

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 76

011EA2.10

Large Break LOCA

**Ability to determine or interpret the following as they apply to a Large Break LOCA:
Verification of adequate core cooling**

Unit 1 was at 100% power. The following conditions exist:

- NC Subcooling = (-) 35 deg F
- Core Exit Temperature = 836 deg F
- Containment Pressure = 4.2 psig
- Reactor Vessel Level = 40%
- Intermediate Range SUR = (-) 0.3 dpm
- Pressurizer Level is off scale low

Following successful completion of the applicable procedure, S/G pressures will be approximately (1) and RVLIS level will be greater than a minimum of (2) .

- A. (1) 125 psig
 (2) 41%
- B. (1) 125 psig
 (2) 61%
- C. (1) atmospheric pressure
 (2) 41%
- D. (1) **atmospheric pressure**
 (2) **61%**

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 76

Distractor Analysis

- A. Incorrect. First part is plausible because the initial cooldown in FR-C.1 stops at 125 psig and 356° F Hot Leg Temp in order to isolate cold leg accumulators. Second part is plausible because this is the value which required entry into the CSF procedure.
- B. Incorrect. First part is plausible because the initial cooldown in FR-C.1 stops at 125 psig and 356° F Hot Leg Temp in order to isolate cold leg accumulators. Second part is correct.
- C. Incorrect. First part is correct. Second part is plausible because this is the value which required entry into the CSF procedure.
- D. **CORRECT.** FR-C.1 entry is required based on the listed conditions. This procedure directs a cooldown to 125 psig S/G pressure, isolation of CLAs, and then a cooldown to atmospheric pressure. Although a RVLIS level of 41% requires entry into the CSF procedure, it may not be exited until level exceeds 61% (Step 21 of FR-C.1).

References:

- EP/1/A/5000/FR-C.1 (Response to Inadequate Core Cooling), Rev. 023, step 16.e, 19, and 21.
- EP/1/A/5000/F-0 (Critical Safety Function Status Trees), Rev. 009, Page 4

KA Match:

Given a LOCA with degrading conditions, the applicant is required to demonstrate knowledge of the actions and verification of restoration of adequate core cooling.

Cognitive Level: High

The applicant must evaluate given conditions, recall procedure selection criteria, and using the conclusion from that, select the conditions that will be resulting from performance of the detailed steps in the appropriate procedure.

Source of Question: Bank 690 Modified

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(5) (**Assessment and Selection of Procedures**):

1. It cannot be answered solely by knowing "systems knowledge", i.e., how the system works, flowpath, logic, component location.
2. It cannot be answered solely by knowing immediate operator actions.
3. It cannot be answered solely by knowing entry conditions for AOPs or plant parameters that require direct entry to major EOPs.
4. It cannot be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

5. The question does involve a procedure selection, which is RO, but the applicant is further tested on detailed instructions for the purpose of restoring core cooling, not as an overall strategy, but based on detailed operating parameters (specific step requirements for a specific purpose).

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 77

025AA2.04

Loss of Residual Heat Removal System (RHRS)

Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: Location and isolability of leaks

Given the following initial conditions:

- Unit 2 is in Mode 4 cooling down for a refueling outage.
- 2A ND train is in service and aligned in residual heat removal mode.

Subsequently:

- Pressurizer level begins to slowly decrease.
- NC pressure begins to decrease.
- The CRS has implemented AP/2/A/5500/019 (Loss of Residual Heat Removal System), Case II (Leak in ND).

(1) Gravity feed from the FWST to ND pump suctions to the hot legs _____ an available option listed in Enclosure 7 (Assured NC System Makeup Alignments).

(2) If the leak is determined to be in containment, AP/19 will _____ .

A. (1) is NOT
(2) be exited to AP/2/A/5500/27 (Shutdown LOCA)

**B. (1) is
(2) be exited to AP/2/A/5500/27 (Shutdown LOCA)**

C. (1) is
(2) continue attempts to isolate the leak

D. (1) is NOT
(2) continue attempts to isolate the leak

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Distractor Analysis

- A. Incorrect. First part is plausible if it is assumed that some pump head will be required for makeup to the RCS. Second part is correct.
- B. **CORRECT.** Enclosure 7 of AP/19 lists options for make-up to the RCS, one of which is gravity feed to the hot or cold legs. Step 19 of AP/19 directs transition to AP/27 if the leak is determined to be inside containment. Otherwise, further isolations are attempted.
- C. Incorrect. First part is correct. Second part is plausible because this answer would be correct if the leak were outside containment.
- D. Incorrect. First part is plausible if it is assumed that some pump head will be required for makeup to the RCS. Second part is plausible because this answer would be correct if the leak were outside containment.

References:

- AP/2/A/5500/019 (Loss of Residual Heat Removal System), Rev. 058, Step 19 RNO b, and Enclosure 7, Step 5

KA Match:

For a Loss of RHR, the question tests ability to interpret given conditions to arrive at the appropriate procedure requirements specific to leak location along with mitigative actions.

Cognitive Level:

High

Involves analysis of given conditions and determination of applicability of procedure.

Source of Question:

New

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(5) (**Assessment and Selection of Procedures**):

1. It cannot be answered solely by knowing "systems knowledge", i.e., how the system works, flowpath, logic, component location.
2. It cannot be answered solely by knowing immediate operator actions.
3. It cannot be answered solely by knowing entry conditions for AOPs or plant parameters that require direct entry to major EOPs.
4. It cannot be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.
5. The question does involve an initial abnormal procedure selection (information provided in the stem), but the applicant is then tested on detailed instructions for a contingency (leak not isolated), procedure content for an available option for makeup to the RCS, and then selection and identification of the section which will then be used to assess whether to continue in that procedure, or to transition to a different procedure, based on inability to isolate the leak up to that point in the procedure implementation.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 78

026AG2.4.21

Loss of Component Cooling Water

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.

