

EPE007 EK1.05 - Reactor Trip

Knowledge of the operational implications of the following concepts as they apply to the reactor trip: (CFR 41.8 / 41.10 / 45.3)

Decay power as a function of time .....

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Given the following:

- Unit 1 entered EP/1/A/5000/ECA-1.1, (Loss of Emergency Coolant Recirculation) following a LOCA outside containment
- Safety Injection Termination criteria is NOT met
  - The crew has been directed to determine minimum SI flow per Enclosure 4 (Minimum S/I Flowrate Versus Time After Trip)

Current conditions:

- The Unit 1 Reactor was tripped 60 minutes ago
- NCS pressure is 1000 psig.
- 1B NI pump is running with flow indicated at 320 gpm
- 1A NV pump is running with flow indicated at 400 gpm

Which ONE of the following completes the statements below?

The MINIMUM required injection flowrate to remove current reactor decay heat is \_\_\_\_ (1) \_\_\_\_.

The 1B NI Pump \_\_\_\_ (2) \_\_\_\_ be secured.

**REFERENCE PROVIDED**

- A. 1. 340 gpm  
2. will NOT
  - B. 1. 340 gpm  
2. will
  - C. 1. 360 gpm  
2. will
  - D. 1. 360 gpm  
2. will NOT
-

**General Discussion**

Required SI flow at 50 minutes is 380 gpm (graph starts at 10 minutes) if the graph is interpreted correctly. Securing the 1B NI pump would reduce flow to the 400 gpm being supplied by the 1A NV pump. Since the intent of this portion of the procedure is to minimize use of makeup sources, the crew would secure 1B NI pump.

**Answer A Discussion**

Part 1 is plausible if the applicant is confused when interpreting the required flow rate curve and overlooks the fact that the graph starts at 10 minutes (i.e. uses the 70 minute vs. 60 minute line due to incorrect interpretation).

Part 2 is plausible because the stem states that Safety Injection Termination criteria is NOT met. In most Emergency Procedures, no SI pumps are secured until termination criteria is met.

**Answer B Discussion**

Part 1 is plausible if the applicant is confused when interpreting the required flow rate curve and overlooks the fact that the graph starts at 10 minutes (i.e. uses the 70 minute vs. 60 minute line due to incorrect interpretation).

Part 2 is correct.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible because the stem states that Safety Injection Termination criteria is NOT met. In most Emergency Procedures, no SI pumps are secured until termination criteria is met.

**Basis for meeting the K**

The KA is matched because the applicant must determine injection flow (operational implication) as it relates to decay power as a function of time following a reactor trip. Additionally, the applicant must demonstrate knowledge of the concept of minimizing flow to only that required (in the condition given).

**Basis for Hi Cog**

Applicant is presented with numerous operating parameters, and must analyze these to determine a required injection flow rate which relates to removal of decay power as a function of time.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**

EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation), Rev 40, Step 18 and Enclosure. 4

**Student References Provided**

EP/1/A/5000/ECA-1.1, Encl. 4

EPE007 EK1.05 - Reactor Trip

Knowledge of the operational implications of the following concepts as they apply to the reactor trip: (CFR 41.8 / 41.10 / 45.3)

Decay power as a function of time .....

**401-9 Comments:**

**Remarks/Status**

EPE009 EK2.03 - Small Break LOCA

Knowledge of the interrelations between the small break LOCA and the following: (CFR 41.7 / 45.7)

S/Gs .....

Given the following:

- Unit 1 has experienced a Reactor Trip and Safety Injection due to a Small-Break LOCA
- The crew has just completed the actions of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)
- NV pump flow to the NC system Cold Legs is 390 GPM
- NC system pressure is 1350 PSIG and STABLE
- SG pressures are 1092 PSIG and STABLE
- NC system subcooling on the ICCM is 22°F and STABLE

Upon transition to EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant), which ONE of the following completes the statements below?

NC pumps \_\_\_\_\_(1)\_\_\_\_\_ be in service

AND

Steam Generators \_\_\_\_\_(2)\_\_\_\_\_ be required for heat removal.

- A. 1. will  
2. will
- B. 1. will  
2. will NOT
- C. 1. will NOT  
2. will
- D. 1. will NOT  
2. will NOT

**General Discussion**

Although NV pumps are injecting into the RCS, subcooling is not less than 0°F. Therefore, E-0 foldout page will not direct the RCPs to be secured.

Additionally, since NC system pressure is greater than SG pressures and both NC system and SG pressures are stable, the SGs are required for NC system cooling.

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

Part 1 is correct.

Part 2 is plausible because the applicant may conclude that the SGs are not required for NC system heat removal since there is 390 GPM of flow to the cold legs from the NV pumps.

**Answer C Discussion**

Part 1 is plausible because the applicant might conclude that NC pumps should not be running since a Safety Injection has occurred and the NV pumps are injecting into the cold legs at 390 GPM. However, the NC pumps are only secured in accordance with E-0 Foldout Page criteria if the NV pumps are running and NC system subcooling has been lost.

Part 2 is correct.

**Answer D Discussion**

Part 1 is plausible because the applicant might conclude that NC pumps should not be running since a Safety Injection has occurred and the NV pumps are injecting into the cold legs at 390 GPM. However, the NC pumps are only secured in accordance with E-0 Foldout Page criteria if the NV pumps are running and NC system subcooling has been lost..

Part 2 is plausible because the applicant may conclude that the SGs are not required for NC system heat removal since there is 390 GPM of flow to the cold legs from the NV pumps.

**Basis for meeting the K**

This K/A is met because the applicant must evaluate a given situation where a small break LOCA has occurred and determine that the SGs are still required for NC system heat removal.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	

**Development References**

EP/1/5000/E-0, Revision 42, Steps 22 & 24, Encl. 1, Step 1

**Student References Provided**

EPE009 EK2.03 - Small Break LOCA  
 Knowledge of the interrelations between the small break LOCA and the following: (CFR 41.7 / 45.7)  
 S/Gs .....

**401-9 Comments:**

**Remarks/Status**

APE015/017 2.2.39 - Reactor Coolant Pump (RCP) Malfunctions

APE015/017 GENERIC

Knowledge of less than or equal to one hour Technical Specification action statements for systems. (CFR: 41.7 / 41.10 / 43.2 / 45.13)

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Given the following:

- Unit 1 is in Mode 3
- Rod control is capable of rod withdrawal.
- NC loops 1A, 1B, and 1D are in operation.
- The crew has entered AP/1/A/5500/008 (Malfunction of Reactor Coolant Pump)
- 1A NC Pump lower bearing temperature is currently 190°F and increasing 5°F per minute

Which ONE of the following completes/answers the statements below?

- (1) 1A NC Pump lower bearing temperature will reach trip setpoint in \_\_\_\_\_ .
- (2) What is the specified Completion Time of the action required by TS 3.4.5 (RCS Loops – MODE 3) following the trip of 1A NCP?

- A. 1. 7 minutes  
2. immediately
- B. 1. 7 minutes  
2. 1 hour
- C. 1. 1 minute  
2. immediately
- D. 1. 1 minute  
2. 1 hour
-

**General Discussion**

Since the Unit is in Mode 3, AND rod control is capable of rod withdrawal, TS 3.4.5 requires that at least 3 loops be operable (and in operation). The first part of the question is knowledge of RCP trip criteria (lower bearing). The TS required action is per Condition C "One or two required loops not in operation and rod control capable of withdrawal" which has a completion time of 1 hour.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible because this is a specified completion time within the same LCO for 3 required loops inoperable.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because this would be the correct answer if given the same conditions for the motor bearing (195 degrees).

Part 2 is plausible because this is a specified completion time with in the same LCO for 3 required loops inoperable.

**Answer D Discussion**

Part 1 is plausible because this would be the correct answer if given the same conditions for the motor bearing (195 degrees).

Part 2 is correct.

**Basis for meeting the K**

The applicant is required to apply a less than one hour Technical Specification related to a malfunction (loss) of a Reactor Coolant Pump.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze given conditions and then perform a calculation in order to determine the correct answer.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	NEW	

**Development References**

AP/1/A/5500/008 (Malfunction of Reactor Coolant Pump), Rev. 18, Case I, Step 2  
 TS 3.4.5 (RCS Loops - Mode 3), Rev. 207/201, Condition C  
 OP-CN-PS-NCP (Reactor Coolant Pumps Lesson Plan), Rev. 100, Section 6.1

APE015/017 2.2.39 - Reactor Coolant Pump (RCP) Malfunctions

APE015/017 GENERIC

Knowledge of less than or equal to one hour Technical Specification action statements for systems. (CFR: 41.7 / 41.10 / 43.2 / 45.13)

**Student References Provided**

**401-9 Comments:**

**Remarks/Status**

APE025 AA2.01 - Loss of Residual Heat Removal System (RHRS)

Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: (CFR: 43.5 / 45.13)

Proper amperage of running LPI/decay heat removal/RHR pump(s) .....

Given the following:

- Unit 1 is in Reduced Inventory following refueling
- AP/1/A/5500/019 (Loss of Residual Heat Removal System) has been entered following the loss of 1B ND Pump
- The crew has transitioned to Enclosure 8 (Restoring an ND Train to Operation), started 1A ND pump, and reached the following table to determine maximum allowed flow:

NC Level	Maximum Allowed ND Flowrate
Greater than or equal to 39%	3000 GPM
Greater than or equal to 24%	2000 GPM
Greater than or equal to 15%	1500 GPM
Greater than or equal to 11%	1000 GPM

Which ONE of the following completes the statement below?

The crew will NOT exceed a MAXIMUM ND flowrate of \_\_\_\_\_(1)\_\_\_\_\_ in order to prevent 1A ND Pump \_\_\_\_\_(2)\_\_\_\_\_ .

- A. 1. 1500 gpm  
2. runout
- B. 1. 1500 gpm  
2. cavitation
- C. 1. 2000 gpm  
2. runout
- D. 1. 2000 gpm  
2. cavitation

**General Discussion**

Reduced inventory corresponds to a NC level  $\leq 16\%$ . Since this level is between the 15% and 24% values listed in the table, the applicant should choose the conservative flow rate of 1500 gpm.

AP/19, Encl. 8, Step 23.b, directs the operators regarding ND flow restrictions. This guidance is for a loops not filled condition. There is a CAUTION just prior to Step 23.b for determining the maximum allowable ND flow using the table provided in the stem of this question. The CAUTION reads as follows: Flashing may occur in the high point of the ND pump suction line if the following ND flow rate limits are exceeded.

Since the concern is for flashing in the SUCTION line of the ND pump, this is to avoid cavitating of the ND pump.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible since the applicant could reason an operating limit of "maximum allowed ND flow rate" as being a concern for pump runout.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible if the applicant confuses Reduced Inventory with Lowered Inventory (25% NC Level) or does not choose the conservative value from the table.

Part 2 is correct.

**Answer D Discussion**

Part 1 is plausible if the applicant confuses Reduced Inventory with Lowered Inventory (25% NC Level) or does not choose the conservative value from the table.

Part 2 is plausible since the applicant could reason an operating limit of "maximum allowed ND flow rate" as being a concern for pump runout.

**Basis for meeting the K**

This K/A is matched as the applicant is required to interpret a given table as it applies to operation of RHR pump during a "Loss of RHR" condition. The application of proper amperage is demonstrated through reasoning for maximum flow rate.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**  
 SLC 16.5-1 (Reduced Inventory and Mid-Loop Operation with Irradiated Fuel in the Core), Rev. 2  
 AP/1/A/5500/019, (Loss of Residual Heat Removal System), Enclosure 8 (Restoring an ND Train to Operation, Step 23 and NOTE prior to step

**Student References Provided**

APE025 AA2.01 - Loss of Residual Heat Removal System (RHRS)  
 Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: (CFR: 43.5 / 45.13)  
 Proper amperage of running LPI/decay heat removal/RHR pump(s) .....

**401-9 Comments:**

**Remarks/Status**





APE026 AA1.01 - Loss of Component Cooling Water (CCW)

Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: (CFR 41.7 / 45.5 / 45.6)

CCW temperature indications .....

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Given the following:

- Unit 1 is at 100% RTP
- 1A1 KC Pump is in service
- 1B NV Pump is in service
- OAC Alarm C1D2215 (KC Train A Low-Low Level Surge Tank Isol) is actuated due to an instrument failure

Following the receipt of the OAC alarm, and assuming no operator action, which ONE of the following completes the statements below?

1RN-291 (KC Hx 1A Outlet Throttle Valve) will throttle in the \_\_\_\_\_(1)\_\_\_\_\_ direction in order to maintain KC system temperature.

1B NV Pump motor bearing temperatures will \_\_\_\_\_(2)\_\_\_\_\_ .

- A.     1. open  
       2. increase
  
  - B.     1. open  
       2. remain constant
  
  - C.     1. closed  
       2. increase
  
  - D.     1. closed  
       2. remain constant
-

**General Discussion**

The Component Cooling Water System is normally cross connected with one pump supplying two trains. With 1A KC train in service, Nuclear Service Water flow will be automatically adjusted to maintain outlet temperature of the 1A KC HX at 87 degrees via operation of 1RN-291. The 1A Low Surge Tank actuation will cause the trains to separate. Therefore, the heat load on the 1A KC HX is decreased reducing the need for cooling water. 1RN-291 will throttle in the closed direction. The 1B NV pump has lost cooling due to train separation causing motor bearing temperatures to increase.

**Answer A Discussion**

Part 1 is plausible in that a loss of cooling incident has occurred. An applicant unfamiliar with system operation could reason that more service water flow would be required.

Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible in that a loss of cooling incident has occurred. An applicant unfamiliar with system operation could reason that more service water flow would be required.

Part 2 is plausible because this would be correct if the trains did not separate under the given conditions or if a "B" train pump were in service.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible because this would be correct if the trains did not separate under the given conditions or if a "B" train pump were in service.

**Basis for meeting the K**

Given a Loss of Component Cooling Water scenario, the applicant is required to demonstrate knowledge of CCW temperature indication at the outlet of the CCW Heat Exchanger through relationship with the automatic temperature control circuit. The applicant is also required to demonstrate knowledge of a condition resulting in train separation and the associated effects on temperature in other portions of the system.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must first apply the information given in the stem to system actions recalled from memory. The applicant must then apply that action to calculate a change in system temperature and determine the correct flow rate adjustment required to compensate for that change.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**

OP-CN-PSS-KC (Component Cooling System Lesson Plan), Rev. 100, Section 2.1, 2.3  
 AP/1/A/5500/021 (Loss of Component Cooling), Rev. 042, Step 9.a RNO

**Student References Provided**

APE026 AA1.01 - Loss of Component Cooling Water (CCW)

Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: (CFR 41.7 / 45.5 / 45.6)

CCW temperature indications .....

**401-9 Comments:**

**Remarks/Status**

**ILT15 CNS RO NRC Examination QUESTION 6**

6

APE027 2.4.18 - Pressurizer Pressure Control System (PZR PCS) Malfunction

APE027 GENERIC

Knowledge of the specific bases for EOPs. (CFR: 41.10 / 43.1 / 45.13)

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Given the following:

- Unit 1 is at 100% RTP
- A DCS malfunction has caused an Alternate Action on SPP-1 (Selected PZR Pressure-1)

Subsequently:

- The Main Turbine trips
- The Reactor does NOT trip automatically or manually
- The crew has entered EP/1/A/5000/FR-S.1 (Response to Nuclear Power Generation/ATWS)

Which ONE of the following completes the statements below?

As NC pressure increases, 1NC-32B (PZR PORV) \_\_\_\_\_(1)\_\_\_\_\_ automatically open.

FR-S.1 contains guidance to ensure PZR pressure remains below the PORV setpoint in order to \_\_\_\_\_(2)\_\_\_\_\_ .

- A. 1. will  
2. ensure sufficient boration flow
  - B. 1. will  
2. prevent challenging PZR Safety Valves
  - C. 1. will NOT  
2. ensure sufficient boration flow
  - D. 1. will NOT  
2. prevent challenging PZR Safety Valves
-

### General Discussion

An Alternate Action on Selected PZR Pressure -1 (SPP-1) will block automatic actuation of all PZR PORVS although only one PORV receives its operating signal from this circuit.

FR-S.1 will direct manual operation of PZR PORVs if pressure exceeds 2335 psig (normal PZR PORV setpoint) to reduce pressure less than 2135 psig. The basis for this step is to alert the operator to a condition which would reduce charging or S/I pump injection into the NC system and, therefore, boration.

### Answer A Discussion

Part 1 is plausible because PZR PORV 1NC-32B actuation is controlled by SPP-2 which has not entered Alternate Action. However, an Alternate Action on either Selected Pressurizer Pressure circuit (SPP) circuit will block all automatic PORV operation.

Part 2 is correct.

### Answer B Discussion

Part 1 is plausible because PZR PORV 1NC-32B actuation is controlled by SPP-2 which has not entered Alternate Action. However, an Alternate Action on either Selected Pressurizer Pressure circuit (SPP) circuit will block all automatic PORV operation.

Part 2 is plausible because this is a function of the PZR PORVs. However, not the basis for this particular step in FR-S.1

### Answer C Discussion

CORRECT. See explanation above.

### Answer D Discussion

Part 1 is correct.

Part 2 is plausible because this is a function of the PZR PORVs. However, not the basis for this particular step in FR-S.1

### Basis for meeting the K

Given a malfunction of the Pressurizer Pressure Control System, the applicant is required to demonstrate knowledge of the affect of that malfunction upon components normally controlled by an opposing circuit. The applicant is also required to demonstrate knowledge of the basis for operation of PZR PCS components within EOPs.

### Basis for Hi Cog

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

### Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

### Development References

OP-CN-PS-IPE (Pressurizer Pressure Control Lesson Plan), Rev. 101, Section 5.4  
 EP/1/A/5000/FR-S.1 (Response to Nuclear Power Generation/ATWS), Rev. 22, Step 4.f  
 FR-S.1 Background Doc, Rev. 11, Step 4

APE027 2.4.18 - Pressurizer Pressure Control System (PZR PCS) Malfunction

APE027 GENERIC

Knowledge of the specific bases for EOPs. (CFR: 41.10 / 43.1 / 45.13)

### 401-9 Comments:

### Student References Provided

### Remarks/Status

CHIEF EXAMINER NOTE:

This question was discussed with Chief Examiner on 12/2/14 concerning difficulty in meeting K/A at RO level. Chief Examiner provided suggestions related to spray valve malfunctions and RCP operations. Decided to write question concerning PCS malfunction which leads to EP entry followed by RO level EP basis question. Chief Examiner agreed in



EPE038 EA1.20 - Steam Generator Tube Rupture (SGTR)

Ability to operate and monitor the following as they apply to a SGTR: (CFR 41.7 / 45.5 / 45.6)

AFW flow control valve reset switches and indicators .....

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Given the following:

- A tube rupture has occurred on 1A S/G.
- The crew has just completed the immediate actions of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
- Current 1A S/G NR level is 35%.
- 1B, 1C and 1D S/G NR levels are 23%.
- Total CA flow is approximately 1000 gpm.
- The RO has depressed the “CA SYS VLV CTRL TRN A” and “CA SYS VLV CTRL TRN B” reset buttons.
- “CA SYS VLV CTRL TRN A” reset light is DARK.
- “CA SYS VLV CTRL TRN B” reset light is LIT.

Which ONE of the following completes the statements below?

CA flow to 1A S/G using the flow control valve \_\_\_\_\_(1)\_\_\_\_\_ under operator control

AND

EP/1/A/5000/E-0 \_\_\_\_\_(2)\_\_\_\_\_ permit closure of the flow control valve to 1A S/G at this time.

- A. 1. is  
2. does
  - B. 1. is  
2. does NOT
  - C. 1. is NOT  
2. does
  - D. 1. is NOT  
2. does NOT
-

**General Discussion**

A dark reset light would indicate that "A" train auxiliary feed is not reset. Therefore, flow to "A" and "B" S/Gs would not be under operator control.

E-0, Encl 1, Step 4 lists criteria for isolating auxiliary feed flow to a ruptured S/G (uncontrolled level increase and NR level > 11%). Since these conditions are met, flow may be isolated to the 1A S/G.

**Answer A Discussion**

Part 1 is plausible because depressing "CA SYS VLV CTRL" reset normally gives the operator control of associated valves.

Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because depressing "CA SYS VLV CTRL" reset normally gives the operator control of associated valves.

Part 2 is plausible because closure of the flow control valve is not allowed until the S/G reaches no load value of 39% under normal conditions. However, separate guidance is given if a tube rupture has occurred.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible because closure of the flow control valve is not allowed until S/G reaches no load value of 39% under normal conditions. However, separate guidance is given if a tube rupture has occurred.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of the operation of AFW flow control valve resets through monitoring of given indications.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	BANK	

**Development References**

EP/10/A/5000/E-0 (Reactor Trip or Safety Injection), Rev. 42, Enc 1, Step 4  
 OP-CN-CF-CA (Auxiliary Feedwater System Lesson Plan), Rev. 101, Section 3.5

**Student References Provided**

EPE038 EA1.20 - Steam Generator Tube Rupture (SGTR)  
 Ability to operate and monitor the following as they apply to a SGTR: (CFR 41.7 / 45.5 / 45.6)  
 AFW flow control valve reset switches and indicators .....

**401-9 Comments:**

**Remarks/Status**



APE054 AK1.01 - Loss of Main Feedwater (MFW)

Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): (CFR 41.8 / 41.10 / 45.3)

MFW line break depressurizes the S/G (similar to a steam line break) .....

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Given the following:

- A Feed Line Break has occurred on Unit 2
- 2A S/G pressure is 600 PSIG and decreasing
- 2B, 2C and 2D S/G pressures are 860 PSIG and decreasing
- Containment pressure is 2.8 PSIG and increasing
- NC system  $T_{avg}$  is 565°F and decreasing
- NC system pressure is 1980 PSIG and decreasing

Based on the conditions above, which ONE of the following completes the statements below?

A Feed Water Isolation signal \_\_\_\_\_(1)\_\_\_\_\_ been generated.

A Main Steam Isolation signal \_\_\_\_\_(2)\_\_\_\_\_ been generated.

- A. 1. has  
2. has NOT
  - B. 1. has NOT  
2. has
  - C. 1. has  
2. has
  - D. 1. has NOT  
2. has NOT
-

**General Discussion**

The applicants will be required to determine that a Reactor trip and SI has occurred based on containment pressure and then determine which ESF actuations have occurred.

Main Feedwater Isolation (FWI) is initiated by:

- Safety Injection (SS)
- Reactor trip and low T-avg (P-4 and 564°F on 2/4 channels)
- High High S/G level 77% on 2/3 channels on 1/4 S/G (P-14)
- Manually (1/2 pushbuttons)

A Main Steam Isolation (MSI) signal can be actuated by any one of the following signals:

- Manually 1/2 pushbuttons
- Hi Hi Containment Pressure >3.0 psig 2/4 channels
- Low Steam Pressure < 775 psig 2/3 channels on 1/4 S/G > P-11
- High steam line pressure negative rate(-)100 psig/sec 2/3 channels on 1/4 S/G below P-11 if the Lo Press Stm Line Isol is blocked

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible if applicant does not recall the correct logic for a MSI signal on low steam pressure of 775 psig (2/3 on 1/4). Also plausible due to containment pressure being a MSI initiation signal at 3.0 psig and current conditions has containment pressure at 2.8 psig.

**Answer B Discussion**

Part 1 is plausible if applicant correctly concludes a FWI signal due to Reactor trip and Low Tavg has not occurred but forgets that a SI has occurred due to being greater than 1.2 psig in containment. SI signal is a separate FWI signal.

Part 2 is correct.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is plausible if applicant correctly concludes a FWI signal due to Reactor trip and Low Tavg has not occurred but forgets that a SI has occurred due to being greater than 1.2 psig in containment. SI signal is a separate FWI signal.

Part 2 is plausible if applicant does not recall the correct logic for a MSI signal on low steam pressure of 775 psig (2/3 on 1/4). Also plausible due to containment pressure being a MSI initiation signal at 3.0 psig and current conditions has containment pressure at 2.8 psig.

**Basis for meeting the K**

The K/A is matched because the applicants are required to have knowledge of the operational implications (ESF actuations) as the S/G(s) depressurize when a feed line break inside containment occurs.

**Basis for Hi Cog**

This is a high cog question because the applicants are required to analyze current (post event) conditions and determine which ESF actuations have/have not occurred as a result.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	

**Development References**

OP-CN-ECCS-ISE (Engineered Safety Features Actuation System Lesson Plan). Rev. 100, Sections 5.5 & 5.6

**Student References Provided**

APE054 AK1.01 - Loss of Main Feedwater (MFW)

Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): (CFR 41.8 / 41.10 / 45.3)

MFW line break depressurizes the S/G (similar to a steam line break) .....

