

# **INITIAL SUBMITTAL**

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

**APRIL 2 - 6 & 16 - 20, 2001**

**INITIAL SUBMITTAL  
SRO WRITTEN EXAMINATION**

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

**Catawba Nuclear Station**

**SRO Exam**

**With ANSWER KEY**

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# Catawba Sample Plan

Facility: Catawba				Date of Exam: 5/19/00				Exam Level: SRO							
		K/A Category Points											Point		
Tier	Group	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	Total	Target	
1  Emergency & Abnormal  Plant  Evolutions	1	3	5	4				4	5			3	24	24	
	2	1	3	3				6	1			2	16	16	
	3	0	1	0				1	1			0	3	3	
	Tier Totals														
		4	9	7				11	7			5	43	43	
2  Plant  Systems	1	0	1	0	3	2	1	0	3	3	3	3	19	19	
	2	1	2	2	2	0	1	3	3	1	2	0	17	17	
	3	1	0	1	1	0	0	0	0	0	0	1	4	4	
	Tier Totals														
		2	3	3	6	2	2	3	6	4	5	4	40	40	
3	Generic Knowledge and Abilities					Cat 1		Cat 2		Cat 3		Cat 4			
						5		4		4		4		17	17

EAPE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Points	Question							
000001 Continuous Rod Withdrawal / I						1.32	Ability to explain all system limits and precautions	3.4/3.8	1	503a							
000003 Dropped Control Rod / I						4.1	Knowledge of EOP entry conditions and immediate action steps	4.3/4.6	1	766							
000005 Inoperable/Stuck Control Rod / I				1.02			Ability to operate and/or monitor ... rod selection switches	3.7/3.5	1	779							
000011 Large Break LOCA / III			3.10				Knowledge of the reasons for the following responses ... PTS limits on RCS pressure and temperature	3.7/3.9	1	089a							
W/E04 LOCA Outside Containment / III			2.1				Knowledge of the interrelationships between ... components and functions of control and safety systems including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.5/3.9	1	388							
W/E02 SI Termination / III					2.1		Ability to determine and interpret the following ... facility conditions and selection of appropriate procedures during abnormal and emergency operations	3.3/4.2	1	185b							
000015/17 RCP Malfunction / IV			2.07				Knowledge of the interrelationships between ... RCP seals	2.9/2.9	1	788							
000024 Emergency Boron / I						4.1	Knowledge of EOP entry conditions and immediate action steps	4.3/4.6	1	784							
000028 Loss of Component Cooling Water / VIII				1.07			Ability to operate and/or monitor ... flow rates to the components and systems that are serviced by the CCWS, interlocks among components	2.8/3.0	1	782							
000040 Steam Line Rupture - Excessive Heat Transfer / IV				1.12			Ability to operate and/or monitor ... RCS pressure and temperature	4.2/4.2	1	791							
000051 Loss of Condenser Vacuum / IV				2.02			Ability to determine and interpret ... conditions requiring a reactor or turbine trip	3.8/4.1	1	453a							
000055 Station Blackout / VI				1.01			Ability to operate and/or monitor ... In-core thermocouple temperatures	3.7/3.9	1	788							
000062 Loss of Nuclear Service Water / IV				2.02			Ability to determine and interpret ... the cause of possible SWS loss	2.8/3.6	1	787							
000066 Control Room Evac. / VIII			3.12				Knowledge of the reasons for the following responses ... Required sequence of actions for emergency evacuation of the control room	4.1/4.5	1	596a							
000076 High Reactor Coolant Activity / IX			2.01				Knowledge of the interrelationships between ... process radiation monitors	2.8/3.0	1	380							
K/A Category Totals:							3	5	4	4	5	3	Group Point Total:		24	24	24

										Bank	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Points	Question	
000008 Pressurizer Vapor Space Accident / III	1.01						Knowledge of the operational implications of the following concepts ...thermodynamics and flow characteristics of open or leaking valves	3.2/3.7	1	311	
000009 Small Break LOCA / III						3.9	Knowledge of process for performing a containment purge	2.5/3.9	1	767	
000022 Loss of Reactor Coolant Makeup / II				1.09			Ability to operate and/or monitor ...RCP seal flows, temperatures, pressures and vibrations	3.2/3.3	1	647a	
000027 Pressurizer Pressure Control System Malfunction / III		2.03					Knowledge of the interrelationships between...controllers and positioners	2.6/2.8	1	783	
000032 Loss of Source Range NI / VII				1.01			Ability to operate and/or monitor ...manual restoration of power	3.1*/3.4*	1	393	
000033 Loss of Intermediate Range NI / VII							randomly deselected				
000037 Steam Generator Tube Leak / III						4.34	Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications	3.8/3.6	1	300b	
000038 Steam Generator Tube Rupture / III				1.38			Ability to operate and/or monitor ...PZR heaters	3.3/3.3	1	193a	
000054 Loss of Main Feedwater / IV			3.03				Knowledge of the reasons for the following responses ... manual control of AFW flow control valves	3.8/4.1	1	768	
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / IV				1.1			Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes and automatic and manual features	4.1/4.0	1	768	
000058 Loss of DC Power / VI				1.01			Ability to operate and/or monitor...cross-tie of the affected DC bus with the alternate supply	3.4*/3.5	1	770	
000060 Accidental Gaseous Radwaste Rel. / IX			3.02				Knowledge of the reasons for the following responses ... Isolation of auxiliary building ventilation	3.3*/3.5*	1	771	
000061 ARM System Alarms / VII							randomly deselected				
W/E16 High Containment Radiation / IX		2.1					Knowledge of the interrelationships between...components and functions of control and safety systems including instrumentation, signals, interlocks, failure modes, and automatic and manual features	3.0/3.3	1	787	
000065 Loss of Instrument Air / VIII							randomly deselected				
K/A Category Totals:										Group Point Total:	
										16	16

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																					Bank				
System # / Name	K	1	K	2	K	3	K	4	K	5	K	6	A	1	A	2	A	3	A	4	Q	K/A Topic(s)	Imp.	Points	Question
001 Control Rod Drive																					Knowledge of the bases for prioritizing safety functions during abnormal and emergency operations	3.04.0		1	714
003 Reactor Coolant Pump										5.04											Knowledge of the following operational implications...effects of RCP shutdown on secondary parameters such as steam pressure, steam flow and feed flow	3.23.5		1	715
004 Chemical Volume Control										2.02											Knowledge of bus power supplies to...makeup pumps	2.83.1		1	725
013 Engineered Safety Features Actuation																					Ability to monitor automatic operation of the...operation of actuated equipment	4.114.2		1	716
014 Rod Position Indication										4.02											Knowledge of design feature(s) and/or interlock(s) which provide for...lower electrical limit	2.572.7*		1	739
015 Nuclear Instrumentation																					Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels	4.09.5		1	718
017 In-core Temperature Monitor																					Ability to predict the impacts of the following malfunction or operation...and based on those predictions, use procedures to correct, control or mitigate the consequences of...thermocouple open and short circuits	3.173.5		1	783
022 Containment Cooling																					Knowledge of the effect that a loss or malfunction will have on...initiation of safeguards mode of operation	4.114.3		1	720
028 Containment Spray										4.07											Knowledge of design feature(s) and/or interlock(s) which provide for...adequate level in containment sump for suction (interlock)	3.874.1*		1	741
036 Condensate																					Ability to predict the impacts of the following malfunction or operation...and based on those predictions, use procedures to correct, control or mitigate the consequences of...loss of condensate pumps	2.62.8*		1	722
039 Main Feedwater																					Ability to manually operate and/or monitor in the control room...initiation of automatic feedwater isolation	3.42.5		1	723
041 Auxiliary/Emergency Feedwater										5.01											Knowledge of the following operational implications...relationship between APV flow and RCS heat transfer	3.62.9		1	724
083 DC Electrical																					Ability to monitor automatic operation of the...meters, annunciators, dials, recorders and indicating lights	2.73.1		1	437a
071 Waste Gas Disposal										4.04											Knowledge of design feature(s) and/or interlock(s) which provide for...isolation of waste gas release tanks	2.93.4		1	726
072 Area Radiation Monitoring																					Knowledge of new and spent fuel movement procedures	2.673.5		1	783
003 Reactor Coolant Pump																					Ability to manually operate and/or monitor in the control room...RHR temperature, PZR heaters and flow, and/or Nitrogen	2.872.7*		1	728
072 Area Radiation Monitoring																					Ability to manually operate and/or monitor in the control room...alarm and interlocks setpoint checks and adjustments	3.073.3		1	789
K/A Category Totals:	0	1	0	3	2	1	0	3	3	3	3										Group Point Total:	19	19	19	

Cstawba Sample Plan

System # / Name	K	1	K	2	K	3	K	4	K	5	K	6	A	1	A	2	A	3	A	4	G	K/A Topic(s)	Imp.	Points	Question
008 Emergency Core Cooling																									
010 Pressurizer Pressure Control	1.02																					Knowledge of physical connections and/or cause and effect relationships...ESFAS	3.9/4.1	1	1736
011 Pressurizer Level Control																						Knowledge of the effect that a loss or malfunction...will have on...PZR PCS	3.2/3.7	1	1737
012 Reactor Protection														2.07								Ability to predict the impacts of the following malfunction or operation...and based on those predictions, use procedures to correct, control or mitigate the consequences of...loss of DC control power	3.2/3.7	1	1738
016 Non-nuclear Instrumentation																						Knowledge of design feature(s) and/or interlock(s) which provide for...reading of NNIS channels outside control room	2.8/2.9*		1740
027 Containment Iodine Removal																			4.03			Ability to manually operate and/or monitor in the control room...CIRS fans	3.3/3.2	1	1444a
028 Hydrogen Recombiner and Purge Control	2.01																					Knowledge of bus power supplies to...Hydrogen recombiners	2.5/2.6*	1	708
029 Containment Purge																						Knowledge of the effect that a loss or malfunction will have on...CPS isolation	3.8/4.0	1	162a
033 Spent Fuel Pool Cooling														1.01								Ability to manually operate and/or monitor in the control room...spent fuel pool water level	2.7/3.3	1	1743
034 Fuel Handling Equipment																									
035 Steam Generator																						Knowledge of the effect that a loss or malfunction will have on...S/G level detector	2.6/3.0	1	1744a
055 Condenser Air Removal																						Knowledge of the effect that a loss or malfunction...will have on...main condenser	2.5/2.7	1	1547
062 AC Electrical Distribution	2.01																					Knowledge of bus power supplies to...major system loads	3.3/3.4	1	1747
064 Emergency Diesel Generator																						Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the...minimum load on EDG to prevent a reverse power trip	3.1/3.4	1	1748
075 Circulating Water																						Knowledge of design feature(s) and/or interlock(s) which provide for...heat sink	2.5/2.8	1	1749
079 Station Air																						Ability to predict the impacts of the following malfunction or operation...and based on those predictions, use procedures to correct, control or mitigate the consequences of...cross-connection with IAS	2.9/3.2	1	1262a
098 Fire Protection																									
103 Containment																									
K/A Category Totals:	1	2	2	2	0	1	3	3	1	2	0											Group Point Total:	17	17	17

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Catawba Sample Plan

Category	K/A #	Topic	Imp.	Points	Question
Conduct of Operations	1.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation	3.7/4.4	1	556
	1.24	Ability to obtain and interpret station electrical and mechanical drawings	2.8/3.1	1	773
	1.31	Ability to locate control room switches, controls and indications to determine if they are correctly reflecting the desired plant lineup	4.2/3.9	1	792
Total			5	5	
Equipment Control					
	2.34	Knowledge of process for determining the internal and external effects on core reactivity	2.8/3.2*	1	189a
Total			4	4	
Radiation Control	3.2	Knowledge of facility ALARA program	2.5/2.9	1	124
	3.4	Knowledge of radiation exposure limits and contamination control including permissible levels in excess of those authorized	2.5/3.1	1	661a
	3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure	2.9/3.3	1	775
	3.11	Ability to control radiation releases	2.7/3.2	1	671a
Total			4	4	
Emergency Procedures and Plan	4.17	knowledge of EOP terms and definitions	3.1/3.8	1	776
	4.19	Knowledge of EOP layout, symbols and icons	2.7/3.7	1	339a
	4.15	Knowledge of communications procedures associated with EOP implementation	3.0/3.5	1	387a
Total			4	4	
Tier 3 Point Total			17	17	17

# Catawba NRC Operator Licensing Examination

The following table summarizes the changes made to the randomly selected K/As. All changes were discussed and approved with the NRC Chief Examiner.