Given the following:

- Unit 2 is at 100% power.
 - SPOC has determined that 2KC-56A (KC to ND Hx 2A Sup Isol) will not open due to breaker damage.
- (1) If required for core cooling, EP/2/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation) will verify a minimum flow of _____ gpm through 2KC-56A.
- (2) 2KC-56A failure will require entry into the action statement of T.S. _____ .
- A. (1) 5700
(2) 3.5.2 (ECCS Operating)
- B. (1) 5700
(2) 3.7.7 (Component Cooling Water System)
- C. (1) 5000
(2) 3.5.2 (ECCS Operating)**
- D. (1) 5000
(2) 3.7.7 (Component Cooling Water System)

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 78

Distractor Analysis

- A. Incorrect. 5700 gpm is plausible since it is the normal value of expected flow. Tech. Spec. is correct.
- B. Incorrect. 5700 gpm is plausible since it is the normal value of expected flow. Tech. Spec. 3.7.7 is plausible because Component Cooling Water is the system which has lost flow.
- C. **CORRECT.** ES-1.3, Step 10.b (excerpt shown below) specifies verification that KC flow to ND heat exchangers be greater than 5000 gpm. Tech. Spec. 3.5.2 requires that two ECCS trains be OPERABLE for the given mode. With valve 2KC-56A not able to be opened, one train of KC is inoperable and also affects operability that associated train's ECCS components.
- D. Incorrect. First part is correct. 3.7.7 is plausible as described in "B" above.

References:

- EP/2/A/5000/ES-1.3, (Transfer to Cold Leg Recirculation), (excerpt shown below), Rev. 028, Step 10.b
- Tech. Spec. 3.5.2 (ECCS Operating), including Bases
- Tech. Spec. Basis 3.7.7 (Component Cooling Water System), Rev. 002, LCO

10. (Continued)

- ___ b. Verify KC flow to ND heat exchangers -
GREATER THAN 5000 GPM.

KA Match:

KA is met since the applicant must use knowledge of required flow through a safety system, and make an assessment of the status of that safety function.

Cognitive Level: High

Involves application of system knowledge, Tech. Spec. requirements, and analysis of given conditions to arrive at the correct answer.

Source of Question: Bank 584 Modified

SRO Only Basis:

Part 1 of Question:

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 Screen Criteria for questions linked to 10CFR55.43(b)(5) (**Assessment and Selection of Procedures**):

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

1. It cannot be answered solely by knowing “systems knowledge”, i.e., how the system works, flowpath, logic, component location.
2. It cannot be answered solely by knowing immediate operator actions.
3. It cannot be answered solely by knowing entry conditions for AOPs or plant parameters that require direct entry to major EOPs.
4. It cannot be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.
5. The applicant is tested on detailed instructions for the purpose of restoring core cooling, not as an overall strategy, but based on detailed operating parameters (specific step requirements for a specific purpose).

Part 2 of Question:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.
3. It cannot be answered solely by knowing the TS Safety Limits.
4. The question involves detailed knowledge of procedure content, and assessment of plant conditions, including analysis (based on application of Tech. Spec. basis information) to determine the correct governing Tech. Spec.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 79

056AG2.4.30

Loss of Off-Site Power

Knowledge of events related to system operations/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator

Given the following initial conditions:

- Unit 1 is in Mode 5 cooling down for an upcoming outage.
- Unit 2 is at 100%.

Subsequently:

- At 0800 both units experienced a loss of offsite power.
 - Only the 1A D/G started.
- At 0818 attempts to start all other D/Gs have failed.

- (1) State and county warning points will be notified that CNS has entered a(n) _____ classification.
- (2) Documented notification time will be _____ .

Reference Provided

- A. (1) Alert
(2) fax confirmation time
- B. (1) Site Area Emergency
(2) fax confirmation time
- C. (1) Alert
(2) first agency phone contact
- D. (1) Site Area Emergency
(2) first agency phone contact**

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

**QUESTION 79
Distractor Analysis**

- A. Incorrect. First part is plausible if the applicant incorrectly applies the operating mode and selects 4.5.A.1-1 vs. 4.5.S.1-1. Second part is plausible if the applicant assumes notification occurs when recipients receive the fax vs. phone contact.
- B. Incorrect. First part is correct. Second part is plausible if the applicant assumes notification occurs when recipients receive the fax vs. phone contact.
- C. Incorrect. First part is plausible if the applicant incorrectly applies the operating mode (or does not consider the effects of Unit 2) and selects 4.5.A.1-1 vs. 4.5.S.1-1. Second part is correct.
- D. **CORRECT.** Due the operating mode of Unit 2, and the fact that no power has been restored to an essential bus, a Site Area Emergency must be declared per 4.5.S.1-1. The procedure for notification of state and counties directs the communicator to document the notification time once the first agency answers.

References:

- RP/0/A/5000/001 (Classification of Emergency) Rev. 031, Enclosure 4.5 - Provided
- RP/0/A/5000/006A (Notification to States and Counties from the Control Room), Rev. 028, Enclosure 4.2, Step 1.3

Provide to Applicant:

- RP/0/A/5000/001 (Classification of Emergency) Rev. 031, Enclosure 4.5 - Provided

KA Match:

The applicant is required to demonstrate knowledge of the state/county notification process and the ability to properly classify a Loss of Offsite Power event.

Cognitive Level: High

This question requires more than one mental step to arrive at the correct answer. The applicant must first analyze the given data to determine the condition of the essential busses of both units and then properly determine the correct emergency classification.

Source of Question: New

SRO Only Basis:

This question is not tied to 10CFR50.43 (b) but can be classified as an **SRO Plant Specific Example**. This question requires additional knowledge required for the higher license level and is unique to the SRO/OSM position. At CNS it is the responsibility of the SRO to classify the event in the event that an emergency is declared. Per Lesson Plan OP-CN-EP-SEP, Emergency Plan, Objective #2, the SRO is trained to: "When given a set of plant conditions and access to reference materials, correctly classify an event using RP/0/A/5000/001." This is identified as an SRO only learning objective.

Objective 17, (Prepare Emergency Notification Forms) is also designated as SRO only. Both the understanding of the requirements and the actual completion of the required paperwork, along with the transmittal are SRO ONLY tasks at CNS.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 80

065AG2.2.36

Loss of Instrument Air

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

Given the following:

- Unit 1 has cooled down in preparation for a refueling outage.
- NC Tavg is currently 205°F and stable.
- 1A ND has been placed in RHR mode.
- 1B ND remains in injection mode due to an inoperable loop suction valve.
- IAE has requested permission to isolate VI (Instrument Air) to PZR PORVs 1NC-32B and 1NC-34A in order to troubleshoot a solenoid power supply issue.

