

Catawba 2013-301

Catawba submitted a 213-page combined RO/SRO draft written exam for the 2013-301 exam. The following are pages 161-213, which comprise the SRO portion of the draft exam.

**CNS 2013 NRC Exam 100 Questions
Current Revision as of 7/12/13
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Question 76

008AA2.28

Pressurizer Vapor Space Accident

Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident:

Safety parameter display system indications

Given the following Unit 1 conditions and times:

- 1000 1NC-34A fails OPEN and cannot be closed or isolated. Reactor is manually tripped. Crew enters EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
- 1002 NC pumps are tripped due to loss of subcooling.
- 1003 NO CA pumps are on.
- 1005 Containment pressure peaks at 2.3 psig.
- 1007 Core Exit Thermocouples indicate 1050°F.
- 1009 All S/G narrow range levels indicate 8%.
- 1010 Lower Range RVLIS level indicates 54%.
- 1011 CRS reaches the transition guidance of step 23 of E-0.

Which ONE of the following steps will the CRS read next?

- A. Step 24 of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)
- B. Step 1 of EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant)
- C. Step 1 of EP/1/A/5000/FR-C.2 (Degraded Core Cooling)
- D. Step 1 of EP/1/A/5000/FR-H.1 (Loss of Secondary Heat Sink)**

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QUESTION 76

Distractor Analysis

- A. **Incorrect.** Plausible if the applicant is not aware that the open Pzr PORV requires the crew to transition out of E-0.
- B. **Incorrect.** Plausible if the applicant does not realize that entry conditions of F-0 will be analyzed first, or does not realize that entry conditions are met.
- C. **Incorrect.** Plausible if the applicant does not realize that FR-H.1 takes priority over FR-C.2, or if applicant does not realize that entry condition exist for FR-H.1.
- D. **CORRECT.** Transition guidance of E-0 directs the crew to implement functional recovery guidelines of F-0 and then go to E-1. Upon review of F-0 it should be determined that FR-H.1 needs to be entered based on <450 gpm feed flow and all S/G levels <11%.

References:

- EP/1/A/5000/E-0, (Reactor Trip or Safety Injection), step 23, Revision 041
- F-0, (Critical Safety Function Status Trees), Revision 008

KA Match:

The KA is matched because many of the parameters in the stem are indicated as part of the SPDS; e.g., S/G levels, RVLIS level, CETs, containment pressure. By selecting the correct answer to this question, the SRO applicant is demonstrating an ability to determine a course of action in the appropriate procedure, and has also demonstrated the ability to interpret indications for a Vapor Space LOCA (a PORV has failed open).

Cognitive Level: **High**

Requires analysis of multiple parameters, and the recall of procedure content to select the appropriate procedure.

Source of Question: **New**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 77

011EG2.4.41

Large Break LOCA

Knowledge of the emergency action level thresholds and classifications

Given the following Unit 1 conditions:

- The Unit was initially at 100%.
- A large break LOCA occurred 45 minutes ago.

Currently:

- Containment pressure indicates 9 psig.
- Containment hydrogen concentration is 1%.
- CETs indicate 1100°F.
- RVLIS lower range level indicates 48%.
- 1EMF- 53A indicates 165 R/hr.
- Subcooling margin indicates -35°F.
- All S/G NR levels are off scale LOW.
- NO CA flow indicated.

Which ONE of the following is the classification and associated EAL Number for this event?

Reference Provided

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

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QUESTION 77

Distractor Analysis

- A. Incorrect. This answer is plausible if the applicant fails to recognize that the conditions given represent a "Loss of NCS Barrier". A valid Heat Sink Red Path is represented in the stem which, taken alone, constitutes only 4 Points for the NCS Barrier (Potential Loss) in the Matrix and resulting in a total of 9 points and a classification of SAE with an EAL of 4.1.S.2.
- B. Incorrect. This answer is plausible if the applicant incorrectly applies the containment radiation indication and determines that a potential loss of containment applies. This designation is time dependent and it is possible to misread this scale when evaluating a given indication.

- C. **CORRECT**. The applicant has been given a set of conditions associated with a large break LOCA and a copy of the Fission Product Barrier Matrix, then asked to determine the event classification. The conditions given result in the following determinations per **RP-001 Enc 4.1 (Fission Product Barrier Matrix) 5 pages**.

(Containment Barrier)---0 point - Close to Potential loss due to Containment Rad. Monitor EMF-53A or 53B reading @ time since shutdown (45 min) > 170 R/hr @ 0.5 - 2 hr.
(Reading 165 R/hr)

(NCS Barrier)--- 5 Points--- Loss due to "GREATER THAN available makeup capacity as indicated by a loss of NCS Subcooling" (Subcooling margin indicates -35 deg)

(Fuel Clad Barrier)--- 5 Points--- Loss due to Containment radiation monitor EMF 53A or 53B reading >43 R/hr 45 minutes since shutdown.

The result of the evaluation above is a total of 10 points (4.1.S.1) (Loss of Both Nuclear Coolant System and Fuel Clad) and the corresponding classification of "Site Area Emergency".

- D. Incorrect. This answer is plausible if the applicant incorrectly determines that a loss of the containment barrier exists but correctly determines the loss of the other two barriers. This would result in a total of 13 points, a General Emergency classification with an EAL# 4.1.G.1.

References:

- RP-001, Enclosure 4.1 (Fission Product Barrier Matrix), Revision 029

Provide to Applicant:

- **RP-001 Enc 4.1 (Fission Product Barrier Matrix) 5 pages**

KA Match:

By its nature, this KA is an SRO level KA. The KA is matched because the question contains emergency conditions for the applicant to analyze, and along with usage of a Fission Product Barrier Matrix (part of the EPlan), determines the category of the emergency, including which EAL that is based on.

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Cognitive Level: **High**

Requires analysis of an emergency condition with numerous operating parameters, and application of knowledge of a classification procedure to arrive at the correct answer.

Source of Question: **Bank 4428**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 78

025AG2.4.34

Loss of RHR System

Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects

Given the following Unit 1 conditions:

- Unit 1 evacuated the Control Room due to a Fire Event.
- The decision is made to initiate a cooldown to Mode 5.
- Attempts to place the ND system in service have failed due to loss of power to 1ND-1B (ND Pump 1A Suction from Loop B).

(1) The CRS will use _____ (1) _____ for the detailed steps needed for aligning alternate power to 1ND-1B.

(2) Following the alternate power alignment, the Reactor Operator will be dispatched to the _____ (2) _____ in order to open the valve.

- A. (1) AP/0/A/5500/045, (Plant Fire)
(2) Breaker Faceplate
- B. (1) AP/0/A/5500/045, (Plant Fire)
(2) Annulus TBOX
- C. (1) OP/1/A/6200/004, (Residual Heat Removal System)**
(2) Breaker Faceplate
- D. (1) OP/1/A/6200/04, (Residual Heat Removal System)
(2) Annulus TBOX

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QUESTION 78

Distractor Analysis

- A. Incorrect. AP/45 (Plant Fire) is a lengthy procedure, which could lead an applicant not familiar with procedure content to think that detailed procedure steps for this alternate power alignment would be contained in the abnormal procedure for plant fire (AP/45). There are several places in that procedure that DO give detailed directions on alternate power alignments, and numerous others that make reference to alternate power alignments. For example, AP/45, Enclosure 4, Step 1 gives detailed direction on aligning alternate power to 1EMXS. But these directions are not for the component given in the stem of the question.

The second part is correct.

- B. Incorrect. See answer A for description concerning first part. The second part is also incorrect, but plausible because the alternate power supply is connected to the annulus TBOX.
- C. **CORRECT.** To answer this question the SRO applicant must recognize that several abnormal procedures apply, including:

AP/45 - Plant Fire
AP/17, Loss of Control Room
AP/19, Loss of Residual Heat Removal System

The applicant must recognize that the conditions constitute a Loss of RHR, and that AP/19 applies. AP/19, Enclosure 8 (Restoring An ND Train to Operation), Step 14 RNO refers the CRS to OP/1/A/6200/004, (the operating procedure for RHR) for alignment of an alternate power supply to the loop suction valves. To supply alternate power to 1ND-1B, OP/1/A/6200/004 directs connection of a temporary cable in the annulus. The procedure also directs operation of the valve from breaker 1EMXC-F02A faceplate.

- D. Incorrect. The first part is correct. See answer B for description of second part.

