

SYS004 A2.27 - 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)

Improper RWST boron concentration

Given the following conditions on Unit 1:

- The unit is performing a normal NC system cooldown for refueling
- Current NC temperature is 400°F
- 1FWST boron is 2650 PPM

Per SLC 16.9.11 (Borated Water Sources - OPERATING), as a minimum, the _____ shall be OPERABLE as required by SLC 16.9.9 (Boration Flowpath - OPERATING).

Per Tech Spec 3.5.4 (RWST), the basis for the boron limit which has been exceeded is to prevent _____.

Which ONE (1) of the following completes the statements above?

- A. 1. Boric Acid Tank (BAT) AND Refueling Water Storage Tank (FWST)
2. caustic stress corrosion damage to various systems and components during containment sump recirc
 - B. 1. BAT AND FWST
2. boron precipitation hindering core cooling prior to transferring to Hot Leg Recirc
 - C. 1. BAT OR FWST
2. caustic stress corrosion damage to various systems and components during containment sump recirc
 - D. 1. BAT OR FWST
2. boron precipitation hindering core cooling prior to transferring to Hot Leg Recirc
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General Discussion

Per SLC 16.9.11, both the BAT and FWST shall be operable in Modes 1-3 and Mode 4 > 300 F. The Tech Spec required boron concentration for the FWST to be operable is 2675 - 2875 PPM. Per fhte SLC basis, the FWST limits on boron ensure a containment sump pH value of 7.5-9.5, which minimizes the effect of chloride stress corrosion and caustic stress corrosion. Excessive boron results in a lower pH condition, therefore, the effect of chloride stress corrosion is increased. Low boron concentration (initial conditions in this question) results in a higher pH condition, increasing the effect of caustic stress corrosion.

According to the basis of Tech 3.5.4 (RWST): The upper limit on boron concentration as listed in the COLR is used to determine the maximum allowable time to switch to hot leg recirculation following a LOCA. The purpose of switching from cold leg to hot leg injection is to avoid boron precipitation in the core following the accident. EP/1/A/5000/E-1, step 20 addresses transfer to Hot Leg Recirc (HLR) 6 hours after event initiation.

Per the basis document:

After six hours after event has initiated, boric acid concentrations could approach the solubility limit in the reactor vessel/core region following a double-ended cold leg guillotine break. The time established by this analysis would preclude boron precipitation from the boric acid solution that could potentially hinder core cooling.

If FWST boron is higher than the assumptions in the accident analysis, the solubility limit in the reactor vessel/core region could be reached sooner than 6 hours.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT: See explanation above.

First part correct.

Second part is plausible because it would be correct if the boron concentration were out of spec high. This is plausible if the applicant reverses the effect boron concentration has on pH, or thinks the current boron concentration is out of spec high.

Answer C Discussion

INCORRECT: See explanation above.

First part is plausible because SLC 16.9.14 (Borated Water Sources - Shutdown) only requires one of the two tanks to be operable. This SLC is applicable in Mode 4 (< 300 F) and Mode 5 and 6.

Second part is correct.

Answer D Discussion

INCORRECT. See explanation above.

PLAUSIBLE:

First part is plausible because SLC 16.9.14 (Borated Water Sources - Shutdown) only requires one of the two tanks to be operable. This SLC is applicable in Mode 4 (< 300 F) and Mode 5 and 6.

Second part is plausible if the applicant reverses the effect boron concentration has on pH, or concludes the current boron concentration is out of spec high.

Basis for meeting the KA

This question requires the applicant to predict a possible impact of an out of spec FWST boron concentration (SLC 16.9.11 basis). While an improper FWST boron concentration does not directly impact the CVCS, it does affect the boration flowpath function of the CVCS to mitigate a LOCA.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(2) (Tech Specs):

- 1) It can NOT be answered solely by knowing < 1 hour Tech Specs.
- 2) It can NOT be answered solely by knowing the LCO/TRM information listed "above-the-line".

- 3) It can NOT be answered by knowing the Tech Spec Safety Limits or their bases
- 4) It requires the applicant to have detailed knowledge of SLC 16.9.11 basis to determine the correct answer.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References
References: Tech Spec 3.5.4 (RWST) Tech Spec 3.5.4 Basis Learning Objectives: OP-MC-EP-E1 Objective 6

Student References Provided

SYS004 A2.27 - 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)

Improper RWST boron concentration

401-9 Comments:

Remarks/Status
Send to chief examiner in 10 question preliminary 401-9 review.
Revised based on Chief Examiner's recommendation. HCF 06-19-12

SYS006 A2.02 - Emergency Core Cooling System (ECCS)

Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 45.5)

Loss of flow path

At 0700, the following conditions exist on Unit 1:

- A Loss of Offsite Power has occurred resulting in a stuck open PZR Safety and subsequent Safety Injection
- The 1B D/G failed to start
- Actions in E-0 (Reactor Trip or Safety Injection) are complete
- NC pressure is 1585 PSIG
- RVLIS Lower Range level is 35% and decreasing
- 1NI-9A (NC Cold Leg Inj from NV) is closed and cannot be opened
- CETs are reading 705°F
- Subcooling Monitor is indicating -35°F

If the conditions above are still present at 0720, which ONE (1) of the following is the classification for this event AND the associated EAL Number?

REFERENCE PROVIDED

- A. Site Area Emergency based on 4.1.S.1
- B. Site Area Emergency based on 4.1.S.2
- C. General Emergency based on 4.1.G.1
- D. General Emergency based on 4.1.G.2

General Discussion

Given the plant conditions the applicant should determine a loss of subcooling (based on NCS pressure and CET temperature), no NCPs running (due to Loss of Offsite Power) and a Red Path on the Core Cooling safety function (> 700 °F and < 39% reactor vessel level with NCPs off).

Per RP/0/A/5700/000, the correct classification is General Emergency based on 4.1.G.2. (Loss of Any Two Barriers AND Potential Loss of the Third)

Containment Barrier: 1 points (Due to Core Cooling RED path indicated for greater than 15 minutes)

NCS Barrier: 5 points (Due to Loss of Subcooling) - LOSS

Fuel Clad Barrier: 5 points (Due to Core Cooling RED path) - LOSS

TOTAL POINTS = 11 (General Emergency)

If the containment barrier was also affected, the classification was be upgraded to a General Emergency.

Answer A Discussion

INCORRECT. See explanation above.

PLAUSIBLE:

This answer is plausible if the applicant does not include the points for a RED path on Core Cooling for greater than 15 minutes.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Plausible if the applicant fails to consider a loss of subcooling for the NCS barrier or incorrectly determines Core Cooling safety function is ORANGE.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Plausible if the applicant believes the loss of power to the 1B train of Containment isolation valves means Containment Isolation is incomplete, resulting in a loss of the containment barrier.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

KA is matched as follows:

The question examines the applicant’s knowledge of the effects of multiple malfunctions on the high pressure injection valves (Loss of flowpath) in a small break LOCA event.

The applicant must evaluate the overall effect on the plant and determine the emergency response procedure to mitigate the consequences of the event.

Basis for Hi Cog

This Question represents a higher cognitive level of Application because it involves a multi-part mental process of assembling different combinations of given information to select a correct classification.

Basis for SRO only

This question is linked to 10CFR55.43 (b)(7) “Emergency Classification” Per the guidance in 10CFR55.43 and per the MNS objective referenced for this question, assessing plant conditions and determining the proper classification of emergency is considered SRO level.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	2011 MNS NRC Q77 MODIFIED (Bank 4428)

Development References
References: RP-000 (Classification of Emergency)
Learning Objectives: OP-MC-EP-EAL Objective 6 OP-MC-EP-FRC Objective 2

Student References Provided
RP/0/A/5700/000, Classification of Emergency

SYS006 A2.02 - Emergency Core Cooling System (ECCS)

Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 45.5)

Loss of flow path

401-9 Comments:

Remarks/Status
In the past, we have taken credit for use of the EALs to meet a "use procedures to correct, control, or mitigate the consequences" KA similar to the way we have taken credit for Tech Specs. We have done so based on the belief that since the EALs are designed to protect the health and safety of the public, and hence would qualify as a procedure that "mitigates" the consequences of an event. However, our Fleet Exam review team questioned whether the EALs really qualify.
We're going to send this question to Michael as part of our 10 question package mainly to get his option regarding the EALs as a "mitigating" procedure.
Also, tried to meet both the 'a' and 'b' part of the KA but could not come up with a reasonable question that met both parts of the KA.

SYS022 A2.02 - Containment Cooling System (CCS)

Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; 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)

Fan motor vibration

Given the following conditions on Unit 2:

- Today's date is September 5th
- PT/1/A/4450/006 B (VX System Train 1B Performance Test) is in progress
- At 1100, the test is stopped due to high vibration on the 1B VX Fan and 1B VX Train is declared INOPERABLE
- At 1230, 1A DG is declared INOPERABLE due to a fuel oil leak
- Maintenance estimates that repairs to the 1A DG will take approximately 2 hours

To preclude having to declare both trains of VX INOPERABLE, the LATEST time that the crew must restore 1B VX Train or 1A DG to OPERABLE is _____.

Which ONE of the following completes the statement above?

- A. 1500 on September 5th
 - B. 1630 on September 5th
 - C. 1100 on September 8th
 - D. 1230 on September 8th
-

General Discussion

The MNS, the Containment Air Return System (VX) is associated with Containment Cooling. During a LOCA, the CARS is design to rapidly return air from Upper Containment to Lower Containment for continued cooling by the Ice Condensers.

In accordance with Tech Spec 3.8.1 (AC Sources - Operating), due to the INOPERABILITY of the 1A DG, the redundant features associated with the 1B VX Train (which is already INOPERABLE) must also be declared INOPERABLE. This means that the 1A VX Train is also INOPERABLE. Tech Spec 3.8.1 requires that the 1A DG or the 1B VX Train be restored to OPERABLE within 4 hours or the unit be placed in MODE 3 within 6 hours.

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible if the applicant incorrectly applies the action time starting with the inoperability of the 1B VX Train instead of the time of the 1A DG inoperability.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible if the applicant does not recall the 4 hour time limitation contained in Tech Spec 3.8.1 and applies the 72 hours time for the DG or the VX Train to the original operability time of the 1B VX Train.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible if the applicant does not recall the 4 hour time limitation contained in Tech Spec 3.8.1 and applies the 72 hours time for the DG or the VX Train to the time the the 1A DG became inoperable.

Basis for meeting the KA

The KA is matched because one of the CARS trains has become inoperable and the applicant must apply Tech Specs 3.8.1 and Tech Spec 3.6.11 to control the consequences of the malfunction.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. It requires the applicant to recall the requirements of Tech Spec 3.8.1 and 3.6.11. Then the applicant must analyze the conditions given to determine the appropriate action time.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(2) (Tech Specs):

- 1) This question can NOT be answered by knowing less than 1 hour Tech Specs
- 2) This question can NOT be answered by knowing information listed "above-the-line".
- 3) This question can NOT be answered by knowing the TS Safety Limits or their bases.
- 4) This question requires the applicant to recall Tech Spec below-the-line requirements and apply those requirements to the conditions given. Therefore, this is SRO-level knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
References: Tech Spec 3.8.1 (AC Sources - Operating) Tech Spec 3.6.11 (ARS)
Learning Objectives: OP-MC-CNT-VX Objective 11

Student References Provided

SYS022 A2.02 - Containment Cooling System (CCS)

Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; 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)

Fan motor vibration

401-9 Comments:

Remarks/Status

SYS059 2.1.20 - Main Feedwater (MFW) System

SYS059 GENERIC

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

Given the following Unit 1 conditions:

- The unit experienced a total loss of feedwater and subsequent reactor trip
- FR-H.1 (Response to Loss of Secondary Heat Sink) has been entered and feed and bleed of the NC system was initiated
- Subsequently, the 1A CF Pump was restored to service per Enclosure 8 (Reestablishing CF Flow) and the crew is ready to establish feedwater flow to the selected steam generator
- All SG WR levels are indicating 11%
- NC loop hot leg temperature is at 558°F
- Core exit thermocouple temperatures are GOING UP

Per FR-H.1, (Loss of Secondary Heat Sink) Enclosure 8 (Re-establishing CF Flow):

- 1) Feedwater flow will initially be re-established to the selected S/G at a rate which results in (1) .
- 2) Flow is established at this rate to prevent excessive thermal stresses on the (2) .