If allowed to perform this work which of the following valves will be considered available to meet the requirements of T.S. 3.4.12 (Low Temperature Overpressure Protection)?

1. 1NC-32B (PZR PORV)
 2. 1NC-34A (PZR PORV)
 3. 1NC-36B (PZR PORV)
 4. 1ND-3 (1A ND Pump Suction From NC Loop B Header Relief)
 5. 1ND-38 (1B ND Pump Suction From NC Loop C Header Relief)
- A. 4 ONLY
- B. 4 and 5 ONLY
- C. 3 and 4 ONLY
- D. 1, 2 & 4 ONLY**

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 80

Distractor Analysis

- A. Incorrect. Plausible if the applicant believes that PZR PORVs require an instrument air supply in order to be operable for LTOP.
- B. Incorrect. Plausible to believe that PZR PORVs require an instrument air supply in order to be operable for LTOP, and with an incomplete understanding of system design and flowpaths resulting from the given lineups, an applicant may conclude that valve 1ND-38 is still available, when in reality it is isolated as a result of the given alignment (4th bullet - 1B ND aligned injection mode).
- C. Incorrect. Plausible since 1NC-36B is a PORV, but is not used for LTOP. Item 4 is correct.
- D. **CORRECT.** 1NC-32B and 34A remain operable because a motive force (N₂ from CLAs A & B) is available. 1NC-36B is not used for LTOP and not applicable to the T.S. 1ND-3 is available with the associated train in service. 1ND-38 is unavailable due to being isolated while in injection mode.

References:

- OP-CN-PS-IPE (Pressurizer Pressure Control Lesson Plan), Rev. 101, Section 4.2
- T.S.B 3.4.12 (Low Temperature Overpressure Protection System Basis), Rev. 004, LCO Section

KA Match:

The applicant is required to demonstrate knowledge of the effect of isolating instrument air (for maintenance) to Tech. Spec. required components and determine the status of the applicable LCO.

Cognitive Level: High

The applicant must analyze the given conditions and apply system and operational knowledge to determine the availability of each relief valve and then compare those results with the requirements of the applicable Tech. Spec.

Source of Question: New

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.
3. It cannot be answered solely by knowing the TS Safety Limits.
4. This question tests T.S. basis knowledge concerning the requirements for operability of a PZR PORV while in LTOP mode.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

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 was at 85% power when a LOCA occurred outside of containment.
- 0EMF-41 reached 1.8×10^6 cpm.
- The crew has entered EP/1/A/5000/ECA-1.2 (LOCA Outside Containment).
- The CRS is reading Step 3 "Verify leak path is isolated as follows:" in order to determine procedure flowpath.

- (1) The next procedure will be entered based on _____ .
- (2) Based on 0EMF-41 countrate ONLY, a Site Assembly _____ be required.

- A. (1) PZR level
(2) will
- B. (1) PZR level
(2) will NOT
- C. (1) NC pressure
(2) will**
- D. (1) NC pressure
(2) will NOT

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 81

Distractor Analysis

- A. Incorrect. First part is plausible because PZR level will provide indication of leak isolation, but this is not the method specified. Second part is correct.
- B. Incorrect. First part is plausible because PZR level will provide indication of leak isolation, but this is not the method specified. Second part is plausible since numerous ARPs for radiation monitor alarms only requires that the SRO evaluate if a Site Assembly is needed. The ARP refers the SRO to an RP series of procedure for doing that. This particular radiation monitor (EMF-41) is very specific in directly giving direction to initiate a Site Assembly and does not provide direction to evaluate whether one is needed.
- C. **CORRECT.** Step 3 of ECA-1.2 directs the operator to verify NC pressure increasing in order to determine flowpath. The ARP for OEMF-41 directs operators to initiate a Site Assembly if EMF-41 count rate exceeds 1×10^6 cpm.
- D. Incorrect. First part is correct. Second part is plausibility is described in "B" above.

References:

- OP/1/B/6100/010X (Annunciator Response for Radiation Monitoring Panel 1RAD-1), B/3, (EMF-41 AUX BLDG VENT HI RAD) on page 13, Rev. 064
- EP/1/A/5000/ECA-1.2 (LOCA Outside Containment), Rev. 003, Step 3.a

KA Match:

Given conditions related to a LOCA outside containment, the applicant is required to demonstrate knowledge of the parameters used for procedure transition along with knowledge of annunciator response procedures (for the EMF-41) related to this condition.

Cognitive Level: High

Requires analysis of the stem conditions and determination of the appropriate procedure, including application of detailed knowledge for Site Assembly requirements.

Source of Question: New

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(5) (**Assessment and Selection of Procedures**):

1. It cannot be answered solely by knowing "systems knowledge", i.e., how the system works, flowpath, logic, component location.
2. It cannot be answered solely by knowing immediate operator actions.
3. It cannot be answered solely by knowing entry conditions for AOPs or plant parameters that require direct entry to major EOPs.
4. It cannot be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

5. The question does involve assessing plant conditions (involving ECA-1.2 content), and then further assessing those conditions for determining the parameter used for transitioning to the next procedure (specific step for a specific purpose) to address a LOCA Outside Containment.

Therefore, this is an SRO only question.

Part 2 of the question is SRO only under **SRO Plant Specific Example**. Involves detailed administrative knowledge of a radiation monitor response and requirements for a Site Assembly.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 82

003AA2.03

Dropped Control Rod

Ability to determine and interpret the following as they apply to the Dropped Control Rod:

Dropped rod, using in-core/ex-core instrumentation, in-core or loop temperature measurements

Given the following:

- Unit 1 is at 100% power.
- At 0500 Rod M-14 (located near Loop A and excore NI N-44) dropped fully into the core.

- (1) Immediately following this failure, the setpoint of Loop A _____ will increase.
- (2) What is the BASIS for the guidance of CNEI-0400-45 (McGuire and Catawba Nuclear Stations Dropped/Misaligned RCCA Recovery Guidelines) which specifies waiting a specified amount of time prior to attempting rod retrieval?

