flow transmitter failure response.

Level: SRO Only; 10CFR55.43(b)(5)

KA: APE 054AA2.08(2.9/3.3)

Lesson Plan Objective: CF-IFE SEQ 11

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-CF-IFE page 33
2. AP/1/A/5500/06 pages 2-3

**Bank Question: 873****Answer: C**

1 Pt(s)

Unit 1 is in mode 3 responding to a loss of off-site power.

Given the following parameters at the indicated times:

<u>Parameter</u>	<u>0200</u>	<u>0300</u>	<u>0400</u>	<u>0500</u>
• NCS pressure (psig)	1955	1905	1855	1805
• T <sub>ave</sub> (°F)	400	390	375	350
• Pressurizer level (%)	27	23	26	25
• Containment pressure (psig)	0.5	0.6	0.8	1.0

Which one of the following is the **earliest** action required to ensure a controlled transition to mode 4?

- A. **Block SI actuation at 0200.**
- B. **Terminate SI flow at 0300.**
- C. **Block SI actuation at 0400.**
- D. **Terminate SI flow at 0500.**

**Distracter Analysis:**

- A. **Incorrect:** Must be <1955 to block SI.  
**Plausible:** if the candidate thinks that SI is blockable because this is the numerical P-11 setpoint.
- B. **Incorrect:** SI has not actuated.  
**Plausible:** - if the candidate thinks that SI actuated at 1945 psig.
- C. **Correct answer:** this is the first time and action possible to prevent uncontrolled cooldown due to SI actuation.
- D. **Incorrect:** SI blocked at 0400.  
**Plausible:** - if the candidate does not understand P-11 and recognizes that SI actuates at 1845 psig.

Level: RO&amp;SRO

KA: SYS 002A2.02(4.2/4.4)

Lesson Plan Objective: ECC-ISE SEQ 8/9/10

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-ECC-ISE pages 21, 23

**Bank Question: 874****Answer: C**

1 Pt(s)

Unit 1 is at full power with all systems selected to automatic. Given the following event:

- Bus 1EVKA was deenergized.

Why would the crew have to switch the suction source for the NV pumps to the FWST?

- A. VCT level indication is lost.
- B. Control power to the boric acid pumps is lost.
- C. Auto makeup capability to the VCT is lost.
- D. VCT makeup cannot keep up with charging flow.

---

**Distracter Analysis:**

- A. **Incorrect:** VCT level transmitters remain powered.  
**Plausible:** if the candidate thought level indication is lost, then it would seem prudent to switch to the FWST.
- B. **Incorrect:** BA pumps can be manually operated.  
**Plausible:** candidate may know blended makeup is lost but not sure why. Loss of boric acid pumps would seem like a likely reason to switch to the FWST.
- C. **Correct:** the modulating signal for NV-252 and 267 is lost. Auto blended makeup to the VCT is lost.
- D. **Incorrect:** makeup capacity is matched to charging capacity.  
**Plausible:** if the candidate is aware of the loss of makeup control, this would be the reason for swapping to the FWST.

Level: RO&SRO

KA: APE 057AK1.04(3.5/3.6)

Lesson Plan Objective: AP-15 SEQ 2

Source: New

Level of knowledge: comprehension

References:

1. AP-15 Background Document page 21
2. AP-15 page 8, 130

**Bank Question: 876****Answer: C**

1 Pt(s)

Unit 1 is operating at 100% power, steady state when a *PZR SPRAY LINE LO TEMP* alarm annunciates. No other abnormal annunciators are alarming. Which one of the following statements is the most likely explanation for this alarm?

- A. Pressurizer heater bank C is off.
- B. Lack of insurge/outsurge cycles has allowed ambient cooling.
- C. Spray valve orifice fouling problems.
- D. 1B NCP has tripped.

---

**Distracter Analysis:**

- A. **Incorrect:** heater loss could cause low PZR pressure and temperature but will not affect Tcold flow from NCPs.  
**Plausible:** heaters can be energized to maximize mixing of NCS and pressurizer, when heaters are on, there will be more spray.
- B. **Incorrect:** Spray temperature is not affected by PZR surges.  
**Plausible:** this could be a partial answer to a surge line low temperature, which the minimum spray flow also addresses.
- C. **Correct:**
- D. **Incorrect:** There will be other alarms if an NCP trips.  
**Plausible:** this could cause a low spray temperature alarm.

Level: RO&amp;SRO

KA: SYS 010K4.01(2.7/2.9)

Lesson Plan Objective: PS-NC SEQ 9

Source: New

Level of knowledge: memory

References:

1. OP-MC-PS-NC page 31

**Bank Question: 877****Answer: B**

1 Pt(s) Unit 1 is at full power. Pressurizer level is on program. All systems are in automatic.

Which one of the following statements correctly describes the relationship between the charging and letdown flow?

- A. **Charging flow through the regenerative heat exchanger equals letdown flow + seal return.**
- B. **Charging flow through the regenerative heat exchanger is less than letdown flow.**
- C. **Charging flow through 1NV-241 (SEAL INJ FLOW CONTROL) equals letdown flow.**
- D. **Charging flow through 1NV-241 + seal injection equals letdown flow.**

-----  
**Distracter Analysis:**

- A. **Incorrect:** charging flow through the regenerative heat exchanger will be approximately 55 gpm. Letdown + seal return is 87 gpm.  
**Plausible:** if the candidate misunderstands or misapplies the flow balance.
- B. **Correct:** charging flow through the regenerative heat exchanger will be approximately 55 gpm. Letdown flow is 75 gpm.
- C. **Incorrect:** Charging flow through NV-241 will be 55 gpm, letdown is 75 gpm.  
**Plausible:** if the candidate misunderstands or misapplies the flow balance.
- D. **Incorrect:** 55 gpm + 32 gpm is 87 gpm, letdown is 75 gpm. The balance is charging + seal injection = letdown + seal return  
**Plausible:** if the candidate misunderstands or misapplies the flow balance.

Level: RO&SRO

KA: SYS 011K5.06(2.9/3.2)

Lesson Plan Objective: PS-NV SEQ 3

Source: New

Level of knowledge: memory

References:

1. OP-MC-PS-NV page 117

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**Bank Question: 878****Answer: B**

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1 Pt(s)

A Unit 1 startup is in progress. Given the following events and conditions:

- Reactor is critical in the source range.
- Power Range channel 41 is removed from service for zero power physics testing.
- A loss of EKVB occurs.

Which one of the following actions occur?

- A. **Reactor trips and source range channel 32 is deenergized. Source range 31 is still in operation.**
- B. **Reactor trips and both source range channels are deenergized.**
- C. **The reactor critical and source range channel 32 is deenergized. Source range channel 31 is still in operation.**
- D. **The reactor is critical Both source range channels are de-energized.**

---

**Distracter Analysis:**

- A. **Incorrect:** P-10 will be met, both SR's will de energize.  
**Plausible:** if the candidate does not realize P-10 will turn off both source ranges and recognizes the reactor trips when SR 32 de energizes.
- B. **Correct:**
- C. **Incorrect:** Reactor trips on a number of PR/SR trip setpoints. Also, P-10 will turn off both SR's.  
**Plausible:** if the candidate thinks that the loss of the bus will turn off the SR-32 without actuating the trip bistable.
- D. **Incorrect:** Reactor trips on a number of PR/SR trip setpoints.  
**Plausible:** if the candidate does not realize at power trips (or SR 32 loss of power) will cause a reactor trip but fails to realize P-10 will turn off the SR (loss of power actuates P-10 bistable on N42).