Which ONE (1) of the following completes the statements above?

- A. 1. feed flow indication going up ONLY
2. reactor vessel nozzles
 - B. 1. feed flow indication going up ONLY
2. SG tubes
 - C. 1. feed flow indication going up AND CETs decreasing
2. reactor vessel nozzles
 - D. 1. feed flow indication going up AND CETs decreasing
2. SG tubes
-

General Discussion

With all SGs < 12% WR (all dry), FR-H.1, Enclosure 8, steps 22-24 direct that flow be established to one intact SG at minimum flow to minimize thermal shock to the SG.
The minimum rate depends on the status of the Core Exit T/Cs (CETs). If CETs are stable or going down, the SGs are fed at the minimum rate that obtains SG WR Level response or feed flow indication going up. If CETs are going up, the minimum rate is that needed to lower CETs. In the scenario given, the CETs are going up, so a feed rate to turn the temperature is needed.

Answer A Discussion

INCORRECT: See explanation above.
PLAUSIBLE:
First part is plausible since the feedwater flow would be correct for the condition where core exit thermocouples are stable or decreasing.
Second part is plausible because overcooling the NC system is stated in FR-H.1 as a concern in multiple notes and cautions concerning initiating feed to a dry generator. And, reactor vessel nozzle protection is plausible since it is a component that interfaces with the SGs.

Answer B Discussion

INCORRECT: See explanation above.
PLAUSIBLE:
First part is plausible since the feedwater flow would be correct for the condition where core exit thermocouples are stable or decreasing.
Second part is correct.

Answer C Discussion

INCORRECT: See explanation above.
PLAUSIBLE:
First part is correct.
Second part is plausible because overcooling the NC system is stated in FR-H.1 as a concern in multiple notes and cautions concerning initiating feed to a dry generator. And, reactor vessel nozzle protection is plausible since it is a component that interfaces with the SGs.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The KA is matched because the operator must demonstrate the ability to interpret and execute procedure steps to restore Main Feedwater to the SGs during a Loss of Secondary Heat Sink. Specifically he must demonstrate the ability to recognize plant conditions and take the procedural actions accordingly.

Basis for Hi Cog

This is a hi cog question because it involves a level of analysis of given situation. This involves a multi-part mental process where the applicant must evaluate the indications given and determine its meaning related to the scenario given and determine a course of action and the basis for that action.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):
1) The question can NOT be answered solely by knowing systems knowledge.
This is not systems knowledge. It is detailed knowledge of the steps in FR-H.1 and how to implement them.
2) The question can NOT be answered by knowing immediate operator actions.
There are NO immediate actions associated with the FR-H.1.
3) The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure. The first part of this question requires detailed knowledge of procedure step requirements. The second part of this question requires detailed knowledge of a note Enclosure 8 of FR-H.1.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	2008 Watts Bar NRC Q88 MODIFIED (Bank 4260)

Development References
References: FR-H.1 Loss of Secondary Heat Sink
Learning Objectives: OP-MC-EP-FRH Objectives 3 & 4

Student References Provided

SYS059 2.1.20 - Main Feedwater (MFW) System
SYS059 GENERIC
Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)

401-9 Comments:

Remarks/Status

SYS064 2.4.45 - Emergency Diesel Generator (ED/G) System
SYS064 GENERIC

Ability to prioritize and interpret the significance of each annunciator or alarm. (CFR: 41.10 / 43.5 / 45.3 / 45.12)

Unit 1 is at 100% power when the Control Room receives the following alarms:

- OAC Alarm M1A1590, 1A1 VG HEADER PRESS, Lo-Lo
- Annunciator 1AD11-A/6, DG A PANEL TROUBLE

A NEO dispatched to the 1A DG Room reports the following:

- Annunciator 1AD19-C/5 (STARTING AIR PRESS LOW) is in alarm
- The VG Starting Air Tank 1A1 is 208 psig and going down slowly
- VG compressor 1A1 cannot be started
- The 1A1 VG Starting Air Tank has been isolated

Based on the conditions above, the 1A Emergency Diesel Generator is (1) .

Per Tech Spec 3.8.3 (Diesel Fuel Oil and Starting Air) basis, for the Starting Air system to be considered OPERABLE it must be capable of a MINIMUM of (2) start attempts without recharging the air start receivers.

Which ONE (1) of the following completes the statements above?

- A. 1. OPERABLE
 2. three

 - B. 1. OPERABLE
 2. five

 - C. 1. INOPERABLE
 2. three

 - D. 1. INOPERABLE
 2. five
-

General Discussion

Per Tech Spec 3.8.3 basis, Each DG has an air start system with adequate capacity for five successive start attempts on the DG without recharging the air start receiver(s). Per Condition D Basis, DG starting air system normal alignment allows air from both receivers to enter both left and right starting air headers. Therefore, with one receiver isolated, both left and right starting air headers will be supplied from the remaining receiver. With the degraded receiver isolated and the remaining receiver @ 210 psig, the capacity for 5 starts exists. Therefore, the DG is still operable. If starting air pressure to the receiver tank cannot be restored within 48 hours, the DG would then be declared inoperable.

Answer A Discussion

INCORRECT: See explanation above.

First part is correct.

Second part is plausible if the applicant fails to realize that one starting air receiver tank will supply both left and right starting air headers and think that starting air capacity has been reduced.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT: See explanation above.

First part is plausible because other conditions associated with starting air would render the D/G inoperable right away (e.g. both receiver tanks pressures < 210 psig). Additionally if starting air pressure couldn't be restored within 48 hours, the DG would be declared inoperable for this condition.

Second part is plausible if the applicant concludes that starting air capacity has been reduced with the loss of one of the receiver tanks.

Answer D Discussion

INCORRECT: See explanation above.

First part is plausible because other conditions associated with starting air would render the D/G inoperable right away (e.g. both receiver tanks pressures < 210 psig). Additionally if starting air pressure couldn't be restored within 48 hours, the DG would be declared inoperable for this condition.

Second part is correct.

Basis for meeting the KA

The KA is matched because the question concerns annunciators that indicate the malfunctioning Starting Air system (VG). The applicant must determine that Tech Spec 3.8.3 is applicable. The OAC alarm gives indications that only one of two starting air tanks is losing pressure. This requires the applicant to "interpret the significance" of the alarms to determine the operability of the DG and current capacity of the Starting Air system for the 1A DG.

Basis for Hi Cog

This is a higher cognitive level question because it requires multiple mental steps. The applicant must first analyze the information to determine that the low starting air pressure is an entry condition for Tech Specs. The applicant must then recall from memory that one Starting Air Receiver tank is all that is needed for the DG to meet its intended function (one tank can still provide 5 start attempts, therefore the DG is still considered operable).

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(2) (Tech Specs):

- 1) It can NOT be answered solely by knowing < 1 hour Tech Specs.
- 2) It can NOT be answered solely by knowing the LCO/TRM information listed "above-the-line".
- 3) It can NOT be answered by knowing the Tech Spec Safety Limits or their bases
- 4) It requires the applicant to have detailed knowledge of Tech Spec 3.8.3 Basis document.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References
References:
TS 3.8.3 (DG Fuel Oil and Starting Air)

Student References Provided

TS 3.8.3 Basis
Learning Objectives:
OP-MC-DG-DGA Objective 56

SYS064 2.4.45 - Emergency Diesel Generator (ED/G) System

SYS064 GENERIC

Ability to prioritize and interpret the significance of each annunciator or alarm. (CFR: 41.10 / 43.5 / 45.3 / 45.12)

401-9 Comments:

Remarks/Status
There is only one annunciator alarm in the Control Room for each DG (DG Panel Trouble). So, there is nothing for the CRS to prioritize related to DG annunciators. Therefore, had to write a question related to interpreting the significance of the alarm based on a NEO report from the field.

SYS001 A2.11 - Control Rod Drive System

Ability to (a) predict the impacts of the following malfunction or operations on the CRDS- 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)

Situations requiring a reactor trip

Given the following conditions on Unit 1:

- The unit is at 90% RTP
- QPTR is 1.05
- Unit 1 has implemented AP-14 (Rod Control Malfunction) in response to a dropped control rod
- The OATC subsequently reports that AFD has exceeded the limits of Tech Specs
- The dropped rod has not yet been recovered

Based on the conditions above, which ONE (1) of the following describes the action required by AP-14?

- A. Reduce power to less than 81% to comply with Tech Spec 3.2.4 (QPTR) ONLY.
 - B. Reduce power to less than 75% to comply with Tech Spec 3.1.4 (Rod Group Alignment) ONLY.
 - C. Reduce power to less than 50% using AP-04 (Rapid Downpower) or OP/1/A/6100/003 (Controlling Procedure for Unit Operation) ONLY.
 - D. Trip the reactor and transition to E-0 (Reactor Trip or Safety Injection).
-

General Discussion

AP-14, step 13.d.4, checks to determine if AFD is within Tech Spec limits. If Tech Spec AFD limits are exceeded and reactor power is greater than 50%, the operators are directed to trip the reactor and transition to E-0. Although a logical action would be to reduce power to less than 50%, restoring AFD to within limits in an acceptable amount of time to prevent fuel damage without the use of the controls rods is not likely to be successful. Therefore, the reactor is tripped to prevent axial peaking factors from causing fuel damage.

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible if the applicant concludes that Tech Spec 3.2.4 applies since QPTR limits have been exceeded. If that were the case and the applicant misapplies the spec, they would determine that power should be reduced by 3% for each 1% that QPTR is outside the limit (1.02). They would therefore conclude that power should be reduced by 9% (to 81%) to comply with the spec.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because if AFD had NOT exceeded the Tech Spec limits, this would be the correct answer.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because if AFD had not exceeded the Tech Spec limits, this would be a correct answer.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

KA is matched because candidate must understand the mitigating strategy of AP-14 (Rod Control Malfunction). (i.e. when conditions are met which require a reactor trip)

Basis for Hi Cog

Basis for SRO only

This question is an SRO Only question linked to 10CFR55.43(b)(5) (Procedures) because the question can NOT be answered by knowing systems knowledge alone, it can NOT be answered by knowing immediate actions from AP-14, and it can NOT be answered by knowing AP-14 entry conditions. It DOES REQUIRE the candidate to recall specific steps from AP-14.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References

References:
 AP-14 (Rod Control Malfunction)
 AP-14 Background Document
 Tech Spec 3.2.3

Learning Objectives:
 OP-MC-AP-14 Objective 4

Student References Provided

SYS001 A2.11 - Control Rod Drive System

Ability to (a) predict the impacts of the following malfunction or operations on the CRDS- 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)

Situations requiring a reactor trip

401-9 Comments:

Remarks/Status

SYS035 2.2.40 - Steam Generator System (S/GS)

SYS035 GENERIC

Ability to apply Technical Specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3)

In accordance with Tech Spec 3.4.5 (RCS Loops - MODE 3):

- 1) a MINIMUM of _____ NC loops shall be OPERABLE.
- 2) for an NC loop to be considered OPERABLE, its associated S/G NR level shall be greater than a MINIMUM of _____.