- A. (1) **OT Δ T only**
(2) **To allow Xenon to decay so that Fq will remain acceptable during subsequent rod recovery and power escalation**
- B. (1) OT Δ T only
(2) To allow time for performing a reactivity balance calculation prior to any further rod movement or operation
- C. (1) OT Δ T and OP Δ T
(2) To allow Xenon to decay so that Fq will remain acceptable during subsequent rod recovery and power escalation
- D. (1) OT Δ T and OP Δ T
(2) To allow time for performing a reactivity balance calculation prior to any further rod movement or operation

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 82

Distractor Analysis

- A. **CORRECT.** The dropped rod near loop A will cause temperature in this area to decrease. Loop Tave below full load value will cause the OT Δ T setpoint to increase. No similar credit is provided for the OP Δ T setpoint. CNEI-0400-45 restricts dropped control rod withdrawal to greater than 15 hours from insertion.
- B. **Incorrect.** First part is correct. The second part is plausible because performing a reactivity balance sounds appropriate for the given conditions, since reactivity is a concern. It is also plausible since it is a procedure step listed in the Operating Procedure for Rod Retrieval - OP/1/A/6160/008, Enclosure 4., Step 3.2. It appears in many places throughout the OP. But it is not the basis, per the listed CNEI document.
- C. **Incorrect.** First part is plausible if the applicant misapplies the calculation for OP Δ T (i.e. no bonus for lowered temperature). Second part is correct.
- D. **Incorrect.** First part is plausible if the applicant misapplies the calculation for OP Δ T (i.e. no bonus for lowered temperature). Second part plausibility is explained in "B" above.

References:

- CNEI-0400-45 (McGuire and Catawba Nuclear Stations Dropped/Misaligned RCCA Recovery Guidelines), Rev. 002, Page 4
- OP-CN-IC-IPX (Reactor Protection System), Rev. 100, Sections 4.12 and 4.13
- OP/1/A/6150/008 (Rod Control), Rev. 062, Encl. 4.6, Step 3.4
- OP-CN-AP-14 (AP-14 Control Rod Misalignment), Rev. 0, Section 3.1, Step 15.b

KA Match:

Given conditions involving a dropped control rod, the applicant is required to demonstrate knowledge of the applicable loop temperature change through its effect on the OT Δ T and OP Δ T calculation. The applicant is further required to recall engineering guidance concerning rod retrieval limitations.

Cognitive Level: High

More than one mental step is required to answer this question. The applicant must first make a determination of the effect on loop temperature and apply that to each calculation individually. This requires multiple mental steps.

Source of Question: New

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

3. It cannot be answered solely by knowing the TS Safety Limits.
4. The question involves detailed knowledge of the requirements of an administrative engineering document for recovery of a dropped control rod, including the BASIS for the administrative requirement. This knowledge does NOT involve any systems knowledge.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

**Question 83
028AG2.2.12
Pressurizer Level Control Malfunction
Knowledge of surveillance procedures**

Given the following:

- Unit 1 is at 100%.
- PZR level Channel I transmitter (C1A0707) has failed low.
- No TSAIL entries have been created to address applicable Tech Specs.
- The Unit 1 BOP is performing the mode surveillance PT and comes to the following items:

Enclosure 13.1
Periodic Surveillance Items Data

PT/1/A/4600/002 A
Page 11 of 34

#	SURVEILLANCE ITEM (Tech Spec Reference)	ACCEPTANCE CRITERIA	QUALIFYING CONDITIONS	COMPUTER POINT/ GAUGE ID	DAY SHIFT INITIALS	NIGHT SHIFT INITIALS
21	PZR Water Level Monitor Channel Check (SR 3.3.1.1, Table 3.3.1-1 Item 9)	Level differential between highest and lowest channels $\leq 3.5\%$. Calculate below: High Channel _____ % Low Channel _____ % Differential _____ %		C1A0707 C1A0867 C1A0873		
22	PZR Total Water Volume (SR 3.4.9.1)	PZR Level: $\leq 92\%$		C1A0707 C1A0867 C1A0873		

- (1) In order to address item #21, a TSAIL _____ entry should be created for TS 3.3.1.
- (2) In order to address item #22, a TSAIL _____ entry should be created for TS 3.4.9.
- A. (1) tracking
(2) tracking
- B. (1) tracking
(2) active
- C. (1) **active**
(2) **tracking**
- D. (1) active
(2) active

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 83

Distractor Analysis

- A. Incorrect. First part is plausible if because the pressurizer level control system will still function correctly with one channel failed but the applicable T.S requires all three channels to be operable. Second part is correct.
- B. Incorrect. First part is plausible if because the pressurizer level control system will still function correctly with one channel failed but the applicable T.S requires all three channels to be operable. Second part is plausible to believe that the malfunction affects the ability to verify this requirement.
- C. **CORRECT.** T.S. 3.3.1 requires all three channels to be operable in Mode 1 so an active entry would be required and the applicable action statement would need to be entered. T.S. 3.4.9 only requires PZR level to be below 92%. The indication problem does not affect actual level so action statement entry would not be required. A tracking entry will be created to address failure of an indication specified per the Mode Surveillance.
- D. Incorrect. First part is correct. Second part is plausible to believe that the malfunction affects the ability to verify this requirement.

References:

- PT/1/A/4600/002A (Mode 1 Periodic Surveillance Items), Rev. 225, Step 12.4, and Encl. 13.1, #21 & 22
- T.S. 3.3.1 (Reactor Trip System Instrumentation), Amendment Nos 173/165, Table 3.3.1-1, Item #9
- T.S. 3.4.9 (Pressurizer), Amendment Nos. 173/165

KA Match:

This question tests the ability to determine impact to the applicable surveillance procedure if a Tech Spec required input to the control system malfunctions.

Cognitive Level: High

The applicant is required to analyze the given conditions, apply system and operational knowledge and demonstrate ability to properly apply Technical specifications, including requirements for tracking vs. active entries into TSAIL.

Source of Question: New

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.
3. It cannot be answered solely by knowing the TS Safety Limits.
4. Requires the applicant to evaluate an equipment malfunction and properly apply Technical Specifications. This Tech Spec evaluation is a function of the SRO position.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

ROs do not access the TSAIL program or have the required permissions to make entries. In practice the RO would identify that the acceptance criteria is not met and document on a procedure discrepancy form for SRO evaluation. The SRO would make the required TSAIL entry and document/sign the discrepancy form.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 84

068AG2.2.40

Control Room Evacuation

Ability to apply Technical Specifications for a system

Given the following:

- The control room has been evacuated due to toxic gas.
- Unit 1 is currently in Mode 3 with control established from the Auxiliary Shutdown Panels.
- 1A S/G level instrumentation has failed.
- All other instruments are functioning properly.

