

**1 POINT**

**Question 1**

Unit 1 initial conditions:

- Reactor power = 100%

Current conditions:

- Both Main FDWPs tripped
- Reactor power = 46% decreasing
- All Main Turbine Stop Valves are open
- The generator breakers are closed (PCB-20 & PCB-21)

Based on the current conditions, which ONE of the following would be the required initial operator actions?

- A. Manually insert control rods and initiate Emergency Boration
- B. Manually insert control rods and ensure both channels of AMSAC have actuated
- C. Place both EHC pumps in pull-to-lock and initiate Emergency Boration
- D. Place both EHC pumps in pull-to-lock and ensure both channels of AMSAC have actuated

2009 NRC REACTOR OPERATOR EXAM

Question 1

**T1/G1 - jmb**

007EA2.02, Reactor Trip Stabilization - Recovery

**Ability to determine and interpret the following as they apply to a Reactor Trip:**

Proper actions to be taken if the automatic safety functions have not taken place

(4.3/4.6)

**K/A MATCH ANALYSIS**

Requires knowledge of the actions directed in the EOP if the reactor fails to trip following a loss of Main Feedwater Pumps.

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: Per Rule 1 ATWS manually insert rods and initiate emergency boration.**
- B. Incorrect: First part is correct. Second part is plausible as both Main Feedwater Pumps are tripped and should have actuated AMSAC which starts EFW pumps and trips the Main Turbine.
- C. Incorrect: First part is incorrect and plausible in that if the turbine will not manually trip these actions will be taken during IMAs. Second part is correct.
- D. Incorrect: 1st part is incorrect but plausible in that if the turbine will not manually trip these actions will be taken during IMAs. Second part is incorrect but plausible as both Main Feedwater Pumps are tripped and should have actuated AMSAC which starts EFW pumps and trips the Main Turbine.

---

Technical Reference(s): **EP/1/A/1800/001 Rev 36 EOP IMAs, UNPP Tab and Rule 1**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-IMA Obj. R4, EAP-UNPP Obj. R10**

Question Source: **M (EAP111001)**

Question History: Last NRC Exam \_\_\_\_\_

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

***Modified stem and answer choices to improve plausibility. // Added "initial" to stem for clarity. MB OK***

**1 POINT**

**Question 2**

Unit 2 initial conditions:

- Mode 3
- Startup in progress
- RCS temperature = 350°F stable
- RCS Pressure = 1250 psig slowly decreasing
- Pressurizer Level = 292 inches stable
- Quench Tank Level = 84 inches increasing
- Quench Tank pressure = 5 psig slowly increasing
- The PORV is leaking

Based on the above conditions, which ONE of the following describes the expected PORV tail pipe temperature (°F) and is the Pressurizer level exceeding the TS limit?

- A. 265 / no
- B. 265 / yes
- C. 228 / no
- D. 228 / yes

2009 NRC REACTOR OPERATOR EXAM

Question 2

**T1/G1**

008AG2.2.22, Pressurizer Vapor Space Accident

**Knowledge of limiting conditions for operations and safety limits.**

(4.0/4.7)

**K/A MATCH ANALYSIS**

Requires knowledge of difference between indications of a PZR vapor space leak and spray flow and assess the impact of the reduced RCS pressure on DNBR (Reactor Core Safety Limit parameter)

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: Plausible in that the tail pipe temperature is correct; however wrong in that that the limit is exceeded ( $> 260$  inches). Plausible because 375" reactor trip.
- B. Correct: Using Steam Tables/Mollier diagram determines the PORV tail pipe temperature for 20 psia to be  $\sim 265^{\circ}\text{F}$  at 1265 psia. TS limit for PZR level is exceeded at  $> 260$  inches**
- C. Incorrect: Plausible;  $228^{\circ}\text{F}$  based on  $T_{\text{sat}}$  for 20 psia from the steam tables ignoring the constant enthalpy throttling process. Also, wrong in that the PZR level TS limit is exceeded ( $> 260$  inches)
- D. Incorrect: Plausible;  $228^{\circ}\text{F}$  based on  $T_{\text{sat}}$  for 20 psia from the steam tables ignoring the constant enthalpy throttling process. Second part is correct

---

Technical Reference(s): **PNS-PZR Rev 16a**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **PNS-PZR Obj R19, ADM-TSS Obj R1**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Wrote new question to match K/A and improve plausibility statements. MB OK ///***  
***Changed A and B for improved accuracy. Changed C and D to improve plausibility using  $T_{\text{sat}}$  for 5 psia \* MB OK***

1 POINT

Question 3

Unit 1 initial conditions:

- Reactor power = 100%

Current conditions:

- SBLOCA
- 1A and 1B SG Levels at the LOSCM setpoint
- TBVs in AUTO and CLOSED

Based on the above conditions, which ONE of the following combinations of parameters describes the indications that boiler-condenser mode heat transfer has been established?

RCS primary water level is \_\_\_\_\_ / SG Pressures will \_\_\_\_\_

- A. below the SG secondary water level / increase until the TBV setpoint is reached
- B. below the SG secondary water level / decrease until SG pressure stabilizes at  $T_{sat}$  for the RCS temperature
- C. above the SG upper tube sheet / increase until the TBV setpoint is reached
- D. above the SG upper tube sheet / decrease until SG pressure stabilizes at  $T_{sat}$  for the RCS temperature

Question 3

**T1/G1 - okm**

009EK1.01, Small Break LOCA

**Knowledge of the operational implications of the following concepts as they apply to the small break LOCA:** Natural circulation and cooling, including reflux boiling  
(4.2/4.7)

**K/A MATCH ANALYSIS**

Requires knowledge of the plant conditions required for boiler-condenser cooling (reflux boiling) during a SBLOCA

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: Primary level must be established at some level below the SG secondary side level to allow condensation of primary side steam. When BCM is established SG pressure will increase due to the transfer of heat from the RCS to the SGs.**
- B. Incorrect: First part is correct. Second part is incorrect but plausible if it is assumed that not fully developed BCM heat transfer means that heat transfer is intermittently lost and restored. It is not lost. It is just not at its optimum capability so SG pressure will increase until TBVs open.
- C. Incorrect: First part is incorrect. Primary level is plausible in that level being above the upper tube sheet level exists when transitioning from sustained Two-Phase natural circulation flow towards BCM flow. Second part is correct.
- D. Incorrect: First part is incorrect as described above. Second part is incorrect as described above.

---

Technical Reference(s): **TA-AM1**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **TA-AM1 Obj. R16**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Removed bolded assumptions and put in stem; LOSCM setpoint is a varying value. Added the word "secondary" to A and B // MB OK /// Modified stem and second part of all answers to ensure only one correct answer. Enhanced plausibility statements. \* MB OK***

**1 POINT**

**Question 4**

Unit 1 conditions:

- RCS Pressure = 200 psig decreasing
- HPI Flow in 1A Header = 750 gpm
- HPI Flow in 1B Header = 490 gpm

Based on the conditions above, which ONE of the following describes the required operator actions to protect the HPI pumps?

- A. Throttle HPI flows in BOTH 1A & 1B headers to <475 gpm per pump
- B. Throttle HPI flow in ONLY 1A header to <750 gpm
- C. Throttle HPI flows in BOTH 1A & 1B headers to <950 gpm combined
- D. Throttle HPI flow in ONLY 1B header to <475 gpm



**1 POINT****Question 5**

Unit 1 initial conditions:

- Reactor power = 65%
- 1LPSW-6 (UNIT 1 RCP COOLERS SUPPLY) fails closed

Current conditions:

- AP/16 (Abnormal RCP Operation) in progress
- RCP Temperatures:

	<u>1A1</u>	<u>1A2</u>	<u>1B1</u>	<u>1B2</u>
Upper Guide Bearing Temp	182°F	197°F	188°F	185°
Radial Bearing Temp	219°F	220°F	231°F	222°

Based on the above conditions, which ONE of the following is required per AP/16?

- Manually trip the Reactor and stop ALL RCPs
- Manually trip the Reactor and stop RCPs 1A2 & 1B1 ONLY
- Stop RCP 1A2 ONLY and verify FDW re-ratios properly
- Stop RCP 1B1 ONLY and verify FDW re-ratios properly



1 POINT

Question 6

Unit 1 plant conditions:

Time = 0400

- Reactor power = 100%
- 1A HPI Pump operating
- 1B HPI Pump in AUTO

Time = 0401

- 1SA-2/C-2 (HP Injection Pump Disch Header Pressure Low) actuated
- 1SA-2/B-2 (HP RCP Seal Inlet Header Flow High/Low) actuated
- RCS makeup flow erratic and low
- 1A HPI Pump amps cycling

Time = 0405

- AP/14 (Loss Of Normal HPI Makeup and/or RCP Seal Injection) in progress
- Operators just completed Step 3.3, for stopping all HPI pumps

Based on the conditions above, which ONE of the following describes the pump used to restore RCS makeup and the suction source used as directed by AP/14?

- A. 1B HPI pump / BWST
- B. 1B HPI pump / LDST
- C. 1C HPI Pump / BWST
- D. 1C HPI Pump / LDST



1 POINT

Question 7

Unit 1 initial conditions:

- Normal LPI decay heat removal in service

Current conditions:

- Loss of offsite power occurs
- Power restored via CT-4
- 1A and 1B LPI Pumps not available

Based on the above conditions, which ONE of the following describes the requirements to start the 1C LPI Pump to restore decay heat removal?

Manual reset of Load Shed is \_\_\_\_\_ and starting of 1C LPI Pump is allowed after a minimum of \_\_\_\_\_ seconds.

- A. NOT required / 5
- B. required / 5
- C. NOT required / 30
- D. required / 30

Question 7

**T1/G1 – jmb**

025AK1.01, Loss of Residual Heat Removal System

**Knowledge of the operational implications of the following concepts as they apply to Loss of Residual Heat Removal System:** Loss of RHRS during all modes of operation  
(3.9/4.3)

**K/A MATCH ANALYSIS**

Requires knowledge of actions required to restore core decay heat removal following a failure of the LPI/DHR Pumps

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: Pushing the Control Room MFB monitor RESET pushbuttons is not required because the signal for the 1C LPI Pump is removed 5 seconds after the Load Shed actuated.**
- B. Incorrect: First part is incorrect but plausible because load shed reset is required for many other components (see pg 16 of EL-PSL). Second part is correct.
- C. Incorrect: First part is correct. Second part is incorrect but plausible if confused with the Load Shed operation of X6 and X7 which automatically re-energize after 30 seconds.
- D. Incorrect: First part is incorrect but plausible because reset is required for many other components. Second part is also incorrect but plausible if confused with the Load Shed operation of X6 and X7 which automatically re-energize after 30 seconds.

---

Technical Reference(s): **NONE**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EL-PSL Obj. R6**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Wrote new question to match K/A. // MB OK /// Modified stem to meet current operating procedures \* MB OK***

**1 POINT**

**Question 8**

Unit 1 initial conditions:

- Reactor power = 100%
- NR RCS Pressure Channel "A" failed low
- NR RCS Pressure Channel "B" = 2155 psig stable
- NR RCS Pressure Channel "C" = 2158 psig stable
- NR RCS Pressure Channel "D" = 2162 psig stable
- NR RCS Pressure Channel "E" = 2148 psig stable

Current conditions:

- NR RCS Pressure Channel "E" failed low

Based on the conditions above, which ONE of the following describes the impact on Pzr Heaters and the response of the unit over the next 30 minutes?

**ASSUME NO OPERATOR ACTION**

All Pzr Heater controlled from the Unit 1 control room are...

- A. "ON" / Reactor will automatically trip
- B. "ON" / Reactor will NOT automatically trip
- C. NOT "ON" / Reactor will automatically trip
- D. NOT "ON" / Reactor will NOT automatically trip

Question 8

**T1/G1 - okm**

027AK2.03, Pressurizer Pressure Control Malfunction

**Knowledge of the interrelations between the Pressurizer Pressure Control and the following:** Controllers and Positioners

(2.6/2.8)

**K/A MATCH ANALYSIS**

Requires knowledge of impact of RCS NR Pressure failure on automatic operation of the controllers for the Pzr heaters and PORV

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. **CORRECT: Failure (low) of the controlling NR Pressure signal will energize the Pzr Heaters and prevent automatic operation of both the Spray Valve and the PORV. RCS pressure would continue to rise unchecked and the unit would trip on High RCS pressure**
- B. Incorrect: First part is correct. 2<sup>nd</sup> part is incorrect plausible if it is misconceived that RCS pressure would be reduced by Spray.
- C. Incorrect: First part is incorrect but plausible if it is misconceived that Pzr heaters will fail "as is". Second part is correct but plausible if it is thought that without Pzr heaters coming on that RCS pressure will continue to decrease such that a Variable Low Pressure or Low Pressure trip could occur.
- D. Incorrect: First part is incorrect but plausible if it is misconceived that Pzr heaters will fail "as is". Second part is correct but plausible if it is thought that without Pzr heaters coming on that RCS pressure will stay at normal values or at least at non-trip values.

---

Technical Reference(s): **AP/44 Rev. 00 (Draft), AP/28 Rev. 14**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **IC-RCI Obj.R6, EAP-APG Obj R9, PNS-PZR Obj. R28, R36**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Added "Reactor power = 100%". Deleted last bullet. Updated AA /// Wrote new question – MB OK //// Added time to stem to ensure a correct answer and modified stem and answers to clarify "C" Pzr heaters are not part of question. \* MB OK***

1 POINT

Question 9

Unit 3 initial conditions:

- Reactor Power = 95% decreasing
- RCS Pressure = 2455 psig increasing
- Tavg = 598°F increasing
- Pressurizer level = 355 inches increasing

Current conditions:

- Reactor Power = 4% decreasing
- RCS Pressure = 2735 psig (maximum reached) decreasing
- Tavg = 596°F decreasing
- Pressurizer level = 365 inches decreasing

Based on the conditions above, which ONE of the following describes whether or not the RCS Pressure safety limit has been exceeded and the bases for the safety limit?

The TS RCS Pressure Safety Limit has \_\_\_\_\_. This Safety Limit \_\_\_\_\_.

- A. been exceeded / ensures RCS pressure is maintained below 110% of design pressure to prevent RCS pressure boundary failure
- B. been exceeded / ensures that RCS pressure remains in the assumed range used in the analysis for reactivity accidents including slow rod withdrawal
- C. NOT been exceeded / ensures RCS pressure is maintained below 110% of design pressure to prevent RCS pressure boundary failure
- D. NOT been exceeded / ensures that RCS pressure remains in the assumed range used in the analysis for reactivity accidents including slow rod withdrawal

Question 9  
T1/G1 - jmb

029EG2.2.25, Anticipated Transient Without Scram (ATWS)  
**Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.**  
(3.2/4.2)

**K/A MATCH ANALYSIS**

Requires knowledge of RCS pressure status in relation to the RCS Pressure Safety Limit during an ATWS event and bases for safety limit

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: RCS pressure has not exceeded 2750 psig safety limit value. Second part is correct.
- B. Incorrect: RCS pressure has not exceeded 2750 psig safety limit value. Second part is incorrect. Plausible as the basis for the RPS high pressure trip set point.
- C. Correct: RCS pressure given as maximum observed is below the safety limit value. The limit is based on ensuring that RCS integrity is maintained by assuring that RCS pressure is less than 110% of design pressure value of 2500 psig.**
- D. Incorrect: First part is correct. Second part is incorrect. Second part is incorrect. Plausible as the basis for the RPS high pressure trip set point.

---

Technical Reference(s): **Tech Spec 2.1.1.2 and Bases**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **ADM-TSS Obj 4 & 5**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Modified stem per suggestion. // MB OK /// Added "TS" to RCS Pressure Safety Limit for clarity. Changed "observed" to reached in stem. \* MB OK***

1 POINT

Question 10

Unit 1 plant conditions:

- Reactor Power = 29% decreasing
- Primary to secondary leakage in 1A SG
- Pzr level = 160 inches decreasing
- ALL HPI Pumps running
- 1HP-26 and 1HP-27 open
- 1HP-5 closed

Based on the conditions above, which ONE of the following describes whether 1RIA-59 & 1RIA-60 may be used to determine the SG Tube Leak Rate and what method will be used to shutdown per the EOP SGTR Tab?

1RIA-59 & 1RIA-60 \_\_\_\_\_ to determine the SG Tube Leak Rate and the \_\_\_\_\_.

- A. may be used / reactor is NOT required to be manually tripped
- B. may be used / reactor is required to be manually tripped
- C. may NOT be used / reactor is NOT required to be manually tripped
- D. may NOT be used / reactor is required to be manually tripped

Question 10

**T1/G1 – jmb**

038EK3.06, Steam Generator Tube Rupture

**Knowledge of the reasons for the following responses as they apply to the**

**SGTR:** Actions contained in EOP for RCS water inventory balance, S/G tube rupture, and plant shutdown procedures

(4.2/4.5)

**K/A MATCH ANALYSIS**

Requires knowledge of the method used to determine RCS leak rate in the SGTR EOP and the method of shutdown used and reason based on power level and leak rate,

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: First part is incorrect. Plausible in that 1RIA-59 &-60 (MS Line N-16 gamma detectors) are accurate above 40% power. Below 40% they provide a trend but can not be used to determine leakrate. Second part is incorrect. Plausible if the student fails to realize the SGTR tab directs tripping the reactor for this size leak or that the leak rate is exceeding HPI capacity.
- B. Incorrect: First part is incorrect as described above. Second part is correct.
- C. Incorrect: First part is correct as described below. Second part is incorrect as described above.
- D. Correct: First part is correct. 1RIA-59 &-60 (MS Line N-16 gamma detectors) are only accurate above 40% power. Below 40% they only provide a trend and can not be used to determine leakrate. Second part is correct. The SGTR tab requires the reactor be tripped when the leakrate is > HPI capacity.**

---

Technical Reference(s): **EAP-SGTR, EP/1/1800/01 SGTR Tab**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-SGTR Obj R1, R2**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Modified the question to improve plausibility. Removed "inventory balance" from stem and added reason to better match K/A. // Added "required" to answers. Added "control" A and C. Modified answers to trip or not trip. MB OK /// Enhanced plausibility statements.***

1 POINT

**Question 11**

Unit 1 conditions:

- Reactor Tripped
- Main Turbine Control Valves are ALL closed
- Main Turbine Stop Valves 1 & 3 (1MS-105 & 103) are both open

Based on the conditions above, which ONE of the following describes the action required (if any) and the reason action is (or is not) required?

- A. No action is required / ALL Control Valves being closed isolates the Main Steam supply to the Main Turbine and prevents a post trip overcooling due to excessive steam flow.
- B. No action is required / ALL Control Valves being closed isolates the Main Steam supply to the Main Turbine to prevent turbine damage from overspeeding following a generator trip from 100% power.
- C. Place both EHC Pumps in PULL TO LOCK / ALL Stop Valves must be closed to ensure the Main Steam Lines are isolated from each other to prevent a main steam line break from affecting both SGs.
- D. Place both EHC Pumps in PULL TO LOCK / ALL Stop Valves must be closed to ensure the steam chest delta T requirements are not exceeded.

Question 11

**T1/G1**

040AK3.01, Steam Line Rupture

**Knowledge of the reasons for the following responses as they apply to the Steam Line Rupture:** Operation of steam line isolation valves

(4.2/4.5)

**K/A MATCH ANALYSIS**

Requires knowledge of the reason the Turbine Stop Valves are required to be closed following a Reactor/Turbine Trip

**Per discussion with NRC Lead Examiner - substituted Turbine Stop Valves (TSVs) for MSIVs and kept K/A. TSVs perform similar function of MSIVs for Steam Line Rupture.**

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Plausible as the control valves isolate steam flow to the turbine and would prevent a post trip overcooling from steam flow to the turbine.
- B. Incorrect: Plausible as isolating the steam supply following a loss of load would minimize the possibility of exceeding turbine speed ratings that could lead to damage.
- C. Correct: EOP IMA require the Turbine Stop Valves (TSVs) to be closed. The required action is to place the EHC Pumps in PTL. The TSVs serve as the isolation valves between the OTSGs in the RB and the Main Turbine. All four TSVs are needed. If for example a MSLB occurred, both S/Gs would discharge through the break by way of the steam chest. Once the TSVs closed, then the steam loss would be isolated to just the single affected steam generator / MS line.**
- D. Incorrect: First part is correct. Second part is incorrect. Plausible in that chest warming has a 125°F/hr Difference Limit between inner and outer steam chest metal that applies during chest warming.

---

Technical Reference(s): **EP/1/1800/001 EOP IMAs, TS Bases 3.3.15 & 3.7.2**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **STG-MT Obj. R3, EAP-IMA Obj. R5**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**Modified Distractor "D" for improved plausibility. // MB OK**

1 POINT

Question 12

Unit 1 initial conditions:

- Reactor power = 100%

Current conditions:

- Station Blackout (power has NOT been restored)
- RCS Temperatures 2 minutes after trip
  - $T_c = 550^\circ\text{F}$
  - $T_h = 556^\circ\text{F}$
  - CETCs =  $558^\circ\text{F}$
- SG Pressures = 1010 psig stable

Based on the conditions above, which ONE of the following describes the response of the RCS heat removal parameters during the transition but prior to establishing natural circulation?

- | <u>RCS Tcold</u> | <u>CETCs</u> |
|------------------|--------------|
| A. Increasing    | Increasing   |
| B. Decreasing    | Stable       |
| C. Stable        | Increasing   |
| D. Decreasing    | Increasing   |

Question 12

**T1/G1 jmb**

055EA1.01, Station Blackout

**Ability to operate and monitor the following as they apply to a Station Blackout:**

In-core thermocouple temperatures

(3.7/3.9)

**K/A MATCH ANALYSIS**

Requires the ability to determine the status of RCS heat removal based on the relationship between RCS Loop Temperatures and CETC temperature

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Plausible in that CETCs will be increasing to develop the necessary  $\Delta T$ , but incorrect in that  $T_c$  would be either stable or decreasing. Candidate could confuse this concept.
- B. Incorrect:  $T_{cold}$  response is correct as it could be decreasing or held constant by the SG Pressure/Temp. CETC response would be correct if at low decay heat levels or natural circ had fully developed but neither of these is the situation here.
- C. Correct: In the time period following the trip natural circulation conditions will be developing. That and CETC will be increasing with  $T_{cold}$  being held constant by SG pressures in order to build in an adequate thermal driving head to establish flow. After flow is established CETC & That will stabilize and eventually decrease as either decay heat level drops off or SG pressures are reduced.**
- D. Incorrect:  $T_{cold}$  response is correct as it could be decreasing or held constant by the SG Pressure/Temp. CETC response would be correct if at low decay heat levels or natural circ had fully developed but neither of these is the situation here.

---

Technical Reference(s): **TA-AM1 Rev 08c**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **TA-AM1 Obj R3**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Rewrote answers to improve plausibility. // Moved assumption to current conditions. MB OK /// Added "but prior to establishing" to stem for clarity and enhanced plausibility statements. \* MB OK***

1 POINT

Question 13

Unit 1 initial conditions:

- LBLOCA occurred 1 hour ago
- RCS Pressure = 30 psig
- 1A & 1B LPI Pumps are running

Current conditions:

- 1KVIA is de-energized
- 1SA-18/A-3 RVLIS/ICCM/RG1.97 Train A Trouble actuated

Based on the conditions above, which ONE of the following describes the impact on the LPI system instrumentation and what alternate indication can be used to determine the status of the LPI pumps?

- A. LPI HDR 1A INJ FLOW (gpm) is Blank / 1A LPI Pump amps and breaker indicating lights
- B. LPI HDR 1A INJ FLOW (gpm) is Blank / 1A LPI HDR flow computer point (OAC)
- C. LPI HDR 1B INJ FLOW (gpm) is Blank / 1B LPI Pump amps and breaker indicating lights
- D. LPI HDR 1B INJ FLOW (gpm) is Blank / 1B LPI HDR flow computer point (OAC)

Question 13

**T1/G1 jmb**

057AA1.05, Loss of Vital AC Instrument Bus

**Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus:** Backup instrument indications

(3.2/3.4)

**K/A MATCH ANALYSIS**

Requires ability to assess of LPI pump operating status and correlate pump flow to operating current (amps) and Cooler  $\Delta T$  following a loss of an instrument bus (KVIA).

**ANSWER CHOICE ANALYSIS**

**Answer: A**

*Pg 48 of EL-CB describes 4160v Bkr control power as 125 VDC for pumps*

**A. Correct: The loss of 1KVIA de-energizes Train A ICCM and results in LPI Train A Injection Flow dixon indicator failing. Pump amps and breaker indicating lights are not powered from ICCM and remain normal (approx 53-54 amps).**

B. Incorrect: First part is correct as described above. Second part is plausible if assumption is made that the OAC is not dependent on ICCM.

C. Incorrect: First part is incorrect. Plausible as it is the indication lost if KVIB were de-energized. Failure to apply the correct train power supply would result in this selection. Second part is correct. This indication is available and is also not impacted by ICCM.

D. Incorrect: First part is incorrect as described above. Second part is correct. This indication is available and is also not impacted by ICCM.

---

Technical Reference(s): **OP/1/A/1105/012, OP/1/A/6101/005, IC-RCI**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **IC-RCI Obj. R 43 & 59**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Added support documentation of breaker control power sources. MB OK ///***  
***Enhanced plausibility statements.***

**1 POINT**

**Question 14**

Plant conditions:

- Unit 1, 2, & 3 Vital DC systems are aligned normally
- 1CA Battery Charger fails - output voltage = 0 VDC
- 1CA Battery voltage = 120 VDC
- 1DCB Bus voltage = 123 VDC
- Unit 2 DCA/DCB Bus voltage = 125 VDC
- Unit 3 DCA/DCB Bus voltage = 127 VDC

Based on the above conditions, which ONE of the following will supply power to 1DIA panelboard?