Level: RO&amp;SRO

KA: SYS 015K4.01(3.1/3.3)

Lesson Plan Objective: IC-ENB SEQ 12

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-IC-ENB pages 51, 61
2. OP-MC-IC-IPE page 83

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**Bank Question: 880****Answer: A**

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1 Pt(s)

Unit 1 was preparing to synchronize and load the main generator onto the grid. Given the following conditions:

- The appropriate generator voltage conditions have been established.
- The *GEN AUTO/MANUAL SYNC SWITCH* has been placed in the *MAN* position

If the operators have been directed to manually synchronize the generator, which one of the following actions are correct to close breaker 1A?

- A. **Press and hold the *SYNC* button. When the synchroscope is rotating slowly in the fast direction, then press the *CLOSE* button for the 1A breaker at 5 minutes to 12 o'clock.**
- B. **Press and hold the *AUTO SYNC* button on the DEH panel until the 1A generator breaker is closed.**
- C. **Rotate the main generator *GEN AUTO/MANUAL SYNC SWITCH* to the *AUTO 1A BREAKER* position, and press the *SYNC* button for breaker 1A.**
- D. **Press and hold the *AUTO SYNC* button on the DEH panel. When the synchroscope is rotating slowly in the fast direction, press the *CLOSE* button for the 1A breaker at 5 minutes to 12 o'clock.**

---

**Distracter Analysis:**

- A. **Correct:** to manually close, the pushbutton is depressed until the breaker is closed
- B. **Incorrect:** *AUTO SYNC* button only works for auto-synchronization. The *GEN* switch would have to be placed in the *Auto 1A* position.  
**Plausible:** this partially reflects the auto-closure mode (breaker 1A position).
- C. **Incorrect:** the *SYNC* button will not close the breaker.  
**Plausible:** this partially reflects the auto-closure mode (*AUTO SYNC* vs. *SYNC*).
- D. **Incorrect:** *AUTO SYNC* button only works for auto-synchronization.  
**Plausible:** synchroscope rotation is a requirement for closing the breaker.

Level: RO&amp;SRO

KA: SYS 062K4.05(2.7/3.2)

Lesson Plan Objective: GEN-MG SEQ 6

Source: New

Level of knowledge: memory

References:

1. OP-MC-GEN-MG page 71, 111
2. OP/1/A/6300/001 pages 11, 12

**Bank Question: 881****Answer: B**

1 Pt(s)

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

- 1EVDA is supplying normal full power loads,
- No battery charger is available,
- Systems operate normally

Which one of the following statements correctly describes the minimum length of time that bus 1EVDA is designed to sustain loads and what action will protect the DC bus loads?

- A. **After 1 hour, the vital battery bus breaker will open automatically when bus voltage falls to 105 volts.**
- B. **After 1 hour, the vital battery breaker must be manually opened when bus voltage falls to 105 volts.**
- C. **After 4 hours, the vital battery breaker will open automatically when bus voltage falls to 107 volts.**
- D. **After 4 hours, the vital battery breaker must be manually opened when bus voltage falls to 107 volts.**

---

**Distracter Analysis:**

- A. **Incorrect:** the vital battery breaker does not automatically open  
**Plausible:** partially correct – the design time for sustaining loads is 1 hour
- B. **Correct:** below this value the battery could be damaged or components will begin to fail.
- C. **Incorrect:** the battery is expected to last for 1 hour and there is no automatic trip associated with low voltage  
**Plausible:** the 4 hour requirement for battery performance is typical of the aux batteries – voltage limit is 107 volts.
- D. **Incorrect:** the vital batteries are not designed to sustain loads for 4 hours  
**Plausible:** partially correct – DC bus protection is achieved by manually opening the breaker – voltage limit is 107 volts.

Level: RO&amp;SRO

KA: SYS 063A4.03(3.0/3.1)

Lesson Plan Objective: AP-15 SEQ 2

Source: New

Level of knowledge: memory

References:

1. AP-15 Background Document pages 4, 40
2. AP/1/A/5500/015 page 49

**Bank Question: 883****Answer: A**

1 Pt(s)

A diesel powered VI compressor has auto-started due to decreasing VI pressure. Given the following events and conditions:

- VI system pressure has returned to 93 psig.
- The operator presses the blue RESET button on the compressor control panel.

Which one of the following statements correctly describes the expected status of the VI compressor?

- A. **No response, the compressor remains running because pressure is less than 95 psig.**
- B. **The VI compressor remains running, but now can be shutdown and returned to auto by the operator and remain shutdown unless pressure decreases below 90 psig.**
- C. **The VI compressor remains running, but now will automatically stop when pressure is greater than 95 psig.**
- D. **The VI compressor automatically shuts down immediately but will restart if returned to automatic by the operator.**

---

**Distracter Analysis:**

- A. **Correct:** The compressor will not shutdown. Control of the compressor can be regained when pressure is above 95 psig, then the reset can be accomplished and the compressor shutdown.
- B. **Incorrect:** The compressor does not shutdown and the operator cannot take control  
**Plausible:** candidate believes the control is returned to the operator and can be returned to auto. This is not true, if returned to auto below 95 psig, it will restart.
- C. **Incorrect:**  
**Plausible:** if the candidate thinks the reset button allows the compressor to automatically shutdown.
- D. **Incorrect:**  
**Plausible:** candidate believes the compressor will stop, the compressor if returned to auto (after shutdown by the operator), would restart.

Level: RO&amp;SRO

KA: SYS 078 K4.01 (2.7/2.9)

Lesson Plan Objective: SS-VI SEQ 4

Source: New

Level of knowledge: comprehension

References:

1. OP-MN-SS-VI page 57, 61

**Bank Question: 884****Answer: B**

1 Pt(s)

Which one of the following statements correctly describes how the train B manual reactor trip and automatic reactor trip signals input to the train B reactor trip bypass breaker?

- A. **Manual de-energizes the bypass breaker UV coil through SSPS. Auto does not input to the bypass breaker circuit.**
- B. **Manual energizes the bypass breaker shunt coil. Auto does not input to the bypass breaker circuit.**
- C. **Manual de-energizes the bypass breaker UV coil through SSPS. Auto energizes the bypass breaker shunt coil.**
- D. **Manual energizes the bypass breaker shunt coil. Auto de-energizes the bypass breaker UV coil through the SSPS.**

---

**Distracter Analysis:**

- A. **Incorrect:** manual energizes the shunt trip coil.  
**Plausible:** if the candidate knows auto does not input to the circuitry, but confuses which action the manual trip performs.
- B. **Correct:**
- C. **Incorrect:** manual energizes the shunt trip coil, and auto performs no function for the corresponding train.  
**Plausible:** auto performs this action for the opposite train bypass breaker.
- D. **Incorrect:** auto de-energizes the opposite bypass breaker UV coil.  
**Plausible:** close to the normal RTB response to trip signals.