In accordance with T.S. 3.3.4 (Remote Shutdown System) BASES document:

(1) The above conditions _____(1)_____ meet the definition of a safe shutdown condition.

(2) The instrumentation requirement for verification of decay heat removal via Steam Generators _____(2)_____ met.

**A. (1) do
(2) is**

B. (1) do
(2) is NOT

C. (1) do NOT
(2) is

D. (1) do NOT
(2) is NOT

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 84

Distractor Analysis

- A. **CORRECT.** Per the basis of T.S. 3.3.4, a safe shutdown condition is defined as Mode 3. Per the requirements of T.S. 3.3.4, either AFW flow or S/G level are acceptable means of verifying decay heat removal.
- B. Incorrect. First part is correct. Second part is plausible if the applicant believes that ONLY S/G level is an acceptable means of verifying decay heat removal, since that parameter is used in many locations throughout procedures as an indication of heat removal capability.
- C. Incorrect. First part is plausible because the question asks safe “shutdown” which is the included in the title of Mode 4 (Hot Shutdown) and Mode 5 (Cold Shutdown). Second part is correct.
- D. Incorrect. First part is plausible because the question asks safe “shutdown” which is the included in the title of Mode 4 (Hot Shutdown) and Mode 5 (Cold Shutdown). Second part is plausible if the applicant believes that ONLY S/G level is an acceptable means of verifying decay heat removal, since that parameter is used in many locations throughout procedures as an indication of heat removal capability.

References:

- T.S. 1.1, (Use and Application), Amendment Nos. 179/171, Table 1.1-1 (Modes)
- T.S. 3.3.4 (Remote Shutdown System), Amendment Nos. 272/268, Table 3.3.4-1, Item 3.d
- T.S.B 3.3.4 (Remote Shutdown System Background), Rev. 002, Background Section

KA Match:

Given conditions requiring a control room evacuation, the applicant is required to demonstrate knowledge of the requirements of the Remote Shutdown Technical specification, including basis information.

Cognitive Level: **Low**

Source of Question: **New**

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.
3. It cannot be answered solely by knowing the TS Safety Limits.
4. The applicant is required to demonstrate knowledge of the Remote Shutdown Technical Specification basis.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 85

WE10EA2.2

Natural Circulation with Steam Void in Vessel with/without RVLIS

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

Initial conditions:

- Unit 1 had a complete loss of switchyard
- The crew was performing steps in EP/1/A/5000/ES-0.2, Natural Circulation Cooldown
- Station management recommended a rapid cooldown due to secondary inventory concerns
- The crew transitioned to EP/1/A/5000/ES-0.3, (Natural Circulation Cooldown with Steam Void in the Vessel).

Current conditions:

- Pressurizer level is 92% and increasing.
- Reactor vessel Upper Range (UR) level is 70% and decreasing.
- The STA notes a YELLOW path on NC INVENTORY and confers with the OSM regarding the need to transition to EP/1/A/5000/FR-I.3, (Response to Voids in Reactor Vessel).

Which ONE of the following identifies:

- (1) the action the SRO is required to direct the crew to perform in order to control void growth without interrupting natural circulation;
- (2) the required procedure which directs this action?

- A. (1) Open reactor vessel head vents
(2) EP/1/A/5000/FR-I.3
- B. (1) Open reactor vessel head vents
(2) EP/1/A/5000/ES-0.3
- C. (1) Energize pressurizer heaters
(2) EP/1/A/5000/FR-I.3
- D. (1) **Energize pressurizer heaters**
(2) **EP/1/A/5000/ES-0.3**

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 85

Distractor Analysis

- A. Incorrect. Plausible, since this is an action in FR-I.3 to vent a non-condensable bubble, but these conditions are NOT for a non-condensable bubble.
- B. Incorrect. Plausible, since this is the correct procedure to be in. However, this procedure does not vent the head, since this is the action taken in FR-I.3 if the bubble is non-condensable gas.
- C. Incorrect. FR-I.3 does contain this step for this condition, but the direction in Step 1 is, if ES-0.3 was in progress, to return to the procedure in effect (i.e., ES-0.3).
- D. **CORRECT.** ES-0.3 is implemented if the 50°F/hr cooldown of ES-0.2 limit is not fast enough. ES-0.3 is designed to perform a plant cooldown on natural circulation, assuming that a void will develop in the reactor vessel head region. The operator monitors the void growth and the procedure requires that level in the vessel head be maintained greater than 73% upper range level. The void level is controlled by the use of pressurizer heaters (to control subcooling), and charging and letdown. FR-I.3 is entered from a yellow path on CSF status trees when reactor vessel upper range level is not greater than 95%. This sends the crew to FR-I.3. This procedure is primarily for venting a hard bubble in the PZR, not collapsing a steam void. Therefore, for the current conditions, if a transition to FR-I.3 is made, it will send you back to ES-0.3 for mitigation.

References:

- EP/1/A/5000/FR-I.3, (Response to Voids in Reactor Vessel), step 1, 7.b RNO b.1), and 23, Rev. 017
- EP/1/A/5000/ES-0.3 (Natural Circulation Cooldown with Steam Void in Vessel), Rev. 014, step 2.c RNO 1)a)

KA Match:

The applicant is presented with plant conditions involving a loss of the switchyard. Then, based on the resulting operating characteristics, including the instrument indications for reactor vessel water level and pressurizer level must evaluate whether a bubble is forming in the vessel head. Based on that assessment, the SRO applicant then determines the appropriate action and subprocedure for the conditions.

Cognitive Level: High

This is a high cognitive level question because it involves a level of analysis of a given set of plant conditions to determine that vessel head voiding is occurring, then apply system knowledge, and knowledge of plant operating characteristics (response of natural circulation when mitigating vessel head voiding) to decide upon a course of action, including procedure selection, for mitigation.