**ASSUME NO OPERATOR ACTIONS**

- A. 1CA Battery
- B. Unit 3 DC Bus
- C. 1DCB Bus
- D. Unit 2 DC Bus

Question 14

**T1/G1 okm**

058AK1.01, Loss of DC Power

**Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power: Battery charger equipment and instrumentation (2.8/3.1)**

**K/A MATCH ANALYSIS**

**Requires knowledge of the operational implications of failed battery charger and the operational impact of the loss of a Vital DC Battery Charger and the response by the Vital DC system**

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect. Unit 2 supplies power to the alternate isolating diodes for 1DIA panelboard. The voltage from Unit 2 is higher than the 1CA battery voltage since Unit 2 is being supplied from the charger, so Unit 2 will supply power. Plausible if the student fails to realize unit 2 backs up unit 1 when its voltage is higher than unit 1 battery bus.
- B. Incorrect. Unit 3's DC Bus is not connected to Unit 1. Plausible because unit 3 does backup unit 1 in the SSF power scheme. The student may get this confused.
- C. Incorrect. For the Vital DC system, the 1DCB bus is not aligned to the 1DCA bus. Plausible because 1DCB Bus is aligned to backup the essential inverters
- D. Correct, The voltage from Unit 2 is higher than the 1CA battery voltage since Unit 2 is being supplied from the charger, so Unit 2 will supply power.

---

Technical Reference(s): Lesson Plan EL-DCD

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EL-DCD R4**

Question Source: **B**

Question History: Last NRC Exam **ONS 2006 RO Written#59**

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

**Replaced question // MB OK /// Enhanced plausibility statements.**

1 POINT

**Question 15**

Unit 3 initial conditions:

- Reactor power = 100%

Current conditions:

- LPSW header pressure = 20 psig increasing

Based on the above conditions, which ONE of the following describes the status of statalarm 3SA-9/C3 (LPSW Low Press RB Aux Cooler Isolation) and if the RBACs isolate, how is LPSW flow restored?

- A. Actuated / Automatically when LPSW pressure returns above setpoint
- B. Actuated / Manually after depressing LPSW LOW PRESS DIG CH 1 AND 2 pushbuttons
- C. Not Actuated / Automatically when LPSW pressure returns above setpoint
- D. Not Actuated / Manually after depressing LPSW LOW PRESS DIG CH 1 AND 2 pushbuttons

Question 15

**T1/G1 jmb**

062AG2.4.46, Loss of Nuclear Service Water

**Ability to verify that the alarms are consistent with the plant conditions.**

(4.2/4.2)

**K/A MATCH ANALYSIS**

Requires ability to evaluate alarm status based on plant conditions and determine status of LPSW to the RB Aux Coolers.

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: First part is correct. The alarm setpoint was reached at 23 psig decreasing and pressure must rise to > 23 psig in order for the S/A to automatically clear. Second part is incorrect. RBACs did isolate; however rising LPSW header pressure above 23 psig will not automatically restore flow to the RBACs. Plausible if the student fails to realize the RBCUs are not automatically restored.
- B. CORRECT: Alarm status is correct; alarm setpoint was reached at 23 psig decreasing and pressure must rise > 23 psig in order for the S/A to automatically clear. RBACs did isolate and they must be manually restored to their normal OPEN/AUTO status after depressing both LPSW LOW PRESS DIG CH 1 AND 2 pushbuttons.**
- C. Incorrect: First part is incorrect. Alarm setpoint was reached at 23 psig decreasing and pressure must rise to > 23 psig in order for the S/A to automatically clear. Plausible if the student does not remember the alarm setpoint. Second part is incorrect as described above.
- D. Incorrect: First part is incorrect as described above. Second part is correct as described above.

---

Technical Reference(s): **Statalarm 3SA-9/C3 (LPSW Low Press RB Aux. Cooler Isolation)**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **SSS-LPW Obj R13, PNS-RBC Obj. R14**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**No changes // MB OK /// Enhanced plausibility statements.**

**1 POINT**

**Question 16**

Unit 1 initial conditions:

- Reactor power = 100%
- Instrument Air Pressure decreasing
- AP/22 (Loss of Instrument Air) initiated

Current conditions:

- Instrument Air pressure = 61 psig decreasing
- FDW Pump  $\Delta P$  OAC alarms actuate
- 1A & 1B Main FDW Pump speeds are both increasing

Based on the above conditions, which ONE of the following describes the actions required by AP/22?

- A. Commence a plant shutdown. If at any time two or more CRD temperatures are  $>180^{\circ}\text{F}$ , then trip the reactor.
- B. Commence a plant shutdown. If at any time SG level approaches main FDW pump trip criteria, then trip the reactor.
- C. Manually trip the reactor. Manually trip both main FDW pumps.
- D. Manually trip the reactor. Take both FDW Masters to Hand and decrease demand to zero.

Question 16

**T1/G1- OKM**

065AA1.05, Loss of Instrument Air

**Ability to operate and / or monitor the following as they apply to the Loss of Instrument Air: RPS**

(3.3/3.3)

**K/A MATCH ANALYSIS**

Question tests knowledge of when to trip the reactor during a loss of IA event. Therefore, the question tests knowledge of the ability to operate the RPS, via tripping reactor, when a loss of instrument air occurs.

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Plausible in that a rapid unit shutdown is required; however the method directed is a manual Rx trip. Second part is plausible as it is the immediate trip criteria for loss of CC flow to the CRDMs during the loss of IA is valid.
- B. Incorrect: Plausible in that a rapid unit shutdown is required; however the method directed is a manual Rx trip. Second part is plausible in that OMP 1-18 dictates a Manual Rx Trip and tripping of both MFWPS if any SG reaches >96% on the OR level.
- C. Correct. AP/22 requires the reactor to be tripped when FDW is not controllable. The OAC alarm actuates at about 30 psig, well below the ~65 psig where FDW valves can stop responding to control signals. Applicants need to know when the OAC alarm actuates. (See referenced SAEL and Step 4.3 of the AP) Therefore, the AP requires that the reactor be tripped and the MFDW pumps to be tripped.**
- D. Incorrect: AP/22 requires MFDW pumps to be tripped immediately after the reactor is manually due to loss of FDW controllability. Plausible in that the candidate could erroneously think that Feedwater control valves (and FDW demand) would still be controllable if taken to Hand on the ICS stations.

---

Technical Reference(s): **AP/22 Rev 25 (Loss of Instrument Air), Lesson Plan SSS-IA, Instrument Air System, Rev. 18, Simulator Guide, SAE-L 035, Loss of Instrument Air, Rev. 9.**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **SSS-IA R44, R45, R53**

Question Source: **B**

Question History: Last NRC Exam **ONS 2006 RO Exam Q#62**

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

***FDW flow cannot be controlled by procedure using FDW pumps speed control //***  
**MB OK**

**1 POINT**

**Question 17**

Unit 3 plant conditions:

- A voltage disturbance is occurring
- AP/34 (Degrade Grid) initiated
- Power Factor is leading
- Generator Mwe = 800
- Generator Hydrogen pressure = 60 psig
- Generator output voltage = 18.3 kV

Based on the above conditions, which ONE of the following is the limit on MVARs in accordance with the Generator Capacity Curve?

**REFERENCE PROVIDED**

- A. 325
- B. 375
- C. 410
- D. 550

Question 17

**T1/G1 – jmb**

077AK1.03, Generator Voltage and Electric Grid Disturbances

**Knowledge of the operational implications of the following concepts as they apply to Generator Voltage and Electric Grid Disturbances: Under-excitation (3.3/3.4)**

**K/A MATCH ANALYSIS**

Requires knowledge of operating characteristics associated with generator MWe and MVAR and the operational concern with operating in an under-excited condition. Also requires knowledge of the operation of the excitation system to correct the condition.

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: Plausible if the 45 psig H2 generator gas pressure line is followed on the curve instead of the 60 psig gas pressure line as stated.
- B. Correct: Determines using the attached curve from AP/34 that the generator is under-excited and the maximum (-) MVARs limit is ~375.**
- C. Incorrect: Plausible if the 45 psig H2 generator gas pressure line is followed on the lagging pf side of the curve instead of the 60 psig pressure line on the leading pf side as stated.
- D. Incorrect: Plausible if erroneously applies a lagging power factor instead of leading pf with all other parameters as stated.

---

Technical Reference(s): **AP/34, STG-015**

Proposed references to be provided to applicants during examination: **AP/34, Encl. 5.1, Generator Capability Curve**

Learning Objective: **STG-015 Obj R26, EAP-APG Obj R9**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**Added attachment from AP/34 // Modified stem to improve readability. MB OK**

1 POINT

Question 18

Unit 1 plant conditions:

- Loss of Heat Transfer exists due to the loss of ALL FDW sources
- HPI Forced Cooling in progress
- RCS pressure = 2210 psig slowly decreasing
- Pzr Level = 380 inches increasing
- Core SCM = 56°F increasing

Based on the conditions above, which ONE of the following correctly completes the statement below regarding HPI throttling and the parameter/trend used to determine if the criteria for HPI throttling is met?

HPI flow \_\_\_\_\_ be throttled because \_\_\_\_\_.

- A. may NOT / RCS pressure is decreasing
- B. may NOT / CETCs are increasing
- C. may / Pzr Level is increasing
- D. may / CETCs are decreasing

Question 18

**T1/G1 - jmb**

BE04EK2.2, Inadequate Heat Transfer

**Knowledge of the interrelations between the (Inadequate Heat Transfer) and the following:** Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

(4.2/4.2)

**K/A MATCH ANALYSIS**

Requires knowledge of criteria for throttling HPI during HPI Forced Cooling based on the status of core cooling provided by HPI (CETC trend and Core SCM status)

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: First part is incorrect. Criteria for throttling HPI during HPI cooling is based on Core SCM >0 and CETC decreasing. Plausible if slowly decreasing pressure is used as the basis for core SCM increasing.
- B. Incorrect: First part is incorrect. Criteria for throttling HPI during HPI cooling is based on Core SCM >0 and CETC decreasing. Plausible if correlation between increasing Core SCM and slowly decreasing pressure is not recognized as indication that CETC temperatures are decreasing.
- C. Incorrect: First part is correct. Second part is incorrect but plausible in that Pzr level increasing is part of the HPI throttling criteria if NOT in HPI F/C.
- D. **Correct: Criteria for throttling HPI during HPI cooling is based on Core SCM >0 and CETC decreasing. Core SCM increasing with RCS pressure slowly decreasing indicates that CETC temperatures are decreasing.**

---

Technical Reference(s): **EP/1/1800/01 Rule 6**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-HPI CD Obj. R3**

Question Source: **B (EAP140310)**

Question History: Last NRC Exam \_\_\_\_\_

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

**Modified stem and C distractor to add plausibility // MB OK**

1 POINT

Question 19

Unit 3 initial conditions:

- Reactor power = 100%
- SASS is in MANUAL
- ALL PZR level Channels = 220 inches
- Pzr Level Channel 3 is selected

Current conditions:

- PZR temperature channel "B" fails LOW

Which ONE of the following describes how Standby Shutdown Facility (SSF) Pzr Level indication will be initially affected by the above temperature failure and how will 3HP-120 respond to the failure?

SSF Pzr Level indication will initially \_\_\_\_\_ and 3HP-120 will \_\_\_\_\_.

- A. decrease / be unaffected
- B. stay the same / be unaffected
- C. decrease / open
- D. stay the same / open

2009 NRC REACTOR OPERATOR EXAM

Question 19

**T1/G2 - okm**

028AK2.02, Pressurizer Level Control Malfunction

**Knowledge of the interrelations between the Pressurizer Level Control Malfunctions and the following:** Sensors and detectors

(2.6/2.7)

**K/A MATCH ANALYSIS**

Requires the student to know the response of the plant to a malfunction in the Pzr Level Control circuit specifically Pzr level temperature compensation.

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: First part is incorrect. Plausible if SSF Pzr level is assumed to Temperature compensated from the affected channel. Second part incorrect and plausible if relationship between Pzr Temperature and ICCM Train is misapplied and the affect is assumed to be on level 1 and 2 which are associated with ICCM train "A".
- B. Incorrect: First part is correct as described below. Second part is incorrect as noted above.
- C. Incorrect: First part is plausible as noted in distracter A. Second part is correct as noted below.
- D. Correct: The SSF PZR level indication is not temperature compensated and will not change. PZR temperature channel "B" feeds ICCM Train "B". PZR level 3 comes from ICCM Train "B". With a loss of temperature compensation the associated level indication will decrease. SASS is in manual so HP-120 will respond to the lower level indication and open.**

---

Technical Reference(s): **IC-RCI Rev 19, PNS-PZR Rev 16a**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **PNS-PZR Obj R14/15 & 31, IC-RCI Obj R13**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**No changes. // MB OK /// Enhanced plausibility statements.**

**1 POINT**

**Question 20**

Plant initial conditions:

- Unit 1 in MODE 6
  - De-fuel in progress
- Unit 2 in MODE 5
- Unit 1 & 2 RB Purge Fans running
- 1RIA-3 (Fuel Transfer Canal Wall) = 1.4 mr/hr
- 1RIA-6 (Spent Fuel Pool) = 1.72 mr/hr

Current conditions:

- 1RIA-3 (Fuel Transfer Canal Wall) = 1.5 mr/hr
- 1RIA-6 (Spent Fuel Pool) = 15.2 mr/hr

Based on the above conditions, which ONE of the following describes REQUIRED operator actions?

- A. Stop Unit 1 RB Purge Fan and start a SFP Filtered exhaust fan.
- B. Start ALL Outside Air Booster Fans and stop Unit 1 RB Purge Fan.
- C. Stop Unit 2 RB Purge Fan and start a SFP Filtered exhaust fan.
- D. Start ALL Outside Air Booster Fans and close ALL containment penetrations

Question 20

**T1/G2 - jmb**

036AA2.02, Fuel Handling Incidents

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

(3.4/4.1)

**K/A MATCH ANALYSIS**

Requires the ability to determine the location of a fuel handling accident based on changes in radiation levels and what actions are required to mitigate it.

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: First part is incorrect. Plausible if RIA indication is misinterpreted. Starting the SFP Filtered Exhaust Fan is directed if the FH accident occurs in the U 1& 2 SFP area.
- B. Incorrect: Procedure directs starting the Outside Air Booster fans for both control rooms and stopping U1 RB Purge Fan if the event occurs in the RB.
- C. Correct: RIAs indicate spent fuel damage in the SFP. Action to stop Unit 2 purge fan is directed to allow placing the SFP Filtered Exhaust Fan in service.**
- D. Incorrect: First part is incorrect as noted above. Second part is correct.

---

Technical Reference(s): **AP/9, Spent Fuel Damage**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **FH-FHS R47**

Question Source: **B (FH014702)**

Question History: Last NRC Exam **ONS 2007 NRC RO Exam Q#22**

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

**No changes. // MB OK**

## 1 POINT

## Question 21

Unit 1 plant conditions:

- A Steam Generator Tube Rupture has occurred in the "1B" SG
- ALL RCPs operating

Which ONE of the following sets of parameters will result in the least amount of primary to secondary leakage?

RCS temperature is \_\_\_\_\_°F.      RCS pressure is \_\_\_\_\_ psig.

	<b>RCS Temp</b>	/	<b>RCS pressure</b>
A.	520	/	831
B.	532	/	890
C.	540	/	987
D.	552	/	1095

Question 21

**T1/G2 -OKM**

037AK1.01, Steam Generator (S/G) Tube Leak

**Knowledge of the operational implications of the following concepts as they apply to Steam Generator Tube Leak: Use of steam tables**

(2.9/3.3)

**K/A MATCH ANALYSIS**

Requires the student to use Steam Tables to calculate sub-cooling margin for initial and current conditions to determine changes in steam generator tube leak rate

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: The SGs will be at  $P_{sat}$  for the RCS  $T_{sat}$ . Sat pressure for  $520^{\circ}\text{F} \approx 798$  psig. ( $831 - 798 = 33$  psid across the SG tubes)
- B. Correct: The SGs will be at  $P_{sat}$  for the RCS  $T_{sat}$ . Sat pressure for  $532^{\circ}\text{F} \approx 885$  psig. ( $890 - 885 = 5$  psid). This is the minimum  $\Delta p$  between RCS and SGs of all the answers. Minimum  $\Delta p$  will result in the least amount of primary to secondary leakage.**
- C. Incorrect: The SGs will be at  $P_{sat}$  for the RCS  $T_{sat}$ . Sat pressure for  $540^{\circ}\text{F} \approx 948$  psig. ( $987 - 948 = 39$  psid across the SG tubes)
- D. Incorrect: The SGs will be at  $P_{sat}$  for the RCS  $T_{sat}$ . Sat pressure for  $552^{\circ}\text{F} \approx 1048$  psig. ( $1095 - 1048 = 47$  psid across the SG tubes)

---

Technical Reference(s): **Steam Tables**

Proposed references to be provided to applicants during examination: **Steam Tables**

Learning Objective: **EAP-SGTR, R6**

Question Source: **B (EAP090606)**

Question History: Last NRC Exam \_\_\_\_\_

Question Cognitive Level: Memory or Fundamental Knowledge  
Comprehension or Analysis

***Rewrote question // Added "allow RCP operation" to stem for clarity. MB OK ///***  
***Replaced question due to conflict with procedures. All plausible distracters violated RCP NPSH curve. \* MB OK***

**1 POINT**

**Question 22**

Unit 3 plant conditions:

- Reactor power = 100%
- Main condenser vacuum = 28" Hg decreasing slowly

Based on the above conditions, which ONE of the following describes the highest vacuum (inches Hg) at which a MANUAL Reactor Trip would be required per 3AP/27 (Loss of Condenser Vacuum)?

- A. 25
- B. 22
- C. 20
- D. 19

Question 22

**T1/G2 - OKM**

051AG2.4.2, Loss of Condenser Vacuum

**Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.**

(4.5/4.6)

**K/A MATCH ANALYSIS**

Requires the student to know set points for low vacuum trips and the set point for immediate manual reactor trip from the Loss of Condenser Vacuum AP

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: Plausible in that 25”Hg decreasing is the SA “COND VACUUM LOW” setpoint
- B. CORRECT: per AP/27 IAAT Step 4.1; manually trip Reactor if  $\leq 22$ ” Hg is reached**
- C. Incorrect: Plausible in that 20”Hg provides margin for the operator to respond to trip prior to the MFWPT trip.
- D. Incorrect: Plausible in that 19”Hg is the FWP automatic trip on low vacuum

---

Technical Reference(s): **3/AP/27 Rev 03**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-APG R7; STG-MT R13 ; CF-FPT R8**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

**No changes // MB OK**

**1 POINT**

**Question 23**

Unit 1 initial conditions:

- Mode 6
- Fuel assemblies are being loaded into the core
- All four SR NIs in service
- SR 1NI-1 and SR 1NI-3 are the designated NIs for Fuel Handling

Current conditions:

- Power supply to SR 1NI-1 fails (0 vdc)

Based on the above conditions, which ONE of the following describes the impact on fuel movement?

Fuel movement...

- A. may continue because two SR NIs remain in service.
- B. may continue because one of the designated SR NIs is still in service.
- C. is required to be stopped until another SR NI is designated because other NIs are procedurally allowed to be designated.
- D. is required to be stopped and cannot be resumed until SR 1NI-1 is returned to service because other NIs are NOT procedurally allowed to be designated.

Question 23

**T1/G2 - okm**

032AK1.01, Loss of Source Range Nuclear Instrumentation

**Knowledge of the operational implications of the following concepts as they apply to Loss of Source Range Nuclear Instrumentation:** Effects of voltage changes on performance

(2.5/3.1)

**K/A MATCH ANALYSIS**

Requires knowledge of the effects of changing power supply voltage on the shared SR and WR NIs and the operational implications of this change

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Plausible because the two SR NIs remain in service however the procedure requires the NIs used to monitor core reactivity be designated in advance.
- B. Incorrect: Plausible if it is not understood that the procedure requires 2 designated NIs to be operable.
- C. **Correct: Procedure requires movement to be stopped until 2 NIs used to monitor core reactivity can be designated.**
- D. Incorrect: Plausible as restoring SR NI-1 would restore 2 designated NIs however the procedure allows an alternate NI to be designated and then continue fuel movement. It is not required to restore NI-1 if another NI can be designated to replace it.

---

Technical Reference(s): **OP/1/A/1502/007 Rev 81**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **FH-FHS Obj R20**

Question Source: **M (FH041401)**

Question History: Last NRC Exam \_\_\_\_\_

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

***Modified C & D choices to improve plausibility // Modified C and D to ensure only one correct answer. Modified initial conditions to read "Fuel assemblies are being loaded into the core" MB OK***

1 POINT

Question 24

Unit 3 initial conditions:

- SBLOCA
- EOP ICC tab is in progress
- No ECCS injection sources are available
- 3RC-4 (PORV Block) is closed

Current conditions:

- 3A & 3B HPI pumps operating
- Conditions require the opening of 3RC-4 and establishing PORV flow to the Quench Tank

Based on the above conditions, which ONE of the following describes actions required to operate 3RC-4 and the reason for establishing flow to the Quench Tank?

Position 3RC-4 switch to...

- A. OPEN / increase HPI injection flow
- B. OPEN / elimination of non-condensable gases
- C. OPEN AND depress OPEN PERMIT / increase HPI injection flow
- D. OPEN AND depress OPEN PERMIT / elimination of non-condensable gases

Question 24

**T1/G2 -okm/jmb**

074EA1.23, Inadequate Core Cooling

**Ability to operate and monitor the following as they apply to an Inadequate Core Cooling:** PORV block valve indicators, switches, controls (for both RCS and S/G)  
(3.9/4.0)

**K/A MATCH ANALYSIS**

Requires the student to know the controls and to understand the reasons/results on the plant of opening the PORV and RC-4 during an ICC condition

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. **Correct: Operation of RC-4 (PORV Block) requires operating the Control Switch only and verifying light indication changes. RCS pressure will decrease causing HPI flow to increase per the design of the procedure.**
- B. Incorrect: First part is correct. Second part is plausible because non-condensable gases will be eliminated but this is not the basis for the alignment.
- C. Incorrect: First part is incorrect. Operation of RC-4 (PORV Block) requires operating the Control Switch only and verifying light indication changes; the PORV requires the use of the OPEN PERMIT button. Second part is correct. RCS pressure will decrease causing HPI flow to increase per the design of the procedure.
- D. Incorrect: First part is incorrect. Operation of RC-4 (PORV Block) requires operating the Control Switch only and verifying light indication changes as the PORV requires the use of the OPEN PERMIT button. Second part is plausible because non-condensable gases will be eliminated but this is not the basis for the alignment.

---

Technical Reference(s): **EOP ICC Tab, EOP Reference Document and EAP-ICC Lesson Plan**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **EAP-ICC R5, PNS-Pzr R37**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Modified B & D to enhance plausibility // MB OK /// Added bullet to current conditions and modified stem for clarity. "Position 3RC-4 switch to..." \* MB OK***

**1 POINT**

**Question 25**

Unit 3 plant conditions:

- Control Room Evacuation complete due to a non-fire event
- ASDP has been "manned"
  
- Following indications are observed at the ASDP:
  - Turbine Header Pressure = 1011 psig and slowly decreasing
  - TBVs demand is 12% in Automatic and decreasing
  - RCS T Hot = 560°F and slowly decreasing
  - Pzr Level = 140 inches increasing
  - SG SU levels = 48 inches and increasing
  - ALL RCPs are operating

Based on the conditions above, which ONE of the following correctly describes the action(s) required (if any) per AP/8 (Loss of Control Room)?

The operator must take ...

- A. NO actions the plant is responding as expected.
- B. manual control of TBVs to stabilize SG Pressure.
- C. manual control and cycle 3B HPI pump to stabilize Pzr level.
- D. manual control of FDW Startup Control Valves and lower SG levels.

2009 NRC REACTOR OPERATOR EXAM

Question 25

**T1/G2 -jmb**

BA06AK3.4, Shutdown Outside Control Room

**Knowledge of the reasons for the following responses as they apply to the (Shutdown Outside Control Room):** RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated. (3.8/3.8)

**K/A MATCH ANALYSIS**

Requires knowledge of control parameters and reason for actions required to establish control from the ASDP to establish stable Hot Standby conditions

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: Operator action is required, FDW SU control valves are not performing correctly SG levels are above 25 inches and rising. Plausible as the SG response would be normal if RCPs were not running and SG levels would control at 50% OR Level (240 inches SUR)
- B. Incorrect: TBVs are responding normally to post trip conditions and to the overfeed causing SG pressure to decrease
- C. Incorrect: Per AP/8 Pzr level should be maintained 100-220 inches. Plausible if Pzr level were to be controlled at the normal level of 220 inches
- D. **Correct: Manual control is needed; FDW SU control valves should be closing and controlling at 25 inches on SUR Level post trip (LLL)**

---

Technical Reference(s): **AP/8 Rev 11**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **IC-ASP Obj. T1, EAP-APG Obj R9**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**No changes // MB OK**

**1 POINT**

**Question 26**

Boron precipitation is primarily a concern for a \_\_\_\_\_ leg rupture. Failure to initiate the Boron Dilution flow path when required would challenge the ability to \_\_\_\_\_.

- A. hot / prevent boron stratification in the cold leg to ensure a restart event does not occur when the cold leg volume enters the core.
- B. hot / ensure boron does not concentrate in the core and block the long term core cooling flow path
- C. cold / prevent boron stratification in the cold leg to ensure a restart event does not occur when the cold leg volume enters the core.
- D. cold / ensure boron does not concentrate in the core and block the long term core cooling flow path

Question 26

**T1/G2 -jmb**

BE08EG2.2.38, LOCA Cooldown

**Knowledge of conditions and limitations in the facility license**

(3.6/4.5)

**K/A MATCH ANALYSIS**

Requires knowledge of the requirements for establishing the Long Term Boron dilution flowpath and the impact on the ability to meet the 10CFR50.46 requirements for coolable geometry/flowpath.