Level: RO&amp;SRO

KA: EPE 007EK2.02 (2.6/2.8)

Lesson Plan Objective: IC-RTB SEQ 8

Source: New

Level of knowledge: memory

References:

1. OP-MC-IC-RTB page 29, 31, 65

**Bank Question: 885****Answer: D**

1 Pt(s)

Unit 1 is operating at 60% power. PZR level and pressure control are selected to the (3-2) combination. Given the following events and conditions:

- Inverter 1EVID fails.

Assuming no operator action, which one of the following statements correctly describes the effect of this failure on charging and letdown control?

**REFERENCES PROVIDED: AP-15 pages 135-138**

- A. **1NV-238 (CHARGING LINE FLOW CONTROL) opens, 1NV-2A (NC L/D ISOL TO REGEN HX) closes, and actual PZR level increases.**
- B. **1NV-238 closes, 1NV-1A (NC L/D ISOL TO REGEN HX) closes, and actual PZR level increases.**
- C. **1NV-238 closes, 1NV-1&2A close, and actual PZR level decreases.**
- D. **There is no effect on charging or letdown control.**

-----  
**Distracter Analysis:**

- A. **Incorrect:** Channel 4 will fail low.  
**Plausible:** This is the response to a controlling channel failed low.
- B. **Incorrect:** Channel 4 will fail low.  
**Plausible:** This is the response to a backup channel failed low.
- C. **Incorrect:** Channel 4 will fail low.  
**Plausible:** if the candidate thinks that the output fails high on loss of power.
- D. **Correct:**

Level: RO&SRO

KA: SYS 004K2.06(2.6/2.7)

Lesson Plan Objective: EP-EPL SEQ 6

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-PS-ILE pages 15, 23, 25
2. AP/1/A/5500/15 pages 135-138 - PROVIDED

**Bank Question: 887.1****Answer: D**

1 Pt(s)

Unit 1 is conducting a reactor startup following a plant trip due to an IAE error during instrument calibration. Given the following data:

- Time of shutdown 1520 on 01/27/02
- Anticipated time of criticality 0100 on 01/28/02
- Core burnup 250 EFPD
- NCS Boron 750 ppm
- Estimated critical position 105 steps on Bank C
- Control rod position at 0300 40 steps on Bank C

Which of the following describes the required operator actions?

**REFERENCES PROVIDED: Unit 1 Databook Table 6.3B and Graph 1.2, OP/0/A/6100/006**

- A. Recalculate the ECP if the reactor is not yet critical at 175 steps of Bank C.
- B. Insert the rods and recalculate the ECP if criticality will be achieved at 50 steps of Bank C.
- C. Recalculate the ECP because it is no longer accurate.
- D. Insert the rods and recalculate the ECP because it is no longer accurate.

**Distracter Analysis:** TSIL = 47 steps on Bank C. ECP +750pcm = 195 steps on Bank C. ECP - 750 pcm = 25 steps on Bank C.

- A. **Incorrect:** Can pull rods to 195 steps before recalculating.  
**Plausible:** If the candidate misreads the integral rod worth table.
- B. **Incorrect:** Critical rod position is > TSIL and ECP - 750 pcm.  
**Plausible:** If the candidate misreads Databook graphs.
- C. **Incorrect:** The rods must be inserted.  
**Plausible:** This could be possible if Xenon was not decaying rapidly.
- D. **Correct:**

Level: SRO Only; 10CFR55.43(b)(6)

KA: G2.2.34 (2.8/3.2)

Lesson Plan Objective: RT-RB SEQ 4

Source: New

Level of knowledge: analysis

References:

1. OP-MC-RT-RB pages 8-9, 16, 18
2. OP/0/A/6100/006 pages 2, 3- PROVIDED
3. Unit 1 Databook Graph 1.2 and Table 6.3B - PROVIDED

**Bank Question: 888****Answer: B**

1 Pt(s)

Unit 1 is responding to a steam break inside containment from full power. Given the following events and conditions:

- All systems operate as designed.
- Narrow range S/G level is 15% for each intact S/G
- CA flow is 100 GPM to each intact S/G.
- The NCPs were tripped.
- The crew entered FR-P.1 (*Response to Imminent Pressurized Thermal Shock Condition*) due to low temperature.
- NCS temperature is now stable.
- NCS pressure is stable with only the control group of pressurizer heaters energized.
- Letdown has been restored

If the crew has determined that a 1 hour soak is required, which of the following evolutions could be performed by the crew in the next hour while continuing on through the EP procedures?

- A. Start 1D NCP
- B. Place auxiliary spray in service
- C. Increase CA flow to one intact S/G to raise NR level to 50%
- D. Commence a 25-degree/hour cooldown to Mode 5

---

**Distracter Analysis:**

- A. **Incorrect:** Starting a NCP will cause a pressure transient and could cause further cooldown.  
**Plausible:** If the candidate does not understand the limitations during the soak or the effects of NCP start.
- B. **Correct:** Any actions that will not cause either a cooldown or a pressure rise and are specified by any other procedure in effect are permitted during this "soak" period.
- C. **Incorrect:** Increases cooldown stressing the vessel.  
**Plausible:** The candidate may not link raising S/G level with a cooldown.
- D. **Incorrect:** Cooldown is not allowed.  
**Plausible:** The candidate may recall that a cooldown at less than 50/hr is directed after the soak.

Level: RO&amp;SRO

KA: W/E 08 EK 3.3 (3.7/3.8)

Lesson Plan Objective: EP-FRP SEQ 3

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-FRP pages 17, 43
2. EP/1/A/5000/FR-P.1 page 28

**Bank Question: 889****Answer: C**

1 Pt(s)

A small fire has broken out in the incore instrument room as a result of welding on a thimble support. Given the following events and conditions:

- The control room isolated the VT systems (breakers are tagged open).
- The fire watch exhausted a portable CO<sub>2</sub> fire extinguishers on the burning insulation before leaving the area,
- The area is posted as a radiological surface contamination area with the maximum level of 10E5 dpm/100 cm<sup>2</sup>

Which one of the following would be the preferred method for the fire brigade to extinguish this fire?

- A. **Actuate the incore instrument room Halon system**
- B. **Portable CO<sub>2</sub> extinguishers due to the potential for electrical hazards in the area.**
- C. **Portable water extinguishers because of their better quenching capability in this low combustible loading area.**
- D. **Portable dry chemical extinguishers because of their better smothering capability.**

---

**Distracter Analysis:**

- A. **Incorrect:** There is no Halon system in this room  
**Plausible:** Some areas are equipped with Halon fire protection systems.
- B. **Incorrect:** Portable water extinguishers would be preferred.  
**Plausible:** CO<sub>2</sub> is preferred for electrical fires.
- C. **Correct:** A hose would be overkill and spread contamination.
- D. **Incorrect:** Portable water extinguishers would be preferred.  
**Plausible:** Dry chemical extinguishers smother oil fires better.