**ILT15 CNS RO NRC Examination**

**QUESTION 8**

<b>401-9 Comments:</b>

<b>Remarks/Status</b>

EPE055 EK1.02 - Loss of Offsite and Onsite Power (Station Blackout)

Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : (CFR 41.8 / 41.10 / 45.3)

Natural circulation cooling .....

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Given the following:

- Both units have experienced a Loss of Offsite Power (LOOP)
- No backup Diesel VI compressor is available
- EP/1/A/5000/ECA-0.0 (Loss of All AC Power) was implemented on Unit 1 and the crew has just transitioned to EP/1/A/5000/ECA-0.1 (Loss of All AC Power Recovery Without S/I Required)

Current conditions:

- 30 minutes have elapsed since the LOOP
- NC T<sub>hots</sub> are STABLE
- S/G pressures are STABLE at 725 PSIG
- S/G levels are decreasing and approaching 11% NR
- NC T<sub>colds</sub> are 490°F and STABLE
- VI header pressure is 0 PSIG

Based on the indications above, which ONE of the following completes the statements below?

Natural Circulation flow   (1)   been established.

In accordance with ECA-0.1, the Operators will   (2)  .

**REFERENCE PROVIDED**

- A. 1. has  
2. increase CA flow using flow controllers in the control room
- B. 1. has  
2. increase CA flow by notifying AO to throttle CA valves locally
- C. 1. has NOT  
2. increase dumping steam using SM PORV controllers on main control board AND increase CA flow using flow controllers in the control room
- D. 1. has NOT  
2. dispatch an operator to locally increase flow from the SM PORVs AND increase CA flow by notifying AO to throttle CA valves locally

**General Discussion**

In the scenario given, the station has experienced a complete loss of offsite power as well as a loss of both vital AC buses on U-1 and instrument air. The applicant is asked to evaluate actions required by ECA 0.1 (Loss of AC Power Recovery Without S/I Required) to address given indications that Natural circulation cooling is effective and that S/G levels need to be increased.

In the first part of the answers, the applicant is asked to determine if conditions for natural circulation have been established. Generic Enclosure 15 is provided as a reference. With the conditions given, the crew would NOT be required to raise dumping steam because S/G conditions are within the limits of the graph provided in the reference. Additionally, the required actions have been affected by the loss of VI (Instrument Air) and the loss of AC power making them unique to a loss of all AC scenario.

CA (Aux Feedwater) control would not be lost from the control room at this time due to instrument air accumulators designed to provide air for approximately 1 hour following a loss of instrument air.

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

Part 1 is correct.

Part 2 is plausible because this would be the required action approximately 1 hour after the LOOP (control valve air accumulators have been exhausted).

**Answer C Discussion**

Part 1 is plausible if the applicant misreads the graph in Enclosure 15 OR concludes that Natural Circulation conditions are not met because NC Tcolds are not at saturation for given S/G pressure (i.e. does not read the qualifier in Enclosure 15 that states "Within the limits of the graph below").

Part 2 is plausible if the applicant concludes that Natural Circulation is not adequate, dumping steam would be the required action.

**Answer D Discussion**

Part 1 is plausible if the applicant misreads the graph in Enclosure 15 OR concludes that Natural Circulation conditions are not met because NC Tcolds are not at saturation for given S/G pressure (i.e. does not read the qualifier in Enclosure 15 that states "Within the limits of the graph below").

Part 2 is plausible if the applicant concludes that Natural Circulation is not adequate, dumping steam would be the required action.

**Basis for meeting the K**

The applicant is required to determine if natural circulation cooling is occurring following a station blackout, based on information given, and demonstrate knowledge of the operation implications (feed vs. feed/steam). The applicant is also required to demonstrate knowledge of the method required to complete the desired action

**Basis for Hi Cog**

This question is Hi Cog because the applicant must evaluate a given set of conditions and, through a multipart mental process, determine the required actions based on these conditions.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	

**Development References**

EP/1/A/5000/G-1 (Unit 1 Generic Control Room Enclosures), Rev. 9, Encl. 15 (Natural Circulation Monitoring Parameters)

**Student References Provided**

Generic Enclosure 15

EPE055 EK1.02 - Loss of Offsite and Onsite Power (Station Blackout)

Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : (CFR 41.8 / 41.10 / 45.3)

Natural circulation cooling .....

**401-9 Comments:**

**Remarks/Status**



APE056 2.4.47 - Loss of Offsite Power  
APE056 GENERIC

Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (CFR: 41.10 / 43.5 / 45.12)

Given the following:

- Unit 1 tripped from 100% RTP due to a Loss of Offsite Power
- NC cooldown is currently in progress in accordance with EP/1/A/5000/ES-0.2 (Natural Circulation Cooldown)
- The trend of NC Temperature is as follows:

Time	0800	0830	0900
NC Temperature	535°F	495°F	455°F

In accordance with ES-0.2, which ONE of the following completes the statements below?

NC Temperature will be determined by monitoring of \_\_\_\_ (1) \_\_\_\_ .

At 0900, the required cooldown rate \_\_\_\_ (2) \_\_\_\_ been exceeded.

- A. 1. NC Tave  
2. has
- B. 1. NC Tave  
2. has NOT
- C. 1. NC Tcolds  
2. has
- D. 1. NC Tcolds  
2. has NOT

**General Discussion**

ES-0.2 contains guidance to maintain cooldown rate less than 50°F/Hr (less than most EPs). When RCPs are not in service, the EPs specify RCS temperature monitoring via Tcolds vs. Tave.

**Answer A Discussion**

Part 1 is plausible because Tave would be the monitored parameter if RCPs were in service.  
Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because Tave would be the monitored parameter if RCPs were in service.  
Part 2 is plausible because the maximum cooldown rate of ES-0.3 (and the majority of EPs) is 100 degrees per hour.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.  
Part 2 is plausible because the maximum cooldown rate of ES-0.3 (and the majority of EPs) is 100 degrees per hour.

**Basis for meeting the K**

With a given loss of offsite power, the applicant must recognize which control room reference will be used to determine RCS temperature and determine, via trending, if a procedural setpoint has been exceeded.

**Basis for Hi Cog**

This question requires the applicant to perform a calculation.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**  
EP/1/A/5000/ES-0.2 (Natural Circulation Cooldown), Rev. 26, step 8.c.1 RNO

**Student References Provided**

APE056 2.4.47 - Loss of Offsite Power

APE056 GENERIC

Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (CFR: 41.10 / 43.5 / 45.12)

**401-9 Comments:**

**Remarks/Status**



APE057 AK3.01 - Loss of Vital AC Electrical Instrument Bus

Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: (CFR 41.5,41.10 / 45.6 / 45.13)

Actions contained in EOP for loss of vital ac electrical instrument bus ...

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Given the following:

- Unit 1 is at 100% RTP
- 1ERPA is de-energized
- The crew has entered AP/1/A/5500/029 (Loss of Vital or Aux Control Pwr)

Which ONE of the following completes the statements below?

In accordance with AP/29, an operator will be dispatched to 1A D/G room because \_\_\_\_ (1) \_\_\_\_ .

Entry conditions of AP/1/A/5500/016 (Malfunction of Nuclear Instrumentation System) \_\_\_\_ (2) \_\_\_\_ been met.

- A. 1. D/G control power has been lost  
2. have
  - B. 1. D/G control power has been lost  
2. have NOT
  - C. 1. D/G Day Tank auto makeup capability has been lost  
2. have
  - D. 1. D/G Day Tank auto makeup capability has been lost  
2. have NOT
-

**General Discussion**

1FD-22 (D/G Eng Fuel Oil Day Tank 1A Fill) fails closed upon a loss of 1ERPA. AP/29 will direct an operator to open the associated bypass valve in order to maintain operability of the D/G.

Loss of 1ERPA will de-energize one power range NI. Step 23 of AP/29 will direct operators to remove the failed NI from service per AP/16.

**Answer A Discussion**

Part 1 is plausible because the loss of 1ERPA does affect D/G operation (prevents Manual starts) but does not result in a loss of control power.

Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because the loss of 1ERPA does affect D/G operation (prevents Manual starts) but does not result in a loss of control power.

Part 2 is plausible if the applicant is unaware that 1ERPA supplies power to power range instrumentation.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible if the applicant is unaware that 1ERPA supplies power to power range instrumentation.

**Basis for meeting the K**

Given a loss of a vital AC bus, the applicant is required to demonstrate knowledge of the reason for an action contained in the associated abnormal procedure.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

References: AP/1/A/5500/29 (Loss of Vital or Aux Control Power), Rev. 28, step 7 & 23, Encl 14 (1ERPA Load List), Step 8  
AP/29 Background Document, Rev. 000, step 9

**Student References Provided**

APE057 AK3.01 - Loss of Vital AC Electrical Instrument Bus

Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: (CFR 41.5,41.10 / 45.6 / 45.13)

Actions contained in EOP for loss of vital ac electrical instrument bus ...

**401-9 Comments:**

**Remarks/Status**

CHIEF EXAMINER NOTE:  
Discussed question with Chief Examiner on 02/09/15 due to lack of EOP actions available for Loss of Vital AC. Chief Examiner agreed that AOP actions would be acceptable.

APE058 AA2.01 - Loss of DC Power

Ability to determine and interpret the following as they apply to the Loss of DC Power: (CFR: 43.5 / 45.13)

That a loss of dc power has occurred; verification that substitute power sources have come on line .....

Given the following:

- Unit 1 is at 100% RTP
- The 125 VDC/120 VAC Auxiliary Control Power System is in normal alignment
- The supply breaker from 1CDA to Static Inverter 1KXIA trips open

Which ONE of the following completes the statements below?

Alternate power to 1KXPA will be \_\_\_\_ (1) \_\_\_\_ aligned.

The crew can verify 1KXPA is energized by observing that \_\_\_\_ (2) \_\_\_\_ .

- A.
  1. manually
  2. NC pump vibration monitor is IN SERVICE
- B.
  1. automatically
  2. NC pump vibration monitor is IN SERVICE
- C.
  1. manually
  2. individual P-11 Channel 1 status light on 1SI-7 is LIT
- D.
  1. automatically
  2. individual P-11 Channel 1 status light on 1SI-7 is LIT

**General Discussion**

Static Inverter 1KXIA has an associated automatic transfer switch which will swap power to an alternate source on inverter low output voltage.

Panelboard 1KXPA supplies power to the NC pump vibration monitor.

**Answer A Discussion**

Part 1 is plausible because the vital static inverters must be manually swapped to an alternate power supply.

Part 2 is correct.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because the vital static inverters must be manually swapped to an alternate power supply.

Part 2 is plausible because this is an indication of 1ERPA (vital AC panelboard) vs 1KXPA (auxiliary AC panelboard).

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible because this is an indication of 1ERPA (vital AC panelboard) vs 1KXPA (auxiliary AC panelboard).

**Basis for meeting the K**

The K/A is matched because the applicant must have knowledge of the effect of a loss of a DC load and how it affects the ability to monitor plant systems.

**Basis for Hi Cog**

This is a higher cognitive level question because it requires more than one mental step.

The applicant must first recall from memory the arrangement of the 125VDC/120VAC Auxiliary Control Power system to determine Bus KXPA has an auto bus transfer feature.

The applicant must then analyze the given condition to determine what indications are available to indicate that power has been restored to KXPA.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	MODIFIED	

<b>Development References</b>
OP-CN-EL-EPF (125V & 240/120 VAC Auxiliary Control Power System Lesson Plant), Rev. 103, Section 2.8, 2.12, & Figure 9.1

<b>Student References Provided</b>

APE058 AA2.01 - Loss of DC Power

Ability to determine and interpret the following as they apply to the Loss of DC Power: (CFR: 43.5 / 45.13)

That a loss of dc power has occurred; verification that substitute power sources have come on line .....

<b>401-9 Comments:</b>

<b>Remarks/Status</b>

APE062 AA2.03 - Loss of Nuclear Service Water

Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: (CFR: 43.5 / 45.13)

The valve lineups necessary to restart the SWS while bypassing the portion of the system causing the abnormal condition .....

Given the following:

- Units 1 & 2 are at 100% RTP
- 1A RN pump is in service
- 1A and 2A KC trains are in service

Subsequently:

- “A” RN Pit intake screen becomes clogged
- The crew has entered AP/0/A/5500/020 (Loss of Nuclear Service Water), Case II (Loss of RN Pit Level)

Which ONE of the following completes the statements below?

Enclosure 2 (RN Valve Alignment for RN Swap to SNSWP) will direct the BOP to ensure \_\_\_\_\_(1)\_\_\_\_\_ is closed .

Following system stabilization, the BOP is directed to “Ensure KC Hx Outlet Mode Switches – Properly Aligned”. In response, the BOP \_\_\_\_\_(2)\_\_\_\_\_ reposition 1RN-291 (KC Hx 1A Outlet Throttle Valve) from its original alignment.

- A.
  1. 1RN-47A (RN Supply X-Over Isol)
  2. will
- B.
  1. 1RN-47A (RN Supply X-Over Isol)
  2. will NOT
- C.
  1. 1RN-48B (RN Supply X-Over Isol)
  2. will
- D.
  1. 1RN-48B (RN Supply X-Over Isol)
  2. will NOT

**General Discussion**

As a result of an Emergency Low Pit Level actuation signal, opposite train crossover isolation valves will close automatically. AP/20 contains steps to ensure proper alignment of these valves.

Following system stabilization, AP/20 will direct the crew to ensure proper alignment of component cooling water outlet control valves. The position of these valves (KC temp. vs. Miniflow) is determined by which component cooling water train is in service (i.e. not by the NSW train in service). Therefore, transferring NSW trains will not affect the position of these valves.

**Answer A Discussion**

Part 1 is plausible because the low pit level has been experienced in "A" train. However, the associated signal repositions the opposite train valve.

Part 2 is plausible because NSW trains will need to be swapped. However, this will have no affect on the position 1RN-291 since CCW trains are unaffected.

**Answer B Discussion**

Part 1 is plausible because the low pit level has been experienced in "A" train. However, the associated signal repositions the opposite train valve.

Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.

Part 2 is plausible because NSW trains will need to be swapped. However, this will have no affect on the position 1RN-291 since CCW trains are unaffected.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The applicant is required to determine the applicable valve lineup associated with bypassing a portion of the NSW system (intake pit) causing a loss of Nuclear Service Water. The applicant is also required to demonstrate knowledge of a valve position associated with a tie to another system.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**

OP-CN-PSS-RN (Nuclear Service Water Lesson Plan), Rev. 104, Section 4.4 & 12.2  
 AP/0/A/5500/020 (Loss of Nuclear Service Water), Rev. 043, Case 2 (Loss of RN Pit Level), step 7, and Encl 2 (RN Valve Alignment for RN Swap to SNSWP), Step 4

**Student References Provided**

APE062 AA2.03 - Loss of Nuclear Service Water

Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: (CFR: 43.5 / 45.13)

The valve lineups necessary to restart the SWS while bypassing the portion of the system causing the abnormal condition .....

**401-9 Comments:**

**Remarks/Status**

CHIEF EXAMINER NOTE:  
 Discussed question with Chief Examiner on 02/09/15 concerning the "bypassing portion of NSW System" required by K/A. Requested the ability to consider alternate alignment of suction sources caused by a low pit level due to lack of bypass alignments available. Chief Examiner agreed in principle.



APE065 AK3.08 - Loss of Instrument Air

Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: (CFR 41.5,41.10 / 45.6 / 45.13)

Actions contained in EOP for loss of instrument air .....

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Given the following:

- Both units are at 100% RTP
- VI pressure is decreasing
- The crew has entered AP/0/A/5500/022 (Loss of Instrument Air)

In accordance with AP/22, which ONE of the following completes the statement below?

An operator will be dispatched to align air cylinders to operating compressors if VI pressure decreases below a MAXIMUM of \_\_\_\_\_(1)\_\_\_\_\_ in order to \_\_\_\_\_(2)\_\_\_\_\_ .

- A. 1. 60 psig  
2. provide a backup VI supply
  - B. 1. 60 psig  
2. prevent compressor damage
  - C. 1. 76 psig  
2. provide a backup VI supply
  - D. 1. 76 psig  
2. prevent compressor damage
-



**General Discussion**

AP/22 will direct operators to align backup air bottles to operating VI compressors if pressure decreases below 60 psig in order to prevent damage to compressor seals.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible because some air operated components have backup air supplies (i.e. S/G PORVs have backup N2 bottles installed).

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because this is the setpoint for operation of 1VS-78 which provides backup air supply from station air compressors.

Part 2 is plausible because some air operated components have backup air supplies (i.e. S/G PORVs have backup N2 bottles installed).

**Answer D Discussion**

Part 1 is plausible because this is the setpoint for operation of 1VS-78 which provides backup air supply from station air compressors.

Part 2 is correct.

**Basis for meeting the K**

Given a loss of instrument air, the applicant is required to demonstrate knowledge of an action contained in the associated abnormal procedure and the reason for that action.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

AP/0/A/5500/022 (Loss of Instrument Air), Rev. 35, Step 18 and preceding Caution, OP-CN-SS-VI,VS&VB (Air Systems Lesson Plan), Rev. 100, Section 13.1

**Student References Provided**

APE065 AK3.08 - Loss of Instrument Air

Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: (CFR 41.5,41.10 / 45.6 / 45.13)

Actions contained in EOP for loss of instrument air .....

**401-9 Comments:**

**Remarks/Status**

CHIEF EXAMINER NOTE:  
Discussed question with Chief Examiner on 02/09/15 due to lack of EOP actions available for Loss of Instrument Air. Chief Examiner agreed that AOP actions would be acceptable.

APE077 AA1.03 - Generator Voltage and Electric Grid Disturbances

Ability to operate and/or monitor the following as they apply to Generator Voltage and Electric Grid Disturbances: (CFR: 41.5 and 41.10 / 45.5, 45.7, and 45.8 )

Voltage regulator controls.....

Given the following:

- Unit 1 is at 100% RTP
- Operators are controlling the Main Generator Voltage Regulator in MANUAL because it is not functioning correctly in AUTO
- An electrical grid disturbance results in the Main Generator operating with a power factor of 0.8 lagging

Which ONE of the following completes the statements below?

Based on the conditions above, to return the Main Generator to a 0.99 lagging power factor, AP/1/A/5500/037 (Generator Voltage and Electrical Grid Disturbances) directs the operators to use the Main Generator Voltage Regulator \_\_\_\_ (1) \_\_\_\_ pushbutton.

The concern with operating the Main Generator at a 0.8 lagging power factor is overheating of the generator \_\_\_\_ (2) \_\_\_\_ .

**REFERENCE PROVIDED**

- A. 1. RAISE  
2. core end
- B. 1. RAISE  
2. field windings
- C. 1. LOWER  
2. core end
- D. 1. LOWER  
2. field windings

**General Discussion**

Because the Main Generator is operating in an extreme over-excited condition, the operator will have to take action to return the Main Generator to a normal operating power factor (approximately 0.99). To do this the operator will have to reduce the Main Generator excitation by using the Voltage Regulator LOWER pushbutton. The concern with operating the Main Generator at a 0.8 lagging power factor is overheating of the Main Generator rotor field windings.

**Answer A Discussion**

Part 1 is plausible because it is logical to assume that using the RAISE pushbutton would be appropriate to "increase" the power factor from 0.8 lagging to 0.99 lagging.

Part 2 is plausible since stator end irons would be correct for a leading power factor of similar magnitude.

**Answer B Discussion**

Part 1 is plausible because it is logical to assume that using the RAISE pushbutton would be appropriate to "increase" the power factor from 0.8 lagging to 0.99 lagging.

Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.

Part 2 is plausible since stator end irons would be correct for a leading power factor of similar magnitude.

**Answer D Discussion**

CORRECT: See explanation above.

**Basis for meeting the K**

The K/A is matched because the applicant must have knowledge of how to operating the Main Generator Voltage Regulator based on current conditions to return it to a normal operating condition.

The operator must also know the operational implications (concern) for operating the Main Generator in an extreme over-excited condition.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	

**Development References**  
 AP/1/A/5500/37, (Generator Voltage and Electric Grid Disturbances), Rev. 03, Step 3  
 OP-CN-GEN-EGB (Generator Excitation Lesson Plan), Rev. 101, Section 3.3.2 & 5.12.3  
 AP-37 LP Step 3  
 Databook Fig. 43

**Student References Provided**  
 Generator Capability Curve.

APE077 AA1.03 - Generator Voltage and Electric Grid Disturbances

Ability to operate and/or monitor the following as they apply to Generator Voltage and Electric Grid Disturbances: (CFR: 41.5 and 41.10 / 45.5, 45.7, and 45.8 )

Voltage regulator controls.....

**401-9 Comments:**

**Remarks/Status**



WE04 EK2.1 - LOCA Outside Containment

Knowledge of the interrelations between the (LOCA Outside Containment) and the following:  
(CFR: 41.7 / 45.7)

Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

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Given the following:

- A LOCA outside containment has occurred on Unit 1
- NC subcooling is 0°F.
- The crew has entered EP/1/A/5000/ECA-1.2 (LOCA Outside Containment)

Which ONE of the following completes the statements below?

Containment Phase A Isolation \_\_\_\_ (1) \_\_\_\_ automatically occurred.

In accordance with ECA-1.2, the parameter used to verify that the LOCA has been isolated is \_\_\_\_ (2) \_\_\_\_ .

- A. 1. has NOT  
2. pressurizer level
  - B. 1. has NOT  
2. NC pressure
  - C. 1. has  
2. pressurizer level
  - D. 1. has  
2. NC pressure
-

**General Discussion**

Phase A has actuated, since a Safety Injection was initiated due to low RCS pressure resulting from the LOCA. The procedure directs the use of RCS pressure increasing as the method used to indicate the leak has been isolated.

**Answer A Discussion**

Part 1 is plausible if the applicant misapplies the fact that the LOCA occurred outside of containment, and therefore containment pressure does not rise to 1.2 psig.

Part 2 is plausible since the student could reason that PZR level would be increasing if the leak is isolated.

**Answer B Discussion**

Part 1 is plausible if the applicant misapplies the fact that the LOCA occurred outside of containment, and therefore containment pressure does not rise to 1.2 psig.

Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.

Part 2 is plausible since the student could reason that PZR level would be increasing if the leak is isolated.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

Applicant is presented with conditions involving a LOCA outside containment, and must then apply knowledge of the procedure and of automatic features.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**  
 OP-CN-ECCS-ISE (Engineered Safety Features Actuation System Lesson Plan), Rev. 100, Section 5.2  
 EP/1/A/5000/ECA-1.2 (LOCA Outside Containment), Rev. 3, Step 3

**Student References Provided**

WE04 EK2.1 - LOCA Outside Containment  
 Knowledge of the interrelations between the (LOCA Outside Containment) and the following:  
 (CFR: 41.7 / 45.7)  
 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

**401-9 Comments:**

**Remarks/Status**

WE05 EK2.2 - Loss of Secondary Heat Sink

Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the following:  
(CFR: 41.7 / 45.7)

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.

---

Given the following:

- Unit 1 was operating at 100% RTP when the 1A S/G faulted inside Containment
- Containment pressure peaked at 2.7 psig and is now slowly decreasing
- The crew has implemented EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink)
- All attempts to restore CA flow have been unsuccessful

In accordance with FR-H.1, which ONE of the following completes the statements below?

The NEXT source of feed water attempted for restoration of flow to the S/Gs is through the CM/CF system using \_\_\_\_\_(1)\_\_\_\_\_ .

The crew will be required to establish bleed and feed when W/R level in at least 3 S/Gs is less than a MAXIMUM level of \_\_\_\_\_(2)\_\_\_\_\_ .

- A. 1. either Main Feed Water pump  
2. 24%
  - B. 1. either Main Feed Water pump  
2. 36%
  - C. 1. Hotwell and Booster pumps  
2. 24%
  - D. 1. Hotwell and Booster pumps  
2. 36%
-

**General Discussion**

If CA flow is not available, FR-H.1 will first attempt to place MFPs in service followed by a depressurization and attempts to feed from the Howell and Booster pumps.

Bleed and Feed initiation criteria is 3 S/Gs less than 24% or 36% (ACC). Adverse Containment is 3 psig in containment.

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

Part 1 is correct.

Part 2 is plausible because this would be the correct answer if adverse containment condition numbers were in effect.

**Answer C Discussion**

Part 1 is plausible because the Hotwell and Booster pumps could be used if S/Gs were first depressurized and are an option specified in FR-H.1 (following attempts to place MFPs in service).

Part 2 is correct.