References:

- OP/1/A/6200/004, (Residual Heat Removal System), Encl 4.4, Revision 136
- AP/0/A/5500/045, (Plant Fire), Enclosure 4, Step 1, Revision 008
- AP/1/A/5500/019, (Loss of Residual Heat Removal System), Enclosure 8, Step 14, Revision 58
- AP/1/A/5500/017, (Loss of Control Room), Case II, "Loss of Plant Control Due to Fire or Security Event", Revision 57
- ND Lesson Plan, Section 6.5, Alternate Power Supply to ND-37A and ND-1B, Pg 42, Revision 100

KA Match:

Conditions involving a loss of RHR (no suction path) are given, and applicant is tested on a task performed by the RO during the emergency, including the "resultant operational effects", which are that the valve is operated from an alternate location.

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Cognitive Level: Low

Source of Question: New

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 79

056AA2.88

Loss of Off-site Power

Ability to determine and interpret the following as they apply to the Loss of Offsite Power:

Necessary S/G water level for natural circulation

Given the following Unit 1 conditions:

- The Unit tripped due to a loss of offsite power.
- The CRS is currently reading step 9 of EP/1/A/5000/ES-0.2 (Natural Circulation Cooldown) for verification of natural circulation capability.

For these conditions:

(1) One requirement of this step is that N/R levels in all S/Gs be at least GREATER THAN _____ .

(2) The Background Document for ES-0.2 states that the basis for Step 9 is to prevent _____ .

- A. (1) 11%
(2) uneven cooling which could impact cooldown
- B. (1) 29%
(2) uneven cooling which could impact cooldown
- C. (1) 11%
(2) **void formation which could impact depressurization**
- D. (1) 29%
(2) void formation which could impact depressurization

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QUESTION 79

Distractor Analysis

A. Incorrect. The S/G level is correct for non-ACC conditions

The second part is plausible because Step 8 of ES-0.2 includes the necessity to attempt to maintain equal pressures in S/Gs in to order to prevent uneven cooling of the NC system.

B. Incorrect. The S/G level is plausible because this value would be correct if adverse containment conditions existed (29%). But ACC is only if containment pressure is > 3.0 psig. For the given conditions, there is no reason to believe that containment pressure has been significantly impacted. To place a bullet in the stem to that effect would require something similar to "No other event is in progress." This could be seen as potentially teaching in the stem.

C. **CORRECT.** Per Step 9 of ES-0.2, the required S/G level is greater than 11%. Per the Background Document for ES-0.2, Step 9, the basis for the step is to prevent void formation which could impact any further depressurization.

D. Incorrect. The S/G level plausibility is described in "B" above.

The second part is correct.

References:

- ES-0.2 Background Document steps 8 & 9, Revision 002
- EP/1/A/5000/ES-0.2, (Natural Circulation Cooldown), Step, 9, Revision 025

KA Match:

Question stem involves a Loss of Offsite Power and implementation of the Natural Circulation Cooldown procedure. Applicant is tested on interpreting (reasons for the step according to the Emergency Procedure Basis Document), and the necessary water level in the S/Gs for natural circulation.

Cognitive Level: **Low**

Source of Question: **New**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 80

065AG2.4.8

Loss of Instrument Air

Knowledge of how abnormal operating procedures are used in conjunction with EOPs

Given the following Unit 1 conditions:

- The Unit was initially at 100% power.

Subsequently:

- The Unit tripped due to a loss of offsite power.
- VI pressure is currently 68 psig and decreasing.
- Attempts to start the diesel back-up VI compressor have been unsuccessful.

Note:

AP/0/A/5500/022 (Loss of Instrument Air)

EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)

EP/1/A/5000/ES-0.1 (Reactor Trip Response)

_____ (1) _____ contain(s) guidance to align N2 from 1A and 1B CLAs to PZR PORVs.

_____ (2) _____ will direct concurrent implementation of AP actions with EP actions.

- A. (1) AP-22 and ES-0.1
(2) E-0, Step 5
- B. (1) AP-22 and ES-0.1
(2) ES-0.1, Step 14**
- C. (1) AP-22 ONLY
(2) E-0, Step 5
- D. (1) AP-22 ONLY
(2) ES-0.1, Step 14

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QUESTION 80

Distractor Analysis

- A. Incorrect. First part is correct. Second part is plausible if applicant believes that E-0 contains specific direction to implement AP actions upon transition to ES-0.1.
- B. **CORRECT.** Step 1 of AP/22 and step 2 of ES-0.1 both address the loss of control air to PZR PORVs due to low instrument air pressure by aligning N2 from cold leg accumulators. Although some abnormal procedures may be performed with emergency procedures in some circumstances, step 14 of ES-0.1 specifically directs implementation of abnormal procedures as required.
- C. Incorrect. First part is plausible if the applicant is unaware that ES-0.1 contains guidance to align backup air supply to PZR PORVs when instrument air pressure is low. Second part is plausible if applicant believes that E-0 contains specific direction to implement AP actions upon transition to ES-0.1.
- D. Incorrect. First part is plausible if the applicant is unaware that ES-0.1 contains guidance to align backup air supply to PZR PORVs when instrument air pressure is low. Second part is correct.

References:

- AP/0/A/5500/022 (Loss of Instrument Air), Step 1, Revision 034
- EP/1/A/5000/E-0 (Reactor Trip or Safety Injection), Step 5, Revision 40
- EP/1/A/5000/ES-0.1 (Reactor Trip Response), Step 2 and 14, Revision 038
- OMP 1-7, (Emergency/Abnormal Procedure Implementation Guidelines), Revision 39, Step 7.5

KA Match:

The KA is matched because the question involves a loss of instrument air, including unsuccessful backup air supplies. For a particular lineup to provide a backup source of operating fluid (N2) for operating the PORVS, the applicant must select which procedure (AP used in conjunction with EPs) contains the guidance for steps to perform this alternate lineup.

Cognitive Level: **High**

Requires an evaluation of plant conditions, recall and application of system knowledge, recall of and recognition of procedure content for arriving at the correct answer.

Source of Question: **New**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 81

WE04EA2.1

LOCA Outside Containment

Ability to determine and interpret the following as they apply to the (LOCA Outside Containment)

Facility conditions and selection of appropriate procedures during abnormal and emergency operations

Given the following Unit 1 conditions:

- The Unit has experienced a loss of all offsite power, concurrent with a valid Safety Injection.
- Control Room indications are:
 - Containment pressure 0.13 psig
 - Containment sump level 0.5 feet
 - PZR level 7% and decreasing
 - PZR pressure 1820 psig and decreasing
 - EMF-1 (522 FF-57 AUX BLDG 522) Trip 2
 - ND A Train discharge flow to the cold legs is 60 gpm and slowly decreasing.
 - ND A Train discharge pressure is 530 psig.
 - ND B Train discharge flow to the cold legs is 0 gpm.
 - ND B Train discharge pressure is 530 psig.

Once EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) has been implemented, which ONE of the following describes the required sequence of procedures and the action(s) for isolating ND?

- A.
 1. Isolate both trains of ND per OMP 1-7
 2. EP/1/A/5000/ES-1.1 (SI Termination)
- B.
 1. Isolate both trains of ND per OMP 1-7
 2. EP/1/A/5000/ECA-1.2 (LOCA Outside Containment)
 3. EP/1/A/5000/ES-1.1 (SI Termination)
- C.
 1. EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant)
 2. Isolate A or B Train of ND
 3. EP/1/A/5000/ES-1.1 (SI Termination)
- D.
 1. **EP/1/A/5000/ECA-1.2 (LOCA Outside Containment)**
 2. **Isolate A or B Train of ND**
 3. **EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant)**

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QUESTION 81

Distractor Analysis

- A. Incorrect. This distracter is written assuming the crew incorrectly isolates ND and then meets the required conditions for SI termination.
- B. Incorrect. This distracter is written assuming the crew incorrectly isolates ND and then continues in the appropriate flow path using existing indications.
- C. Incorrect. Assumes the student does not understand the indications of a leak outside containment or does not know the appropriate procedure to use. E-1 is used for all non-outside containment breaks.
- D. **CORRECT.** New simulator crews sometimes want to isolate a ND leak using OMP 1-7 guidance. Per OMP 1-7, General Philosophy #10 crews may take appropriate action to isolate a known leak if the situation requires prompt action. A known leak is one that is confirmed by local verification or redundant control room indications. The confirmation must identify the leak path and exclude all other potential leak paths. This guidance shall not be interpreted to allow isolating a ruptured S/G. This does not allow the isolation of a suspected leak on ND unless the crew has visual proof as to where the leak is. The crew cannot determine which train has the leak from control room indications since the trains are tied together. A crew must enter and take action per ECA-1.2 (LOCA Outside Containment) to isolate the leak. This is written assuming the crew could isolate the ND leak without going to ECA-1.2. The crew would then enter E-0 and immediately terminate SI and go to ES-1.1 (SI Termination).