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect. First part is plausible if assumed the flowpath is off of the hot leg. Second part is incorrect. Plausible as boron stratification/dilution is a concern for RCP restart criteria following a LOSCM.
- B. Incorrect. First part is plausible if assumed the flowpath is off of the hot leg. Second part is correct.
- C. Incorrect. First part is correct. During a Cold Leg Rupture, the coolant will enter the vessel through the Core Flood nozzles into the inlet plenum and flow out the Cold Leg break. The core will continue to steam through the Internal Vent Valves and out the Cold Leg Break. This steaming will cause the boric acid to precipitate in the core due to the evaporation of the water. Second part is incorrect. Plausible as boron stratification/dilution is a concern for RCP restart criteria following a LOSCM.
- D. Correct. During a Cold Leg Rupture, the coolant will enter the vessel through the Core Flood nozzles into the inlet plenum and flow out the Cold Leg break. The core will continue to steam through the Internal Vent Valves and out the Cold Leg Break. This steaming will cause the boric acid to precipitate in the core due to the evaporation of the water. The precipitated Boron could then block the flowpath for LPI through the core.**

---

Technical Reference(s): **EOP LCD tab; EOP Reference Document**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **PNS-LPI Obj R28**

Question Source: **M (PNS122707)**

Question History: Last NRC Exam \_\_\_\_\_

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

**No changes // MB OK**

1 POINT

Question 27

Unit 1 initial conditions:

- Reactor power = 100%
- ACB-3 closed

Current conditions:

- Switchyard Isolation
- RCS pressure = 1146 psig stable
- All SCM = 21°F increasing
- Keowee Unit 2 emergency locked out

Based on the above conditions, which ONE of the following describes the first procedure required to be performed by an RO after EOP IMAs and Symptoms Check are complete?

- A. Enclosure 5.1 (ES Actuation)
- B. Enclosure 5.2 (Placing RB Hydrogen Analyzers In Service)
- C. Enclosure 5.5 (Pressurizer and LDST Level Control)
- D. Enclosure 5.38 (Restoration of Power)

Question 27

**T1/G2 - jmb**

BE14EA2.1, EOP Enclosures

**Ability to determine and interpret the following as they apply to the (EOP Enclosures):** Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

(3.4/4.0)

**K/A MATCH ANALYSIS**

Requires the student to recognize plant conditions and select the appropriate Rule/Enclosure to initiate.

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: Conditions indicate ES has actuated (RCS pressure < 1600#). Encl. 5.1 is the appropriate Enclosure to use first.**
- B. Incorrect: Plausible as this Enclosure is directed to be performed as part of Encl 5.1.
- C. Incorrect: Plausible as this enclosure would be appropriate to use first if the ES conditions were not present.
- D. Incorrect: Plausible as this Enclosure would be appropriate if it is not recognized that power is still available. The power conditions given could lead to the assumption that power is not available as this Encl. is used to restore power. If unit one Keowee had a lockout then this would be a correct answer.

---

Technical Reference(s): **EP/1/1800/001 Parallel Action Page, OMP 1-18**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-EOP, R26**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Added "required" to stem. Modified answer D plausibility statement to explain plausibility better. // MB OK***

**1 POINT**

**Question 28**

Unit 1 plant conditions:

- Unit 1 startup in progress
- 1A1 and 1B1 RCPs are operating

Based on the above conditions, which ONE of the following describes a condition that would prevent 1A2 RCP from starting?

- A. RCS  $T_c = 340^\circ\text{F}$
- B. RCP Oil Lift Pressure = 700 psig
- C. HPI Seal Injection flow rate = 28 gpm
- D. Total Component Cooling flow = 554 gpm

2009 NRC REACTOR OPERATOR EXAM

Question 28

**T2/G1 -okm**

003K4.04, Reactor Coolant Pump

**Knowledge of RCPS design feature(s) and/or interlock(s) which provide for the following:** Adequate cooling of RCP motor and seals  
(2.8/3.1)

**K/A MATCH ANALYSIS**

Requires the student to know RCP motor starting interlocks associated with motor cooling and seals

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: Plausible; RC temperature must be  $\geq 350^{\circ}\text{F}$  to start the fourth RCP. This is the 3rd RCP start.
- B. Incorrect: Plausible; must know that oil lift pressure interlock is satisfied if  $\geq 600$  psig
- C. Incorrect: Plausible; must know difference between Unit 1 and Units 2/3 SI requirements; for Unit 1 is  $\geq 22$  gpm (Unit 2/3 is  $\geq 30$  gpm)
- D. Correct: CC flow should be  $> 575$  gpm**

---

Technical Reference(s): **PNS-CPM**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **PNS-CPM, R19**

Question Source: **B (PNS061401)**

Question History: Last NRC Exam **2008 ONS Retest RO Exam Q#28**

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

**No Changes // MB OK**

**1 POINT**

**Question 29**

Unit 1 initial conditions:

- Reactor power = 100%

Current conditions:

- 1TE de-energized

Based on the above conditions, which ONE of the following describes the status of the listed HPI components?

- A. 1B HPI pump    de-energized  
   1HP-26        energized
- B. 1B HPI pump    de-energized  
   1HP-27        de-energized
- C. 1C HPI pump    de-energized  
   1HP-26        de-energized
- D. 1C HPI pump    de-energized  
   1HP-27        energized

Question 29

**T2/G1 - gcw**

004K2.05, Chemical and Volume Control System (CVCS)  
**Knowledge of bus power supplies to the following: MOVs**  
(2.7/2.9)

**K/A MATCH ANALYSIS**

Requires knowledge to recognize the potential problems associated with a loss of power to HPI pumps and MOVs.

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: 1TE supplies power to the 1B HPI pump and 1HP-26 is supplied by 1TC**
- B. Incorrect: First part is correct. Second part is incorrect. Plausible as could be correct if the pumps power supplies followed the standard convention. 1HP-27 is powered from 1TD.
- C. Incorrect: both parts are incorrect. Plausible if you do not know the power supply convention for the HPI system. 1HP-26 is supplied by 1TC
- D. Incorrect: First part is incorrect. Plausible if you do not know the power supply convention for the HPI system. Second part is correct.

---

Technical Reference(s): **PNS-HPI**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **PNS-HPI T2**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**No Changes // MB OK**

**1 POINT**

**Question 30**

Unit 3 plant conditions:

- Reactor power = 100%
- Aligning of 3B LPI Train for BWST recirc is in progress

Based on the above conditions, which ONE of the following describes a condition that must be met prior to operating 3LP-42 (LPI RETURN TO BWST) in accordance with OP/3/A/1104/004 (Low Pressure Injection System)?

An individual is required to be designated to...

- A. close 3LP-42 in the event of an Engineered Safeguards actuation.
- B. close 3LP-42 in the event of an LPI piping overpressure condition.
- C. throttle 3LP-42 to ensure adequate LPI pump NPSH is maintained.
- D. throttle 3LP-42 to ensure LPI pump minimum flow requirements are met.

Question 30

**T2/G1 - okm/jmb**

005A4.05, Residual Heat Removal System (RHRS)

**Ability to manually operate and/or monitor in the control room:** Position of RWST recirculation valve (locked when not in use, continuously monitored when in use).

(2.8/2.8)

**K/A MATCH ANALYSIS**

Requires the student to know the procedural requirement and the reason for the requirement associated with operation of the BWST recirculation valve

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: Per LPI operating procedure limit and precaution an individual must be designated at LP-42 (and LP-40 and -41) to manually close these valves should an ES actuation occur; required for Modes 1-4**
- B. Incorrect: Plausible as the current RCS Pressure is above the pressure limits associated with the LPI system piping and leakage past an isolation valve could lead to an overpressure condition. (OE: PIP O-97-4645)
- C. Incorrect: Plausible because flowrates are established to ensure pump flow is within the operating limits to prevent pump from running with inadequate NPSH, however LP-42 is fully opened by the procedure and the LPI cooler outlet valve is used to throttle flow.
- D. Incorrect: Plausible because flowrates are established to ensure pump flow is within the operating limits to prevent pump from running with inadequate flow, however LP-42 is fully opened by the procedure and the LPI cooler outlet valve is used to throttle flow.

---

Technical Reference(s): **Rev 130 OP/3/A/1104/004 L&P 2.22 & Enclosure 4.4**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **PNS-LPI Obj. R34**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**Added 'required' to stem // MB OK**

**1 POINT**

**Question 31**

Which ONE of the following events and failures will result in fuel/clad damage?

**ASSUME NO OPERATOR ACTION**

- A. MSLB with a failure of ES Channels 1 & 2
- B. MSLB with a failure of ES Channels 3 & 4
- C. SBLOCA with a failure of ES Channels 1 & 2
- D. SBLOCA with a failure of ES Channels 3 & 4

Question 31

**T2/G1 - gcw**

006K3.02, Emergency Core Cooling System (ECCS)

**Knowledge of the effect that a loss or malfunction of the ECCS will have on the following:** Fuel

(4.2/4.4)

**K/A MATCH ANALYSIS**

Requires the student to know that a loss or malfunction of the ECCS will affect fuel clad temperature

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Plausible if the candidate does not realize that ES-1 &2 are needed to help recover RCS inventory/pressure/SCM but the loss is only due to the volume reduction from the cooldown.
- B. Incorrect: Plausible if it is not realized that losing all LPI auto-actuation will not affect core cooling because RCS pressure will still be too high to allow LPI injection
- C. **Correct: Failure of ES-1 &2 will result in NO source of highly borated water via HPI flow being injected into the core. This will be the only way to maintain RCS inventory and prevent core damage. RCS pressure is too high for any other source of injection water.**
- D. Incorrect: Plausible if it is not realized that losing all LPI auto-actuation will not affect core cooling because RCS pressure will still be too high to allow LPI injection

---

Technical Reference(s): **None**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **IC-ES R1, T1**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

**Replace with a new question that matches K/A. // MB OK**

**1 POINT**

**Question 32**

Unit 1 initial conditions:

- Loss of all Feedwater
- HPI forced cooling initiated
- Quench Tank pressure = 50 psig increasing
- RCS activity indicates no fuel failures present

Current conditions:

- Quench Tank pressure = 3 psig stable

Which ONE of the following describes the containment response to the above conditions?

- A. RB Normal sump level rises. 1RIA-47 radiation level increases
- B. RB Normal sump level rises. 1RIA-47 radiation level remains constant
- C. RB Normal sump level remains constant. 1RIA-47 radiation level increases
- D. RB Normal sump level remains constant. 1RIA-47 radiation level remains constant

Question 32

**T2/G1 - gcw**

007K3.01 Pressurizer Relief/Quench Tank

**Knowledge of the effect that a loss or malfunction of the PRTS will have on the following:** Containment

(3.3/3.6)

**K/A MATCH ANALYSIS**

Requires knowledge of impact of discharge from PORV to the Quench Tank and indications of failed/blown rupture disk and the impact of the failure on containment parameters.

Plausibility based around whether applicant recognizes status of QT rupture disk. If disk is assumed to have blown, then containment pressure would rise. With normal levels of RCS activity an applicant would have to determine what the effects on containment radiation would be and where the leakage is directed (Misc. Waste vs. RBNS)

**ANSWER CHOICE ANALYSIS****Answer: A**

- A. Correct. Decrease in Quench Tank pressure indicates the Rupture Disk has blown. Inventory from the Quench Tank will go to the RBNS causing a level increase. RCS activity in the inventory will result in 1RIA-47 reading increase.**
- B. Incorrect. RBNS response is correct. 1RIA-47 response is incorrect but plausible if RCS activity is assumed to be negligible or the source of QT pressure rise is due to DW/B Bleed in-leakage. (OE)
- C. Incorrect. RBNS response is incorrect but plausible if the pressure reduction is assumed to be caused by draining to the Misc Waste System via the Component Drain flow path. 1RIA-47 response is correct.
- D. Incorrect. RBNS response is incorrect as noted above. 1RIA-47 response is consistent with inventory going to Misc Waste or assuming activity is negligible (OE with Demin Water & B Bleed Holdup Tank water leak into the Quench Tank).

---

 Technical Reference(s): **PNS-CS Rev 16, PNS-PZR Rev 16a**
Proposed references to be provided to applicants during examination: **None**Learning Objective: **PNS-CS (R7)**Question Source: **New**

Question History: Last NRC Exam: \_\_\_\_\_

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

**Added "RCS activity indicates no fuel failure present" to initial conditions for clarity. // MB OK**

**1 POINT**

**Question 33**

Which ONE of the following describes the interlock associated with the High Pressure Injection (HPI) valves (HP-1 and HP-2) and Component Cooling (CC) valves (CC-1 and CC-2) for the Letdown Coolers?

The interlock...

- A. isolates the Letdown Cooler if letdown temperature reaches interlock setpoint.
- B. ensures CC flow is established before letdown flow.
- C. prevents over-rating the CC system cooling capacity.
- D. ensures letdown flow is secured after CC flow.

Question 33

**T2/G1 - okm/jmb**

008K1.02, Component Cooling Water System (CCWS)

**Knowledge of the physical connections and/or cause-effect relationships between the CCWS and the following systems:** Loads cooled by CCWS

(3.3/3.4)

**K/A MATCH ANALYSIS**

Requires the student to know the physical connections and an interlock associated with components cooled by the CCWS

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: Plausible if the High Temp interlock to close HP-5 is misapplied to HP-1 & HP-2.
- B. Correct: Interlock opens CC-1 & CC2 prior to opening HP-1 & HP-2 to ensure CC flow is established prior to establishing Letdown Flow.**
- C. Incorrect: Plausible if system capabilities and capacities are not misapplied; for example the immediate addition of large loads can cause a momentary drop in system pressure.
- D. Incorrect: Plausible as this is the reverse order of the interlock.

---

Technical Reference(s): **PNS-CC, OP/1/A/1104/008 Rev. 59**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **PNS-CC R15**

Question Source: **B (PNS112202)**

Question History: Last NRC Exam \_\_\_\_\_

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

***Changed distractor 'C' to "prevents over rating the CC system cooling capacity" to increase plausibility. // MB OK***

**1 POINT**

**Question 34**

Which ONE of the following states the automatic OPEN setpoints (psig) for 1RC-1 (Pzr Spray) and 1RC-66 (PORV) in Mode 1?

- |    | <u>1RC-1</u> | <u>1RC-66</u> |
|----|--------------|---------------|
| A. | 2205         | 2450          |
| B. | 2205         | 2500          |
| C. | 2255         | 2450          |
| D. | 2255         | 2500          |

Question 34

**T2/G1 - okm/jmb**

010K4.03, Pressurizer Pressure Control System (PZR PCS)

**Knowledge of PZR PCS design feature(s) and/or interlock(s) which provide for the following:** Over pressure control

(3.8/4.1)

**K/A MATCH ANALYSIS**

Requires knowledge of PZR PCS setpoints for automatic pressure control.

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: 1RC-1 (PZR Spray) setpoint is 2205 psig and 1RC-66 (PORV) is 2450 psig when in HIGH (Mode 1)**
- B. Incorrect: 1RC-1 (PZR Spray) setpoint is correct. 1RC-66 (PORV) setpoint is incorrect. Plausible as 2500 psig is the PZR Safety Valve setpoint.
- C. Incorrect: 1RC-1 (PZR Spray) setpoint is incorrect. Plausible as 2255 psig is the PZR High pressure alarm setpoint. 1RC-66 (PORV) setpoint is correct.
- D. Incorrect: 1RC-1 (PZR Spray) setpoint is incorrect. Plausible as 2255 psig is the PZR High pressure alarm setpoint. 1RC-66 (PORV) setpoint is incorrect as noted above.

---

Technical Reference(s): **PNS-PZR,**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **PNS-PZR R5**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

***Incorporated NRC Comments. // MB OK***

**1 POINT**

**Question 35**

Unit 2 initial conditions:

- Reactor power = 100%
- Feedwater transient occurs

Current conditions:

- Reactor power = 65% stable
- Pzr level = 250" slowly decreasing
- RCS pressure = 2195 psig (highest reached) slowly decreasing
- Pzr temperature = 627°F

Based on the current conditions, which ONE of the following describes the status of the Pzr heaters and the yellow dot on the OAC P/T display?

- A. All Pzr heaters are "OFF" / yellow dot is "ON" the blue saturation line
- B. All Pzr heaters are "OFF" / yellow dot is "LEFT" of the blue saturation line
- C. Some Pzr heaters are "ON" / yellow dot is "ON" the blue saturation line
- D. Some Pzr heaters are "ON" / yellow dot is "LEFT" of the blue saturation line

Question 35

**T2/G1 - okm**

010K5.01, Pressurizer Pressure Control System (PZR PCS)

**Knowledge of the operational implications of the following concepts as they apply to the PZR PCS:** Determination of condition of fluid in PZR, using steam tables (3.5/4.0)

**K/A MATCH ANALYSIS**

Requires knowledge of PZR parameters, controls/interlocks, and use of Steam Tables to determine the condition of the PZR fluid and the response of the PZR PCS.

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: Both parts are incorrect. First part is plausible because normally all heaters will be off at this pressure. Second part is plausible if steam tables are not used correctly.
- B. Incorrect: First part is plausible because normally all heaters will be off at this pressure. The second part is correct because the P/T display will show the yellow Pzr "dot" has moved to the left of the saturation curve whenever subcooled conditions exist in the Pzr (627°F) .
- C. Incorrect: The first part is correct because the transient resulted in an insurge which subcooled the Pzr; this causes the Pzr Water Space Saturation Recovery circuit to turn ON Bank 2 Heaters. The second part is incorrect and plausible if steam tables are not used correctly.
- D. Correct: The transient resulted in an insurge which subcooled the Pzr; this causes the Pzr Water Space Saturation Recovery circuit to turn ON Bank 2 Heaters; the P/T display will show the yellow Pzr "dot" has moved to the left of the saturation curve whenever subcooled conditions exist in the Pzr (627°F)**

---

Technical Reference(s): **PNS-PZR**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **PNS-PZR R22, R27, R29**

Question Source: **Bank (PNS142902)**

Question History: Last NRC Exam \_\_\_\_\_

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

***Reworded stem for clarity. // MB OK***

**1 POINT**

**Question 36**

Unit 2 plant conditions:

- Reactor power = 100%
- I&E technicians went to the wrong unit and incorrectly removed the HI TEMPERATURE TRIP bistable from the 2B RPS Channel

Based on the above conditions, which ONE of the following describes the affect on the Reactor Protection System?

2B RPS Channel is \_\_\_\_\_ and the associated CRD Breaker is \_\_\_\_\_.

- A. Tripped / Closed
- B. Tripped / Open
- C. Not Tripped / Closed
- D. Not Tripped / Open

Question 36

**T2/G1 - okm**

012K6.01, Reactor Protection System

**Knowledge of the effect of a loss or malfunction of the following will have on the**

**RPS: Bistables and bistable test equipment**

(2.8/3.3)

**K/A MATCH ANALYSIS**

Requires knowledge of RPS Channel internal relationships between RPS bistables, relays, and associated CRD Breakers due to loss of a bistable

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: Loss of the bistable results in the 2B K-Relay becoming de-energized. This trips the 2B RPS channel, however power is still available to the 2B CRD Breaker from the UV coil.**
- B. Incorrect: Plausible in that the 2B RPS Channel is tripped; however power is still available to the 2B CRD Breaker from the UV coil.
- C. Incorrect: Plausible in that the student must know that loss of any one bistable will trip an (2B) RPS Channel. Power is still available to the 2B CRD Breaker from the UV coil.
- D. Incorrect: Plausible in that the student must know that loss of any one bistable will trip an (2B) RPS Channel and that power is still available to the UV coil. Removing a bistable will trip the channel but not open the CRD breaker due to requiring 2 RPS channels tripped to de-energize the UV coil. The student may believe that removing the bistable will de-energized the UV coil.

---

Technical Reference(s): **IC-RPS**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **IC-RPS Obj. R7 R22**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Added "I&E technicians went to the wrong unit" to the stem to remove assumptions. Enhanced plausibility statements. // MB OK***

**1 POINT**

**Question 37**

Unit 3 initial conditions:

- Reactor power = 100%
- 3B HPI Pump in service

Current conditions:

- Reactor tripped due to SBLOCA
- ES Digital Channels 1, 3, and 5 failed to automatically actuate

Based on the above conditions, which ONE of the following lists the safety related components that will be in their ES condition?

**ASSUME NO OPERATOR ACTIONS**

- A. 3A HPI Pump / 3B LPI Pump
- B. 3B HPI Pump / 3B LPI Pump
- C. 3A HPI Pump / 3A LPI Pump
- D. 3B HPI Pump / 3A LPI Pump

Question 37

**T2/G1 - okm/jmb**

013K5.01, Engineered Safety Features Actuation System (ESFAS)

**Knowledge of the operational implications of the following concepts as they apply to the ESFAS: Definitions of safety train and ESF channel**

(2.8/3.2)

**K/A MATCH ANALYSIS**

Requires knowledge of the ES Channels to their associated safety train components

**ANSWER CHOICE ANALYSIS**

**Answer: B**

A. Incorrect: 3A HPI Pump would not have gone to its ES position

**B. Correct: All components are on ES Digital Channels 2, 4, and 6**

C. Incorrect: 3A LPI Pump would not have gone to its ES position

D. Incorrect: 3A LPI Pump would not have gone to its ES position

---

Technical Reference(s): **EOP Enc. 5.1 Rev 36a**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **IC-ES Obj. R14, EAP-ESA Obj R2**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

***Incorporated NRC comments. Added status of HPIP to initial conditions for clarity  
// NRC OK***

1 POINT

Question 38

Unit 1 initial conditions:

- Reactor power = 50%

Current conditions:

- LBLOCA occurs
- 1TC de-energized

Based on the above conditions, which ONE of the following describes the status of the below listed Reactor Building Cooling Units five (5) minutes after ES actuates?

**ASSUME NO OPERATOR ACTIONS**

	<u>1A RBCU</u>	<u>1B RBCU</u>
A.	LOW	LOW
B.	LOW	OFF
C.	OFF	LOW
D.	OFF	OFF

Question 38

**T2/G1 - okm/jmb**

022K2.01, Containment Cooling System (CCS)

**Knowledge of power supplies to the following:** Containment cooling fans  
(3.0/3.1)

**K/A MATCH ANALYSIS**

Requires knowledge of power supplies to Reactor Building Cooling Units (RBCUs)

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Plausible as the RBCU power supplies are not sequenced such that the letter designator follows the power supply arrangement. If 1C RBCU fan is applied to TC bus this choice would be plausible.
- B. Incorrect: Plausible if candidate confuses the typical power supply arrangement where TC supplies "B" safety train components and TE supplies "C" safety train components.
- C. Correct: 1TD supplies 1X9 which supplies 1C RBCU and 1TE supplies 1XS3 which supplies 1B RBCU and 1TC supplies 1XS8 which supplies 1A RBCU. ES will only start the 1B & 1C RBCUs.**
- D. Incorrect: Plausible as there is a time delay on the restart of the RBCUs. Incorrect application of the time delay could result in selecting this distracter.

---

Technical Reference(s): **PNS-RBC, EL-EPD**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **PNS-RBC R1, R14, R15**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

***Modified the stem and distractors to specify only two RBCUs and to remove the third distractor (1C RBCU) // MB OK***

**1 POINT**

**Question 39**

Unit 2 initial conditions:

- Reactor Building Spray actuated

Current conditions:

- RB Pressure = 2 psig slowly decreasing

Based on the above conditions, which ONE of the following describes the operation and any control room actions associated with resetting the RB Pressure Contact Buffers and ES Digital Channels 7 & 8?

RB Pressure Contact Buffers \_\_\_\_\_ and ES Digital Channels 7 & 8\_\_\_\_\_.

- A. automatically reset / must be reset manually
- B. automatically reset / automatically reset
- C. must be reset manually / must be reset manually
- D. must be reset manually / automatically reset

Question 39

**T2/G1 - okm**

026A4.05, Containment Spray System (CSS)

**Ability to manually operate and/or monitor in the control room:** Containment spray reset switches

(3.5/3.5)

**K/A MATCH ANALYSIS**

Requires knowledge of ES RBS system operation concerning the automatic features and manual actions needed to reset containment spray channels. (Oconee does not have "Containment spray reset switches")

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: RBS pressure switches supply Analog Channel Contact Buffers that automatically reset themselves when RB pressure decreases below 10 psig; this is unique as compared to the other Analog channels which must be manually reset once actuated. ES Digital Channels 7 & 8 are like the other Digital channels in that they must be manually reset.**
- B. Incorrect: Plausible in that the first part is correct. It is possible for the candidate to confuse the unique aspect of the RBS Contact Buffers automatically resetting to the Digital channels. Second part is plausible because ES permissive signals automatically reset.
- C. Incorrect: First part is plausible in that feedwater pump contact buffers in RPS channels are manually reset. The second part is correct.
- D. Incorrect: First part is plausible in that feedwater pump contact buffers in RPS channels are manually reset. Second part is plausible because ES permissive signals automatically reset.

---

Technical Reference(s): **IC-ES lesson**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **IC-ES R3, R13**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

**Enhanced plausibility statements MB OK**

1 POINT

Question 40

Unit 1 plant conditions:

- SB LOCA has occurred
- EOP Enclosure 5.12 (ECCS Suction Swap to RBES) is in progress
- 1LP-19 & 1LP-20 (1A & 1B RX BLDG SUCTION) are OPEN
- 1LP-21 & 1LP-22 (1A & 1B LPI BWST SUCTION) are OPEN
- RB pressure = 12 psig stable

Based on the above conditions, which ONE of the following describes the suction source that is supplying the RB Spray pumps and the reason for the addition of caustic to the RBES?

- A. BWST / to enhance iodine entrainment in RB Spray water
- B. BWST / to minimize hydrogen production from zirconium-water reaction
- C. RBES / to enhance iodine entrainment in RB Spray water
- D. RBES / to minimize hydrogen production from zirconium-water reaction



**1 POINT**

**Question 41**

Unit 1 initial conditions:

- Reactor Power = 100% stable
- 1RIA-16 = 14 mr/hr increasing
- 1RIA-17 = 0.01 mr/hr stable
- 1RIA-59 = 12 gpm slowly increasing
- 1RIA-60 = 5.8 E -3 gpd stable
- 1RIA-40 in alarm HIGH

Current conditions:

- Reactor power = 45% decreasing
- 1SA-8/E-10 "RM N-16 Primary to Secondary Tube Leak" actuated
- 1RIA-16 = 21 mr/hr increasing
- 1RIA-17 = 3.7 mr/hr increasing
- 1RIA-59 = 27.1 gpm increasing
- 1RIA-60 = 1.9 gpm increasing

Based on the current conditions above, which ONE of the following describes the SG(s) with indications of a tube leak and the procedure that contains the required operator actions used to mitigate this event?