**Answer D Discussion**

Part 1 is plausible because the Hotwell and Booster pumps could be used if S/Gs were first depressurized and are an option specified in FR-H.1 (following attempts to place MFPs in service).

Part 2 is plausible because this would be the correct answer if adverse containment condition numbers were in effect.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of heat removal system prioritization and initiation setpoints upon a loss of secondary heat sink.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	

**Development References**

OP-CN-EP-FPH (FR-H Lesson Plan), Rev. 101, Section 3.2  
 EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink), Rev. 42, Enclosure 1, Step 1

**Student References Provided**

**WE05 EK2.2 - Loss of Secondary Heat Sink**

Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the following:  
 (CFR: 41.7 / 45.7)

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.

**401-9 Comments:**

**Remarks/Status**



WE11 EK3.4 - Loss of Emergency Coolant Recirculation

Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation)  
(CFR: 41.5 / 41.10, 45.6, 45.13)

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.

---

Which ONE of the following is a complete list of the reasons for the reactor operator performing a controlled depressurization of the Steam Generators (SGs) during the performance of EP/1/A/5000/ECA-1.1, (Loss of Emergency Coolant Recirculation)?

List of Reasons

1. Minimize NC dilution potential in case of a subsequent tube rupture
2. To establish conditions for injection of the Cold Leg accumulators
3. Minimize reactor coolant flow from the LOCA
4. To establish conditions for ND system operation

- A. 1 and 2 ONLY
- B. 3 and 4 ONLY
- C. 1, 2, and 3 ONLY
- D. 2, 3, and 4 ONLY
-

**General Discussion**

Per ECA-1.1 Basis, the reasons for a controlled depressurization of the SGs during the performance of ECA-1.1, (Loss of Emergency Coolant Recirculation) are to enable cold leg accumulators injection, minimize break flow, and to establish RHR conditions.

**Answer A Discussion**

Plausible, since one of the choices is correct (#2). Reason #1 (NC dilution) is plausible, because reducing SG pressure would reduce the potential for dilution, but it is misapplied here, and is not part of the basis, or reason, for the required RO actions.

**Answer B Discussion**

Plausible, since Reasons 3 and 4 are correct. However, the applicant has failed to also recognize that Reason #2 is also correct. By excluding this selection, the applicant has failed to recognize an important aspect of mitigation of this event (and the reason for their actions).

**Answer C Discussion**

Plausible, since Reasons 2 and 3 are correct. However, Reason 1 is NOT part of the basis for SG depressurization during the performance of ECA-1.1.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The K/A asks for the reasons for RO function (action) during a Loss of Emergency Coolant Recirculation, NOT necessarily what actions are performed. This question establishes a context of ECA-1.1 performance, including an important function performed by the RO during the Loss of Emergency Coolant Recirculation, and tests knowledge of the reasons (basis) for performing these actions, with an inherent knowledge component of why they are important (minimizing break flow, assuring injection, etc.). This also addresses the K/A component of (limitations are not violated).

**Basis for Hi Cog**

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Memory	BANK	

<b>Development References</b>
OP-CN-EP-E1 (E-1 Series Lesson Plan), Rev. 102, Section 8.1

<b>Student References Provided</b>

**WE11 EK3.4 - Loss of Emergency Coolant Recirculation**

Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation)  
(CFR: 41.5 / 41.10, 45.6, 45.13)

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.

<b>401-9 Comments:</b>

<b>Remarks/Status</b>

APE001 AA1.03 - Continuous Rod Withdrawal

Ability to operate and / or monitor the following as they apply to the Continuous Rod Withdrawal : (CFR 41.7 / 45.5 / 45.6)

Boric acid pump control switch .....

---

Given the following:

- The crew is responding to a continuous rod withdrawal on Unit 1 per AP/1/A/5500/015 Case 2, Continuous Rod Motion
- Control rods have been placed in manual and rod motion has stopped
- Boron is being added with 1A boric acid transfer pump to return Tavg to Tref

Subsequently:

- 1ETA experiences a loss of power
- The blackout sequencer re-energized 1ETA

Which choice states the minimum action(s), if any, required to be completed before the operator can secure the 1A boric acid transfer pump using its control switch?

- A. Reset the 1A diesel generator sequencer and then reset the 1A boric acid transfer pump
  - B. Reset the 1A diesel generator sequencer
  - C. Reset the 1A boric acid transfer pump
  - D. No additional actions are required
-

**General Discussion**

The boric acid transfer pumps receive a start signal on a Blackout signal. The Boric Acid Transfer Pumps cannot be manually secured until the Sequencer is reset, and the Boric Acid Transfer Pump RESET pushbutton is depressed for each train.

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

Plausible because this is correct for any sequencer load to establish control board switch control by the operator. However, the BA transfer pump has an additional reset requirement.

**Answer C Discussion**

Plausible because this is correct to regain control of the pump if the sequencer is reset.

**Answer D Discussion**

Plausible because some loads require no action in order to operate following an Blackout signal (i.e. load group 13 components).

**Basis for meeting the K**

The applicant is required to demonstrate the ability to operate the Boric Acid Pump control switch following a continuous rod withdrawal event and blackout.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	

**Development References**  
 OP-CN-PS-NV (Chemical and Volume Control System), Rev. 201, Section 2.6.3

**Student References Provided**

APE001 AA1.03 - Continuous Rod Withdrawal  
 Ability to operate and / or monitor the following as they apply to the Continuous Rod Withdrawal : (CFR 41.7 / 45.5 / 45.6)  
 Boric acid pump control switch .....

**401-9 Comments:**

**Remarks/Status**

APE036 AK3.02 - Fuel Handling Incidents

Knowledge of the reasons for the following responses as they apply to the Fuel Handling Incidents: (CFR 41.5,41.10 / 45.6 / 45.13)

Interlocks associated with fuel handling equipment .....

---

Which ONE of the following completes the statements below?

In accordance with SLC 16.9-19 (Refueling Operations – Manipulator Crane), the overload cutoff limit for the Reactor Building Manipulator crane is required to be less than or equal to \_\_\_\_\_(1)\_\_\_\_\_ pounds.

The reason for the manipulator crane overload limits it to prevent damage to the \_\_\_\_\_(2)\_\_\_\_\_ .

- A.     1. 2900  
       2. Core Internals
  
  - B.     1. 3250  
       2. Core Internals
  
  - C.     1. 2900  
       2. Refueling Bridge
  
  - D.     1. 3250  
       2. Refueling Bridge
-

**General Discussion**

In accordance with SLC 16.9.19 (Refueling Operations - Manipulator Crane), the overload cutoff limit for the Refueling Building Manipulator Crane is ≤ 2900 pounds.

The reason for the functionality of the Refueling Manipulator crane is to prevent damage to the core internals.

**Answer A Discussion**

CORRECT: See explanation above.

**Answer B Discussion**

Part 1 is plausible because this is the minimum weight associated with the capacity of the manipulator crane.

Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.

Part 2 is plausible because the manipulator crane is part of the refueling bridge. It is plausible for the applicant to conclude that weight limit is set to prevent the refueling bridge from collapsing due to excessive load.

**Answer D Discussion**

Part 1 is plausible because this is the minimum weight associated with the capacity of the manipulator crane.

Part 2 is plausible because the manipulator crane is part of the refueling bridge. It is plausible for the applicant to conclude that weight limit is set to prevent the refueling bridge from collapsing due to excessive load.

**Basis for meeting the K**

The KA is matched because the applicant must have knowledge of the reason for the manipulator crane overload limit (an interlock associated with the fuel handling equipment).

**Basis for Hi Cog**

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Memory	BANK	

**Development References**

SLC 16.9.19 (Refueling Operations - Manipulator Crane), Rev. 3

**Student References Provided**

APE036 AK3.02 - Fuel Handling Incidents

Knowledge of the reasons for the following responses as they apply to the Fuel Handling Incidents: (CFR 41.5,41.10 / 45.6 / 45.13)

Interlocks associated with fuel handling equipment .....

**401-9 Comments:**

**Remarks/Status**

APE037 AK1.01 - Steam Generator (S/G) Tube Leak

Knowledge of the operational implications of the following concepts as they apply to Steam Generator Tube Leak: CFR 41.8 / 41.10 / 45.3)

Use of steam tables .....

---

Given the following:

- A Steam Generator Tube Leak has occurred on Unit 2
- All NC pumps are running
- The crew is preparing to depressurize the NC system to minimize subcooling

Which ONE of the following sets of operating conditions will result in the LEAST Primary-to-Secondary leakage?

	<u>NCS Temperature</u>	<u>NCS Pressure</u>
A.	504°F	770 PSIG
B.	512°F	826 PSIG
C.	516°F	855 PSIG
D.	524°F	885 PSIG

**General Discussion**

Primary-to-Secondary leakage can be minimized by reducing NC system subcooling to a minimum. For this example:

(numbers are approximated for ease of calculation)

Solution A:

770 psig + 14.696 = ~785 psia  
 Saturation Pressure of 516° = ~785 psia  
 516° - 504° = 12° Subcooled

Solution B:

826 psig + 14.696 = ~841 psia  
 Saturation Pressure of 524° = ~841 psia  
 524° - 512° = 12° Subcooled

Solution C:

855 psig + 14.696 = ~870 psia  
 Saturation Pressure of 528° = ~870 psia  
 528° - 516° = 12° Subcooled

Solution D:

885 psig + 14.696 = ~900 psia  
 Saturation Pressure of 532° = ~900 psia  
 532° - 524° = 8° Subcooled

The minimum subcooling and hence the minimum Primary-to-Secondary leakage would be the condition in Answer D.

**Answer A Discussion**

Plausible if the applicant performs math error or incorrectly correlates values in the Steam Tables. Also plausible if the applicant does not understand the concept of minimizing subcooling in order to reduce leakage.

**Answer B Discussion**

Plausible if the applicant performs math error or incorrectly correlates values in the Steam Tables. Also plausible if the applicant does not understand the concept of minimizing subcooling in order to reduce leakage.

**Answer C Discussion**

Plausible if the applicant performs math error or incorrectly correlates values in the Steam Tables. Also plausible if the applicant does not understand the concept of minimizing subcooling in order to reduce leakage.

**Answer D Discussion**

CORRECT: See explanation above.

**Basis for meeting the K**

The KA is match because the applicant is given a set of conditions where a Steam Generator Tube Leak is present and must perform calculations involving interpolation of the Steam Tables to determine which condition minimizes subcooling thus minimizes Primary-to-Secondary leakage.

**Basis for Hi Cog**

This is a higher cognitive level question because it requires the applicant to perform multiple calculations to determine which condition represents the minimum subcooling.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	

**Development References**

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**Student References Provided**

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APE037 AK1.01 - Steam Generator (S/G) Tube Leak

Knowledge of the operational implications of the following concepts as they apply to Steam Generator Tube Leak: CFR 41.8 / 41.10 / 45.3)



Use of steam tables .....

<b>401-9 Comments:</b>

<b>Remarks/Status</b>

APE051 AA2.02 - Loss of Condenser Vacuum

Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: (CFR: 43.5 / 45.13)

Conditions requiring reactor and/or turbine trip .....

Given the following:

- Unit 2 is at 50% Power.
- The crew enters AP/2/A/5500/023 (Loss of Main Condenser Vacuum) due to decreasing vacuum.

The following conditions are noted:

Time	1257	1258	1259	1300
A Cond. Vacuum	23.2"	22.0"	21.7"	21.5"
B Cond. Vacuum	24.0"	22.6"	21.9"	21.7"
C Cond. Vacuum	24.3"	22.9"	22.3"	22.0"

Based upon the above information, which ONE of the following describes:

- 1) The latest time the crew must take action(s) PRIOR to exceeding the turbine trip setpoint?
- 2) The action(s) the crew must take?
  - A.
    1. 1258
    2. Trip the Turbine and Reactor
  - B.
    1. 1258
    2. Trip the Turbine ONLY
  - C.
    1. 1259
    2. Trip the Turbine and Reactor
  - D.
    1. 1259
    2. Trip the Turbine ONLY

**General Discussion**

The Main Turbine Low Vacuum trip is 21.8" Hg in any condenser. Per AP/23, the reactor is only tripped if power level is above 69%.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible because this would be the correct answer if Reactor Power were greater than 69%.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible if the applicant believes that 2 out of 3 condensers are required to be below setpoint in order to initiate a turbine trip.

Part 2 is plausible because this would be the correct answer if Reactor Power were greater than 69%.

**Answer D Discussion**

Part 1 is plausible if the applicant believes that 2 out of 3 condensers are required to be below setpoint in order to initiate a turbine trip.

Part 2 is correct.

**Basis for meeting the K**

Given a loss of condenser vacuum, the applicant must determine conditions requiring a turbine trip along with making a determination of the need to trip the reactor.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	BANK	

**Development References**

OP-CN-MT-MT3 (Turbine Instrumentation and Protection) Lesson Plan, Rev. 100, Section 4.6  
 AP/1/A/5500/023 (Loss of Condenser Vacuum), Rev. 22, Enclosure 1, Step 2

**Student References Provided**

APE051 AA2.02 - Loss of Condenser Vacuum

Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: (CFR: 43.5 / 45.13)

Conditions requiring reactor and/or turbine trip .....

**401-9 Comments:**

**Remarks/Status**

APE068 AA2.10 - Control Room Evacuation

Ability to determine and interpret the following as they apply to the Control Room Evacuation: (CFR: 43.5 / 45.13)

Source range count rate .....

---

Given the following:

- The Control Room has been evacuated due to toxic gas

Following Control Room evacuation, per AP/1/A/5500/017 (Loss of Control Room), which ONE of the following completes the statements below?

Reactor shutdown condition can be verified by monitoring of \_\_\_\_\_(1)\_\_\_\_\_ .

Shutdown margin will be maintained by use of the \_\_\_\_\_(2)\_\_\_\_\_ .

- A.
    1. Source Range instrumentation
    2. Standby Makeup Pump
  - B.
    1. Source Range instrumentation
    2. Boric Acid Transfer Pumps
  - C.
    1. Wide Range Neutron instrumentation
    2. Standby Makeup Pump
  - D.
    1. Wide Range Neutron instrumentation
    2. Boric Acid Transfer Pumps
-

**General Discussion**

The AOP for Control Room Evacuation (AP/1/A/5500/017) is comprised of two cases. Case I is for toxic gas and directs relocation to the Auxiliary Shutdown Panels. Case II is for fire/security events and directs relocation to the Safe Shutdown Facility.

The Auxiliary Shutdown Panels contain Source Range instruments and controls for the Boric Acid Transfer pumps while the Safe Shutdown Facility contains Wide Range Neutron monitors and controls for the Standby Makeup Pump.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible if the applicant is unaware of the control location for the Standby Makeup Pump vs. the Boric Acid Transfer Pump or is unaware of the proper control area location following a Control Room evacuation due to toxic gas.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible if the applicant is unaware of the instrumentation location for the Source Range vs. Wide Range neutron power or is unaware of the proper control area location following a Control Room evacuation due to toxic gas.

Part 2 is plausible if the applicant is unaware of the control location for the Standby Makeup Pump vs. the Boric Acid Transfer Pump or is unaware of the proper control area location following a Control Room evacuation due to toxic gas.

**Answer D Discussion**

Part 1 is plausible if the applicant is unaware of the instrumentation location for the Source Range vs. Wide Range neutron power or is unaware of the proper control area location following a Control Room evacuation due to toxic gas.

Part 2 is correct.

**Basis for meeting the K**

The applicant is required to apply the given information concerning a Control Room evacuation in order to determine the alternate control location and the method of monitoring shutdown conditions (Source Range count rate) from that location.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

AP/1/A/5500/017 (Loss of Control Room), Rev. 058, B. Symptoms, and Case I, (Control Room Uninhabitable), Step 1.b  
 OP-CN-CP-RSS (Remote Shutdown System Lesson Plan), Rev. 101, Section 2.2  
 OP-CN-CP-AD (Standby Shutdown Facility Lesson Plan), Rev. 103, Section 3.1.1, 3.1.6

**Student References Provided**

APE068 AA2.10 - Control Room Evacuation

Ability to determine and interpret the following as they apply to the Control Room Evacuation: (CFR: 43.5 / 45.13)

Source range count rate .....

**401-9 Comments:**

**Remarks/Status**

CHIEF EXAMINER NOTE:

\*EARLY SUBMITTAL QUESTION\*

NOTES:

This question was discussed with Chief Examiner on 12/2/14 due to difficulty in meeting K/A in that the Control Room Evacuation Procedure does not direct any operations related to source range count rate. Exam author agreed to review procedure

again.

Further procedure reviews yielded no guidance concerning source range interpretation. Decided to write the question related to general determination of shutdown conditions and availability of instrumentation at the prescribed evacuation location for a given circumstance.

APE076 AK2.01 - High Reactor Coolant Activity

Knowledge of the interrelations between the High Reactor Coolant Activity and the following: (CFR 41.7 / 45.7)

Process radiation monitors .....

---

Given the following:

- Unit 1 is in Mode 3 at EOL.
- NC temperature is 557°F.
- NC system boron concentration is 2200 ppmB.
- NV letdown flow is 75 gpm.
- 1EMF-48 (NC Sample Line Reactor Coolant) Trip 2 alarm is LIT.
- 1EMF-18 (568 KK, 56 NC Filter 1A) countrate is increasing.

**Chemistry reports:**

- Isotopic analysis shows high levels of Cobalt 60 is present in the NC system.
- Iodine concentration has remained stable since the unit was shutdown.

Which ONE of the following describes:

- (1) The cause of the above conditions?
  - (2) The required action(s), in accordance with AP/1/A/5500/018, (High Activity in Reactor Coolant)?
- 
- A.
    - 1. Failed fuel
    - 2. Ensure at least one mixed bed demineralizer is in service
  - B.
    - 1. Failed fuel
    - 2. Isolate all demineralizers and place second NC filter in service
  - C.
    - 1. Crud burst
    - 2. Ensure at least one mixed bed demineralizer is in service
  - D.
    - 1. Crud burst
    - 2. Isolate all demineralizers and place second NC filter in service
-

**General Discussion**

The major action of AP/18 is to initiate Chemistry sampling and evaluation in order to determine the cause of high RCS activity. Co-60 identifies the source to be a crud burst. The procedure will then take steps to ensure the Mixed Bed Demineralizers are in service for purification of Reactor Coolant.

**Answer A Discussion**

Part 1 is plausible because failed fuel is a possible cause of EMF indication but can be ruled out by chemistry analysis.  
Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because failed fuel is a possible cause of EMF indication but can be ruled out by chemistry analysis.  
Part 2 is plausible because NC filters do remove crud. However, the procedure specifies use of one mixed bed demineralizer.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.  
Part 2 is plausible because NC filter do remove crud. However, the procedure specifies use of one mixed bed demineralizer.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of the actions required upon alarm actuation of a reactor coolant process radiation monitor.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	

**Development References**

AP/1/A/5500/018, (High Activity In Reactor Coolant), Rev. 17, Step 1-4  
OP-CN-AP-18 (AP/18: High Activity in Reactor Coolant Lesson Plan), Rev. 1, Section 1.3

**Student References Provided**

APE076 AK2.01 - High Reactor Coolant Activity  
Knowledge of the interrelations between the High Reactor Coolant Activity and the following: (CFR 41.7 / 45.7)  
Process radiation monitors .....

**401-9 Comments:**

**Remarks/Status**



WE03 EK2.2 - LOCA Cooldown and Depressurization

Knowledge of the interrelations between the (LOCA Cooldown and Depressurization) and the following:

(CFR: 41.7 / 45.7)

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.

---

Given the following:

- A Small-Break LOCA has occurred on Unit 1
- EP/1/A/5000/ES-1.2 (POST LOCA COOLDOWN AND DEPRESSURIZATION) has been implemented
- Containment pressure is 2.8 PSIG and STABLE

In accordance with ES-1.2, which ONE of the following completes the statements below?

The crew will FIRST attempt to establish an NC system cooldown using the \_\_\_\_\_(1)\_\_\_\_\_ .

The crew will cooldown \_\_\_\_\_(2)\_\_\_\_\_ .

- A.
    1. SM PORVs
    2. as close as possible without exceeding 100°F in an hour
  - B.
    1. SM PORVs
    2. at the maximum rate
  - C.
    1. Condenser Dumps
    2. as close as possible without exceeding 100°F in an hour
  - D.
    1. Condenser Dumps
    2. at the maximum rate
-

**General Discussion**

ES-1.2 directs the operators to first attempt to establish a cooldown using Steam Dumps.  
 ES-1.2 specifies a cooldown rate based on NC T-colds as close as possible without exceeding 100°F in an hour.

**Answer A Discussion**

Part 1 is plausible if the applicant concludes that condenser dumps cannot be established due to containment pressure.  
 Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible if the applicant concludes that condenser dumps cannot be established due to containment pressure.  
 Part 2 is plausible because cooling down at the maximum rate is a strategy that is used in other situations in the EOP network when an NC system cooldown is required.

**Answer C Discussion**

CORRECT: See explanation above

**Answer D Discussion**

Part 1 is correct.  
 Part 2 is plausible because cooling down at the maximum rate is a strategy that is used in other situations in the EOP network when an NC system cooldown is required.

**Basis for meeting the K**

The K/A is met by testing the interrelationship with Post LOCA cooldown and depressurization and heat removal (maximum permissible cooldown rate and method of cooldown).

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	

Development References
EP/1/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization), Rev. 33, Step 11

Student References Provided

WE03 EK2.2 - LOCA Cooldown and Depressurization  
 Knowledge of the interrelations between the (LOCA Cooldown and Depressurization) and the following:  
 (CFR: 41.7 / 45.7)

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.

401-9 Comments:

Remarks/Status

WE08 EK3.3 - Pressurized Thermal Shock

Knowledge of the reasons for the following responses as they apply to the (Pressurized Thermal Shock)  
(CFR: 41.5 / 41.10, 45.6, 45.13)

Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations.

---

Given the following:

- A Small-Break LOCA has occurred on Unit 1
- Containment pressure is 1.2 PSIG
- NC system pressure is 400 PSIG
- EP/1/A/5000/FR-P.1 (Response To Imminent Pressurized Thermal Shock) has been implemented
- SI Termination criteria per FR-P.1 has been met

Which ONE of the following completes the statement below?

To terminate Safety Injection, FR-P.1 directs the operator to reset \_\_\_\_\_(1)\_\_\_\_\_ and stop \_\_\_\_\_(2)\_\_\_\_\_ .

- A. 1. Safety Injection ONLY  
2. both NI pumps and all but one NV pump ONLY
  - B. 1. Safety Injection AND the Sequencers  
2. both NI pumps, both ND pumps and all but one NV pump
  - C. 1. Safety Injection AND the Sequencers  
2. both NI pumps and all but one NV pump ONLY
  - D. 1. Safety Injection ONLY  
2. both NI pumps, both ND pumps and all but one NV pump
-

**General Discussion**

Per FR-P.1, when SI termination criteria is met, SI and the Sequencers must be reset. Termination of SI flow is required to stop any unwarranted cooldown and this is accomplished by stopping all but one NV pump, both NI pump and both ND pumps if ND pumps suction is aligned to the FWST. Due to the SI that has occurred, ND pump suction is aligned to the FWST.

**Answer A Discussion**

Part 1 is plausible since resetting SI is required to clear the start signal that fired the sequencer. The sequencer is what loaded the emergency safeguards pumps on the bus and must be reset to regain control board control of these pumps.

Part 2 is true but not complete. Plausible since applicant must be aware that ND pumps are taking a suction on the FWST due to the SI that has occurred and must be secured.

**Answer B Discussion**

CORRECT: See explanation above.

**Answer C Discussion**

Part 1 is correct.

Part 2 is true but not complete. Plausible since applicant must be aware that ND pumps are taking a suction on the FWST due to the SI that has occurred and must be secured.

**Answer D Discussion**

Part 1 is plausible since resetting SI is required to clear the start signal that fired the sequencer. The sequencer is what loaded the emergency safeguards pumps on the bus and must be reset to regain control board control of these pumps.

Part 2 is correct.

**Basis for meeting the K**

The KA is matched because the applicant must know which controls to manipulate to terminate Safety Injection flow that is causing an undesired cooldown of the NC system.

**Basis for Hi Cog**

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Memory	BANK	

**Development References**

EP/1/A/5000/FR-P.1( Response to Imminent Pressurized Thermal Shock Condition), Rev. 25, Step 8 & 10

**Student References Provided**

WE08 EK3.3 - Pressurized Thermal Shock

Knowledge of the reasons for the following responses as they apply to the (Pressurized Thermal Shock)

(CFR: 41.5 / 41.10, 45.6, 45.13)

Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations.