References:

- OMP 1-7, Emergency/Abnormal Procedure Implementation, Revision 39, Attachment 11.1, Step 10
- EP/1/A/5000/E-0, Revision 41, Step 27 & 42
- EP/1/A/5000/ECA-1.2, Revision 3, Step 2 & 3

KA Match:

The KA is matched because conditions are given that required the SRO applicant to determine that the procedure for LOCA Outside Containment contains the steps needed for mitigation (in this case, isolating the ND (RHR) system).

Cognitive Level: High

High cognitive level because it requires analysis of multiple parameters, recognition of the significance of radiation monitor trip status, and recall/recognition of emergency procedures and administrative guidance on procedure usage to arrive at the correct answer.

Source of Question: Bank 687

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 82

028AG2.2.25

Pressurizer Level Malfunction

Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits

Unit 1 is at 3% during a post refueling startup.

In accordance with Tech Spec 3.3.1, (Reactor Trip System Instrumentation), the High Pressurizer Water Level Trip (1) required because (2) .

- A. (1) IS
(2) of potential overflow of the pressurizer.

- B. (1) is NOT
(2) the Pressurizer High Pressure trip provides a backup signal.

- C. (1) IS
(2) backup protection for the Pressurizer High Pressure trip is required.

- D. (1) **Is NOT**
(2) **sufficient time is available to evaluate conditions and take corrective action.**

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QUESTION 82

Distractor Analysis

- A. Incorrect. Plausible because this trip is required by this Tech Spec, but not at the listed power level.
- B. Incorrect. Plausible because the relationship has been reversed. The high level trip actually provides backup to the high pressure trip.
- C. Incorrect. Plausible because this trip is required by this Tech Spec, but not at the listed power level.
- D. **CORRECT.** The PZR high level trip is required above the P-7 (10%) setpoint. Per Tech Spec 3.3.1 basis, the reason it is not required at lower powers is that there is "sufficient time to evaluate unit conditions and take corrective actions".

References:

- Tech. Spec. 3.3.1, Table 3.3.1-1, (Reactor Trip System Instrumentation), Item 9, "Pressurizer Water Level - High"
- Tech. Spec. 3.3.1 Bases, for Item 9
- Tech. Spec. 3.4.9, Applicability (for plausibility of Modes 1, 2, 3)

KA Match:

With only a casual look at this question it may not appear to match the "Pressurizer Level Malfunction" aspect of the KA. But the malfunction is inherent in the conditions given; i.e., a high Pressurizer Water Level trip. The SRO applicant is also tested on the basis of why the Tech. Specs. require this function.

Cognitive Level: **Low**

Source of Question: **New**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 83

076AG2.2.40

High Reactor Coolant Activity

Ability to apply Technical Specifications for a system

For high activity in the reactor coolant, to ensure that the requirements of Tech. Spec. 3.4.16, (RCS Specific Activity), the SRO is ALSO required to apply the requirements of AP/1/A/5500/018, (High Activity in Reactor Coolant) for NC System Dose Equivalent
_____ (1) _____ .

These RCS Specific Activity limits are based on the _____ (2) _____ Design Basis Accident?

- A. (1) I-131
(2) LOCA outside containment
- B. (1) I-131
(2) Steam Generator Tube Rupture**
- C. (1) Xe-133
(2) LOCA outside containment
- D. (1) Xe-133
(2) Steam Generator Tube Rupture

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QUESTION 83

Distractor Analysis

- A. Incorrect. First part correct. The second part is plausible because the Tech Spec basis references a pipe break outside containment.
- B. **CORRECT.** AP-18 contains requirements to take specific actions contained in LCO 3.4.16 even though activity levels are below those specified in the Tech. Spec. The applicable Tech. Spec. Basis assume a leakage rate of 150 gpd per SG exists.
- C. Incorrect. First part is plausible because Tech Spec 3.4.16 has specific requirements for XE-133. However, there are not restrictive limits listed in AP-18. The second part is plausible because the Tech Spec basis references a pipe break outside containment.
- D. Incorrect. First part is plausible because Tech Spec 3.4.16 has specific requirements for XE-133. However, there are not restrictive limits listed in AP-18. The second part is correct.

References:

- T.S. 3.4.16, Pg. 1
- T.S. 3.4.16 Basis, Revision 4, Pg. 1 & 2
- AP/1/A/5500/018 High Activity in Reactor Coolant, Revision 17, Step 7.b

KA Match:

The KA is matched. Although the G2.2.40 KA is often tested by using a question that requires the applicant to analyze given conditions, then actually use a provided reference (Tech. Spec.) to determine required actions and completion times, this question meets the KA in a new way. The Tech. Spec. for Reactor Coolant System activity is LCO 3.4.16. In order to correctly APPLY this Tech. Spec., the SRO is tested on how the specification is completely and appropriately applied by recalling content from an abnormal procedure that ensures that the Tech. Spec. is applied properly. It lists additional requirements that will ensure the spec. is met. The applicant is also tested on the basis for these specifications.

Cognitive Level: **Low**

Source of Question: **New**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 84

WE03EA2.1

LOCA Cooldown - Depress.

Ability to determine and interpret the following as they apply to the (LOCA Cooldown and Depressurization)

Facility conditions and selection of appropriate procedures during abnormal and emergency operations

Which ONE of the following describes conditions for which selection of EP/1/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization) will be effective in mitigating the effects of a LOCA?

- A. From EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) if pressurizer level can be maintained stable or increasing when normal charging conditions are achieved.
- B. From EP/1/A/5000/E-1 (Loss of Primary or Secondary Coolant), if NC pressure is greater than the shutoff head of the ND pumps.**
- C. From EP/1/A/5000/ES-1.1 (Safety Injection Termination), if NC pressure increases with only one NV pump in service.
- D. From EP/1/A/5000/ES-1.1 (Safety Injection Termination), if NC pressure is greater than the shutoff head of the NI pumps.

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QUESTION 84

Distractor Analysis

- A. Incorrect. Would go to ES-1.2 if PZR level could not be maintained STABLE or INCREASING.
- B. **CORRECT.** Entry conditions for ES-1.2 (Post LOCA Cooldown and Depressurization) are:
-From E-1 step 13 when NC system is greater than the shutoff head of the ND pump
-From ES-1.1 step 7 if NC pressure decreases after stopping all but 1 NV pump
-From ES-1.1 step 11 when PZR level cannot be maintained using normal charging
-From ES-1.1 step 12 when NC system pressure is less than shutoff head pressure of the NI pumps
-From E0 step 27
- C. Incorrect. Would go to ES-1.2 if only 1NV pump running and NC pressure is decreasing.
- D. Incorrect. Would go to ES-1.2 if NC pressure was less than shutoff head of the NI pumps.

References:

- EP/1/A/5000/E-0 (Reactor Trip or Safety Injection), Revision 041
- EP/1/A/5000/E-1 (Loss of Primary or Secondary Coolant), Revision 028
- EP/1/A/5000/ES-1.1 (Safety Injection Termination), Revision 032
- EP/1/A/5000/ES-1.2, (Post LOCA Cooldown and Depressurization), Revision 031

KA Match:

The KA is matched as discussed with the Chief Examiner as explained in the Note below.

Cognitive Level: High

High cognitive level because applicant is required to recall the implications of a particular type of accident scenario (Post LOCA Cooldown and Depressurization) in the context of applying the knowledge of procedure content to effectively address the accident. More than one mental step is involved; therefore, this is a higher cognitive level question.

Source of Question: Bank 1102

Note: This question was discussed with Chief Examiner on 7/9/13 regarding any concern for a backwards logic question. At that time it was determined that the question meets the KA, is SRO only, and meets the requirements of NUREG-1021.

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Question 85

WE10EA2.2

Natural Circ. With Steam Void

Ability to determine and interpret the following as they apply to the (Natural Circulation with Steam Void in Vessel with/without RVLIS)

Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments

Given the following Unit 1 conditions:

- A loss of off-site power resulted in a Unit trip.
- A PZR PORV failed OPEN and has now been isolated.
- A bubble formed in the reactor vessel head while the failed PZR PORV was being isolated.
- The crew is presently cooling down in accordance with EP/1/A/5000/ES-0.3 (Natural Circulation Cooldown with Steam Void in Vessel).