- A. 1A SG ONLY / AP/31 (Primary to Secondary Leakage)
- B. 1A SG ONLY / EOP SGTR Tab
- C. 1A & 1B SG / AP/31 (Primary to Secondary Leakage)
- D. 1A & 1B SG / EOP SGTR Tab

Question 41

**T2/G1 –jmb/okm**

039A2.03, Main and Reheat Steam System (MRSS)

**Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:** Indications and alarms for main steam and area radiation monitors (during SGTR)  
(3.4/3.7)

**K/A MATCH ANALYSIS**

Requires the ability to calculate the leak rate of a SGTR using the change in area rad monitor reading and the presence of Rad monitor alarms and determine the required procedure to be used for the event.

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: Selected SG is incorrect. Plausible as the increase in RIA readings is significantly higher in the 1A SG. Procedure selection is incorrect. Plausible if threshold for transition to SGTR is not recognized.
- B. Incorrect: Selected SG is incorrect. Plausible as the increase in RIA readings is significantly higher in the 1A SG. Procedure selection is correct. Transition to SGTR if leakrate is >25 gpm.
- C. Incorrect: SG selection is correct. Procedure selection is incorrect as noted above
- D. Correct: Both RIA-59 & RIA-60 indicate an increase. 1RIA-59 and -60 both reading elevated indicate leaks in both SGs. Calculated leakrate is >25 gpm transition criteria between 1/AP/31 and SGTR Tab using either the RCS inventory balance or 1RIA-59 & 60.**

---

Technical Reference(s): **EOP Reference Document – SGTR pg 1**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **EAP-SGTR R2, RAD-RIA Obj. R2**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**Modified stem as noted and clarified the specific conditions at which the required procedure is to be chosen (based on the current conditions above)// added words to specify which procedure to mitigate // MB OK**

1 POINT

**Question 42**

Unit 2 initial conditions:

- Reactor power = 100%

Current conditions:

- Feedwater Valve  $\Delta P$  controlling signal fails LOW

**ASSUME NO OPERATOR ACTIONS**

Based on the above conditions, which ONE of the following describes the Main Feedwater Pump Turbines (FWPTs) response and the required actions per AP/28 (ICS Instrument Failures)?

BOTH FWPTs speed \_\_\_\_\_ / Place \_\_\_\_\_

- A. increases to HSS (high speed stop) / BOTH 2A & 2B MAIN FDW PUMPs to Hand and lower speed to prevent tripping FWPs on high discharge pressure
- B. decreases to LSS (low speed stop) / BOTH 2A & 2B MAIN FDW PUMPs to Hand and raise speed to prevent tripping the Reactor on high RCS pressure
- C. increases to HSS (high speed stop) / ALL Feedwater Control Valves (Main & Startup) to Hand and adjust as necessary to restore stable plant conditions
- D. decreases to LSS (low speed stop) / ALL Feedwater Control Valves (Main & Startup) to Hand and adjust as necessary to restore stable plant conditions

Question 42

**T2/G1 - okm**

039A4.03, Main and Reheat Steam System (MRSS)

**Ability to manually operate and/or monitor in the control room:** MFW pump turbines

(2.8/2.8)

**K/A MATCH ANALYSIS**

Requires the ability to diagnose a failure that specifically affects MFW pumps; to understand the affect and to know the required actions.

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: A low valve dp failure causes both MFPs to speed up to the HSS (high speed stop). The operator must take the MFP bailey stations to Hand and decrease speed to restore/stabilize feed flow. Without this action the MFPs may trip on high discharge pressure**
- B. Incorrect: Plausible if mis-diagnoses of low dp means low feed flow and FWPT speed will need to be increased. Correspondingly low feed flow means that the RCS could trip on high RCS pressure
- C. Incorrect: Plausible in that MFP speed will increase but there is no speed correction back to original flow. Composite valve demand error feeds all Fdw Control Valves. Valve dp correction is only applied to the MFPs.
- D. Incorrect: Plausible if misdiagnoses FWPT response and there is no speed correction back to original flow. Composite valve demand error feeds all Fdw Control Valves. Valve dp correction is only applied to the MFPs.

---

Technical Reference(s): **AP/28 Rev. 14 – Valve DP Failure**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **STG-ICS Obj. R21**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

**Modified AA for C and D to explain valve dp signal function to MFPs only. NRC needed copy of AP/28; provided it. MB OK**

2009 NRC REACTOR OPERATOR EXAM

1 POINT

**Question 43**

Unit 3 initial conditions:

- 04:00:00
- Reactor power = 70% stable
- 3A Main Feed Pump suction pressure = 236 psig decreasing

Current conditions:

- 04:01:25
- 3A Main FDW Pump suction pressure = 230 psig increasing

Based on the current conditions, which ONE of the following describes the current status of the Main Feedwater pumps and the plant?

- A. Both MFPs are operating / Plant runback in progress at 20%/min
- B. Both MFPs are operating / Reactor power = 70% stable
- C. 3A MFP has tripped / Plant runback in progress at 20%/min
- D. 3A MFP has tripped / Reactor power = 65% stable

Question 43

**T2/G1 - okm**

059A3.03, Main Feedwater (MFW) System

**Ability to monitor automatic operation of the MFW, including:** Feedwater pump suction flow pressure

(2.5/2.6)

**K/A MATCH ANALYSIS**

Requires knowledge of setpoints for MFP low suction pressure runback / trip and the ability to determine the status of the plant and MFW system components

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: Conditions are met for a CBP/Fdw Pump Low Suction Pressure runback (<235 psig; for >90 sec MFP trips; Runback rate = 20%/min.). Only 85 secs has elapsed therefore runback is still in progress and MFPT is not tripped.**
- B. Incorrect: Plausible in that both MFPs are still operating (< 90 secs); second part is plausible as it is the current power level and is consistent with the FDWP operating status (i.e. no runback to 65% due to FDWPT Trip)
- C. Incorrect: Plausible if the time delay is incorrectly assumed to be met and the MFP has tripped. Runback status is correct.
- D. Incorrect: Plausible if the time delay is incorrectly assumed to be met and the MFP has tripped. Second part is consistent with MFP status and the runback is incorrectly assumed to have stopped at the loss of MFP runback setpoint

---

Technical Reference(s): **CF-FDW, STG-ICS LP pg 27**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **CF-FDW R7 & R38; STG-ICS R3 & R4**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

**No changes. // MB OK**

1 POINT

Question 44

Unit 1 initial conditions:

- Reactor power = 100%
- 1TDEFWP is OOS

Current conditions:

- Both Main Feed Pumps trip
- 1A MDEFWP fails to start
- 1A SG level = 26 inches XSUR decreasing
- 1B SG level = 28 inches XSUR increasing
- Enclosure 5.9 (Extended EFDW Operation) is in progress
- 1FDW-313 and 1FDW-314 (1A & 1B EFDW LINE DISCH X-CONNs) open

Based on the above conditions, which ONE of the following describes the maximum acceptable flowrate (gpm) allowed to each SG at the same time per EOP Rule 7?

- A. 1A SG = 300 / 1B SG = 300
- B. 1A SG = 500 / 1B SG = 450
- C. 1A SG = 600 / 1B SG = 600
- D. 1A SG = 100 / 1B SG = 600

Question 44

**T2/G1 - okm**

061A2.04, Auxiliary / Emergency Feedwater (AFW) System

**Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:** pump failure or improper operation

(3.4/3.8)

**K/A MATCH ANALYSIS**

Requires an understanding of the impact of a loss of 2 EFDWPs and the direction contained in the EOP Rules to address the condition

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: Total flowrate given is the pump flow limit and is balanced between SG's which would be desired.**
- B. Incorrect: Total flowrate given is incorrect. Plausible as it the limit associated with the TDEFDWP. 1A SG would require a higher flow rate to recover level as it is lower than the 1B SG.
- C. Incorrect: Plausible as the values given would be the normal values if both the MDEFDW pumps are running.
- D. Incorrect: Plausible as the flowrates are consistent with the Dry SG flow limitation for feeding the 1A SG vice with both MDEFDW pumps running.

---

Technical Reference(s): **EOP Rule 3 & Rule 7 Rev 36**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **EAP-LOHT Obj. R26, R27**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**No changes. // MB OK**

1 POINT

Question 45

Unit 1 plant conditions:

- Reactor power = 100%
- Pressurizer level = 219 inches and stable
- 1B1 RCP parameters:
  - Lower seal cavity pressure = 900 psig decreasing
  - Upper seal cavity pressure = 100 psig decreasing
  - Seal Return flow = 1.1 gpm decreasing
  - Seal Leakage flow = 0.9 gpm increasing

Based on the above conditions, which ONE of the following 1B1 RCP seal(s) are failing?

- A. Lower ONLY
- B. Upper ONLY
- C. BOTH Lower and Upper
- D. BOTH Middle and Upper

Question 45

**T2/G1 - okm**

003K6.02, Reactor Coolant Pump System

**Knowledge of the effect of a loss or malfunction of the following will have on the RCPS components: RCP Seals and Seal Water Supply**

(2.7/3.1)

**K/A MATCH ANALYSIS**

Requires knowledge and comprehension of the indications of a loss of RCP seals

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: If ONLY the Lower seal failed, then Upper cavity pressures would increase to ~ 1025 psig and lower cavity pressure would increase to ~ 2150 psig.
- B. Incorrect: Plausible in that if ONLY the upper seal failed, then lower cavity pressure would decrease to ~1050 psig (1/2 system pressure). But since lower cavity pressure is still decreasing (900 psig and decreasing) then the Middle Seal is degrading also. Seal Return (SR) decreasing and Seal Leakage (SL) increasing is also an indication that the upper seal is failing (less restriction to flow).
- C. Incorrect: If the lower and upper seals both failed, upper cavity pressure would decrease to ~atmospheric (Same as given parameter change) and lower cavity pressure would increase up to ~2150 psig (opposite from given parameter change). Seal return (SR) flow would decrease as upper cavity pressure decreases due to greater back pressure from the LDST than atmospheric or the QT. SR flow would become Seal Leakage flow.
- D. Correct: The middle and upper seals both failed. The dP across the lower seal increases to 2150 psig and both the lower and upper cavity pressures decrease toward atmospheric or QT. Seal return flow decreases as upper cavity pressure decreases due to greater back pressure from the LDST than to atmospheric or to the QT. Seal Leakage flow increases as Seal Return flow becomes leakage flow.**

---

Technical Reference(s): **PNS-CPS**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **PNS-CPS R20**

Question Source: **B (PNS072006)**

Question History: Last NRC Exam \_\_\_\_\_

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

**Modified distractor B (and AA) to be Upper Seal only failed // MB OK**

**1 POINT**

**Question 46**

Unit 1 initial conditions:

- Reactor power = 22% power
- CT1 Amps = 2000
- Central Switchyard is energizing the STBY Buses
- PCB 17 (OCONEE WH. STARTUP TRANS. CT1 TIE) is open for maintenance

Current conditions:

- Yellow Bus lockout occurs

Based on the conditions above, which ONE of the following alignments will supply power to Unit 1's Main Feeder Buses?

- A. 1T (Unit 1 Auxiliary Transformer)
- B. CT-1 (Unit 1 Startup Transformer)
- C. CT-4 (Keowee Underground to STBY Buses Transformer)
- D. CT-5 (100KV line to STBY Buses)

Question 46

**T2/G1**

062A3.05, AC Electrical Distribution System

**Ability to monitor automatic operation of the ac distribution system, including:**

Safety-related indicators and controls

(3.5/3.6)

**K/A MATCH ANALYSIS**

Requires ability to determine auto transfer of offsite electrical power to the onsite 4160 VAC distribution system following a yellow bus lockout

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: Plausible if fail to recognize that conditions given indicate that 1T is not currently supplying power to the MFBs
- B. Incorrect: Plausible as CT-1 could be energized via the RED bus if PCB-17 was closed/operable and this would be the first choice of power after a unit trip
- C. Incorrect: Plausible as CT-4 would be the preferred source of power to the standby buses normally, however since CT- 5 is already supplying the bus CT-4 will not.
- D. **Correct: If the Red bus path is not available and Central path is established this is the power path since the SL breakers are closed therefore the SK breakers can NOT close**

---

Technical Reference(s): **SA-3/C3, OP/0/1108/01 Encl 3.37, EL-EPD, OP-OC-EL-EPD-2**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EL-EPD Obj R17 & 20**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**Modified stem to make 1T a more plausible distractor // MB OK**

**1 POINT**

**Question 47**

Initial conditions:

- Both Keowee Units generating to the grid at  $\approx$  60 MWe
- ACB-4 closed

Current conditions:

- A SBLOCA occurs on Unit 2
- When ES channels 1&2 actuate
  - Keowee Unit #2 Emergency locks out
  - Keowee Main Step-Up Transformer locks out

Within thirty (30) seconds of these actions, which ONE of the following Keowee breaker combinations should exist?

- A. ACB-1 open and ACB-2 closed
- B. ACB-1 closed and ACB-3 closed
- C. ACB-3 open and ACB-4 closed
- D. ACB-3 closed and ACB-4 open

Question 47

**T2/G1**

062K1.02, AC Electrical Distribution System

**Knowledge of the physical connections and/or cause effect relationships between the ac distribution system and the following systems: ED/G**

(4.1/4.4)

**K/A MATCH ANALYSIS**

Requires knowledge of KHU Step-up Transformer lockout and Emergency lockout of KHU and determination of resulting lineup to electrical distribution system

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect - ACB-2 can't close KHU-2 locked out. Plausible if interface between ES start and emergency lockout is misinterpreted
- B. Incorrect - ACB-1 won't close because Keowee Main Xfmer LO signal
- C. Incorrect – ACB-3 closes 8.5 sec after the Emerg start signal (Zone overlap Protection). KHU-2 Emergency Lock out opens ACB-4 and prevents auto closure
- D. Correct - ACB-3 closes 8.5 sec after the Emerg start signal if ACB-4 opens due to Emerg LO and the Keowee Main Xfmer is Locked out thus completing the requirements for Zone Overlap Protection**

---

Technical Reference(s): **OP/0/A/2000/100 KHS Alarm Response Guide SA-1/A-1**  
**OP/2/A/2000/102 KHU-2 Alarm Response Guide 2SA-2/A-3, EL-KHG**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EL-KHG Obj. R10, R11**

Question Source: **B (EL041107)**

Question History: Last NRC Exam \_\_\_\_\_

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

**No changes. // MB OK**

**1 POINT**

**Question 48**

Station initial conditions:

- All three units Reactor power = 100%

Current conditions:

- All Unit's 4160v Main Feeder Busses are de-energized
- Unit 1, 2, and 3 EOP Blackout tabs in progress

Based on the above conditions, which ONE of the following describes the required status of Unit 1 Essential Inverters per the EOP Enclosure 5.38 (Restoration of Power) and why?

Unit 1's Essential Inverters...

- A. remain energized to provide power to ES channels.
- B. remain energized to provide control power to 4160v.
- C. are de-energized to prevent inverter damage.
- D. are de-energized to extend available battery life.

Question 48

**T2/G1**

063A1.01, DC Electrical Distribution System

**Ability to predict and/or monitor changes in parameters associated with operating the DC electrical system controls including:** Battery capacity as it is affected by discharge rate

(2.5/3.3)

**K/A MATCH ANALYSIS**

Requires knowledge of required actions within procedures and the correlation of the impact of high battery load on available battery capacity as the bases for actions directed in the EOP

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: Plausible if ES Channels (are vital loads from KVIA,B,C,D) are confused with essential loads (from KI, KU, KX); vital loads must be differentiated from essential loads
- B. Incorrect: Plausible if control power (ex. for breakers, switches, etc) are incorrectly assumed to be essential inverter loads
- C. Incorrect: Incorrect but plausible in that inverters could be damaged due to high current as input voltages start to decrease.
- D. Correct: Essential Inverters KI, KU, & KX DC input breakers are opened to extend battery life per direction given from the EOP SBO tab (Encl. 5.38 and tab Step 2.38)**

---

Technical Reference(s): **Rev 36 of EP/1/A/1800/01, EAP-SBO; AP/11**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-SBO Obj. R8, EL-DCD Obj R1**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Wrote new question to improve plausibility. // MB OK***

1 POINT

Question 49

Operators are preparing to synchronize KHU-2 to the grid per OP/0/A/1106/019, Keowee Hydro At Oconee

The operator notes the following indications:

- Keowee 2 Line Volts = 13.8 kV
- Keowee 2 Output Volts = 15.4 kV
- Grid Frequency = 60 cycles
- Keowee Frequency = 60.6 cycles

Based on the above conditions, which one of the following describes the control that will be used to adjust the synchroscope indication and what is the response when ACB 2 is closed?

The \_\_\_\_\_ will be used to adjust the synchroscope indication and \_\_\_\_\_.

- A. UNIT 2 AUTO VOLTAGE ADJUSTER / ACB 2 will NOT receive a trip signal as a direct result of the line voltage differential.
- B. UNIT 2 SPEED CHANGER MOTOR / after 5 seconds ACB 2 will receive a trip signal as a direct result of the line voltage differential
- C. UNIT 2 AUTO VOLTAGE ADJUSTER / after 5 seconds ACB 2 will receive a trip signal as a direct result of the line voltage differential
- D. UNIT 2 SPEED CHANGER MOTOR / ACB 2 will NOT receive a trip signal as a direct result of the line voltage differential

Question 49

**T2/G1**

064A2.03, Emergency Diesel Generator (ED/G) System

**Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:**

Parallel operation of ED/Gs

(3.1/3.1)

**K/A MATCH ANALYSIS**

Requires knowledge of paralleling operations, breaker protective signals, and procedural requirements to control or mitigate paralleling operations problems

**ANSWER CHOICE ANALYSIS**

**Answer: D**

**Out of tolerance circuit protection is only active for Emergency Starts. Speed Changer Motor (SCM), Auto Voltage Adjuster (AVA)**

A. Incorrect: Plausible in that the second part is correct. First part is wrong but plausible if it is not known that the SCM not the AVA is used to adjust the synch scope.

B. Incorrect. Plausible in that the first part is correct. Second part is wrong but plausible if the OOT protection circuit is misapplied (only for Emerg Starts) in which case the breaker still would not trip as the voltage high but still within tolerance.

C. Incorrect: First part is wrong but plausible if it is not known that the SCM not the AVA is used to adjust the synch scope. Second part is wrong but plausible if the OOT protection circuit is misapplied (only for Emerg Starts) in which case the breaker still would not trip as the voltage high but still within tolerance.

**D. CORRECT: Keowee frequency is higher than grid so synchroscope will be spinning clockwise (CW) which will require use of the MSC. Out of tolerance circuit protection will not trip ACB 2.**

Plausibility is based on memorizing the ACB auto trip feature and correctly calculating less than 10% normal voltage. Also, plausibility is hinged on the applicant knowing how the synch scope will respond to the frequency differential.

---

Technical Reference(s): **EL-KHG, OP/0/A/1106/019 Rev 83**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EL-KHG R11, R4, R20, R19, R7**

Question Source: **M (EL041110)**

Question History: Last NRC Exam **2006 ONS RO NRC Exam Q#58**

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

**Modified stem and all answers to improve plausibility // Changed Keowee output voltage to 15.4 to improve plausibility. MB OK**

**1 POINT**

**Question 50**

Which ONE of the following describes the operation of the Unit Vent Radiation Monitors RIA-45 and RIA-46 when the switchover acceptance range setpoint is reached?

RIA-45 will read \_\_\_\_\_ and RIA-46 will provide \_\_\_\_\_

- A. offscale high / only alarm and unit vent radiation level indication.
- B. offscale high / the same interlock functions that RIA-45 performs.
- C. ZERO / only alarm and unit vent radiation level indication.
- D. ZERO / the same interlock functions that RIA-45 performs.

Question 50

**T2/G1**

073G2.1.27, Process Radiation Monitoring (PRM) System  
**Knowledge of system purpose and/or function**  
(3.9/4.0)

**K/A MATCH ANALYSIS**

Requires knowledge of the functions provided by the Process Radiation monitoring system

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: First part is incorrect. Plausible in that student could have a misconception and believe that RIA-45 stays off-scale high. RIA-45 will read zero. RIA-46 will provide the same interlock functions as RIA-45 (which would include tripping Purge fans and closing Purge valves).
- B. Incorrect: First part is incorrect. Plausible in that student could have a misconception and believe that RIA-45 stays off-scale high. RIA-45 will read zero. Student could have a misconception and believe that RIA-45 stays off-scale high.
- C. Incorrect: First part is correct. RIA-46 will provide same interlock function as RIA-45.
- D. Correct: First part is correct. RIA-45 will read zero and RIA-46 will provide the same interlock functions as RIA-45 (which would include tripping Purge fans and closing Purge valves).

---

Technical Reference(s): **RAD-RIA**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **RAD-RIA Obj R1, R2**

Question Source: **B RAD011501**

Question History: Last NRC Exam \_\_\_\_\_

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

***Replaced with bank question at proper level of difficulty. // MB OK***

**1 POINT**

**Question 51**

Unit 1 initial conditions:

- Reactor power = 100%

Current conditions:

- A, B, and C LPSW pumps tripped
- AP/24, Loss of LPSW in progress

Based on the above conditions, which ONE of the following conditions will result in EOP entry?

- A. Pressurizer level = 278 inches
- B. Any one CRD stator temperature = 192 °F
- C. Any RCP Motor Stator temperature = 265 °F
- D. Main Turbine journal bearing #9 vibration = 17 mils

Question 51

**T2/G1**

076G2.4.2, Service Water System

**Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.**

(4.5/4.6)

**K/A MATCH ANALYSIS**

Requires knowledge of criteria/setpoints in abnormal procedures which require EOP entry

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect – Plausible in that loss of CC will occur which will cause a loss of Letdown and Pzr level to increase. Pzr Level >375 inches is Rx trip criteria
- B. Incorrect – Plausible in that loss of CC will occur but wrong in that two CRD Stators (not any; one) must be  $\geq 180$  °F per AP/20 which can be initiated from AP/24
- C. Incorrect – Plausible per AP/24, is correct but the setpoint for RCP Motor Stator (T) is > 295 °F.
- D. Correct - Per AP/24, if any Main Turbine journal bearing vibration (bearings 1-10) is > 12 mils, THEN trip the Rx and trip the Turbine Generator. When bringing the turbine up to full speed between 800-1400 rpm the vibration trip is >15 mils**

---

Technical Reference(s): **AP/24 Rev 23 , AP/20 Rev 9**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-APG Obj R9**

Question Source: **B (EAP210966)**

Question History: Last NRC Exam \_\_\_\_\_

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

**Added 'one' to answer B for clarity. // MB OK**

**1 POINT**

**Question 52**

Unit 3 initial conditions:

- Reactor Power = 100%
- 3A LPSW Pump operating
- LPSW Line leak occurs

Current conditions:

- Unit 3 LPSW Pressure = 60 psig decreasing slowly
- Operating LPSW pump(s) amps slowly increasing

Based on the conditions above, which ONE of the following describes the status of the Unit 3 LPSW Pumps and an appropriate action per AP/24 (Loss of LPSW)?

- A. ONLY 3A LPSW pump is running / secure operating LPSW pump
- B. ONLY 3A LPSW pump is running / reduce LPSW loads as needed
- C. BOTH 3A and 3B LPSW pumps are running / reduce LPSW loads as needed
- D. BOTH 3A and 3B LPSW pumps are running / secure operating LPSW pumps

Question 52

**T2/G1**

076K4.02, Service Water System

**Knowledge of SWS design feature(s) and/or interlock(s) which provide for the following:** Automatic start features associated with SWS pump controls  
(2.9/3.2)

**K/A MATCH ANALYSIS**

Requires knowledge of the LPSW pump auto start setpoint and status with the Standby LPSW Pump Auto Start Circuit in DISABLE and the action required if pressure is below the setpoint.

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Pump status is incorrect in that both LPSW pumps are running because current LPSW pressure is below the Auto Start signal setpoint of 70 psig. Cross-tie is incorrect but plausible in that the AP only directs this if NO Unit 3 LPSW pumps are available.
- B. Incorrect: Pump status is incorrect as described above but plausible if Auto start interlock is misapplied or setpoint is assumed incorrectly. Action in second part is correct.
- C. Correct: Both LPSW pumps are running because current LPSW pressure is below the Auto Start signal setpoint of 70 psig. Action directed if LPSW pressure remains below normal is to reduce LPSW loads.**
- D. Incorrect: Pump status is correct as noted above in that current LPSW pressure is below the Auto Start signal setpoint of 70 psig. Cross-tie is incorrect but plausible in that the AP only directs this if NO Unit 3 LPSW pumps are available.

---

Technical Reference(s): **AP/1/A/1700/024, AP/3/A/1700/024, 3SA-9/A-9**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **SSS-LPW R23, EAP-APG R9**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**Modified second part of choice A and D (and associated analyses) // Added "Operating LPSW pump(s) amps slowly increasing" to current conditions.**

**Modified second part of A and D to read "secure operating LPSW pumps" MB OK**

**1 POINT**

**Question 53**

Initial conditions:

- IA Pressure = 105 psig stable
- IA-2718 (Air Supply to Radwaste Facility) Open
- Radwaste Air pressure 78 psig (and stable)
- Instrument air compressors are aligned as follows:
  - Primary IA compressor is Operating
  - Backup IA compressors "A" and "B" in Standby 1
  - Backup IA compressor "C" in Standby 2
  - Auxiliary IA compressors in Auto

Current conditions:

- IA pressure decreased to 91 psig and is stable

Based on the conditions above, which ONE of the following describes the status of IA components?

- A. Only Auxiliary IA Compressors start
- B. Only Backup IA compressors "A" & "B" start
- C. ALL Backup IA compressors start; Auxiliary IA Compressors start
- D. ALL Backup IA compressors start; IA-2718 (Air Supply to Radwaste Facility) CLOSES

Question 53

**T2/G1**

078A3.01, Instrument Air System (IAS)

**Ability to monitor automatic operation of the IAS, including:** Air pressure  
(3.1/3.2)

**K/A MATCH ANALYSIS**

Requires ability to predict IA system automatic response to a lowering IA system pressure

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: The AIA compressors do not start until AIA receiver pressure reaches 88 psig. the stem identifies pressure at 91 psig.
- B. Correct: ONLY the 'A' and 'B' B/U IA compressors will start and they started at 93 psig.**
- C. Incorrect: Same as 'A' above for B/U instrument air compressors. The AIA compressors do not start until AIA receiver pressure reaches 88 psig.
- D. Incorrect: See 'B' above, IA-2718 (Air Supply to Radwaste Facility) closes at IA pressure below 85 psig.