Which ONE (1) of the following completes the statements above?

- A.
 1. 2
 2. 12%
 - B.
 1. 2
 2. 17%
 - C.
 1. 3
 2. 12%
 - D.
 1. 3
 2. 17%
-

General Discussion

In accordance with Tech Spec 3.4.5 (RCS Loops - MODE 3) a minimum of three NC loops shall be OPERABLE.
For an NC system loop to be considered OPERABLE the S/G NR level in the OPERABLE loop shall be greater than 12%.

Answer A Discussion

INCORRECT: See explanation above.
PLAUSIBLE:
First part is plausible if the applicant confuses the MODE 3 requirements with the MODE 4 requirements.
Second part is correct.

Answer B Discussion

INCORRECT: See explanation above.
PLAUSIBLE:
First part is plausible if the applicant confuses the MODE 3 requirements with the MODE 4 requirements.
Second part is plausible if the applicant confuses the required S/G NR level with the setpoint for CA pump auto start based on S/G NR level.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT: See explanation above.
PLAUSIBLE:
First part is plausible if the applicant confuses the MODE 3 requirements with the MODE 4 requirements.
Second part is plausible if the applicant confuses the required S/G NR level with the setpoint for CA pump auto start based on S/G NR level.

Basis for meeting the KA

The KA is matched because the ability to apply Tech Specs associated with S/Gs requires the applicant to have knowledge surveillance requirements for S/G level for an NC system loop to be considered operable.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(2) (Tech Specs):

- 1) This question can NOT be answered by knowing less than 1 hour Tech Specs
The information being tested related to Tech Spec 3.4.5 is NOT associated with less than 1 hr Tech Specs.
- 2) This question can NOT be answered by knowing information listed "above-the-line".
Part 1 of this question is "above-the-line" and is therefore RO level knowledge. Part 2 of this question is related to knowledge of Tech Spec 3.4.5 surveillance requirements which is "below-the-line" knowledge.
- 3) This question can NOT be answered by knowing the TS Safety Limits or their bases.
This knowledge is NOT related to TS Safety Limits or their bases. It is related to application of Tech Specs based on knowledge of specific TS surveillance requirements.
- 4) This question is related to application of Tech Specs based on knowledge of specific "below-the-line" surveillance requirements. Therefore, it is SRO-level knowledge.

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C

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QUESTION 82

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Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References

References:

Tech Spec 3.4.5 (RCS Loops - MODE 3)

Learning Objectives:

OP-MC-PS-NC Objective 24

SYS035 2.2.40 - Steam Generator System (S/GS)

SYS035 GENERIC

Ability to apply Technical Specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3)

Student References Provided

401-9 Comments:

Remarks/Status

SYS027 A2.01 - Containment Iodine Removal System (CIRS)

Ability to (a) predict the impacts of the following malfunctions or operations on the CIRS; 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)

High temperature in the filter system

Given the following conditions on Unit 1:

- PT/1/A/4450/003 A (Annulus Ventilation System Train A Operability Test) is being performed.
- During the test, Annunciator 0AD-12 / F-2 (1A VE Filter Hi Temp) alarms
- The 1A VE Filter temperature is 222 °F
- The cause of the high temperature is a malfunction of the filter heater

- 1) What automatic action(s) is(are) expected as a result of this alarm?
- 2) In accordance with Tech Spec 3.6.10 Background Document, with the heater INOPERABLE, the 1A Annulus Ventilation train _____.

Which ONE (1) of the following completes the statements above?

- A.
 1. 1A Heaters trip ONLY
 2. is INOPERABLE
 - B.
 1. 1A Heaters AND 1A VE Fan trip
 2. is INOPERABLE
 - C.
 1. 1A Heaters trip ONLY
 2. remains OPERABLE
 - D.
 1. 1A Heaters AND 1A VE Fan trip
 2. remains OPERABLE
-

General Discussion

Per OP/0/A/6100/010P (Annunciator Response for HVAC Panel 0AD-12) ,the preheaters automatically de-energize if the charcoal filter reaches 220 F, (which also causes the VE Filter Hi Temp annunciator (0AD-12, F/2). The VE fans will not trip until Filter temperature reaches 325 F (annunciator VE Filter Fire; 0AD-12, F/3).

In accordance with Tech Spec 3.6.10, if an AVS heater becomes INOPERABLE, it must be returned to service within 7 days. However, in accordance with the Tech Spec 3.6.10 Background Document an INOPERABLE heater does NOT affect the OPERABILITY of the AVS train.

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

First part is correct.

Second part is plausible because the heaters are listed in the TS Background document as equipment that is part of the AVS train.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

First part is plausible because the VE Fan will trip on filter bed high temperature. However they will not trip until temperature increases to 325 F.

Second part is plausible because the heaters are listed in the TS Background document as equipment that is part of the AVS train.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

First part is plausible because the VE Fan will trip on filter bed high temperature. However they will not trip until temperature increases to 325 F.

Second part is correct.

Basis for meeting the KA

The KA is matched because the applicant is given a set of conditions where there is a high temperature in an Annulus Ventilation Filter train due to a malfunctioning heater. The applicant must use Tech Specs (procedures) to mitigate the consequences of the malfunction by determining operability of the system, which would then result in the appropriate actions to be taken.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(2) (Tech Specs):

- 1) This question can NOT be answered by knowing less than 1 hour Tech Specs
- 2) This question can NOT be answered by knowing information listed "above-the-line".

This is knowledge of LCO action times and information from the TS Basis.

- 3) This question can NOT be answered by knowing the TS Safety Limits or their bases.

From TS 3.6.10 (AVS).

- 4) This question requires the applicant to recall information from the TS basis. Therefore, it is SRO-level knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References
References: Tech Spec 3.6.10 (AVS) Tech Spec 3.6.10 Background Document Learning Objectives: OP-MC-CNT-VE Objectives 8 and 13

Student References Provided

SYS027 A2.01 - Containment Iodine Removal System (CIRS)

Ability to (a) predict the impacts of the following malfunctions or operations on the CIRS; 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)

High temperature in the filter system

401-9 Comments:

Remarks/Status

APE015/017 AA2.10 - Reactor Coolant Pump (RCP) Malfunctions

Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): (CFR 43.5 / 45.13)

When to secure RCPs on loss of cooling or seal injection

Given the following conditions on Unit 1:

- The unit is at 100% RTP
- 1D NC Pump Lower Motor Bearing temperature is 205°F and increasing
- Lower Bearing KC Outlet Flow is slowly decreasing
- AP-08 (Malfunction of NC Pump) Case II (NC Pump Motor or Motor Bearing Malfunction) has been implemented

Which ONE (1) of the following describes the ACTIONS to be directed by the CRS in accordance with AP-08 and the HIGHEST POWER allowed at which the NCP can be stopped?

- A. Trip the Reactor, verify reactor power less than 5%, then stop the 1D NCP.
 - B. Trip the Reactor, verify reactor power less than 10%, then stop the 1D NCP.
 - C. Reduce reactor power to < 5% using AP-04 (Rapid Downpower), then stop the 1D NCP.
 - D. Reduce reactor power to < 10% using AP-04 (Rapid Downpower), then stop the 1D NCP.
-

General Discussion

In accordance with AP-08, if an NC pump must be stopped reactor must be tripped if the unit is operating in Mode 1 or 2 and the NC can not be stopped until power is less than 5%.

If the NC pump trip criteria has not yet been exceeded but it is determined that the NCP still needs to be stopped, AP-08 directs performing a unit shutdown in accordance with OP/1/A/6100/003 (Controlling Procedure for Unit Operation) or AP-04 (Rapid Downpower). The NCP is then stopped after all rods are inserted and the Reactor Trip breakers are open.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because tripping the Reactor first is the correct action. Stopping the NCP when power is less than 10% is plausible since the NC low flow trips are defeated when less than 10% power (P-10). It is also plausible for the applicant to believe that the reactor would be at greater than 5% after a trip since initial decay heat load immediately after a trip is approximately 7%.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because the NC pump is stopped when power is less than 5%. However, the reactor is tripped instead of performing a Rapid Downpower.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because stopping the NCP when power is less than 10% is reasonable since the NC low flow trips are defeated when less than 10% power (P-10).

Basis for meeting the KA

The KA is matched because a malfunction of the NC Pump cooling system has occurred and the applicant must analyze the conditions given and determine when the NC pump must be stopped in accordance with the requirements of AP-08.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. The applicant must first analyze the given plant conditions and determine that the 1D NCP must be stopped immediately. The applicant must then recall from memory the AP-08 actions required for stopping the NCP.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):

- 1) The question can NOT be answered by knowing systems knowledge. This is detail procedure content from AP-08.
- 2) The question can NOT be answered by knowing immediate Operator actions. None of the actions in the correct answer or in the distracters are immediate actions.
- 3) The question can NOT be answered by knowing entry conditions for the AP.
- 4) The question can NOT be answered by knowing the purpose, overall sequence of events, or overall mitigative strategy of AP-08.
- 5) The question require the applicant to assess plant conditions and determine appropriate actions based on detailed knowledge of procedure content. Specifically, the applicant must determine that the NC pump needs to be stopped immediately which requires the Reactor to be tripped first and power verified less than 5% before the NCP can be stopped. Therefore, this is SRO level knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	2010 MNS NRC Q84 (Bank 2784)

Development References
References: AP-08 (Malfunction of NC Pump)
Learning Objectives: OP-MC-AP-08 Objective 3

Student References Provided

APE015/017 AA2.10 - Reactor Coolant Pump (RCP) Malfunctions
Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): (CFR 43.5 / 45.13)
When to secure RCPs on loss of cooling or seal injection

401-9 Comments:

Remarks/Status

APE022 AA2.04 - Loss of Reactor Coolant Makeup

Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: (CFR 43.5/ 45.13)

How long PZR level can be maintained within limits

Given the following conditions on Unit 1:

- The unit is operating at 100% RTP
- The 1A NV pump is tagged out for maintenance
- The 1B NV pump trips
- The PD pump cannot be started
- AP-12 (Loss of Letdown, Charging, or Seal Injection) has been implemented
- Per AP-12 Step 33, the crew is evaluating placing the Standby Makeup pump in service
- Currently, Pressurizer level is 40% and decreasing at a rate of 1%/min

Based on the current Pressurizer level and rate of decrease, the evaluation for placing the Standby Makeup pump in service must be completed within (1) minutes.

After normal seal injection is restored, the MINIMUM seal injection flow rate required by AP-12 is (2) .

Which ONE (1) of the following completes the statements above?

- A. 1. 20
 2. 6 GPM

 - B. 1. 36
 2. 6 GPM

 - C. 1. 20
 2. 8 GPM

 - D. 1. 36
 2. 8 GPM
-

General Discussion

In accordance with AP-12:

IF AT ANY TIME it is known that a charging pump will not be restored prior to Pzr level reaching 20%, THEN evaluate starting Standby Makeup pump PER Enclosure 3 (Standby Makeup Pump Startup).

The MINIMUM seal injection flow required by AP-12 is 6 GPM. Normal minimum seal injection flow for starting a pump in OP/1/A/6150/002A (NC Pump Operation) is 8 GPM.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is plausible because in 36 minutes Pressurizer level would be 4% which is the minimum PZR level used throughout the APs and EOPs as a criteria for tripping the Reactor and going to E-0. Additionally, one of the reasons cited in the basis for Step 18 is that if a Reactor trip is subsequently required (possibly due to placing the Standby Makeup Pump in service) PZR level will initially be high enough that the shrink caused by the Reactor trip will not reduce PZR level below 4% which would require Safety Injection to be initiated.

Part 2 is correct.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is correct.