**401-9 Comments:**

**Remarks/Status**

WE15 2.4.3 - Containment Flooding

WE15 GENERIC

Ability to identify post-accident instrumentation. (CFR: 41.6 / 45.4)

---

Given the following:

- Unit 1 has experienced a Large Break LOCA
- Containment pressure is 2.8 psig
- Containment radiation is indicating 30 R/Hr
- Containment sump level is 17 feet

Which ONE of the following completes the statements below?

Entry requirements for \_\_\_\_\_(1)\_\_\_\_\_ are currently met.

TS 3.3.3 (Post-Accident Monitoring Instrumentation) requires operability of \_\_\_\_\_(2)\_\_\_\_\_ .

- A.
    1. EP/1/A/5000/FR-Z.2 (Response to Containment Flooding)
    2. Containment Radiation Instruments ONLY
  - B.
    1. EP/1/A/5000/FR-Z.2 (Response to Containment Flooding)
    2. Containment Radiation AND Level Instruments
  - C.
    1. EP/1/A/5000/FR-Z.3 (Response to High Containment Radiation Level)
    2. Containment Radiation Instruments ONLY
  - D.
    1. EP/1/A/5000/FR-Z.3 (Response to High Containment Radiation Level)
    2. Containment Radiation AND Level Instruments
-

**General Discussion**

FR-Z.2 entry criteria is a containment sump level greater than 15.5 ft. FR-Z.3 entry criteria is a radiation level greater than 35R/hr.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible if the applicant is unaware of the requirements of T.S. 3.3.3.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because FR-Z.3 entry conditions would be met if containment radiation were greater than 35 R/hr.

Part 2 is plausible if the applicant is unaware of the requirements of T.S. 3.3.3.

**Answer D Discussion**

Part 1 is plausible because FR-Z.3 entry conditions would be met if containment radiation were greater than 35 R/hr.

Part 2 is correct.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of the requirements of the Tech. Spec. associated with post accident instrumentation related to containment flooding.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	NEW	

**Development References**  
 EP/1/A/5000/F-0 (Critical Safety Function Status Trees), Rev. 9, Containment Tech. Spec. 3.3.3 (Post Accident Instrumentation), Rev. 219/214, Table 3.3.3-4 Functions 5 and 7

**Student References Provided**

WE15 2.4.3 - Containment Flooding  
 WE15 GENERIC  
 Ability to identify post-accident instrumentation. (CFR: 41.6 / 45.4)

**401-9 Comments:**

**Remarks/Status**

SYS003 K6.02 - Reactor Coolant Pump System (RCPS)

Knowledge of the effect of a loss or malfunction on the following will have on the RCPS: (CFR: 41.7 / 45/5)

RCP seals and seal water supply .....

---

Given the following:

- 1A NCP #2 Seal has shown signs of degraded performance and engineering suspects failure may be imminent

Which of the following alarms would confirm failure of the #2 NCP seal?

1A NCP Standpipe \_\_\_\_ (1) \_\_\_\_ level alarm.

1A NCP #1 Seal Leakoff \_\_\_\_ (2) \_\_\_\_ flow alarm.

- A. 1. High  
2. High
  - B. 1. High  
2. Low
  - C. 1. Low  
2. High
  - D. 1. Low  
2. Low
-

**General Discussion**

A failure of the #2 NCP seal will result in an increased flow through this seal thus redirecting seal leakoff flow to the #2 seal. Additionally, the excess #2 seal flow will result in more flow to the standpipe resulting in a high level alarm.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible because a #1 NCP Seal failure would result in increased seal leakoff flow.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because a #3 NCP Seal failure would result decreased flow to the standpipe.

Part 2 is plausible because a #1 NCP Seal failure would result in increased seal leakoff flow.

**Answer D Discussion**

Part 1 is plausible because a #3 NCP Seal failure would result decreased flow to the standpipe.

Part 2 is correct.

**Basis for meeting the K**

The KA is matched because the applicant is tested on how a failure of an RCP seal affects the overall RCP System, in the context of the effect on standpipe conditions and its associated alarm, and the effect on a different seal.

**Basis for Hi Cog**

To answer this question requires the applicant to apply system knowledge of the interface between the standpipe and of the RCP seal water system, in the context of a failure.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	BANK	

**Development References**  
 OP/1/B/6100/010H (Annunciator Response For Panel 1AD-7), Rev. 077, A/1 & C/2

**Student References Provided**

SYS003 K6.02 - Reactor Coolant Pump System (RCPS)  
 Knowledge of the effect of a loss or malfunction on the following will have on the RCPS: (CFR: 41.7 / 45/5)  
 RCP seals and seal water supply .....

**401-9 Comments:**

**Remarks/Status**



SYS004 A2.26 - Chemical and Volume Control System

Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5/ 43/5 / 45/3 / 45/5)

Low VCT pressure .....

---

Given the following:

- A malfunction of 1NV-224 (H2 Sup to VCT Press Reg VIv) has isolated the VCT Hydrogen supply

Which ONE of the following completes the statements below?

As VCT pressure decreases, NCP #1 Seal leakoff flow will \_\_\_\_ (1) \_\_\_\_ .

NV pump suction \_\_\_\_ (2) \_\_\_\_ automatically transfer to the FWST as a result of low VCT pressure.

- A.    1. decrease  
      2. will
  
  - B.    1. decrease  
      2. will NOT
  
  - C.    1. increase  
      2. will
  
  - D.    1. increase  
      2. will NOT
-

**General Discussion**

#1 seal leakoff flow is controlled by the difference between RCS pressure and VCT pressure. The VCT overpressure provides backpressure to force flow through the #2 seal. Therefore, a decrease in VCT pressure will result in an increased #1 seal leakoff flow rate and decreased #2 seal leakoff flow rate.

**Answer A Discussion**

Part 1 is plausible if the applicant associates decreased seal leakoff flow with decreased VCT pressure.  
 Part 2 is plausible because an automatic FWST transfer is available for low VCT level and it would reason that one would be available for low pressure due to the likelihood of pump failure.

**Answer B Discussion**

Part 1 is plausible if the applicant associates decreased seal leakoff flow with decreased VCT pressure.  
 Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.  
 Part 2 is plausible because an automatic FWST transfer is available for low VCT level and it would reason that one would be available for low pressure due to the likelihood of pump failure.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The applicant is required to predict the impacts of low VCT pressure upon the CVCS and the interlocks designed for mitigation (or lack thereof) related to this condition.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**

OP-CN-PS-NV (Chemical and Volume Control System Lesson Plan), Rev. 201, Section 2.2 & 3.1

**Student References Provided**

SYS004 A2.26 - Chemical and Volume Control System

Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5/ 43/5 / 45/3 / 45/5)

Low VCT pressure .....

**401-9 Comments:**

**Remarks/Status**

SYS004 K2.02 - Chemical and Volume Control System  
Knowledge of bus power supplies to the following: (CFR: 41.7)  
Makeup pumps .....

---

Which ONE of the following completes the statement below?

The 1A Boric Acid Transfer Pump receives power from \_\_\_\_\_ .

- A. SMXG
  - B. 1EMXA
  - C. 1EMXG
  - D. 1MXW
-

**General Discussion**

1A Boric Acid Transfer Pump receives power from 1EMXA.
--

**Answer A Discussion**

Plausible because the Standby Makeup Pump is powered from SMXG.
---

**Answer B Discussion**

CORRECT. See explanation above.
---------------------------------

**Answer C Discussion**

Plausible because this is also a Unit 1 "A" train essential power supply.
---

**Answer D Discussion**

Plausible because this is the power supply to the 1A Reactor Makeup Water Pump.
---

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of the power supply for a makeup pump which is part of the CVCS.
---

**Basis for Hi Cog**

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**Basis for SRO only**

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Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

<b>Development References</b>
OP-CN-PS-NV (Chemical and Volume Control System Lesson Plan), Rev. 201, Section 4.1

<b>Student References Provided</b>

SYS004 K2.02 - Chemical and Volume Control System  
 Knowledge of bus power supplies to the following: (CFR: 41.7)  
 Makeup pumps .....

<b>401-9 Comments:</b>

<b>Remarks/Status</b>

SYS005 A1.01 - Residual Heat Removal System (RHRS)

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RHRS controls including: (CFR: 41.5 / 45.5)

Heatup/cooldown rates .....

---

Given the following:

- The Unit 1 NC system is currently SOLID in Mode 5
- 1A ND is in service
- 1B ND is secured
- ND Letdown is in service
- The BOP has been directed to perform a 10°F heatup

Which ONE of the following completes the statements below?

To commence heatup, the BOP will manually operate \_\_\_\_\_(1)\_\_\_\_\_ .

In order to prevent exceeding LTOP limits during the heatup, the BOP will throttle 1NV-135 (ND Flow to Letdown HX) in the \_\_\_\_\_(2)\_\_\_\_\_ direction.

- A.     1. 1ND-26 (ND HX 1A Outlet CTRL)  
       2. open
  - B.     1. 1ND-26 (ND HX 1A Outlet CTRL)  
       2. closed
  - C.     1. 1ND-27 (ND HX 1A Bypass CTRL)  
       2. open
  - D.     1. 1ND-27 (ND HX 1A Bypass CTRL)  
       2. closed
-

**General Discussion**

RHR Heat Exchanger Outlet Control Valves are used to establish heatup rates by controlling flow through the associated heat exchanger. The bypass control valves automatically maintain a set system flowrate using a heat exchanger bypass. During the heatup RCS pressure will increase. Since INV-135 controls letdown flow, and no information is given concerning a change in charging flow, this valve must be throttled opened in order to maintain pressure and prevent violating LTOP limits.

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

Part 1 is correct.  
Part 2 is plausible if the applicant confuses the operation of this valve with the charging flow control valve.

**Answer C Discussion**

Part 1 is plausible because operation of this valve would cause a change in temperature. However, this valve controls total system flow in Automatic and is not used for temperature control.  
Part 2 is correct.

**Answer D Discussion**

Part 1 is plausible because operation of this valve would cause a change in temperature. However, this valve controls total system flow in Automatic and is not used for temperature control.  
Part 2 is plausible if the applicant confuses the operation of this valve with the charging flow control valve.

**Basis for meeting the K**

The applicant is required to demonstrate operational knowledge of the RHR controls in order to establish a heatup and prevent exceeding a design limit.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**

OP-CN-PS-ND (Residual Heat Removal System Lesson Plan), Rev. 100, Section 2.7, 2.8, & 2.14

**Student References Provided**

SYS005 A1.01 - Residual Heat Removal System (RHRS)

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RHRS controls including: (CFR: 41.5 / 45.5)

Heatup/cooldown rates .....

**401-9 Comments:**

**Remarks/Status**

SYS006 K5.07 - Emergency Core Cooling System (ECCS)

Knowledge of the operational implications of the following concepts as they apply to ECCS: (CFR: 41.5 / 45.7)

Expected temperature levels in various locations of the RCS due to various plant conditions .....

---

Given the following:

- Unit 1 has experienced a Reactor Trip and Safety Injection due to a Tube Rupture in the 1B S/G
- The crew is performing EP/1/A/5000/E-3 (Steam Generator Tube Rupture)
  - 1B S/G has been isolated
  - A plant cooldown has been initiated
  - The crew is preparing to depressurize the NC system
  - **ALL NC pumps are in service**

Which ONE of the following completes the statements below?

During NC cooldown, 1B NC Hot Leg Temperature ( $T_{hot}$ ) will be \_\_\_\_\_(1)\_\_\_\_\_ 1C NC Hot Leg ( $T_{hot}$ ) Temperature.

During NC depressurization 1NC-27 (PZR Spray Ctrl Frm Loop A) will be \_\_\_\_\_(2)\_\_\_\_\_ effective than 1NC-29 (PZR Spray Ctrl Frm Loop B)

- A.
    - 1. equal to
    - 2. less
  - B.
    - 1. higher than
    - 2. less
  - C.
    - 1. equal to
    - 2. more
  - D.
    - 1. higher than
    - 2. more
-

**General Discussion**

With all RCPs in service, hot leg temperature will not be affected by the tube leak. Hot leg temperature should essentially be the temperature of coolant exiting the core and be equal in all loops.  
 Because 1B S/G is not being steamed, the cold leg temperature in this loop will be higher thereby reducing the effectiveness of PZR spray.

**Answer A Discussion**

Part 1 is correct.  
 Part 2 is plausible because loop B spray is normally more effective due to the surge line connection to B loop.

**Answer B Discussion**

Part 1 is plausible because cold leg temperature will be higher than all other loops.  
 Part 2 is plausible because loop B spray is normally more effective due to the surge line connection to B loop.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is plausible because cold leg temperature will be higher than all other loops.  
 Part 2 is correct.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of temperature levels in various locations of the RCS with ECCS in service for a given scenario.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	NEW	

**Development References**

EP/1/A/5000/E-3 (Steam Generator Tube Rupture), Rev. 43, NOTE prior to Step 42

**Student References Provided**

SYS006 K5.07 - Emergency Core Cooling System (ECCS)

Knowledge of the operational implications of the following concepts as they apply to ECCS: (CFR: 41.5 / 45.7)

Expected temperature levels in various locations of the RCS due to various plant conditions .....

**401-9 Comments:**

**Remarks/Status**



SYS007 2.1.20 - Pressurizer Relief Tank/Quench Tank System (PRTS)

SYS007 GENERIC

Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)

---

Given the following:

- Unit 1 is in the process of drawing a bubble in the Pressurizer
- The following step is taken from OP/1/A/6100/001 (Controlling Procedure For Unit Startup) following actions to vent Nitrogen from the PZR as the bubble is formed:

\_\_\_\_\_ 3.44.4 **WHEN** N<sub>2</sub> venting is complete, open a PZR PORV for 15 seconds to ensure pure steam exists in the PZR steam space, then close the PZR PORV.

Which ONE of the following completes the statements below?

In order to determine when Nitrogen venting is complete, the operators will verify \_\_\_\_\_(1)\_\_\_\_\_ .

If necessary to lower PRT pressure following this evolution, PRT level will be decreased by draining to the \_\_\_\_\_(2)\_\_\_\_\_ .

- A.
    1. PRT temperature equalizes with PZR steam space temperature
    2. Reactor Coolant Drain Tank
  - B.
    1. PRT temperature equalizes with PZR steam space temperature
    2. Containment Floor and Equipment Sump
  - C.
    1. PRT level increases without a corresponding PRT pressure increase
    2. Reactor Coolant Drain Tank
  - D.
    1. PRT level increases without a corresponding PRT pressure increase
    2. Containment Floor and Equipment Sump
-

**General Discussion**

PRT pressure and level indications are used to determine when all N2 has been vented from the pressurizer during bubble formation. N2 venting is considered complete when PRT pressure does not increase with a corresponding PRT level increase.

**Answer A Discussion**

Part 1 is plausible because the applicant may reason that temperatures would equalize based on steaming the PZR to the PRT.  
Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because the applicant may reason that temperatures would equalize based on steaming the PZR to the PRT.  
Part 2 is plausible because the Containment Floor and Equipment Sump receives drains from within Containment.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.  
Part 2 is plausible because the Containment Floor and Equipment Sump receives drains from within Containment.

**Basis for meeting the K**

The applicant is required to demonstrate the ability to interpret and execute a procedure step related to the PRT operation.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

OP/1/A/6100/001 (Controlling Procedure For Unit Startup), Rev. 237, Note prior to Step 3.44  
OP-CN-PS-PRT (PZR Relief Tank Lesson Plan), Rev. 101, Section 5.1

**Student References Provided**

SYS007 2.1.20 - Pressurizer Relief Tank/Quench Tank System (PRTS)  
SYS007 GENERIC  
Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)

**401-9 Comments:**

**Remarks/Status**

SYS008 A3.05 - Component Cooling Water System (CCWS)

Ability to monitor automatic operation of the CCWS, including: (CFR: 41.7 / 45.5)

Control of the electrically operated, automatic isolation valves in the CCWS .....

---

Given the following:

- A LOCA has occurred inside Containment on Unit 1
- Containment pressure peaked at 3.2 psig

Which ONE of the following completes the statements below?

The non-essential KC headers were automatically isolated by the \_\_\_\_\_(1)\_\_\_\_\_ signal.

Based on this alignment, Spent Fuel Pool temperature will \_\_\_\_\_(2)\_\_\_\_\_ .

- A. 1. Phase A  
2. increase
  - B. 1. Phase A  
2. decrease
  - C. 1. Phase B  
2. increase
  - D. 1. Phase B  
2. decrease
-

**General Discussion**

The Component Cooling Water Auxiliary and Reactor Building Non-Essential Headers isolate on a Phase B signal. Loss of the Auxiliary Building Non-Essential Header will isolate cooling to the Spent Fuel Pool Cooling Water Pumps and Heat Exchangers resulting in a temperature increase.

**Answer A Discussion**

Part 1 is plausible because Phase A does isolate other components within the system.  
Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because Phase A does isolate other components within the system.  
Part 2 is plausible because Phase B aligns full cooling water flow to the RHR Heat Exchanger.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.  
Part 2 is plausible because Phase B aligns full cooling water flow to the RHR Heat Exchanger.

**Basis for meeting the K**

The applicant is required to demonstrate the ability to monitor automatic operation of electrically operated automatic isolation valves within the CCW system.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	NEW	

<b>Development References</b>
OP-CN-PSS-KC (Component Cooling System Lesson Plan), Rev. 100, Section 17

<b>Student References Provided</b>

SYS008 A3.05 - Component Cooling Water System (CCWS)  
Ability to monitor automatic operation of the CCWS, including: (CFR: 41.7 / 45.5)  
Control of the electrically operated, automatic isolation valves in the CCWS .....

<b>401-9 Comments:</b>

<b>Remarks/Status</b>

SYS010 K6.01 - Pressurizer Pressure Control System (PZR PCS)

Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: (CFR: 41.7 / 45.7)

Pressure detection systems .....

---

Given the following:

- Unit 1 is at 100% RTP
- A slight cooldown of the NC system causes the "C" PZR heaters to be full "on"
- A malfunction of two PZR pressure transmitters causes an Alternate Action to occur on the Pressurizer Pressure Control System

Assuming NO operator actions, which ONE of the following completes the statements below?

The PZR Pressure Master will be in \_\_\_\_\_(1)\_\_\_\_\_ control

AND

"C" Heaters \_\_\_\_\_(2)\_\_\_\_\_ be energized.

- A. 1. Manual  
2. will
  - B. 1. Manual  
2. will NOT
  - C. 1. Automatic  
2. will
  - D. 1. Automatic  
2. will NOT
-

**General Discussion**

Alternate Action in Selected PZR Pressure-1 results in the following:  
 PZR Pressure Master controller goes to manual with last good value (C heater operation and spray valve position do not change)  
 All automatic PORV actuation is blocked  
 Blocks high and low pressure control deviation alarms  
 Blocks low pressure backup heaters on at 25 psig < setpoint (nominal 2235 psig)

Alternate Action in Selected PZR Pressure-2 results in the following:  
 All automatic PORV actuation is blocked  
 Blocks the high pressure alarm at 2310 psig

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

Part 1 is correct.  
 Part 2 is plausible because most control functions are blocked (i.e. PORV and Backup heater).

**Answer C Discussion**

Part 1 is plausible because the Distributed Control System is capable of automatic operation with multiple suspect inputs (by selection of quality and validation of channels). The applicant may be unaware that Alternate Action removes the Automatic function.  
 Part 2 is correct.

**Answer D Discussion**

Part 1 is plausible because the Distributed Control System is capable of automatic operation with multiple suspect inputs (by selection of quality and validation of channels). The applicant may be unaware that Alternate Action removes the Automatic function.  
 Part 2 is plausible because most control functions are blocked (i.e. PORV and Backup heater).

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of effect a given malfunction of PZR pressure detectors will have upon the Pressurizer Pressure Control System.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**  
 OP-CN-PS-IPE (Pressurizer Pressure Control Lesson Plan), Rev. 101, Section 5.4

**Student References Provided**

SYS010 K6.01 - Pressurizer Pressure Control System (PZR PCS)  
 Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: (CFR: 41.7 / 45.7)  
 Pressure detection systems .....

**401-9 Comments:**

**Remarks/Status**

SYS010 K6.02 - Pressurizer Pressure Control System (PZR PCS)

Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: (CFR: 41.7 / 45.7)

PZR .....

---

Given the following:

- Unit 2 is at 100% RTP
- 2B Pressurizer heaters are manually energized to promote mixing following unit start-up
- All plant parameters are at equilibrium
- A fault causes breaker 2LXH-6C (2B NC PZR Heater Power Panel PHP2B Feeder) to OPEN.

1) How will the output of the pressurizer master control change?

2) What is the system's response to the loss of heat input?

- A.
    - 1. Increase
    - 2. Pressurizer Spray Valves will close prior to "A" & "D" Pressurizer Heaters energizing
  - B.
    - 1. Decrease
    - 2. Pressurizer Spray Valves will close prior to "A" & "D" Pressurizer Heaters energizing
  - C.
    - 1. Increase
    - 2. "A" & "D" Pressurizer Heaters will energize prior to Pressurizer Spray Valves closing
  - D.
    - 1. Decrease
    - 2. "A" & "D" Pressurizer Heaters will energize prior to Pressurizer Spray Valves closing
-

**General Discussion**

The master controller lowers the output signal to raise pressure in response to loss of heaters (with spray valves open). The spray valves will close prior to reaching the setpoint for energizing other backup heaters..

**Answer A Discussion**

Part 1 is plausible if the applicant reverses the response of the PZR pressure control logic.

The second part is correct.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible if the applicant reverses the response of the PZR pressure control logic.

Part 2 is plausible because the given condition states that Spray Valves are open with a Backup Heater energized.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible because the given condition states that Spray Valves are open with a Backup Heater energized.

**Basis for meeting the K**

KA is matched because applicant is presented with a failure of a component of the Pressurizer (heaters), and then tested on knowledge of the effect of this failure on the Pressurizer master pressure control, including spray valve and heater response.

**Basis for Hi Cog**

This is a higher cog question because the applicant must analyze conditions involving loss of a component and predict the response of the system's control signal and component response.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	2013 NRC Exam Q37

**Development References**

OP-CN-PS-IPE (Pressurizer Pressure Control Lesson Plan), Rev. 101, Section 2.2 and Pressurizer DCS graphic

SYS010 K6.02 - Pressurizer Pressure Control System (PZR PCS)

Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: (CFR: 41.7 / 45.7)

PZR .....

**401-9 Comments:**

**Remarks/Status**



SYS012 K2.01 - Reactor Protection System (RPS)

Knowledge of bus power supplies to the following: (CFR: 41.7)

RPS channels, components, and interconnections .....

---

Which ONE of the following describes the impact on the Reactor Protection System for a loss of 125 VDC Panelboard 1EPA or 1EPD?

- A. SSPS Logic Bay has lost one of two power supplies
  - B. SSPS Output Bay has lost one of two power supplies
  - C. The associated Reactor Trip Breaker cannot be opened by the UV trip
  - D. The associated Reactor Trip Breaker cannot be opened by the Shunt trip
-

**General Discussion**

The Reactor Trip Breaker Shunt Trip coil is powered from 1EPA(D).

**Answer A Discussion**

Plausible if the applicant confuses 1EPA(D) with 1ERPA(D).

**Answer B Discussion**

Plausible if the applicant confuses 1EPA(D) with 1ERPA(D) and the number of power supplies to the Output Bay.

**Answer C Discussion**

Plausible because 1EPA(D) does supply power to a Reactor Trip Breaker function.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of a power supply associated with the Reactor Protection system

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	

**Development References**

OP-CN-ECCS-ISE (Engineered Safety Features Actuation System Lesson Plan), Rev. 100, Section 2.5 & 2.6  
OP-CN-IC-IPX (Reactor Protection System Lesson Plan), Rev. 100, Section 11

SYS012 K2.01 - Reactor Protection System (RPS)  
Knowledge of bus power supplies to the following: (CFR: 41.7)  
RPS channels, components, and interconnections .....

**Student References Provided**

**401-9 Comments:**

**Remarks/Status**

**ILT15 CNS RO NRC Examination QUESTION 38**

38

SYS013 K4.09 - Engineered Safety Features Actuation System (ESFAS)

Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following : (CFR: 41.7)

Spurious trip protection .....

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Which ONE of the following describes features of the Engineered Safety Features Actuation System (ESFAS) which are designed to prevent spurious actuations?

A loss of \_\_\_\_\_(1)\_\_\_\_\_ Vital I&C channel(s) will NOT result in an actuation.

Hi Containment Pressure Safety Injection signal logic requires \_\_\_\_\_(2)\_\_\_\_\_ channels above setpoint for actuation.