EAPE or System	K/A Tested	Summary of Changes
T1G1 000024 Emergency Boration	G2.4.1	Randomly selected 2.3.9 (Radiation Control – knowledge of process for performing a containment purge). This K/A was not applicable for the selected EAPE. Selected next applicable K/A in sequence.
T1G2 000003 Dropped Control Rod	G2.4.1	Randomly selected 2.3.1 (Knowledge of 10CFR20 and related facility radiation requirements) and 2.3.4 (Knowledge of radiation exposure limits, contamination control including permissible limits in excess of those authorized). These K/As are PWGs that are not applicable to this EAPE. Randomly selected next K/A in sequence.
T1G2 000009 Small Break LOCA	G2.3.9	Randomly selected 2.3.4 (Knowledge of radiation exposure limits, contamination control including permissible limits in excess of those authorized). This K/A was a PWG that is not applicable to this EAPE. Randomly selected next K/A in sequence.
T1G2 000011 Large Break LOCA	K3.10	Randomly selected K3.11 (Knowledge of the reasons for the following responses ...NC and PC). The team could not determine what this K/A was testing and did not know the terminology “PC”. Randomly reselected K3.10.
T1G2 000037 Steam Generator Tube Leak	G2.4.34	Randomly selected G2.4.39 (Knowledge of ROs responsibilities in emergency plan implementation). This was a PWG that did not test any EAPE specific knowledge. Randomly reselected G2.4.34.
T1G2 000058 Loss of DC Power	A1.10	The original sample plan contained a typographical error. The stem statement was incorrect. Corrected in the attached sample plan.
T2G1 015 Nuclear Instrumentation	G2.2.2	Randomly selected 2.2.6 (Knowledge of process for making changes in procedures as described in the SAR) and 2.2.29 (Knowledge of SRO fuel handling responsibilities). These K/As are PWGs that are not applicable to this system. Randomly selected G2.2.2.

T2G1 068 Liquid Rad Waste	A2.04	Shifted from K/A 2.03 with NRC approval (Ability to predict the impacts of the following malfunction or operation...and based on those predictions, use procedures to correct, control or mitigate the consequences of...insufficient sampling frequency of boric acid in the evaporator bottoms) because we did not know what this K/A was testing. Randomly selected A2.04.
T2G1 003 Reactor Coolant Pump	A4.03	Originally randomly sampled the Condensate System (0056). Decided to resample system to RCPs because the condensate system had already been sampled once and there were very few K/As that were < 2.5 in this system.
T2G1 013 Engineered Safety Features Actuation	G2.1.32	Randomly sampled G2.1.16 (paging system operation) and G2.1.26 (non-nuclear safety - high temp, high pres, etc). These K/As were PWGs and were not directly applicable to this system. Randomly selected G2.1.32.
T2G2 010 Pressurizer Pressure Control	K1.02	Randomly sampled K4.02. However, there was only 1 K1 that had been randomly sampled in all Tier 2 systems on the SRO exam. The ES-1021 requires a minimum of 2 questions in each category to assure that all categories are represented (assuming one question is deleted during exam review). Randomly selected this question (from all systems that had K4s selected) and randomly reselected K1.02. This increased the number of K1s from 1 to 2 in Tier 2 and decreased the number of K4s from 7 to 6 on the SRO exam.
T2G2 064 Emergency Diesel Generator	A1.08	Randomly selected A1.02 (Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the...fuel consumption rate with load). However, this K/A was judged not to be appropriate RO level of knowledge at Catawba.
T2G3 041 Steam Dump/Turbine Bypass Control	G2.2.1	Randomly selected K/A G2.3.6 (Radiation control: Knowledge of requirements for preparing a radiation work permit), K/A G2.3.10 (Radiation Control: Ability to perform procedures to reduce excessive levels of radiation and guard against

		personnel exposure) and G2.3.4 (Knowledge of radiation exposure limits, contamination control including permissible limits in excess of those authorized) – these K/As were determined to be inappropriate for this system. Selected G2.2.1 at the direction of the Chief Examiner.
Tier 3 Group 1 Conduct of Operations	G2.1.24	Randomly selected G2.1.27 (Knowledge of system purpose or function), which was not a PWG. Randomly resampled.
Tier 3 Group 2 Equipment Control	G2.2.22	Randomly sampled G2.2.4 (Ability to explain the variations in control board layouts, systems, instrumentation and procedural actions between units at a facility). This K/A had initially already been used in systems questions and was removed as a duplicate – but this K/A was later deselected during the sample plan review process.
Tier 3 Group 4 Emergency Procedures and Plans	G2.4.15	Randomly selected G2.4.22 (Knowledge of bases for prioritizing safety functions during abnormal and emergency operations). This K/A had initially already been used in systems questions and was removed as a duplicate from Tier 2 Group 1 Control Rod Drive system. Randomly selected G2.4.15 as replacement K/A.

## **SRO Examination Exam**

Steam Tables – Questions 185b, 311,

### Tech Specs

- 3.4.5 – question 096a
- 3.4.6 – question 096a
- 3.4.13 – question 734
- 3.5.1 – question 697a
- 3.5.2 – question 096a
- 3.6.1 – question 515a
- 3.6.2 – question 515a, 762
- 3.6.13 – 589b
- 3.7.1 pages 1-3 – question 217a
- 3.7.8 – Question 778
- 3.8.4 – question 770
- 3.8.7 – question 770
- 3.8.9 – question 770

### SLCs:

- 16.7-10 – Question 515a
- 16.9-3 – question 759
- 16.11-1 – Question 575

### EOPs:

- E-1 page 5 – question 185b
- F-0 page 2 – question 195b

### AOPs:

- AP/17 – question 189a
- AP-29 – question 760

### Other

- Reactor Operating Databook, Sections 4.1 & 4.2 – question 189a
- Curve Book curve 7.30.2 – question 697a
- COLR Rev 17 – page 21 – question 697a
- NSD-200 – question 121a

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

## **Catawba Nuclear Station SRO EXAM**

With Answer Key

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**Bank Question: 033****Answer: B**

1 Pt(s)

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

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

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

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

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**Distracter Analysis:**

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

Level: RO&amp;SRO

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

Lesson Plan Objective: KF LPRO 15

Source: Mod Ques\_033e

Level of knowledge: memory

References:

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

**Bank Question: 051****Answer: A**

1 Pt(s)

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

- ND pump 1A is tagged out of service for maintenance
- Containment pressure increases to 14 psig
- The operators performed FR-Z.1, (*Response to High Containment Pressure*) upon exiting E-0, (*Reactor Trip or Safety Injection*) and then transitioned to E-1 (*Loss of Reactor or Secondary Coolant*)
- Later when shifting to cold leg recirc using ES-1.3, (*Transfer to Cold Leg Recirculation*), valve 1NI-184B (*Containment Sump to Train 1B ND & NS*) fails to open
- The operators are currently implementing ECA-1.1 (*Loss of Emergency Coolant Recirculation*)

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

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

- A. **ECA-1.1 takes priority because it conserves FWST water level as long as possible for injection and spray flow.**
- B. **FR-Z.1 takes priority because it was implemented in response to a valid orange path and FRPs always have priority over ECA procedures.**
- C. **ECA-1.1 takes priority because ECA procedures always have priority over FRPs.**
- D. **FR-Z.1 takes priority because the loss of containment integrity takes precedence over the potential loss of NCS inventory.**

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**Distracter Analysis:**

- A. **Correct answer**
- B. **Incorrect:** ECA-1.1 takes priority over FR-Z.1  
**Plausible:** FRPs normally take priority over most EOPs.
- C. **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.
- D. **Incorrect:** ECA-1.1 takes priority over FR-Z.1.

**Plausible:** This is a true statement except that loss of ND suction would be a loss of core cooling rather than NCS inventory.

Level: SRO Only

KA: WE11EA2.1(3.4/4.2)

Lesson Plan Objective: FRZ LPSO 4

Source: NRC McGuire Exam 2000 Ques\_051

Level of knowledge: memory

References:

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

**Bank Question: 080a****Answer: D**

1 Pt(s)

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

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

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**Distracter Analysis:**

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

Level: RO&amp;SRO

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

Lesson Plan Objective: PTS SEQ 13, 14

Source: Mod Ques\_080

Level of knowledge: comprehension

References:

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

**Bank Question: 096a****Answer: B**

1 Pt(s)

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

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

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

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

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

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**Distracter Analysis:**

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

Level: SRO Only

KA: G2.4.9 (3.3/3.9)

Lesson Plan Objective: ND LPSO 11

Source: Mod Ques\_96e

Level of knowledge: comprehension

**References:**

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

**Bank Question: 104a****Answer: C**

1 Pt(s)

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

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

What is the cause of these indications?

- A. **Pressurizer level master controller output fails high**
- B. **Pressurizer level channel I fails low**
- C. **NCS Loop C narrow range T<sub>c</sub> channel fails high**
- D. **Pressurizer level channel II fails low**

---

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

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

Level: RO&SRO

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

Lesson Plan Objective: ILE LPSO 6

Source: Mod Ques\_104

Level of knowledge: comprehension

References:

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

**Bank Question: 121a****Answer: D**

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

3/19

1900 Started Shift Turnover

1930 Assumed shift duties

3/20

0730 Relieved of duties

0800 Departed site

1530 Called in to relieve the day shift due to illness

1600 Assumed shift duties

3/21

0730 Relieved of duties

0800 Departed site

What action should have been taken to comply with shift staffing requirements?

**REFERENCES PROVIDED:**

**NSD-200**

- A. The day SWM should have approved a "*Request for Work Hours Extension*" form on 3/20.
- B. The day SWM should have approved a "*Request for Work Hours Extension*" form on 3/21.
- C. The Operations Shift Manager should have approved a "*Request for Work Hours Extension*" form between 1500 and 1900 on 3/20.
- D. The Operations Shift Manager should have approved a "*Request for Work Hours Extension*" form between 0000 and 0400 on 3/21.

---

**Distracter Analysis:**

- A. **Incorrect:** Can't approve before 4 hours prior to exceeding the limit.  
**Plausible:** If the candidate does not know the 4 hour FFD eval limit.
- B. **Incorrect:** cannot approve after the fact.  
**Plausible:** gets the approval documented if the candidate assumes that after the fact approval is OK.

- C. Incorrect:** doesn't exceed limit til 0400, 3/21  
**Plausible:** If the candidate thinks he exceeds 16 in 24 criteria by including turnover time.
- D. Correct Answer:**

Level: SRO Only

KA: G2.1.5 (2.3/3.4)

Lesson Plan Objective: ADM-NS05 LPSO 8

Source: Mod Ques\_121

Level of knowledge: comprehension

References:

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

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

1 Pt(s)

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

Which one of the following work teams and estimated repair times would maintain 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: HP LPRO 10

Source: Mod Ques\_124e

Level of knowledge: comprehension

References:

1. OP-CN-RAD-HP page 19

**Bank Question: 162a****Answer: B**

1 Pt(s)

Unit 1 is purging containment while in mode 5.

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

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

---

**Distracter Analysis:**

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

Level: RO&amp;SRO

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

Lesson Plan Objective: EMF LPRO 2

Source: Mod Ques\_162

Level of knowledge: memory

References:

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

**Bank Question: 185b****Answer: C**

1 Pt(s)

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

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

Given and the following conditions at the following times:

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

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

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

**REFERENCES PROVIDED*****E-1 page 5, Steam Tables***

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

---

**Distracter Analysis:**

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

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

Level: RO&SRO

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

Lesson Plan Objective: EP2 LPRO 8, 9

Source: Bank 185

Level of knowledge: analysis

References:

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

**Bank Question: 189a****Answer: C**

1 Pt(s)

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

Given the following conditions:

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

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

**REFERENCES PROVIDED**

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

- A. 2850±28 gallons
- B. 15460±154 gallons
- C. 20550±205 gallons
- D. 24025±240 gallons

---

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

- A. **Incorrect:** 20553 gallons of boric acid required  
**Plausible:** if the candidate misreads the need add 2850gal instead of getting to 2850 graph
- B. **Incorrect:** 20553 gallons of boric acid required  
**Plausible:** if the candidate does not calculate the addition properly (various plausible errors).
- C. **Correct Answer:** borate to 2850 ppm – which requires 20553 gallons to go from 1200 ppm to 2850 ppm
- D. **Incorrect:** 20553 gallons of boric acid required  
**Plausible:** if the candidate uses the wrong table, or other miscalculations.

Level: RO&SRO

KA: G2.2.34 (2.8/3.2)

Lesson Plan Objective: RT-RB LPRO 4

Source: Mod Ques\_189

Level of knowledge: analysis

References:

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

**Bank Question: 193a**

**Answer: A**

1 Pt(s)

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

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

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

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

Level: RO&SRO

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

Lesson Plan Objective: EP-EP4 Obj: 7

Source: Bank McGuire Exam 1997

Level of knowledge: comprehension

References:

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

**Bank Question: 195b****Answer: B**

1 Pt(s)

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

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

Which one of the following response actions is required?