---

Technical Reference(s): **AP/22 Rv 35, SSS-IA**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **SSS-IA Obj. R8 & R39**

Question Source: **B (SSS040801)**

Question History: Last NRC Exam \_\_\_\_\_

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

***Modified stem to improve clarity // MB OK***

**1 POINT**

**Question 54**

Unit 2 plant conditions:

- Reactor power = 100%
- RB pressure = 12.3 psia

Based on the above conditions, which ONE of the following describes how RB pressure will be increased to within the limits per PT/2/A/0600/001 (Periodic Instrument Surveillance)?

- A. 2PR-42 (RB Purge Disch to Unit Vent) will be opened and this alignment is limited to 1 hour.
- B. 2PR-42 (RB Purge Disch to Unit Vent) will be opened and this alignment is limited to 4 hours.
- C. 2IA-90 (IA Pent Isolation) will be opened and this alignment is limited to 1 hour.
- D. 2IA-90 (IA Pent Isolation) will be opened and this alignment is limited to 4 hours.

Question 54

**T2/G1**

078K1.03, Instrument Air System (IAS)

**Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems:** Containment air

(3.3/3.4)

**K/A MATCH ANALYSIS**

Requires knowledge of physical relationship between IA system and containment (RB) and the requirements associated with aligning IA to the RB during plant operation

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: First part is incorrect in that this is the lineup to vent the RB; plausible if it is miscalculated from the given pressure that RB pressure is too high and needs to be vented/lowered. Time limit is incorrect but plausible because TS requires containment pressure to be restored to within limits within 1 hour.
- B. Incorrect: First part is incorrect in that this is the lineup to vent the RB; plausible if it is miscalculated from the given pressure that RB pressure is too high and needs to be vented/lowered. Time limit is correct.
- C. Incorrect: First part is correct. IA-90 must be opened to pressurize containment pressure to within limits. Time limit is incorrect but plausible because TS requires containment pressure to be restored to within limits within 1 hour.
- D. Correct. IA-90 must be opened to return containment pressure to within limits and it is limited to 4 hours.**

---

Technical Reference(s): **OP/0/A/1106/027 Encl 4.39, PT/600/01, OP/0/A/1102/014**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **SSS-IA Obj R14**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Wrote a new question to improve plausibility // Added "increased to within" to the stem to improve plausibility. // MB OK***

1 POINT

Question 55

Unit 1 initial conditions:

- Reactor Power = 100%
- Reactor Building average temperature = 120°F stable
- RBCU Status:
  - 1A - High Speed
  - 1B - High Speed
  - 1C - High Speed

Current conditions:

- Inadvertent ES Channel 5 actuation

Based on the conditions above, which ONE of the following describes the response of RB Pressure and the RB high pressure limit per TS 3.6.4 (Containment Pressure)?

RB Pressure will \_\_\_\_\_ and the RB high pressure TS Limit is \_\_\_\_\_.

- A. increase /  $\leq + 1.2$  psig
- B. increase /  $\leq + 2.45$  psig
- C. decrease /  $\leq + 1.2$  psig
- D. decrease /  $\leq + 2.45$  psig

Question 55

**T2/G1**

103A1.01, Containment System

**Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls**

**including:** Containment pressure, temperature, and humidity

(3.7/4.1)

**K/A MATCH ANALYSIS**

Requires the ability to predict the impact of changing RBCU configuration on RB pressure due to the resulting change in temperature and the operating limit that is affected by the change

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: The first part is correct. ES channel 5 actuation causes 1A & 1B RBCUs to shift to low speed which reduces cooling air flow. This results in less heat removal. RB pressure will increase due to the heat up of the containment environment. The second part is correct. The RB high pressure limit Per TS 3.6.4 is +1.2 psig.**
- B. Incorrect: First part is correct as describe above. The second part is incorrect.  $\leq + 2.45$  psig is plausible in that the low TS limit is (-) 2.45 psig not (+) 2.45 psig.
- C. Incorrect: First part is incorrect. It is plausible if the candidate fails to realize that two RBCUs will shift to low speed or that low speed will remove less heat. It is also plausible if it is misunderstood that the increase in RB temperature will not cause a corresponding increase in RB pressure. The second part is correct. The RB high pressure limit Per TS 3.6.4 is +1.2 psig.
- D. Incorrect: First part is incorrect. It is plausible if the candidate fails to realize that two RBCUs will shift to low speed or that low speed will remove less heat. It is also plausible if it is misunderstood that the increase in RB temperature will not cause a corresponding increase in RB pressure. The second part is incorrect.  $\leq + 2.45$  psig is plausible in that the low TS limit is (-) 2.45 psig not (+) 2.45 psig.

---

Technical Reference(s): **OP/1/A/1104/015, PT/1/A/0600/001, TS 3.6.4**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **PNS-RBC R20, ADM-TSS R4**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Wrote new question // Changed B and D to " $\leq + 2.45$  psig" to improve plausible. // Changed stem // MB OK // Fixed answer analysis to explain answer and plausibility statements. /// Added TS name to stem.***

**1 POINT**

**Question 56**

Unit 1 initial conditions:

- RCS Cooldown is in progress
- RCS temperature = 240°F
- RCS pressure = 260 psig
- PORV Setpoint Selector is in LOW
- RC LR PRESS ENABLE Switch is inadvertently placed in OFF

Current conditions:

- RCS pressure = 450 psig

Based on the conditions given, which ONE of the following describes the operation of the PORV?

- A. PORV will open if pressure reaches 2450 psig.
- B. PORV will open if the LR PRESS ENABLE Switch is placed back in ON.
- C. PORV will NOT open automatically OR manually
- D. PORV will NOT open automatically but can be opened manually

Question 56

**T2/G2**

002K4.10, Reactor Coolant System (RCS)

**Knowledge of RCS design feature(s) and/or interlock(s) which provide for the following:** Overpressure protection

(4.2/4.4)

**K/A MATCH ANALYSIS**

Requires knowledge of operation of the PORV during Low Temperature Overpressure Protection conditions

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: Plausible if the candidate believes that the normal opening setpoint is still in effect.
- B. Incorrect: Immediate opening of the PORV is plausible if candidate believes they have reached the Low range PORV setpoint.
- C. Incorrect: First part is correct. PORV will not operate in AUTO as the pressure input is removed from the circuit with the LR Selector in OFF and the PORV selected to LOW. Second part is incorrect; Manual operation of the PORV is not affected. Plausible since the selector switch is a part of the operating circuit.
- D. **Correct: PORV will not operate in AUTO as the pressure input is removed from the circuit if the LR Selector is in OFF with the PORV selected to LOW. Manual operation of the PORV is not affected.**

---

Technical Reference(s): **PNS-PZR**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **PNS-PZR R37**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**Changed distractors A and B to improve plausibility. // MB OK**

**1 POINT**

**Question 57**

Unit 1 Power Range NI indications are as follows:

- NI-5 = 98.7%
- NI-6 = 99.2%
- NI-7 = 99.3%
- NI-8 = 98.8%
- NI-9 = 99.1%

Based on the conditions above, which ONE of the following NI signals will be supplying the input to the Unit 1 Chessell NI Chart Recorder?

- A. NI-5
- B. NI-6
- C. NI-7
- D. NI-9

Question 57

**T2/G2**

015A3.01, Nuclear Instrumentation System (NIS)

**Ability to monitor automatic operation of the NIS, including:** Console and cabinet indications

(3.8/3.8)

**K/A MATCH ANALYSIS**

Require the ability to determine which NI channel will be auto selected to provide the signal to the control board chart recorder to indicate reactor power.

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: Recorder uses second highest of NI-5 through 8, NI-5 is not the second highest
- B. Correct: NI-6 is the second highest of NI-5 through 8**
- C. Incorrect: NI-7 is not the second highest of NI-5 through 8. Plausible as it is the highest (most conservative) NI indication.
- D. Incorrect: NI-9 is no longer input to Chessell. Plausible as prior to the recent modification NI-5, 6 & 9 were median selected and NI-9 is the median of the 5, 6 & 9. (Unit 2 used this method as of 10/22/08)

---

Technical Reference(s): **IC-NI**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **IC-NI Obj. R24**

Question Source: **B (IC072402)**

Question History: Last NRC Exam \_\_\_\_\_

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

***Incorporated NRC comment.// MB OK***

**1 POINT**

**Question 58**

Unit 1 initial conditions:

- Reactor power = 40%

Current conditions:

- Final Feedwater temperature controlling signal fails HIGH

Based on the conditions above, which ONE of the following describes the initial plant response and the appropriate ICS station(s) used to stabilize the plant in accordance with AP/28 (ICS Instrument Failures)?

Actual Feedwater Flow will \_\_\_\_\_. Place the Diamond Panel in Manual and \_\_\_\_\_ in Hand.

- A. decrease / 1A & 1B FDW Masters
- B. decrease / Steam Generator Master
- C. increase / 1A & 1B FDW Masters
- D. increase / Steam Generator Master

Question 58

**T2/G2**

016K3.04, Non-Nuclear Instrumentation System (NNIS)

**Knowledge of the effect that a loss or malfunction of the NNIS will have on the following:** MFW system

(2.6/2.7)

**K/A MATCH ANALYSIS**

Requires knowledge of the effect of a failed FW Temp instrument on the ICS control of the FDW System and the appropriate FDW controls to operate to stabilize the plant

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Plant response is incorrect. Plausible if the impact of the temperature compensation on the flow instrument is misapplied and assumption is that indicated flow would go down resulting in indicated flow being < FDW demand. Hand/Auto Stations identified in AP/28 are the FDW Masters only.
- B. Incorrect: Plant response is incorrect. Plausible if the impact of the temperature compensation on the flow instrument is misapplied and assumption is that indicated flow would go down resulting in indicated flow being < FDW demand. SG Master Hand/Auto Station is plausible if the failed signal is incorrectly assumed to be applied upstream of the SG Master instead of upstream of the FDW Loop Masters.
- C. Correct: FW Temp failing high will increase FDW Demand signal and raise actual FDW Flow. Hand/Auto Stations identified in AP/28 are the FDW Masters only.**
- D. FW Temp failing high will increase FDW Demand signal and raise actual FDW Flow. SG Master Hand/Auto Station is plausible if the failed signal is incorrectly assumed to be applied upstream of the SG Master instead of upstream of the FDW Loop Masters.

---

Technical Reference(s): **AP/28 Encl 4J, Rev 14**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **STG-ICS Obj R14, SAE-L 087 Obj R17 & R4**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Incorporated NRC comment. // MB OK***

2009 NRC REACTOR OPERATOR EXAM

**1 POINT**

**Question 59**

Which ONE of the following describes the Train A ICCM/RVLIS plasma display indication of CORE SCM for a superheated core and the Core Exit Thermocouples used to calculate this indication.

- A. Reverse video with negative numbers / Average of the 5 highest of the 12 for that train of ICCM
- B. Red flashing negative numbers / Average of the 5 highest of the 12 for that train of ICCM
- C. Reverse video with negative numbers / Average of the 5 highest of the 24 qualified
- D. Red flashing negative numbers / Average of the 5 highest of the 24 qualified

Question 59

**T2/G2-okm**

017K5.02, In-Core Temperature Monitor System (ITM)

**Knowledge of the operational implications of the following concepts as they apply to the ITM system:** Saturation and subcooling of water

(3.7/4.0)

**K/A MATCH ANALYSIS**

Requires knowledge of ITM signal input to Core SCM indications and determining the state of the core coolant in relation to saturation conditions

Knowledge of saturated conditions are being tested by having the candidate differentiate between saturated and superheated ITM indications

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. CORRECT: Superheated conditions are correctly displayed by Red/Flashing/Negative Numbers on a reverse video background; ITM SCM indication comes from the Avg of the 5 Highest reading CETCs for each ICCM train**
- B. Incorrect: 2<sup>nd</sup> part is correct; 1<sup>st</sup> part is incorrect but plausible in that red flashing negative numbers are displayed for superheated core conditions on the OAC Standout digital SCM monitors which do not always provide qualified indications.
- C. Incorrect: 1<sup>st</sup> part is correct; 2<sup>nd</sup> part is incorrect but plausible in that the avg of the five highest of the 24 qualified CETCs is used for the OAC SCM display when >2% power.
- D. Incorrect: Both parts incorrect. 1<sup>st</sup> part is incorrect but plausible in that red flashing negative numbers are displayed for superheated core conditions on the OAC Standout digital SCM monitors which do not always provide qualified indications. 2<sup>nd</sup> part is incorrect but plausible in that the avg of the five highest of the 24 qualified CETCs is used for the OAC SCM display when >2% power.

---

Technical Reference(s): **IC-RCI**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **IC-RCI R44**

Question Source: **B (IC084202)**

Question History: Last NRC Exam \_\_\_\_\_

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

**Removed (or B) from stem // MB OK**

**1 POINT**

**Question 60**

Unit 1 initial conditions:

- Reactor power = 100%
- 1KI is de-energized

Current conditions:

- Reactor trip

Based on the conditions given, which ONE of the following describes the operation of the Turbine Bypass valves (TBVs)?

The TBVs...

- A. fail closed.
- B. fail to 50% open.
- C. will continue to function normally in Auto.
- D. will be controlled manually from the control room.

2009 NRC REACTOR OPERATOR EXAM

Question 60

**T2/G2**

041K2.01, Steam Dump System (SDS)/Turbine Bypass Control

**Knowledge of bus power supplies to the following:** ICS, normal and alternate power supply  
(2.8/2.9)

**K/A MATCH ANALYSIS**

Requires knowledge that KI supplies ICS Auto power and the effect of a loss of ICS Auto power on the operation of the Turbine Bypass Valves (TBVs)

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: Plausible as this is the response to a loss of ICS Auto & Hand power.
- B. Incorrect: Plausible as this is a common hand auto station response to a loss of Hand power while the station is in hand per the alarm response. The TBV controllers have Auto & Hand power supplied to the controller in Hand.
- C. Incorrect: Plausible as this is the response to a loss of ICS Hand power.
- D. Correct: Per 1SA-2/B-11 the TBV's will swap to hand and are operable in Hand only.**

---

Technical Reference(s): **1SA-2/B-11, AP/23 Rev 17**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **STG-ICS Obj R33**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Discuss with NRC. All other H/A stations fail to mid position. // MB OK***

**1 POINT**

**Question 61**

Unit 1 initial conditions:

- Mode 6
- Defueling in progress
- 1RIA-6 (Spent Fuel Pool Area Monitor) = 4 mr/hr stable

Current conditions:

- 1RIA-6 monitor power supply fuse blows
- 1RIA-6 local reading = 0 mr/hr
- 1RIA-6 View Node indication is magenta

Based on the conditions above, which ONE of the following describes the impact on fuel handling activities per OP/1/A/1502/007 (Operations Defueling/Refueling Responsibilities)?

Fuel Handling activities in the SFP may...

- A. NOT continue until a replacement monitor is in place that is equivalent to 1RIA-6.
- B. continue because only the SFP Portable Bridge monitor is required.
- C. NOT continue until continuous RP coverage is present on the SFP Bridge.
- D. continue provided RIA-41 (SFP Gas) is operable.

Question 61

**T2/G2 - jmb**

072A2.03, Area Radiation Monitoring System

**Ability to (a) predict the impacts of the following malfunctions or operations on the ARM system- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Blown power-supply fuses  
(2.7/2.9)**

**K/A MATCH ANALYSIS**

Requires ability to predict the impact of a blown power supply fuse on SFP Area Rad monitor on the alarm function and Fuel Handling activities

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: FH activity must stop. Both monitors are required per OP/1/A/1502/007 and SLC 16.12.2. The replacement monitor must be a portable instrument equivalent in range, sensitivity, and able to alarm locally**
- B. Incorrect: Plausible if the incorrect assumption is made that only one the two monitors is required
- C. Incorrect: Plausible in that FH activity must stop. Incorrect in that continuous RP coverage would be advantageous but this does not procedural compliance for loss of local monitors
- D. Incorrect: Plausible if the candidate believes that RIA-41 can be taken credit for monitoring SFP during fuel movement. RIA-6 must be in service to move fuel in the SFP.

---

Technical Reference(s): **OP/1/A/1502/007 Rev 81 and SLC 16.12.2.**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **RAD-RIA Obj R9, ADM-TSS Obj R4**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**Changed distractor 'D' to improve plausibility. // MB OK**

**1 POINT**

**Question 62**

Unit 1 initial conditions:

- Mode 6

Current conditions:

- FTC Level = 20.9 ft (placard on FTC Wall) decreasing
- East fuel carriage is in the RB and empty
- West fuel carriage is in the SFP and empty
- Main Fuel Bridge in transit to the upender with a spent fuel assembly in the mast
- Section 4D (Fuel Transfer Canal Flooded) of AP/26 (Loss of Decay Heat Removal) initiated

Based on the conditions above, which ONE of the following describes the first actions required to be taken in accordance with Section 4D (Fuel Transfer Canal Flooded)?

- A. Place the fuel assembly into the East Upender and position the West Fuel Carriage to the RB
- B. Place the fuel assembly into the East Upender and position the East Fuel Carriage to the SFP
- C. Verify SF system aligned for refueling cooling mode and stop 2B SF cooling pump
- D. Close 1SF-1 and 1SF-2 (East/West Transfer Tube Isolations)

Question 62

**T2/G2- jmb**

034A1.02, Fuel Handling Equipment System (FHES)

**Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the Fuel Handling System controls**

**including:** Water level in the refueling canal

(2.9/3.7)

**K/A MATCH ANALYSIS**

Requires ability to interpret changes in FTC & SFP Levels and determine the correct location to place a fuel assembly and the upenders to prevent exceeding radiation release and off-site dose limits per 10 CFR 100

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: East upender is the correct location. Procedure directs placing the carriages in the SFP to allow FTT Isolation valves to be closed. Misconception about which way the carriage must go to close SF-1 & 2
- B. Correct: Procedure directs placing the fuel assembly in transit into a safe location and specifies the upender or original/intended location and positioning the carriages in the SFP in preparation for closing the FTT Isolation valves.**
- C. Incorrect: Plausible because it will be performed later in this section of AP/26.
- D. Incorrect: Plausible because it will be performed later however both carriages must be placed in the SFP prior to closing SF-1/2.

---

Technical Reference(s): **AP/26 Rev 20, TS 3.9.6**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-APG Obj R9, FH-FHS Obj R7**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_.

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

***Changed distractors C and D to improve plausibility. // MB OK /// Modified stem and answers C and D to ensure only one correct answer \* MB OK***

**1 POINT**

**Question 63**

Unit 2 initial conditions:

- Reactor power = 100% stable
- Generator MWe = 890 Mwe
- Condenser vacuum = 28.5 inches Hg stable

Current conditions:

- Condenser vacuum = 24.5 inches Hg slowly decreasing
- AP-27 (Loss of Condenser Vacuum) in progress

Based on the conditions above, which ONE of the following describes the impact on Reactor power and a required action in accordance with AP/27?

Reactor power will...

- A. decrease / reduce power to decrease turbine exhaust steam load on condenser
- B. decrease / start and align the Main Vacuum Pumps to increase vacuum in the condenser
- C. remains approximately the same / reduce power to decrease turbine exhaust steam load on condenser
- D. remains approximately the same / start and align the Main Vacuum Pumps to increase vacuum in the condenser



1 POINT

Question 64

Which ONE of the following describes the RIA status that will automatically terminate a Gaseous waste release on Unit 3 and the status of the Waste Gas Exhauster if it is running prior to the alarm?

- A. 3RIA-37 (NORM WD Gas) AND 3RIA-38 (HIGH WD Gas) HIGH alarm actuated / Waste Gas Exhauster stops automatically.
- B. 3RIA-37 (NORM WD Gas) OR 3RIA-38 (HIGH WD Gas) HIGH alarm actuated / Waste Gas Exhauster stops automatically.
- C. 3RIA-37 (NORM WD Gas) AND 3RIA-38 (HIGH WD Gas) HIGH alarm actuated / operator must manually stop the Waste Gas Exhauster.
- D. 3RIA-37 (NORM WD Gas) OR 3RIA-38 (HIGH WD Gas) HIGH alarm actuated / operator must manually stop the Waste Gas Exhauster.

Question 64

**T2/G2 - jmb**

071K1.06, Waste Gas Disposal System (WGDS)

**Knowledge of the physical connections and/or cause effect relationships between the Waste Gas Disposal System and the following systems: ARM and PRM systems**

(3.1/3.1)

**K/A MATCH ANALYSIS**

Requires knowledge of cause/effect relationship between the PRM System and the WGD system during releases

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: Either 37 or 38 will isolate the GWD release and stop the exhauster.
- B. Correct: Either 37 or 38 will isolate the GWD release and stop the exhauster.**
- C. Incorrect: Either 37 or 38 will isolate the GWD release and stop the exhauster.
- D. Incorrect: Either 37 or 38 will isolate the GWD release and stop the exhauster when 37 or 38 alarms.

---

Technical Reference(s): **3SA-8/B-9, OP/3/A/1104/018 Rev73**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **RAD-RIA Obj 14**

Question Source: **B**

Question History: Last NRC Exam **2005 NRC RO Exam Q#52**

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

***Incorporated NRC comment. // MB OK***

**1 POINT**

**Question 65**

Unit 2 initial conditions:

- Reactor power = 100%
- Switchyard Isolate occurs

Current conditions:

- Unit 2 MFB 1 & 2 energized

Based on the conditions above, which ONE of the following describes the suction supply to LPSW and when the LPSW pumps will restart?

Unit 1 & 2 LPSW is supplied via the ECCW \_\_\_\_\_ and LPSW pumps will restart \_\_\_\_\_ after power is restored?

- A. first siphon / immediately
- B. second siphon / immediately
- C. first siphon / 10 seconds
- D. second siphon / 10 seconds

Question 65

**T2/G2 - jmb**

075A4.01, Circulating Water System

**Ability to manually operate and/or monitor in the control room:**

Emergency/essential SWS pumps

(3.2/3.2)

**K/A MATCH ANALYSIS**

Requires ability to determine the impact of the loss of Circulating Water (CCW) due to the loss of power and the response of the ECCW and LPSW systems to the loss

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: First siphon flowpath from the intake to the CCW crossover header is the correct source to LPSW. LPSW start time is incorrect. Plausible if time delay is assumed to start when pumps are lost or if time delay is not applied.
- B. Incorrect: The suction source is incorrect. Plausible as it is the source to supply cooling to the condenser in this condition. LPSW start time is incorrect as noted above.
- C. Correct: First siphon flowpath from the intake to the CCW crossover header is the correct source to LPSW. LPSW pumps will receive a start signal 10 seconds after power is restored due to low system pressure.**
- D. Incorrect. Incorrect: The suction source is incorrect. Plausible as it is the source to supply cooling to the condenser in this condition. LPSW pump start time is correct.

---

Technical Reference(s): **OP/1/A/1104/010 Rev 127, OP/1/A/1104/012 Rev 76**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **STG-CCW Obj R11, SSS-LPW Obj R23**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**No Changes // MB OK**

**1 POINT**

**Question 66**

Which ONE of the following describes the requirements in OMP 1-02, Rules of Practice to ensure a Motor Operated Valve that acts as a throttle valve closes?

The switch must be placed in the CLOSED position and...

- A. released when the OPEN indication light is off.
- B. released as soon as the CLOSED indication light is lit.
- C. held for a minimum of five seconds after the CLOSED indication light is lit.
- D. held for a minimum of three seconds after the CLOSED indication light is lit.

Question 66

**T3 - jmb**

G2.1.1, Conduct of Operations

**Knowledge of conduct of operations requirements.**

(3.8/4.2)

**K/A MATCH ANALYSIS**

Requires knowledge of requirements to operate MOVs that act as throttling valves per OMP 1-02, Rules of Practice

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Plausible for normal valve operations but not per guidance given in OMP 1-2 for operating MOVs that act as throttling valves
- B. Incorrect: Plausible for normal valve operations but not per guidance given in OMP 1-2 for operating MOVs that act as throttling valves
- C. Correct: Per OMP 1-2, hold the switch for a minimum of 5 seconds after receiving the open or closed indication.**
- D. Incorrect: Plausible but incorrect in that the requirement is 5 seconds. The previous requirement was 3 seconds.

---

Technical Reference(s): **OMP 1-02, Rules of Practice Rev 72**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **ADM-OMP Obj R6**

Question Source: **B ADM043601**

Question History: Last NRC Exam \_\_\_\_\_

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

***Changed distracters to enhance plausibility statements. // MB OK***

**1 POINT**

**Question 67**

Unit 3 plant conditions:

Time: 0340

- Night Shift RO makes an AUTOLOG entry

Time: 0905

- Day Shift RO reviewing the AUTOLOG identifies a mistake in the entry made at 0340

Based on the above conditions, which ONE of the following describes how the AUTOLOG entry is corrected per OMP 2-2 (Unit Logs)?

Unit AUTOLOG corrections may be made...

- A. ONLY by the CR SRO by editing the original entry.
- B. by any member of the CR Team by editing the original entry.
- C. ONLY by the CR SRO by making a late entry that references the original entry.
- D. by any member of the CR Team by making a late entry that references the original entry.

Question 67

**T3 - jmb**

G2.1.18, Conduct of Operations

**Ability to make accurate, clear, and concise logs, records, status boards, and reports.**

(3.6/3.8)

**K/A MATCH ANALYSIS**

Requires ability to determine the method of correcting an archived AUTOLOG entry and who may make the correction.

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect. The time of the correction is past the end of the shift that the original entry was made indicating that the log has been archived. Per OMP 2-2, correction can be made to archived entries by a late entry that references the original entry. Plausible as this method of correction is allowed if the log has not been archived. There is no requirement for the correction to be made only by the CRSRO.
- B. Incorrect. The time of the correction is past the end of the shift that the original entry was made indicating that the log has been archived. Per OMP 2-2, correction can be made to archived entries by a late entry that references the original entry. Plausible as this method of correction is allowed if the log has not been archived.
- C. Incorrect. The method of correction is correct. There is no requirement for the correction to be made only by the CRSRO.
- D. Correct. Per OMP 2-2, correction can be made to archived entries by a late entry that references the original entry. The time of the correction is past the end of the shift that the original entry was made indicating that the log has been archived. The correction can be made by any member of the control room team.**

---

Technical Reference(s): **OMP 2-2 Rev 18**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **ADM-OMP Obj R24**

Question Source: **M (ADM042401)**

Question History: Last NRC Exam \_\_\_\_\_

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

**MB OK**

**1 POINT**

**Question 68**

Which ONE of the following activities is consistent with the conservative operating guidance contained in SOMP 1-2 (Reactivity Management)?