- A.    1. one  
      2. 2 of 3
  
  - B.    1. one  
      2. 2 of 4
  
  - C.    1. two  
      2. 2 of 3
  
  - D.    1. two  
      2. 2 of 4
-

**General Discussion**

Actuation of ESFAS components require initiation (or loss of power) from at least two channels. High Containment Pressure requires two of three available channels in order to initiate a safety injection.

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

Part 1 is correct.  
Part 2 is plausible because this is the required logic for most ESFAS actuations.

**Answer C Discussion**

Part 1 is plausible if the applicant does not realize that a loss of a channel will provide an actuation signal. For example, most actuation signal logic is 2/4. The applicant may assume that the loss of two channels leaves two other channels available.  
Part 2 is correct.

**Answer D Discussion**

Part 1 is plausible if the applicant does not realize that a loss of a channel will provide an actuation signal. For example, most actuation signal logic is 2/4. The applicant may assume that the loss of two channels leaves two other channels available.  
Part 2 is plausible because this is the required logic for most ESFAS actuations.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of a design feature which prevents spurious ESFAS actuations.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**  
OP-CN-ECCS-ISE (Engineered Safety Features Actuation System Lesson Plan), Rev. 100, Section 4.1 & 5.1

**Student References Provided**

SYS013 K4.09 - Engineered Safety Features Actuation System (ESFAS)  
Knowledge of ESFAS design feature(s) and/or interlock(s) which provide for the following : (CFR: 41.7)  
Spurious trip protection .....

**401-9 Comments:**

**Remarks/Status**

SYS022 A4.01 - Containment Cooling System (CCS)

Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)

CCS fans .....

Given the following:

- Unit 1 is at 100% RTP
- The following Lower Containment Ventilation Units (LCVU) are operating in low speed:
  - LCVU 1A
  - LCVU 1B
  - LCVU 1D
- Upper Containment Ventilation Unit (UCVU) 1C is the only operating UCVU
- Containment pressure is at 0.2 psig
- LCVU 1D then trips on overcurrent

Which ONE of the following describes:

(1) the next required action for providing additional containment cooling, per OP/1/A/6450/001, (Containment Ventilation Systems), in addressing the above conditions;

AND

(2) if this action is NOT successful, AND no further operator actions are taken, which LCO entry, or alarm condition, will FIRST be reached for containment pressure?

- A.
  - 1. Start LCVU 1C in low speed, AND start ALL UCVUs
  - 2. LCO 3.6.4 (Containment Pressure)
- B.
  - 1. Start LCVU 1C in low speed, AND start ALL UCVUs
  - 2. Annunciator LIT which instructs operators to initiate high speed for LCVUs
- C.
  - 1. Start LCVU 1C in low speed ONLY
  - 2. LCO 3.6.4 (Containment Pressure)
- D.
  - 1. Start LCVU 1C in low speed ONLY
  - 2. Annunciator LIT which instructs operators to initiate high speed for LCVUs

**General Discussion**

The Operating Procedure for Containment Ventilation Systems requires the operators to start additional Lower Containment Ventilation Units in LOW speed first. If this does not provide sufficient cooling, the procedure goes on to direct placing the LCVUs in HIGH fan speed. LCO 3.6.4 requires that containment pressure be maintained at < 0.3 psig. The alarm condition which instructs operators to initiate high speed for the LCVUs comes in at 0.5 psig containment pressure. The distractors intentionally do not give the complete title of the alarm, since the full title gives away the pressure value, as follows: 1AD-19 B/12 (LOWER CONT PRESS 0.5 PSIG INITIATE HI SPEED). However, the conceptual description of the alarm is adequate for the applicant to evaluate which one is expected first if conditions worsen.

**Answer A Discussion**

Part 1 is plausible because these actions are contained within AP/28 for high containment pressure.  
Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because these actions are contained within AP/28 for high containment pressure.  
Part 2 is plausible because this would be an expected condition if no action were taken. However, this condition will occur after the T.S. limit is reached (0.3 psig vs 0.5 psig).

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.  
Part 2 is plausible because this would be an expected condition if no action were taken. However, this condition will occur after the T.S. limit is reached (0.3 psig vs 0.5 psig).

**Basis for meeting the K**

The applicant is required to demonstrate the ability to operate (per procedure) and monitor Containment Cooling Fans.

**Basis for Hi Cog**

A calculation will be required in order to determine the correct answer.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	

**Development References**

AP/1/A/5500/028 (Secondary Stem Leak), Rev. 8, Step 9 RNO  
OP/1/A/6450/001 (Containment Ventilation Systems), Rev. 42, Enclosure 4.11, Step 3.1  
OP/1/B/6100/010R (Annunciator Response for Panel 1AD-19), Rev. 39, B/12

**Student References Provided**

SYS022 A4.01 - Containment Cooling System (CCS)  
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)  
CCS fans .....

**401-9 Comments:**

**Remarks/Status**

SYS022 K4.03 - Containment Cooling System (CCS)

Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)

Automatic containment isolation .....

---

Concerning the Containment Ventilation System, which ONE of the following completes the statements below?

Under normal conditions, Containment Ventilation Units are cooled by the \_\_\_\_\_(1)\_\_\_\_\_ system.

Containment Ventilation cooling water supply is isolated by a \_\_\_\_\_(2)\_\_\_\_\_ signal.

- A.     1. YV  
       2. Phase A
  
  - B.     1. YV  
       2. Phase B
  
  - C.     1. RN  
       2. Phase A
  
  - D.     1. RN  
       2. Phase B
-

**General Discussion**

The YV system provides normal cooling to containment components. However, these components can also be cooled by the Nuclear Service Water system upon a loss of YV. The shared flowpath is isolated on a Phase B signal.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible because many containment isolations occur on Phase A signal.

**Answer B Discussion**

CORRECT: See explanation above.

**Answer C Discussion**

Part 1 is plausible because RN does provide Containment Ventilation cooling. However, it is not the normal cooling medium.

Part 2 is plausible because many containment isolations occur on Phase A signal.

**Answer D Discussion**

Part 1 is plausible because RN does provide Containment Ventilation cooling. However, it is not the normal cooling medium.

Part 2 is correct.

**Basis for meeting the K**

The K/A is matched because the applicant must know the effect of a Containment Isolation signal (Sp) on the alignment of the Containment Ventilation Cooling System Supply Isolation valves.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

OP-CN-CNT-VV (Containment Ventilation System Lesson Plan), Rev. 100, Section 4.1 and 4.2  
OP-CN-PSS-RN (Nuclear Service Water Lesson Plan), Rev. 104, Section 8.4

**Student References Provided**

SYS022 K4.03 - Containment Cooling System (CCS)

Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)

Automatic containment isolation .....

**401-9 Comments:**

**Remarks/Status**



SYS025 A4.01 - Ice Condenser System

Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)

Ice condenser isolation valves .....

---

Given the following:

- A SBLOCA has occurred on Unit 1
- NC System pressure is 1940 PSIG and lowering slowly
- Containment pressure is 2.3 PSIG and rising slowly

Which ONE of the following completes the statement below?

NF (ICE CONDENSER) system valve(s) \_\_\_\_\_ will receive a signal to CLOSE.

COMPONENT LEGEND:

- 1NF-228A (Glycol Sup Cont Isol Otsd)
- 1NF-233B (Glycol Ret Cont Isol)
- 1NF-234A (Glycol Ret Cont Isol)

- A. 1NF-233B ONLY
  - B. 1NF-228A and 1NF-233B ONLY
  - C. 1NF-228A and 1NF-234A ONLY
  - D. 1NF-228A, 1NF-233B and 1NF-234A
-

**General Discussion**

The Ice Condenser Cooling system contains three containment isolation valves. All three close on an St signal.

**Answer A Discussion**

Plausible if the applicant concludes that ONLY inside containment isolation valves close on a Phase A (St) signal and outside containment isolation valves close on a Phase B (Sp) signal

**Answer B Discussion**

Plausible if the applicant concludes that closing one containment inside isolation and one containment outside isolation would provide complete isolation for the NF system.

**Answer C Discussion**

Plausible if the applicant concludes that ONLY outside containment isolation valves close on a Phase A (St) signal and inside containment isolation valves close on a Phase B (Sp) signal.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The applicant must demonstrate the ability to monitor Ice Condenser Isolation Valves by demonstrating knowledge of automatic operation.

**Basis for Hi Cog**

Applicant is required to analyze plant conditions and determine which safety signal has been generated and then recall from memory which NF containment isolation valves close.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	

**Development References**  
 OP-CN-CNT-NF (Ice Condenser Lesson Plan), Rev. 100, Section 5.1

**Student References Provided**

SYS025 A4.01 - Ice Condenser System  
 Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)  
 Ice condenser isolation valves .....

**401-9 Comments:**

**Remarks/Status**

SYS026 A1.01 - Containment Spray System (CSS)

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: (CFR: 41.5 / 45.5)

Containment pressure .....

---

Which ONE of the following completes the statement below?

The bistables required to permit Containment Spray Pump operation will \_\_\_\_\_(1)\_\_\_\_\_ to actuate. Once started, the NS pumps will secure on decreasing containment pressure at \_\_\_\_\_(2)\_\_\_\_\_ .

- A. 1. energize  
2. 0.9 psig
  - B. 1. energize  
2. 0.35 psig
  - C. 1. de-energize  
2. 0.9 psig
  - D. 1. de-energize  
2. 0.35 psig
-

**General Discussion**

Loss of power to a CPCS transmitter will cause it to go to the inhibit state to prevent inadvertent containment spray. NS / VX bistables are energized to actuate to prevent a spurious trip due to a loss of instrument power from causing a containment depressurization. CPCS allow operation of Containment Spray pumps at 0.9 psig and secure pumps at 0.35 psig.

**Answer A Discussion**

Part 1 is correct.  
Part 2 is plausible because this is a setpoint associated with the associated permissive. However, this setpoint allows Containment Spray Pump operation vs. secures operation.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because most bistables de-energize to actuate in order to assure operation when required.  
Part 2 is plausible because this is a setpoint associated with the associated permissive. However, this setpoint allows Containment Spray Pump operation vs. secures operation.

**Answer D Discussion**

Part 1 is plausible because most bistables de-energize to actuate in order to assure operation when required.  
Part 2 is correct.

**Basis for meeting the K**

The applicant is required to demonstrate the ability to operate CSS controls by recognizing the conditions at which components will be in operation in relation to containment pressure.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

OP-CN-ECCS-NS (Containment Spray Lesson Plan) Rev. 101, Section 3.1

**Student References Provided**

SYS026 A1.01 - Containment Spray System (CSS)  
 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: (CFR: 41.5 / 45.5)  
 Containment pressure .....

**401-9 Comments:**

**Remarks/Status**

SYS039 K5.01 - Main and Reheat Steam System (MRSS)

Knowledge of the operational implications of the following concepts as they apply to the MRSS: (CFR: 441.5 / 45.7)

Definition and causes of steam/water hammer .....

---

Given the following:

- A Unit 1 reactor trip has occurred due to a secondary system malfunction
- EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) has been performed and a transition has been made to EP/1/A/5000/ES-0.1 (Reactor Trip Response)
- The crew has entered EP/1/A/5000/FR-H.2 (Response to Steam Generator Overpressure)
- The crew is preparing to dump steam from the affected S/G

Which ONE of the following completes the statements below?

FR-H.2 will only allow steam release from the affected S/G if NR level is less than a MAXIMUM of \_\_\_\_ (1) \_\_\_\_ .

If the maximum level has been exceeded, an evaluation must be performed prior to release due to the potential effects of \_\_\_\_ (2) \_\_\_\_ .

- A. 1. 83%  
2. steamline water hammer
  - B. 1. 92%  
2. steamline water hammer
  - C. 1. 83%  
2. condenser tube damage
  - D. 1. 92%  
2. condenser tube damage
-

**General Discussion**

The procedure for S/G high pressure directs operators to enter the procedure for S/G high level if level is  $\geq 92\%$  in order to prevent a water hammer event if steam is released above this setpoint.

Following reduction of S/G level, an evaluation must be performed due to the potential for water intrusion into the steamline.

**Answer A Discussion**

Part 1 is plausible because this is the setpoint specified for FR-H.3 entry and the P-14 (Hi-Hi S/G Level Interlock).

Part 2 is correct.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because this is the setpoint specified for FR-H.3 entry and the P-14 (Hi-Hi S/G Level Interlock).

Part 2 is plausible because it could be reasoned that water entry into the condenser via steam dumps may cause tube damage.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible because it could be reasoned that water entry into the condenser via steam dumps may cause tube damage.

**Basis for meeting the K**

The applicant is required to determine the implication of high S/G water level as related to the potential for water hammer.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**

EP/1/A/5000/F-0 (Critical Safety Function Status Trees), Rev. 009, Heat Sink  
 EP/1/A/5000/FR-H.2 (Response to Steam Generator Overpressure), Rev. 08, Step 3  
 EP/1/A/5000/FR-H.3 (Response to Steam Generator High Level), Rev. 09, Step 1  
 EP/1/A/5000/FR-H.3 Background Document, Rev. 1, Step 1  
 OP-CN-STM-SM (Main Steam Lesson Plan), Rev. 101 Section 7.3

**Student References Provided**

SYS039 K5.01 - Main and Reheat Steam System (MRSS)

Knowledge of the operational implications of the following concepts as they apply to the MRSS: (CFR: 441.5 / 45.7)

Definition and causes of steam/water hammer .....

**401-9 Comments:**

**Remarks/Status**

CHIEF EXAMINER NOTE:

\*EARLY SUBMITTAL QUESTION\*

SYS059 A1.03 - Main Feedwater (MFW) System

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MFW controls including: (CFR: 41.5 / 45.5)

Power level restrictions for operation of MFW pumps and valves. ....

---

Given the following:

- Unit 2 is at 100% RTP

Subsequently:

- 2A CFPT tripped

Which ONE of the following completes the statement below?

The S/G level control setpoint will change for a period of \_\_\_\_\_(1)\_\_\_\_\_ if Reactor power was greater than a MINIMUM of \_\_\_\_\_(2)\_\_\_\_\_ prior to the event.

- A. 1. 6 minutes  
2. 56%
  - B. 1. 6 minutes  
2. 65%
  - C. 1. 10 minutes  
2. 56%
  - D. 1. 10 minutes  
2. 65%
-

**General Discussion**

For Unit 2 only, the response for a single feed pump trip if Nuclear Power is greater than 65% for SGWLC is different. Following a single feed pump trip with Rx power > 65%, S/G water levels will drop to values less than the program minimum, its return to the program level could come in at a rate that could overshoot the program band and challenge the S/G high-high level P-14 value (77%). Because of this, the control circuit looks at a combination of:  
 Rx power > 65%  
 Either Feed pump A or B tripped  
 Validated S/G level < 52% (7% dead band) and does not exceed 59% within the 30 second time period.  
 Once these conditions exist, for 30 seconds, a 600 second (10 minutes) timer combines with the condition that if S/G level has now risen greater than 53% to change the S/G level setpoint to 53%. Once the 10 minute timer drops out, the controlling circuit now inserts a slow ramp back from 53% to the current programmed value between 62 and 67%.

**Answer A Discussion**

Part 1 is plausible if the applicant is not aware of the time period (actually 600 seconds) associated with this circuit.  
 Part 2 is plausible because this is the setpoint for which actions associated with a full load rejection occur.

**Answer B Discussion**

Part 1 is plausible if the applicant is not aware of the time period (actually 600 seconds) associated with this circuit.  
 Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.  
 Part 2 is plausible because this is the setpoint for which actions associated with a full load rejection occur.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

This K/A is matched because the applicant is required to predict parameter changes associated with a MFW control circuit installed to prevent exceeding design limits following a loss of on MFW pump at a certain power level.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**  
 OP-CN-CF-IFE (S/G Water level and Feedwater Pump Speed Control Lesson Plan), Rev. 103, Sect. 9

**Student References Provided**

SYS059 A1.03 - Main Feedwater (MFW) System  
 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MFW controls including: (CFR: 41.5 / 45.5)  
 Power level restrictions for operation of MFW pumps and valves. ....

**401-9 Comments:**

**Remarks/Status**



SYS059 A3.04 - Main Feedwater (MFW) System

Ability to monitor automatic operation of the MFW, including: (CFR: 41.7 / 45.5)

Turbine driven feed pump .....

Given the following:

- Unit 1 is at 100% RTP

Concerning the Main Feed Pumps, which ONE of the following complete the statements below?

The Steam Generator Water Level Control system will automatically decrease feed pump speed if \_\_\_\_\_(1)\_\_\_\_\_ .

In order to ensure 1B CFPT assumes MORE load than 1A, "CFPT BIAS" must be adjusted \_\_\_\_\_(2)\_\_\_\_\_ than 0%

- A.
  - 1. CFPT speed exceeds 6226 rpm
  - 2. greater
  
- B.
  - 1. CFPT speed exceeds 6226 rpm
  - 2. less
  
- C.
  - 1. CF Header Pressure exceeds 1300 psig
  - 2. greater
  
- D.
  - 1. CF Header Pressure exceeds 1300 psig
  - 2. less

**General Discussion**

Main Feed Header Pressure of 1300 psig will generate a high pressure alarm and rapidly reduce MFP speed. MFP speed bias is used to distribute load between the two pumps. Decreasing the setting below 0 will cause B MFP to assume more load.

**Answer A Discussion**

Part 1 is plausible because this is the setpoint of the primary overspeed trip.

Part 2 is plausible because this would be the correct method of placing more load on 1A MFP.

**Answer B Discussion**

Part 1 is plausible because this is the setpoint of the primary overspeed trip.

Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.

Part 2 is plausible because this would be the correct method of placing more load on 1A MFP.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The applicant is required to demonstrate the ability to monitor automatic operation of the Turbine Driven Main Feed Pumps through knowledge of the high pressure runback circuit and MFP load distribution control.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**  
 .OP-CN-CF-IFE (S/G Water Level and Feedwater Pump Speed Control Lesson Plan), Rev. 103, Section 4.4.6 & 5.2  
 OP-CN-CF-FPT (Main Feed Pump Turbine Lesson Plan), Rev. 102, Section 13

**Student References Provided**

SYS059 A3.04 - Main Feedwater (MFW) System  
 Ability to monitor automatic operation of the MFW, including: (CFR: 41.7 / 45.5)  
 Turbine driven feed pump .....

**401-9 Comments:**

**Remarks/Status**

SYS061 A2.08 - 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: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Flow rates expected from various combinations of AFW pump discharge valves .....

Given the following:

- A Unit 1 Safety Injection has occurred due to a fault of 1C S/G inside containment
- The crew has entered EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)
- Containment pressure 4.5 psig

S/G	1A	1B	1C	1D
NR Level	28%	26%	9%	24%
CA Flow	225 gpm	200 gpm	250 gpm	150 gpm

Which ONE of the following completes the statements below?

Prior to being given specific S/G level control guidance by the CRS, the OATC can reduce feed flow to non-faulted S/Gs when level reaches \_\_\_\_\_(1)\_\_\_\_\_ .

Following completion of Enclosure 1 (Foldout Page) actions, S/G \_\_\_\_\_(2)\_\_\_\_\_ will be receiving the highest CA flow rate.

- A. 1. 29%  
2. 1A
- B. 1. 29%  
2. 1D
- C. 1. 39%  
2. 1A
- D. 1. 39%  
2. 1D

**General Discussion**

From OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), General Statements of Philosophy:  
 Following a CA auto start, crews shall not take action to reset and control CA until one of the following conditions are met:  
 - Any S/G reaches its normal level setpoint.  
 OR  
 - Direct procedural guidance is given.

Per E-0, Enclosure 1, Step 5:  
 5. Faulted S/G CA isolation Criteria:  
 IF all the following conditions met, THEN stop CA flow to affected S/G:  
 S/G pressure decreasing in an uncontrolled manner or completely depressurized  
 Only one S/G diagnosed as faulted  
 Secondary heat sink criteria met:  
 Total CA flow - GREATER THAN 450 GPM  
 OR  
 ANY S/G(s) N/R level - GREATER THAN 11% (29% ACC).

Once flow is isolated to 1C S/G, 1D S/G Aux Feed flowrate will increase since it is the only flowpath available from 1B Aux Feed pump.

**Answer A Discussion**

Part 1 is plausible because this is the setpoint listed for minimum heat sink level in ACC conditions.

Part 2 is plausible because this S/G has the highest initial flowrate (other than 1C). If the applicant is unaware of the impact of securing flow to 1C S/G per Enclosure 1 guidance this would be the logical choice.

**Answer B Discussion**

Part 1 is plausible because this is the setpoint listed for minimum heat sink level in ACC conditions.

Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.

Part 2 is plausible because this S/G has the highest initial flowrate (other than 1C). If the applicant is unaware of the impact of securing flow to 1C S/G per Enclosure 1 guidance this would be the logical choice.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The K/A is matched because the applicant must predict the impact of procedurally driven actions upon the flowrate of AFW pump discharge valves along with demonstrating knowledge of when flowrates can be manually controlled.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	NEW	

**Development References**

OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), Rev. 040, Attach. 11.1, Step 4  
 EP/1/A/5000/E-0 (Reactor Trip or Safety Injection), Rev. 42, Encl. 1, Step 5

**Student References Provided**

SYS061 A2.08 - 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: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Flow rates expected from various combinations of AFW pump discharge valves .....

<b>401-9 Comments:</b>

<b>Remarks/Status</b>

SYS061 K5.05 - Auxiliary / Emergency Feedwater (AFW) System

Knowledge of the operational implications of the following concepts as they apply to the AFW: (CFR: 41.5 / 45.7)

Feed line voiding and water hammer .....

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Which ONE of the following describes how the concern for potential feed line voiding and water hammer in the discharge piping of the CA pumps is addressed?

If a \_\_\_\_ (1) \_\_\_\_ condition exists, an OAC alarm is generated.

To mitigate this condition, the operators will \_\_\_\_ (2) \_\_\_\_ .

- A.
    - 1. high pressure
    - 2. run the CA pump to flush and reset the CA pump discharge check valve
  - B.
    - 1. high temperature
    - 2. run the CA pump to flush and reset the CA pump discharge check valve
  - C.
    - 1. high temperature
    - 2. operate 1CF-105 (S/G Tempering Flow Supply Throttle) to increase tempering flow
  - D.
    - 1. high pressure
    - 2. operate 1CF-105 (S/G Tempering Flow Supply Throttle) to increase tempering flow
-

**General Discussion**

The operating procedure identifies high temperature as a concern for feed line voiding and subsequent potential water hammer. If the discharge check valves are leaking back through, then an alarm annunciates on the OAC at High (220°F) and at High-High (250°F). The OAC alarm response refers the operator to the OP which directs actions to assess the extent of the condition, and then to attempt reseating the check valve by operating the CA pump.

**Answer A Discussion**

Part 1 is plausible because concern for a high pressure is valid if applicant reasons that a high pressure condition is indicative of back leakage of the check valve. If the check valve can be reseated, and the piping begins to cool, the pressure will decrease.

Part 2 is correct.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is correct.

Part 2 is plausible because the applicant may reason that increasing tempering flow would cool down the area of piping. However, this is the incorrect section of piping.

**Answer D Discussion**

Part 1 is plausible because concern for a high pressure is valid if applicant reasons that a high pressure condition is indicative of back leakage of the check valve. If the check valve can be reseated, and the piping begins to cool, the pressure will decrease.

Part 2 is plausible because the applicant may reason that increasing tempering flow would cool down the area of piping. However, this is the incorrect section of piping.

**Basis for meeting the K**

The KA is matched because the question tests knowledge of the operational implications (in this case, what is required for avoiding the condition) of the concern for feed line voiding and water hammer. An additional "operational implication" tested by this question is what alarms will alert the operator to a potential problem.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	

**Development References**

OP/1/A/6250/002, (Auxiliary Feedwater System), Rev. 148, Enclosure 4.10 and 4.13  
 OP-CN-CF-CA, (Auxiliary Feedwater System Lesson Plan), Rev. 101, Section 3.6, & 10.1.3  
 OP-CN-CF-CF, (Feedwater System Lesson Plan), Rev. 102, Section 2.6

**Student References Provided**

SYS061 K5.05 - Auxiliary / Emergency Feedwater (AFW) System

Knowledge of the operational implications of the following concepts as they apply to the AFW: (CFR: 41.5 / 45.7)

Feed line voiding and water hammer .....

**401-9 Comments:**

**Remarks/Status**

SYS062 A2.11 - AC Electrical Distribution System

Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)  
Aligning standby equipment with correct emergency power source (D/G) .

---

Given the following:

- Unit 1 is at 100% RTP
- Battery Charger 1ECC needs to be removed from service for maintenance
- Standby Charger 1ECS will be aligned to supply Distribution Center 1EDC

Which ONE of the following completes the statements below?