**REFERENCES PROVIDED: F-0 page 2**

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

---

**Distracter Analysis:**

- A. **Incorrect:** Above P-11 must use E-0.  
**Plausible:** This is the correct answer for initiating below P-11.
- B. **Correct:**
- C. **Incorrect:** There is no yellow path because SUR < -0.2dpm.  
**Plausible:** If the candidate is looking for an FR-S response to the stuck rod and breaker.
- D. **Incorrect:** No ATWS because 3 RTB's are open and only one rod stuck.  
**Plausible:** If the candidate makes a literal reading of E-0 without knowledge of the ERG background positions on what constitutes a tripped reactor.

Level: SRO Only

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

Lesson Plan Objective: EP1 LPRO 18

Source: Mod Ques\_195a

Level of knowledge: comprehension

References:

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

**Bank Question: 217a**

**Answer: B**

1 Pt(s)

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

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

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

**REFERENCES PROVIDED**

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

- A.      Power must be reduced below 24% to ensure that the reactor coolant pressure boundary is not over-pressurized.**
- B.      Power must be reduced below 41% to ensure that the reactor coolant pressure boundary is not over-pressurized.**
- C.      Power must remain less than 50% to ensure that the S/G's are not over-pressurized.**
- D.      Power must be reduced below 24% to ensure that the S/G's are not over-pressurized.**

---

**Distracter Analysis:**

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

Level: SRO Only

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

Lesson Plan Objective: STM-SM SEQ 26

Source: Mod; Ques\_217

Level of knowledge: comprehension

References:

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

**Bank Question: 263**

**Answer: A**

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

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

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

- A.      **1EMF-15 (SPENT FUEL BLDG REFUEL BRIDGE) has failed high.**
- B.      **1EMF-20 (NEW FUEL STOR 1A) has failed high.**
- C.      **The load in the new fuel elevator weighs 1100 lbs.**
- D.      **The spent fuel bridge crane is NOT indexed over the new fuel elevator.**

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: FHS LPRO 8

Source: NRC Catawba Exam 1999 Ques\_263

Level of knowledge: memory

References:

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

**Bank Question: 282a****Answer: B**

1 Pt(s) Which of the following describes the plant response to decreasing VI system pressure?

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

---

**Distracter Analysis:**

Loss of VI (Obj. #5, 8)

Automatic actions:

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

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

**Plausible:** If candidate reverses the order

B. **Correct:**

C. **Incorrect:**

**Plausible:** backup compressor does not automatically start

D. **Incorrect:**

**Plausible:** backup compressor does not automatically start

Level: RO&SRO

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

Lesson Plan Objective: VI SEQ 5, 8

Source: NRC Catawba Exam 1999 Ques\_282

Level of knowledge: memory

References:

1. VI lesson plan page 19 of 36

**Bank Question: 300b****Answer: A**

1 Pt(s)

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

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

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

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

---

**Distracter Analysis:**

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

Level: RO&amp;SRO

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

Lesson Plan Objective: none

Source: Mod Catawba Exam 1997 Ques\_300

Level of knowledge: memory

References:

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

**Bank Question: 301b**

**Answer: C**

1 Pt(s)      The operators are at step 23 of ECA-0.0, (*Loss of All AC Power*):

*Depressurize intact S/Gs to 165 psig as follows: ...*

- *Verify all NC T-Colds – GREATER THAN 280°F.*

Which one of the following statements correctly describes the basis for maintaining T-Colds above 280 °F?

- A.    **To prevent Nitrogen injection into the NCS.**
- B.    **To prevent a return to criticality.**
- C.    **To prevent a challenge to NCS integrity from PTS.**
- D.    **To prevent a loss of natural circulation.**

---

**Distracter Analysis:**

- A.    **Incorrect:** Nitrogen injection avoidance is accomplished by maintaining SG pressure greater than 165 psig  
**Plausible:** The candidate knows nitrogen is a concern, but is not sure of the steps to assure it does not happen.
- B.    **Incorrect:** this concern is covered in almost all cases by the SG pressure limit.  
**Plausible:** candidate links the reactivity added by the cooldown to a possible return to criticality.
- C.    **Correct:** cold leg temperatures should be monitored to ensure that the depressurization does not impose a challenge to the integrity CSF. This check is included in step 23 since procedure ECA-0.0 has priority over the FRPs. Consequently, step 23d implicitly protects the integrity CSF. The depressurization should not approach the T2 limit at which a challenge would exist
- D.    **Incorrect:** Natural circulation will exist.  
**Plausible:** if the candidate does not understand the restrictions of natural circulation flow

Level: SRO Only

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

Lesson Plan Objective: EP5 SEQ 10

Source: mod Catawba Exam 1997 Ques\_301

Level of knowledge: memory

References:

1. ECA-0.0 background, step 23

**Bank Question: 311**

**Answer: A**

---

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

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

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

**REFERENCES PROVIDED: Steam Tables**

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

**Distracter Analysis:**

- A.     **Correct answer**
- B.     **Incorrect:** Temp is too low - the correct temp is 260 °F  
**Plausible:** If the candidate makes the mistake of not correcting for atmospheric pressure by failing to adding 14.6 psi to the PRT pressure and uses 20 psia.
- C.     **Incorrect:** Temp is too low - the correct temp is 260 °F  
**Plausible:** If the candidate reverses the correction for atmospheric pressure by subtracting 14.6 psi from PRT pressure of 20 psig to get 5 psia.
- D.     **Incorrect:** Temp is too low - the correct temp is 260 °F  
**Plausible:** If the candidate thinks that the discharge temperature will be at the same temperature as the PRT fluid.

Level: RO&SRO

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

Lesson Plan Objective: FLO SEQ 8

Source: NRC Catawba Exam 1999 Ques\_311

Level of knowledge: analysis

References:

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

**Bank Question: 339a**

**Answer: D**

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

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

KA: G2.4.19 (2.7 / 3.7)

Lesson Plan Objective: ADM-OP SEQ 21

Source: NRC Catawba Exam 97 Ques\_339

Level of knowledge: memory

References:

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

**Bank Question: 357a**

**Answer: D**

1 Pt(s)

Unit 1 is responding to a LOCA into containment. Given the following events and conditions:

- The operators completed E-0 (*Reactor Trip and Safety Injection*) and transitioned to E-1 (*Loss of Reactor or Secondary Coolant*)
- The operators completed E-1 through step 13 and transitioned to ES-1.2 (*Post LOCA Cooldown and Depressurization*)
- At step 10 of ES-1.2, the STA reported:
  - A valid ORANGE PATH on Containment existed
  - A valid RED PATH on Heat Sink existed
- The operators transitioned to FR-H.1 (*Response to Loss of Heat Sink*) from step 10 of ES-1.2.
- The operators performed all required actions in FR-H.1, which placed feedwater back in service.
- Upon completion of FR-H.1, the STA reports that all CSFs are now GREEN (including Containment).

Which one of the following describes the correct procedure flow path?

- A.     Go to ES-0.0 (*Rediagnosis*) and rediagnose the situation.
- B.     Return to ES-1.2 step 1 and continue.
- C.     Complete FR-Z.1 (*Response to High Containment Pressure*) and then return to ES-1.2 step 1.
- D.     Return to ES-1.2 step 10 and continue.

**Distracter Analysis:**

- A.     **Incorrect:** Not in accordance with rules of usage.  
        **Plausible:** Rediagnosis is appropriate if the rule of usage do not cover the correct procedure to implement.
- B.     **Incorrect:** Not in accordance with rules of usage.  
        **Plausible:** The orange path for containment no longer is valid, makes sense to return to the last procedure transition completed.
- C.     **Incorrect:** Not in accordance with rules of usage.  
        **Plausible:** The orange path for containment was valid, makes sense to implement the procedure. This is a modification of a previously used question from the 1999 NRC exam. If the candidates have simply memorized that question/answer, they will select C.
- D.     **Correct:** - The operators never entered FR-Z.1 so it is not required to enter at this time.

Level: SRO Only

KA: WE03EK3.4(3.5/3.9)

Lesson Plan Objective: EP2 LPRO 29, OP LPRO 28

Source: Mod Catawba Exam 1999 Ques\_357

Level of knowledge: comprehension

References:

1. OMP 1-7 page 8-13

**Bank Question: 380**

**Answer: C**

1 Pt(s)

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: none

Source: NRC McGuire Exam 1999 Ques\_380

Level of knowledge: memory

References:

1. OP-CN-WE-EMF page 11

**Bank Question: 387a**

**Answer: B**

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

KA: G2.4.15 (3.0/3.5)

Lesson Plan Objective: EP-INTRO LPRO 12

Source: Mod McGuire Exam 1999 Ques\_387

Level of knowledge: memory

References:

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

**Bank Question: 388**

**Answer: A**

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

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

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

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

**Distracter Analysis:**

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

diversion path would be a reasonable thing to do. This alignment does not accomplish this goal.

Level: RO&SRO

KA: WE04EK2.1(3.5/3.9)

Lesson Plan Objective: EP-E2 SEQ 14

Source: NRC McGuire Exam 1999 Ques\_388

Level of knowledge: comprehension

References:

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

**Bank Question: 393****Answer: C**

1 Pt(s)

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

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

Which of the following operator errors would explain this event?

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

---

**Distracter Analysis:**

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

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

Level: RO&SRO

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

Lesson Plan Objective: ENB LPRO 9

Source: NRC McGuire Exam 1999 Ques\_393

Level of knowledge: comprehension

References:

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

**Bank Question: 437a**

**Answer: B**

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: EPL SEQ 15, 16

Source: Mod - McGuire Exam 1999 Ques\_437

Level of knowledge: memory

References:

1. Lesson plan pages 16 and 17

**Bank Question: 444a**

**Answer: B**

1 Pt(s)

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: VE LPRO 9

Source: NRC McGuire Exam 1999 Ques\_444

Level of knowledge: memory

References:

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

**Bank Question: 453a****Answer: C**

1 Pt(s)

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

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

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

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

---

**Distracter Analysis:**

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

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

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

- a. Ensure turbine - TRIPPED.

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

**Plausible:** tripping the turbine is not **required** until the set point is reached – but is **allowed** by OMP 1-8 - if the candidate does not recognize that power is below 65%

**C.      Correct:**

**D.      Incorrect:** should not immediately trip the reactor.

**Plausible:** If the candidate does not recognize that power is below 65%

Level: RO&SRO

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

Lesson Plan Objective: ZM SEQ 17

Source: mod Catawba Exam 1999 Ques\_453

Level of knowledge: memory

References:

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

**Bank Question: 503a**

**Answer: A**

1 Pt(s)      Unit 2 was operating at 80% power. Given the following events and conditions:

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: IC-IRX LPRO 5

Source: Mod Catawba exam 1999

Level of knowledge: analysis

References:

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

**Bank Question: 505****Answer: D**

1 Pt(s)

Unit 2 is responding to a small break LOCA in E-1, (*Loss of Reactor or Secondary Coolant*). Given the following plant events and conditions:

- NCPs tripped
- Pressurizer level is steady
- Only one train of ECCS is injecting
- Loop A temperatures are representative of all 4 loops
- Steam generator pressures are the same as steam header pressure

Which one of the following sets of plant parameters is indicative of gas induced flow blockage in the steam generators?

	Time	<u>0200</u>	<u>0205</u>	<u>0210</u>	<u>0215</u>
<b>A.</b>	<b>Steam Header Pressure (psig)</b>	<b>1042</b>	<b>1009</b>	<b>976</b>	<b>945</b>
	<b>NC System Pressure (psig)</b>	<b>1968</b>	<b>1964</b>	<b>1960</b>	<b>1958</b>
	<b>Loop A Thot (°F)</b>	<b>579</b>	<b>574</b>	<b>569</b>	<b>564</b>
	<b>Loop A Tcold (°F)</b>	<b>548</b>	<b>544</b>	<b>540</b>	<b>536</b>
<b>B.</b>	<b>Steam Header Pressure (psig)</b>	<b>1042</b>	<b>1009</b>	<b>976</b>	<b>945</b>
	<b>NC System Pressure (psig)</b>	<b>1968</b>	<b>1972</b>	<b>1975</b>	<b>1981</b>
	<b>Loop A Thot (°F)</b>	<b>579</b>	<b>574</b>	<b>569</b>	<b>564</b>
	<b>Loop A Tcold (°F)</b>	<b>548</b>	<b>544</b>	<b>540</b>	<b>536</b>
<b>C.</b>	<b>Steam Header Pressure (psig)</b>	<b>1042</b>	<b>1047</b>	<b>1050</b>	<b>1052</b>
	<b>NC System Pressure (psig)</b>	<b>1968</b>	<b>1964</b>	<b>1960</b>	<b>1958</b>
	<b>Loop A Thot (°F)</b>	<b>579</b>	<b>579</b>	<b>578</b>	<b>580</b>
	<b>Loop A Tcold (°F)</b>	<b>548</b>	<b>549</b>	<b>548</b>	<b>550</b>
<b>D.</b>	<b>Steam Header Pressure (psig)</b>	<b>1042</b>	<b>1009</b>	<b>976</b>	<b>945</b>
	<b>NC System Pressure (psig)</b>	<b>1968</b>	<b>1972</b>	<b>1975</b>	<b>1981</b>
	<b>Loop A Thot (°F)</b>	<b>579</b>	<b>582</b>	<b>585</b>	<b>595</b>
	<b>Loop A Tcold (°F)</b>	<b>548</b>	<b>544</b>	<b>540</b>	<b>536</b>

**Distracter Analysis:**

- A. Incorrect:** This shows indication of natural circulation flow occurring - decreasing S/G pressure, Tcold at S/G saturation conditions and decreasing, Thot decreasing.  
**Plausible:** If the candidate does not understand how to analyze for gas binding conditions.
- B. Incorrect:** Natural circulation is occurring

**Plausible:** NC pressure is increasing - unrelated to S/G gas binding conditions - this is an indication of gas binding but not with the associated S/G conditions.