Part 2 is plausible because this is the minimum seal injection flow required by OP/1/A/6150/002A (NC Pump Operation) to start a NCP. Additionally, this is the minimum seal injection flow during NORMAL operation.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is plausible because in 36 minutes Pressurizer level would be 4% which is the minimum PZR level used throughout the APs and EOPs as a criteria for tripping the Reactor and going to E-0. Additionally, one of the reasons cited in the basis for Step 18 is that if a Reactor trip is subsequently required (possibly due to placing the Standby Makeup Pump in service) PZR level will initially be high enough that the shrink caused by the Reactor trip will not reduce PZR level below 4% which would require Safety Injection to be initiated.

Part 2 is plausible because this is the minimum seal injection flow required by OP/1/A/6150/002A (NC Pump Operation) to start a NCP. Additionally, this is the minimum seal injection flow during NORMAL operation.

Basis for meeting the KA

The KA is matched because a loss of both charging pumps occurs, resulting in a loss of reactor coolant makeup and the applicant must determine how long it will take to reach a specific PZR level associated with required procedure step actions.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. The applicant must first recall the PZR level that requires evaluation for placing the Standby Makeup Pump in service. The applicant must then calculate the amount of time, based on current PZR level and rate of decrease that it will take before PZR reaches the minimum level. The applicant must also recall from memory the minimum seal injection flow specified in AP-12.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):

1) The question can NOT be answered solely by knowing systems knowledge.

This requires detailed procedure step knowledge of AP-12.

2) The question can NOT be answered by knowing immediate operator actions.

There are NO immediate actions associated with AP-12.

3) The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.

The required knowledge is detailed procedure step knowledge and is NOT associated with procedure entry conditions.

4) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.

This is detailed knowledge of procedure steps within AP-12.

5) The question requires detailed knowledge of procedure content. Therefore, it is SRO knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References

References:
AP-12 (Loss of Letdown, Charging or Seal Injection)

Learning Objectives:
OP-MC-AP-12 Objective 4

Student References Provided

APE022 AA2.04 - Loss of Reactor Coolant Makeup
 Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: (CFR 43.5/ 45.13)
 How long PZR level can be maintained within limits

401-9 Comments:

Remarks/Status

EPE029 2.4.21 - Anticipated Transient Without Scram (ATWS)

EPE029 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 conditions on Unit 1:

- The crew implements E-0 (Reactor Trip or Safety Injection) due to a valid Reactor trip signal
- Subsequently, the crew transitions to FR-S.1 (Response to Nuclear Power Generation / ATWS) due to a failure of the Reactor to trip automatically or manually
- At Step 15 of FR-S.1, the crew observes the following conditions:
 - I/R SUR is positive
 - W/R Neutron Flux is 7%
 - CETs are 1220°F and increasing

Which ONE (1) of the following describes the required actions based on the conditions above?

- A. Complete the actions of FR-S.1 and then implement FR-C.1.
 - B. Immediately implement FR-C.1 (Response to Inadequate Core Cooling).
 - C. Remain in FR-S.1 until I/R SUR is negative and W/R Neutron Flux is less than 5%.
 - D. Immediately implement EG/1/A/MSAM/SACRG1 (Severe Accident Control Room Guideline Initial Response).
-

General Discussion

For the conditions given, the crew would implement EG/1/A/MSAM/SACRG1 (Severe Accident Control Room Guideline Initial Response).

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible if the applicant does not recall that they were directed to monitor CSFSTs prior to the transition from E-0 to FR-S.1. If they continued to the end of FR-S.1, they would be directed to "return to procedure and step in effect". This would send them back to E-0 where they would continue until directed to monitor CSFSTs and would then transition to FR-C.1 based on a RED path condition.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because in the RNO for the next step the crew is permitted to implement the actions of other Critical Safety Functions that apply provided they do not cool down the NC system or otherwise add positive reactivity.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because applicants are trained that, with the exception of ECA-0.0, FR-S.1 takes priority over all other procedures. It is therefore plausible for the applicant to conclude that they should remain in FR-S.1 until the entry conditions for FR-S.1 are no longer met.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The KA is matched because the applicant is given a set of conditions where entry conditions for two FRPs are met. Based on a plant conditions and a knowledge of the procedure, the applicant must determine how the FRPs should be implemented .

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. The applicant must analyze the conditions given to determine the condition of the plant. The applicant must then recall from memory the procedural requirements from FR-S.1 to determine which procedure must be implemented.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):

1) The question can NOT be answered solely by knowing systems knowledge.

Question involves detailed procedure step knowledge.

2) The question can NOT be answered by knowing immediate operator actions.

This is knowledge NOT related to the immediate actions of FR-S.1.

3) The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.

Required the applicant to have detailed knowledge of procedure transition requirements of FR-S.1.

4) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.

Not related to purpose or sequence of steps. Not related to knowledge of mitigative strategy in that the applicant must have knowledge of specific procedure step requirements.

5) The question requires detailed knowledge of procedure content. Therefore, it is SRO knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
References: FR-S.1 (Response to Nuclear Power Generation / ATWS) Learning Objectives: OP-MC-EP-FRS Objective 7

Student References Provided

EPE029 2.4.21 - Anticipated Transient Without Scram (ATWS)
EPE029 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
Question sent to Chief Examiner. CE determined that KA was not met at the SRO-level. CE provided a suggestion regarding how to approach KA. Re-wrote question per CE's suggestion. HCF 3/15/12 Reworded slightly and then rearranged distracters A, B, & C for psychometrics.

EPE038 EA2.17 - Steam Generator Tube Rupture (SGTR)

Ability to determine or interpret the following as they apply to a SGTR : (CFR 43.5 / 45.13)

RCP restart criteria

Given the following initial conditions on Unit 2:

- A SGTR has occurred
- Prior to initiating NC system cooldown, all NC pumps were stopped due to loss of subcooling

Subsequently, the following conditions exist:

- NC system cooldown and depressurization is COMPLETE
- NC subcooling is 25°F
- The crew has reached the step in E-3 (SGTR) to check NCP status

In accordance with E-3:

The basis for restarting an NC pump in E-3 is to (1) during the subsequent recovery.

Prior to restarting an NC pump, starting requirements (2) required to be met.

Which ONE (1) of the following completes the statements above?

- A. 1. reduce S/G tube thermal stress
 2. ARE
 - B. 1. provide normal Pressurizer spray flow
 2. ARE
 - C. 1. reduce S/G tube thermal stress
 2. ARE NOT
 - D. 1. provide normal Pressurizer spray flow
 2. ARE NOT
-

General Discussion

In accordance with the background document, NC pump operation is preferred during recovery from a SGTR to provide normal PZR Spray and homogenous fluid temperatures and boron concentrations.

In E-3, NC pumps may not be restarted unless starting requirements are met.

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is plausible because S/G tube thermal stress is one of the factors considered when determining whether a faulted S/G should be used during recovery actions in E-3.

Part 2 is correct.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is plausible because S/G tube thermal stress is one of the factors considered when determining whether a faulted S/G should be used during recovery actions in E-3.

Part 2 is plausible because sometimes NC pumps are restarted even if starting requirements are not met (e.g. FR-C.1).

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is correct.

Part 2 is plausible because sometimes NC pumps are restarted even if starting requirements are not met (e.g. FR-C.1).

Basis for meeting the KA

The KA is matched because the applicant must have knowledge of the NCP restart criteria contained in E-3 (SG Tube Rupture).

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):

1) The question can NOT be answered solely by knowing systems knowledge.

Question involves knowledge of specific procedure step requirements and basis.

2) The question can NOT be answered by knowing immediate operator actions.

There are NO immediate actions associated with E-3 (SG Tube Rupture).

3) The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.

This involves knowledge of procedure step requirements near the end of E-3 and the basis for that step.

4) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure. This is detailed knowledge of procedure step sequence not sequence of events within the procedure.

Not related to purpose or sequence of steps. Not related to knowledge of mitigative strategy in that the applicant must have knowledge of specific procedure step requirements and the basis for the step.

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5) The question requires detailed knowledge of procedure content and its basis. Therefore, it is SRO knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References
References: E-3 (Steam Generator Tube Rupture) Lesson Plan OP-MC-EP-E3 Page 105 Learning Objectives: OP-MC-EP-E3 Objectives 3 & 4

Student References Provided

EPE038 EA2.17 - Steam Generator Tube Rupture (SGTR)
Ability to determine or interpret the following as they apply to a SGTR : (CFR 43.5 / 45.13)
RCP restart criteria

401-9 Comments:

Remarks/Status

APE058 2.4.47 - Loss of DC Power
APE058 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 conditions on Unit 1:

- Battery Charger EVCS is currently out-of-service for preventive maintenance
- During rounds, the Unit 1 Auxiliary Building Operator reports that Battery Charger EVCA has tripped and can NOT be restarted
- A NEO is stationed at EVDA to continuously monitor bus voltage and report to the Control Room
- AP-15 (Loss of Vital or Aux Control Power) Enclosure 1 (Response to Degraded DC Bus Voltage) has been implemented
- The following EVDA trend is reported by a NEO in the field:

TIME	VOLTAGE (VDC)
0600	115
0700	110
0800	107
0900	105

Based on the conditions above, the EARLIEST time that AP-15 requires inverter EVIA be swapped to an alternate power supply is (1) .

In accordance with the Design Basis, Battery EVCA must be capable of carrying its design loads for a MINIMUM of (2) .

Which ONE (1) of the following completes the statements above?

- A. 1. 0700
2. 1 hour
- B. 1. 0800
2. 4 hours
- C. 1. 0800
2. 1 hour
- D. 1. 0700
2. 4 hours

General Discussion

In accordance with AP-15 the Vital Battery Busses (EVDA, B, C, &D) are capable of carrying their design loads for a minimum of 1 hour. The Auxiliary Battery Chargers are capable of carrying their design loads for a minimum of 4 hours.

AP-15 directs the Operators to ensure that the effected DC bus is swapped to an alternate source prior to bus voltage reaching 107 VDC.

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is plausible because Tech Spec 3.8.6 requires that the surveillance to verify battery cell parameters be performed any time the battery is discharged to less than 110VDC.

Part 2 is correct.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is correct.

Part 2 is plausible because 4 hours is the design life of the Auxiliary Batteries.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is plausible because Tech Spec 3.8.6 requires that the surveillance to verify battery cell parameters be performed any time the battery is discharged to less than 110VDC.

Part 2 is plausible because 4 hours is the design life of the Auxiliary Batteries.

Basis for meeting the KA

MNS does not have the ability to monitor or trend DC Bus voltage in the Control Room. For the purposes of this question, the trending of DC Bus voltage is performed by a NEO in the field who reports those voltages to the Control Room. The Control Room staff is tasked with tracking that trend and taking appropriate actions based on knowledge of AP-15 (Control Room Reference Material). Therefore, the KA is matched.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. The first part of the question requires the applicant to recall from memory the voltage at which the inverter must be swapped to an alternate power supply and then they must calculate the time to reach that voltage based on the current battery voltage and the rate of decrease in terminal voltage.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):

1) The question can NOT be answered solely by knowing systems knowledge.

Part 1 of this question is RO level knowledge. Part 2 of this question can only be answered by having knowledge of AP-15 (Loss of Vital or Aux Control Power).

2) The question can NOT be answered by knowing immediate operator actions.

There are NO immediate actions associated with AP-15.

3) The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.

Neither part of this question is associated with AP-15 entry conditions. Both are related to information contained in AP-15 Enclosure 1 (Response to Degraded DC Bus Voltage).

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4) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure. This is detailed knowledge of procedure step sequence not sequence of events within the procedure.

This is not related to the purpose, sequence of events, or mitigative strategy of AP-15.