Source of Question: Bank 4347 - 2010 NRC exam

SRO Only Basis:

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

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Criteria for question linked to 10CFR55.43(b)(5) (**Assessment of conditions and selection of appropriate procedures**):

1. It cannot be answered solely by knowing “systems knowledge”, i.e., how the system works, flowpath, logic, component location.
2. It cannot be answered solely by knowing immediate operator actions.
3. It cannot be answered solely by knowing entry conditions for AOPs or plant parameters that require direct entry to major EOPs.
4. It cannot be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.
5. This question requires analysis of the accident conditions, determination of what action will control vessel head void growth, without interrupting natural circulation, and then evaluating which procedure to use to accomplish the action. The procedure selected is NOT a major EOP, but is a specific sub-procedure (ES-0.3). The question does require the applicant to assess plant conditions and then select a subprocedure with which to proceed.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 86

003G2.4.45

Reactor Coolant Pump System

Ability to prioritize and interpret the significance of each annunciator or alarm

Unit 1 was initially at 100% power. Given the following:

- 1002 1AD-7 C/1 "NCP #1 SEAL LEAKOFF HI FLOW" annunciator received
- 1007 1AD-6 A/1 "LOOP A LO FLOW ALERT" annunciator received.
- 1010 1AD-6 B/5 "NCP HI-HI VIBRATION" annunciator received.

(1) A MANUAL Reactor Trip will be required following validation of the alarm received at _____ (1) _____ .

(2) A notification to Security within 15 minutes from the first alarm _____ (2) _____ required.

A. (1) 1007
(2) is

**B. (1) 1010
(2) is**

C. (1) 1007
(2) is not

D. (1) 1010
(2) is not

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 86

Distractor Analysis

- A. Incorrect. First part is plausible because the alarm received at this time will indicate an instrument has exceeded a trip setpoint (1 of 3). Second part is correct.
- B. **CORRECT.** 1AD-6 B/5 alarms at 5 mils (frame) or 20 mils (shaft) which correspond to RCP trip criteria. 1AD-7, C/1, alarm response for NCP #1 seal leakoff high flow contains guidance to conservatively declare the SSF nonfunctional as a Supplementary Action of this alarm response. Security is required to be notified within 15 minutes due to degradation of the SSF.
- C. Incorrect. First part is plausible because the alarm received at this time will indicate an instrument has exceeded a trip setpoint (1 of 3). Second part is plausible because there is no given information indicating total leakage has exceeded 20 gpm (normal criteria for declaring SSF nonfunctional). Applicant must know conservative requirement of ARP.
- D. Incorrect. First part is correct. Second part is plausible because there is no given information indicating total leakage has exceeded 20 gpm (normal criteria for declaring SSF nonfunctional). Applicant must know conservative requirement of ARP. Additionally, there is no guidance in AP/08 (Malfunction of Reactor Coolant Pump) to notify security.

References:

- OP/1/B/6100/010G (Annunciator Response for Panel 1AD-6), Rev. 065, Pg. 3 and 21
- OP/1/B/6100/010H (Annunciator Response for Panel 1AD-7), Rev. 076, Pg. 19
- SLC 16.7-9 (Standby Shutdown System), Rev. 009, Condition B

KA Match:

The applicant is required to interpret various annunciators related to malfunctions of a reactor coolant pump and determine which will require the pump/reactor to be tripped. The applicant is also required to interpret the significance of an ARP requirement and conservatively declare the SSF nonfunctional.

Cognitive Level: High

The applicant is required to analyze various annunciators, recall setpoints, and compare to the requirements of manually securing a reactor coolant pump, and for conservative declaration of non-functionality of a standby shutdown facility.

Source of Question: New

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.
3. It cannot be answered solely by knowing the TS Safety Limits.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

4. The applicant is required to demonstrate the ability to apply SLCs including basis type information (for functionality of the Standby Shutdown Facility) and knowledge of requirements more conservative than those listed in a particular commitment. Also requires knowledge of an administrative requirement for a conservative declaration of non-functionality of the SSF for the conditions in the stem.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 87

005G2.1.20

Residual Heat Removal System (RHRS)

Ability to interpret and execute procedure steps

Given the following:

- Unit 1 is in Mode 5 following a refueling outage.
- Enclosure 4.3 (Shutdown and Alignment For Standby Readiness During Plant Startup) of OP/1/A/6200/004 (Residual Heat Removal System) is in progress.
- The RO has requested completion of step 3.2.1.3 (as shown below).

3.2 Prior to entering Mode 4, remove one train of ND from RHR alignment as follows:

_____ 3.2.1 **IF** 1A ND Train is to be removed from RHR alignment prior to Mode 4, perform the following:

_____ 3.2.1.1 Ensure ND Pump 1B is in service.

_____ 3.2.1.2 Verify ND Pump 1A is stopped.

_____ 3.2.1.3 Log 1ND-3 (1A ND Pump Suction From NC Loop B Header Relief) in TSAIL as inoperable per Tech Spec LCO 3.4.12.
SRO

- (1) Completion of this step will require the SRO to create a(n) (1) entry into the TSAIL program.
- (2) In order for 1ND-3 to be considered OPERABLE, the associated NC loop suction isolation valves must be OPEN; removal of power from the valve operators (2) required.

- A. (1) active
(2) is NOT
- B. (1) tracking
(2) is NOT
- C. (1) active
(2) is
- D. (1) tracking
(2) is

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 87

Distractor Analysis

- A. **Incorrect.** First part is plausible because the step requires the valve to be logged as “inoperable”. An applicant may believe this requires an active entry (i.e. action statement). Second part is plausible because the RHR suction reliefs are available for pressure control when the valves are open, but this does not meet the requirement of the T.S.
- B. **Incorrect.** First part is correct. Second part is plausible because the RHR suction reliefs are available for pressure control when the valves are open, but this does not meet the requirement of the T.S.
- C. **Incorrect.** First part is plausible because the step requires the valve to be logged as “inoperable”. An applicant may believe this requires an active entry (i.e. action statement). Second part is correct.
- D. **CORRECT.** Since only two relief devices are required per the applicable T.S., unavailability of one will not require entry into the action statement (i.e. no “required Operable” date/time required). This meets the requirements of a Tracking entry per OMP 2-29. Per the basis of T.S. 3.4.12, RHR suction isolation valves must be open with power removed to make RHR suction relief valves operable.