Level: RO&amp;SRO

KA: G2.4.26 (2.9/3.3)

Lesson Plan Objective: None

Source: New

Level of knowledge: memory

References:

1. None

**Bank Question: 891****Answer: B**

1 Pt(s)

Unit 1 has experienced a loss of coolant accident. Emergency procedures prescribe successful response mechanisms if containment water level remains between 3.5 and 10.5 feet.

What is the reason why safe plant recovery is not assured when level exceeds 10.5 feet?

- A. **Operation of the ND system is compromised by high suction pressure.**
- B. **Operation of critical components needed for safe recovery is endangered by submersion.**
- C. **Operation of the KC system is compromised by loss of water to the containment.**
- D. **Operation of critical components needed for safe plant recovery is endangered by high humidity.**

---

**Distracter Analysis:**

- A. **Incorrect:** 10.5 feet of water will not lift the ND suction relief, or if it did the relief returns to the PRT.  
**Plausible:** High containment level increases ND suction pressure.
- B. **Correct:**
- C. **Incorrect:** KC is a closed system that provides limited source of water inside containment.  
**Plausible:** the KC system is a possible source of flooding inside containment.
- D. **Incorrect:** Critical components inside containment are protected from high humidity (EQ program).  
**Plausible:** Non-critical components will be endangered by high humidity.

Level: RO&amp;SRO

KA: EPE WE 15 EK2.2 (2.7/2.9)

Lesson Plan Objective: EP-FRZ SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-FRZ page 47

**Bank Question: 893.1****Answer: C**

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1 Pt(s) Unit 1 is operating at 80 % power, steady state. Given the following events and conditions:

- Rod control is in manual for testing.
- Control bank D is at 155 steps.
- 1AD-2, A9 & B9 (*CONTROL BANK LO & LO-LO LIMIT*) alarms actuate.

Which one of the following conditions could be the cause of these two alarms?

- A. Turbine impulse pressure channel failed high.
- B. NIS channel N42 failed high.
- C. Loop 1B  $T_h$  instrument failed high.
- D. Loop 1A  $T_{ave}$  failed high.

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**Distracter Analysis:**

- A. **Incorrect:** D/T controls RIL.  
**Plausible:** Impulse pressure ( $T_{ref}$ ) is proportional to power and could be used to calculate RIL.
- B. **Incorrect:** D/T controls RIL.  
**Plausible:** NIS power could be used to calculate RIL (and is at some plants).
- C. **Correct:** Control bank D is above the RIL alarms, but when D/T goes high, RIL goes to 161 and the alarms actuate.
- D. **Incorrect:** D/T controls RIL.  
**Plausible:**  $T_{ave}$  is proportional to power and could be used to calculate RIL.

Level: RO&SRO

KA: SYS 014K1.02(3.0/3.3)

Lesson Plan Objective: IC-IRE SEQ 11

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-IC-IRE pages 17, 37, 55, 63
2. OP-MC-PS-NC pages 45, 47
3. Unit 1 Databook Graph 1.2
4. OP/1/A/6100/010C, A9 Control Bank Lo Limit
5. OP/1/A/6100 /010C, B9 Control Bank Lo-Lo Limit

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**Bank Question: 894****Answer: B**

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1 Pt(s)

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

- “B” essential train is in service.
- 2A RN train is in operation for testing.
- The RN trains are split with 2RN-41B, (*TRAIN B TO NON-ESS HDR ISOL*) closed.

Which of the following statements correctly describes the potential consequence if 2RN-190B (*RN TO B KC HX CONTROL*) failed to perform its automatic function associated with decreasing B train RN flow?

- A. **Flashing in the 2B KC heat exchanger.**
  - B. **Overheating 2B RN pump.**
  - C. **Overheating the running B train KC pumps.**
  - D. **2RN-41B will open to restore flow to the heat exchanger.**
- 

**Distracter Analysis:**

- A. **Incorrect:** no flashing should occur, pressure is not changing.  
**Plausible:** candidate believes that like the letdown regen heat exchanger, flashing on loss of cooling could occur
- B. **Correct:** Lose mini-flow protection for RN pump 2B.
- C. **Incorrect:** B train pumps cooled by separate supply.  
**Plausible:** candidate believes heat exchanger and pump cooling come from the same place.
- D. **Incorrect:** no auto open signal for RN41B.  
**Plausible:** candidate feels there is some reason for the stated position of 41B in the setup and guesses it can auto open. Valve closes on blackout signal.

Level: RO&amp;SRO

KA: APE 062AK3.04(3.5/3.7)

Lesson Plan Objective: PSS-RN SEQ 7

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-PSS-RN pages 23, 41, 73, 85
2. OP-MC-PSS-KC page 39

**Bank Question: 896****Answer: D**

1 Pt(s)

Unit 1 is operating in mode 4. Given the following events and conditions:

- Pressurizer level is at 25% (*INCP-5173*) (*COLD CAL*)
- 1B NCP is in operation
- All steam generator narrow range levels are approximately 45%
- 1A ND pump and its associated heat exchanger are in service
- "B" Train of ND is operable.
- NCS temperature currently at 280°F
- Cooling water is lost to the 1B KC heat exchanger,

How much time does the crew have to restore inoperable equipment or loops to service?

**REFERENCES PROVIDED: Tech Spec 3.4.6, 3.7.6**

- A. **No time: an NCS loop must be restored immediately**
- B. **1 hour**
- C. **36 hours**
- D. **72 hours**

-----  
**Distracter Analysis:**

- A. **Incorrect:** There are 72 hours allowed to restore KC loop B.  
**Plausible:** if the candidate believes loss of KC loop B results in loss of cooling to the D NCP. Tech Spec 3.4.6 requires immediate action
- B. **Incorrect:** There are 72 hours allowed to restore KC loop B.  
**Plausible:** if the candidate believes TS 3.0.3 applies
- C. **Incorrect:** There are 72 hours allowed to restore KC loop B.  
**Plausible:** if the candidate applies time to be in MODE 5 instead of the AOT of 72 hours
- D. **Correct:** B KC loop is out of service, TS 3.4.6 does not apply. Crew has 72 hours to restore KC to operable status.

Level: RO&SRO

KA: APE 026 G2.2.23 (2.6/3.8)

Lesson Plan Objective: PSS-KC SEQ 15

Source: New

Level of knowledge: comprehension

References:

1. Tech Spec 3.7.6
2. Tech Spec 3.4.6

**Bank Question: 898****Answer: C**

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1 Pt(s)

Which one of the following electrical sources provides control and indication power to the *RESET/RETRANSFER* switches for the lower containment ventilation air handling units (AHUs)?

- A. Vital 125 VDC
  - B. The normal power supply
  - C. The emergency power supply
  - D. The power supply providing power to the AHU
- 

**Distracter Analysis:**

- A. **Incorrect:** Power supplied from emergency power supply  
**Plausible:** many controls are DC powered
- B. **Incorrect:** Power supplied from emergency power supply  
**Plausible:** If candidate believes normal should be the logical choice
- C. **Correct:** Emergency power supply is the source of power.
- D. **Incorrect:** Power supplied from emergency power supply  
**Plausible:** Logical that transfer power comes from the selected source.