5) The question requires detailed procedure step knowledge of AP-15. Therefore, it is SRO knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
References: AP-15 (Loss of Vital or Aux Control Power) Enclosure 1 (Response to Degraded DC Bus Voltage)
Learning Objectives: OP-MC-AP-15 Objectives 3 & 4

Student References Provided

APE058 2.4.47 - Loss of DC Power

APE058 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
MNS does not have the ability to trend DC Bus voltage in the Control Room. For this question, had to meet the "diagnose and recognize trends" part of the KA based on reported DC bus voltage trend from the field and the operators in the control room diagnosing the impact of that trend based on knowledge of AP-15.

WE11 2.4.23 - Loss of Emergency Coolant Recirculation

WE11 GENERIC

Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations. (CFR: 41.10 / 43.5 / 45.13)

Given the following conditions on Unit 1:

- A LOCA has occurred
- ECA-1.1 (Loss of Emergency Coolant Recirculation) has been implemented
- The crew has transitioned to Enclosure 5 (NS Alignment to Containment Sump)
- Containment sump levels are 3.5 FT
- Containment pressure is 3.2 PSIG
- Both NS pumps are OFF
- The crew has just opened 1NS-18A (1A NS Pump Suction from Cont Sump Isol) as directed by Enclosure 5
- The STA announces that there is an ORANGE path on the Containment CSFST

Based on the conditions above:

- 1) What actions are required by the crew?
 - 2) What is the basis for those actions?
- A.
1. Remain in Enclosure 5 and start ONE NS pump ONLY.
 2. The Containment Orange path is Invalid, FR-Z.1 should not be entered unless the NS pump fails to start.
- B.
1. Immediately transition to FR-Z.1 (Response to High Containment Pressure) and start ONE NS pump ONLY.
 2. A Valid Orange path for Containment exists and transition to FR-Z.1 is required.
- C.
1. Remain in Enclosure 5, start BOTH NS pumps.
 2. The Containment Orange path is Invalid, FR-Z.1 should not be entered unless the NS pump fails to start.
- D.
1. Immediately transition to FR-Z.1 (Response to High Containment Pressure), and start BOTH NS pumps.
 2. A Valid Orange path for Containment exists and transition to FR-Z.1 is required.
-

General Discussion

There is a NOTE in ECA-1.1 prior to transition the Enclosure 5 that an invalid ORANGE path may exist between the time that the NS sump valves are opened and the NS pump is started. The operators are directed to NOT enter FR-Z.1 unless an NS pump fails to start.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because in most cases, transition to FR-Z.1 would be required. And, for the conditions given if a transition to FR-Z.1 was made, starting one NS pump would be the correct action.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because remaining in Enclosure 5 is the correct procedure. Aligning one train of ND Aux Spray is plausible because that is the action to be taken after ONE NS pump is running in FR-Z.1 if Containment pressure is greater than 15 PSIG.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because because in most cases, transition to FR-Z.1 would be required. Starting ONE NS pump is the correct action when in FR-Z.1. Aligning one train of ND Aux Spray is plausible because that is the action to be taken after ONE NS pump is running in FR-Z.1 if Containment pressure is greater than 15 PSIG.

Basis for meeting the KA

The KA is matched because the applicant must have knowledge of the "basis" for prioritizing the implementation of procedures associated with operation of the NS system.

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 ECA-1.1 requirements regarding an invalid ORANGE path. The applicant must then analyze the conditions given and determine that for the conditions given the ORANGE path is not valid.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):

1) The question can NOT be answered solely by knowing systems knowledge.

This is not systems level knowledge.

2) The question can NOT be answered by knowing immediate operator actions.

There are NO immediate actions associated with this procedure.

3) The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.

The knowledge required to answer this question is NOT related to AOP or EOP entry conditions. It is related to procedure transition requirements.

4) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.

This is detailed knowledge of procedure transition requirements.

5) The question requires detailed knowledge of procedure content. It requires the applicant to have knowledge of the requirements in a procedure NOTE regarding procedure transition under a specific set of conditions. Therefore, it is SRO knowledge.

FOR REVIEW ONLY - DO NOT DISTRIBUTE

A

2012 MNS SRO NRC Examination

QUESTION 89

89

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
References: ECA-1.1 Loss of Emergency Coolant Recirc
Learning Objectives: OP-MC-EP-E1 Objective 4

Student References Provided

WE11 2.4.23 - Loss of Emergency Coolant Recirculation

WE11 GENERIC

Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations. (CFR: 41.10 / 43.5 / 45.13)

401-9 Comments:

Remarks/Status

APE036 AA2.03 - Fuel Handling Incidents

Ability to determine and interpret the following as they apply to the Fuel Handling Incidents: (CFR: 43.5 / 45.13)

Magnitude of potential radioactive release

Which ONE (1) of the following describes (1) the applicability and (2) the basis for Tech Spec 3.9.7 (Refueling Cavity Water Level)?

- A.
 - 1. During movement of irradiated fuel assemblies within containment ONLY.
 - 2. To ensure iodine release due to a postulated fuel handling accident is captured by the water and offsite doses are maintained within 10CFR50 limits.

 - B.
 - 1. During movement of irradiated fuel assemblies within containment ONLY.
 - 2. To ensure the total dose received by refueling personnel remains within the limits of 10CFR20.

 - C.
 - 1. During CORE ALTERATIONS, except during latching and unlatching of control rod drive shafts, AND during movement of irradiated fuel assemblies within containment.
 - 2. To ensure iodine release due to a postulated fuel handling accident is captured by the water and offsite doses are maintained within 10CFR50 limits.

 - D.
 - 1. During CORE ALTERATIONS, except during latching and unlatching of control rod drive shafts, AND during movement of irradiated fuel assemblies within containment.
 - 2. To ensure the total dose received by refueling personnel remains within the limits of 10CFR20.
-

General Discussion

Tech Spec 3.9.7 is applicable: 1. During CORE ALTERATIONS, except during latching and unlatching control rod drive shafts, and 2. during movement of irradiated fuel assemblies within containment.

The basis for Tech Spec 3.9.7 is to ensure sufficient water necessary to retain iodine fission product activity in the water in the event of a fuel handling accident. Sufficient iodine activity would be retained to limit offsite doses from the accident to within 10 CFR 50.67 limits,

Answer A Discussion

INCORRECT.

PLAUSIBLE:

First part incorrect. Plausible because another refueling Tech Spec is applicable only during movement of irradiated fuel assemblies (TS 3.9.4 - Containment Penetrations) and the applicant may confuse the two. Additionally, since the TS basis deals with damaged fuel and the release of iodine, the applicant may conclude that there is no water level limit or there is another Tech Spec that addresses core alterations.

Second part correct.

Answer B Discussion

INCORRECT

PLAUSIBLE:

First part incorrect. Plausible because another refueling Tech Spec is applicable only during movement of irradiate fuel assemblies (TS 3.9.4 - Containment Penetrations) and the applicant may confuse the two. Additionally, since the TS basis deals with damaged fuel and the release of iodine, the applicant may conclude that there is no water level limit during core alterations.

Second part is incorrect. Plausible because there are dose concerns to refueling personnel on site during fuel movement. The magnitude of the dose concerns would be related to the refueling cavity water level.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

INCORRECT

PLAUSIBLE

First part correct.

Second part is incorrect. Plausible because there are dose concerns to refueling personnel on site during fuel movement. The magnitude of the dose concerns would be related to the refueling cavity water level.

Basis for meeting the KA

The water level requirements in Tech Spec 3.9.7 will ensure the radiological consequences of a postulated fuel handling accident are within the limits of the accident analysis. (036 Fuel Handling Incidents).

The basis for the water level requirement relates to the magnitude of the potential radioactive releases (and offsite dose concerns) if refueling cavity water level was not high enough..

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(2) (Tech Specs):

- 1) This question can NOT be answered by knowing less than 1 hour Tech Specs
- 2) This question can NOT be answered solely by knowing information listed "above-the-line".
- 3) This question can NOT be answered by knowing the TS Safety Limits or their bases. This question is not related to TS Safety Limits.
- 4) This question requires the applicant to recall information from the TS basis. Therefore, it is SRO-level knowledge.

FOR REVIEW ONLY - DO NOT DISTRIBUTE

C

2012 MNS SRO NRC Examination

QUESTION 90

90

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References
References: Tech Spec 3.9.7 (Refueling Cavity Water Level) Tech Spec 3.9.7 Basis Learning Objectives: OP-MC-FH-FC Objective 7

Student References Provided

APE036 AA2.03 - Fuel Handling Incidents

Ability to determine and interpret the following as they apply to the Fuel Handling Incidents: (CFR: 43.5 / 45.13)

Magnitude of potential radioactive release

401-9 Comments:

Remarks/Status
New KA after 75-day submittal.

APE059 AA2.02 - Accidental Liquid Radioactive-Waste Release

Ability to determine and interpret the following as they apply to the Accidental Liquid Radwaste Release: (CFR: 43.5 / 45.13)

The permit for liquid radioactive-waste release

A release of Waste Monitor Tank (WMT) A has been planned.
A radioactive liquid release permit has been prepared with the following data:

=== RC PUMP DATA ===

RC pumps running.....	3.00
RC pumps assigned to RELEASE.....	3.00
Total RC pumps required (all concurrent releases).....	4.00

=== RECOMMENDED RELEASE RATE ===

Allowable release rate (gpm).....	1.61E+01
Recommended release rate (gpm).....	1.20E+02

=== SETPOINT DATA ===

EMF49L in Service	Yes
Monitor Background (cpm).....	4.49E+03
Cs-137 Equivalence (uCi/ML)...	7.23E-06
Expected CPM.....	4.50E+03
Trip 1 setpoint (cpm).....	8.97E+03
Trip 2 setpoint (cpm).....	1.42E+04

Which ONE (1) of the following actions is correct for approval of this release permit?

- A. The release may NOT be approved due to inadequate number of RC pumps ONLY.
- B. The release may NOT be approved due to incorrect Recommended Release Rate ONLY.
- C. The release may NOT be approved due to inadequate number of RC Pumps AND incorrect Recommended Release Rate.
- D. The release MAY be approved as presented.

General Discussion

The Liquid Waste Release (LWR) permit is designed to prevent an UNCONTROLLED release of radioactive materials to the environment in liquid effluents. The two pieces of this control are: 1. ensuring adequate dilution of the liquid and 0EMF40(L) Trip setpoints. The amount of dilution needed is based on the activity of the tank to be released. The dilution includes a limit on the release rate and the number of RC pumps that need to be running. Minimum dilution flow is assured by an interlock terminating waste liquid releases if the number of RC Pumps running falls below the number of pumps required for dilution.

Since more than one liquid waste release can occur at one time, the LWR states the number of pumps needed for this release and also the total number for all concurrent releases. The SRO must verify the required number of RC pumps are running for all concurrent releases. If less than the required number of RC pumps is running, the LWR cannot be approved.

Per OP-MC-WE-RLR lesson, section 2.1, a limiting release rate is calculated and shown as "Allowable Release Rate" on the LWR. This is based on the activity present in the tank. Also printed on the LWR is the Recommended Release Rate. The Recommended Release Rate is either the Allowable Release Rate or the system maximum, whichever is lower. The system maximum for the WMT pump is 120 gpm. In this case, if the WMT is released at 120 gpm, it is possible the limits of SLC 16.11.1 (Liquid Effluents - Concentration) would be exceeded.

When reviewing the LWR, the SRO is not expected to know the exact Trip setpoint values of the EMF, just that the "Expected CPM" of the EMF and the EMF "Trip I" Setpoint are less than the "Trip II" Setpoint.

Answer A Discussion

INCORRECT: The RECOMMENDED RELEASE RATE is also incorrect.