- C.      Incorrect:** Steam pressure is increasing and loop temperatures are tracking along with this trend. Temperature difference is constant indicating that heat removal rate is constant. Indicates plant is heating up - likely due to a heat removal problem in the SDV system

**Plausible:** Does not show the classic indications of natural circulation.

- D.      Correct answer:** Steam pressure is decreasing, NC pressure is increasing, Thot is increasing, Tcold is decreasing.

Level: SRO Only

KA: WE09 EK2.1 (3.2/3.4)

Lesson Plan Objective: TA-AM LPRO 7

Source: NRC Catawba Exam 1999 Ques\_505

Level of knowledge: analysis

References:

1. OP-CN-TA-AM page 15

**Bank Question: 515a**

**Answer: D**

1 Pt(s)      Unit 2 was cooling down in mode 4 in preparation for starting a refueling outage. Given the following plant conditions:

- Containment has not been entered for this outage
- Containment purge and exhaust valves are locked shut
- The Outage Coordinator requests that personnel be allowed to enter containment to conduct a 15-minute walk-down for an outage work package.

<b>Containment</b>	<b>Activity (CPM)</b>	<b>Trip 2 setpoint (CPM)</b>
1EMF-38(L) ( <i>CONTAINMENT PART</i> )	13,400	45,000
1EMF-39(L) ( <i>CONTAINMENT GAS</i> )	12,400	40,000
1EMF-40(L) ( <i>CONTAINMENT IODINE</i> )	5,200	15,000

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

**REFERENCES PROVIDED: SLC 16.7-10, Tech Specs 3.6.1, 3.6.2**

- A.      **Perform a required air lock leakage rate test in accordance with 10CFR50 Appendix J within 24 hours of entry.**
- B.      **Unlock containment purge and isolation valves and purge containment to reduce gaseous activity prior to personnel entry.**
- C.      **Perform a source check surveillance test on 1EMF 38, 39, & 40 prior to entering containment.**
- D.      **Reset the alarm setpoint on 1EMF-39(L).**

**Distracter Analysis:**

- A.      **Incorrect:** Appendix J testing required for air locks 72 hours after entry.  
**Plausible:** 24 hours afterward is a reasonable Appendix J leak rate test frequency.
- B.      **Incorrect:** Purge valves must remain locked shut in mode 4  
**Plausible:** This action could reduce personnel exposure- but is not required.
- C.      **Incorrect:** This source check test is required every 12 hours - not prior to opening the containment.  
**Plausible:** Testing the containment radiation monitors would be prudent - but not required
- D.      **Correct answer** Required by SLC 16.7-10 - reduce below 37,200 CPM

Level: SRO Only

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

Lesson Plan Objective: WE-EMF SEQ 4

Source: NRC Catawba exam 1999 Ques\_515

Level of knowledge: analysis

References:

1. OP-CN-WE-EMF page 9
2. SLC 16.7-10 - PROVIDED
3. Tech Spec 3.6.1 - PROVIDED
4. Tech Spec 3.6.2 - PROVIDED

**Bank Question: 518**

**Answer: C**

- 1 Pt(s)      Which one of the following design features prevents the containment isolation valves inside containment (KC, NC, NI and NM systems) from spuriously opening during a containment flooding event following a containment isolation phase A signal?
- A.      **The valves are all located above the equipment qualification (EQ) flooding level and should never be submerged by design.**
  - B.      **These valves were designed to use air operators, which are not subject to spurious actuation when submerged.**
  - C.      **These valves have motor operators that have their OPEN controls disabled and must be manually reset from the control room.**
  - D.      **These valves have all power removed from their motor operators and must be manually enabled from the control room.**

---

**Distracter Analysis:**

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

Level: RO&SRO

KA: WE15EK2.1(2.8/2.9)

Lesson Plan Objective: CNT LPRO 13

Source: NRC Catawba Exam 1999 Ques\_518

Level of knowledge: memory

References:

1. OP-CN-CNT-CNT page 16

2. OP-CN-EP-FRZ pages 5, 7

**Bank Question: 547****Answer: C**

1 Pt(s) Unit 1 was operating at 100% power when main condenser vacuum dropped from 25 in Hg to 23 in Hg.

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: MT-ZM SEQ 9, 14

Source: NRC Catawba Exam 99 Ques\_547

Level of knowledge: comprehension

References:

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

**Bank Question: 556****Answer: D**

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

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

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

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

**Distracter Analysis:**

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

Level: RO&SRO

KA: G2.1.7 (3.7/4.4)

Lesson Plan Objective: VQ LPRO 2

Source: NRC Catawba 1999 Ques\_556

Level of knowledge: analysis

References:

1. OP-CN-CNT-VQ page 6

**Bank Question: 575**

**Answer: B**

1 Pt(s)      The RadWaste system operator has requested SRO approval to release 1000 gals of wastewater from the monitor tank building (MTB).

Which one of the following statements correctly describes the maximum concentration limit for dissolved or entrained noble gases that can be allowed for this release into Lake Wylie via the RL system?

**REFERENCES PROVIDED: SLC 16.11-1**

- A.      Sample concentration in the tank to be released from the MTB cannot exceed  $2 \times 10^{-4}$   $\mu\text{Ci/ml}$  prior to dilution.
- B.      Concentration cannot exceed  $2 \times 10^{-4}$   $\mu\text{Ci/ml}$  after dilution by the RL system water at the point of discharge.
- C.      Sample concentration in the tank to be released from the MTB cannot exceed  $1 \times 10^{-5}$   $\mu\text{Ci/ml}$  prior to dilution.
- D.      Concentration cannot exceed  $1 \times 10^{-4}$   $\mu\text{Ci/ml}$  after dilution by the RL system water at the point of discharge.

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**Distracter Analysis:**

- A.      **Incorrect:** the limit is after dilution occurs - which is when the water is released to unrestricted areas  
          **Plausible:** if the candidate is not aware that you need to account for the dilution factor - this uses the correct limit number
- B.      **Correct answer**
- C.      **Incorrect:** Limit is  $2 \times 10^{-4}$   $\mu\text{Ci/ml}$  after dilution  
          **Plausible:** Uses LLD value from Table 16.11-1
- D.      **Incorrect:** Limit is  $2 \times 10^{-4}$   $\mu\text{Ci/ml}$  after dilution  
          **Plausible:** Uses  $10 \times$  LLD value from Table 16.1-1 - in case candidate thinks that the LLD values are the 10CFR20 limits.

Level: SRO Only

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

Lesson Plan Objective: WE-WL LPRO 4, 9

Source: NRC Catawba Exam 1999 Ques\_575

Level of knowledge: comprehension

References:

1. OP-CN-WE-WL page 14-15
2. SLC 16.11-1 pages 1-7 - PROVIDED

**Bank Question: 585a**

**Answer: B**

1 Pt(s)

Unit 1 is in mode 5 with a NC system hydrostatic test in progress. Given the following events and conditions:

- Plant pressure indicated 2445 psig as indicated on the hydrostatic test skid.

At 0200, Plant Engineering stated that the hydrostatic test vendor confirmed that the calibration standards used to calibrate the hydrostatic test gages are in error by 300 psig and actual plant pressure is 2745 psig.

Which one of the following statements correctly describes the crew response to this condition?

- A.    **No action required; consult with the duty engineer and recalibrate NC system pressure gages prior to completing the hydro.**
- B.    **Reduce NC system indicated pressure below 2435 psig within 5 minutes.**
- C.    **Reduce NC system indicated pressure below 2435 psig within 1 hour.**
- D.    **Reduce NC system indicated pressure below 2235 psig within 1 hour.**

---

**Distracter Analysis:**

- A.    **Incorrect:** actual pressure is still below the SL of 2735 psig.  
**Plausible:** if the candidate does not think that a calibration error is sufficient grounds to enter safety limits action statements.
- B.    **Correct:** required if above 2735 psig in mode 3.
- C.    **Incorrect:** must reduce pressure below safety limits within 5 minutes  
**Plausible:** this is the correct answer if the plant is above mode 3.
- D.    **Incorrect:** must reduce pressure below safety limits within 5 minutes  
**Plausible:** if the candidate thinks that pressure must be reduced to normal operating pressure, 2235 psig.

Level: SRO Only

KA: G2.2.22 (3.4/4.1)

Lesson Plan Objective: ADM LPSO 8

Source: mod Ques\_585

Level of knowledge: memory

References:

1. OP-CN-ADM-TS page 15
2. Tech Spec 2.1.2

**Bank Question: 589b**

**Answer: D**

1 Pt(s)      Unit 1 is in mode 5. Engineering reported the following results from completion of shutdown surveillances on ice condenser doors.

<u>Inlet doors:</u>	<u>Door 1</u>	<u>Door 2</u>	<u>Door 3</u>	<u>Door 4</u>
Closing torque (in-lb.)	79	96	114	113
Opening torque (in-lb.)	150	175	191	190

<u>Intermediate Doors</u>	<u>Lifting Force</u>
Adjacent to crane wall	36 lb.
Paired with door adjacent to crane wall	33 lb.
Adjacent to containment wall	30 lb.
Pair with door adjacent to crane wall	29 lb.

Plant heat-up is proceeding with entry into mode 4 scheduled in 16 hours. If ice bed temperature remains less than 27 °F, which one of the following statements correctly describes the action required?

**REFERENCES PROVIDED: Tech Spec 3.6.13**

- A.      **The heat-up cannot be allowed until intermediate door movement has been restored.**
- B.      **The heat-up can proceed as long as inlet door torque values are restored to Tech Spec requirements within 16 days.**
- C.      **The heat-up cannot be allowed until inlet door frictional torque values are within Tech Spec requirements.**
- D.      **The heat-up can proceed without restrictions.**

**Distracter Analysis:**

- A.      **Incorrect:** Intermediate door lifting force is within specs  
**Plausible:** If the candidate does not correctly compare these values
- B.      **Incorrect:** Cannot change modes if inlet door torque values were out of spec for mode 4.  
**Plausible:** If the candidate thinks that door torque values are high, and does not recognize that mode changes are prohibited - there are 16 days (14 + 48 hrs) to take action to correct the torque in mode 4 - but NOT to enter mode 4.

- C.      Incorrect:** The frictional torque values on Ice condenser doors meet the tech spec limit.  
**Plausible:** If the candidate does not correctly apply or compute TS values.

**D.      Correct answer**

Level: SRO Only

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

Lesson Plan Objective: CNT-NF SEQ 9

Source: Mod Catawba Exam 1999 Ques\_589

Level of knowledge: analysis

References:

1. OP-CN-CNT-NF page 8
2. Tech Spec 3.6.13 - PROVIDED

**Bank Question: 596a**

**Answer: B**

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

Given the following conditions:

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: CP-RSS SEQ 9

Source: Mod McGuire Exam 2000 Ques\_596

Level of knowledge: memory

References:

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

**Bank Question: 647a****Answer: D**

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

	<u>0200</u>	<u>0205</u>	<u>0210</u>
1A-1D NCP#1 seal outlet temp (°F)	100	130	145
1A-1D NCP #1 seal leakoff flow (gpm)	3.0	3.5	4.0
1A-1D NCP #1 seal d/p (psid)	>400	>400	>400
1A-1D NCP seal water inj filter d/p (psid)	10	2.0	1.0
1A-1D NCP seal injection (gpm)	8.0	1.5	<1.0
VCT Level	50%	49%	50%
Pressurizer level	55%	56%	55%
Charging Flow (gpm)	87	88	87
Letdown Flow (gpm)	75	75	75

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

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

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

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

Level: RO&amp;SRO

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

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

Source: Mod McGuire Exam 2000 Ques\_647

Level of knowledge: analysis

References:

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

**Bank Question: 659**

**Answer: B**

1 Pt(s)

Unit 1 is at 1% power, starting up from a plant trip due to multiple power range nuclear instrument failures. Unit 2 is shutting down (30% power) to Mode 3, to investigate the potential common mode failure mechanism. The Unit 2 power range nuclear instrument channel N41 has been removed from service in preparation for the investigation.