Level: RO&amp;SRO

KA: SYS 022 K2.01 (3.0/3.1)

Lesson Plan Objective: CNT-VUL SEQ 6

Source: New

Level of knowledge: memory

References:

1. OP-MN-CNT-VUL page 29

**Bank Question: 899****Answer: D**

1 Pt(s)

Unit 1 is at full power. Given the following events and conditions:

- 1NC-34A (*PZR PORV*) was leaking has been isolated in accordance with Technical Specifications.
- NC pressure is 2345 psig.
- 1NCV-36B (*PZR PORV*) is slightly open.
- Master controller output is stuck at 83%.

Which one of the following statements correctly describes when 1NC-36B will automatically close and if it does not, what action is required to isolate the valve?

- A. 1NC-36B will not close. The operator must close the block valve by taking the control switch to “*CLSD*”.
- B. 1NC-36B will not close. The operator must close the block valve by taking the control switch to “*OVERRIDE*”.
- C. 1NC-36B will close when pressure decreases to 2315 psig. If necessary to close the block valve, take the control switch to “*CLSD*”.
- D. 1NC-36B will close when pressure decreases to 2315 psig. If necessary to close the block valve, take the control switch to “*OVERRIDE*”.

**Distracter Analysis:**

- A. **Incorrect:** 1NCV-36B will close and must take the block valve to override.  
**Plausible:** if the candidate does recognize the multiple block valve protection and assumes control for 1NV-36B is off the pressure controller.
- B. **Incorrect:** 1NC-36B will close.  
**Plausible:** if the candidate does not realize that control for 1NV-36B is not from the pressure controller.
- C. **Incorrect:** must take the block valve to override.  
**Plausible:** if the candidate does not recognize the multiple block valve protection.
- D. **Correct:**

Level: RO&amp;SRO

KA: APE 008AA1.07 (4.0/4.2)

Lesson Plan Objective: AP-11 SEQ 2

Source: New

Level of knowledge: comprehension

References:

1. AP-11 background document page 5

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**Bank Question: 900****Answer: B**

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1 Pt(s)

The operator has just opened 1VI-820 (*VI SUPPLY TO VS CONTROL*). The switch is left in the *OPEN* position.

Which one of the following statements correctly describes the adverse effect of leaving the *CLOSE/AUTO/OPEN* switch in the *OPEN* position?

- A. The valve will not close on decreasing VI pressure.
- B. The valve closes on decreasing VI pressure, but immediately reopens if pressure increases above 90 psig.
- C. The valve will not close on decreasing VS pressure.
- D. The valve closes on decreasing VS pressure, but immediately reopens if pressure increases above 90 psig.

---

**Distracter Analysis:**

- A. **Incorrect:** The valve will close.  
**Plausible:** if the candidate believes that if not in auto, the valve will not respond to decreasing pressure.
- B. **Correct:** the opening will not be under the control of the operator.
- C. **Incorrect:** The valve will close on low VI pressure.  
**Plausible:** if the candidate confuses which system is being protected, and believes that if not in auto, the valve will not respond to decreasing pressure.
- D. **Incorrect:** The valve responds to VI pressure.  
**Plausible:** candidate believes that the valve will receive an open signal once it is fully closed

Level: RO&amp;SRO

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

Lesson Plan Objective: SS-VI SEQ 7

Source: New

Level of knowledge: memory

References:

1. OP-MC-SS-VI page 67

**Bank Question: 901****Answer: B**

1 Pt(s)

The crew is implementing AP-11 (*Pressurizer Pressure Anomalies*) due to 1NC-32B (*PZR PORV*) failing open.

If the PORV cannot be isolated, the RNO for step 5 instructs the operators to trip the reactor, but not to manually initiate SI unless the reactor is tripped or the SI setpoint is reached.

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

- A. To prevent safety injection from lifting more PORVs and taking the pressurizer solid.
- B. To prevent initiating a loss of feedwater during an ATWS event.
- C. To prevent unnecessary SI actuations because once the unit is tripped, NC pressure has time to recover.
- D. To prevent upgrading the emergency event classification from a Notification of Unusual Event (NOUE) to an Alert.

---

**Distracter Analysis:**

- A. **Incorrect:** The basis is to preclude a bad ATWS scenario.  
**Plausible:** this is the basis for SI termination criteria.
- B. **Correct:** This avoids premature SI during an ATWS, which would automatically turn any ATWS into the worst case ATWS, one combined with a loss of feedwater.
- C. **Incorrect:** Without SI, NC pressure will not recover after a trip.  
**Plausible:** If the candidate does not understand post trip plant performance.
- D. **Incorrect:** If the PORV will not close, the Alert level is already achieved by exceeding charging pump capacity.  
**Plausible:** an NOUE will be declared based on leakage through the PORV.

Level: SRO Only; 10CFR55.43(b)(5)

KA: APE 027 AK3.03 (3.7/4.1)

Lesson Plan Objective: AP-11 SEQ 3

Source: New

Level of knowledge: comprehension

References:

1. AP/1/A/5500/11 page 3
2. AP-11 Background Document page 6

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**Bank Question: 902****Answer: A**

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1 Pt(s)

Unit 2 is at full power preparing to shutdown for refueling. Given the following events and conditions:

- Pressurizer level is on program and in automatic.
- The controlling pressurizer level transmitter fails at its current output.
- No operator action is taken.

Which one of the following statements correctly describes the system response as plant load is reduced?

- A. Charging flow decreases  
Letdown isolates  
Pressurizer heaters turn off**
- B. Charging flow increases  
Pressurizer heaters energize  
Pressurizer level increase to the trip setpoint**
- C. Charging flow decreases  
Letdown will not isolate  
Pressurizer level decreases until the pressurizer is empty**
- D. Charging flow increases  
Pressurizer heaters will not energize  
Pressurizer level increases to the trip setpoint.**

---

**Distracter Analysis:** As load is reduced, Tave will decrease, Program Pressurizer level will decrease. The system will see the controlling channel maintaining a high level and decrease charging in an effort to reduce level. Actual level will decrease. The backup channel will decrease and at 17%, letdown will isolate and heaters will de energize.

- A. Correct:**
- B. Incorrect:** charging flow will decrease.  
**Plausible:** candidate believes charging flow will increase in an effort to maintain the higher level
- C. Incorrect:** letdown will isolate from the bakup channel.  
**Plausible:** if the candidate believes the low level interlock will not be satisfied only from the controlling channel.
- D. Incorrect:** charging flow will decrease.  
**Plausible:** candidate believes charging flow will increase to maintain the higher level

Level: RO&SRO

KA: APE 028 AA2.02 (3.4/3.8)

Lesson Plan Objective: PS-ILE SEQ 12

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-PS-ILE page 33 (Figure 7.2)

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**Bank Question: 903****Answer: B**

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1 Pt(s)

Why is it important for the source range high voltage to be properly set?