- A. Manual rod withdrawal during a Feedwater transient to stop a temperature decrease caused by an instrument failure
- B. Manually increasing Feedwater flow to stop an RCS pressure increase caused by an RCS temperature increase
- C. Manually raising one Loop FDW demand while lowering the other Loop FDW demand to control  $\Delta T_{cold}$  following an RCP trip
- D. Manually increasing turbine demand to reduce Turbine Header Pressure and RCS temperature

Question 68

**T3**

G2.1.39, Conduct of Operations

**Knowledge of conservative decision making practices.**

(3.6/4.3)

**K/A MATCH ANALYSIS**

Requires knowledge of conservative reactivity management actions allowed during plant transients.

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Manual rod withdrawal is not permitted.
- B. Incorrect: Increasing FDW Flow is not permitted.
- C. Correct: The sequence given is permitted as there is no intent to raise FDW Flow.**
- D. Incorrect: Increase in Turbine demand is only allowed if intent is to stabilize Turbine Header Pressure not to reduce pressure or RCS temperature.

---

Technical Reference(s): **SOMP 1-2 Rev 6**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **ADM-OMP Obj R23, TA-PTR Obj R1**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**MB OK**

1 POINT

Question 69

In accordance with OMP 1-02 (Rules of Practice), which ONE of the following describes a condition which would allow Independent Verification of a single valve to be waived and the minimum level of approval required?

- A. Dose received will be = 14 mr for a single check  
Plant SRO
- B. Valve located in a room where the area dose rate = 878 mr/hr  
Plant SRO
- C. Dose received will be = 14 mr for a single check  
Operations Superintendent
- D. Valve located in a room where the area dose rate = 878 mr/hr  
Operations Superintendent

Question 69

**T3 - okm**

G2.2.14, Equipment Control

**Knowledge of the process for controlling equipment configuration or status.**

(3.9/4.3)

**K/A MATCH ANALYSIS**

Requires knowledge of the independent verification process associated with equipment configuration control

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. **CORRECT: Per OMP 1-2, IV waiver allowed for personnel dose if a single valve IV will result in a dose of > 10 mrem. Any Ops supervision can make this determination.**
- B. Incorrect: Plausible in that the requirement for waiver due to dose rate is >1 Rem/hr. 2nd part is correct.
- C. Incorrect: 1<sup>st</sup> part is correct. 2<sup>nd</sup> part incorrect; plausible because the Operations section manager is responsible for approval of dose extension above admin limits.
- D. Incorrect: Both parts incorrect. First part is plausible in that the requirement for waiver due to dose rate is >1 Rem/hr. 2<sup>nd</sup> part incorrect; plausible because the Operations section manager is responsible for approval of dose extension above admin limits..

---

Technical Reference(s): **OMP 1-2 pg. 11 Rev. 72**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **ADM-OMP R6,36,37,39,40**

Question Source: **M (ADM060902)**

Question History: Last NRC Exam \_\_\_\_\_

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

**MB OK /// Modified second part of C & D to "Operations Superintendent" from "Ops Section Manager" to match Operations nomenclature of RP Manual titles \*  
Changed A&B to "Plant SRO" MB OK**

**1 POINT**

**Question 70**

Which ONE of the following describes two (2) evolutions or tests that have pre-planned pre-job briefs per NSD 213 (Risk Management Process), Infrequently Performed Tests or Evolutions?

- A. Unit 2 Mid-Loop Operations / Turbine Stop Valve Movement Test
- B. Unit 2 Mid-Loop Operations / Zero Power Physics Testing
- C. Placing a new demineralizer in service / Turbine Stop Valve Movement Test
- D. Placing a new demineralizer in service / Zero Power Physics Testing

Question 70

**T3 - okm**

G2.2.7, Equipment Control

**Knowledge of the process for conducting special or infrequent tests**

(2.9/3.6)

**K/A MATCH ANALYSIS**

Requires knowledge of the definition of Infrequently Performed Tests or Evolutions (IPTEs)

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: Plausible in that knowledge of which tests/evolutions are listed/described in NSD 213, IPTEs. Of the two only Mid-Loop Ops is listed.
- B. **CORRECT: Per NSD-213 (Risk Management Process) and as mentioned in OMP 1-22 (Pre-job and Post-job Briefs) , Mid-loop Operations and Zero Power Physics Testing are listed/meet the criteria for an Infrequently Performed Test/Evolution**
- C. Incorrect: Plausible in that both evolutions affect reactivity but are specified as NSD 213 IPTEs. CRD Movement tests are performed quarterly. TSV tests are done every month.
- D. Incorrect: Plausible in that knowledge of which tests/evolutions are listed/described in NSD 213, IPTEs. Of the two, only Zero Power Physics Testing is listed.

---

Technical Reference(s): **NSD 213 Rev 7, OMP 1-22 Rev 11**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **ADM-OMP R11, R28**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

***Incorporated NRC comments. Changed first part of C and D distractor. // MB OK***

**1 POINT**

**Question 71**

Unit 3 plant conditions:

- Spent Fuel Demineralizer Room dose rate = 3000 MR/HR

Based on the above condition, which ONE of the following describes the radiological posting requirements and the access controls for this area?

- A. Locked High Radiation / area MUST be posted with a Yellow Flashing Light
- B. Locked High Radiation / entrance MUST be Locked or Guarded
- C. Very High Radiation / area MUST be posted with a Yellow Flashing Light
- D. Very High Radiation / entrance MUST be Locked or Guarded

Question 71

**T3 - okm**

G2.3.12, Radiation Control

**Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.**

(3.2/3.7)

**K/A MATCH ANALYSIS**

Requires knowledge of radiological postings and required RP access controls

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: Room posting should be LHRA; wrong in that this room is able to be locked but with a caged door; a flashing yellow light is only used when a room/area can not be reasonably locked
- B. **CORRECT: Room posting should be LHRA (>1 r/hr – to - <500 R/hr). Since the SF Demineralizer Room is able to be locked in the plant it must be locked. Student must apply the fact that this specific room can be locked otherwise a flashing yellow light would also be correct.**
- C. Incorrect: Plausible if posting requirements are not known (VHRAs = >500 r/hr) also wrong in that VHRAs must be locked at all times.
- D. Incorrect: Plausible if posting requirements are not known (VHRAs = >500 r/hr). Plausible in that VHRAs must be locked at all times.

---

Technical Reference(s): **RAD RPP, NSD-507 Rev 13**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **RAD-RPP R8, R24**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

**MB OK**

1 POINT

Question 72

Unit 1 plant conditions:

- Reactor power = 100%
- 7 gpm primary to secondary leak in 1A SG
- AP/31 is in progress
- The SRO has directed the NEO to perform an action in the turbine building basement

Based on the above conditions, which ONE of the following describes the location that will have the greatest increase in general area dose rates and the operators response if he receives a dose alarm in the area?

- A. Powdex / Remain in the area and monitor dose
- B. Powdex / Immediately stop and leave the area
- C. TB Sump / Remain in the area and monitor dose
- D. TB Sump / Immediately stop and leave the area

Question 72

**T3 - okm**

G2.3.14, Radiation Control

**Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.**

(3.4/3.8)

**K/A MATCH ANALYSIS**

Requires knowledge of increased contamination hazards due to a SGTL and radiological safety practices

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: Plausible in that the Powdex will have the highest general dose rates due to concentrating the SGTL activity. Second part is incorrect in that EDLs are not in effect (not in EOP) therefore he cannot work through a dose alarm. Candidate may believe EDLs are in affect due to being in an AP.
- B. CORRECT: The Powdex will gather and concentrate the RCS activity making it have the highest general dose rates; since emergency dose limits (EDLs) are not in affect (not in EOP) the NEO is expected to regard all dose alarms**
- C. Incorrect: Plausible in that the TB Sump will be an area for secondary contamination to collect but it will not have dose rates as high as the Powdex; wrong – also in that EDLs are not in effect therefore he cannot work through dose alarms
- D. Incorrect: Plausible in that the TB Sump will be an area for secondary contamination to collect but it will not have dose rates as high as the Powdex; since emergency dose limits (EDLs) are not in affect (not in EOP) the NEO is expected to regard all dose alarms

---

Technical Reference(s): **AP-31 Rev 15, OMP 1-18 Rev 27**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **EAP-EOP R20, ADM-OMP R10, R52**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

***Incorporated NRC comments. // MB OK***

**1 POINT**

**Question 73**

Plant conditions:

- All Units Reactor power = 100%
- 1SA3/B-6 (Fire Alarm) actuated
- NEO reports flames and heavy smoke spreading to equipment and cable trays
- Fire location = Near the LPSW pumps, Column G30

Based on the above information, which ONE of the following locations is the affected SSF Risk Area(s) and the required action?

**REFERENCE PROVIDED**

- A. ALL Three Units / Trip ALL Three Units
- B. Unit 2 ONLY / Trip Unit 2 ONLY
- C. ALL Three Units / Perform a controlled shutdown on all three units
- D. Unit 2 ONLY / Perform a controlled shutdown on Unit 2 ONLY

Question 73

**T3 - okm**

G2.4.27, Emergency Procedures/Plans

**Knowledge of "fire in the plant" procedures.**

(3.4/3.9)

**K/A MATCH ANALYSIS**

Requires knowledge of the Fire Alarms, Fire Plan usage, and AP/25 SSF actions for an in-plant fire

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: First part is incorrect. Plausible in that the fire is located partly on Unit 1 and 2 but the Attachment 1-fire plan dictates the fire as Unit 2 SSF Risk Area ONLY. The candidates must choose the correct attachment for the correct floor elevation and then determine the correct area affected. Second part is incorrect. Candidate must know manual trip criteria from AP/25 and trip only the affected unit (Unit 2 only).
- B. CORRECT: Per ARG for 1SA3/B-6 the fire is a Challenging Active Fire; its location is between Unit 1 and Unit 2; Attachment 1 (provided) dictates the fire as Unit 2 SSF Risk Area ONLY. AP/25 requires only Unit 2 to be manually tripped.**
- C. Incorrect: First part is incorrect. Plausible in that the fire is located partly on Unit 1 and 2 but the Attachment 1-fire plan dictates the fire as Unit 2 SSF Risk Area ONLY. The candidates must choose the correct attachment for the correct floor elevation and then determine the correct area affected. Second part is incorrect. Plausible if the candidate does not understand there is a challenging active fire requiring a unit trip or that AP/25 requires a unit trip (since the unit trip would be a memory item). The candidate may believe a controlled shutdown is required on all three units due to LPSW being affected by the fire.
- D. Incorrect: First part is correct. Per ARG for 1SA3/B-6, the fire is a Challenging Active Fire. Its location is between Unit 1 and Unit 2. Attachment 1 (provided) dictates the fire as Unit 2 SSF Risk Area ONLY. Second part is incorrect. Plausible if the candidate does not understand there is a challenging active fire requiring a unit trip or that AP/25 requires a unit trip (since the unit trip would be a memory item). The candidate may believe a controlled shutdown is required on unit 2 only due to LPSW being affected by the fire.

---

Technical Reference(s): **1SA3/B-6, AP/25 Rev 41**

Proposed references to be provided to applicants during examination: **1SA3/B-6 Attachment 1 Body and the two enclosed fire plan maps**

Learning Objective: **EAP-SSF R10**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

Question Cognitive Level: Memory or Fundamental Knowledge

**Comprehension or Analysis**

***Modified answers to improve plausibility // MB OK /// Enhanced plausibility statements***

**1 POINT**

**Question 74**

Unit 1 plant conditions:

- Reactor tripped from 100% power
- The following Statalarms actuate:
  - 1SA-1/C-11 (ES Channel 7 Trip)
  - 1SA-1/D-11 (ES Channel 8 Trip)
  - 1SA-2/C-4 (RC Pressurizer Level Emerg High/Low)
  - 1SA-2/C-8 (AFIS Header A Initiated)
  - 1SA-2/D-5 (HP LDST Level Interlock Initiated)
  - 1SA-8/A-3 (FDWPT A Trip)
  - 1SA-8/A-6 (FDWPT B Trip)

Based on the above conditions, which ONE of the following emergency procedures has the highest priority?

- A. Enclosure 5.1 (ES Actuation)
- B. Rule 5 (Main Steam Line Break)
- C. Enclosure 5.5 (Pzr and LDST Level Control)
- D. Rule 3 (Loss of Main or Emergency Feedwater)

Question 74

**T3 - okm**

G2.4.45, Emergency Procedures/Plans

**Ability to prioritize and interpret the significance of each annunciator or alarm**  
(4.1/4.3)

**K/A MATCH ANALYSIS**

Requires the ability to interpret the significance of stataarms, to diagnose the event, and to prioritize EOP rules and enclosures

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: Plausible in that ES Actuation of all 8 Channels has most likely occurred
- B. CORRECT: AFIS actuation tells the operator that MSLB has occurred which is the highest priority due to the overcooling it can cause; in fact EHT has caused all the other SA conditions**
- C. Incorrect: Plausible in that overcooling is causing the RCS inventory to contract to the point of possibly emptying the Pzr and LDST; however the overcooling would be stopped by Rule 5.
- D. Incorrect: Plausible in that AFIS has caused the MFWPs to trip; a loss of both MFW and EFW would be a higher priority than Rule 5 but there is no reason to assume that EFW pumps are unavailable.

---

Technical Reference(s): **EP/1/A/1800/001 Rev 36**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **EAP-EOP R27**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

**MB OK**

**1 POINT**

**Question 75**

Unit 3 plant conditions

- LDST level = 75 inches decreasing
- LDST pressure = 35 psig stable

Based on the above level and pressure trend, which ONE of the following describes the status of the HPI system and states the required action in accordance with OP/1108/001 (Curves and General Information)?

**REFERENCE PROVIDED**

HPI is...

- A. Operable / Initiate makeup to LDST
- B. Operable / Depressurize LDST
- C. Inoperable / Initiate makeup to LDST
- D. Inoperable / Depressurize LDST

Question 75

T3 - jmb

G2.4.47, Emergency Procedures/Plans

**Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.**

(4.2/4.2)

**K/A MATCH ANALYSIS**

Requires the ability to diagnose trends, to apply the trend to reference material, and knowledge of corrective actions

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: First part is incorrect. Operation above and to the left of curve 1 requires declaring both trains of HPI inoperable. Plausible because the candidate must recall from memory the actions based on the location of level/press on the curve. Second part is incorrect. Making up would increase level which would also increase pressure and keep the LDST out of the permissible region. Plausible because the compensatory actions may be applied for Step 1 "HPI Pumps Operating" in that the student may select this section based on having HPI in service. Could also be chosen if the candidate misapplies the required actions for being outside the "Permissible Operating Region" but still between curve 1 and curve 2.
- B. Incorrect: First part is incorrect as stated in answer choice 'A'. Second part is correct.
- C. Incorrect: First part is correct. Second part is incorrect as stated in answer choice 'A'
- D. CORRECT: Step 2 of enclosure 4.39 requires declaring HPI inoperable and immediately depressurizing the LDST below Curve 1.**

---

Technical Reference(s): **Rev 78 of OP/0/A/1108/001 Enclosure 4.39**

Proposed references to be provided to applicants during examination: **OP/0/A/1108/001 Enclosure 4.39 (page 1 only with action notes removed)**

Learning Objective: **PNS-HPI Obj. R35**

Question Source: **N**

Question History: Last NRC Exam \_\_\_\_\_

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

***Wrote new question to improve plausibility of answers / Rewrote answers and stem to improve plausibility. MB OK /// Fixed plausibility statements.***

## List of RO Exam Attachments

- #17 AP/3/A/1700/034 Encl. 5.1 Generator Capability Curve - pgs 1 & 3 of 3
- #73 ARG for 1SA-03/ B-6 (FIRE ALARM) which comes from OP/1/A/6101/003  
– pgs 1-7 and pgs 26 & 27
- #75 OP/0/A/1108/001 Enclosure 4.39 (page 1 only with action notes removed)

**1 POINT**

**Question 76**

Unit 1 initial conditions:

- Reactor power = 100%

Current conditions:

- Tcold = 532 °F slowly decreasing
- CETCs = 477 °F slowly decreasing
- RCS pressure = 535 psig decreasing
- Pzr Level = 0 inches
- 1A SG Pressure = 750 psig slowly decreasing
- 1B SG Pressure = 680 psig slowly decreasing
- 1RIA-49 in HIGH alarm

Based on the above, which ONE of the following is the procedure path to mitigate this event?

**REFERENCE PROVIDED**

- A. Loss of Subcooling Margin tab to LOCA Cooldown tab
- B. Loss of Subcooling Margin tab to Forced Cooldown tab
- C. Excessive Heat Transfer tab to Loss of Subcooling Margin tab
- D. Excessive Heat Transfer tab to Forced Cooldown tab

Question 76

**T1/G1 - okm**

011EA2.13, Large Break LOCA

**Ability to determine or interpret the following as they apply to a large break**

**LOCA:** Difference between overcooling and LOCA indications

(3.7/3.7)

**K/A MATCH ANALYSIS**

Requires the student to interpret the indications and determine that a LBLOCA has occurred; then a determination of EOP procedure routing is required.

**SRO-ONLY ANALYSIS**

Requires assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations. (43.5)

SRO level knowledge required to select appropriate cooldown procedure.

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. CORRECT: Conditions above indicate a LBLOCA event has occurred; procedure hierarchy dictates routing from the LOSCM tab to the LOCA CD tab**
- B. Incorrect: Plausible in that the first part is correct and RCPs will have been secured. Second part is plausible in that FCD tab is used to cooldown without RCPs during subcooled conditions. However, entrance into forced cooldown tab is not correct based on RCS saturated conditions.
- C. Incorrect: Plausible in that a large MSLB (EHT) event will cause excessive overcooling that could cause the RCS to saturate due inventory contraction. First part is incorrect. When in the EHT tab if the plant is saturated then the EHT tab transfers to the LOSCM tab. Therefore the second part is plausible.
- D. Incorrect: Plausible in that a large MSLB (EHT) event will cause excessive overcooling that could cause the RCS to saturate due inventory contraction. First part is incorrect. FCD is plausible if the student thinks that at least one SG will be available to transfer heat and that RCPs cannot be restored to service.

---

Technical Reference(s): **EAP LOSCM**

Proposed references to be provided to applicants during examination: **EOP Encl. 5.18**

Learning Objective: **EAP LOSCM, R5**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

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

***Clarified plausibility statement. Discuss purpose of FCD tab with NRC. MB OK***

1 POINT

Question 77

Unit 1 initial conditions:

Time = 0900

- Reactor power = 100%
- 1SA2/C2 HP INJECTION PUMP DISCH HEADER PRESSURE LOW actuated
- HPI Pump discharge pressure = 2300 psig stable
- Pzr Level = 209 inches decreasing
- LDST Level = 84 inches decreasing
- Seal Injection flow = 32 gpm stable
- RC Makeup Flow = 140 gpm increasing

Current conditions:

Time = 0905

- Pressurizer level = 200 inches decreasing
- LDST Level = 65 inches decreasing
- Seal Injection flow = 32 gpm stable
- RC Makeup Flow = 160 gpm stable
- Repairs will require 7 days to complete

Based on the above conditions, which ONE of the following describes the current plant condition and whether a Tech Spec shutdown is required?

- A. HPI Normal Injection header break  
Shutdown is required
- B. HPI Normal Injection header break  
Shutdown is NOT required
- C. Letdown Line leak  
Shutdown is required
- D. Letdown Line leak  
Shutdown is NOT required



**1 POINT**

**Question 78**

Unit 1 initial conditions:

- Reactor power = 100%

Current conditions:

- Pressurizer level = 72 inches increasing
- Pressurizer heaters energized
- RCS Pressure = 1910 psig

Based on the conditions above, which ONE of the following describes whether Pressurizer heaters should be energized and the TS bases for the availability of a minimum capacity of pressurizer heaters?

A. Pressurizer Heaters should be energized

Ensure the ability to control system pressure and maintain subcooling with an extended loss of offsite power

B. Pressurizer Heaters should be energized

To prevent solid plant operations and subsequent pressure transients that could damage RCS piping

C. Pressurizer Heaters should NOT be energized

Ensure the ability to control system pressure and maintain subcooling with an extended loss of offsite power

D. Pressurizer Heaters should NOT be energized

To prevent solid plant operations and subsequent pressure transients that could damage RCS piping

Question 78

**T1/G1 - jmb**

027AA2.10, Pressurizer Pressure Control System Malfunction

**Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions:** PZR heater energized/de-energized condition (3.3/3.6)

**K/A MATCH ANALYSIS**

Requires the ability to determine if the appropriate PZR heaters are energized with PZR level below the interlock at reduced RCS pressure.

**SRO-ONLY ANALYSIS**

Requires knowledge Facility operating limitations in the technical specifications bases. (43.2)

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Heater status is incorrect. Plausible as this is the condition the heaters would be in if PZR level were > 80 inches. The Tech Spec bases is correct.
- B. Incorrect: Heater status is incorrect as noted above. Bases is incorrect. Plausible in that solid PZR operations implies the loss of the PZR vapor space and the loss of the vapor space is the bases for the maximum water level in the pressurizer.
- C. **Correct: The pressure given would result in energizing all the pressurizer heaters however with PZR level < 80 inches all heater will be off. The bases of the heater capacity as stated in TS 3.4.9: " A minimum required available capacity of 400 kW ensures that the RCS pressure can be maintained. Unless adequate heater capacity is available, reactor coolant subcooling cannot be maintained indefinitely. Inability to control the system pressure and maintain subcooling under conditions of natural circulation flow in the primary system could lead to loss of single phase natural circulation and decreased capability to remove core decay heat."**
- D. Incorrect: Heater status is correct. Bases is incorrect as noted above in B.

---

Technical Reference(s): **PNS-PZR Rev 16a, TS 3.4.9 Bases**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **PNS-PZR Obj. R5, R7 & R19, ADM-TSS Obj R5**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

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

**No changes // MB OK**

**1 POINT**

**Question 79**

Unit 3 plant conditions:

- Reactor power = 100%
- CC CRD Return Flow = 142 gpm slowly decreasing
- CC Return Flow = 563 gpm decreasing
- Letdown Temperature = 138°F stable
- One or more of the following alarms have actuated:
  - 3SA-9/B-1 (CC CRD Return Flow Low).
  - 3SA-2/C-1 (HP Letdown Temperature High)
  - 3SA-9/C-1 (CC Component Cooling Return Flow Low)

Based on the above conditions, which ONE of the following describes a required action from the associated ARG(s) to mitigate this event? If the ARG directed actions are NOT successful, which Abnormal Procedure is required to be entered first?

- A. Verify CC Surge Tank level > 15 inches and start the standby CC pump  
AP/32 (Loss of Letdown)
- B. Verify CC Surge Tank level > 15 inches and start the standby CC pump  
AP/20 (Loss of Component Cooling)
- C. Decrease letdown flow using 3HP-7 (LETDOWN CONTROL)  
AP/32 (Loss of Letdown)
- D. Decrease letdown flow using 3HP-7 (LETDOWN CONTROL)  
AP/20 (Loss of Component Cooling)

Question 79

**T1/G1 - jmb**

026EG2.4.50, Loss of Component Cooling Water

**Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.**

(4.2/4.0)

**K/A MATCH ANALYSIS**

Requires the ability to determine alarm status based upon plant conditions and determine the appropriate controls directed to be operated in the alarm response.

**SRO-ONLY ANALYSIS**

Requires assessment of facility conditions and selection of appropriate procedures during an abnormal situation. (43.5)

**ANSWER CHOICE ANALYSIS**

**Answer: B**

3SA-2/C-1 setpoint = 130°F and is actuated. 3SA-9/B-1 (CC CRD Return Flow Low) Setpoint = 138 gpm and is NOT actuated. Loss of letdown has occurred as a result of decreased CC flow. SRO must prioritize AP entry.

- A. Incorrect: First part is correct. Action is correct as it is directed by 3SA-2/C1. Second part is incorrect. Entry conditions are met for both AP/20 and AP/32 however; AP/20 is first to be entered by statalarm procedure (AP/20 is the higher priority procedure and must be prioritized first).
- B. **Correct: Action to verify CC surge tank level > 15 inches and start standby CC pump are directed in 3SA-9/B-1. AP/20 is first to be entered by statalarm procedure.**
- C. Incorrect: Plausible in that the action directed is correct for 3SA-2/C-1 (High Letdown Temp). Procedure selection is incorrect as noted above in A.
- D. Incorrect: Plausible in that the action directed is correct for 3SA-2/C-1 (High Letdown Temp). Abnormal procedure selection is correct.

---

Technical Reference(s): **OP/3/A/6103/002 (3SA-2/C-1), OP/3/A/6103/009 (3SA-9/B-1 & 3SA-9/C-1), AP/20, AP/32**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **PNS-CC Obj R17 & R20**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

Question Cognitive Level: Memory or Fundamental Knowledge

**Comprehension or Analysis**

*Increase letdown temperature to make both APs apply. // Rewrote stem to improve plausibility. MB stated he is okay with the concept but need to clean up the wording /// Reordered choices for psychometrics and rewrote AA; rewrote stem for clarity. MB OK //// Modified stem for clarity \* MB OK ///// Modified second and third bullets by lowering values and adding trends to minimize confusion. MB OK*

**1 POINT**

**Question 80**

Unit 1 initial conditions:

- Startup from refueling outage in progress
- Reactor power = 5% stable
- 1A Main FDW Pump in service

Current conditions:

- Switchyard isolate
- 1A Main FDW Pump tripped
- EOP IMAs and Symptom Checks complete

Which ONE of the following describes how EFW will be controlled based on the above conditions and which design bases scenario requires the highest initial post-trip EFW flow?