In accordance with OP/1/A/6350/008 (125V/120VAC Vital Instrument and Control Power System), 1ECS must be powered from \_\_\_\_\_(1)\_\_\_\_\_. This power supply alignment is required in Modes \_\_\_\_\_(2)\_\_\_\_\_ .

- A. 1. 1EMXA  
2. 1 - 4
  - B. 1. 1EMXA  
2. 1 - 6
  - C. 1. 1EMXJ  
2. 1 - 4
  - D. 1. 1EMXJ  
2. 1 - 6
-



**General Discussion**

The following NOTE is contained in Enclosure 7 (1ECC Shutdown and Return to Service) of OP/1/A/6350/008:

The only time 1ECS may be aligned per Enclosure 4.4 (Placing 1ECS in Standby Alignment from 1EMXJ (Train B)) is during No Mode. Aligning 1ECS per Enclosure 4.4 (Placing 1ECS in Standby Alignment from 1EMXJ (Train B)) will result in Train A equipment being powered from Train B.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible because the associated LCO (3.8.4 - DC Sources - Operating) is applicable in Modes 1-4.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible if the applicant is unaware of the train arrangement concerning Vital I&C. Typically, "A" and "C" channels are associated with "A" train. However, this is not always true. For example, "A" Reactor Trip breaker undervoltage trip is powered from "A" and "B" channels (ERPA and ERPB).

Part 2 is plausible because the associated LCO (3.8.4 - DC Sources - Operating) is applicable in Modes 1-4.

**Answer D Discussion**

Part 1 is plausible if the applicant is unaware of the train arrangement concerning Vital I&C. Typically, "A" and "C" channels are associated with "A" train. However, this is not always true. For example, "A" Reactor Trip breaker undervoltage trip is powered from "A" and "B" channels (ERPA and ERPB).

Part 2 is correct.

**Basis for meeting the K**

The applicant is required to demonstrate the ability to align standby equipment with the correct emergency power source and also demonstrate knowledge of the applicability of alignment requirement.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

OP/1/A/6350/008 (125VDC/120VAC Vital Instrument and Control Power System), Rev. 072, Encl. 4.7 Note prior to step 2.1 and L&P 1.3  
 OP-CN-EL-EPL (125VDC/120VAC Vital Instrumentation and Control Power System Lesson Plan), Rev. 100, Section 11.4 (Figure 4)

**Student References Provided**

SYS062 A2.11 - AC Electrical Distribution System

Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Aligning standby equipment with correct emergency power source (D/G) .

**401-9 Comments:**

**Remarks/Status**



SYS063 K3.02 - DC Electrical Distribution System

Knowledge of the effect that a loss or malfunction of the DC electrical system will have on the following: (CFR: 41.7 / 45.6)

Components using DC control power .....

---

Given the following:

- Unit 2 is in Mode 4 performing a cooldown for refueling
- Train 2A ND is in service
- ND flow is stable at 3400 gpm

Which ONE of the following describes:

- 1) the effect on NC cooldown rate of losing power to Vital DC Bus 2EPA;  
  
AND
  - 2) what action the operator will take to restore the desired cooldown rate per AP/2/A/5500/029 (Loss of Vital or Aux Control Power)?  
  
A.
    1. Rate INCREASES
    2. Manually adjust setpoint of 2ND-26 (ND HX 2A OUTLET CTRL)  
B.
    1. Rate DECREASES
    2. Place PWR DISCON FOR 2NI-173A switch to THROT and manually control 2NI-173A  
C.
    1. Rate INCREASES
    2. Place PWR DISCON FOR 2NI-173A switch to THROT and manually control 2NI-173A  
D.
    1. Rate DECREASES
    2. Manually adjust setpoint of 2ND-26 (ND HX 2A OUTLET CTRL)
-

**General Discussion**

EPA is the Vital DC Bus which provides control power to the following valves:  
 - 2ND-26 (control valve on outlet of ND heat exchanger)  
 - 2ND-27 (control valve on bypass line around ND heat exchanger)  
 2ND-26 fails OPEN on loss of control power. 2ND-27 fails CLOSED on loss of control power. These features are designed to ensure maximum cooling for ECCS. With 2ND-26 failed fully OPEN, and the bypass valve (2ND-27) failed CLOSED, the NC system cooldown rate will RISE, and potentially exceed prescribed cooldown rates. The operator needs to take manual action. Per AP/029 (Loss of Vital or Aux Control Power), the correct action is to enable the manual throttling feature of the Cold Leg injection valve, 2NI-173A. This is done by selecting its control switch to "THROT" position and using the pushbuttons to throttle the valve open or closed, as needed to restore the cooldown rate. In this case, the valve would be throttled in the closed direction.

**Answer A Discussion**

Part 1 is correct. Part 2 is plausible because an applicant could reason that manual adjustment of the controller is needed, if they have the misconception that since the bypass valve fails closed, manual adjustment would be needed on the main valve in order to stabilize temperature.

**Answer B Discussion**

Plausible if an applicant has an incomplete understanding of components which use Vital DC for control power, or has confused the failure modes of the listed valves, and believes that the cooldown rate has decreased, as follows:  
 1.) A vital valve (2NI-173A) which uses control power from this vital DC bus has lost its control power, which made the valve start to close. I need to take manual control of the valve.  
 OR  
 2.) 2ND-27 (bypass around the Hx) has lost its control power and has failed OPEN, which means less water is being cooled by the heat exchanger. I need to somehow raise overall flow (with the result of some additional water overall through the heat exchanger), and I can do that by opening the loop valve further. Some plants (e.g., Palisades) do use these loop valves to throttle RHR flow for a normal cooldown.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Plausible if an applicant has an incomplete understanding of components which use Vital DC for control power, or has confused the failure modes of the listed valves, concluding that the controller has caused heat exchanger outlet valve (2ND-26) has failed closed, and that manual control is needed for restoring cooling.

**Basis for meeting the K**

The applicant is given plant conditions involving the RHR system in operation, a system containing numerous components which use DC control power. Next, the applicant is provided information involving a loss of a Vital DC Bus. The applicant must then diagnose what the effect is of this loss of DC, and which action the operator will take to address the condition, per the procedure.

**Basis for Hi Cog**

This is a high cognitive level question because the applicant must analyze the conditions involving a loss of power, and perform more than one mental step to conclude that this effects the control power for a controller, which is controlling RHR temperature. The applicant must combine (or synthesize) this information to conclude how the temperature is affected, and what action is required to restore the desired cooldown rate.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	

**Development References**  
 AP/2/A/5500/029, (Loss of Vital or Aux Control Power), Rev. 28, Note prior to Step 3 and Step 3, Enclosure 6, Step 11

**Student References Provided**

SYS063 K3.02 - DC Electrical Distribution System  
 Knowledge of the effect that a loss or malfunction of the DC electrical system will have on the following: (CFR: 41.7 / 45.6)  
 Components using DC control power .....

<b>401-9 Comments:</b>

<b>Remarks/Status</b>

SYS064 K3.03 - Emergency Diesel Generator (ED/G) System

Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following: (CFR: 41.7 / 45.6)

ED/G (manual loads) .....

---

Given the following:

- Unit 1 is at 100% RTP

Subsequently:

- A Blackout of 1ETA occurs
- While loading, the Accelerated Sequence halts at Load Group 2

Which ONE of the following completes the statements below?

Assuming D/G voltage and speed permissives are met, the Accelerated Sequence \_\_\_\_ (1) \_\_\_\_ re-initiate once the Committed Sequence completes Load Group 2.

Following completion of all Load Groups, the sequencer \_\_\_\_ (2) \_\_\_\_ need to be reset in order to start the 1A KF Pump.

- A. 1. will  
2. does
  - B. 1. will  
2. does NOT
  - C. 1. will NOT  
2. does
  - D. 1. will NOT  
2. does NOT
-

**General Discussion**

The Accelerated Sequence and Committed Sequence use the same loading relays. If the Accelerated Sequence fails to get a load group on, once the committed sequence has loaded that group, then the Accelerated Sequence will continue loading (assuming the Accelerated Sequence permissive is still met).

Until the sequencer has been reset, no 4160 V load manual operations can take place (except load group 13 manual loads) on the affected unit. The 1A KF (Spent Fuel Pool Cooling) Pump receives a permissive per Load Group 13.

**Answer A Discussion**

First part is correct.

Second part is plausible because all 4160V pump motors, except KF (Load Group 13) require reset in order to manually energize.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

First part is plausible the Committed Sequence is the required load timer per Tech Specs (not the accelerated sequence). The applicant may reason that failure of the Accelerated Sequence is inconsequential and/or permanent thereby resulting in no re-start.

Second part is plausible because all 4160V pump motors, except KF (Load Group 13) require reset in order to manually energize.

**Answer D Discussion**

First part is plausible the Committed Sequence is the required load timer per Tech Specs (not the accelerated sequence). The applicant may reason that failure of the Accelerated Sequence is inconsequential and/or permanent thereby resulting in no re-start.

Second part is correct.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of the effect of a malfunction of the D/G loading sequence following a blackout. Additionally, the applicant is required to demonstrate knowledge of the requirement for starting manual loads following a blackout.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

OP-CN-DG-EQB (Diesel Generator Load Sequencer Lesson Plan), Rev. 100, Section 2.8, 2.10, 2.11, 8.3

**Student References Provided**

SYS064 K3.03 - Emergency Diesel Generator (ED/G) System

Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following: (CFR: 41.7 / 45.6)

ED/G (manual loads) .....

**401-9 Comments:**

**Remarks/Status**

CHIEF EXAMINER NOTE:  
Discussed question with Chief Examiner on 02/09/15 concerning the use of a sequencer malfunction as the ED/G system malfunction. Searched other K/As to ensure the subject is not sampled elsewhere. Found none. Chief Examiner agreed in principle to use of sequencer malfunction.





SYS073 K1.01 - Process Radiation Monitoring (PRM) System

Knowledge of the physical connections and/or cause-effect relationships between the PRM system and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Those systems served by PRMs .....

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Concerning the operation of 1EMF-46A (Component Cooling Water), which ONE of the following completes the statements below?

When a Trip 2 alarm is received, 1KC-122 (KC Surge Tank Vent)  
\_\_\_\_\_ automatically close.

When the associated KC train pumps are NOT running, the EMF loss of flow alarm \_\_\_\_\_ blocked from being received in the control room.

- A.    1. will  
      2. is
  
- B.    1. will  
      2. is NOT
  
- C.    1. will NOT  
      2. is
  
- D.    1. will NOT  
      2. is NOT

**General Discussion**

There is no auto actuation feature of the Component Cooling Water (KC) Surge Tank Vent on a high radiation. Per the alarm response procedure 1RAD-2, E/1, the alarm function of the radiation monitor is defeated when the associated KC pumps are not running.

**Answer A Discussion**

Part 1 is plausible because an applicant could reason that the vent would auto close, and some sites DO employ that design; e.g., McGuire Nuclear Station.

Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because an applicant could reason that the vent would auto close, and some sites DO employ that design; e.g., McGuire Nuclear Station.

Part 2 is plausible because there are other radiation monitors where the alarm is NOT blocked on loss of sample flow. For example, 1EMF-60 and 1EMF-38/39 as listed in 1RAD-1, D/1 and D/4.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible because there are other radiation monitors where the alarm is NOT blocked on loss of sample flow. For example, 1EMF-60 and 1EMF-38/39 as listed in 1RAD-1, D/1 and D/4.

**Basis for meeting the K**

The KA is matched because the question tests knowledge of how (or if) a Trip 2 alarm on the Component Cooling Water system radiation monitor affects a component on the KC (CCW) system, and also tests knowledge of how a loss of flow through the PRM affects the alarm function associated with the radiation monitor.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	

**Development References**

OP/1/B/6100/010Y (Annunciator Response for Radiation Monitoring Panel 1RAD-2), Rev. 041, A/4 & E/1

**Student References Provided**

SYS073 K1.01 - Process Radiation Monitoring (PRM) System

Knowledge of the physical connections and/or cause-effect relationships between the PRM system and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Those systems served by PRMs .....

**401-9 Comments:**

**Remarks/Status**

SYS076 A4.04 - Service Water System (SWS)

Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)

Emergency heat loads .....

---

Which ONE of the following completes the statements below?

Per EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation), Enclosure 2 (Aligning NS for Recirculation), in order to provide cooling to the Containment Spray (NS) Heat Exchanger, the operator will align \_\_\_\_\_(1)\_\_\_\_\_ at a flowrate less than the MAXIMUM of \_\_\_\_\_(2)\_\_\_\_\_.

- A.     1. RN  
       2. 5000 gpm
  
  - B.     1. RN  
       2. 4650 gpm
  
  - C.     1. KC  
       2. 5000 gpm
  
  - D.     1. KC  
       2. 4650 gpm
-

**General Discussion**

The Containment Spray Heat Exchanger is cooled by the NSW system. Cooling water flow is manually aligned via an outlet throttle valve. ES-1.3 contains a caution alerting operators to the possibility of HX tube damage if a flow rate of 4650 gpm is exceeded.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible because 5000 gpm is the actual value that tube vibration criteria is exceed per ARP.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because all other ECCS components are cooled by the CCW system.

Part 2 is plausible because 5000 gpm is the actual value that tube vibration criteria is exceed per ARP..

**Answer D Discussion**

Part 1 is plausible because all other ECCS components are cooled by the CCW system.

Part 2 is correct.

**Basis for meeting the K**

The applicant is required to demonstrate the ability to operate the service water system to cool and emergency heat load and monitor to ensure a limit is not exceeded.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

EP/1/A/5000/ES-1.3 (transfer to Cold Leg Recirculation), Rev. 029, Encl. 2, Step 5.k & Caution  
OP/1/A/6100/010M (Annunciator Response for Panel 1AD-12), Rev. 040, F/1

SYS076 A4.04 - Service Water System (SWS)

Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)

Emergency heat loads .....

**Student References Provided**

**401-9 Comments:**

**Remarks/Status**

SYS076 2.4.21 - Service Water System (SWS)  
SYS076 GENERIC

Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc. (CFR: 41.7 / 43.5 / 45.12)

---

Given the following:

- A LOCA has occurred on Unit 1
- The BOP is currently performing actions of EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation), Enclosure 2 (Aligning NS for Recirculation)
- Containment pressure is 6 psig
- Containment sump level is 5 feet

Which ONE of the following completes the statements below?

Upon opening 1NS-18A (NS Pump A Suct From Cont Sump), Containment Integrity status will change to \_\_\_\_\_(1)\_\_\_\_\_ .

In order to return Containment Integrity status to a “Green” condition, the BOP must \_\_\_\_\_(2)\_\_\_\_\_ .

- A.     1. red  
       2. start 1A NS pump ONLY
  
  - B.     1. orange  
       2. start 1A NS pump ONLY
  
  - C.     1. red  
       2. start 1A NS pump and align 1A NS HX cooling water flow
  
  - D.     1. orange  
       2. start 1A NS pump and align 1A NS HX cooling water flow
-

**General Discussion**

With no available Containment Spray cooling water (service water) aligned with a Containment Spray Sump Valve open, the Containment Integrity logic will satisfy an "Orange" condition. In order to clear this condition, the associated spray pump must be started and cooling water must be established.

**Answer A Discussion**

Part 1 is plausible because the listed indication will direct entry into EP/1/A/5000/FR-Z.1 which also serves as the "Red" path procedure.

Part 2 is plausible because of a Note prior to the step directing alignment of Containment Spray which states that FR-Z.1 should not be entered unless the NS pump fails to start. However, starting the pump alone will not clear the orange condition logic.

**Answer B Discussion**

Part 1 is correct.

Part 2 is plausible because of a Note prior to the step directing alignment of Containment Spray which states that FR-Z.1 should not be entered unless the NS pump fails to start. However, starting the pump alone will not clear the orange condition logic.

**Answer C Discussion**

Part 1 is plausible because the listed indication will direct entry into EP/1/A/5000/FR-Z.1 which also serves as the "Red" path procedure.

Part 2 is correct.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The applicant is required to apply knowledge of the logic used to determine Containment Integrity status as it relates to the Service Water System.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	NEW	

**Development References**

EP/1/A/5000/F-0 (Critical Safety Function Status Trees), Rev. 9, Containment  
EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation), Rev. 29, Step 7 Note

**Student References Provided**

SYS076 2.4.21 - Service Water System (SWS)

SYS076 GENERIC

Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc. (CFR: 41.7 / 43.5 / 45.12)

**401-9 Comments:**

**Remarks/Status**

CHIEF EXAMINER NOTE:

\*EARLY SUBMITTAL QUESTION\*

SYS078 2.4.8 - Instrument Air System (IAS)

SYS078 GENERIC

Knowledge of how abnormal operating procedures are used in conjunction with EOPs. (CFR: 41.10 / 43.5 / 45.13)

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Given the following:

- Unit 1 and 2 are operating at 100% RTP
- AP/0/A/5500/022 (Loss of Instrument Air) has been entered due to decreasing VI header pressure
- Attempts to restore VI pressure have been unsuccessful

Subsequently:

- Both units are tripped per direction of AP/22
- VI Pressure continues to decrease

Which ONE of the following completes the statements below?

Per OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), the actions of AP/22 will be continued \_\_\_\_\_(1)\_\_\_\_\_ .

As VI pressure decreases, AP/22 will FIRST dispatch operators to manually control \_\_\_\_\_(2)\_\_\_\_\_ .

Procedure Legend:

EP/1(2)/A/5000/E-0 (Reactor Trip or Safety Injection)

EP/1(2)/A/5000/ES-0.1 (Reactor Trip Response)

- A.
    1. following actions to control key plant parameters in ES-0.1
    2. CA feed flow
  - B.
    1. following actions to control key plant parameters in ES-0.1
    2. NV charging flow
  - C.
    1. IMMEDIATELY following completion of Immediate Actions in E-0
    2. CA feed flow
  - D.
    1. IMMEDIATELY following completion of Immediate Actions in E-0
    2. NV charging flow
-

**General Discussion**

When EOPs and AOPs are performed concurrently, OMP 1-7 directs operators to complete ES-0.1 to the step that directs concurrent AOP use unless an extreme circumstance is occurring.

The AFW flow control valves have an installed accumulator designed to provide motive force for one hour following a loss of instrument air. Charging flow control has no backup source of air. Therefore, AP/22 first directs operators to manually control charging flow.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible if the applicant is unaware of the backup accumulators since EOPs will first direct operators to control AFW flow.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because there are some AOPs which direct operators to perform actions in parallel with E-0 (i.e.. AP/08). AP/22 does not contain this guidance.

Part 2 is plausible if the applicant is unaware of the backup accumulators since EOPs will first direct operators to control AFW flow.

**Answer D Discussion**

Part 1 is plausible because there are some AOPs which direct operators to perform actions in parallel with E-0 (i.e.. AP/08). AP/22 does not contain this guidance.

Part 2 is correct.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of the application of the Instrument Air System AOP when used in conjunction with an EOP.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	NEW	

**Development References**

OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), Rev. 040, Section 7.5  
 AP/0/A/5500/022 (Loss of Instrument Air), Rev. 035, Step 8.d & 15.d  
 AP/1/A/5500/008 (Malfunction of Reactor Coolant Pump), Rev. 018, Enclosure 1, Step 2  
 OP-CM-CF-CA (Auxiliary Feedwater System Lesson Plan), Rev. 101, Section 7.3

SYS078 2.4.8 - Instrument Air System (IAS)

SYS078 GENERIC

Knowledge of how abnormal operating procedures are used in conjunction with EOPs. (CFR: 41.10 / 43.5 / 45.13)

**Student References Provided**

**401-9 Comments:**

**Remarks/Status**



SYS103 K1.08 - Containment System

Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

SIS, including action of safety injection reset .....

---

Given the following:

- A LOCA has occurred on Unit 1
- Containment pressure is 3.8 psig and slowly decreasing
- SI has not been reset
- Containment isolation signals have not been reset

In order to re-establish Instrument Air to Containment, which ONE of the following completes the statements below?

Safety Injection \_\_\_\_\_(1)\_\_\_\_\_ required to be RESET.

Phase "B" \_\_\_\_\_(2)\_\_\_\_\_ required to be RESET.

- A. 1. is  
2. is
  - B. 1. is  
2. is NOT
  - C. 1. is NOT  
2. is
  - D. 1. is NOT  
2. is NOT
-

**General Discussion**

The signal that actuates an automatic Phase "B" (3.0 psig) would also initiate a Safety Injection at 1.2 psig. However, control of Containment Isolation valves does not require SI reset but does require reset of Phase B.

**Answer A Discussion**

Part 1 is plausible because a Safety Injection signal will be present and components controlled by an "Ss" signal will require SI reset in order to operate.

Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because a Safety Injection signal will be present and components controlled by an "Ss" signal will require SI reset in order to operate.

Part 2 is plausible if the applicant believes 1VI-77B is isolated per an Ss or Phase A signal.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible if the applicant believes that 1VI-77B is isolated by a Phase A signal.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of the a Containment Isolation signal and its cause/effect relationship with Safety Injection Reset.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**  
 OP-CN-ECCS-ISE (Engineered Safety Features Actuation System Lesson Plan), Rev. 100, Section 5.3  
 OP-CN-SS-VI, VS, & VB (Air Systems Lesson Plan), Rev. 100, Section 2.7

**Student References Provided**

**SYS103 K1.08 - Containment System**

Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

SIS, including action of safety injection reset .....

**401-9 Comments:**

**Remarks/Status**

SYS001 A1.02 - Control Rod Drive System

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CRDS controls including: (CFR: 41.5/45.5)

T-ref .....

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Given the following:

- Unit 1 is at 50% RTP
- Control Rod Bank Select Switch is in “Auto”
- Control Bank “D” is at 195 steps withdrawn

Subsequently:

- STIP-1 (Selected Turbine Impulse Pressure Input to Reactor Control System) fails to the 100% value

Which ONE of the following completes the statement below?

Assuming no operator action, Control Bank “D” will \_\_\_\_\_ .

- A. withdraw 5 steps
  - B. withdraw 36 steps
  - C. remain at 195 steps
  - D. withdraw until Reactor Power reaches 103%
-

**General Discussion**

With Control Rods in Automatic, the failure of Selected Impulse Pressure 1 (which determines the Tref setpoint) will result in a negative temperature error signal. This signal will cause control rods to withdraw. Once Control Bank "D" reaches 200 steps, all automatic rod motion will be stopped by Rod Stop Relay C-11.

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

Plausible if the applicant is not aware of the C-11 Rod Stop Relay.

**Answer C Discussion**

Plausible if the applicant is unaware that Selected Turbine Impulse Pressure 1 inputs Reactor Control.

**Answer D Discussion**

Plausible if the applicant is unaware of the C-11 Rod Stop Relay.

**Basis for meeting the K**

The applicant is required to predict and monitor (through knowledge of an interlock) changes associated with the Control Rod Drive System when T-ref input parameters are modified.

**Basis for Hi Cog**

The applicant must perform a calculation in order to arrive at the correct answer.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**  
 OP-CN-IC-IRE (Rod Control System Lesson Plan), Rev. 102, Section 15  
 OP-CN-IC-IRX (Reactor Control System Lesson Plan), Rev. 101, Section 2.4

**Student References Provided**

SYS001 A1.02 - Control Rod Drive System  
 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CRDS controls including: (CFR: 41.5/45.5)  
 T-ref .....

**401-9 Comments:**

**Remarks/Status**

SYS011 K5.15 - Pressurizer Level Control System (PZR LCS)

Knowledge of the operational implications of the following concepts as they apply to the PZR LCS: (CFR: 41.5 / 45.7)

PZR level indication when RCS is saturated .....

---

Given the following:

- Unit 1 tripped from 100% RTP due to a loss of Offsite Power.
- The crew has transitioned to EP/1/A/5000/ES-0.3 (Natural Circulation Cooldown With Steam Void In Vessel) due to void formation in the Vessel Head
- All PZR Heaters are OFF

Which ONE of the following completes the statements below?

Under these conditions, PZR level will initially increase if \_\_\_\_\_(1)\_\_\_\_\_ flow is increased.

Vessel UR Level must be maintained greater than 68% in order prevent \_\_\_\_\_(2)\_\_\_\_\_ .

- A. 1. letdown  
2. fuel uncover
  - B. 1. letdown  
2. void entry into hot legs
  - C. 1. charging  
2. fuel uncover
  - D. 1. charging  
2. void entry into hot legs
-

**General Discussion**

PZR level will not respond in the normal manner with a void present in the head. If letdown is greater than charging, PZR pressure will decrease, the vessel void will grow and PZR level will increase.

Vessel level must be maintained greater than 68% in order to prevent the void from reaching the hot legs and disrupting natural circulation.