- A. **To ensure that the detector operates in the ionization region where the flow of detector current reflects exactly the flow of ionizing radiation and secondary multiplication is prevented.**
- B. **To ensure the detector operates in the proportional region where secondary ionizations cause gas multiplication to occur.**
- C. **To ensure that detector operates in the recombination region where the recombination effect prevents the smaller pulses from gamma interactions from being detected.**
- D. **To ensure that the detector operates in the Geiger Muller region where each ionization event results in a complete discharge of the detector tube.**

---

**Distracter Analysis:**

- A. **Incorrect:** This describes the ionization range. The SR is a proportional counter.  
**Plausible:** If the candidate does not understand detector theory or confuses what region the SR operate in.
- B. **Correct:** SR operates in the proportional region of the detector curve where gas amplification causes secondary ionizations.
- C. **Incorrect:** This describes the recombination range.  
**Plausible:** Gamma interactions are discriminated by a pulse-height discriminator circuit. If the candidate does not understand detector theory or confuses what region the SR operate in.
- D. **Incorrect:** This describes the G-M region.  
**Plausible:** If the candidate is unfamiliar with what region SR operates in.

Level: RO&amp;SRO

KA: APE 032 AK1.01 (2.5/3.1)

Lesson Plan Objective: IC-ENB SEQ 3

Source: New

Level of knowledge: memory

References:

1. OP-MC-IC-ENB page 17-19

**Bank Question: 904****Answer: D**

1 Pt(s)

The unit 1 operating crew has entered AP-15 (*LOSS OF VITAL OR AUX CONTROL POWER*) due to a loss of 1 EVDA.

Why will the crew have to diligently monitor containment pressure while 1EVDA is de-energized?

- A. **Decreased cooling will increase containment pressure because the VL and VU system is inoperable.**
- B. **1VQ-1A (*CONT AIR REL INSIDE ISOL*) will fail open on a loss of power and containment pressure may change rapidly resulting in a release path.**
- C. **The PRT will slowly pressurize and rupture causing an increase in containment pressure because of Nitrogen in-leakage.**
- D. **VI system leaks will increase containment pressure because the VQ system is inoperable.**

**Distracter Analysis:** Loss of DC control power causes 1VQ-1A to fail closed and prevents using the VQ system for an air release to lower containment pressure. Pressure increases due to VI leaks inside containment.

- A. **Incorrect:** VL and VU systems are operable under these conditions  
**Plausible:** contingency action is to increase cooling flow in an attempt to cool the containment air mass, slowing the pressure increase.
- B. **Incorrect:** 1VQ-1A will fail closed not open  
**Plausible:** if the candidate does not recognize that this containment isolation valve always fails closed.
- C. **Incorrect:** N2 will not leak into the PRT  
**Plausible:** loss of DC will cause a loss of power to many valves – if the candidate thinks that a loss of DC control power could cause the N2 sparging valves to fail open or leak by.
- D. **Correct:** numerous VI leaks inside containment will slowly increase containment pressure with the VQ system unable to release to the unit 1 stack. VQ-1A fails closed due to a loss of power.

Level: RO&SRO

KA: APE 058 AK3.02 (4.0/4.2)

Lesson Plan Objective: AP15 SEQ 3

Source: New

Level of knowledge: memory

References:

1. AP-15 Background Document pages 16, 18, 19
2. AP-15 pages 10, 13, 14

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**Bank Question: 905****Answer: A**

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1 Pt(s)

The selector switches for the 1A and 1B Boric Acid pumps are in *LOCAL* at the Auxiliary Shutdown Panel (ASP). The operator is starting the 1A Boric Acid pump at the ASP.

Which one of the following statements describes ALL the indication(s) that the operator has at the ASP indicating that the boric acid pump is running?

- A. Red "ON" light LIT.
- B. Red "ON" light LIT and pump amps registering.
- C. Pump amps registering and boric acid flow indicating when 1NV-265B (*BORIC ACID TO NV PUMPS*) is opened.
- D. Red "ON" light LIT and boric acid flow indicating when 1NV-265B is opened.

---

**Distracter Analysis:**

- A. **Correct:** Both BA pumps have LOCAL/CR selector switches, Red/green indicator lights, and start controls on the ASP.
- B. **Incorrect:** There are no pump amps indicators on the ASP.  
**Plausible:** These are normal indications checked when a pump is started.
- C. **Incorrect:** There is no flow indication on the ASP.  
**Plausible:** NV-265B is controlled (with Red/Green lights) from the ASP
- D. **Incorrect:** BA flow is not indicated at the ASP  
**Plausible:** This valve can be controlled from the ASP

Level: RO&amp;SRO

KA: APE 068 AA1.19 (3.7/3.9)

Lesson Plan Objective: CP-ASP SEQ 2

Source: New

Level of knowledge: memory

References:

1. OP-MC-CP-ASP page 25, 31

**Bank Question: 906****Answer: B**

1 Pt(s)

A station emergency battery is supplying DC bus loads without a battery charger online. If the equipment on the DC bus does not change, which one of the following statements correctly describes a vital battery's discharge rate (amps) as the battery is expended?

- A. **The discharge rate will be fairly constant until the design battery capacity (amp-hours) is exhausted and then will rapidly decrease.**
- B. **The discharge rate will increase steadily until the design battery capacity is exhausted.**
- C. **The discharge rate will decrease steadily until the design battery capacity is exhausted.**
- D. **The discharge rate will initially decrease until approximately 50% design capacity had been expended and then increase until the battery has been exhausted.**

---

**Distracter Analysis:**

- A. **Incorrect:** The discharge rate increases.  
**Plausible:** This is a typical response for many design systems - If the candidate does not recall that  $V = I \times R$ .
- B. **Correct:**
- C. **Incorrect:** The discharge rate increases.  
**Plausible:** If the candidate reverses the effect of decreasing voltage on discharge rate.
- D. **Incorrect:** The discharge rate increases.  
**Plausible:** If the candidate does not understand battery theory.

Level: RO&amp;SRO

KA: EPE 055 EK1.01 (3.3/3.7)

Lesson Plan Objective: EL-EPL SEQ 12/20

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-EPL pages 65-67

**Bank Question: 907****Answer: D**

1 Pt(s)

Unit 1 is implementing FR-C.1 (*Response to Inadequate Core Cooling*).  
Given the following events and conditions:

- P-11 has been blocked.
- Operators are preparing to open the steam dumps to depressurize intact steam generators to 110 psig.

What guidance should be given to the operator opening the steam dumps?

- A. **The steam dumps should be fully opened to depressurize the S/Gs as quickly as possible.**
- B. **A cooldown rate of less than 100 degrees/hour should be established to prevent exceeding Tech Spec limits.**
- C. **A cooldown rate of less than 25 degrees/hour should be established to prevent pressurized thermal shock concerns.**
- D. **The steam dumps should be very slowly opened (<2 psig / sec) to prevent MSIV closure.**

---

**Distracter Analysis:**

- A. **Incorrect:** The steam dumps should be opened slowly.  
**Plausible:** If the candidate confuses the FR-C guidance with tube rupture guidance.
- B. **Incorrect:** While TS limits apply, the dumps will be isolated long before that limit is approached.  
**Plausible:** This is the TS cooldown limit.
- C. **Incorrect:** PTS is not the immediate concern with CETs >1200 degrees.  
**Plausible:** PTS and limiting cooldown are reasonable concerns for other events.
- D. **Correct:** note in C.1 informs the operator that a depressurization rate of less than 2 psig/second will maintain the MSIVs open.