- A. Emergency feedwater will be allowed to control SG levels in AUTO  
Loss of Main FDW and loss of offsite power
- B. Emergency feedwater will be allowed to control SG levels in AUTO  
Loss of Main FDW with offsite power available
- C. Emergency feedwater will be manually throttled to prevent RCS overcooling  
Loss of Main FDW and loss of offsite power
- D. Emergency feedwater will be manually throttled to prevent RCS overcooling  
Loss of Main FDW with offsite power available

2009 NRC SENIOR REACTOR OPERATOR EXAM

Question 80  
T1/G1 - okm

054AG2.4.9, Loss of Main Feedwater

**Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies. (3.8/4.2)**

**K/A MATCH ANALYSIS**

Requires the student to know the implications of a loss of Main Feedwater from a low power condition and the mitigation strategies involved

**SRO-ONLY ANALYSIS**

Requires student to know mitigation strategies beyond Entry Conditions/IMAs and TS bases

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: Both parts are incorrect. First part is plausible in that normally auto operation of EFW is preferred. Second part is plausible in that the candidate could assume that a loss of offsite power would be more limiting.
- B. Incorrect: First part is incorrect. Plausible in that normally auto operation of EFW is preferred. Second part is correct.
- C. Incorrect: First part is correct. Second part is incorrect but plausible in that the candidate could assume that a loss of offsite power would be more limiting.
- D. Correct: Due to low core decay heat EFW is required to be throttled to prevent RCS overcooling. Per TS 3.7.5 Bases "The limiting event for the EFW System is the loss of main feedwater with offsite power available; i.e. with RCP heat.**

---

Technical Reference(s): **EP/1/A/1800/001 Rev 36a (EOP) RULE 3**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **EAP-LOHT R26; ADM-TSS R5**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

**Added "manually" to C and D. // MB OK /// Changed initial power in stem from 2% to 5% for clarity \* MB OK**

**1 POINT**

**Question 81**

Unit 3 initial conditions:

- Reactor power = 100%

Current conditions:

- 3DIA supply breaker to CRD breaker shunt trip device in RPS channel "A" tripped OPEN

Based on current plant conditions, which ONE of the following describes the status of RPS channel "A" and the required administrative actions?

A. 3A RPS channel is NOT operable.

TS 3.3.1 (RPS Instrumentation) action statements are required to be performed.

B. 3A RPS channel is operable.

TS 3.3.4 (Control Rod Drive Trip Devices) action statements are required to be performed.

C. 3A RPS channel is NOT operable.

TS 3.3.1 (RPS Instrumentation) action statements are NOT required to be performed.

D. 3A RPS channel is operable.

TS 3.3.4 (Control Rod Drive Trip Devices) action statements are NOT required to be performed.

Question 81

**T1/G1 - gcw**

058AG2.2.37, Loss of DC Power

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

(3.6/4.6)

**K/A MATCH ANALYSIS**

Requires ability to determine operability of RPS channel with a loss of DC power.

**SRO-ONLY ANALYSIS**

Question requires knowledge of TS operability for components affecting reactivity.

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: both parts are incorrect.
- B. Correct: The RPS trip signal will still de-energize to trip the CRD breaker and the RPS channel is operable. TS 3.3.4 requires all 4 Control Rod Drive Trip Devices to be operable**
- C. Incorrect: first part incorrect. Plausible because if the RPS channel power supply KVIA was de-energized this would be correct. Second part is correct. Only require 3/4 RPS trip functions to be operable.
- D. Incorrect: first part correct. TS 3.3.4 requires all 4 Control Rod Drive Trip Devices to be operable. Plausible because TS only require 3/4 RPS trip functions to be operable.

---

Technical Reference(s): **TS 3.3.4 (Control Rod Drive Trip Devices)**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **IC-RPS Obj R17**

Question Source: **Bank**

Question History: Last NRC Exam **2007 ONS SRO Exam Q #91**

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

***Modified second part of answers to remove unneeded information per NRC comment. // MB OK***

**1 POINT**

**Question 82**

Unit 1 initial conditions:

- Reactor power = 100%
- 1C HPIP is declared inoperable

Current conditions:

- 1HP-120 valve controller air line blows off
- HPI FLOW TRAIN "A" indication fails to zero gpm

Based on the conditions above, which ONE of the following describes the impact on 1HP-120 and whether performing actions of TS LCO 3.0.3 are required?

**ASSUME NO OPERATOR ACTIONS**

- A. 1HP-120 fails OPEN  
Actions of LCO 3.0.3 are required
- B. 1HP-120 fails OPEN  
Actions of LCO 3.0.3 are NOT required
- C. 1HP-120 fails CLOSED  
Actions of LCO 3.0.3 are required
- D. 1HP-120 fails CLOSED  
Actions of LCO 3.0.3 are NOT required

Question 82

**T1/G2 – New K/A**

028AA2.03, Pressurizer Level Control Malfunction

**Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions:** Charging subsystem flow indicator and controller  
(2.8/3.3)

**K/A MATCH ANALYSIS**

Requires ability to predict how the pressurizer level control valve fails due to loss of IA and the affect of a loss of an HPI train flow gauge on HPI operability

**SRO-ONLY ANALYSIS**

Requires knowledge of the bases for the operating limits established in Tech Specs for operability of an HPI train. This requires SRO knowledge from the TS basis to know this.

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: First part incorrect. Plausible because another primary valve (HP-31) fails open on a loss of IA. Second part is correct.
- B. Incorrect: First part incorrect. Plausible because another primary valve (HP-31) fails open on a loss of IA. Second part is incorrect. Plausible if the candidate does not know that having the flow instrument out of service makes the train out of service. This would lead to the candidate believing that only one train of HPI is out of service and TS 3.0.3 is not required.
- C. **Correct: 1HP-120 fails CLOSED on a loss of IA. HPI FLOW TRAIN “A” failing causes the “A” HPI train to be inoperable (This requires SRO knowledge from the TS basis to know that having the flow instrument out of service makes the train out of service). The “B” train is already inoperable due to the 1C HPIP OOS. TS 3.5.2 Condition H requires entering LCO 3.0.3 immediately for two HPI training inoperable.**
- D. Incorrect: First part is correct. Second part is incorrect. Same as answer ‘B’ above.

---

Technical Reference(s): **AP/22 (Loss of Instrument Air); TS 3.5.2 (High Pressure Injection)**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-APG AP/14 Encl. R9; ADM-TSS R5, R6**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

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

***Operability of second HPI train requires TS basis knowledge. Discuss with NRC. // Modified stem and answers to improve SRO level. // MB OK /// fixed plausibility statements to match previous changes.***

**1 POINT**

**Question 83**

Unit 1 initial conditions:

- Time = 0600
- Reactor Power = 36%
- Pressurizer level = 220 inches
- LDST Level = 85 inches

Current conditions:

- Time = 0610
- Reactor Power = 36%
- Pressurizer level = 220 inches
- LDST Level = 77.5 inches
- 1RIA-40 Alert and High Alarm actuated

Based on the above conditions, which ONE of the following describes the procedure required to be entered and actions directed by the procedure?

A. EOP (Emergency Operating Procedure) SGTR Tab

Initiate a Maximum Runback to 15% then manually trip the reactor and isolate the affected SG

B. EOP (Emergency Operating Procedure) SGTR Tab

Initiate a plant shutdown to 5% then manually trip the reactor. Maintain Pressurizer level 140 - 180 inches while cooling down to isolate the affected SG

C. AP/31 (Primary to Secondary Leakage)

Initiate Enclosure 5.2 (Reduction of Secondary leakage and Cross-Unit Contamination) and perform Enclosure 5.8 (Resetting 1RIA-40 and OAC Setpoints)

D. AP/31 (Primary to Secondary Leakage)

Initiate a shutdown using AP/29 (Rapid Unit Shutdown) and perform Enclosure 5.2 (Reduction of Secondary leakage and Cross-Unit Contamination) to control Secondary Leakage.

Question 83

**T1/G2 - jmb**

037AG2.4.31, Steam Generator (S/G) Tube Leak

**Knowledge of annunciator alarms, indications, or response procedures.**

(4.2/4.1)

**K/A MATCH ANALYSIS**

Requires knowledge of conditions indicated by plant indications and alarms and procedures used to address the conditions.

**SRO-ONLY ANALYSIS**

Requires determination of plant conditions and selection of appropriate procedures to address the conditions given (43.5)

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: First part is incorrect. Plausible as this is correct for a larger pri to sec leak (> 25 gpm). EOP entry is directed for tube leaks > 25 gpm. AP entry is not required. Prz level can remain stable for leaks up to 160 gpm.
- B. Incorrect: First part is incorrect. Plausible as this is correct for a larger pri to sec leak (> 25 gpm). EOP entry is directed for tube leaks > 25 gpm. AP entry is not required. Prz level can remain stable for leaks up to 160 gpm.
- C. Incorrect. Using Attachment 5.5 of AP/31 or Enclosure 5.1 of AP/2 the leak rate is  $\approx 23$  gpm. Miscalculating leak rate or failure to recognize correct routing in AP/31 would result in initiating Encl 5.2 and resetting the RIA & OAC setpoint as these actions are directed if leak rate is lower.
- D. Correct: Calculated tube leak size using changes in LDST level is  $\approx 23$  gpm. (31.3 gal/in X 7.5 in/ 10 min = 23.5 gpm) This amount of Primary to secondary leakage requires entry into AP/31 and a shutdown is initiated. Based on conditions the appropriate procedure for the plant S/D to meet Encl 5.1 requirements is AP/29. AP/31 Enclosure 5.2 is directed to be used to control secondary leakage.**

---

Technical Reference(s): **EOP Rev. 36 - IMAs & SAs, SGTR Tab, AP/31 Rev. 15**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-APG Obj R9 EAP-SGTR Obj R2**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

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

**Added information to AA. Modified A and B to go to SGTR tab. // MB OK**

1 POINT

Question 84

Unit 2 initial conditions:

- Reactor power = 70% stable
- 2A2 RCP secured 10 days ago

Current conditions

- Control Rod Group 4 Rod 1 dropped to 0% withdrawn
- Excore and Incore Quadrant Power Tilt (QPT) readings exceed the TRANSIENT limits, but are less than the MAXIMUM limits

Based on the above conditions and per AP/15 (Dropped or Misaligned Control Rods), which ONE of the following describes the runback requirement and the TS bases for QPT limits?

An ICS runback \_\_\_\_\_ and QPT limits ensure \_\_\_\_\_.

- A. and operator action is required to reduce power to  $\leq 60\%$  of Allowable Thermal Power  
clad failure does not occur due to power peaking
- B. and operator action is required to reduce power to  $\leq 60\%$  of Allowable Thermal Power  
a flat flux profile is maintained as the core ages
- C. automatically reduces power to  $\leq 60\%$  of Allowable Thermal Power  
clad failure does not occur due to power peaking
- D. automatically reduces power to  $\leq 60\%$  of Allowable Thermal Power  
a flat flux profile is maintained as the core ages

Question 84

T1/G2 - okm

BA01AG2.4.11, Plant Runback

Knowledge of abnormal condition procedures

(4.0/4.2)

**K/A MATCH ANALYSIS**

Requires knowledge of the control rod ICS runback and knowledge of AP/15 actions

**SRO-ONLY ANALYSIS**

Requires knowledge of facility procedures and bases for TSs

**ANSWER CHOICE ANALYSIS**

Answer: A

- A. CORRECT: Per AP/15 and ICS design the rod runback reduces power to 55% however the allowable power level is 75% for 3-RCP operations; therefore AP/15 directs action to further reduce to  $\leq 45\%$ . Cladding failure due to power peaking for all modes of operation is the reason for QPT limits**
- B. Incorrect: First part is correct; QPT limits are there to assure core safety limits will not be exceeded during all modes of operation especially accidents; however maintaining a flat flux profile as the core ages is a concern associated with normal operation and fuel management.
- C. Incorrect: Plausible in that ICS runback lowers power to  $\leq 55\%$ , however power must be reduced to  $\leq 60\%$  of Allowable Thermal Power which for 3-RCP operations is 45% not 55% so further operator action is needed to lower power. Second part is correct.
- D. Incorrect: Plausible in that ICS runback lowers power to  $\leq 55\%$ , however power must be reduced to  $\leq 60\%$  of Allowable Thermal Power which for 3-RCP operations is 45% not 55% so further operator action is needed to lower power. QPT limits are there to assure core safety limits will not be exceeded during all modes of operation especially accidents; however maintaining a flat flux profile as the core ages is a concern associated with normal operation and fuel management.

---

Technical Reference(s): **AP/15, RT-PD**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **EAP-APG R9, RT-PD R5, R6**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

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

**Added "of Allowable Thermal Power" to A and B. // MB OK /// Reworded "within limits" to "less than" limits in stem CCs. Changed 45% to 60% in A and B due to no correct answer. Modified 2<sup>nd</sup> part of all answers for improved plausibility. Fixed answer analyses for B,C, and D \* MB OK**

**1 POINT**

**Question 85**

Unit 1 initial conditions:

- Reactor power = 100%
- 1B HPI Pump OOS

Current conditions:

- LOSCM tab in progress
- Rule 2 is complete
- RCS pressure = 825 psig increasing slowly
- Core SCM = 4°F increasing
- Loop SCM = 0°F
- Pzr level = 0 inches
- 1C HPI Pump has a sheared shaft

Based on the above conditions, which ONE of the following states how SG pressure will be controlled per the LOSCM tab and which EOP tab will be used to cool down the unit to decay heat removal conditions?

- A. Control SG steaming and feeding rates to establish RCS cooldown rate within TS limits / LOCA CD
- B. Control SG steaming and feeding rates to establish RCS cooldown rate within TS limits / FCD
- C. Establish EFDW Flow to both SGs and fully depressurize both SGs / LOCA CD
- D. Establish EFDW Flow to both SGs and fully depressurize both SGs / FCD

2009 NRC SENIOR REACTOR OPERATOR EXAM

Question 85

**T1/G2**

BE08EA2.1, LOCA Cooldown

**Ability to determine and interpret the following as they apply to the (LOCA Cooldown):** Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

(2.8/4.2)

**K/A MATCH ANALYSIS**

Requires determination that conditions exist for a controlled cooldown of the RCS using SGs and selection of procedure used to direct the cooldown to cold shutdown conditions.

**SRO-ONLY ANALYSIS**

Requires assessment of plant conditions and based on that assessment selection of the appropriate procedure used to control the plant cooldown. (43.5)

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: First part is incorrect. Plausible because this would be the normal steps taken if HPI were not degraded. Second part is correct.
- B. Incorrect: First part is incorrect. Plausible because this would be the normal steps taken if HPI were not degraded. Second part is plausible because with no RCPs operating and SCM > 0°F a transfer would be made to the FCD tab.
- C. CORRECT: With loss of SCM and degraded HPI, the SG's are fed to the LOSCM setpoint and fully depressurized. A transfer will be made to the LOCA CD tab of the EOP.**
- D. Incorrect: First part is correct. Second part is plausible because with no RCPs operating and SCM > 0°F a transfer would be made to the FCD tab.

---

Technical Reference(s): **EP/1/1800/001 LOSCM Tab Rev 36**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-LOSCM Obj. R12 & 17**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

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

**No changes. // MB Ok**

**1 POINT**

**Question 86**

Unit 3 initial conditions:

- Reactor Power = 100% stable
- 3A1 RCP vibration = 4 mils slowly increasing

Current conditions:

- Reactor Power = 100% stable
- 3SA-9/E2 (RC PUMP VIBRATION EMERG HIGH) actuates
- 3A1 RCP vibration = 22 mils slowly increasing

Based on the current conditions above, which ONE of the following describes how the SRO will direct the sequence of actions to mitigate this event?

The OATC will...

- perform a rapid runback per AP/29 (Rapid Unit Shutdown) to <70% and then the BOP will manually trip the 3A1 RCP.
- perform a rapid runback per AP/16 (Abnormal RCP Operation) to <70% and then the BOP will manually trip the 3A1 RCP.
- manually trip the reactor and then perform IMAs; the BOP will manually trip 3A1 RCP and then perform a symptom check.
- manually trip the reactor and then perform IMAs; the BOP will perform a symptom check and then manually trip 3A1 RCP.

Question 86

**T2/G1 - okm**

003G2.4.49, Reactor Coolant Pump

**Ability to perform without reference to procedures those actions that require immediate operation of system components and controls**

(4.6/4.4)

**K/A MATCH ANALYSIS**

Requires the ability to recognize conditions requiring the immediate tripping of a RCP (including the prerequisite tripping of the Reactor)

**SRO-ONLY ANALYSIS**

Requires the assessment of plant conditions and selecting the sequence of procedures during abnormal/emergency situations (43.5) The SRO prioritizes the sequence of how these procedures are implemented. He determines that securing RCP takes precedents over the normal practice of the BOP performing a symptoms check immediately following a reactor trip.

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: AP/29 is plausible if candidate does not recognize that an immediate RCP trip is required. AP/29 is normally the AP used to rapidly reduce power.
- B. Incorrect: This would be correct if the immediate trip criteria is not met.
- C. Correct: SRO must immediately recognize that conditions require the immediate tripping of the Reactor and then the RCP per AP/16. Once tripped EOP IMAs will be directed. After IMAs are directed the SRO will then direct the BOP to trip the RCP per AP/16 (still in progress) while the OATC is performing IMAs.**
- D. Incorrect: This routing is plausible as it is the normal sequence following a reactor trip.

---

Technical Reference(s): **OMP 1-18 Rev. 027, 3/AP/16 Rev. 18**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **EAP-EOP Obj. R7, R20, EAP-APG Obj. R9**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

**Modified "D" for improved plausibility. Added "Reactor Power = 100% stable" to current conditions. Discuss SRO knowledge. // MB OK**

**1 POINT**

**Question 87**

Unit 1 plant conditions:

- Date/Time = 12-2 / 2100
- RCS Loops "dropped"
- 1A LPI pump operating
- SR 3.4.8.1 is discovered to have NOT been performed since 12-1 / 2100
- SR 3.4.8.1 cannot be performed

Based on the above conditions, which ONE of the following states the time that the operating DHR loop shall be declared inoperable due to not meeting surveillance requirements per Tech Spec 3.4.8 (RCS Loops – MODE 5, Loops Not Filled) including any applicable extensions?

**REFERENCE PROVIDED**

Declare the operating DHR loop inoperable at...

- A. 2100 on 12-2.
- B. 1200 on 12-2.
- C. 0900 on 12-3.
- D. 2100 on 12-3.

Question 87

**T2/G1- okm**

005G2.2.38, Residual Heat Removal System

**Knowledge of conditions and limitations in the facility license**

(3.6/4.5)

**K/A MATCH ANALYSIS**

Requires knowledge of LPI Tech Specs as pertains to the DHR mode of operation

**SRO-ONLY ANALYSIS**

Requires knowledge of the conditions and limitations in the facility license (43.2)

**ANSWER CHOICE ANALYSIS**

**Answer: D**

- A. Incorrect: SR 3.0.3 is applicable due to discovery of missed surveillance. SR 3.0.3 allows the greater of 24 hours or the stated frequency (12 hours), whichever is greater, to complete the surveillance. Plausible if the loop is declared inoperable immediately due to missing the surveillance.
- B. Incorrect: SR 3.0.3 allows an additional 12 hours as explained above. This answer is plausible if inoperable is declared at SR\*1.25 (15 hrs) from last SR performance (ignores idea of "time of discovery").
- C. Incorrect: Time is from discovery + additional 12 hours (additional 24 hrs is allowed)
- D. CORRECT: Time is from discovery + additional 24 hours or specified frequency (12 hours), whichever is greater. This answer uses 24 hrs, most allowed.**

---

Technical Reference(s): **TS 3.4.8, TS SR 3.0.3**

Proposed references to be provided to applicants during examination: **TS 3.4.8**

Learning Objective: **ADM –TSS R5, R6**

Question Source: **B (ADM010501)**

Question History: Last NRC Exam \_\_\_\_\_

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

***Enhance "D" AA. /// Replaced with a bank question //// Modified stem for clarity MB OK /// Modified the stem as follows for clarity and to ensure only one correct answer : added bullet "SR 3.4.8.1 cannot be performed" and to stem "include any applicable extensions" and to stem "LPI operating in normal DHR" to replace "1C LPI pump..." to remove alignment conflicts. \* MB OK //// Modified stem by deleting bullet for RCS temperature and modified DHR bullet to now state "1A LPI pump operating. Also added "due to not meeting surveillance requirements" to stem. MB OK***

**1 POINT**

**Question 88**

Unit 1 plant conditions:

- EOP LOCA Cooldown tab in progress
- RC temperature = 240°F slowly decreasing
- RC pressure = 180 psig slowly decreasing
- BWST level = 5.5 ft stable
- Radiation Levels in the LPI pump rooms allow access

Based on the above conditions, which ONE of the following describes the alignment for the in-progress cooldown to accomplish decay heat removal provided by the EOP?

- A. One LPI train in High Pressure Mode and one LPI train in ECCS alignment with suction from the RBES.
- B. One LPI train in series Mode and one LPI train in ECCS alignment with suction from the RBES.
- C. Both LPI trains in ECCS alignment with suction from the RBES.
- D. Both LPI trains in normal DHR alignment.

Question 88

**T2/G1 - gcw**

006G2.1.20, Emergency Core Cooling System (ECCS)

**Ability to interpret and execute procedure steps.**

(3.8/4.0)

**K/A MATCH ANALYSIS**

Requires knowledge of ECCS alignment during LOCA cooldown

**SRO-ONLY ANALYSIS**

Requires SRO knowledge EOP LOCA cooldown steps

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: The LOCA Cooldown section of the EOP will align one LPI train in the High Pressure Mode while leaving the other in its ECCS alignment with suction on the RBES.**
- B. Incorrect Series mode would require use of both LPI Coolers. By procedure one train remains aligned to the RBES to provide for replacement of water lost out of the break.
- C. Incorrect: One train is aligned in the High Pressure Mode due to its better Cooling characteristics.
- D. Incorrect: By procedure one train remains aligned to the RBES to provide for replacement of inventory lost out the break.

---

Technical Reference(s): **EOP LOCA Cooldown tab.**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **EAP-LCD Obj. R7**

Question Source: **Bank (EAP240701)**

Question History: Last NRC Exam \_\_\_\_\_

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

**New KA and new bank question. // Changed RCS temp to 240 degrees. MB OK**

1 POINT

Question 89

Unit 3 initial conditions:

- LOCA in progress
- RB Pressure = 16 psig increasing

Current conditions:

- BWST Level = 5 feet stable
- 3SA8/D11, BS "A" HEADER FLOW HIGH/LOW, actuated
- 3A RBS Pump amps are oscillating
- 3B Train RBS parameters are normal for the plant conditions

Based on the above conditions, which ONE of the following describes the actions required by the Alarm Response Guide and the design basis for RBS?

- A. Allow 3A RBS Pump to run, throttle discharge valve (3BS-1), and vent the pump.  
RBS is necessary to maintain RB pressure and temperature within design values.
- B. Allow 3A RBS Pump to run, throttle discharge valve (3BS-1), and vent the pump.  
RBS is necessary to maintain RB pressure within design value. No design value exists for RB temperature.
- C. Secure the 3A RBS Pump.  
RBS is necessary to maintain RB pressure and temperature within design values.
- D. Secure the 3A RBS Pump.  
RBS is necessary to maintain RB pressure within design value. No design value exists for RB temperature.

Question 89

**T2/G1 - okm**

026A2.07, Containment Spray System (CSS)

**Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:** Loss of containment spray pump suction when in recirculation mode, possibly caused by clogged sump screen, pump inlet high temperature exceeded cavitation, voiding, or sump level below cutoff (interlock) limit  
(3.6/3.9)

**K/A MATCH ANALYSIS**

Requires knowledge of TS Bases in that the impact of losing a spray pump is still within the RB P-T design basis limits. Procedure usage to correct, control, or mitigate is covered by the Alarm Response Guide

**SRO-ONLY ANALYSIS**

55.43(2) Facility operating limitations in the technical specifications and their bases

**ANSWER CHOICE ANALYSIS****Answer: C**

- A. Incorrect. Throttling is contrary to the guidance in the ARG. Plausible because throttling the discharge valve would be a method to raise suction pressure, which can be a cause of cavitation.
- B. Incorrect. According to TS Basis, a design value for RB Temperature exists. Throttling is contrary to the guidance in the ARG. Plausible because throttling the discharge valve would be a method to raise suction pressure, which can be a cause of cavitation. Also plausible because ES actuation is triggered by containment pressure, not temperature.
- C. **Correct. CAUTION in the ARG states that RBS is to be secured if loss of suction is causing the low flow. Loss of suction is indicated by the oscillating amps in conjunction with the alarm. Tech Spec Bases states RB spray is required to keep post-accident pressure and temperature within design values.**
- D. Incorrect. According to TS Bases, a design value for RB Temperature exists. Plausible because ES actuation is triggered by containment pressure, not temperature.

---

Technical Reference(s): **OP/1/A/6101/008, ARG 1SA-08/D-11 // TS 3.6.5, Reactor Building Spray and Cooling System, Bases**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **PNS-RBS R11**

Question Source: **BANK**

Question History: Last NRC Exam: **2006 SRO Exam #34**

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

**No changes. // Changed stem to read "the design basis for RBS". MB OK**

**1 POINT**

**Question 90**

Unit 1 initial conditions:

- Reactor power = 100%

Current conditions:

- Main Turbine trips
- 1FDW-35 (1A FDW Control Valve) fails OPEN
- Statalarm 1SA-2/B-9 (MS Stm Gen A Level High/Emerg Low) actuates
- 1A SG level = 98% OR increasing
- 1B SG level = 53 inches XSUR decreasing

Based on the above conditions, which ONE of the following describes the required action in accordance with the EOP Subsequent Actions and the bases for the SLC limit on SG Level?

- A. Take manual control 1FDW-35 and reduce 1A SG level / ensure overcooling event due to steam generator overfill will not lead to pressurized thermal shock of the reactor vessel.
- B. Take manual control 1FDW-35 and reduce 1A SG level / ensure containment pressure remains within the maximum design limits assumed in the accident analysis for a MSLB
- C. Trip both Main FDW Pumps and stop steaming 1A SG / ensure overcooling event due to steam generator overfill will not lead to pressurized thermal shock of the reactor vessel.
- D. Trip both Main FDW Pumps and stop steaming 1A SG / ensure containment pressure remains within the maximum design limits assumed in the accident analysis for a MSLB

Question 90

**T2/G1 - jmb**

059A2.12, Main Feedwater System

**Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:** Failure of feedwater regulating valves

(3.1/3.4)

**K/A MATCH ANALYSIS**

Requires a prediction of the impact of a failed FW Regulating valve and the appropriate procedure actions to address the impact.