In accordance with Technical Specifications:

- (1) PRIOR TO going below 210°F on any RCS cold leg, the breaker for ONE NV pump and _____ (1) _____ breaker(s) must be racked out and tagged.
- (2) When NC cold leg temperatures are between 70°F and 125°F, the maximum number of NC pumps allowed to be in operation is _____ (2) _____.

Which ONE of the following completes the above statements?

- A. (1) **ONE NI pump ONLY**
(2) **Two**
- B. (1) BOTH NI pumps
(2) Two
- C. (1) ONE NI pump ONLY
(2) Three
- D. (1) BOTH NI pumps
(2) Three

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QUESTION 85

Distractor Analysis

- A. **CORRECT.** Tech Spec. 3.4.12 requires a maximum of two high head injection pumps capable of injecting into the RCS below 210°F. Per this specification, the maximum number of Reactor Coolant Pumps operating between 70°F and 125°F is two.
- B. Incorrect. The first portion is plausible if the applicant does not recognize that one NV pump is already removed from service or does not realize that this Tech Spec allow all high head injection pumps (NV & NI) to be used interchangeably. The second portion is correct.
- C. Incorrect. The first portion is correct. The second portion is plausible if the applicant is not aware of the table listing maximum NC pump operation of Tech. Spec. 3.4.12.
- D. Incorrect. The first portion is plausible if the applicant does not recognize that one NV pump is already removed from service or does not realize that this Tech Spec allow all high head injection pumps (NV & NI) to be used interchangeably. The second portion is plausible if the applicant is not aware of the table listing maximum NC pump operation of Tech. Spec. 3.4.12.

References:

- Tech. Spec. 3.4.12 Low Temperature Overpressure Protection (LTOP), Pg. 1

KA Match:

The KA is matched because conditions involving the use of the procedure ES-0.3 (Natural Circulation Cooldown with Steam Void in Vessel) are given. The SRO is tested on "determining and interpreting" this by demonstrating the ability to interpret a requirement from a Tech. Spec. for LTOP and applying the given conditions to determine the appropriate required action. Further knowledge of adherence to these requirements is tested at the SRO level by testing on a detailed requirement from a Table (below the line) in the contents of a Tech. Spec. on operating restrictions for RCPs (application).

Cognitive Level: **High**

To match the KA the question has to be at the higher cognitive level as follows: to arrive at the correct answer the applicant must analyze the given conditions and determine the required course of action regarding equipment status. Along with this is recall and application of a detailed Tech. Spec. requirement for RCP operating restrictions for the given condition.

Source of Question: **Bank 3202 - Sig Mod**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 86

005G2.2.36

Residual Heat Removal

Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions of operations

Unit 1 is 100% power on 04/26/13.

Given the following timeline:

1000 1A ND pump is removed from service due to a mechanical seal leak.

1200 1B D/G is removed from service due to an oil leak.

In accordance with Technical Specifications, the Unit is required to be placed in Mode 3 no later than _____.

Reference Provided

- A. 04/26/13 at 1900
- B. 04/26/13 at 2300**
- C. 04/29/13 at 1600
- D. 04/29/13 at 1800

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QUESTION 86

Distractor Analysis

- A. Incorrect. Plausible if the applicant applies actions of LCO 3.0.3 immediately upon inoperability of 1B D/G.
- B. **CORRECT.** With 1A ND out of service, the 1B D/G issue creates inoperabilities on both trains due to safety related equipment supported by 1B D/G. This constitutes a condition not addressed by a specific LCO, therefore LCO 3.0.3 should apply. However, LCO 3.8.1 (Condition B) allows 4 hours to declare supported features inoperable when redundant features are inoperable.

Therefore, 1B D/G supported equipment must be declared inoperable by 1600 on 4/26/13 and LCO 3.0.3 is entered at that time, requiring shutdown to Mode 3 within 7 hours.

- C. Incorrect. Plausible because this contains the correct time for LCO 3.5.2 only (1A ND pump).
- D. Incorrect. Plausible because this contains the correct time for LCO 3.8.1 only (1B D/G).

References:

- Tech. Spec. 3.5.2, ECCS - Operating
- Tech. Spec. 3.8.1, AC Sources - Operating
- Tech. Spec. 3.0, LCO Applicability

KA Match:

The KA is matched because the applicant is presented with conditions involving RHR equipment out of service for maintenance, and two hours later, a degraded power source is removed from service for maintenance. The SRO applicant is then required to analyze the effect of the combination of these pieces of equipment on the LCOs in effect, including LCO 3.0.3.

Cognitive Level: High

Higher cognitive level since it involves a calculation, and application of Tech. Spec. requirements, and analysis of the conditions to determine if a Tech. Spec. rule (3.0.3) applies.

Source of Question: New

Provide to Applicant:

- Tech. Spec. 3.8.1, AC Sources – Operating, pages 3.8.1-1, 2, 3, and 4 only

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 87

008A2.08

Component Cooling Water

Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:

Effects of shutting (automatically or otherwise) the isolation valves of the letdown cooler

Given the following Unit 1 conditions:

- The Unit is at 80% power.
- A malfunction has caused 1KC-132 (Letdown Temperature Control Valve) to CLOSE.
- Control Room has received 1AD-7 F/3 (LETDN HX OUTLET HI TEMP).
- Letdown temperature is 145°F and increasing.

(1) This malfunction will initially cause NC system Tave to _____ (1)_____.

(2) Steps for BOTH of the following:

- ✓ restoration of KC flow through the Letdown Heat Exchanger

AND

- ✓ restoration of letdown flow through the mixed bed demineralizers

will be directed using _____ (2)_____ .

- A. (1) Increase
(2) 1AD-7 F/3 Annunciator Response Procedure.
- B. (1) Increase
(2) AP/1/A/5500/021 (Loss of Component Cooling Water).
- C. (1) Decrease
(2) AP/1/A/5500/021 (Loss of Component Cooling Water).
- D. (1) **Decrease**
(2) **1AD-7 F/3 Annunciator Response Procedure.**

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QUESTION 87

Distractor Analysis

- A. **Incorrect.** The first part is plausible because this failure does cause an increase of temperature, but it is letdown temperature. The second part is correct.
- B. **Incorrect.** The first part is plausible because this failure does cause an increase of temperature, but it is letdown temperature. The second part is plausible because high letdown temperature meets the entry criteria for AP/21 and provide specific guidance for isolating letdown upon a complete loss of KC. However, this guidance does not pertain to low KC flow to a single component.
- C. **Incorrect.** First part is correct. The second part is plausible because high letdown temperature meets the entry criteria for AP/21 and provide specific guidance for isolating letdown upon a complete loss of KC. However, this guidance does not pertain to low KC flow to a single component.
- D. **CORRECT.** The loss of letdown heat exchanger cooling will result in increased letdown temperature which will change the affinity of boron to the resin in the mixed bed demineralizer. The increased temperature causes boron to be released from the resin (until the demineralizer is bypassed at 136 F), adding negative reactivity, thereby decreasing primary system temperature. The ARP contains specific guidance for manually operating 1KC-132 upon high letdown temperature.

References:

- 1AD-7, F/3 Annunciator Response Procedure, Revision 076
- AP/1/A/5500/021, (Loss of Component Cooling), Revision 042, Pg. 1 and Step 4
- OP-CN-PS-NV, Lesson Plan for Chemical and Volume Control System, Pg 22, Revision 101

KA Match:

The KA is matched because conditions are given for a malfunction of the letdown temperature control valve. The applicant then predicts the impact of this malfunction, and is required to select a procedure which contains the steps for restoring letdown flow through the demineralizers.

Cognitive Level: **High**

Higher cognitive level as the KA requires a question which predicts an impact based on analysis of given conditions, and then a selection of procedure content.

Source of Question: **New**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 88

026A2.09

Containment Spray

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

Radiation hazard potential of BWST

Given the following:

- 0800 1A NS Pump is started (in recirc alignment to FWST) in preparation of IWP.
- 0815 Unit 1 Safety Injection occurs due to a LOCA.
- 0820 1EMF-53A and 1EMF-53B indicate 112 Rem.
- 0822 1A NS pump has been restored to standby alignment.
- 0825 The OSM declares a Site Area Emergency.
- 0835 Emergency Notification Form is transmitted to States and Counties.
- 0845 ECCS systems are transferred to Cold Leg Recirc Alignment. 1A NS pump is STARTED.
- 0850 It is discovered that the 1A NS Pump manual recirc alignment was NOT isolated when system was restored to standby and it canNOT be isolated.

The next notification will be required at _____ (1) _____ and will be marked _____ (2) _____.