References:

- OMP 2-29 (Technical Specifications Action Item Log), Rev.057 , Section 6.12
- OP/1/A/6200/004 (Residual Heat Removal), Rev. 137, Enclosure 4.3, Step 3.2
- T.S.B 3.4.12 (Low Temperature Overpressure Protection System Basis), Rev. 004, RHR Suction Relief Valve Requirements

KA Match:

Given a condition of placing RHR in service, the applicant is required to demonstrate the ability to interpret and execute a procedure step regarding Tech. Spec logging requirements. The applicant is also required to recall the requirements for relief valve operability per the applicable Tech Spec basis. Although the concept of tracking vs. active TSAIL entries also appears on question 83 we do not believe this constitutes double jeopardy for the applicant. It is simply a means of questioning if the action statement of an LCO must be entered.

Cognitive Level: High

Requires more than one mental step. The applicant must apply specific operability requirements to given conditions, determine if Tech Spec action statement entry is required, and then apply proper use of the Tech Spec Action Item log.

Source of Question: New

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.
3. It cannot be answered solely by knowing the TS Safety Limits.
4. The applicant must recall and apply basis information from T.S. 3.4.12 concerning operability requirements of RHR suction reliefs for the purpose of meeting LTOP requirements.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 88

012G2.2.25

Reactor Protection System (RPS)

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

In accordance with the following Technical Specification BASES:

- (1) T.S. 2.1.2 (RCS Pressure SL)
Pressurizer Safeties, Reactor Trip Setpoints, and _____ (1) _____ are required in order to ensure Reactor Coolant System Pressure Safety Limits are not exceeded.
- (2) T.S. 3.3.1 (Reactor Trip System Instrumentation)
Only three channels of pressurizer level (vs. four) are required because _____ (2) _____.
- A. (1) Pressurizer PORVs
(2) pressurizer level does NOT provide a backup signal to any other reactor trips
- B. (1) Pressurizer PORVs
(2) of the slow rate of charging that is available
- C. (1) Steam Generator Safeties
(2) pressurizer level does NOT provide a backup signal to any other reactor trips
- D. (1) Steam Generator Safeties
(2) of the slow rate of charging that is available**

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 88

Distractor Analysis

- A. **Incorrect.** First part is plausible because the PZR PORVs do provide pressure relief protection for the RCS. An applicant with an incomplete understanding of the applicable T.S. basis information could logically assume this is the correct answer. Second part is plausible because the PZR level trip does provide a backup signal.
- B. **Incorrect.** First part is plausible because the PZR PORVs do provide pressure relief protection for the RCS. An applicant with an incomplete understanding of the applicable T.S. basis information could logically assume this is the correct answer. Second part is correct.
- C. **Incorrect.** First part is correct. Second part is plausible because the PZR level trip does provide a backup signal.
- D. **CORRECT.** Per T.S. 2.1.2 basis, the Main Steam Safety valves ensure RCS pressure SL will not be exceeded. Per T.S. 3.3.1 basis, due to the slow rate of charging available, pressure overshoot due to level channel failure cannot cause safety valves to actuate before a reactor high pressure trip.

References:

- T.S.B. 3.3.1 (Reactor Trip System Instrumentation Basis), Rev. 007, Section 9 (Pressurizer Water Level High)
- T.S.B. 2.1.2 (Reactor Coolant System Pressure SL Basis), Rev. 000, Applicable Safety Analysis

KA Match:

The applicant must demonstrate knowledge of the requirements of an RPS function and a component credited for maintaining operation within the safety limits; i.e., Tech. Spec. basis information.

Cognitive Level: **Low**

Source of Question: **New**

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.
3. It cannot be answered solely by knowing the TS Safety Limits.
4. The applicant must recall basis information from T.S. 2.1.2 and 3.3.1.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 89

076A2.01

Service Water System

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

Given the following Unit 1 conditions:

Initial

- The Unit is at 100% power.
- 1B RN Pump is in service.

Subsequent

The following indications are observed:

- 1B RN Pump amps are oscillating.
- 1AD-12, B/5 "RN PIT B SCREEN HI D/P" is lit.
- 1AD-12, B/4 "RN PUMP INTAKE PIT B LEVEL-LO" is lit.
- The CRS has implemented AP/0/A/5500/020 (Loss of Nuclear Service Water).

(1) The actions required to mitigate this event _____ contained in Case I (Loss of RN Train).

(2) These conditions _____ require alignment to the Nuclear Service Water Pond.

- A. (1) are
(2) will
- B. (1) are
(2) will NOT
- C. (1) are NOT
(2) will**
- D. (1) are NOT
(2) will NOT

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 89

Distractor Analysis

- A. Incorrect. First part is plausible because swinging amps could be reasoned with the hi/lo flow and pressure entry conditions of Case I or if the applicant confuses hi screen D/P with hi strainer D/P. Second part is correct.
- B. Incorrect. First part is plausible because swinging amps could be reasoned with the hi/lo flow and pressure entry conditions of Case I or if the applicant confuses hi screen D/P with hi strainer D/P. Second part is plausible because Case I contains steps to ensure proper alignment to the lake.
- C. **CORRECT.** The listed conditions indicate lowering RN pit level, which requires entry in to Case II (Loss of RN Pit Level). This procedure requires alignment to the Nuclear Service Water Pond if the Low Level Annunciator is lit.
- D. Incorrect. First part is correct. Second part is plausible because Case I contains steps to ensure proper alignment to the lake.

References:

- AP/0/A/5500/020 (Loss of Nuclear Service Water), Rev. 043, Section B (Symptoms), Case I steps 4 RNO, Case II step 3

KA Match:

KA is matched because question tests knowledge of the impacts of a loss of a SWS component (the intake pit screen is plugging causing a low level) by testing ability to select the appropriate Case of the AP. The "impact" is tested basically as part of the procedure selection; i.e., knowing that it is NOT Case I (loss of an RN train) is knowledge of an impact. It is actually Case II, which loss of intake pit. The second part of the KA is tested by determining if the procedure requires an alternate alignment for a suction source.

Cognitive Level: High

High cog level because the applicant must evaluate the given conditions to determine the impact on the system and determine from those indications which is the appropriate procedural usage.