PLAUSIBLE: The "allowable release rate" is determined by the amount of activity present in the tank. The "recommended release rate" is the release rate limit imposed by the procedure (i.e. LWR). The operator will set the release rate at the value of the recommended release rate. This answer is plausible if the applicant confuses the terms and think that "allowable" is the procedural limit instead of the "recommended".

Answer B Discussion

INCORRECT: There is also an inadequate number of RC pumps running to dilute all concurrent releases. Under the RC PUMP DATA, the "Total RC Pumps required (all concurrent releases)" will normally be equal to "RC pumps assigned to RELEASE". However it can be higher if more than one liquid release is occurring at one time. Under the conditions associated with this LWR, another liquid release is occurring, and the total RC pumps required is higher.

PLAUSIBLE if the candidate fails to realize another release is occurring and/or believes the only concern is RC pumps associated with this release.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

INCORRECT: There are two problems with this LWR. Inadequate number of RC pumps running and incorrect Recommended Release Rate.

PLAUSIBLE: The "allowable release rate" is determined by the amount of activity present in the tank. The "recommended release rate" is the release rate limit imposed by the procedure (i.e. LWR). The operator will set the release rate at the value of the recommended release rate. This answer is plausible if the applicant confuses the terms and think that "allowable" is the procedural limit instead of the "recommended".

PLAUSIBLE if the candidate fails to realize another release is occurring and/or believes the only concern is RC pumps associated with this release.

Basis for meeting the KA

This KA deals with Accidental Liquid Radioactive-Waste Release. An Accidental Release could be an uncontrolled or unmonitored release, or one that is not adequately diluted. There are three items the SRO must verify before approving a release: Adequate number of RC pumps for dilution, Recommended Release Rate is less than or equal to the Allowable release rate, and EMF Trip 2 setpoint. A release rate that is too high, or an inadequate number of RC pumps running could result in inadequate dilution of the release. Therefore this KA is matched.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. The SRO must recall from memory the purpose of each section of the LWR, then determine if it meets the requirements.

Basis for SRO only

This is SRO level because the SRO is responsible for authorizing the release based on given conditions.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	Bank 898

Development References
References: Lesson Plan OP-MC-MT-RC Section 2.1 Lesson Plan OP-MC-WE-RLR Section 2.1
Learning Objectives: OP-MC-WE-RLR Objective 3

Student References Provided

APE059 AA2.02 - Accidental Liquid Radioactive-Waste Release
Ability to determine and interpret the following as they apply to the Accidental Liquid Radwaste Release: (CFR: 43.5 / 45.13)
The permit for liquid radioactive-waste release

401-9 Comments:

Remarks/Status

APE067 2.4.18 - Plant Fire On Site

APE067 GENERIC

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

Given the following plant conditions:

- Both units are operating at 100% RTP
- A fire occurs in the Control Room
- AP-45 (Plant Fire) has been implemented
- Enclosure 22 (Control Room Fire Unit 1 and 2 Actions) has just been implemented

In accordance with AP-45, the assured Safe Shutdown Train for this event is (1).

In accordance with the AP-45 Background document, the PZR PORVs Block valves must be closed within (2) minutes of the start of the fire.

Which ONE (1) of the following completes the statements above?

- A. 1. the SSF
 2. 10

 - B. 1. the SSF
 2. 30

 - C. 1. Train A or B
 2. 10

 - D. 1. Train A or B
 2. 30
-

General Discussion

AP-45 (Plant Fire). Enclosure 13 (AB 733' Battery Room Fire Unit 1 and 2 Actions) directs the operators to close the PZR PORV Block Valves for both units.

AP-45 directs that the action to close the PORV Block Valves is time critical. However, the time critical time is only listed in the AP-45 Background document.

In accordance with AP-45:

"Without operator action what could happen after 10 min is a Pzr PORV Isol could be open and the power supply cable to the valve motor could be burnt through. Per Appendix R assumptions, all three isolations may have lost power. Also, the one assumed smart short could be sending an open signal to one PORV. To prevent this scenario, the PORV block valves are closed within 10 minutes, before these failures could occur. "

In accordance with AP-45, the SSF is the assured Safe Shutdown Train for a fire in the Control Room.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

The first part is correct.

The second part is plausible because 30 minutes is a time-critical time that is used extensively throughout the APs.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

The first part is plausible because Train A or B is the assured Safe Shutdown Train credited for many areas in the Auxiliary Building.

The second part is correct.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

The first part is plausible because Train A or B is the assured Safe Shutdown Train credited for many areas in the Auxiliary Building.

The second part is plausible because 30 minutes is a time-critical time that is used extensively throughout the APs.

Basis for meeting the KA

While the step that requires closing the PZR PORV Block valves in AP-45 is identified as a time critical step, the required time to close those valves is not identified in AP-45. The only place that the required time is identified is in the AP-45 Basis Document. Since the applicant must have knowledge of specific basis for the step in the AP to know when they must be closed, the KA is met.

Basis for Hi Cog

Basis for SRO only

Part 1 of this question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):

- 1) This question can NOT be answered by knowing systems knowledge alone. This is strict procedure knowledge.
This is not covered during systems training or discussed in a systems lesson plan.
- 2) This question can NOT be answered by knowing immediate operator actions.
There are no immediate actions associated with AP-45.
- 3) This question can NOT be answered by knowing the entry conditions for AOPs.

This is based on knowledge of the AP-45 Background (Basis) document and specific procedure step knowledge.

4) This question can NOT be answered by knowing the purpose, overall sequence of events, or overall mitigative strategy of the AOPs.

This is based on knowledge of the AP-45 Background (Basis) document and specific procedure step knowledge.

5) The question requires the applicant to have in-depth knowledge of the AP-45 Background document and detailed procedure step knowledge. Therefore, this is SRO level knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References
References: AP-45 (Plant Fire) AP-45 Background Document Lesson Plan OP-MC-AP-45 Learning Objectives: OP-MC-AP-45 Objective 2

Student References Provided

APE067 2.4.18 - Plant Fire On Site
APE067 GENERIC
Knowledge of the specific bases for EOPs. (CFR: 41.10 / 43.1 / 45.13)

401-9 Comments:

Remarks/Status

WE15 2.4.23 - Containment Flooding
WE15 GENERIC

Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations. (CFR: 41.10 / 43.5 / 45.13)

Given the initial conditions on Unit 1:

- A LOCA occurred
- Containment pressure peaked at 2.8 PSIG and is slowly decreasing

Current conditions:

- ECCS suction has been swapped to the Cold Leg Recirculation alignment
- FWST level is 7%
- NC pressure is 2 PSIG
- Containment sump level is off scale high
- CETs are 560°F
- RVLIS Level is 57% and slowly decreasing
- Containment pressure is 1.8 PSIG and increasing

Which ONE (1) of the following states the procedure that must be implemented AND the basis for implementing that procedure?

- A. Implement FR-C.2 (Response to Degraded Core Cooling).
The level of water in the core region has been reduced such that core cooling has been lost.
- B. Implement FR-C.2 (Response to Degraded Core Cooling).
The level of water in the core region has been reduced such that the core has become uncovered.
- C. Implement FR-Z.2 (Response to Containment Flooding).
Containment sump level is higher than expected and indicates a potential damaged RN or KC pipe.
- D. Implement FR-Z.2 (Response to Containment Flooding).
Containment sump level is high due to the input from the reactor coolant system and Refueling Water Storage Tank.
-

General Discussion

From the conditions given, an ORANGE condition exists on the Containment CSFST that requires FR-Z.2 be implemented (i.e. Containment pressure less than 15 PSIG - YES => Containment pressure less than 3 PSIG - YES => Containment Sump Level less than 12.5 FT - NO (Top of the scale is 20 ft) => GO TO FR-Z.2).

There is a YELLOW condition on Core Cooling due to which would require FR-C.3 to be implemented (i.e. CETs < 1200°F - YES => NC Subcooling based on CETs > 0°F - NO => At least one NC Pump ON - NO => CETs Less than 700°F - YES => Reactor Vessel Lower Range Level Greater Than 39% - YES => GO TO FR-C.3)

From the FRZ Lesson Plan (Basis Document):

The maximum level of water in the containment following a major accident generally is based upon the stored water volumes from the FWST, CLAs, ice condenser, and NC system. This water volume approximates the maximum water volume introduced into the containment following a LOCA plus a steamline or feedline break inside containment.

An indicated water level in the containment greater than the maximum expected volume (design basis flood level) is an indication that water volumes other than those represented by the above noted volumes have been introduced into the containment. Also, the high water level provides an indication that potential flooding of critical systems and components needed for plant recovery may occur. Identification and isolation for any broken or leaking water line inside containment is essential to maintaining the water level below the design basis flood level.

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because the indications show some loss of core cooling has occurred due to the loss of inventory in the core.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible if the applicant fails to recall the level at which core uncover occurs. If that were the case, they would conclude that the core has become uncovered and this would be the correct response.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because the total volume of the NC system and the total volume of the FWST emptying into Containment would cause a substantial rise in Containment sump levels. These are also plausible because they are expected inputs into the Containment sump during an accident. If the applicant fails to recall, from the basis document all of the inputs that contribute to the normal increase in sump level during an accident they could incorrectly conclude that this is the correct response.

Basis for meeting the KA

The KA is matched because the applicant must have knowledge of the CSFSTs to prioritize which procedure must be implemented and must have knowledge of the FRZ Basis Document to determine the basis for why the procedure is being implemented.

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 Containment and Core Cooling CSFSTs. The applicant must then analyze the conditions given to determine what conditions have been met and what Functional Restoration Procedure must be implemented. The applicant must also recall from the Basis Document the reason why the CSF has been jeopardized making it a priority for implementation.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):

1) The question can NOT be answered solely by knowing systems knowledge.

This is not systems knowledge. It is knowledge of the CSFSTs and how to implement them.

2) The question can NOT be answered by knowing immediate operator actions.

There are NO immediate actions associated with the FRPs.

3) The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.

While FR-C.2 and FR-Z.2 are NOT direct entry EOPs, knowledge of the conditions that require implementation of the FRPs associated with ALL CSFs is expected knowledge of an RO. Therefore, the first part of this question is RO-level knowledge.

The second part of the question requires the applicant to have knowledge of the FRP Basis Document and is therefore not related to AOP or EOP entry conditions.

4) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure. This is detailed knowledge of procedure step sequence not sequence of events within the procedure.

The question is related to entry conditions and knowledge of the basis document.

5) The question requires detailed knowledge of the procedure basis and is therefore SRO knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	2008 CNS AUDIT Q86 (Bank 1886)

Development References

References:
 F-0 (Critical Safety Function Status Trees) Lesson Plan OP-MC-EP-FRZ

Learning Objectives:
 OP-MC-EP-FRZ Objective 4

Student References Provided

WE15 2.4.23 - Containment Flooding
 WE15 GENERIC
 Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations. (CFR: 41.10 / 43.5 / 45.13)

401-9 Comments:

Remarks/Status

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)

Given the following conditions on Unit 2:

- The unit is at 65% RTP following repairs to 2B CF pump
- Chemistry just reported that Dose equivalent I-131 was 100 $\mu\text{Ci/gm}$ based on a sample taken 1 hour ago

Which ONE (1) of the following describes the Technical Specification requirement associated with the condition above, AND what is the basis for this LCO?