Reference Provided

- A. (1) 0935
(2) Initial
- B. (1) 0935
(2) Follow-up
- C. (1) 0920
(2) Follow-up
- D. (1) **0920**
(2) **Initial**

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QUESTION 88

Distractor Analysis

- A. Incorrect. The first part is plausible because this is the correct answer if the applicant does not recognize the change in classification. The second part is correct.
- B. Incorrect. The first and second part are plausible because these would be the correct answer if the applicant does not recognize the change in classification.
- C. Incorrect. The first part is correct. The second part is plausible because this will not be the first notification.
- D. **CORRECT.** Upon discovery that the NS Pump recirc alignment is not secured constitutes a breach of containment. This breach requires an upgrade in the classification, resulting in a new declaration being completed within 15 minutes (0905) and notification within the following 15 minutes (0920). Since this is the first message in a new classification, it will be marked initial.

References:

- RP/0/A/5000/001, Classification of Emergency, Revision 029, Encl. 4.1, Pg. 1-4, Encl. 4.9, Pg. 1
- RP/0/A/5000/006A, Notifications to States and Counties from the Control Room, Revision 26, pg. 3, Encl. 4.1, Pg. 1 & 2

Provide to Applicant:

- RP-001 Enc 4.1 (Fission Product Barrier Matrix) 5 pages

KA Match:

The KA is matched because conditions involve a problem with the recirc. alignment for a containment spray pump to the borated water storage tank (FWST).

The "predict impacts" aspect of this KA is matched because the SRO applicant is required to analyze the stem conditions and determine that a valve is out of alignment from what is expected. The impact of this is to determine that this is a breach of containment integrity, and that the classification of the emergency will change.

The "control" aspect is met because the SRO must determine what is required for notifications, which is a form of control, particularly in the Eplan. Since this also constitutes a General Emergency, PARs are involved, and this is a form of "mitigating the consequences"; i.e., protecting the public.

Cognitive Level: High

Requires analysis of a timeline of emergency conditions and events, and application of knowledge of EPlan content and requirements to arrive at the correct answer.

Source of Question: New

SRO Only Basis:

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Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 89

062G2.1.30

AC Electrical Distribution

Ability to locate and operate components, including local controls

- (1) The 6.9KV Automatic Fast Transfer switch for 1TA is located on _____ (1) _____ .
- (2) What procedure and related unit condition directs this switch to be placed to DEFEAT?
- A. (1) 1MC-11 in the Control Room
(2) OP/1/B/6300/001, Enclosure 4.4 (Turbine Generator Shutdown)
- B. (1) 1MC-11 in the Control Room
(2) OP/1/A/6350/001 Enclosure 4.14 (Train B Main Power Isolation and Return to Service).
- C. (1) the local panel 1SCPA
(2) OP/1/A/6350/001 Enclosure 4.14 (Train B Main Power Isolation and Return to Service).
- D. (1) the local panel 1SCPA**
(2) OP/1/B/6300/001, Enclosure 4.4 (Turbine Generator Shutdown)

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QUESTION 89**

Distractor Analysis

- A. Incorrect. Switch location is plausible since there are many controls and indications in the main control room for the AC electrical distribution system.

The procedure is correct.

- B. Incorrect. Switch location is plausible since there are many controls and indications in the main control room for the AC electrical distribution system. Procedure is plausible because it is reasonable to believe it would be advantageous to prevent automatic transfer while removing an entire train of offsite power for maintenance activities.

- C. Incorrect. The first part is correct.

Plausibility of the procedure is described in "B" above.

- D. **CORRECT**. Per OP/1/B/6300/001, Enclosure 4.4, Turbine Generator Shutdown, Step 3.24 this switch is located on local Switchgear Control Panel 1SCPA, and is placed to DEFEAT as part of the turbine generator shutdown evolution. The purpose of the DEFEAT position is to eliminate possible equipment damage from surges on a fast transfer. With the main generator offline, the DEFEAT position allows only a slow transfer to occur. It controls the tie breaker and removes sync check relays from the circuit and provides for only a slow transfer (i.e., the bus transfers, but the loads on the bus will deenergize).

References:

- OP-CN-EL-EPB, Lesson Plan for Normal Auxiliary Power Distribution: 6900V, 600V Unit, 600V Shared, Pg 17 & 18, Revision 100
- OP/1/B/6300/001, (Turbine Generator), Enclosure 4.4, "Turbine Generator Shutdown", Step 3.24, Revision 099.

KA Match:

Question tests knowledge of location of a control of the AC Electrical Distribution system, and operation of the control by testing the ability to select the procedure which contains the steps for operation of this control.

Cognitive Level: **Low**

Source of Question: **New**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 90

063A2.02

DC Electrical Distribution

Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:

Loss of ventilation during battery charging

Given the following Unit 1 conditions:

- The Unit is at 100% power.
- Battery 1DGBA has been aligned for an equalizing charge.
- The equalizing charge has been in progress for several hours.
- The following alarm is received:
 - D/G 1A, E/6, (Battery Enclosure Loss of Air Flow)
- A check of the interior Battery Enclosure vents indicates NO air flow.

(1) The impact of the loss of ventilation is that _____ (1) _____.

(2) Procedure guidance for an action to establish partial air circulation and cooling to the Battery Enclosure is located in _____ (2) _____.

- A. (1) unacceptable specific gravity gradients will occur in battery cells.
(2) OP/1/A/6100/009 A (Annunciator Response for 1A D/G Panel).
- B. (1) unacceptable specific gravity gradients will occur in battery cells.
(2) OP/1/A/6350/006 (125 VDC Diesel Auxiliary Power).
- C. (1) an explosive mixture of hydrogen and oxygen may build up in the Battery Enclosure.**
(2) OP/1/A/6100/009 A (Annunciator Response for 1A D/G Panel).
- D. (1) an explosive mixture of hydrogen and oxygen may build up in the Battery Enclosure.
(2) OP/1/A/6350/006 (125 VDC Diesel Auxiliary Power).

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QUESTION 90

Distractor Analysis

- A. Incorrect. The first part is plausible because specific gravity gradients are produced during the charging process. The second part is correct.
- B. Incorrect. The first part is plausible because specific gravity gradients are produced during the charging process. The second part is plausible because the listed procedure contains instructions for startup and shutdown of the D/G Battery Enclosure Air Handling Unit.
- C. **CORRECT.** Per the Limits and Precautions of OP/1/A/6350/006 the ventilation system should remain in operation in order to prevent accumulation of hydrogen gas. The ARP for D/G 1A Panel E/6 (Battery Enclosure Loss of Air Flow) contains detailed instructions for establishing partial air circulation; e.g., propping the door open and ensuring D/G room ventilation is in service.
- D. Incorrect. The first part is correct. The second part is plausible because the listed procedure contains instructions for startup and shutdown of the D/G Battery Enclosure Air Handling Unit.

References:

- Annunciator Response for 1A D/G Panel, E/6, Revision 57, Pg. 51
- OP/1/A/6350/006 (125 VDC Diesel Auxiliary Power), Revision 38, Pg. 2
- T.S. Basis 3.8.6, Revision 4, Pg. 7

KA Match:

The KA is matched because conditions involve a loss of ventilation during battery charging of the DG battery. The applicant must predict the impact of that loss of ventilation, and then select the procedure which contains the details on how to establish partial air circulation to the affected area.

Cognitive Level: High

Involves analysis of plant conditions and prediction of an impact on equipment, and recall of detailed procedure content and application of that knowledge for mitigating the condition.

Source of Question: New

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 91

001G2.2.44

Control Rod Drive

Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions

Given the following:

- Unit 1 has experienced a Loss of Load runback from 100%.
- During the runback, control rods failed to insert in automatic.
- The following alarm is received:
 - 1AD-2, B/9, Control Rod Bank LO-LO Limit

Subsequently:

- The CRS is reading step 15 of AP/1/A/5500/003 (Load Rejection).
 - 15. **Verify the following PCBs - CLOSED:**
- The Steam Dump valves indicate closed on the Main Control Board.
- Tavg-Tref difference indicates 3°F.
- The OATC requests a focus brief for direction concerning control rod insertion.