**SRO-ONLY ANALYSIS**

Requires knowledge of facility operating limitations in the technical specifications (SLC) and their bases. (43.2)

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: First part is incorrect. Plausible as EOP directs manual control of FDW if level is not being properly controlled, however with the levels given the Main FDW Pumps would both be tripped and manual control of 1FDW-35 would be inappropriate. Second part is correct.
- B. Incorrect: First part is incorrect as noted above. Second part is incorrect. Plausible as limiting SG inventory would limit energy addition to containment following a MSLB however it is not the limiting event for containment pressure post accident. This is also the purpose of AFIS.
- C. **Correct: EOP SAs directs both Main FDW Pumps to be tripped (they should be automatically tripped at 96% OR level) and stop steaming the affected SG (1A). The second part is correct per SLC 16.7.5 the overfill protection circuit (High Level MFPT Trip) will "assure that an overcooling event due to steam generator overfill will not lead to pressurized thermal shock of the reactor vessel."**
- D. Incorrect: First part is correct. Second part is incorrect. Plausible as limiting SG inventory would limit energy addition to containment following a MSLB however it is not the limiting event for containment pressure post accident. This is also the purpose of AFIS.

---

Technical Reference(s): **1SA-2/B-9 Rev 24, EOP SA Tab. Rev 36**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-SA Obj R4 & R5, ADM-TSS Obj R5**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

Question Cognitive Level: Memory or Fundamental Knowledge

**Comprehension or Analysis**

**Added SLC to stem for clarity. // Underlined "SLC Limit" MB OK /// Moved underline to SG Level and added procedural name of 1FDW-35 (1A FDW Control Valve) \* MB OK**

**1 POINT**

**Question 91**

Unit 1 plant conditions:

- Station Blackout occurred approximately one hour ago
- Power has NOT been restored
- SSF is activated per AP/25 (SSF EOP)

SSF Control Room indications:

- Both Loop's Tc: 555°F slowly decreasing
- Both Loop's Th: 570°F slowly decreasing
- CETCs: 570°F slowly decreasing
- RCS Pressure: 2170 psig slowly increasing
- Pzr level: 250 inches slowly increasing
- RC M/U Flow: 28.3 gpm
- Unit 1 Total ASW flow: 175 gpm
- 1A SG Level: 200 inches slowly increasing
- 1B SG Level 200 inches slowly increasing
- Pzr Heaters Group B & C ON

Based on the above conditions, which ONE of the following describes actions directed by AP/25 and the design bases of the SSF?

- A. Establish letdown and cycle Pzr Heaters / provide an alternate and independent means to achieve and maintain MODE 3 with an average RC temperature  $\geq 525^{\circ}\text{F}$  for all three units for a minimum of 72 hours
- B. Establish letdown and cycle Pzr Heaters / provide an alternate and independent means to cooldown the plant from MODE 3 to placing Decay Heat in service for all three units within 72 hours
- C. Reduce ASW flow and RC M/U Flow / provide an alternate and independent means to achieve and maintain MODE 3 with an average RC temperature  $\geq 525^{\circ}\text{F}$  for all three units for a minimum of 72 hours
- D. Reduce ASW flow and RC M/U Flow / provide an alternate and independent means to cooldown the plant from MODE 3 to placing Decay Heat in service for all three units within 72 hours

Question 91

T2/G2 – jmb

016G2.1.30, Non-Nuclear Instrumentation System (NNIS)

**Ability to locate and operate components, including local controls.**

(4.4/4.0)

**K/A MATCH ANALYSIS**

Requires ability to use non-nuclear instrumentation to determine plant status and determine/operate local (SSF) controls as required

**SRO-ONLY ANALYSIS**

Requires knowledge of facility operating limitations in the technical specifications and their bases.

**ANSWER CHOICE ANALYSIS**

Answer: A

- A. **Correct: Conditions given require RCS inventory control to be established by restoring Letdown and pressure increase to be halted by turning OFF Pzr heaters. SSF Facility is designed to provide an alternate and independent means to achieve and maintain MODE 3 with an average RC temperature  $\geq 525^{\circ}\text{F}$  for all three units for a minimum of 72 hours following specific event that require control to be established outside of and isolated from the control room.**
- B. Incorrect: Actions given are correct. Design purpose of the SSF is incorrect. Plausible as the initial conditions in the statement are correct however the cooldown to Decay Heat conditions is not desired until either control is restored to the control room and forced flow in the RCS is established.
- C. Incorrect: Action directed is incorrect. Plausible as RCS Temp trend indicates a slight cooldown and reducing ASW flow would reduce the CD rate. Pzr level being high could be corrected by reducing RCMU flow however the directed action is to establish letdown. Purpose/bases statement is correct.
- D. Incorrect: Action directed is incorrect as noted above. Purpose/bases statement is incorrect as noted above.

---

Technical Reference(s): **AP/25 Rev 25 Encl. 5.1A, EAP-SSF TS Bases 3.10.1**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **EAP-SSF Obj. R10, ADM-TSS Obj. R5**

Question Source: **M (EAP204901)**

Question History: Last NRC Exam \_\_\_\_\_

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

**No changes. // MB OK /// Reworded in A and B "turned Pzr Heaters Off" to "cycle Pzr Heaters" for clarity \* MB OK.**

**1 POINT**

**Question 92**

Unit 1 initial conditions:

- Reactor power = 100%

Current conditions:

- Condenser vacuum = 6 inches Hg stable
- 1A SG Outlet pressure = 985 psig stable
- 1B SG Outlet pressure = 982 psig stable
- One Main Steam (MS) Relief valve is open

Based on the above conditions, which ONE of the following describes the method used to control Main Steam header pressure in accordance with the EOP Subsequent Actions and the bases for the minimum RCS temperature allowed during this process?

- A. Adjust the Turbine Header setpoint to reduce MS pressure until the valve reseats  
Ensure shutdown margin is maintained provided all safety and regulating control rods are fully inserted.
- B. Adjust the Turbine Header setpoint to reduce MS pressure until the valve reseats  
Ensure shutdown margin is maintained provided BWST suction to the HPI pumps is aligned
- C. Use Atmospheric Dump Valves to reduce MS pressure until the valve reseats  
Ensure shutdown margin is maintained provided all safety and regulating control rods are fully inserted.
- D. Use Atmospheric Dump Valves to reduce MS pressure until the valve reseats  
Ensure shutdown margin is maintained provided BWST suction to the HPI pumps is aligned

Question 92

**T2/G2 – new K/A**

055G2.2.44, Condenser Air Removal

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

(4.2/4.4)

**K/A MATCH ANALYSIS**

Requires knowledge of the requirements for low condenser vacuum with a stuck MSR/V

**SRO-ONLY ANALYSIS**

Requires knowledge of the Facility Emergency Operating Procedure to prevent loss of SDM due to low RCS temperature.

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: First part is incorrect. Plausible because this would be correct if vacuum were > 7 inches Hg. Second part is correct.
- B. Incorrect: First part is incorrect. Plausible because this would be correct if vacuum were > 7 inches Hg. Second part is incorrect but plausible because 525°F is the error corrected minimum temperature for criticality. Basis is plausible as is the reason BWST is aligned to HPI during a SGTR.
- C. Correct: Because vacuum is < 6 inches Hg the ADVs will be used to lower MS pressure and reset the MSR/V. The lowest allowed RCS temperature during this evolution is 532°F. Basis for 532° to ensure shutdown margin is maintained with all rods inserted.**
- D. Incorrect: First part is correct. Second part is incorrect but plausible because 525°F is the error corrected minimum temperature for criticality. Basis is plausible as is the reason BWST is aligned to HPI during a SGTR.

---

Technical Reference(s): **EOP Rev 36, SA**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **EAP-SA T1**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

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

***Added basis information to answers. Corrected typos. // Added "condenser" to stem. Removed temperatures from answers and reworded stem. MB OK***

**1 POINT**

**Question 93**

Unit 1 initial conditions:

- Reactor power = 100%
- 1A GWD tank release in progress

Current conditions:

- Loss of power to RM-80 skid of 1RIA-45 (Norm Vent Gas)
- 1SA8/B-9 RM PROCESS MONITOR RADIATION HIGH in alarm
- 1SA8/B-10 RM PROCESS MONITOR FAULT in alarm

Based on the above conditions, which ONE of the following states the action required per the Alarm Response Guideline and the SLC bases for the determination of the setpoints for the RIA alarms for this release?

- A. Manually close 1GWD-4  
Setpoints ensure that releases are within the limits of 10CFR20
- B. Manually close 1GWD-4  
Setpoints ensure that resulting 1 hour dose at the Exclusion Area boundary will not exceed 10CFR100 limits
- C. Verify 1GWD-4 has automatically closed  
Setpoints ensure that releases are within the limits of 10CFR20
- D. Verify 1GWD-4 has automatically closed  
Setpoints ensure that resulting 1 hour dose at the Exclusion Area boundary will not exceed 10CFR100 limits

Question 93

**T2/G2**

071A2.05, Waste Gas Disposal System (WGDS)

**Ability to (a) predict the impacts of the following malfunctions or operations on the Waste Gas Disposal System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:** Power failure to the ARM and PRM Systems (2.5/2.6)

**K/A MATCH ANALYSIS**

Requires ability to predict the response of the GWD release valve to a loss of power to the station vent RIA and determine the action required by the alarm response procedure.

**SRO-ONLY ANALYSIS**

Requires knowledge of the SLC bases used in determining the alarm setpoints used during radioactive releases. (43.2)

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. Correct: 1RIA-45 does not automatically terminate GWD releases. It does monitor the release via the station vent stack the required action in the ARG and AP/18 is to stop releases in progress. The bases for the setpoints in SLC 16.11.3 is to ensure that average annual releases of radioactive material in effluents will be small percentages of the limits specified in 10CFR20.**
- B. Incorrect: First part is correct. Second part is incorrect and plausible as it is based on the 2 hour limit used in establishing RCS Activity Tech Spec limits for dose at the Site Boundary.
- C. Incorrect: First part is incorrect. Plausible because an alarm/failure of the release RIAs (RIA-37 or 38) will automatically close 1GWD-4. Second part is correct.
- D. Incorrect: Both parts are incorrect and plausible as noted above in B.

---

Technical Reference(s): **1SA8/B-9, 1SA8/B-10, SLC 16.11.3 & 16.11.2**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **RAD-RIA (R2 & 15), ADM-TSS Obj R5**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

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

**Added SLC to stem. Add info to "B" AA. // MB OK /// Simplified second part of all answers for clarity. \* MB OK**

**1 POINT**

**Question 94**

Plant conditions:

- The work list for night shift has detailed instructions (not contained in a specific procedure) for stroking a valve to flush a hot spot from down stream piping
- Each step has a signoff blank provided

Based on the above conditions, which ONE of the following is correct per OMP 1-23 (Operations Worklist Process)?

- A. Perform the task using the provided signoff steps after verifying the worklist was signed by a qualified preparer and reviewer.
- B. Perform the task using the provided signoff steps after face to face communications with the Unit Coordinator confirms the intent and potential consequences of the task.
- C. Do NOT perform the worklist task because the worklist cannot take the place of an approved procedure.
- D. Do NOT perform the worklist task unless the OSM gives approval to use the provided instructions.

2009 NRC SENIOR REACTOR OPERATOR EXAM

Question 94

**T3 – New K/A**

G2.1.15, Conduct of Operations

**Knowledge of administrative requirements for temporary management directives, such as standing orders, night orders, Operations memos, etc**

(2.7/3.4)

**K/A MATCH ANALYSIS**

Requires knowledge of Operations Worklist Process

**SRO-ONLY ANALYSIS**

Knowledge of SRO responsibilities in performing items on the worklist

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect: Plausible in that an approved procedure uses a qualified preparer and reviewer.
- B. Incorrect: Plausible in that these actions are required when the worklist is given to the shift SRO.
- C. Correct: Per OMP 1-23 the worklist cannot take the place of an approved procedure.**
- D. Incorrect: Plausible in that the OSM is the highest authority on shift.

---

Technical Reference(s): **OMP 1-23**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **None**

Question Source: **New**

Question History: Last NRC Exam: \_\_\_\_\_

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

***Added "not contained in a specific procedure" to stem for clarity. // MB OK***

**1 POINT**

**Question 95**

Unit 2 initial conditions:

- Defueling in progress
  - Withdrawing first fuel assembly
- FTC level = 22.0 feet stable
- No water additions are being made to the system
- 2A LPI train is operable and in service
- 2B LPI train operable

Current conditions:

- 2LP-18 failed closed
- Refueling SRO desires stopping the 2A LPI Pump to aid in inserting a fuel assembly

Based on the above conditions, which ONE of the following describes whether the 2A LPI pump may be stopped in accordance with OP/2/A/1502/007 (Operations Defueling /Refueling Responsibilities) and the TS bases for operation of the pump?

- A. 2A LPI Pump may be stopped for up to 1 hour per 8 hour period.  
FTC level is within TS limits and provides adequate backup decay heat removal.
- B. 2A LPI Pump may be stopped for up to 1 hour per 8 hour period. .  
Spent Fuel Cooling system provides adequate backup decay heat removal.
- C. 2A LPI Pump may be NOT be stopped  
FTC level is below TS limits and cannot provide adequate backup decay heat removal.
- D. 2A LPI Pump may be NOT be stopped  
Spent Fuel Cooling system can NOT provide adequate backup decay heat removal.

Question 95

T3

G2.1.42, Conduct of Operations

**Knowledge of new and spent fuel movement procedures**

(2.5/3.4)

**K/A MATCH ANALYSIS**

Requires knowledge of fuel handling procedures and requirements

**SRO-ONLY ANALYSIS**

Requires knowledge of fuel handling procedures (43.7), TS and Bases (43.2)

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. CORRECT: TS 3.9.4 (Refueling Ops- DHR and Coolant Circulation –High Water Level) is in effect as water level is  $\geq 21.34$  ft. This condition requires only 1 DHR loop to be operable and in service since the water can provide adequate backup decay heat removal. TS and Refueling procedures allow the operating loop to be secured for up to 1 hour every 8 hours with adequate level.**
- B. Incorrect: First part is correct. 2<sup>nd</sup> part is incorrect but plausible since Spent Fuel Cooling (SFC) helps to provide decay heat removal but is not the basis for allowing the pump to be secured for up to an hour.
- C. Incorrect: First part is incorrect but plausible if TS 3.9.5 criteria are misapplied to this situation. TS3.9.5 (DHR and Coolant Circulation – Low Water Level) requires 2 operable DHR loops with one loop in service (no time is allowed for a pump to be secured). 2<sup>nd</sup> part is wrong but plausible in that it would be true if level was below the refueling level of 21.34 ft.
- D. Incorrect: First part is incorrect but plausible if TS 3.9.5 criteria are misapplied to this situation. TS3.9.5 (DHR and Coolant Circulation – Low Water Level) requires 2 operable DHR loops with one loop in service (no time is allowed for a pump to be secured). 2<sup>nd</sup> part is incorrect but plausible since Spent Fuel Cooling (SFC) helps to provide decay heat removal but is not the basis for allowing the pump to be secured for up to an hour.

---

Technical Reference(s): **OP/0/A/1506/001, OP/2/A/1502/007, TS 3.9.4, TS 3.9.5**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **FH-FHS R21, R32 // ADM-TSS R5, R6**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

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

**Wrote new question to match KA and improve plausibility. MB OK**

**1 POINT**

**Question 96**

Which ONE of the following may be used to operate the plant short-term until procedure changes are completed and what is the minimum level of approval required?

- A. Operations Guidelines (Ops Guides) / PORC
- B. Operations Guidelines (Ops Guides) / Superintendent of Operations
- C. Operational Decision Making Issue (ODMI) / PORC
- D. Operational Decision Making Issue (ODMI) / Superintendent of Operations

Question 96

**T3 - okm**

G2.2.5, Equipment Control

**Knowledge of the process for making design or operating changes to the facility.**  
(2.2/3.2)

**K/A MATCH ANALYSIS**

**Knowledge of the process for short term operational changes to the facility.**

**SRO-ONLY ANALYSIS**

**SRO knowledge required to deviate from normal approved procedural requirements.**

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: First part is correct. Second part is incorrect. Plausible because PORC approval is required for justification for continued operations.
- B. CORRECT: Per OMP 4-06, ODMLs, EM 4.11, Ops focus items shall not be used to operate the plant. The only document that can be used to operate the plant short term is an Ops Guide and Ops Guide containing such procedural guides must be approved by Superintendent of Operations.**
- C. Incorrect: First part is incorrect. Plausible because ODMLs are used to provide additional information to the shifts. Second part is incorrect. Plausible because PORC approval is required for justification for continued operations.
- D. Incorrect: First part is incorrect. Plausible because ODMLs are used to provide additional information to the shifts. Second part is correct.

---

Technical Reference(s): **OMP 4-06, Use of Operations Guidelines.**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **None**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

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

***Wrote new question to match KA and improve plausibility. // MB OK***

**1 POINT**

**Question 97**

Unit 1 plant conditions:

- Startup in progress
- Control rod group 1 = 100% withdrawn
- Control rod group 2 = 100% withdrawn
- Control rod group 3 = 100% withdrawn
- Control rod group 4 = 0 % withdrawn
- TD EFDW pump is red tagged for maintenance

Based on the above conditions, which ONE of the following describes the current operational MODE in accordance with OP/1102/001 (Controlling Procedure For Unit Startup), and whether a change to the next higher Mode is allowed?

- A. Mode 2  
No
- B. Mode 2  
Yes
- C. Mode 3  
No
- D. Mode 3  
Yes

2009 NRC SENIOR REACTOR OPERATOR EXAM

Question 97

**T3 – ja/JMB**

G2.2.35, Equipment Control

**Ability to determine Technical Specification Mode of Operation**

(3.6/4.5)

**K/A MATCH ANALYSIS**

KA requires determination of mode. Item addresses condition where mode is in process of being changed.

**SRO-ONLY ANALYSIS**

10CFR55.43(b) item 2 is met because the SRO must understand Technical Specification concerning RPS.

**ANSWER CHOICE ANALYSIS**

**Answer: C**

- A. Incorrect, first part is incorrect. Mode 2 is not entered until CR Group 5 is withdrawn. Second part is correct.
- B. Incorrect, both parts are incorrect.
- C. **Correct, mode 2 is not entered until CR Group 5 is withdrawn. T.S. 3.0.4 does NOT allow a Mode change unless the applicable action statements for the next higher Mode allow continued operation without time limits.**
- D. Incorrect, first part is correct. Second part is incorrect. Plausible because entry would be made if a mode change was made.

---

Technical Reference(s): **TS 1.0.1 Definition, TS 3.3.1, TS 3.0.4**

Proposed references to be provided to applicants during examination: **None**

Learning Objective: **CP-011 R37/38**

Question Source: **BANK**

Question History: Last NRC Exam **ONS 2008 SRO Retest Q#97**

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

***No change. Discuss mode changes with NRC. // Removed TS from stem and added procedure reference. Removed extra info from answers. MB OK /// Modified stem to read "red tagged for maintenance" for clarity \* MB OK***

**1 POINT**

**Question 98**

Unit 1 plant conditions

**Time = 0210**

- Reactor trip

**Time = 0300**

- T<sub>c</sub> = 490°F
- RCS Pressure = 650 psig
- DEI = 6 uCi/ml
- 1RIA-57 = 45 R/hr
- 1RIA-58 = 25 R/hr

**Time = 0330**

- T<sub>c</sub> = 482°F
- RCS Pressure = 600 psig
- DEI = 287 uCi/ml
- 1RIA-57 = 492 R/hr
- 1RIA-58 = 253 R/hr

Based on the above conditions, which ONE of the following describes the EAL classification at 0300 and 0330?

**REFERENCE PROVIDED**

**0300**

A. Alert

B. Alert

C. Unusual Event

D. Unusual Event

**0330**

Site Area Emergency

General Emergency

Site Area Emergency

General Emergency

Question 98

**T3 - gcw**

G2.3.13, Radiation Control

**Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.**

(3.4/3.8)

**K/A MATCH ANALYSIS**

Requires knowledge of EAL classifications in regard to RIA alarms.

**SRO-ONLY ANALYSIS**

43(5) Requires assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: First part is correct. An Alert is correct based on RIA-57/58. Second part is incorrect. Plausible if the student does not correctly interpret the time since shutdown or realize that the RIA readings apply to the Potential Loss of Containment Barriers column.
- B. Correct: 5 points for "1RIA 57 or 58 reading  $\geq 1.0$  R/hr". Indicated RIA-57/58 Reading 45/25 R/hr. Total of 5 points which is an Alert. Second part is a General Emergency due to RIA-57/58 increasing substantially. This gives points from all three areas. RCS barriers = 5 Fuel. Clad barriers = 5. Containment barriers = 1. Total = 11. 11 points is a General Emergency.**
- C. Incorrect: First part is incorrect. Plausible if candidate uses DEI = 6 uCi/ml (DEI > 5 is a UE) instead of RIA-57/58 readings. This would lead the candidate to start with Unusual Event. Second part is incorrect. Same as answer 'A'.
- D. Incorrect: First part is incorrect. Same as answer 'C'. Second part is correct.

---

Technical Reference(s): **RP/1000/001, Emergency Classification.**

Proposed references to be provided to applicants during examination: **RP/1000/001, Emergency Classification.**

Learning Objective: **EAP-SEP R12**

Question Source: **Bank EAP191202**

Question History: Last NRC Exam:

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

***Wrote new question to match K/A and improve plausibility. // Changed C and D to Unusual Event to improve plausibility. MB OK // fixed plausibility statements.***

**1 POINT**

**Question 99**

Unit 1 initial conditions:

- Reactor power = 100%

Current conditions:

- RCS pressure = 1136 psig slowly decreasing
- Core SCM = 0°F
- RB pressure = 11.6 psig slowly decreasing
- 1A SG pressure = 1010 psig slowly decreasing
- 1B SG pressure = 1008 psig slowly decreasing

Based on the above conditions, which ONE of the following describes whether Emergency Dose Limits are in affect and what is the maximum (TEDE) dose that an NEO can receive while performing a task outside of the control room without exceeding any applicable limits?

- A. Yes / 5 rem for performing Time Critical Tasks
- B. Yes / 25 rem for protecting property
- C. No / 2 rem for performing Time Critical Tasks
- D. No / 25 rem for lifesaving activities

2009 NRC SENIOR REACTOR OPERATOR EXAM

Question 99

**T3 - okm**

G2.3.4, Radiation Control

**Knowledge of radiation exposure limits under normal or emergency conditions.**  
(3.2/3.7)

**K/A MATCH ANALYSIS**

Requires knowledge of whether emergency dose limits are in effect and for what task they apply

**SRO-ONLY ANALYSIS**

The SRO as the procedure director evaluates facility conditions and determines if EDLs are in affect.

**ANSWER CHOICE ANALYSIS**

**Answer: A**

- A. CORRECT: Plant conditions indicate a LOCA is occurring. This requires EDLs to be in effect. 5 rem is the maximum dose that could be received under EDLs for performing Time Critical Tasks.**
- B. Incorrect: First part is correct. Second part is incorrect. Plausible because 25 rem is the limit for lifesaving activities.
- C. Incorrect: First part is incorrect. Plausible if they misdiagnose a MSLB. Second part is incorrect. Plausible in that 2 rem is the normal administrative limit.
- D. Incorrect: First part is incorrect. Plausible if they misdiagnose a MSLB. Second part is incorrect. Plausible because 10 rem is the maximum allowed dose for protecting property. 25 rem is the limit for lifesaving activities.

---

Technical Reference(s):

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **EAP-TCA R**

Question Source: **NEW**

Question History: Last NRC Exam \_\_\_\_\_

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

**Changed D to 25 rem per NRC comment. // MB OK**

**1 POINT**

**Question 100**

Unit 3 plant conditions:

- Control room staffing at minimum
- No other SROs or the OSM are available
- Time is not available for a procedure change
- An abnormal procedure (AP) is in progress

Based on the above conditions and per OMP 1-18 (Implementation Standard During Abnormal and Emergency Events), which ONE of the following conditions allows taking actions outside of the AP and the minimum level of approval required?

Taking actions outside of the AP is allowed if a procedure step \_\_\_\_\_. This would require a minimum level of approval of \_\_\_\_\_.

- A. is incorrect / One RO and CR SRO
- B. is incorrect / CR SRO only
- C. will result in unplanned TS entry / One RO and CR SRO
- D. will result in unplanned TS entry / CR SRO only

Question 100

**T3 - gcw**

G2.4.11, Emergency Procedures / Plan  
**Knowledge of abnormal condition procedures.**  
(4.0/4.2)

**K/A MATCH ANALYSIS**

Requires knowledge of taking steps outside of abnormal condition procedures

**SRO-ONLY ANALYSIS**

(43.5) Requires assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

**ANSWER CHOICE ANALYSIS**

**Answer: B**

- A. Incorrect: First part is correct. Second part is incorrect. Plausible because it is the preferred method if the OSM is not available.
- B. CORRECT: A procedure step is incorrect is one the reasons allowed to deviate from the approved AP. Normally this requires OSM approval. In lieu of the OSM two SROs can approve the action. However if only the CR SRO is available then he/she alone can make the determination.**
- C. Incorrect: First part is incorrect. Plausible because unplanned TS entry while performing an OP would require stopping the in progress procedure and getting a procedure change prior to continuing. Second part is incorrect. Plausible because it is the preferred method if the OSM is not available.
- D. Incorrect: First part is incorrect. Plausible because unplanned TS entry while performing an OP would require stopping the in progress procedure and getting a procedure change prior to continuing. Second part is correct.

---

Technical Reference(s): **OMP 1-18, Attachment G**

Proposed references to be provided to applicants during examination: **NONE**

Learning Objective: **ADM-OMP R10**

Question Source: **New**

Question History: Last NRC Exam \_\_\_\_\_

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

**Modified C and D distracters to improve plausibility. // Modified stem and distracters to improve plausibility. MB OK /// Modified stem for clarity. \* MB OK**

## SRO NRC Exam Attachments

- #76 Unit 1 EOP Encl. 5.18
- #87 TS 3.4.8 (RCS Loops – Mode 5, Loops Not Filled), all 2 pgs
- #98 RP/1000/001 (Emergency Classification) all