Which of the following correctly describes the TSAIL entry for power range nuclear instrument inoperability during this maintenance for Unit 2?

- A.    **No TSAIL entry is required because N41 will not be required to be operable in Mode 3.**
- B.    **A TSAIL entry is required because N41 is inoperable in Mode 1.**
- C.    **No TSAIL entry is required because N41 will be within the action statement time limits.**
- D.    **A TSAIL entry is required for tracking only**

---

**Distracter Analysis:**

- A.    **Incorrect:** A TSAIL entry is required.  
**Plausible:** based on knowledge that no entry would be required in Mode 3.
- B.    **Correct:** tagging N41 out of service makes N41 inoperable regardless of the outcome of the investigation into the common mode failure.
- C.    **Incorrect:** A TSAIL entry is required.  
**Plausible:** based on misunderstanding of TSAIL entry requirements.
- D.    **Incorrect:** A TSAIL entry is required due to N41 inoperability in Mode 1.  
**Plausible:** based on the requirement for a “tracking only” entry.

Level: SRO Only

KA: G2.2.23 (2.6/3.8)

Lesson Plan Objective: ADM-TS LPRO 5

Source: NRC McGuire 2000 Ques\_659

Level of knowledge: memory

References:

1. OP-CN-ADM-TS page 22
2. Tech Specs 3.3.1 pages 1-2, 14
3. OMP 2-29 pages 2-3

**Bank Question: 661a**

**Answer: B**

1 Pt(s)      Units 1 and 2 are at 100% power. Given the following conditions:

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

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

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

---

**Distracter Analysis:**

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

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

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

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

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

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

Level: RO&SRO

KA: G2.3.4 (2.5/3.1)

Lesson Plan Objective: HP LPRO 2, 11

Source: Mod McGuire Exam 2000 Ques\_661

Level of knowledge: comprehension

References:

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

**Bank Question: 663a****Answer: A**

1 Pt(s)

With the plant at 10% power, an Instrument Technician was allowed to adjust the limit switches on 1NI-152B (*B NI PUMP DISCH TO HOT LEGS*) without a tag-out. He cycled the valve using the manual hand wheel to set up the limit switches. Upon completion of the work, the worker manually closed 1NI-152B and disengaged the manual hand wheel.

Which one of the following statements is correct at the end of the maintenance activity?

- A. "B" NI train was inoperable while 1NI-152B was being manually cycled and remains inoperable until 1NI-152B has been cycled electrically to comply with requirements of OMP 2-33 (*Valves*).
- B. "B" NI train remained operable provided that the worker was present to position the valve, but now requires an R&R (info sticker on control switch) to document manual positioning.
- C. "B" NI train remained operable provided that the worker was present to position the valve, but 1NI-152B must be cycled electrically to comply with requirements of OMP 2-33 (*Valves*).
- D. "B" NI train was inoperable while 1NI-152B was being manually cycled but is now operable after the valve handwheel was disengaged.

---

**Distracter Analysis:**

- A. **Correct:**
- B. **Incorrect:** NI train is inoperable  
**Plausible:** partially correct – must document with an R&R and info sticker.
- C. **Incorrect:** NI train is inoperable  
**Plausible:** partially correct – must electrically cycle the valve per OMP.
- D. **Incorrect:** Not operable until after 1NI-152B is cycled electrically.  
**Plausible:** partially correct – 1NI-152B was inoperable while it was being manually cycled.

Level: SRO Only

KA: G2.2.19(2.1/3.1)

Lesson Plan Objective: SS-VVO NLO 5

Source: NRC McGuire 2000 Ques\_663

Level of knowledge: comprehension

References:

1. OMP 2-33 page 5

**Bank Question: 671a**

**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) (*Waste Gas Disch*) are completed.**
- B.    **Recalculate the trip set points using 1EMF-50(H) (*Waste Gas Disch*) as the release path monitor, then restart the release after a new GWR form has been approved.**
- C.    **Continue the release using 1EMF-36(L) (*Unit Vent Gas*) as the backup release path monitor.**
- D.    **Recalculate the trip set points using 1EMF-36(L) (*Unit Vent Gas*) as the release path monitor, then restart the release after a new GWR form has been approved.**

---

**Distracter Analysis:**

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

Level: RO&SRO

KA: G2.3.11 (2.7/3.2)

Lesson Plan Objective: WE-WG LPRO 4

Source: NRC McGuire Exam 2000 Ques\_671

Level of knowledge: memory

**References:**

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

**Bank Question: 697a****Answer: B**

1 Pt(s)

Unit 1 is operating at 100% power on 3/19. 1NI-59 (*A CL ACCUM CHECK VLV*) has been leaking. Given the following accumulator indications:

<u>Time</u>	<u>0200</u>	<u>0300</u>	<u>0400</u>	<u>0500</u>
Level (%)	82%	90%	98%	100%
Pressure (psig)	603	635	680	710
Boron (ppm)	2560	2540	2510	2490

Assuming no operator action, what is the latest time that the plant can enter mode 3 and still comply with Tech Spec requirements?

**REFERENCES PROVIDED:***ITS 3.5.1**Curve Book curve 7.30.2**COLR Rev 17 – page 21*

- A. Before 1000 on 3/19
- B. Before 1100 on 3/19
- C. Before 0900 on 3/22
- D. Before 1000 on 3/22

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

Volume  $\geq 7630$  but  $\leq 8079$  gal – exceeded at 0500

Pressure  $\geq 585$  but  $\leq 678$  psig – exceeded at 0400

Boron concentration  $\geq 2550$  but  $< 2975$  ppm – exceeded at 0300

The accumulator exceeds the pressure limits at 0400 – so:

1 hours to repair – by 0500 on 3/19

6 hours to Mode 3 – by 1100 on 3/19 - ANSWER

12 hours to reduce RCS pressure below 1000 psig – by 2300 3/19

- A. **Incorrect:** can wait until 1100 on 3/19  
**Plausible:** if the candidate applies the 6 + 1 hours from exceeding the boron limit cause of the problem – this is at 1000 or 7 hours from exceeding the boron limit at 0300.
- B. **Correct:**
- C. **Incorrect:** must be in Mode 3 by 1100 on 3/19.  
**Plausible:** if the candidate misreads the cause of the problem – this is 72 + 6 hours from exceeding the boron limit at 0300.
- D. **Incorrect:** must be in Mode 3 by 1100 on 3/19

**Plausible:** if the candidate applies the allowable correction time incorrectly – if he adds 72 hours to fix the pressure problem and 6 hours to be in Mode 3.

Level: SRO Only

KA: G2.1.12 (2.9/4.0)

Lesson Plan Objective: ECC-CLA LPSO 6

Source: Mod Ques\_697

Level of knowledge: analysis

References:

1. Tech Specs 3.5.1 pages 1-2 - PROVIDED
2. COLR page 21 - PROVIDED
3. Curve Book 7.30.2 - PROVIDED

**Bank Question: 714**

**Answer: C**

1 Pt(s)

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

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

KA: 001G4.22(3.0/4.0)

Lesson Plan Objective: IRE SEQ 20

Source: New

Level of knowledge: memory

References:

1. AP/14 Case II page 5

**Bank Question: 715**

**Answer: D**

1 Pt(s)

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

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

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

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

---

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

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

Level: RO&SRO

KA: SYS003K5.04(3.2/3.5)

Lesson Plan Objective: none

Source: New

Level of knowledge: analysis

References:

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

**Bank Question: 716**

**Answer: A**

---

1 Pt(s)

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

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

KA: 013A3.02(4.1/4.2)

Lesson Plan Objective: ISE SEQ 4

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-ECCS-ISE page 25

**Bank Question: 718****Answer: B**

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

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

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

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

---

**Distracter Analysis:**

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

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

Level: RO&SRO

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

Lesson Plan Objective: ENB SEQ 9

Source: New

Level of knowledge: analysis

References:

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

**Bank Question: 720****Answer: C**

1 Pt(s)

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

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

Which one of the following correctly describes the status of the Containment Spray System if containment pressure subsequently increases to 5 psig?

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

---

**Distracter Analysis:**

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

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

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

Level: RO&SRO

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

Lesson Plan Objective: ISE Obj 4

Source: New

Level of knowledge: analysis

References:

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

**Bank Question: 722**

**Answer: B**

1 Pt(s)

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

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

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

- A. Start the standby hotwell pump.**
- B. Stop the “C” heater drain tank pumps.**
- C. Open the “C” heater bypass valve.**
- D. Ensure 2CM-83 is modulating to 150 psig.**

---

**Distracter Analysis:**

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

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

Level: RO&SRO

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

Lesson Plan Objective: CM Obj 4

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-lesson plan CM page 14

**Bank Question: 723**

**Answer: C**

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

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: CF Obj 10

Source: New

Level of knowledge: analysis

References:

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

**Bank Question: 724**

**Answer: D**

1 Pt(s)

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

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

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

---

**Distracter Analysis:**

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

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

Level: RO&SRO

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

Lesson Plan Objective: EP1 Obj 21

Source: New

Level of knowledge: comprehension

References:

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

**Bank Question: 725**

**Answer: B**

---

1 Pt(s)

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

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

Which of the following NV loads have been lost?

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

**Distracter Analysis:**

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

Level: RO&SRO

KA: 004 K2.02 (2.9/3.1)

Lesson Plan Objective: NV SEQ 17

Source: New

Level of knowledge: memory

References:

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

**Bank Question: 726**

**Answer: A**

1 Pt(s)      Unit 2 is operating at 100%. Given the following events and conditions:

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

Which one of the following automatic actions should occur?

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

---

**Distracter Analysis:**

EMF-35, 36, and 37

Automatic functions:

Trips unit related unfiltered exhaust fans.

Aligns VF filter train to the filtered mode.

Secures WG release (shuts 1WG-160).

Secures cont air release (shuts VQ-10).

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

Level: RO&SRO

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

Lesson Plan Objective: EMF SEQ 2

Source: New

Level of knowledge: memory

References:

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

**Bank Question: 728**

**Answer: B**

---

1 Pt(s)      Unit 2 is in mode 4. The crew is preparing to start all the NCPs.

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: NCP SEQ 10

Source: New

Level of knowledge: memory

References:

1. OP-CN-PS-NCP page 11



**Bank Question: 734**

**Answer: C**

1 Pt(s)

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

Known leakage is as follows:

- Total RCS leakage = 10.5 gpm
- Secondary leakage:
  - A steam generator = 0.10 gpm
  - B steam generator = 0.10 gpm
  - B steam generator = 0.08 gpm
  - D steam generator = 0.05 gpm
- Leakage into the PRT = 4.5 gpm
- Leakage into the Reactor Coolant Drain Tank = 4.5 gpm
- Leakage into the Containment Floor and Equipment Sumps = 0.8 gpm
- No known pressure boundary leakage

Which of the following RCS Leakage Technical Specifications, if any, have been exceeded?

**REFERENCES PROVIDED: Tech Spec 3.4.13**

- A. None, all leakages are within Technical Specifications.**
- B. Primary to Secondary.**
- C. Unidentified.**
- D. Identified.**

**Distracter Analysis:**

S/G leakage =  $.1 + .1 + .08 + .05 = 0.33 \text{ gpm} \times 60 \times 24 = 475.2 \text{ gpd} < 576 \text{ gpd LCO}$   
 Highest S/G leakage is  $0.1 \text{ gpm} \times 60 \times 24 = 144.0 \text{ gpd} < 150 \text{ gpd tech spec}$   
 Identified leakage =  $4.5 + 4.5 + 0.33 = 9.33 \text{ gpm} < \text{Tech Spec LCO } 10 \text{ gpm}$   
 Unidentified leakage =  $10.5 \text{ gpm} - 9.33 \text{ gpm} = 1.17 \text{ gpm} > \text{Tech Spec LCO } 1.0 \text{ gpm}$

- A. Incorrect:** Unidentified leakage exceeds tech specs  
**Plausible:** if the candidate adds the containment floor and equipment sump leakage (0.8 gpm) to the other identified leakage, then the unidentified leakage will not exceed tech specs.
- B. Incorrect:** S/G leakage is within Tech Spec LCOs  
**Plausible:** If the candidate does not properly convert S/G gpm to gpd, can determine that identified leakage > tech specs

- C.      Correct:** Total leakage is given as 10.5 gpm therefore unidentified leakage is total leakage – identified leakage:  
 $10.5 \text{ gpm} - (4.5 + 4.5 + 0.33) = 1.17 \text{ gpm} > 1.0 \text{ gpm}$  (Tech Spec)
- D.      Incorrect:** Identified leakage is 9.33 gpm ( $4.5 + 4.5 + 0.33$ ), TS requires greater than 10 gpm, so D is incorrect.  
**Plausible:** if the candidate adds the 0.8 gpm from the containment floor and equipment sumps to the other identified leakage, he/she will determine that identified leakage  $> 10 \text{ gpm}$ . This leakage cannot be added unless the leakage is specifically located and known not to interfere with the operation of the leakage detection system – and not to be pressure boundary leakage.