In response to this request, the CRS will use the guidance found in :

- A. Step 2 of AP/03 to insert control rods until Tavg-Tref difference is no more than 1.5° F.
- B. AP/1/A/5500/015, (Rod Control Malfunction) to stop inserting control rods once steam dumps are closed.
- C. Step 13 of AP/03, "Verify reactor power - less than 30%" RNO to insert control rods until Tavg-Tref difference is no more than 1°F.
- D. **OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines) to stop inserting control rods once steam dumps are closed.**

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QUESTION 91

Distractor Analysis

- A. Incorrect. Plausible because AP/03 (Load Rejection) Step 2 requires control rods to be inserted as required to maintain Tavg within 1.5°F of Tref. However, this guidance will no longer be controlling when steam dumps have closed.
- B. Incorrect. Plausible because entry condition of AP/15 are met due to failure of rods to move. Step 2 of AP/15 requires rods be placed in manual.
- C. Incorrect. Plausible because AP/03 Step 13 provides a list of reactivity controls (including control rods) which must be adjusted in order to maintain Tavg within 1°F of Tref. This step will be accomplished per the direction to borate in order to restore Control Rod Insertion Limits. The CRS should understand that further insertion of Control Rods at this point will complicate efforts to restore Insertion Limits within the required time of 2 hours.
- D. **CORRECT.** Per OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), control rods are placed in manual once steam dumps have closed. This is done to allow time for the SRO to conduct a focus brief related to borating the primary system and evaluating and restoring rod insertion limits.

References:

- OMP 1-7, (Emergency/Abnormal Procedure Implementation Guidelines), Attachment 11.1, "General Statements of Philosophy), Item 14, Revision 039
- AP/1/A/5500/015 Rod Control Malfunctions, Case I, Step 2, Rev. 14
- AP/1/A/5500/003 (Load Rejection), Case I, Step 2 and 13, Revision 041

KA Match:

Control room indications for the control rod drive system are provided in the stem. The SRO applicant is required to interpret the significance of the indications and then use that interpretation to verify if control rod insertion limits are being met. Then the applicant uses that conclusion to select which action will have the desired effect. In this case, the correct answer "desired effect" includes/implies that rod insertion should be discontinued once the steam dumps are closed so that time for a focus brief is taken to discuss whether insertion limits are met.

Cognitive Level: High

Involves analysis of given conditions to determine needed actions, and to apply detailed knowledge of procedure content location for addressing the condition. More than one mental step is involved, and is therefore a higher cognitive level question.

Source of Question: New

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 92

011A2.04

Pressurizer Level Control

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

Loss of one, two, or three charging pumps.

Given the following:

- Unit 1 is 100% on 05/12/13.
- Letdown flow is 110 gpm.

Subsequently:

1200 1B NI Pump was removed from service for seal repair.

1500 1A NV Pump tripped due to breaker fault. The crew has entered AP/1/A/5500/012 (Loss of Charging or Letdown).

- (1) How will Pressurizer level respond following the loss of 1A NV pump?
- (2) If NO equipment is returned to service, when will the unit be required to enter Mode 3?
- A. (1) Decrease at approximately 1% per minute and then decrease at a slower rate when Pressurizer level reaches 17%.
(2) 05/15/13 at 1800
- B. (1) Decrease at approximately 1% per minute and then decrease at a slower rate when Pressurizer level reaches 17%.
(2) 05/12/13 at 2200
- C. (1) Decrease continually at less than 0.1 % per minute.
(2) 05/15/13 at 1800**
- D. (1) Decrease continually at less than 0.1 % per minute.
(2) 05/12/13 at 2200

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QUESTION 92

Distractor Analysis

- A. Incorrect. The first part is plausible if the applicant is not aware of the interlock which isolates letdown flow upon loss of both NV pumps. Loss of charging flow without letdown isolation results in a PZR level decrease of ~ 1%/min until the letdown isolation setpoint of 17% is reached. The second part is correct.
- B. Incorrect. See answer A for first part. The second part is plausible if the applicant applies Tech Spec LCO 3.0.3 due to inoperabilities on opposing trains.
- C. **CORRECT.** With both NV pump breakers tripped, letdown does isolate. The only water being removed from the primary system is ~12 gpm seal leakage (3 per NCP). Since 1% PZR level = 120 gallons, this results in a decrease of ~ 0.1% per minute. LCO 3.5.2 is entered at 1200 on 05/12/13 due to 1B NI pump. The inoperability of 1A NV pump does not change the Tech Spec actions because 100% ECCS flow equivalent is still available. Mode 3 will be required following 72 hours of condition A plus 6 hour requirement of condition B.
- D. Incorrect. See answers A & B for description.

References:

- OP-CN-PS-ILE, Lesson Plan for Pressurizer Level Control, Pg. 47, Revision 100
- OP-CN-PS-NV, Lesson Plan for Chemical and Volume Control System, Pg. 19, 20, Revision 101
- LCO 3.5.2, ECCS - Operating

KA Match:

The KA is matched because initial conditions start with a charging pump out of service for repair. A second charging pump is then lost due a breaker fault. The applicant is tested on predicting the impact of these conditions on the PZR level control, and then analyzes the conditions and the impact to determine a required plant configuration, including whether LCO 3.0.3 applies.

Cognitive Level: **High**

The nature of the A2 KA requires a higher cognitive level question. This is a higher cognitive level question because the applicant must analyze given conditions and predict the impact or response of the PZR level program to the failure. Then based on that prediction, apply the requirements of a Tech. Spec. to arrive at the correct answer.

Source of Question: **New**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 93

028A2.01

Hydrogen Recombiner and Purge Control

Malfunctions or operations on the HRPS; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations:

Hydrogen recombiner power setting, determined by using plant data book

Given the following Unit 1 conditions:

- A LOCA has occurred on the Unit.
- Containment pressure is 2.8 psig.
- Containment Hydrogen Concentration is 1.0% and stable.

- (1) The required power setting for the 'A' Hydrogen Recombiner is _____ (1) _____.
- (2) In accordance with the Background Document for EP/1/A/5000/E-1, (Loss of Reactor or Secondary Coolant), the upper limit of containment hydrogen concentration for operability of the hydrogen recombiners is _____ (2) _____.

Reference Provided

- A. (1) 52 kw
(2) 4%
- B. (1) 57 kw**
(2) 6%
- C. (1) 52 kw
(2) 6%
- D. (1) 57 kw
(2) 4%

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QUESTION 93

Distractor Analysis

- A. Incorrect. The first part is correct if the applicant applies the correct setpoint for “B” Train Hydrogen Recombiner operation. The second part is plausible because the Hydrogen Igniters are designed to maintain containment hydrogen concentration below this value per Tech. Spec. basis.
- B. **CORRECT.** Per the Data Book Figure 1, “A” Hydrogen Recombiner setpoint should be 57 KW for the listed conditions. A hydrogen concentration of 6% corresponds to the upper limit for the hydrogen recombinder (per the E-1 basis document).
- C. Incorrect. The first part is correct if the applicant applies the correct setpoint for “B” Train Hydrogen Recombiner operation. The second part is correct.
- D. Incorrect. The first part is correct. The second part is plausible because the Hydrogen Igniters are designed to maintain containment hydrogen concentration below this value per Tech. Spec. basis.

References:

- Unit 1 Data Book, Figure 1-Unit 1 Hydrogen Recombiners Post-LOCA Power Consumption, Revision 0
- EPG/1/A/5000/E-1 Background Document for E-1, Revision 16, Pg. 14
- Tech Spec Basis 3.6.9 Revision 6, Pg. 3

Provide to Applicant:

- Unit 1 Data Book, Figure 1-Unit 1 Hydrogen Recombiners Post-LOCA Power Consumption, Revision 0

KA Match:

The KA is matched because conditions involve an operation of the Hydrogen Recombiners, including use of the Data Book to determine the correct power setting. At the SRO level, the applicant is tested on basis information from the basis document of E-1 regarding the operability of the hydrogen recombiners for a given % H₂.

Cognitive Level: High

Involves multiple mental steps, including interpretation of a unit curve from the Data Book to determine a power setting.

Source of Question: Bank VX-001-A - Sig Mod

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 94

G2.1.2

Conduct of Operations

Knowledge of operator responsibilities during all modes of plant operation

Assume Unit 1 is at 100% power.

In accordance with Technical Specification 5.0, Administrative Controls, if the Control Room Supervisor needs to leave the control room, an STA with an active license may assume the duties of the Control Room Supervisor provided that:

(1) the CRS or a relief SRO is available to return to the control room within _____ (1) _____

AND

(2) the time during which the STA assumes the SRO duties does not exceed a total time of _____ (2) _____ for the shift duration.

Which ONE of the following completes the above statements?

- A. (1) 10 minutes
(2) 1 hour
- B. (1) 15 minutes
(2) 1 hour
- C. (1) 10 minutes
(2) 2 hours
- D. (1) 15 minutes
(2) 2 hours

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QUESTION 94
Distractor Analysis

- A. **CORRECT.** Technical Specifications allows the Shift Technical Advisor to assume the control room command function and perform the duties of the control room SRO in Modes 1, 2, 3, and 4 during periods when the CRSRO and the relief SRO are required to be absent from the control room.