Level: RO&SRO

KA: EPE 074 EK2.06 (3.5/3.6)

Lesson Plan Objective: EP-FRC SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-FRC page 37
2. EP/1/A/5000/FR-C.1 page 9

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**Bank Question: 908****Answer: C**

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1 Pt(s)

Unit 1 is in mode 6.

A fire has occurred in a charcoal filter in the containment ventilation system. RP is performing actions necessary to identify the HOT ZONE.

How will the operators identify the HOT ZONE boundaries?

- A. **Yellow and Magenta ropes**
- B. **Red tape**
- C. **RP tape**
- D. **Yellow tape**

---

**Distracter Analysis:**

- A. **Incorrect:** RP tape identifies HOT zone boundaries.  
**Plausible:** Y&M rope is used to identify radiation area boundaries, and RP tape shares those colors.
- B. **Incorrect:** RP tape is used.  
**Plausible:** Red tape marks the WARM zone boundaries.
- C. **Correct:** The Hot zone is identified by RP tape
- D. **Incorrect:** RP tape is used.  
**Plausible:** Yellow tape marks the COLD zone boundaries.

Level: RO&amp;SRO

KA: SYS 067 G2.3.10 (2.9/3.3)

Lesson Plan Objective: None

Source: New

Level of knowledge: memory

References:

1. RP/0/A/5700/025 enclosure 4.4

**Bank Question: 909.1****Answer: A**

1 Pt(s)

Unit 1 is at full power, steady state, when the following events occur:

- 0200 - Power is lost to all control room annunciators.
- 0220 - The OSM determines more personnel are needed to safely operate the unit.
- 0223 - Power is restored to all annunciators.
- 0230 - The initial notification message has been completed for transmission to State and local authorities and is submitted for approval.

Which one of the following statements correctly describes the required emergency declaration and notification of State and local authorities?

**REFERENCES PROVIDED:***RP/0/5700/000 enclosure 4.1 thru 4.7 (EAL tables)*

- A. **Report that the plant entered a Notification of Unusual Event at 0220 but the event was terminated at 0223. Notify by 0235.**
- B. **Declare a Notification of Unusual Event at 0215 and notify no later than 0230.**
- C. **Declare a Notification of Unusual Event at 0220 notify no later than 0235.**
- D. **Declare an Alert at 0220 and notify no later than 0235.**

---

**Distracter Analysis:** EAL 4.2.U.2-1 – Notification of Unusual Event (NOUE) at 0220 – terminated at 0223.

- A. **Correct:** The NOUE was terminated before the initial notification message was transmitted. The correct response is to immediately terminate the NOUE and report that the plant entered the NOUE but it was terminated - 15 minutes from time of declaration
- B. **Incorrect:** The event does not meet NOUE criteria until 0220 – declaring the event at 0215 is not correct  
**Plausible:** Partially correct - If a NOUE was declared at 0215, then the notification time is correct. This is 15 minutes from time the UE conditions are satisfied.
- C. **Incorrect:** The NOUE no longer existed when power was restored.  
**Plausible:** If the candidate does not recognize that a NOUE can be immediately terminated – this is only true for NOUEs.

- D. **Incorrect:** An Alert is not correct because the plant is not in a significant transient or experiencing a loss of the OAC  
**Plausible:** if the candidate incorrectly classifies the event as an Alert – then this would be the correct answer.

Level: SRO Only; 10CFR55.43(b)(5)

KA: G2.4.32 (3.3/3.5)

Lesson Plan Objective: EAL SEQ 6

Source: New

Level of knowledge: analysis

References:

1. OP-MC-RP-5700/000 enclosure 4.9
2. OP-MC-RP-5700/000, enclosures 4.1 thru 4.7

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**Bank Question: 910****Answer: C**

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1 Pt(s) Which one of the following procedures would be used to bring Unit 1 to cold shutdown after dealing with a fire that results in a loss of plant control from the control room?

- A. AP/1/5500/A/24, (*Loss of Plant Control Due to Fire*)
- B. OP/0/A/6100/20, (*Operational Guidelines Following Fire in Auxiliary Building or Vital Area*)
- C. OP/0/A/6100/21, (*Shutdown Outside the Control Room Following a Fire*)
- D. OP/1/A/6100/04, (*Shutdown Outside the Control Room From Hot Standby to Cold Shutdown*)

---

**Distracter Analysis:**

- A. **Incorrect:** this brings the unit to hot standby  
**Plausible:** candidate believes this procedure will bring the unit to mode 5.
- B. **Incorrect:** this procedure picks up from AP/24 and takes steps to prepare the unit for hot shutdown followed by cold shutdown after a fire in the aux building or vital area.  
**Plausible:** candidate unfamiliar with the procedure
- C. **Correct:** procedure provides the steps required to achieve cold shutdown following a fire that renders the control room unusable.
- D. **Incorrect:** used when the control room is uninhabitable.  
**Plausible:** this procedure does bring the unit to cold shutdown, but not applicable if there has been damage to vital equipment due to fire.

Level: RO&SRO

KA: G2.4.25 (2.9/3.4)

Lesson Plan Objective: SS SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-MN-CP-SS pages 11, 13, 25

**Bank Question: 911**

**Answer: B**

1 Pt(s)

The crew has verified natural circulation in ES-0.1 (*Reactor Trip Response*) based on decreasing core exit thermocouple readings and subcooling  $> 0$  °F. Ten minutes later, the operator notes that the thermocouple input to both plasma displays is malfunctioning.

Which one of the following correctly describes a valid indication that natural circulation is continuing?

- A. **S/G saturation temperatures are decreasing and REACTOR VESSEL UR LEVEL indication is greater than 100 %.**
- B. **S/G pressures are decreasing and  $T_{\text{cold}}$  is at S/G saturation temperature.**
- C. **S/G pressures are decreasing and REACTOR VESSEL D/P indication is greater than 100%.**
- D. **S/G pressure is at saturation pressure for  $T_{\text{cold}}$  and REACTOR VESSEL D/P indication is greater than 100 %.**

**Distracter Analysis:**

- A. **Incorrect:** There is no indication of coupling between primary and secondary.  
**Plausible:** These are important indications during natural circulation.
- B. **Correct:**
- C. **Incorrect:** RVLIS is unavailable during natural circulation.  
**Plausible:** S/G pressure decreases during natural circulation and RVLIS is one of the other plasma display indications.
- D. **Incorrect:** RVLIS is unavailable during natural circulation.  
**Plausible:** S/G pressure will remain close to saturation for  $T_{\text{cold}}$  during natural circulation and RVLIS is one of the other plasma display indications.

Level: RO&SRO

KA: SYS 017 K3.01 (3.5/3.7)

Lesson Plan Objective: EP-E0 SEQ 6

Source: New

Level of knowledge: memory

References:

1. OP-MC-EP-E0 pages 117, 123
2. ES-0.1 page 15
3. ES-0.1 Enclosure 2 page 31

**Bank Question: 912****Answer: B**

1 Pt(s)

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

- 1300 - reactor tripped due to a large break outside containment
- 1320 – crew enters ECA-1.1, (*Loss of Emergency Coolant Recirc*)
- 1340 – current conditions:
  - NCS pressure is 1400 psig
  - 1 NI pump running, indicating 230 gpm
  - 1 NV pump running, indicating 425 gpm
  - Both ND pumps off
  - No NS pumps running
  - Subcooling is 35°F
  - The crew is performing step 18b

Which of the following actions, if any, would be taken to establish the required minimum SI flow?