Level: SRO Only

KA: SYS 002A2.01(4.3/4.4)

Lesson Plan Objective: NC SEQ 10

Source: New

Level of knowledge: analysis

References:

1. Tech Spec 3.4.13 (PROVIDED)
2. Tech Spec definitions page 1.1-3

**Bank Question: 736****Answer: C**

1 Pt(s)

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

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

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

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

---

**Distracter Analysis:**

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

Level: RO&amp;SRO

KA: SYS 010K1.02(3.9/4.1)

Lesson Plan Objective: ISE SEQ 4

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-ECCS-ISE page 14

**Bank Question: 737**

**Answer: B**

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: ILE SEQ 6

Source: New

Level of knowledge: comprehension

References:

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

**Bank Question: 738****Answer: A**

1 Pt(s)

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

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

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

---

**Distracter Analysis:**

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

Level: RO&amp;SRO

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

Lesson Plan Objective: IPX SEQ 2, 4, 6

Source: New

Level of knowledge: comprehension

References:

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

**Bank Question: 739****Answer: C**

1 Pt(s)

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

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

---

**Distracter Analysis:**

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

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

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

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

Level: RO&SRO

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

Lesson Plan Objective: EDA SEQ 4, 5

Source: New

Level of knowledge: memory

References:

1. OP-CN-IC-EDA page 12

**Bank Question: 740**

**Answer: D**

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1 Pt(s)      Unit 1 is in mode 3 and the operators are controlling the plant from the SSF.

What is the coincidence, setpoint and auto action for starting the CAPT?

- A. 1 of 4 S/G WR level at 45%, SA-2 fails open.**
  - B. 2 of 4 S/G WR level at 45%, SA-2 fails open.**
  - C. 1 of 4 S/G WR level at 45%, SA-5 fails open.**
  - D. 2 of 4 S/G WR level at 45%, SA-5 fails open.**
- 

**Distracter Analysis:**

- A.     Incorrect:** requires 2 of 4 – SA-2 does not open  
**Plausible:** knows one valve opens, not sure which one.
- B.     Incorrect:** SA-2 does not open  
**Plausible:** coincidence correct, auto action incorrect.
- C.     Incorrect:** requires 2 of 4 S/G channels  
**Plausible:** incorrect coincidence, correct action.
- D.     Correct:**

Level: RO&SRO

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

Lesson Plan Objective: CA obj 4

Source: New

Level of knowledge: memory

References:

- 1. OP-CN-CA page 9

**Bank Question: 741**

**Answer: D**

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

Which one of the following statements correctly describes the electrical interlock that must be satisfied to allow an operator to open 2NS-43A (*ND PMP 1A TO CONT SPRAY HDR*)?

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

---

**Distracter Analysis:**

Interlocks to open 2NS-43A

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

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

Level: RO&SRO

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

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

Source: New

Level of knowledge: memory

References:

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

**Bank Question: 743**

**Answer: B**

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

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

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

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

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

Level: RO&SRO

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

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

Source: New

Level of knowledge: comprehension

References:

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

**Bank Question: 744a      Answer: C**

---

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

Current conditions:

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

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

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

---

**Distracter Analysis:**

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

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

Level: RO&SRO

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

Lesson Plan Objective: SG SEQ 7

Source: New

Level of knowledge: memory

References:

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

**Bank Question: 747****Answer: D**

1 Pt(s)

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

- No 6900V tiebreakers are closed.
- The main turbine is not synchronized to the grid
- The automatic fast transfer switch is in the DEFEAT position
- RC pumps A and C are running.
- A fault occurs on transformer 1T2B and the transformer is deenergized.

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

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

---

**Distracter Analysis:**

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

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

Level: RO&SRO

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

Lesson Plan Objective: EP SEQ 11

Source: New

Level of knowledge: comprehension

References:

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

**Bank Question: 748**

**Answer: B**

1 Pt(s)      An Emergency Diesel Generator is running in parallel with offsite power. The operator is preparing to shutdown the diesel.

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: DG3 SEQ 17

Source: bank DG 3-027-D

Level of knowledge: memory

References:

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

**Bank Question: 749**

**Answer: C**

1 Pt(s)      Which of the following is performed when starting the RC system to prevent pump runout?

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: RC SEQ 14, 18

Source: New

Level of knowledge: memory

References:

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

**Bank Question: 751**

**Answer: B**

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

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

At what time did KC to the ND heat exchangers automatically open?

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

---

**Distracter Analysis:**

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

Level: RO&SRO

KA: 005 K1.10 (3.2/3.4)

Lesson Plan Objective: ND SEQ 8

Source: New

Level of knowledge: memory

References:

1. Lesson plan ND page 18

**Bank Question: 752**

**Answer: B**

1 Pt(s)

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

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

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

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

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: KC SEQ 7, 14

Source: New

Level of knowledge: comprehension

References:

1. AP-21 page ?

**Bank Question: 754****Answer: A**

1 Pt(s)

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

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

KA: 041 G2.1 (3.7/3.6)

Lesson Plan Objective: IDE SEQ 8

Source: New

Level of knowledge: comprehension

References:

1. Lesson plan IDE page 6 and 27

**Bank Question: 757**

**Answer: B**

1 Pt(s)

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

- Alarm RN PIT SWAP TO SNSWP (1AD-12 E/2) - LIT
- Alarm RN PIT A SCREEN HI D/P (1AD-12 B/2) - LIT
- All RN pumps start.
- RN suction and discharge valves swap to the SNSWP.

Which of the following best describes the cause of this condition?

- A.     **The Lake Wylie dam failed.**
- B.     **RN pump intake pit “A” screens are clogged.**
- C.     **An RN pump intake pit level indicator failed low.**
- D.     **There was a spurious safety injection actuation.**

---

**Distracter Analysis:**

- A.     **Incorrect:** low lake level would not actuate level differential alarm  
          **Plausible:** event would cause the other conditions.
- B.     **Correct:**
- C.     **Incorrect:** It takes 2 of 3 instrument failures.  
          **Plausible:** if the candidate does not know the coincidence logic.
- D.     **Incorrect:** S/I would not cause level alarms.  
          **Plausible:** S/I causes some of the other conditions.

Level: RO&SRO

KA: 000062AA2.02(2.9 / 3.6)

Lesson Plan Objective: PSS-RN SEQ12

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-PSS-RN pages 14, 32
2. OP/1/Q/6100/010M 1AD-12 B/3
3. OP/1/A/6100/010M 1AD-12 E/2

**Bank Question: 759**

**Answer: D**

1 Pt(s)

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

- Fire protection systems are in their normal alignment.
- CA Pump Room CO<sub>2</sub> suppression system main bank CO<sub>2</sub> cylinders A and D have pressure readings of 0 psig
- All reserve bank cylinders pressure read 600 psig.

Which one of the following correctly describes the CACO<sub>2</sub> system status and required operator action?

**REFERENCES PROVIDED: SLC 16.9-3**

- A. The CACO<sub>2</sub> system is operable because the NLO can serve as a fire watch until the A and D main cylinders are replaced with the A and D reserve cylinders.
- B. The CACO<sub>2</sub> system is inoperable, but can be restored if the NLO manually cuts in the A and D reserve cylinders.
- C. The CACO<sub>2</sub> system is operable, because the reserve bank automatically provides a 100% back up supply of CO<sub>2</sub>. No action is required.
- D. The CACO<sub>2</sub> system is inoperable, but can be restored if the NLO manually switches the system from the main to the reserve bank.

---

**Distracter Analysis:**

- A. **Incorrect:** The system is inoperable.  
**Plausible:** a fire watch is an acceptable comp measure for this inoperability.
- B. **Incorrect:** The reserve tanks are put on line as a bank, with the flip of a switch.  
**Plausible:** some gas supplies are replaced this way.
- C. **Incorrect:** The system is inoperable.  
**Plausible:** if the candidate thinks the reserve supply aligns automatically.
- D. **Correct:**

Level: SRO Only

KA: 000067AK3.02(2.5 / 3.3)

Lesson Plan Objective: SS-RFY SEQ 40

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-SS-RFY pages 21-22
2. SLC 16.9-3 - PROVIDED

**Bank Question: 760**

**Answer: B**

1 Pt(s)

Unit 2 is operating at 60% power. Given the following events and conditions:

- Inverter 2EIA fails.
- Valve 2NV-252A (*NV PUMPS SUCTION FROM FWST*) opens.

Assuming no operator action, which one of the following statements correctly describes the observed conditions caused by the loss of vital AC power?

**REFERENCES PROVIDED: AP-29**

- A.      2NV-252A failed open on loss of power to its solenoid.**
- B.      VCT level decreases to the FWST swapover point due to loss of reactor coolant makeup.**
- C.      2NV-252A opened due to loss of power to the BDMS system.**
- D.      VCT level instrument failed low causing FWST swapover.**

---

**Distracter Analysis:** 2NV-252A is the FWST suction valve to the charging pumps

- A.      Incorrect:** 2NV-252A opens due to low VCT level.  
**Plausible:** because 2NV-252A is a fail-open AOV.
- B.      Correct:** lost makeup capacity to the VCT due to loss of 2EIA
- C.      Incorrect:** 2NV-252A opens due to low VCT level.  
**Plausible:** because 2NV-252A opens on a BDMS alarm.
- D.      Incorrect:** 2NV-252A opens due to actual low VCT level  
**Plausible:** because a low level can cause 2NV-252A to open - if the candidate does not recall this is a 2 of 2 logic.

Level: SRO Only

KA: 000057AA2.07(3.3 / 3.5)

Lesson Plan Objective: EP-EPL SEQ14

Source: New

Level of knowledge: memory

References:

1. OP-CN-EP-EPL pages 13, 27
2. OP-CN-PS-NV page 25
3. AP/2/A/5500/29 page 108 - PROVIDED

**Bank Question: 761****Answer: A**

1 Pt(s)

Both units are shutdown for maintenance. Unit 1 is discharging a waste gas decay tank and a recycle monitor tank. The OSM has authorized radiography to be performed in the vicinity of 1EMF-49 (*LIQUID WASTE DISCH*) and 1EMF 50 (*WASTE GAS DISCH*). If only the liquid release is terminated as a result of the radiography source, which one of the following statements correctly describes the reason for this occurrence?

- A. 1EMF-49 is more sensitive to background radiation because it monitors primarily gamma radiation.
- B. 1EMF-50 is more sensitive to background radiation because it monitors primarily gamma radiation.
- C. 1EMF-49 is more sensitive to background radiation because it monitors primarily beta radiation.
- D. 1EMF-50 is more sensitive to background radiation because it monitors primarily beta radiation.

---

**Distracter Analysis:**

- A. **Correct:**
- B. **Incorrect:** 1EMF-50 monitors primarily Beta.  
**Plausible:** If the candidate mixes up the EMF monitors.
- C. **Incorrect:** 1EMF-49 monitors primarily gamma.  
**Plausible:** If the candidate misunderstands detection theory.
- D. **Incorrect:** 1EMF-50 is less sensitive  
**Plausible:** If the candidate misunderstands detection theory.

Level: SRO Only

KA: APE 059AK1.03(2.3/2.9)

Lesson Plan Objective: none

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-WL-EMF page 11

**Bank Question: 762**

**Answer: D**

1 Pt(s)

Unit 2 is operating at full power. Given the following conditions:

- IAE made a containment entry on your shift to recalibrate one of the pressurizer level instruments.
- All personnel exited containment at 0200 on 3/22.
- No maintenance has been conducted on the air locks.
- The last containment air lock door seal leakage tests were completed at 1400 on Wednesday 3/21 following the weekly containment rounds.

Assuming no further containment entries this week, which one of the following statements correctly describes the action needed to comply with Tech Spec requirements following this evolution?