The following requirements must be met:

- The STA must hold an SRO license for the unit.
 - The CRSRO or relief SRO must be available to return to the control room within 10 minutes.
 - The periods during which the STA may perform the control room SRO duties may not exceed 15 minutes in duration or a total of 1 hour for the entire shift.
- B. Incorrect. This answer is plausible if the applicant confuses the time for the CRSRO or relief SRO to return to the control room with the allowable duration of the relief by the STA.
- C. Incorrect. First part is correct. 2 hours is plausible, since that is another time frame related to shift staffing: Tech. Spec. 5.2, Organization, Section 5.2.2, Unit Staff allows for a 2 hour time frame for required shift crew composition to be less than the minimum requirement of 10 CFR 50.54 (m)(2)(i).
- D. Incorrect. This answer is plausible if the applicant confuses the time for the CRSRO or relief SRO to return to the control room with the allowable duration of the relief by the STA. 2 hours is explained in "C" above.

References:

- TS 5.1, Responsibility
- Tech. Spec. 5.2.2, Unit Staff
- OMP 1-10, Shift Manning and Overtime Requirements, Section 6.1, Shift Manning During Normal Operations, Revision 034
- OP-CN-ADM-NSO5, Lesson Plan for Nuclear System Directives, Site Directives, Operations Management Procedures #5, Shift Activities, Section 4, Shift Manning and Overtime, Revision 101

KA Match:

The KA is matched because the applicant is tested on detailed requirements of Tech. Spec. 5.1, Administrative Controls, for how SROs can be absent from the control room for various periods.

Cognitive Level: **Low**

Source of Question: **Bank 2794 - Sig Mod**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 95

G2.1.5

Conduct of Operations

Ability to locate and use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.

Given the following plant conditions:

- Unit 1 has entered Mode 5 and fuel shuffles are in progress in the Unit 1 Spent Fuel Building.
- Unit 2 is in Mode 6 with core alterations in progress.

- (1) There must currently be a Fuel Handling Supervisor (SRO) designated for _____ .
- (2) The SRO(s) must be active or certified for Fuel Handling in accordance with the certification requirements contained in _____ .

- A. (1) Unit 1 AND Unit 2
(2) NSD 512 (Maintenance of RO/SRO NRC Licenses)
- B. (1) Unit 2 ONLY**
(2) NSD 512 (Maintenance of RO/SRO NRC Licenses)
- C. (1) Unit 1 AND Unit 2
(2) SOMP 01-04 (Conduct of Operations)
- D. (1) Unit 2 ONLY
(2) SOMP 01-04 (Conduct of Operations)

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QUESTION 95

Distractor Analysis

- A. Incorrect. The first part is plausible if the applicant believes that fuel movement within the fuel building requires a Fuel Handling Supervisor. The second part is correct.
- B. **CORRECT.** A Fuel Handling Supervisor is only required during Core Alterations in Mode 6. This individual shall hold an active SRO license or be certified for SRO Fuel Handling in accordance with the certification items listed in NSD 512.
- C. Incorrect. The first part is plausible if the applicant believes that fuel movement within the fuel building requires a Fuel Handling Supervisor. The second part is plausible because SOMP 01-04 does contain responsibilities for the Fuel Handling SRO. However, certification requirements are contained in NSD 512.
- D. Incorrect. The first part is correct. The second part is plausible because SOMP 01-04 does contain responsibilities for the Fuel Handling SRO. However, certification requirement details are contained in NSD 512.

References:

- NSD 512, (Maintenance of RO/SRO NRC Licenses), Revision 6, Section 512.10
- OMP 1-10, (Shift Manning and Overtime Requirements), Attachment 7.1, "Administrative Shift Manning Requirements", Revision 034
- SOMP 01-04, (Conduct of Operations), Attachment 7.5, Section 5. (Fuel Handling SRO), Revision 004

KA Match:

The KA is matched because the applicant is tested on where in the procedures a requirement is located for a Fuel Handling Supervisor to be considered qualified, and then from the given conditions to determine which unit(s) this applies to.

Cognitive Level: High

This question may at first appear to be at the recall level, and the second part most likely is. The first part requires recognition of and interpretation of the significance of unit mode for the two units and then application of that to a requirement from the appropriate procedure.

Source of Question: New

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 96

G2.2.14

Equipment Control

Knowledge of the process for controlling equipment configuration or status

Given the following Unit 1 conditions:

- The Unit is at 100% power.
- 1RL-152 (Main Turbine Lube Oil Coolers Temperature Control) has failed CLOSED.
- An NEO has been dispatched to throttle 1RL-154 (Unit 1 LT Coolers Control Bypass) to stabilize turbine lube oil temperature.
- Near the end of the evolution the NEO is directed to isolate 1RL-152 with 1RL-141 (1A Main Turbine Lube Oil Cooler Inlet).

In accordance with SOMP 02-01, (Safety Tagging and Configuration Control), the SRO will document the operation of 1RL-154 with _____(1)_____, and THEN _____(2)_____ will normally be initiated prior to shift change.

- A. (1) a control room log entry
(2) a Configuration Control Card
- B. (1) a Configuration Control Card
(2) an R & R**
- C. (1) a control room log entry
(2) an R&R
- D. (1) an R & R
(2) a Configuration Control Card

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QUESTION 96

Distractor Analysis

- A. Incorrect. The first portion is plausible because manipulations documented on a Configuration Control Card are to documented in the Autolog Satellite Log. The second portion is plausible because a Configuration Control Card will be initiated.
- B. **CORRECT.** There is an actual procedure for operation of the Main Lube Oil Cooler Bypass Valve (OP/1/B/6300/007, Enclosure 4.7), but it for the situation where the normal lube oil temperature control valve is fully open, and considered beyond the range of being able to maintain lube oil temperature below limits for the given lube oil cooler bypass valve. This procedure provides guidance on how to adjust the bypass valve to get the actual temperature control valve back within controlling range.

The question concerns a FAILURE mode of the temperature control valve - it fails closed. This situation is NOT covered by a procedure, and therefore, a configuration control method (Configuration Control Card) is needed. The SOMP guidance then requires an R&R to be generated prior to shift change.

- C. Incorrect. The first portion is plausible because manipulations documented on a Configuration Control Card are to documented in the Autolog Satellite Log. The second portion is correct.
- D. Incorrect. The first portion is plausible because an R&R will be generated, but not immediately. The second portion is plausible because a Configuration Control Card will be initiated.

References:

- SOMP 02-01 Safety Tagging and Configuration Control, Section 12.5, 12.6, 12.9, Revision 016
-

KA Match:

The KA is matched because detailed conditions must be analyzed. The applicant then recalls and applies knowledge of how equipment configuration status is recorded and controlled.

Cognitive Level: **High**

Applicant must assess conditions and determine that the guidance in SOMP 02-01 for emergency situations DOES apply; a two mental step process to arrive at the correct answer.

Source of Question: **Bank 2996 - Sig Mod**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 97

G2.2.42

Equipment Control

Ability to recognize system parameters that are entry-level conditions for Technical Specifications

Given the following Unit 1 conditions:

- An NCS heatup is in progress in preparation for a Mode change following refueling.
- Tavg is 195°F.
- Outside air temperature is 29°F.
- Only one train of FWST heaters is in service.
- FWST water temperature is 64°F.

Which ONE of the following identifies the status of the FWST and the actions relative to the upcoming Mode Change?

Reference Provided

<u>Status of FWST</u>	<u>Actions Relative to Mode Change</u>
A. Below minimum temperature.	Heatup to Mode 4 is allowed if LCO 3.0.4.b requirements are met.
B. Below minimum temperature.	Heatup must be stopped, and may continue only after FWST temperature is above limits.
C. Above minimum temperature.	Heatup to Mode 4 is allowed if LCO 3.0.4.b requirements are met.
D. Above minimum temperature.	Heatup must be stopped, and may continue only after the other train of FWST heaters is operable.