**REFERENCES PROVIDED: ECA-1.1 page 16 and ECA-1.1 enclosure 4**

- A. Minimum flow is 380 gpm, stop the running NI pump.
- B. Minimum flow is 410 gpm, stop the running NI pump.
- C. Minimum flow is 450 gpm, neither pump may be secured at this time.
- D. Minimum flow is 500 gpm, neither pump may be secured at this time.

**Distracter Analysis:**

Time after trip is 40 minutes, graph starts at 10 minutes, flow required is 410 gpm

- A. **Incorrect:** required flow is 410 gpm  
**Plausible:** candidate misses the fact that the graph starts at 10 minutes; this is the 50 minute number
- B. **Correct:** required flow is 410 gpm, the NV pump is providing 425 gpm, and the NI pump may be stopped.
- C. **Incorrect:** required flow is 410 gpm  
**Plausible:** candidate uses 20 minutes to determine required flow (time since procedure entry)
- D. **Incorrect:** required flow is 410 gpm  
**Plausible:** candidate uses 20 minutes to determine required flow (time since procedure entry)

Level: SRO Only: 10CFR55.43(b)(5)

KA: G2.1.25 (2.8/3.1)

Lesson Plan Objective: E1 SEQ 6

Source: New

Level of knowledge: analysis

References:

1. OP-MN-EP/ECA-1.1, step 18 and enclosure 4
- 2 Pump curves, 8.7 and 8.9

**Bank Question: 913****Answer: D**

1 Pt(s)

Unit 1 was conducting a reactor start up immediately following a refueling outage. Given the following conditions and events:

- NC  $T_{ave} = 551^{\circ}\text{F}$
- The reactor is critical at  $2 \times 10^{-6}$  amps in the intermediate range
- A rod control failure results in control rods being withdrawn from 55 steps to 75 steps in bank C before the withdrawal was stopped
- The reactor is not tripped
- Steam dumps are in manual due an unrelated failure

If the steam dump position is not adjusted, what is the final value of  $T_{ave}$  after the reactivity transient has stabilized?

**REFERENCES PROVIDED: Databook ENCL 4.3  
Table 6.3.B, Table 6.6, Table 6.10**

- A.  $T_{ave}$  will decrease to less than  $550.5^{\circ}\text{F}$
- B.  $T_{ave}$  will remain essentially unchanged between  $550.5$  and  $551.5^{\circ}\text{F}$
- C.  $T_{ave}$  will increase to between  $551.6$  and  $554.0^{\circ}\text{F}$
- D.  $T_{ave}$  will increase to greater than  $554.1^{\circ}\text{F}$

**Distracter Analysis:** Integral Rod Worth (IRW) is defined as the total amount of reactivity added by the rods due to their position in the core (Rod Defect). IRW is zero (0) when rods are fully withdrawn. The addition of positive reactivity will cause the NCS  $T_{ave}$  to increase to offset the positive reactivity with negative reactivity. The increase in  $T_{ave}$  will increase steam pressure by  $\sim 50$  psig – which is why the steam dumps must remain in a constant position to avoid compensating for the change.

55 steps = 1812 PCM - Table 6.3B

65 steps = 1719PCM

$\Delta\text{PCM} = +93$  PCM – change in PCM from rod withdrawal

At 0 EFPD and  $550^{\circ}\text{F}$ , PCM/ppmb = 6.96 PCM/ppm – from Table 6.10 at 0 EFPD

$93$  PCM /  $6.96$  PCM/ppm =  $13.3$  ppm – change in reactivity

$1372$  ppm -  $13.3$  ppm =  $1358.7$  ppm  $\sim 557^{\circ}\text{F}$  from Table 6.6 at 0 EFPD burnup

- A. **Incorrect:** Temperature increase to  $557^{\circ}\text{F}$   
**Plausible:** If the candidate reverses the logic and applies the temperature defect correction in the opposite direction

- B. Incorrect:** Temperature increase to 557 °F  
**Plausible:** If the candidate thinks that another mechanism will compensate for the positive reactivity addition or does not recognize that the reactor is above the point of adding heat.
- C. Incorrect:** Temperature increase to 557 °F  
**Plausible:** If the candidate makes a mistake on the calculation or uses the wrong curve. Temperature is increasing a small amount - but not enough due to the rod worth added.
- D. Correct:** Temperature increase to 557 °F

Level: RO&SRO

KA: APE 001 AK1.21 (2.9/3.2)

Lesson Plan Objective: RT-RCO SEQ 23

Source: New

Level of knowledge: analysis

References:

1. OP-MN-RT-RCO page 51
2. OP-MN-RT-RCO page 59 (figure 7.2)
3. OP/1/A/6100/022 Encl 4.3  
Table 6.3B - PROVIDED  
Table 6.6 - PROVIDED  
Table 6.10 - PROVIDED
4. OP-MC-IC-ENB page 49

**Bank Question: 914.1****Answer: A**

1 Pt(s)

Unit 1 was conducting a power ascension to 100%. Given the following events and conditions:

- Reactor power = 10%
- 1A S/G water level = 40% for 3 hours
- 1A S/G has been fed through the CA nozzles
- Feedwater flow has been not been initiated through the CF nozzles

Which one of the following statements correctly describes the required operational limitation on the CF nozzles to prevent water hammer in the 1A S/G?

- A. **Reduce power below 1% and forward purge the CF nozzle prior to initiating feedwater flow through the CF nozzles.**
- B. **Prior to exceeding 15% power, initiate feedwater flow through the CF bypass valves for one hour to warm up the gooseneck.**
- C. **Increase 1A S/G level to greater than 45% and immediately initiate feedwater flow the CF nozzles.**
- D. **Prior to exceeding 25% power, initiate feedwater flow through the CF nozzles.**

---

**Distracter Analysis:**

- A. **Correct:** to prevent water hammer.
- B. **Incorrect:** This will cause water hammer in the gooseneck  
**Plausible:** 15% is the limit for feed flow through the CF bypass valves. The one hour requirement is for the amount of time that the S/G level must be < 45% before a forward purge and power reduction is required.
- C. **Incorrect:** The gooseneck has dried out and must be forward flushed to prevent water hammer. S/G must be  
**Plausible:** If S/G water level had been > 45%, feedwater flow could have been initiated as long as reactor power was < 25%.
- D. **Incorrect:** The gooseneck has dried out and must be forward flushed to prevent water hammer.  
**Plausible:** These are the operating limits to prevent water hammer if the S/G level was > 45% and the gooseneck was not dry.

Level: RO&amp;SRO

KA: SYS 059 K1.03 (3.1/3.3)

Lesson Plan Objective: CF-CF Seq 11, 22

Source: New

Level of knowledge: comprehension

References:

1. OP-MC-CF-CF pages 29, 31, 47
2. OP/1/A/6250/001 page 1

References:

1. OP-MC-CF-CF pages 29, 31, 47
2. OP/1/A/6250/001 page 1