**Answer A Discussion**

Part 1 is correct.

Part 2 is plausible because fuel uncover is a concern. However, the top of the fuel is at 54% RVLIS level.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because this is the PZR level control response under normal conditions.

Part 2 is plausible because fuel uncover is a concern. However, the top of the fuel is at 54% RVLIS level.

**Answer D Discussion**

Part 1 is plausible because this is the PZR level control response under normal conditions.

Part 2 is correct.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of the operational implications of PZR level indications under RCS saturated conditions.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	NEW	

**Development References**

ES-0.3 Background Document, Rev. 2, Step 5 & 6  
 OP-CN-PS-CCM (Inadequate Core Cooling Monitor Lesson Plan), Rev. 100, Section 12

**Student References Provided**

SYS011 K5.15 - Pressurizer Level Control System (PZR LCS)  
 Knowledge of the operational implications of the following concepts as they apply to the PZR LCS: (CFR: 41.5 / 45.7)  
 PZR level indication when RCS is saturated .....

**401-9 Comments:**

**Remarks/Status**

SYS015 K4.09 - Nuclear Instrumentation System (NIS)

Knowledge of NIS design feature(s) and/or interlock(s) provide for the following: (CFR: 41.7)

Redundant sources of information on axial flux density distribution .....

Given the following:

- Unit 1 is at 100% RTP

Which ONE of the following completes the statements below?

**Consider each statement separately**

If AFD exceeds specified limits, the OATC will be notified by an alarm on the \_\_\_\_\_(1)\_\_\_\_\_ .

If the AFD monitor function is not available, T.S. 3.2.3 (Axial Flux Difference) requires \_\_\_\_\_(2)\_\_\_\_\_ .

- A.     1. Operator Aid Computer  
       2. a power reduction to <50%
  
- B.     1. Operator Aid Computer  
       2. manual logging of % delta flux
  
- C.     1. Detector Current Comparator  
       2. a power reduction to <50%
  
- D.     1. Detector Current Comparator  
       2. manual logging of % delta flux

**General Discussion**

AFD is monitored on an automatic basis using the Operator Aid Computer, which has an AFD monitor alarm.  
 Surveillance Requirement 3.2.3.1 requires monitoring of AFD within 1 hour and every 1 hour thereafter with the AFD monitor alarm inoperable. This requirement is performed per the "Loss of OAC" procedure through manual logging of % delta flux on an hourly basis.

**Answer A Discussion**

Part 1 is correct.  
 Part 2 is plausible because this would be the answer if AFD were not within limits and is a "less than one hour" Tech Spec action.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because the Detector Current Comparator does monitor upper and lower detector current (as does AFD) AND provides an alarm function. However, this alarm is related to QPTR vs. AFD.  
 Part 2 is plausible because this would be the answer if AFD were not within limits and is a "less than one hour" Tech Spec action.

**Answer D Discussion**

Part 1 is plausible because the Detector Current Comparator does monitor upper and lower detector current (as does AFD) AND provides an alarm function. However, this alarm is related to QPTR vs. AFD.  
 Second part is correct.

**Basis for meeting the K**

The applicant must demonstrate knowledge the AFD monitor alarm which a required design feature of the NIS. The applicant must also demonstrate knowledge of the required actions for a loss of the AFD monitor alarm, which requires a redundant source of AFD indication.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

PT/1/A/4600/009 (Loss of Operator Aid Computer), Rev. 090, Step 12.20, & Enclosure 13.11  
 OP-CN-IC-ENB (Excure Nuclear Instrumentation Lesson Plan), Rev. 101, Section 4.2  
 T.S. 3.2.3 (Axial Flux Difference), Rev. , SR 3.2.3.1  
 T.S.B 3.2.3 (Axial Flux Difference), Rev. 2, SR 3.2.3.1

**Student References Provided**

SYS015 K4.09 - Nuclear Instrumentation System (NIS)  
 Knowledge of NIS design feature(s) and/or interlock(s) provide for the following: (CFR: 41.7)  
 Redundant sources of information on axial flux density distribution .....

**401-9 Comments:**

**Remarks/Status**



**ILT15 CNS RO NRC Examination QUESTION 59**

59

SYS028 K2.01 - Hydrogen Recombiner and Purge Control System (HRPS)

Knowledge of bus power supplies to the following: (CFR: 41.7)

Hydrogen recombiners .....

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Which ONE of the following completes the statements below?

Containment Hydrogen Recombiners receive power from a(n) \_\_\_\_\_(1)\_\_\_\_\_ Motor Control Center.

Containment Hydrogen Recombiners should not be placed in service if Containment Hydrogen concentration is greater than or equal to \_\_\_\_\_(2)\_\_\_\_\_ .

- A.     1. unit  
       2. 4%
  
- B.     1. unit  
       2. 6%
  
- C.     1. essential  
       2. 4%
  
- D.     1. essential  
       2. 6%

**General Discussion**

Hydrogen Recombiners receive power from essential Motor Control Centers. They cannot be placed in service with Hydrogen concentration greater than or equal to 6% without TSC concurrence.

**Answer A Discussion**

Part 1 is plausible because Containment Hydrogen Purge Fans receive power from a unit Motor Control Center.

Part 2 is plausible because the design of the Containment Air Mitigation system is to maintain H2 below 4%.

**Answer B Discussion**

Part 1 is plausible because Containment Hydrogen Purge Fans receive power from a unit Motor Control Center.

Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.

Part 2 is plausible because the design of the Containment Air Mitigation system is to maintain H2 below 4%.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of the Hydrogen Recombiner power supply.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	

**Development References**

OP-CN-CNT-VX (Hydrogen Skimmer, Containment Air Return System and Containment Hydrogen Sample and Purge System Lesson Plan), Rev. 101, Section 1, 4.2, 4.4, and 6.4

**Student References Provided**

SYS028 K2.01 - Hydrogen Recombiner and Purge Control System (HRPS)

Knowledge of bus power supplies to the following: (CFR: 41.7)

Hydrogen recombiners .....

**401-9 Comments:**

**Remarks/Status**

**ILT15 CNS RO NRC Examination QUESTION 60**

60

SYS041 K6.03 - Steam Dump System (SDS)/Turbine Bypass Control

Knowledge of the effect of a loss or malfunction on the following will have on the SDS: (CFR: 41.7 / 45.7)

Controller and positioners, including ICS, S/G, CRDS .....

---

Given the following:

- Unit 1 has tripped from 100% power
- 1A Rx Trip Breaker is OPEN
- 1B Rx Trip Breaker is CLOSED

Which ONE of the following completes the statements below?

Steam Dumps will be operating to control NC system temperature at \_\_\_\_\_(1)\_\_\_\_\_ degrees F by modulating the \_\_\_\_\_(2)\_\_\_\_\_ .

- A. 1. 557  
2. condenser dumps ONLY
  - B. 1. 557  
2. condenser and atmospheric dumps
  - C. 1. 560  
2. condenser dumps ONLY
  - D. 1. 560  
2. condenser and atmospheric dumps
-

**General Discussion**

With the given conditions, the effect upon the steam dump control system will be as follows:

1A Rx Trip Breaker will generate an "A" P-4 signal which will:

- Arm condenser dumps
- Prevent arming of atmospheric dumps

1B Rx Trip Breaker will NOT generate a "B" P-4 signal which will:

- Allow operation of Load Rejection Controller (which reduces temperature to T-ref plus 3 degrees)
- Prevent operation of Plant Trip Controller (which reduces temperature to a T<sub>no-load</sub> value of 557 degrees).

Therefore, the Load Rejection Controller will be controlling temperature at T<sub>ref</sub> plus 3 degrees (560) using only condenser dumps.

**Answer A Discussion**

Part 1 is plausible if the applicant does not realize that the lack of "B" P-4 will prevent control via the Plant Trip Controller.

Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible if the applicant does not realize that the lack of "B" P-4 will prevent control via the Plant Trip Controller.

Part 2 is correct if the applicant does not realize that "A" P-4 will prevent operation of atmospheric dumps.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.

Part 2 is correct if the applicant does not realize that "A" P-4 will prevent operation of atmospheric dumps.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of Steam Dump Control system controller function when an input has malfunctioned.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**

OP-CN-STM-IDE (Steam Dump Control Lesson Plan), Rev. 100, Section 2.1.1, 2.1.2, 2.2, & 2.3

**Student References Provided**

SYS041 K6.03 - Steam Dump System (SDS)/Turbine Bypass Control  
 Knowledge of the effect of a loss or malfunction on the following will have on the SDS: (CFR: 41.7 / 45.7)  
 Controller and positioners, including ICS, S/G, CRDS .....

**401-9 Comments:**

**Remarks/Status**

SYS045 A4.02 - Main Turbine Generator (MT/G) System

Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)

T/G controls, including breakers .....

---

Given the following:

- Unit 1 is at 100% power.
- Generator Breaker 1A spuriously opens.
- The ONLY annunciator associated with the Turbine or Generator that alarms is:
  - 1AD-11, F/1, GEN BKR B OVERCURRENT

Which ONE of the following describes:

1) another annunciator which SHOULD have alarmed;

AND

2) a manual action required for mitigating these conditions?

- A.
    - 1. 1AD-1, F/4, TURB RUNBACK INITIATED
    - 2. Manually initiate a turbine runback to 48%
  - B.
    - 1. 1AD-1, F/4, TURB RUNBACK INITIATED
    - 2. Manually trip Generator Breaker 1B
  - C.
    - 1. 1AD-11, F/7, GEN BKR B TROUBLE
    - 2. Manually initiate a turbine runback to 48%
  - D.
    - 1. 1AD-11, F/7, GEN BKR B TROUBLE
    - 2. Manually trip Generator Breaker 1B
-

**General Discussion**

Per Alarm Procedure 1AD-1, F/4, TURB RUNBACK INITIATED, if either generator breaker opens with load at > 48%, a runback is automatically initiated and continues until load is < 48%. This is done in order to protect the other generator breaker. Neither generator breaker, alone, is rated to handle 100% generator output. Therefore, the turbine runback is initiated automatically upon opening of one of the generator breakers, with the other generator breaker closed. In the conditions given, the operator will manually initiate the runback in order to prevent overloading of the (closed) generator breaker.

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

It is plausible that an applicant would select this distractor, since the alarm is correct, and it is plausible to trip Generator Breaker 1B, if applicant reasons that it is now carrying all the load, and should be tripped to protect it.

**Answer C Discussion**

The applicant correctly recognizes that a turbine runback should have initiated, but has the misconception that a trouble alarm on the other train Generator Breaker (1B) will come in. This is plausible for an applicant to believe this, since all generator output current flow is now going through that single generator breaker. However, the only alarm expected for Generator Breaker 1B is for overcurrent. The feeds for the generator breaker trouble alarm do NOT include overcurrent.

**Answer D Discussion**

The applicant believes that a trouble alarm on the other train Generator Breaker (1B) will come in. This is plausible, since all generator output current flow is now going through that single generator breaker. However, the only alarm expected for Generator Breaker 1B is for overcurrent. The feeds for the generator breaker trouble alarm do NOT include overcurrent. It is plausible to trip Generator Breaker 1B, if applicant reasons that it is now carrying all the load, and should be tripped to protect it.

**Basis for meeting the K**

Both the operate and the monitor aspect of this K/A have been tested by this question, by presenting the applicant with conditions involving a spurious opening of a generator breaker, and testing what indications/alarms are expected AND what T/G controls must be manually operated to address the condition.

**Basis for Hi Cog**

This is a high cognitive level question because the applicant recalls and applies system knowledge, including alarm conditions, to analyze given conditions for a generator breaker opening, and then making a determination on what action is appropriate.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	

Development References
OP/1/B/6100/010L (Annunciator Response for Panel 1AD-11), Rev. 057, F/1. F/7 OP/1/B/6100/010B (Annunciator Response for Panel 1AD-1), Rev. 057, F/4

Student References Provided

SYS045 A4.02 - Main Turbine Generator (MT/G) System  
 Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)  
 T/G controls, including breakers .....

401-9 Comments:

Remarks/Status

SYS055 2.4.49 - Condenser Air Removal System (CARS)

SYS055 GENERIC

Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6)

---

Given the following:

- Unit 1 is at 100% RTP
- A S/G tube leak has developed

Which ONE of the following completes the statements below?

If 1EMF-33 exceeds the \_\_\_\_\_(1)\_\_\_\_\_ setpoint, the BOP will ensure the \_\_\_\_\_(2)\_\_\_\_\_ system AUTOMATICALLY re-aligns (assuming NO operator action).

- A.
    1. Trip 1
    2. S/G Blowdown (BB)
  - B.
    1. Trip 1
    2. Condenser Offgas (ZJ)
  - C.
    1. Trip 2
    2. S/G Blowdown (BB)
  - D.
    1. Trip 2
    2. Condenser Offgas (ZJ)
-

**General Discussion**

1EMF-33 actions occur upon a Trip 2 signal or loss of power. This actuation will automatically isolate S/G Blowdown and sampling.

**Answer A Discussion**

Part 1 is plausible because some actuations occur upon Trip 1 activation (i.e. 1EMF54).  
Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because some actuations occur upon Trip 1 activation (i.e. 1EMF54).  
Part 2 is plausible because the operator is directed to manually place the control switch in "AUTO" which will then automatically re-align the system if proper conditions are met. However, this alignment will require action by the operator.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.  
Part 2 is plausible because the operator is directed to manually place the control switch in "AUTO" which will then automatically re-align the system if proper conditions are met. However, this alignment will require action by the operator.

**Basis for meeting the K**

The applicant is required to demonstrate the ability to perform Immediate Actions of the Annunciator Response Procedure for the Condenser Air Removal System Radiation Monitor.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

OP-CN-WE-EMF (Radiation Monitoring System Lesson Plan), Rev. 102, Section 6.2 & 6.24  
OP/1/B/6100/010X (Annunciator Response for Radiation Monitoring Panel 1RAD-1), Rev. 064, B/1  
OP-CN-MT-ZM (Main Vacuum System Lesson Plan), Rev. 023, Section 6

SYS055 2.4.49 - Condenser Air Removal System (CARS)  
SYS055 GENERIC

Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6)

**Student References Provided**

**401-9 Comments:**

**Remarks/Status**



SYS056 K1.03 - Condensate System

Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

MFW . .....

Given the following:

- The Condensate System is aligned for High Pressure Cleanup

Subsequently:

- The 1A CFPT experiences a complete loss of oil pressure due to an LF Pump trip

Which ONE of the following completes the statements below?

The windmill protection circuit will send a direct signal to trip the operating \_\_\_\_\_(1)\_\_\_\_\_ .

Low CFPT oil pressure will cause the 1A CFPT \_\_\_\_\_(2)\_\_\_\_\_ to close.

- A.     1. Hotwell Pumps  
       2. recirc valve
  
- B.     1. Hotwell Pumps  
       2. discharge valve
  
- C.     1. Condensate Booster Pumps  
       2. recirc valve
  
- D.     1. Condensate Booster Pumps  
       2. discharge valve

**General Discussion**

Windmill protection is established when Main Feed Pump oil pressure decreases to 4 psig. This circuit will directly trip all Hotwell Pumps. All Condensate Booster Pumps will trip upon trip of the Hotwell Pumps. A signal also closes the Main Feed Pump Recirc valve if oil pressure decreases to 4 psig.

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

Part 1 is correct.  
Part 2 is plausible because an applicant could reason that this action would prevent Main Feed Pump windmilling.

**Answer C Discussion**

Part 1 is plausible because the Condensate Booster Pumps will trip. However, it will not be a direct signal from the windmill protection circuit.  
Part 2 is correct.

**Answer D Discussion**

Part 1 is plausible because the Condensate Booster Pumps will trip. However, it will not be a direct signal from the windmill protection circuit.  
Part 2 is plausible because an applicant could reason that this action would prevent Main Feed Pump windmilling.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of an interlock associated with the Main Feedwater System which affects operation of the Condensate System due to the cause-effect relationship of the two systems.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

OP-CN-CF-CM Condensate System Lesson Plan), Rev. 100, Section 14

**Student References Provided**

SYS056 K1.03 - Condensate System

Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

MFW . .....

**401-9 Comments:**

**Remarks/Status**

SYS072 A2.02 - Area Radiation Monitoring (ARM) 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: (CFR: 41.5 / 43.5 / 43.3 / 45.13)

Detector failure .....

---

Given the following:

- Unit 1 is at 100% RTP
- 1A1 Cont Floor & Equip Sump Pump has automatically started due to normal operational leakage

Subsequently:

- 1EMF-53A (Containment Hi Range) loses power

As a result of this power failure, which ONE of the following completes the statements below?

1A1 Cont Floor & Equip Sump Pump is \_\_\_\_ (1) \_\_\_\_ .

Entry in the action statement of Tech Spec 3.3.3 (Post Accident Monitoring Instrumentation) \_\_\_\_ (2) \_\_\_\_ required.

- A. 1. ON  
2. is
  - B. 1. ON  
2. is NOT
  - C. 1. OFF  
2. is
  - D. 1. OFF  
2. is NOT
-

**General Discussion**

1EMF-53A(B) Trip 2 will cause the Containment Floor and Equipment Sump Discharge Isolation Valves to close. Closure of these valves will cause the Containment Floor and Equipment Sump Pumps to trip.

Tech Spec 3.3.3 only requires one Containment High Range monitor to be operable. Therefore, entry into T.S. 3.3.3 is not required.

**Answer A Discussion**

Part 1 is plausible if the applicant is not aware that actuation of this EMF isolates the Containment Floor and Equipment Sump discharge path.

Part 2 is plausible because Tech Spec 3.3.3 requires two operable channels for the majority of PAM instrumentation.

**Answer B Discussion**

Part 1 is plausible if the applicant is not aware that actuation of this EMF isolates the Containment Floor and Equipment Sump discharge path.

Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.

Part 2 is plausible because Tech Spec 3.3.3 requires two operable channels for the majority of PAM instrumentation.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The applicant is required to predict the impact of an Area Radiation Monitor detector failure and use procedures (Tech Specs) to mitigate the consequences of the malfunction.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**

OP-CN-WE-WL (Liquid Waste System Lesson Plan), Rev. 202, Section 15  
T.S. 3.3.3 (Post Accident Monitoring Instrumentation), Rev. 219/214, Table 3.3.3-1

**Student References Provided**

**SYS072 A2.02 - Area Radiation Monitoring (ARM) 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: (CFR: 41.5 / 43.5 / 43.3 / 45.13)  
Detector failure .....

**401-9 Comments:**

**Remarks/Status**

SYS075 K3.07 - Circulating Water System

Knowledge of the effect that a loss or malfunctions of the circulating water system will have on the following: (CFR: 41.7 / 45.6)

ESFAS .....

---

Given the following:

- Unit 1 is at 4% RTP following startup
  - Main Turbine warming is in progress
  - 1A CFPT is in service
  - 1B CFPT is Tripped
  - All S/G levels are 39%
- The crew has entered AP/1/A/5500/023 (Loss of Condenser Vacuum) due to a loss of Condenser Circulating Water (RC) Pumps

Subsequently:

- 1A CFPT trips on low vacuum actuation

Which ONE of the following completes the statements below?

The OATC \_\_\_\_\_(1)\_\_\_\_\_ required to trip the reactor.

1A and 1B CA pumps \_\_\_\_\_(2)\_\_\_\_\_ automatically start.

- A.    1. is  
      2. will
  - B.    1. is  
      2. will NOT
  - C.    1. is NOT  
      2. will
  - D.    1. is NOT  
      2. will NOT
-

**General Discussion**

The Immediate Action of AP/1/A/5500/006 requires a Reactor Trip if power is  $\geq 5\%$ . Since given power level is 4%, the OATC would not trip the reactor.

The motor driven Auxiliary Feed pumps receive a start signal upon a loss of both Main Feed Pumps. Therefore, these pumps will automatically start.

**Answer A Discussion**

Part 1 is plausible because this would be correct if RTP were 5% or greater.

Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because this would be correct if RTP were 5% or greater.

Part 2 is plausible because this auto start signal is generated from the AMSAC circuitry which is generally bypassed at this power level (less than 40%). However, this particular portion of the circuit is active at all times.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible because this auto start signal is generated from the AMSAC circuitry which is generally bypassed at this power level (less than 40%). However, this particular portion of the circuit is active at all times.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of the effect of a loss of circulating water upon equipment which results in operation of ESFAS components.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

**Development References**

AP/1/A/5500/006 (Loss of S/G Feedwater), Rev. 041, Case I (Loss of CF Supply to S/Gs) Step 1  
 OP-CN-CF-CA (Auxiliary Feedwater System Lesson Plan), Rev. 101, Section 3.1

**Student References Provided**

SYS075 K3.07 - Circulating Water System  
 Knowledge of the effect that a loss or malfunctions of the circulating water system will have on the following: (CFR: 41.7 / 45.6)  
 ESFAS .....

**401-9 Comments:**

**Remarks/Status**

CHIEF EXAMINER NOTE:  
 \*EARLY SUBMITTAL QUESTION\*

GEN2.1 2.1.34 - GENERIC - Conduct of Operations

Conduct of Operations

Knowledge of primary and secondary plant chemistry limits. (CFR: 41.10 / 43.5 / 45.12)

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Note the table below from SLC 16.5-3, Chemistry (excerpt).

PARAMETER	STEADY STATE LIMIT	TRANSIENT LIMIT
Dissolved Oxygen	= 0.10 ppm	= 1.00 ppm
Chloride	= 0.15 ppm	= 1.50 ppm
Fluoride	= 0.15 ppm	= 1.50 ppm

Which ONE of the following completes the statements below?

- 1) In accordance with SLC 16.5-3 (Chemistry), Fluoride is a \_\_\_\_ (1) \_\_\_\_ chemistry parameter.
  - 2) In accordance with the applicable abnormal operating procedure, if dissolved oxygen were at a value in Action Level 3, a shutdown to Mode 3 would be required in \_\_\_\_ (2) \_\_\_\_ hours.
- 
- A.
    1. Primary
    2. 3
  - B.
    1. Primary
    2. 24
  - C.
    1. Secondary
    2. 3
  - D.
    1. Secondary
    2. 24
-

**General Discussion**

The limits in (excerpted) table are included in the stem for the applicant to evaluate whether they are for Primary or Secondary chemistry. The abnormal procedure (AP/035, step 4.c) directs the operator to the SLC 16.5-3 for Primary chemistry parameters. AP/35 requires a shutdown to Mode 3 within 3 hours when Action Level 3 is exceeded.

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

Part 1 is correct.  
 Part 2 is plausible since AP/35 (Primary Chemistry Out of Specification) specifies that, if a parameter exceeds Action Level 2 for 24 hours, then an immediate shutdown is required. Applicant may not recognize that the dissolved oxygen parameter is in Action Level 3, not Action Level 2.

**Answer C Discussion**

Part 1 is plausible because secondary chemistry could easily be confused with primary, since Dissolved Oxygen is a common concern in water systems and other components  
 Part 2 is correct.

**Answer D Discussion**

Part 1 is plausible because secondary chemistry could easily be confused with primary, since Dissolved Oxygen is a common concern in water systems and other components.  
 Part 2 is plausible since AP/35 (Primary Chemistry Out of Specification) specifies that, if a parameter exceeds Action Level 2 for 24 hours, then an immediate shutdown is required. Applicant may not recognize that the dissolved oxygen parameter is in Action Level 3, not Action Level 2.

**Basis for meeting the K**

The KA is matched because the applicant is provided (in the stem) with an excerpt from a guidance document which details certain chemistry parameter requirements. The applicant is then tested on which part of the plant (primary/secondary) these limits apply to, and what action is required if limits are exceeded.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	

**Development References**

SLC 16.5-3 (Chemistry), Rev. 1, Table Table 16.5-3-1 AP/0/A/5500/035 (Primary Chemistry Out of Specification), Rev. 1, Step 4.d & 6.d
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GEN2.1 2.1.34 - GENERIC - Conduct of Operations  
 Conduct of Operations  
 Knowledge of primary and secondary plant chemistry limits. (CFR: 41.10 / 43.5 / 45.12)

**Student References Provided**

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**401-9 Comments:**

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**Remarks/Status**

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GEN2.1 2.1.45 - GENERIC - Conduct of Operations

Conduct of Operations

Ability to identify and interpret diverse indications to validate the response of another indication. (CFR: 41.7 / 43.5 / 45.4)

---

Given the following:

- Unit 1 is at 100% RTP
- 1AD-7 C/4 “NCP Seal Water Lo Flow” alarms
  - The OAC indicates 1B NCP Seal Injection Flow is 0 gpm

Which ONE of the following completes the statements below?

In order to determine that seal water flow to the 1B NCP has been isolated, the BOP would verify an increase in flow on \_\_\_\_\_(1)\_\_\_\_\_ .