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QUESTION 97

Distractor Analysis

- A. **CORRECT.** Per LCO 3.5.4 the minimum required FWST temperature for operability is 70°F. LCO 3.5.4 is not one of the Tech. Specs. which are restricted from applying LCO 3.0.4.b, and therefore if these provisions are met, the mode change can be made.
- B. Incorrect. Plausible, since the FWST status is correct (minimum required temperature per LCO 3.5.4 is 70°F). Stopping the heatup is also plausible if applicant fails to recognize that these conditions DO warrant LCO 3.0.4.b application, and that the heatup does not need to be stopped.
- C. Incorrect. Plausible, if applicant believes the FWST minimum temperature required is 60°F, and that the temperature given in the stem conditions is above that. Also plausible since the second half is correct.
- D. Incorrect. Plausible, if applicant believes the FWST minimum temperature required is 60°F, and that the temperature given in the stem conditions is above that. It is also plausible to believe that both trains of FWST heaters need to be operable, since many ESF components are two channel design, with both channels being operable required prior to an upward mode change.

References:

- Tech. Spec. 3.5.4, (Refueling Water Storage Tank), page 1, 2
- Tech. Spec. 3.0.4b

Provide to Applicant: LCO 3.5.4 (Refueling Water Storage Tank), page 3.5.4-1 ONLY

KA Match:

Applicant is presented with a system parameter and then is to determine the effect of the resultant operability of whether the heatup may continue (SRO level knowledge, since it is application of Tech. Spec. rules for mode changes).

Cognitive Level: High

Application of operability parameter knowledge to arrive at a conclusion on operation of the plant.

Source of Question: Bank WBN May 2009 NRC Exam

SRO only note: temp of FWST is contained ONLY in the ts basis; therefore this is application of basis knowledge, and is SRO only.

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 98

G2.3.4

Radiation Control

Knowledge of radiation exposure limits under normal and emergency conditions

SLC 16.11.19 (Gas Storage Tanks) limits the quantity of radioactivity in each Waste Gas Decay Tank (WGDT) to _____ (1) _____. This limit is based on exposure received by a _____ (2) _____ during an accidental release.

Which ONE of the following completes the statement above?

- A. (1) $\leq 97,000$ Curies
(2) Member of the Public
- B. (1) $\leq 97,000$ Curies
(2) Plant Worker
- C. (1) ≤ 10 Curies
(2) Member of the Public
- D. (1) ≤ 10 Curies
(2) Plant Worker

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QUESTION 98

Distractor Analysis

- A. **CORRECT.** Per SLC 16.11.9, the quantity of radioactivity contained in each gas storage tank shall be limited to 97000 Curies of noble gas. Per the basis, this provides assurance that in the event of an uncontrolled release of the tank's contents, the resulting whole body exposure to a member of the public at the nearest site boundary will not exceed 0.5 rem.
- B. Incorrect. The first part is correct. The second part is plausible if the applicant believes that curie content is to protect plant workers who will likely receive higher dose rates from an uncontrolled release of the tank contents.
- C. Incorrect. The first part is plausible because SLC 16.11-17 limits Liquid Holdup Tanks radioactive material content to 10 Curies. The second part is correct.
- D. Incorrect. The first part is plausible because SLC 16.11-17 limits Liquid Holdup Tanks radioactive material content to 10 Curies. The second part is plausible if the applicant believes that curie content is to protect plant workers who will likely receive higher dose rates from an uncontrolled release of the tank contents.

References:

- SLC 16.11-19 Gas Storage Tanks, Revision 0
- SLC 16.11-17 Liquid Holdup Tanks, Revision 0

KA Match:

The KA is matched because the applicant demonstrates knowledge of radiation exposure limits (in the form a curie limitation from a Selected Licensee Commitment on Waste Gas Storage Tanks). If the curie limit is met, then the radiation exposure limit will also be met. The second part of the question goes on to test at the SRO level, further knowledge; i.e., the basis for these exposure limits.

Cognitive Level: **Low**

Source of Question: **New**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 99

G2.4.25

Emergency Procedures/Plans

Knowledge of fire protection procedures

A fire event has occurred inside the Protected Area. The TSC/OSC have been activated.

- (1) In accordance with RP/0/B/5000/029, (Fire Brigade Response), the "Fire Emergency Report " is filled out by the _____ (1) _____ .
 - (2) If required, _____ (2) _____ will direct partial transfer to the SSF.
- A. (1) Fire Brigade Leader
(2) RP/0/B/5000/029, (Fire Brigade Response)
- B. (1) Fire Brigade Leader
(2) AP/0/A/5500/045, (Plant Fire)**
- C. (1) Operations Shift Manager
(2) RP/0/B/5000/029, (Fire Brigade Response)
- D. (1) Operations Shift Manager
(2) AP/0/A/5500/045, (Plant Fire)

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QUESTION 99

Distractor Analysis

- A. Incorrect. The first part is correct. The second part is plausible because RP/29 contains guidance to shift personnel for response to plant fires.
- B. **CORRECT.** RP/29 directs the on duty Fire Brigade Leader to complete the Fire Emergency Report. AP/45 (Plant Fire) directs partial transfer to the SSF if a fire is located in the dedicated areas. (See Note just prior to Step 5, of AP/45.)
- C. Incorrect. The first part is plausible because the Operations Shift Manager is required to approve the Fire Emergency Report. The second part is plausible because RP/29 contains guidance to shift personnel for response to plant fires.
- D. Incorrect. The first part is plausible because the Operations Shift Manager is required to approve the Fire Emergency Report. The second part is correct.

References:

- RP/0/B/5000/029, (Fire Brigade Response), Enclosure 3.1, "Fire Brigade Response without TSC/OSC Activation" NOTE prior to Step 2.9, Revision 028
- NSD 112, Fire Brigade Organization, Training and Responsibilities, Appendix A, "fire Emergency Report", Revision 11
- AP/0/A/5500/045, (Plant Fire), Revision 008

KA Match:

The KA is matched because conditions involve a fire with activation of the TSC. The applicant demonstrates knowledge of the fire protection procedures by being tested on a requirement from the procedure for Fire Brigade. At the SRO level, the applicant is tested on knowledge of these procedures by selecting the procedure containing the details of how a transfer to the SSF (Standby Shutdown Facility) is performed.

Cognitive Level: High

High cog since applicant must assess the meaning of the TSC/OSC activation status and its significance in the context of the fire protection procedures.

Source of Question: New

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.

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Question 100

G2.4.38

Emergency Procedures/Plans

Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required

Given the following plant conditions:

- Both Units are at 100% power.
- 1A NS pump testing is in progress.

In accordance with RP/0/A/5000/007, (Natural Disaster and Earthquake), Enclosure 4.2, "Tornado Warning Issued For York Country OR Tornado On-Site":

(1) If conditions develop that involve sustained winds in excess of 95 mph on site and jeopardize safe operation of both reactors, both units must be placed in at least _____ (1) _____ .

(2) The 1A NS pump testing _____ (2) _____ required to be terminated.

A. (1) Mode 5
(2) is

B. (1) Mode 5
(2) is NOT

**C. (1) Mode 3
(2) is**

D. (1) Mode 3
(2) is NOT

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QUESTION 100

Distractor Analysis

- A. Incorrect. The first part is plausible because this is also a shutdown mode. Also, RP/07 requires the plant to be shutdown to Mode 5 for certain earthquake scenarios. The second part is correct.
- B. Incorrect. The first part is plausible because this is also a shutdown mode. Also, RP/07 requires the plant to be shutdown to Mode 5 for certain earthquake scenarios. The second part is plausible if the applicant is not familiar with the requirements of RP/07 and reasons that shutting off a containment spray pump, and taking the time to secure testing during would not be prudent for these conditions.
- C. **CORRECT.** RP/07 requires both units to be taken to Mode 3 in the event of sustained winds, lasting 15 minutes, in excess of 95 mph. This procedure also contains a detailed list of operations that are required to be terminated, one of which is any NS pump testing.
- D. Incorrect. The first part is correct. The second part is plausible if the applicant is not familiar with the requirements of RP/07, and reasons that shutting off a containment spray pump, and taking the time to secure testing during would not be prudent for these conditions.

References:

- RP/0/A/5000/007, (Natural Disaster and Earthquake), Enclosure 4.2, "Tornado Warning Issued For York County OR Tornado On-Site", Step 1.1, and Step 1.9.2, Enclosure 4.4 "Earthquake", Step 2.2, Revision 038

KA Match:

K/A is matched because the question tests the ability of the SRO applicant to recognize emergency conditions involving a tornado and knowledge of required actions as the emergency coordinator.

Cognitive Level: **High**

Requires more than one mental step to arrive at the correct answer. Recognition of significance of a wind speed and then application of that to determine the required mode for both units.

Source of Question: **New**

SRO Only Basis:

Please see attached and highlighted excerpt of "Clarification Guidance for SRO-only Question", Revision 1 for justification of why this is SRO only level knowledge.