REFERENCE PROVIDED

- A. Restore dose equivalent I-131 to within limits within 48 hours.
Prevents exceeding the whole body exposure limits of any member of the public at the nearest site boundary following a SGTR accident.
- B. Restore dose equivalent I-131 to within limits within 48 hours.
Prevents exceeding the whole body exposure limits of employees within the site boundary following a SGTR accident.
- C. Be in Mode 3 with T_{avg} less than 500 °F within 6 hours.
Prevents exceeding the whole body exposure limits of any member of the public at the nearest site boundary following a SGTR accident.
- D. Be in Mode 3 with T_{avg} less than 500 °F within 6 hours.
Prevents exceeding the whole body exposure limits of employees within the site boundary following a SGTR accident.
-

General Discussion

In accordance with Tech Spec 3.4.16 (RCS Specific Activity):

At 65% RTP with a Dose Equivalent I-131 level of 100 $\mu\text{Ci/gm}$, the I-131 is in the ACCEPTABLE region of Figure 3.4.16-1. Based on this the required action would be to Restore dose equivalent I-131 to within limits within 48 hours (Condition A).

Condition C (be in Mode 3 with T_{avg} less than 500 °F within the following 6 hours) is NOT applicable unless DEI was not restored within 48 hours or DEI exceeded the acceptable region of the table.

In accordance with Tech Spec 3.4.16 Basis:

"The maximum dose to the whole body and the thyroid that an individual at the site boundary can receive for 2 hours during an accident is specified in 10 CFR 100 (Ref. 1). "

"The LCO limits on the specific activity of the reactor coolant ensures that the resulting 2 hour doses at the site boundary will not exceed a small fraction of the 10CFR100 dose guideline limits following a SGTR.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

First part is correct.

Second part is plausible because there are dose concerns to site employees during a SG tube rupture event due to secondary side contamination and steam releases through relief valves.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

First part is plausible if the applicant misreads the graph in Tech Spec 3.4.16 or misinterprets the requirements of the spec.

Second part is correct.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

First part is plausible if the applicant misreads the graph in Tech Spec 3.4.16 or misinterprets the requirements of the spec.

Second part is plausible because there are dose concerns to site employees during a SG tube rupture event due to secondary side contamination and steam releases through relief valves.

Basis for meeting the KA

The KA is matched because it requires the applicant to have knowledge of primary chemistry Tech Spec limit and basis.

Basis for Hi Cog

This is a higher cognitive level question because it requires multiple mental steps. First, the applicant must read graph in TS 3.4.16 to determine if I-131 levels are in the ACCEPTABLE or UNACCEPTABLE region. The applicant must then apply that knowledge to the specification to determine the required action. The applicant must then recall from memory the basis for the limit from the TS 3.4.16 Basis document.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(2) (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs

There are NO one hour or less actions associated with TS 3.4.16.

2) This question can NOT be answered by knowing information listed "above-the-line".

The required knowledge to answer this question is not "above-the-line" knowledge.

3) This question can NOT be answered by knowing the TS Safety Limits or their bases.

This question is not related to TS Safety Limits.

4) This question requires the applicant to apply the Tech Spec AND have knowledge of the TS basis to determine the correct response. Therefore, it is SRO-level knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	2005 CNS NRC Q89 (Bank 493) MODIFIED

Development References
References: Tech Spec 3.4.16 (RCS Specific Activity) Tech Spec 3.4.16 Basis Learning Objectives: OP-MC-PS-NC Objective 24

Student References Provided
Tech Spec 3.4.16

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)

401-9 Comments:

Remarks/Status

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 conditions on Unit 2:

- Annunciator 2RAD-1 / E-5 (2 EMF 38 CONTAINMENT PART ALERT) alarms
- The crew observes that 2EMF-38L (Containment Particulate Monitor) is in Trip 1

In accordance with Tech Spec 3.4.15 (RCS Leakage Detection Instrumentation) Basis, which ONE (1) of the following would be a diverse indication for identifying a 1 GPM Reactor Coolant system leak in 1 hour or less?

- A. CFAE sump level
 - B. Volume Control Tank level
 - C. Incore Instrument sump level
 - D. 2EMF-39 (Unit 2 Containment Gas Monitor)
-

General Discussion

In accordance with Tech Spec 3.4.15 Basis:

"The reactor coolant contains radioactivity that, when released to the containment, can be detected by radiation monitoring instrumentation. U.S. NRC Regulatory Guide (RG) 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems, (Ref. 2), describes acceptable methods of implementing the requirements for leakage detection systems. Although RG 1.45 is not a license condition, it is generally accepted for use to support licensing basis. RG 1.45 states that instrument sensitivities of 10-9 $\mu\text{Ci/cc}$ radioactivity for air particulate monitoring are practical for leakage detection systems. The containment atmosphere particulate radioactivity monitor at McGuire meets or exceeds this accepted sensitivity.

RG 1.45 also states that detector systems should be able to respond to a one gpm leak, or its equivalent, in one hour or less. The containment atmosphere particulate radioactivity monitor at McGuire has demonstrated capabilities of detecting a 1.0 gpm leak within one hour at the sensitivity recommended in Regulatory Guide 1.45 using the RCS corrosion product activities from the UFSAR."

For MNS, 1(2) EMF-38 are the credited RG 1.45 radiation monitors.

Tech Spec 3.4.15 Basis also states:

"As leakage may go to either or both of the two CFAE sumps, a 1 gpm sump input (cumulative between sumps A and B) is detectable in 1 hour after leakage has reached the sumps (Ref 8)."

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because Containment temperature is discussed in Tech Spec 3.4.15 Basis as one of the diverse indications of "rapid and sizeable leakage to the containment".

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because the incore instrument sump level is credited by Tech Spec 3.4.15 as being able to detect a 1 GPM leak within 4 hours.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because 2EMF-39 will most likely alarm if there is significant leakage into containment. Also, the applicant could confuse 2EMF-39 with 2EMF-38 and conclude that BOTH are credited with detecting a 1 GPM leak within 1 hour.

Basis for meeting the KA

The KA is matched because the applicant must have knowledge of the TS Basis to be able to identify which indication would be a diverse indication credited for identifying a small NC system leak into containment.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(2) (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs

The only "less than one hour" spec associated with Tech Spec 3.4.15 is if all leakage detection method required by the spec are inoperable. That is not the case with this question.

2) This question can NOT be answered by knowing information listed "above-the-line".

The required knowledge to answer this question is not "above-the-line" knowledge.

3) This question can NOT be answered by knowing the TS Safety Limits or their bases.

This question is not related to TS Safety Limits.

4) This question requires the applicant to have knowledge of the TS basis to determine the correct response. Therefore, it is SRO-level knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References
References: Tech Spec 3.4.15 (RCS Leakage Detection Instrumentation) Tech Spec 3.4.15 Basis Learning Objectives: OP-MC-WE-EMF Objective 10

Student References Provided

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 2.2.37 - GENERIC - Equipment Control

Equipment Control

Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)

Given the following conditions on Unit 1:

- The unit is operating at 100% RTP
- A loss of Battery Charger EVCA occurred
- Battery EVCA voltage lowered to 109 VDC

Following restoration, conditions are:

- Battery EVCA voltage is currently 129 VDC
- For two connected cells, the Specific Gravity is 1.180
- For all connected cells, the average Specific Gravity is 1.202
- Electrolyte temperature is 76°F

Based on the conditions above, per Tech Spec 3.8.6 (Battery Cell Parameters), Battery EVCA is considered (1) .

The operability of the DC Distribution System ensures that at least ONE DC (2) is available assuming a loss of off-site OR on-site power coincident with a worst case single failure.

Which ONE (1) of the following completes the statements above?

REFERENCE PROVIDED

- A. 1. Inoperable
2. Train
 - B. 1. Operable but Degraded
2. Train
 - C. 1. Inoperable
2. Channel
 - D. 1. Operable but Degraded
2. Channel
-

General Discussion

Since two battery cell Specific Gravities are greater than .020 below the average of all the cells (i.e. $1.202 - .020 = 1.182$), the battery has to be declared INOPERABLE immediately.

The TS 3.8.6 Basis states that "The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining at least one train of DC sources OPERABLE during accident conditions."

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is plausible if the applicant concludes that battery condition is related to Category A or B. If so, this would be chosen as a correct response.

Part 2 is correct.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is correct.

Part 2 is plausible if the applicant does not recall the requirements for DC subsystem operability from the Tech Spec 3.8.6 Basis.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Part 1 is plausible if the applicant concludes that battery condition is related to Category A or B. If so, this would be chosen as a correct response.

Part 2 is plausible if the applicant does not recall the requirements for DC subsystem operability from the Tech Spec 3.8.6 Basis.

Basis for meeting the KA

KA matched because the applicant must determine operability of selected safety-related equipment.

Basis for Hi Cog

This is a higher cognitive level question because the applicant must apply the Technical Specification provided to the conditions given and recall from memory details from the Technical Specification Basis to determine the correct response.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(2) (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs

While there are less than 1 hour tech specs actions associated with this TS, the question is asking the applicant to have knowledge from the TS Basis and know less than 1 hour knowledge of the spec.

2) This question can NOT be answered by knowing information listed "above-the-line".

The required knowledge to answer this question is not "above-the-line" knowledge.

3) This question can NOT be answered by knowing the TS Safety Limits or their bases.

This question is not related to TS Safety Limits.

4) This question requires the applicant to apply the spec and have knowledge of the TS basis to determine the correct response. Therefore, it is SRO-level knowledge.

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A

2012 MNS SRO NRC Examination

QUESTION 96

96

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	2008 MNS NRC Q81 (Bank 3299)

Development References

References:

Tech Spec 3.8.6 (Battery Cell Parameters)

Tech Spec 3.8.6 Basis

Learning Objectives:

OP-MC-EL-EPL Objectives 3 and 22

Student References Provided

Tech Spec 3.8.6

GEN2.2 2.2.37 - GENERIC - Equipment Control

Equipment Control

Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)

401-9 Comments:

Remarks/Status

GEN2.3 2.3.12 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 45.9 / 45.10)

Given the following conditions:

- A General Emergency has been declared
- All Emergency Response facilities are activated
- A non-licensed operator must be dispatched from the Operations Support Center to the 1B ND pump room to perform actions necessary to protect the pump from damage
- The 1B ND pump room general area is 30 R/hr
- The operator must transit through a 15 R/hr high radiation area for 2 minutes to reach the 1B ND pump room

Which ONE (1) of the following is MAXIMUM amount of time that the Operator can stay in 1B ND pump room and not exceed the allowable emergency exposure limit for this task as specified in RP-004 (General Emergency)?

- A. 8 minutes
 - B. 9 minutes
 - C. 18 minutes
 - D. 19 minutes
-

General Discussion

In accordance with RP-004 (General Emergency), the emergency exposure limit for this task is 10 REM (protecting valuable equipment).

The operator must transit through a 15R/hr area to get to the 1B ND pump room.

Therefore:

$$15 \text{ R/hr} \div 60 \text{ min/hr} = 0.25 \text{ R/min}$$

So, exposure for the transit:

$$0.25 \text{ R/min} \times 4 \text{ min (2 min each way)} = 1 \text{ R total (leaving 9 R for work in the room)}$$

Exposure in the room:

$$30 \text{ R/hr} \div 60 \text{ min/hr} = 0.5 \text{ R/min}$$

Allowable Stay Time in room:

$$9 \text{ R} \div 0.5 \text{ R/min} = 18 \text{ min.}$$

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible if the applicant concludes that the emergency exposure limit is 5 REM which is the limit specified in RP-004 (General Emergency) for all work except that to protect "valuable equipment", "lifesaving", or "protect the public" (which have higher emergency dose limits).

If the applicant concludes that 5 REM is the limit and performs all other calculations correctly this would be the correct answer.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible if the applicant concludes that the emergency exposure limit is 5 REM which is the limit specified in RP-004 (General Emergency) for all work except that to protect "valuable equipment", "lifesaving", or "protect the public" (which have higher emergency dose limits).