Following an actual loss of seal injection flow, the BOP \_\_\_\_\_(2)\_\_\_\_\_ expect to receive OAC alarm C1A0831 “NC Pump B Lower Brg Water Temp Hi-Hi”.

- A.
    - 1. 1NVP5650 (Total Seal Wtr Flow)
    - 2. will
  - B.
    - 1. 1NVP5650 (Total Seal Wtr Flow)
    - 2. will NOT
  - C.
    - 1. 1NVP5330 (NCP 1A Seal In Flow)
    - 2. will
  - D.
    - 1. 1NVP5330 (NCP 1A Seal In Flow)
    - 2. will NOT
-

**General Discussion**

With the given conditions, if flow is isolated to one RCP flow rates to the other three RCPs would increase. The Total Seal Water flow circuit maintains a set flowrate to the line supplying all RCPs and does not account for individual pump injection flow. This question is based on Operating Experience from this station due to clogged seal injection control valves.

A loss of seal injection flow will not result in RCP overheating due to backup cooling provided by the Thermal Barrier Heat Exchanger.

**Answer A Discussion**

Part 1 is plausible if the applicant reasons that the Total Seal Water flow circuit monitors each individual RCP and would increase flow in order to restore flow to 1B NCP.

Part 2 is plausible if the applicant does not recognize that backup cooling will be provided via the Thermal Barrier Heat Exchanger.

**Answer B Discussion**

Part 1 is plausible if the applicant reasons that the Total Seal Water flow circuit monitors each individual RCP and would increase flow in order to restore flow to 1B NCP.

Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.

Part 2 is plausible if the applicant does not recognize that backup cooling will be provided via the Thermal Barrier Heat Exchanger.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The applicant is required to demonstrate the ability to identify and interpret the expected indications for a given scenario.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	NEW	

**Development References**

OP-CN-PS-NCP (Reactor Coolant Pumps Lesson Plan), Rev. 100, Section 2.3.1  
 OP-CN-PS-NV (Chemical and Volume Control System Lesson Plan), Rev. 201, Section 2.3.9, 2.4

GEN2.1 2.1.45 - GENERIC - Conduct of Operations

Conduct of Operations

Ability to identify and interpret diverse indications to validate the response of another indication. (CFR: 41.7 / 43.5 / 45.4)

**401-9 Comments:**

**Remarks/Status**

GEN2.2 2.2.18 - GENERIC - Equipment Control

Equipment Control

Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.  
(CFR: 41.10 / 43.5 / 45.13)

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Given the following:

- During an outage, a planned maintenance activity will result in a YELLOW Defense in Depth (DID) sheet configuration.

In accordance with NSD 403 (Shutdown Risk Management), which ONE of the following complete the statements below?

Defense in Depth (DID) sheets are first initiated once \_\_\_\_\_(1)\_\_\_\_\_ is reached on a shutdown.

A RISK MANAGEMENT PLAN is \_\_\_\_\_(2)\_\_\_\_\_ for a YELLOW risk condition.

- A. 1. Mode 3  
2. optional
  - B. 1. Mode 3  
2. required
  - C. 1. Mode 4  
2. optional
  - D. 1. Mode 4  
2. required
-

**General Discussion**

As described in SOMP 02-02, (Operations Roles in the Risk Management Process), the Electronic Risk Assessment Tool (ERAT) is used in Modes 1-3 while DID sheets are used in Modes 4, 5, 6, and No-Mode.

**Answer A Discussion**

Part 1 is plausible because the reactor is "shutdown" during Mode 3. However, the transition from the Electronic Risk Assessment Tool to the DID sheets does not actually occur until Mode 4.

Part 2 is correct.

**Answer B Discussion**

Part 1 is plausible because the reactor is "shutdown" during Mode 3. However, the transition from the Electronic Risk Assessment Tool to the DID sheets does not actually occur until Mode 4.

Part 2 is plausible because, by definition, a yellow shutdown risk means the plant's ability to perform the associated safety function is reduced. Additionally, SOMP 02-02 (Operations Roles in the Risk Management Process) does discuss risk management actions for Yellow conditions.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible because, by definition, a yellow shutdown risk means the plant's ability to perform the associated safety function is reduced. Additionally, SOMP 02-02 (Operations Roles in the Risk Management Process) does discuss risk management actions for Yellow conditions.

**Basis for meeting the K**

The KA is matched because the question tests knowledge of when the DID sheet process for managing shutdown risk applies and also tests administrative requirements for risk management plans for planned maintenance during an outage that results in an increased risk threshold.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	

**Development References**

SOMP 02-02, (Operations Roles in the Risk Management Process), Rev. 017, Section 8 & 9  
 NSD 403 (Shutdown Risk Management Modes 4, 5, 6, and No-Mode per 10CFR 50.65 (a)(4)), Rev. 030, Section 403.8.2 & 403.10.1

GEN2.2 2.2.18 - GENERIC - Equipment Control  
 Equipment Control

Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc. (CFR: 41.10 / 43.5 / 45.13)

**Student References Provided**

**401-9 Comments:**

**Remarks/Status**

GEN2.2 2.2.38 - GENERIC - Equipment Control

Equipment Control

Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)

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Given the following:

- Unit 1 is in Mode 3

Which ONE of the following completes the statements below?

In accordance with Tech Spec 2.1.2 (RCS Pressure Safety Limit), NC system pressure shall be less than or equal to a MAXIMUM of \_\_\_\_\_(1)\_\_\_\_\_ PSIG.

Based on the conditions above, if the NC system Safety Limit is exceeded, NC system pressure must be restored to within limits in a MAXIMUM of \_\_\_\_\_(2)\_\_\_\_\_ .

- A.     1. 2485  
       2. 5 minutes
  
  - B.     1. 2735  
       2. 5 minutes
  
  - C.     1. 2485  
       2. 1 hour
  
  - D.     1. 2735  
       2. 1 hour
-

**General Discussion**

In accordance with Tech Spec 2.1.1 (RCS Pressure Safety Limit), the limit for NC system pressure is less than or equal to 2735 PSIG.

In MODES 1 & 2, if the NC System pressure TS Safety Limit is exceeded, it must be restored to within limits within 1 hour. In MODES 3, 4, and 5 it must be restored within 5 minutes.

**Answer A Discussion**

Part 1 is plausible because this is the lift setpoint for the NC system Pressurizer Safety Valves.

Part 2 is correct.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because this is the lift setpoint for the NC system Pressurizer Safety Valves.

Part 2 is plausible because this is the time limit to restore NC system pressure within the limits of TS 2.1.2 in MODES 1 and 2.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible because this is the time limit to restore NC system pressure within the limits of TS 2.1.2 in MODES 1 and 2.

**Basis for meeting the K**

The KA is matched because the applicant must have knowledge of the NC system Tech Spec Safety Limits.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	

**Development References**

T.S. 2.1.2 (RCS Pressure SL) & 2.2 (SL Violations), Rev. 210/204  
 OP-CN-PS-IPE (Pressurizer Pressure Control Lesson Plan), Rev. 101, Section 10.3

GEN2.2 2.2.38 - GENERIC - Equipment Control  
 Equipment Control  
 Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)

**Student References Provided**

**401-9 Comments:**

**Remarks/Status**

GEN2.3 2.3.13 - GENERIC - Radiation Control  
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. (CFR: 41.12 / 43.4 / 45.9 / 45.10)

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Given the following:

- Unit 1 is in Mode 6
- A fuel handling accident involving fuel damage occurs
  - 1EMF-17 (Reactor Building Refueling Bridge) is in alarm

Which ONE of the following completes the statements below?

In accordance with AP/1/A/5500/025 (Damaged Spent Fuel), additional radiation monitoring will be provided by \_\_\_\_\_(1)\_\_\_\_\_ .

If this radiation monitor reaches Trip 2 setpoint, the Containment Evacuation Alarm \_\_\_\_\_(2)\_\_\_\_\_ .

- A.
    - 1. 1EMF-53A/B (Containment Train A/B)
    - 2. will AUTOMATICALLY actuate
  - B.
    - 1. 1EMF-53A/B (Containment Train A/B)
    - 2. must be MANUALLY actuated
  - C.
    - 1. 1EMF-38 (Containment Particulate Monitor)
    - 2. will AUTOMATICALLY actuate
  - D.
    - 1. 1EMF-38 (Containment Particulate Monitor)
    - 2. must be MANUALLY actuated
-

**General Discussion**

AP/25 will direct operators to ensure 1EMF-38 and 1EMF-39 Hi Rad annunciators are dark. If the associated annunciator is lit, the procedure will direct the operators to ensure containment evacuation alarm is actuated.

**Answer A Discussion**

Part 1 is plausible because this is a containment monitoring EMF and is used for accident classification purposes. However, this is generally used for monitoring higher radiation levels and not the particular EMF specified in AP/25.

Part 2 is plausible because this EMF does have associated automatic actions at Trip 2 setpoint.

**Answer B Discussion**

Part 1 is plausible because this is a containment monitoring EMF and is used for accident classification purposes. However, this is generally used for monitoring higher radiation levels and not the particular EMF specified in AP/25.

Part 2 is plausible because the Containment Evacuation alarm is not actuated from this EMF but the applicant could easily reason it would be required in this circumstance.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible if the applicant misunderstands the automatic actions of EMF-38 or incorrectly assumes the Containment Evacuation Alarm is blocked.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of radiological safety procedures via the AOP monitoring requirements for damaged spent fuel. Radiation monitoring will be an important licensed operator duty (RO) during a fuel handling incident.

**Basis for Hi Cog**

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	

**Development References**

AP/1/A/5500/025, (Damaged Spent Fuel), Rev. 016, Case I (Damaged Fuel in Reactor Building), Step 1  
 OP-CN-WE-EMF (Radiation Monitoring System Lesson Plan), Rev. 102, Section 6.7 and 6.23

GEN2.3 2.3.13 - GENERIC - Radiation Control  
 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. (CFR: 41.12 / 43.4 / 45.9 / 45.10)

**401-9 Comments:**

**Remarks/Status**

CHIEF EXAMINER NOTE:

\*EARLY SUBMITTAL QUESTION\*

**Student References Provided**





GEN2.3 2.3.14 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. (CFR: 41.12 / 43.4 / 45.10)

---

Given the following:

- Unit 1 is in Mode 3.
- The NV system is being aligned for startup.
- The procedure in use requires independent verification of a single valve located in a room with a general dose rate of 130 mREM/hr.
- Estimated time to independently verify the valve's position is 10 minutes.
- There are no known hot spots in the area.
- There is no airborne activity in this room.
- The room has no surface contamination areas.
- Necessary approvals are obtained.

Which ONE of the following completes the statement below?

Per NSD 700 (Verification Techniques), independent verification of the valve above \_\_\_\_\_(1)\_\_\_\_\_ be waived because \_\_\_\_\_(2)\_\_\_\_\_ .

- A.
    - 1. may
    - 2. the general area dose rate is GREATER than 100 mREM/hr
  - B.
    - 1. may NOT
    - 2. the general area dose rate is LESS THAN 1 REM/hr
  - C.
    - 1. may
    - 2. the radiation exposure for a single verification would EXCEED the allowable limit
  - D.
    - 1. may NOT
    - 2. the radiation exposure for a single verification is WITHIN the allowable limit
-

**General Discussion**

According to NSD-700, Independent and/or Concurrent Verification may be waived if the exposure to an individual of greater than 10 mrem for a single verification would occur or if dose rate in the room is >1 R/hr. This waiver requires supervisory approval and documentation.

The total exposure would be 21.7 mR which exceeds the dose limit of 10mR for a single verification.

**Answer A Discussion**

This answer is plausible because per NSD 700, IV may be waived when dose rate in an area is greater than 1 R/hr, not 100mR /hr.

**Answer B Discussion**

This answer is plausible because per NSD 700, IV may be waived when dose rate in an area is greater than 1 R/hr. This statement is a true statement, but does not correctly answer the question because another limit (> 10mr for one IV) is met.

**Answer C Discussion**

CORRECT. See explanation above.

**Answer D Discussion**

This answer is plausible if the applicant does not recall the guideline of 10 mrem for a single verification criteria or miscalculates the potential exposure.

**Basis for meeting the K**

This KA is met because the applicant must evaluate a potential exposure hazard and determine which requirement applies to that potential exposure.

**Basis for Hi Cog**

This is an analysis question because the applicant is required to calculate the potential exposure and then apply a limit recalled from memory to correctly answer the question.

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	

Development References
NSD700 (Verification Techniques), Rev. 7, Section 700.8

Student References Provided

GEN2.3 2.3.14 - GENERIC - Radiation Control  
Radiation Control

Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. (CFR: 41.12 / 43.4 / 45.10)

401-9 Comments:

Remarks/Status

GEN2.3 2.3.4 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiation exposure limits under normal or emergency conditions. (CFR: 41.12 / 43.4 / 45.10)

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Given the following:

- Prior to a Refueling Outage, an Operator's exposure for the current year is 1250 mREM
- The Operator's first assigned task during the Refueling Outage results in a dose of 600 mREM

Which ONE of the following completes the statements below?

Based on the conditions above, the next time the Operator logs on to the EDC computer, they will receive an \_\_\_\_\_(1)\_\_\_\_\_ notification flag.

In accordance with PD-RP-ALL-001 (RADIATION WORKER RESPONSIBILITIES), the Operator must \_\_\_\_\_(2)\_\_\_\_\_ prior to entering the RCA.

- A. 1. ALERT  
2. notify their supervisor AND obtain a dose extension
  - B. 1. EXCLUDE  
2. notify their supervisor AND obtain a dose extension
  - C. 1. ALERT  
2. notify their supervisor ONLY
  - D. 1. EXCLUDE  
2. notify their supervisor ONLY
-

**General Discussion**

Per PD-RP-ALL-001, when the individual's annual exposure reaches 80% of the established administrative limit, an Alert Flag will be indicated for that individual on the EDC computer. When they reach 90% of the administrative limit, an Exclude Flag will be indicated on the EDC computer.

For this particular situation, the Operator's total exposure for the year is 1850 mREM (1250 + 600). The ALERT exposure limit would be 80% of the Duke annual administrative exposure limit of 2000 mREM or 1600 mREM. The EXCLUDE exposure limit would be 90% of the Duke annual administrative exposure limit or 1800 mREM. The Operator has therefore exceeded the EXCLUDE exposure limit. So, the next time the Operator logs on to the EDC computer, they will receive an Exclude Flag.

Per PD-RP-ALL-001, if an Exclude Flag is received, the individual must obtain a dose extension prior to entering the RCA. If the Operator received an Alert Flag, PD-RP-ALL-001 would require them to notify their supervisor prior to RCA entry.

**Answer A Discussion**

Part 1 is plausible if the applicant does not recall the setpoints for the EXCLUDE and ALERT exposure limits or incorrectly calculates the Operator's total exposure for the year. If so, the applicant would conclude that the Operator has exceeded the ALERT exposure limit but, has not yet exceeded the EXCLUDE exposure limit.

Part 2 is plausible because it is a common misconception among Licensed Operators that a dose extension is required for exceeding either an ALERT or EXCLUDE exposure limit.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible if the applicant does not recall the setpoints for the EXCLUDE and ALERT exposure limits or incorrectly calculates the Operator's total exposure for the year. If so, the applicant would conclude that the Operator has exceeded the ALERT exposure limit but, has not yet exceeded the EXCLUDE exposure limit.

Part 2 is plausible because assuming only the ALERT limit has been exceeded, Supervisor approval would be the correct answer.

**Answer D Discussion**

Part 1 is correct.

Part 2 is plausible because notifying their supervisor is the only action required by PD-RP-ALL-001 if an Alert Flag is received. If the applicant confuses the actions for Alert and Exclude Flags, they could conclude that this is the correct action.

**Basis for meeting the K**

The K/A is matched because the applicant is presented with a situation involving cumulative exposure during normal conditions, and then must apply knowledge of radiation exposure limits to determine what will be required prior to the next RCA entry for that individual.

**Basis for Hi Cog**

This is a higher cognitive level question because it requires more than one mental step.

First, the applicant must recall from memory the Duke annual administrative exposure limit. Next, the applicant must recall the setpoints for the Duke Alert and Exclude exposure limits. Then, the applicant must perform a calculation to determine the actual dose associated with the Duke annual administrative exposure limits.

After determining the Alert and Exclude dose levels, the applicant must then evaluate the conditions given and perform a calculation to determine the Operator's total dose for the year. Then, the applicant must compared the calculated total dose to the Alert and Exclude dose levels to determine which limit has been exceeded.

Finally, the applicant must recall from memory the required actions of PD-RP-ALL-001 based on which limit has been exceeded.

**Basis for SRO only**

<b>Job Level</b>	<b>Cognitive Level</b>	<b>QuestionType</b>	<b>Question Source</b>
RO	Comprehension	BANK	

<b>Development References</b>
References: PD-RP-ALL-001 (Radiation Worker Responsibilities), Rev. 003, Section 5.3.5

<b>Student References Provided</b>

GEN2.3 2.3.4 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiation exposure limits under normal or emergency conditions. (CFR: 41.12 / 43.4 / 45.10)

<b>401-9 Comments:</b>

<b>Remarks/Status</b>

GEN2.4 2.4.11 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of abnormal condition procedures. (CFR: 41.10 / 43.5 / 45.13)

---

Given the following:

- A large fire was reported at the Operations Training Building
- 1) Which of the following describes the availability of the Fire Brigade to respond to this fire?
  - 2) Which procedure contains the guidance for requesting offsite fire department support?
- A.
    1. The fire brigade is not allowed to respond to fires outside the Protected Area
    2. AP/0/A/5500/045 (Plant Fire)
  - B.
    1. The fire brigade is not allowed to respond to fires outside the Protected Area
    2. RP/0/B/5000/029 (Fire Brigade Response)
  - C.
    1. The fire brigade may respond to fires outside the Protected Area as resources permit
    2. AP/0/A/5500/045 (Plant Fire)
  - D.
    1. The fire brigade may respond to fires outside the Protected Area as resources permit
    2. RP/0/B/5000/029 (Fire Brigade Response)
-

**General Discussion**

NSD112 states that the Fire Brigade may respond to fires outside of the protected area and within the owner controlled area as resources permit. AP/45 is written to address a plant fire. However, this AOP provides specific instruction for plant alignments, damage assessments, and control transfers. RP/29 provides specific fire fighting instruction. Including guidance for requesting offsite assistance.

**Answer A Discussion**

Part 1 is plausible because the Fire Brigade has restrictions regarding leaving the site and primary responsibility for Plant SSCs.  
Part 2 is plausible because AP/45 is written to address a plant fire.

**Answer B Discussion**

Part 1 is plausible because the Fire Brigade has restrictions regarding leaving the site and primary responsibility for Plant SSCs.  
Part 2 is correct.

**Answer C Discussion**

Part 1 is correct.  
Part 2 is plausible because AP/45 is written to address a plant fire.

**Answer D Discussion**

CORRECT. See explanation above.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of an AOP and Emergency Procedure.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	

**Development References**  
NSD 112 (Fire Brigade Organization, Training, and Responsibilities), Rev. 13, Section 112.1  
RP/0/B/5000/029 (Fire Brigade Response), Rev. 031, Enclosure 3.4

GEN2.4 2.4.11 - GENERIC - Emergency Procedures / Plan  
Emergency Procedures / Plan  
Knowledge of abnormal condition procedures. (CFR: 41.10 / 43.5 / 45.13)

**Student References Provided**

**401-9 Comments:**

**Remarks/Status**



GEN2.4 2.4.20 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)

---

Given the following:

- 1A S/G has experienced a Tube Rupture
- The crew has transitioned to EP/1/A/5000/E-3 (Steam Generator Tube Rupture)
- NC pressure is 1650 psig
- The CRS has just read a series of NOTES prior to E-3, Step 10  
    *“Initiate NC System cooldown as follows:”*

Which ONE of the following completes the statements below?

Once the cooldown is initiated:

the OATC will dump steam while maintaining a maximum steam pressure negative rate in order to prevent a \_\_\_\_ (1) \_\_\_\_ .

if NC system subcooling is lost, the crew \_\_\_\_ (2) \_\_\_\_ secure NC pumps.

- A.     1. main steam isolation  
       2. will
  - B.     1. main steam isolation  
       2. will NOT
  - C.     1. S/G lo-lo level actuation  
       2. will
  - D.     1. S/G lo-lo level actuation  
       2. will NOT
-

**General Discussion**

A NOTE prior to the step directing RCS cooldown in E-3 directs operators to maintain steam pressure negative rate less than 2 psig per second in order to prevent a Main Steam Isolation. A second note informs operators that NC Pump trip criteria, based on loss of subcooling, does not apply during the cooldown.

**Answer A Discussion**

Part 1 is correct.  
Part 2 is plausible because NCPs are normally tripped upon a loss of subcooling.

**Answer B Discussion**

CORRECT. See explanation above.

**Answer C Discussion**

Part 1 is plausible because the cooldown will rapidly lower S/G levels. In fact, operators are cautioned to increase S/G levels to upper limit of the control band when this procedure is entered because of the rapid level reduction once the cooldown is started.  
Part 2 is plausible because NCPs are normally tripped upon a loss of subcooling.

**Answer D Discussion**

Part 1 is plausible because the cooldown will rapidly lower S/G levels. In fact, operators are cautioned to increase S/G levels to upper limit of the control band when this procedure is entered because of the rapid level reduction once the cooldown is started.  
Part 2 is correct.

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of a series of NOTES contained within an EOP.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**  
EP/1/A/5000/E-3 (Steam Generator Tube Rupture), Rev. 43, Note prior to Step 10

**Student References Provided**

GEN2.4 2.4.20 - GENERIC - Emergency Procedures / Plan  
Emergency Procedures / Plan  
Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)

**401-9 Comments:**

**Remarks/Status**

GEN2.4 2.4.25 - GENERIC - Emergency Procedures / Plan  
Emergency Procedures / Plan  
Knowledge of fire protection procedures. (CFR: 41.10 / 43.5 / 45.13)

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Given the following:

- The shift has just completed a Fire Brigade drill
- The entire Fire Brigade participated and brought all necessary equipment to fight a simulated electrical fire in the Unit 2 Turbine Building basement

Which ONE of the following completes the statements below?

Per RP/0/B/5000/029 (Fire Brigade Response), PT/0/B/4600/032 (Fire Brigade Equipment Inspection/Inventory) \_\_\_\_\_(1)\_\_\_\_\_ required to be performed following the drill.

If performed, PT/0/B/4600/032 will be forwarded to the \_\_\_\_\_(2)\_\_\_\_\_ .

- A.
    1. is
    2. Operations Site Fire Marshal
  - B.
    1. is
    2. Emergency Planning Manager
  - C.
    1. is NOT
    2. Operations Site Fire Marshal
  - D.
    1. is NOT
    2. Emergency Planning Manager
-

**General Discussion**

RP/29 will be entered for any Fire Brigade response (drill or emergency). Following completion of a fire event, completion of the Inspection/Inventory procedure will be directed if equipment was used. The purpose of this procedure is to ensure the Fire Brigade locker is properly stocked with equipment and gear.

The Operations Site Fire Marshal is a relatively new position at this site. Fire Brigade equipment responsibility was formerly assigned to the Emergency Planning group. This has been transferred to a new position within the Operations Department.

**Answer A Discussion**

CORRECT. See explanation above.

**Answer B Discussion**

Part 1 is correct.

Part 2 is plausible because the Emergency Planning Group was formerly responsible for the Fire Brigade Locker

**Answer C Discussion**

Part 1 is plausible if the applicant believes that the purpose of this procedure is to inspect for actual fire damage to fire fighter protective gear and fire fighting equipment.

Part 2 is correct.

**Answer D Discussion**

Part 1 is plausible if the applicant believes that the purpose of this procedure is to inspect for actual fire damage to fire fighter protective gear and fire fighting equipment.

Part 2 is plausible because the Emergency Planning Group was formerly responsible for the Fire Brigade Locker

**Basis for meeting the K**

The applicant is required to demonstrate knowledge of the fire response emergency procedure and applicable surveillance procedure.

**Basis for Hi Cog**

**Basis for SRO only**

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

**Development References**

RP/0/B/5000/029 (Fire Brigade Response), Rev. 031,  
 PT/0/B/4600/032 (Fire Brigade Equipment Inspection/Inventory), Rev. 011,

**Student References Provided**

GEN2.4 2.4.25 - GENERIC - Emergency Procedures / Plan  
 Emergency Procedures / Plan  
 Knowledge of fire protection procedures. (CFR: 41.10 / 43.5 / 45.13)

**401-9 Comments:**

**Remarks/Status**