**REFERENCES PROVIDED**  
**TECH SPEC 3.6.2 & Bases**

- A.      An overall air lock pressure test must be satisfactorily completed before 0200 on 3/25.**
- B.      An air lock door seal leak test does not have to be completed since a prior test was satisfactory within 72 hours of this entry.**
- C.      An air lock door seal leak test does not have to be completed since an overall air lock pressure test was conducted on 2/25/01.**
- D.      An air lock door seal leak test must be satisfactorily completed before 0200 on 3/25.**

---

**Distracter Analysis:**

- A.      Incorrect:** overall test is not needed until 8/25/01.  
**Plausible:** if the candidate confuses overall and door seal tests.
- B.      Incorrect:** a door seal test is required.  
**Plausible:** some door seal tests are exempted due to past entries but not the last entry.
- C.      Incorrect:** a door seal test is required.  
**Plausible:** if the candidate misreads the TS as a seal test has a 6 mo. frequency
- D.      Correct:** A door seal test is 72 hrs after exiting CNT.

Level: SRO Only

KA: APE0 69AK2.03(2.8 / 2.9)

Lesson Plan Objective: CNT-CNT SEQ 19

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-CNT-CNT pages 13-14
2. Tech Spec 3.6.2 & Bases - PROVIDED

**Bank Question: 764****Answer: D**

1 Pt(s)

Unit 2 was operating at 100% power. At 0200, NCP 2C tripped on an electrical fault. Reactor power is 96% and the reactor trip breakers are closed. The operators implement FR-S.1, (*Response to Nuclear Power Generation/ATWS*).

Given the following plant indications:

<u>Indication</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
2NV-312A	OPEN	OPEN	CLSD	OPEN
2NV-314B	OPEN	CLSD	OPEN	CLSD
2NV- 252A	CLSD	OPEN	CLSD	OPEN
2NV- 253B	CLSD	CLSD	OPEN	CLSD
2NV-236B	CLSD	CLSD	CLSD	CLSD
2NV-188A	OPEN	OPEN	CLSD	OPEN
2NV-189B	OPEN	OPEN	OPEN	CLSD
2NI-9A	CLSD	CLSD	OPEN	CLSD
2NI-10B	CLSD	CLSD	CLSD	OPEN
NV PMP 2A	ON	OFF	OFF	ON
NV PMP 2B	OFF	ON	ON	ON
CHG Flow	78	0	25	140

Which one of the above columns contains the correct plant indications from which it can be concluded that NV system is effectively combating the ATWS event?

- A. Column A indications
- B. Column B indications
- C. Column C indications
- D. Column D indications

---

**Distracter Analysis:**

- A. **Incorrect:** No emergency boration from BAT or FWST – 2NV-236B blocks suction from the BAT.  
**Plausible:** if the candidate is focused on normal NV line-up or doesn't know the emergency boration sources.
- B. **Incorrect:** No charging flow.  
**Plausible:** there's a flow path from the FWST and an NV pump running.

- C.      **Incorrect:** only 25 gpm (versus 30gpm).  
         **Plausible:** there's a flow path from FWST through 2NI-9.**
- D.      **Correct:** - uses B train valves instead of A**

Level: RO&SRO

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

Lesson Plan Objective: EP-FRS SEQ 5

Source: New

Level of knowledge: comprehension

References:

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

**Bank Question: 765**

**Answer: A**

1 Pt(s)

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

- A load rejection causes reactor power to decrease to 80%.
- Group step counters for Control Bank D indicate a rod position of 178 steps
- DRPI for one control rod in control bank D indicates a rod position of 192 steps.
- Plant computer trends indicate that the misalignment occurred 4 hours ago.
- Management has directed that power should be maximized for the next 24 hours due to a grid capacity emergency and if possible wants the unit returned to full power as soon as possible.

Which of the following correctly describes the required operator response to this occurrence?

**REFERENCES PROVIDED: Tech Spec 3.1.4**

- A. Attempt to manually insert the rod to its bank position, power ascension may continue because the rod was misaligned for a short period.
- B. Verify shutdown margin and attempt to manually withdraw the rest of control bank D to the misaligned rod position and perform flux maps to verify that core power peaking factors remain within design limits.
- C. Verify shutdown margin and shutdown the reactor because the core power peaking factors can no longer be assumed to be within safety analysis criteria.
- D. Reduce power to 75%, and perform flux maps to verify that core power peaking factors remain within design limits.

**Distracter Analysis:**

- A. **Correct:** LCO allowable completion time is referenced to the time of discovery not time of occurrence – TS 1.3-1 rules of usage
- B. **Incorrect:** this is the method of retrieval for <12 step misalignment.  
**Plausible:** It's a proceduralized method and the flux maps are required by TS 3.1.4 if the rod is not recovered.
- C. **Incorrect:** Shutdown is not required.

**Plausible:** this would be a correct answer if the operators knew the rod was misaligned for 4 hours

**D. Incorrect:** must also verify SDM if the rod is not restored.

**Plausible:** these are other actions of TS3.1.4.

Level: SRO Only

KA: APE 005AK1.04(3.0 / 3.4)

Lesson Plan Objective: IC-IRE SEQ 17, 19

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-IC-IRE page 22
2. Tech Spec 3.1.4 - PROVIDED
3. Tech Spec 1.3 page 1.3-1

**Bank Question: 766**

**Answer: B**

1 Pt(s)

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

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

Which of the following statements correctly describes the required Reactor Operator actions?

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

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: IRE SEQ 20

Source: New

Level of knowledge: comprehension

References:

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

**Bank Question: 767**

**Answer: D**

1 Pt(s)

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

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

Which one of the following statements correctly describes the method for performing this evolution to 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 to the containment air release system where it is filtered prior to release to the unit vent stack.**
- C.      Containment air is exhausted to the annulus where it is continuously recirculated through the annulus ventilation filters.**
- D.      Containment air is exhausted to the annulus where it is continuously recirculated and 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 VY systems.
- C.      Incorrect:** The air is released to the vent stack.  
**Plausible:** If the candidate does not remember that VE releases to the stack to maintain negative pressure in the annulus.
- D.      Correct:**

Level: RO&SRO

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

Lesson Plan Objective: VX SEQ 4

Source: New

Level of knowledge: comprehension

**References:**

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

**Bank Question: 768**

**Answer: B**

1 Pt(s)

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

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

Which one of the following statements correctly describes the consequences of operator failure to respond to this malfunction?

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: SM LPRO 25

Source: New

Level of knowledge: comprehension

References:

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

**Bank Question: 769****Answer: C**

1 Pt(s)

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

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

KA: WE05AA1.1(4.1/4.0)

Lesson Plan Objective: FRH LPRO 5

Source: New

Level of knowledge: analysis

References:

1. OP-CN-EP-FRH page 6

**Bank Question: 770**

**Answer: B**

1 Pt(s)      Unit 1 is starting-up in mode 1. Given the following conditions and events:

- Battery charger 1ECB is out of service.
- Battery charger 1ECS is supplying bus 1EDB.
- Annunciator 1AD-11, H/3 (*125VDC ESS PWR CHANNEL C TROUBLE*) alarms due to the loss of power from battery charger 1ECC.
- The battery charger 1ECC output breaker is faulted.

Which of the following describes operator action needed in response to these conditions?

**REFERENCES PROVIDED: - Tech Spec's 3.8.4, 3.8.7, 3.8.9**

- A.      Switch inverter 1EIC to the regulated power supply, and be in mode 3 within 6 hours.**
- B.      Cross-tie bus 1EDC to bus 1EDA, and fix one of the chargers within 10 days.**
- C.      Switch inverter 1EIC to the regulated power supply, and fix one of the chargers within 24 hours.**
- D.      Cross-tie bus 1EDC to bus 1EDA, and fix one of the chargers or be in mode 3 within 6 hours.**

---

**Distracter Analysis:**

- A.      Incorrect:** they would have 14 hours if the buses were not cross-tied.  
**Plausible:** This is a possible action if the buses could not be cross-tied.
- B.      Correct:**
- C.      Incorrect:** They still have to cross-tie or shutdown within 14 hours..  
**Plausible:** If the candidate focuses on inverter vs DC source TS.
- D.      Incorrect:** the busses can be cross-tied for 10 days.  
**Plausible:** If the candidate thinks more than one train is affected.

Level: RO&SRO

KA: APE 058AA1.01(3.4/3.5)

Lesson Plan Objective: EPL LPRO 9, 19

Source: New

Level of knowledge: memory

References:

1. OP-CN-EL-EPL page 19
2. Tech Spec's 3.8.4, 3.8.7, 3.8.9 - PROVIDED

**Bank Question: 771**

**Answer: D**

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

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

- A.      **1EMF-50 (*Waste Gas Disch*) automatically stops the auxiliary building ventilation unfiltered exhaust fans.**
- B.      **1EMF-41 (*Aux Bldg Vent Hi Rad*) automatically closes valve 1WG-160. The operators must manually stop the auxiliary building ventilation unfiltered exhaust fans.**
- C.      **1EMF-37 (*Unit Vent Iodine*) automatically stops the auxiliary building ventilation unfiltered exhaust fans. The operators must manually close 1WG-160.**
- D.      **1EMF-35 (*Unit Vent Part Hi Rad*) automatically closes valve 1WG-160 and stops the auxiliary building ventilation unfiltered exhaust fans.**

---

**Distracter Analysis:**

- A.      **Incorrect:** EMF-50 does not secure the VA fans.  
**Plausible:** A reasonable response to a leak in the Aux Bldg.
- B.      **Incorrect:** WG-160 does not automatically close  
**Plausible:** if the candidates do not recognize that this is not an automatic action. EMF-41 is an ARM that will alarm under these conditions.
- C.      **Incorrect:** EMF-37 auto trips WG-160 closed.  
**Plausible:** partially correct -- EMF 37-stops the VA fans.
- D.      **Incorrect:** EMF-35 can secure 1WG-160 and VA fans, but will not see an abnormal release in this case.

Level: RO&SRO

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

Lesson Plan Objective: VA LPRO 9

Source: New

Level of knowledge: analysis

References:

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

**Bank Question: 772**

**Answer: B**

1 Pt(s)

Unit 2 is refueling with ND train "A" in operation. Given the following events and conditions:

- NCS temperature is 110°F.
- Valves 2ND-36B & 37A (*ND PUMPS 1B & 1A SUCT FRM LOOP C*) are closed.
- All busses are energized except MCC 2EMXJ & 2EMXD, which are out of service for maintenance.
- B Wide range loop pressure instrument has failed high.

The Shift Manager has denied a maintenance request to perform valve stroke testing on valve 2NI-185A (*ND PUMP 1A CONT SUMP SUCT*).

Which one of the following statements correctly describes the reasoning for this decision?

- A.    **There was no reason to deny the work because 2NI-185A could be opened from its alternate power supply.**
- B.    **2NI-185A cannot be opened because this could cause loss of refueling cavity water to the containment sump.**
- C.    **2NI-185A cannot be opened due to its power supply being out of service.**
- D.    **There is no reason to deny the work because 2NI-185A could be opened because the B-loop wide range pressure instrument interlock affects valve 2NI-184B.**

**Distracter Analysis:** The power supply to 2NI-185A is train A essential power. MCC EMXJ is train B essential power and EMXD is train B essential power. 2NI-185A does NOT have an alternate power supply – although 2ND-1B and 2ND-37A DO have alternate power supplies

- A.    **Incorrect:** 2NI-185A does not have an alternate power supply.  
**Plausible:** The candidate could confuse this valve with 2ND-1B or 2ND-37A, which have this alternate power supply.
- B.    **Correct:** Opening the containment sump isolation valve provides a path for water from the ND pump suction to the sump.
- C.    **Incorrect:** 2NI-185A has an A train power supply.  
**Plausible:** The candidate could confuse MCC2EMXD with A train power supply 2EMXS.

- D.**     **Incorrect:** 2NI-185A does not have a low pressure interlock.  
         **Plausible:** The candidate could confuse this valve with 2ND-37A, which has a low pressure interlock supplied from C-loop wide range pressure.

Level: SRO Only

KA: APE 025AK2.05(2.6/2.6)

Lesson Plan Objective: ECCS-NI LPSO 8

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-PS-ND pages 8-10
2. OP-CN-ECCS-NI pages 12, 19

**Bank Question: 773**

**Answer: D**

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1 Pt(s)

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

What actions are required prior to using this drawing for the R & R?

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

**Distracter Analysis:**

- A.      Incorrect:** the drawing accuracy must be verified  
**Plausible:** a reasonable answer if the notation were only administrative
- B.      Incorrect:** the WCC does not maintain as-built information for electrical drawings.  
**Plausible:** WCC does maintain flow diagrams.
- C.      Incorrect:** the tags are hung after verification of drawing accuracy  
**Plausible:** a reasonable action if the right answer is not known.
- D.      Correct:**

Level: RO&SRO

KA: G2.1.24(2.8/3.1)

Lesson Plan Objective: ADM-NSO2 SEQ 2

Source: New

Level of knowledge: memory

References:

1. OMP 2.10 pages 3, 5-6

2. OP-CN-AD-NSO2 page 8

**Bank Question: 775**

**Answer: B**

1 Pt(s)

An NCP motor has been removed from containment to the electrical maintenance shop for overhaul. Health Physics surveyed the motor with the following results:

- General radiation levels in the shop work area -- <0.1 mR/hr
- Radiation levels on contact with the motor -- 0.3 mR/hr
- Radiation level on contact with  
the pump shaft coupling -- 100 mR/hr
- External loose surface contamination -- 400 dpm/cm<sup>2</sup>
- Internal loose surface contamination -- 750 dpm/cm<sup>2</sup>

Which of the following statements correctly describes the controls, if any, that are required to minimize the exposure to the workers performing the overhaul?