The applicant would also have to calculate the transit time in only one direction to select this as a correct answer. This is plausible as this is a common error for this type of assessment.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible if the applicant calculates the stay time using a transit exposure in only one direction. This is a common error for this type of assessment. If the applicant recalls the correct emergency exposure limit and performs the stay time calculation using transit exposure in only one direction, this would be the response selected.

Basis for meeting the KA

The KA is matched because the applicant must have knowledge of radiological safety principles such as calculating stay times to determine the correct response.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. First, it requires the applicant to recall from memory the emergency exposure limit for the task described. The applicant must then perform a calculation to determine the maximum stay time to prevent exceeding that emergency exposure limit.

Basis for SRO only

This is an SRO-level question as described in "Clarification Guidance for SRO-only Questions" Rev 1 dated 03/11/10 Section II.D (Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions. [10 CFR 55.43(b)(4)].

The question involves "analysis and interpretation of radiation and activity readings" as they relate to "emergency" procedures in that the applicant must recall emergency exposure limits from RP-004 (General Emergency) and apply that knowledge to the conditions given to analyze the proposed task and determine how long the Operator may stay in the 1B ND pump room. Knowledge of emergency exposure limits is SRO-level knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
References: RP-004 (General Emergency)
Learning Objectives: OP-MC-RAD-RP Objective 131

Student References Provided

GEN2.3 2.3.12 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 45.9 / 45.10)

401-9 Comments:

Remarks/Status

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 plant conditions:

- You are tasked to evaluate four available teams of NEOs to perform a valve lineup in a 1500 mREM/hr radiation field

Given the following available teams:

TEAM A

NEO A - 200 mREM YTD
NEO B - 4375 mREM YTD

Team A can complete the alignment in 30 minutes.

TEAM B

NEO A - 500 mREM YTD
NEO B - 3950 mREM YTD

Team B can complete the alignment in 45 minutes.

TEAM C

NEO A - 4700 mREM YTD
NEO B - 200 mREM YTD
NEO C - 250 mREM YTD

Team C can complete the alignment 15 minutes.

TEAM D

NEO A - 4400 mREM YTD
NEO B - 1000 mREM YTD
NEO C - 500 mREM YTD

Team D can complete the alignment in 20 minutes.

Which ONE (1) of the available teams should be selected based on maintaining station radiation dose ALARA without allowing any individual worker to exceed an annual exposure limit?

- A. Team A
- B. Team B
- C. Team C
- D. Team D

General Discussion

To maintain station dose ALARA, the worker/team with the lowest dose for the job consistent with meeting all other exposure limits should be selected.

Team A would receive 750 mREM each and a team total of 1500 mREM. However, Worker B would exceed their annual exposure limit.

Team B would receive 1000 mREM each for a team total of 2000 mREM. Consequently, the total exposure for the valve alignment would be the highest of all teams.

Team C would receive 375 mREM each for a team total of 1125 mREM. This is the lowest total exposure of all teams. However, Worker A would exceed their annual exposure limit.

Team D would receive 500 mREM each for a team total of 1500 mREM. This is the second lowest exposure (tied with Team A) for the valve alignment. While Team D has the highest overall exposure of any team (i.e. total annual exposure + team exposure for the valve alignment), they are the best choice because of low team exposure and the fact that no one will exceed their annual exposure limit.

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because the total team exposure for the valve alignment is low (i.e. the second lowest for all teams). The only team with a lower total exposure for the valve alignment (Team C) can NOT be used because Worker A will exceed the NRC annual exposure limit. Therefore, if the applicant does not realize that Worker B would exceed the NRC annual exposure limit, they would conclude that this would be the best team.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because Team B has the lowest total team exposure prior to the valve alignment. If the applicant does not realize that Team B total team exposure for the valve alignment is the highest of all teams, they could conclude that Team B is the best choice.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

This answer is plausible because Team C would have the lowest total team exposure for the valve alignment. If the applicant does not realize that Worker A would exceed the NRC annual exposure limit, they would conclude that Team C is the best choice.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The KA is matched because the applicant must evaluate the radiation hazard to a team of workers performing a valve alignment.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. It requires the applicant to perform multiple calculations and compare the results of all those calculations to each other and to recalled memory to determine the best choice.

Basis for SRO only

This question is SRO level knowledge because it can not be answered solely by RO knowledge of radiological safety principles (e.g., RWP requirements, stay-time, DAC-hours, etc.).

It requires the applicant to analyze the makeup of the available teams with regards to the total exposure for the job and the accumulated annual exposure for the teams and make a determination as to which team would be the correct choice to maintain station dose ALARA.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
References: Lesson Plan OP-MC-RAD-RP
Learning Objectives: Lesson Plan Objective RAD-RP #135

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

GEN2.4 2.4.43 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of emergency communications systems and techniques. (CFR: 41.10 / 45.13)

Given the following plant conditions:

- A Notification of Unusual Event (NOUE) has been declared
- The initial notification to the State and Counties has been made using the Selective Signaling System

- 1) Assuming plant conditions remain the same, how often are follow-up notifications required?
 - 2) In accordance with RP-029 (Notifications to Offsite Agencies from the Control Room), if the Selective Signal System fails, what is the FIRST backup system that is used to contact the State and Counties?
-
- A.
 1. Every hour
 2. Standard Phone Lines
 - B.
 1. Every four hours
 2. Standard Phone Lines
 - C.
 1. Every hour
 2. Wireless Radio System
 - D.
 1. Every four hours
 2. Wireless Radio System
-

General Discussion

Since the declared event is an Unusual Event, the follow-up notification time is 4 hours. If the event was an Alert or higher, the follow-up time would be 1 hour.

In accordance with RP-029 (Notifications to Offsite Agencies from the Control Room) the first system that would be used to contact the State and Counties should the Selective Signaling System fail would be the Standard Phone Lines. If the Standard Phone Lines did not work the next system would be the Wireless Radio System.

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

The first part of the answer is plausible because this would be the correct follow-up time if the declared emergency was an Alert or higher.

The second part of the answer is correct.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

The first part of the answer is plausible because this would be the correct follow-up time if the declared emergency was an Alert or higher.

The second part of the answer is plausible because this is the system that would be used if the Selective Signaling System and Standard Phone Lines were unavailable.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

The first part of the answer is correct.

The second part of the answer is plausible because this is the system that would be used if the Selective Signaling System and Standard Phone Lines were unavailable.

Basis for meeting the KA

The KA is matched because the applicant must have knowledge of the systems used to communicate with offsite agencies in the event of an emergency. Also, by demonstrating a knowledge of when follow-up notifications are required, the applicant is demonstrating a knowledge of emergency communication techniques.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):

1) The question can NOT be answered solely by knowing systems knowledge.

This question involves knowledge of Emergency Plan Procedures. There is no element of systems knowledge required to answer this question.

2) The question can NOT be answered by knowing immediate operator actions.

This question is related to knowledge of Emergency Plan Procedures which have no immediate actions.

3) The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.

This question is NOT related to procedure entry conditions. It is related to detailed procedure step knowledge within the body of the procedure.

4) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.

This is detailed knowledge of specific procedure step requirements within the body of the procedure.

5) The question requires detailed knowledge of procedure content. Therefore, it is SRO knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References

References:
Lesson Plan OP-MC-EP-EMP, Section 2.1.3
RP-029 (Notifications to Offsite Agencies from the Control Room) Enclosure 4.1 (Completion and Transmission of an Initial Notification Message) & Enclosure 4.2 (Completion and Transmission of a Follow-Up Message)

Learning Objectives:
OP-MC-EP-EMP Objectives 13 & 14

Student References Provided

GEN2.4 2.4.43 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of emergency communications systems and techniques. (CFR: 41.10 / 45.13)

401-9 Comments:

Remarks/Status

GEN2.4 2.4.44 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of emergency plan protective action recommendations. (CFR: 41.10 / 41.12 / 43.5 / 45.11)

Which ONE (1) of the following describes the MINIMUM classification which REQUIRES a Protective Action Recommendation (PAR) to be made, AND the MINIMUM radius that requires evacuation if a PAR is required?

- A. Site Area Emergency; 2 mile radius
 - B. Site Area Emergency; 5 mile radius
 - C. General Emergency; 2 mile radius
 - D. General Emergency; 5 mile radius
-

General Discussion

In accordance with RP-004 (General Emergency) a Protective Action Recommendation (PAR) for the general public is required as part of the notification of General Emergency.

There is no requirement in RP-003 (Site Area Emergency) to make a Protective Action Recommendation to the general public. However, on-site PARs can be made (e.g. site evacuation) and in some instances are made during a Site Area Emergency. Additionally, a Site Assembly is required as an on-site protective action in the event of a SAE.

In the event a PAR is required all zones with 5 miles of the plant are required to evacuate if wind speeds are less or equal to 5 MPH. If wind speed is greater than 5 MPH, the area within 2 miles of the plant and all zones 5 miles downwind are required to evacuate.

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Site Area Emergency is plausible because on-site PARs can be made at this emergency action level. Also, the protective action of performing a Site Assembly is required for a SAE. It is plausible for the applicant to conclude that since protective actions are required on-site that off-site PARs are required as well.

The second part is correct.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

Site Area Emergency is plausible because on-site PARs can be made at this emergency action level. Also, the protective action of performing a Site Assembly is required for a SAE. It is plausible for the applicant to conclude that since protective actions are required on-site that off-site PARs are required as well.

The second part is plausible because both initial PARs require some type of action at the five mile radius. In the event a PAR is required all zones with 5 miles of the plant are required to evacuate if wind speeds are less or equal to 5 MPH. If wind speed is greater than 5 MPH, the area within 2 miles of the plant and all zones 5 miles downwind are required to evacuate. If the applicant recalls the 5 mile radius requirement from both initial PAR requirements and does not recall the 2 mile requirement, this answer is plausible.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:

General Emergency is correct.

The second part is plausible because both initial PARs require some type of action at the five mile radius. In the event a PAR is required all zones with 5 miles of the plant are required to evacuate if wind speeds are less or equal to 5 MPH. If wind speed is greater than 5 MPH, the area within 2 miles of the plant and all zones 5 miles downwind are required to evacuate. If the applicant recalls the 5 mile radius requirement from both initial PAR requirements and does not recall the 2 mile requirement, this answer is plausible.

Basis for meeting the KA

The KA is matched because the applicant must have knowledge of when protective action recommendations are required and the minimum distance from the plant which must be evacuated when a PAR is made.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in the Clarification Guidance for SRO-only Questions Rev 1 dated 03/11/2010 for screening questions linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):

1) The question can NOT be answered solely by knowing systems knowledge.

This is strictly knowledge of the administrative requirements during a declared emergency as specified in an RP procedure.

2) The question can NOT be answered by knowing immediate operator actions.
 The actions of RP-004 (General Emergency) and RP-029 (Notifications to Offsite Agencies from the Control Room) are not immediate actions.

3) The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
 The actions requires are not related to AOP or EOP entry conditions. The actions required are administrative requirements from an RP procedure.

4) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.
 This is detailed knowledge of administrative procedural requirements.

5) The question requires the applicant to know when to implement an attachment to a procedure (i.e. Enclosure 4.4, Protective Action Recommendations) and detailed procedure step knowledge from that attachment. Therefore, it is SRO knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	2008 MNS Audit Q99 (Bank 3419)

Development References

References:
 RP-004 (General Emergency)
 RP-029 (Notifications to Offsite Agencies from the Control Room) Enclosure 4.4 (Protective Action Recommendations)

Student References Provided

GEN2.4 2.4.44 - GENERIC - Emergency Procedures / Plan
 Emergency Procedures / Plan
 Knowledge of emergency plan protective action recommendations. (CFR: 41.10 / 41.12 / 43.5 / 45.11)

401-9 Comments:

Remarks/Status