- A.    **A standing RWP is required because this is a special operation requiring decontamination.**
- B.    **An RWP is required because the operation requires temporary shielding.**
- C.    **No RWP is required because the pump is not inside the RCA.**
- D.    **A standing RWP is required because this is a special operation requiring temporary shielding.**

**Distracter Analysis:**

- A.    **Incorrect:** an RWP is required and decontamination is not an option.  
**Plausible:** if the candidate focuses on a blanket RWP for shop work or S for special.
- B.    **Correct:**
- C.    **Incorrect:** An RWP is required.  
**Plausible:** If the candidate assumes no controls are needed outside the radiological controlled area.
- D.    **Incorrect:** An RWP is required.  
**Plausible:** if the candidate focuses on a blanket RWP for shop work or S for special.

Level: RO&SRO

KA: G2.3.10 (2.9/3.3)

Lesson Plan Objective: RAD-HP LPRO 9, 11

Source: New

Level of knowledge: comprehension

References:

1. OP-CN-RAD-HP pages 18, 25, 28

**Bank Question: 776**

**Answer: C**

1 Pt(s)

Unit 1 was operating at 100% when a LOCA with loss of offsite power occurs. One EDG fails to start. The operators are entering EP/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&SRO

KA: G2.4.17 (3.1/3.8)

Lesson Plan Objective: EP-INTRO LPRO 1

Source: Bank Ques\_776

Level of knowledge: memory

References:

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

**Bank Question: 778**

**Answer: B**

- 1 Pt(s)      Unit 1 is at full power, and Unit 2 is in Mode 5. RN pump 2A has been out of service for 3 days. Maintenance has reported that the motor for RN pump 2A has to be rewound. This job will take 3 weeks. Given no other TSAIL entries, what are the consequences of this occurrence for Unit 1?

**REFERENCES PROVIDED - TECH SPEC 3.7.8**

- A.      Unit 1 must commence a shutdown and be in mode 3 within 6 hours.**
- B.      Unit 1 must commence a shutdown unless the Unit 2 RN non-essential header, train A supply to CA pumps, and NS heat exchanger are isolated.**
- C.      Unit 1 must commence a shutdown and be in mode 5 within 36 hours.**
- D.      Unit 1 must commence a shutdown if RN pump 2A is not in service within 72 hours.**

---

**Distracter Analysis:**

- A.      Incorrect:** Unit 1 may operate.  
**Plausible:** This is the TS required action if the isolation can't be done.
- B.      Correct:**
- C.      Incorrect:** Unit 1 may operate.  
**Plausible:** This is the TS required action if the isolation can't be done.
- D.      Incorrect:** Unit 1 may operate.  
**Plausible:** if the candidate forgets that the pump has been inoperable for 72 hours.

Level: SRO Only

KA: 000076K4.06(2.8 / 3.2)

Lesson Plan Objective: PSS-RN SEQ 20

Source: New

Level of knowledge: memory

References:

1. OP-CN-PSS-RN page 28

2. Tech Spec 3.7.8 - PROVIDED

**Bank Question: 779**

**Answer: C**

1 Pt(s)

The crew is realigning a Control Bank "C", Group 1 rod in accordance with OP/1/A/6150/008, (*Rod Control*), Enclosure 4.6, (*Rod Retrieval (>12 Steps Misaligned)*).

The RO has been directed to operate the lift coil disconnect switches in accordance with the enclosure.

The RO reports that the lift coil disconnect switches for the unaffected rods in Control Bank "C" Group 1 are in the DISCONNECTED position and that the misaligned rod switch is in the CONNECTED position.

Which of the following additional actions, if any, must be performed to correctly realign the Bank C control rod?

- A.    **Return the unaffected group 1 rods to CONNECTED and place the misaligned rod disconnect switch to DISCONNECTED.**
- B.    **Place all the Control Bank A, B, D and Control Bank C group 2 rods in DISCONNECTED.**
- C.    **Place all Control Bank "C" Group 2 rods in DISCONNECTED.**
- D.    **No additional actions necessary, continue with the misaligned rod alignment.**

---

**Distracter Analysis:** The next step in the procedure reads:

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

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

Level: RO&SRO

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

Lesson Plan Objective: IRE SEQ 10, 17

Source: New

Level of knowledge: comprehension

References:

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

**Bank Question: 782**

**Answer: B**

1 Pt(s)

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: KC SEQ 15

Source: New

Level of knowledge: memory

References:

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

**Bank Question: 783      Answer: C**

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1 Pt(s)      Unit 2 is operating at 100% power. Given the following events and conditions:

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

The pressurizer Master Pressure Controller malfunctions and the setpoint is step changed from 2235 psig to 2335 psig.

Which one of the following statements correctly describes the initial automatic responses in the pressurizer Pressure Control System as a result of this failure?

- A. PORV NC-34A opens, Spray Valves open, and pressurizer Heaters de-energize**
- B. PORV NC-32 and NC-36 open, Spray Valves open, and pressurizer Heaters de-energize**
- C. Spray Valves close and pressurizer Heaters energize**
- D. All PORVs remain closed, Spray Valves open and pressurizer Heaters de-energize**

---

**Distracter Analysis:**

- A. Incorrect:**  
**Plausible:** operator believes that the setpoint of 2335 psig will open the PORV
- B. Incorrect:**  
**Plausible:** operator believes setpoint increase causes spray valves to open, and the other two PORV respond to a "high" pressure condition.
- C. Correct:**  
**Plausible:** system responds to "low" pressure. Heaters on, spray valves that were open, will close.
- D. Incorrect:**  
**Plausible:**

Level: RO&SRO

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

Lesson Plan Objective: IPE SEQ 8, 10

Source: New

Level of knowledge: analysis

References:

1. IPE pages 8, 14, 15

**Bank Question: 786      Answer: B**

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1 Pt(s)

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

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

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: NCP SEQ 12

Source: New

Level of knowledge: comprehension

References:

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



**Bank Question: 788**

**Answer: D**

1 Pt(s)

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

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

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

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

**Distracter Analysis:**

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

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

Level: RO&SRO

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

Lesson Plan Objective: CRG-1 SEQ 2

Source: New

Level of knowledge: memory

References:

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

**Bank Question: 789**

**Answer: C**

1 Pt(s)      Unit 1 was shutdown for refueling in mode 6.

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

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

Which one of the following EMFs could have correctly caused this action?

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: WE-EMF LPRO 2

Source: New

Level of knowledge: memory

References:

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

**Bank Question: 791**

**Answer: B**

1 Pt(s)

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

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: EP1 SEQ 23

Source: New

Level of knowledge: analysis

References:

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

**Bank Question: 792****Answer: C**

1 Pt(s)

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

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

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

---

**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: EL-EPL SEQ 3

Source: New

Level of knowledge: comprehension

References:

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

**Bank Question: 793****Answer: D**

1 Pt(s)

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

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

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

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

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

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

Level: RO&amp;SRO

KA: 017 A2.01 (3.1/3.5)

Lesson Plan Objective: IG SEQ 2

Source: New

Level of knowledge: comprehension

References:

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

**Bank Question: 797**

**Answer: D**

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1 Pt(s)      Unit 1 is in mode 6. Given the following events and conditions:

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

*"1EMF-39 CONTAINMENT GAS HI RAD"*

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

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

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

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**Distracter Analysis:**

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

Level: RO&SRO

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

Lesson Plan Objective: VP SEQ 7

Source: New

Level of knowledge: memory

References:

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

**Bank Question: 798**

**Answer: A**

1 Pt(s)      Which of the following is the power supply to the unit 2 “A” Hydrogen Recombiner?

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

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

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

Level: RO&SRO

KA: 028 K2.01 (2.5/2.8)

Lesson Plan Objective: none

Source: New

Level of knowledge: memory

References:

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

**Bank Question: 799**

**Answer: C**

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1 Pt(s)

Unit 1 is responding to a loss of core cooling in FR-C.1 (*INADEQUATE CORE COOLING*). Step 17 requires the operators to stop all NCPs immediately prior to depressurizing the steam generators to atmospheric pressure.

Which one of the following statements correctly describes the reason for this step?

- A.    **To minimize the heat input from the NCPs.**
  - B.    **To prevent PTS to the NC system due to the elevated NCS temperatures.**
  - C.    **To prevent loss of the #1 NCP seal requirements due to the loss of subcooling from the depressurization.**
  - D.    **To prevent loss of subcooling in the NCS due to the reduction in NCS pressure.**
- 

**Distracter Analysis:**

- A.    **Incorrect:** loss of #1 NCP seal is the correct basis  
**Plausible:** This is a correct basis for stopping NCPs in FR-H.1
- B.    **Incorrect:** PTS is not a concern in FR-C.1  
**Plausible:** if the candidates think that higher NCS temperatures mean a more rapid cooldown with the NCPs operating – this is specifically called out as a concern in FR-C.2.
- C.    **Correct:**
- D.    **Incorrect:** Depressurizing to atmospheric pressure will deliberately induce a loss of subcooling  
**Plausible:** loss of subcooling is an NCP trip criterion in other EOPs

Level: SRO Only

KA: EPE 074EK3.08 (4.1/4.2)

Lesson Plan Objective: EP-FRC SEQ 4

Source: New

Level of knowledge: memory

References:

1. OP-CN-EP-FRC page 5, 6
2. ERG Background Document FR-C.1 page 19
3. FR-C.1 pages 15-16

**Bank Question: 800**

**Answer: B**

1 Pt(s)

Unit 1 was operating at 100% power when a pressurizer level master failure caused a high pressurizer level reactor trip. Given the following events and conditions:

- The turbine tripped
- The reactor trip failed and the plant operated at high power levels on the steam dumps for several minutes
- The crew has just initiated emergency boration in accordance with FR-S.1, (*Response to Nuclear Power Generation/ATWS*).
- NC average temperature is 580°F.
- NC system pressure is 2300 psig.
- Pressurizer level is 95%.
- One boric acid pump is running.
- Emergency boration flow indicated on 1 NVP 5440, (*EMER BORATE FLOW*) is 40 gpm.
- Charging flow indicated on 1 NVP 5630, (*CHRG LINE FLOW*) is 32 gpm.
- 1NV-309 (*SEAL WATER INJECTION FLOW*) is closed to supply seal injection flow to the NCPs.

Which of the following describes the status of the boric acid flow into the NC system at this time?

- A. The NV pump is not delivering any boric acid flow to the NC system.
- B. The NV pump is delivering approximately 20 gpm of the boric acid flow to the NC system.
- C. The NV pump is delivering approximately 32 gpm of boric acid to the NC system.
- D. The NV pump is delivering 40 gpm of boric acid is being delivered into the NC system.

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**Distracter Analysis:**

- A. **Incorrect:** The NV pump is capable of delivering flow to 2600 psig – the NV pump is capable of delivering sufficient flow up to the PORV setpoint at 2335 psig.  
**Plausible:** if the candidate does not know the basis for emergency boration in step 4 of FR-S.1 and thinks that the NV pump could be deadheaded

- B. Correct:** the high pressurizer level causes charging flow to be reduced to 32 gpm. NV-309 is closed due to maximize charging flow to the NCP seals and thus 32 gpm charging is going entirely to the NCP seals. The flow divides with  $\sim 3 \times 4 = 12$  gpm going to the seal return line (to the VCT) and the remaining flow  $\sim 5 \times 4 = 20$  gpm going into the NCS.
- C. Incorrect:** only 20 gpm flow will go into the NCS.  
**Plausible:** if the candidate assumes that the flow meter is truly charging flow and 32 gpm is charging flow to the NC system.
- D. Incorrect:** only 20 gpm flow will go into the NCS.  
**Plausible:** if the candidate assumes 32 gpm is charging and assumes 20 would be going in thru the seals, (more charging than boric acid flow), therefore all 40 gpm is being delivered – or if the candidate assumes that all 40 gpm boric acid flow is delivered by the charging pumps

Level: SRO Only

KA: EPE 29 EA2.04 (3.2/3.3)

Lesson Plan Objective: NV SEQ 3, 6, 7

Source: New

Level of knowledge: analysis

References:

1. OP-CN-PS-NV page 24-26
2. FR-S.1 Background document page 4