Source of Question: Bank 5009 - modified

SRO Only Basis:

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. The question required the applicant to have detailed knowledge of AP-20 content.
- 2) The question can NOT be answered by knowing immediate operator actions. There are no immediate actions associated with AP-20.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

- 3) The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs. The question requires the applicant to have detailed knowledge of AP-20 content.
- 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 requires the applicant to have detailed knowledge of AP-20 content.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 90

103A2.02

Containment System

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

Necessary plant conditions for work in containment

Regarding the VP (Containment Purge) System:

- (1) In accordance with Tech. Spec. 3.6.3 (Containment Isolation Valves) Basis, what is the basis for maintaining the VP (Containment Purge) supply and return valves sealed CLOSED in Modes 1-4?
 - (2) What would be the proper alignment of the "NORMAL-REFUEL SELECTOR" switch if aligning the system for purge prior to initial containment entry during plant cooldown for a refueling outage?
- A. (1) A detailed analysis has not been performed to prove it will close during a LOCA in time to ensure offsite dose remains within limits.
(2) "NORMAL"**
- B. (1) A detailed analysis has not been performed to prove it will close during a LOCA in time to ensure offsite dose remains within limits.
(2) "REFUEL"**
- C. (1) Ensures the measured leakage rate for purge system valves is maintained at $\leq 0.01 L_a$ when pressurized to P_a , since the valves have a history of leaking after each operation.
(2) "NORMAL"**
- D. (1) Ensures the measured leakage rate for purge system valves is maintained at $\leq 0.01 L_a$ when pressurized to P_a , since the valves have a history of leaking after each operation.
(2) "REFUEL"**

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 90

Distractor Analysis

- A. **CORRECT.** The listed reason is obtained from the applicable surveillance requirement basis. The purge mode selector switch is not placed in "Refuel" until the missile shield is removed in order to prevent over pressurizing upper containment.
- B. Incorrect. First part is correct. Second part is plausible because this alignment is used for refueling, but would not be in this alignment for initial containment entry.
- C. Incorrect. First part is plausible because this the basis for SR 3.6.3.6 (Containment Air Release leakage rate testing). Second part is correct.
- D. Incorrect. First part is plausible because this the basis for SR 3.6.3.6 (Containment Air Release leakage rate testing). Second part is plausible because this alignment is used for refueling, but would not be in this alignment for initial containment entry.

References:

- T.S.B. 3.6.3 (Containment Isolation Valves basis), Rev. 004, SR 3.6.3.1 and 3.6.3.6
- T.S. 3.6.3 (Containment Isolation Valves), Amend. Nos. 173/165, SR 3.6.3.1 and 3.6.3.6
- OP-CN-CNT-VP (Containment Purge Lesson Plan), Rev. 100, Section 3.2 (Mode Selector Switch)

KA Match:

For the Containment purge system, the applicant is required to use procedures (Tech Specs) to demonstrate knowledge of the mitigation of a system malfunction at power. The applicant must also recall system knowledge in order to prevent over pressure during work in containment.

The "impact" aspect is tested as follows: for working in containment what is the impact (or required configuration of a control for a containment purge in preparation for containment entry.

The "procedure" aspect is tested in part by the same concept being tested for impact (what does the procedure require for the purge prior to entry), and also testing why purge isolation valves are maintained in a certain configuration. This is a form of "correcting, controlling, or mitigating."

Cognitive Level: **Low**

Source of Question: **Bank 4343 & 3711 modified**

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.
3. It cannot be answered solely by knowing the TS Safety Limits.
4. The applicant must recall basis information from T.S.3.6.3.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 91

015G2.1.23

Nuclear Instrumentation System

Ability to perform specific system and integrated plant procedures during all modes of plant operation.

Given the following:

A Unit 1 runback occurred from 100% power to 50% power.

Subsequently (2 hours later):

- Thermal Power Best Estimate (TPBE) reads 50.2%.
- N41 indicates 52.5%
- N42 indicates 50.2%
- N43 indicates 49.4%
- N44 indicates 51.9%

In accordance with Surveillance Requirement 3.3.1.2 and the associated basis:

(1) Adjustment of NIs _____ required.

(2) The NIs _____ operable.

- A. (1) is
(2) are
- B. (1) is
(2) are NOT
- C. (1) is NOT
(2) are
- D. (1) is NOT
(2) are NOT

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 91

Distractor Analysis

- A. **CORRECT.** Per S.R. 3.3.1.2, NIS must be adjusted if absolute difference is >2%, although this requirement is waived until 12 hours after thermal power is $\geq 15\%$. Per the basis of this S.R., NIS is not declared inoperable for exceeding 2%, but only if a channel cannot be adjusted.
- B. **Incorrect.** First part is correct. Second part is plausible because the majority of instrument agreement setpoints (i.e. shift mode surveillance per PT/1/A/4600/002A) constitute operability of the instrument/system.
- C. **Incorrect.** First part is plausible if the applicant fails to apply 2% requirement or misapplies the exception to wait 12 hours following 15% RTP as a 15% power change. Second part is correct.
- D. **Incorrect.** First part is plausible if the applicant fails to apply the 2% requirement or misapplies the exception to wait 12 hours following 15% RTP as a 15% power change. Second part is plausible because the majority of instrument agreement setpoints (i.e. shift mode surveillance per PT/1/A/4600/002A) constitute operability of the instrument/system.

References:

- PT/1/A/4600/002A (Mode 1 Periodic Surveillance Items), Rev. 225, Encl. 13.1, Item 18
- T.S. 3.3.1 (Reactor Trip Instrumentation), Amend Nos. 263/259, SR 3.3.1.2
- T.S.B. 3.3.1 (Reactor Trip Instrumentation Bases), Rev. 007, SR 3.3.1.2

KA Match:

Applicant is tested on runback conditions (system and integrated procedures involved) involving analysis of Nuclear Instrumentation indications following the runback.

Cognitive Level: High

The applicant must perform a calculation and then recall and apply a setpoint in order to determine the correct answer, including the operability status of a component.

Source of Question: New

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing ≤ 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.
3. It cannot be answered solely by knowing the TS Safety Limits.
4. The applicant is required to recall and apply Tech. Spec basis information in order to make an operability determination concerning equipment which exceeds a listed setpoint.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 92

068A2.02

Liquid Radwaste System

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

Lack of tank recirculation prior to release

Given the following:

- A release has been initiated from the Monitor Tank Building.
- OEMF-57 has entered Trip 2 condition.
- The CRS is informed that the recirc pump associated with the tank being released has experienced a sheared shaft.
- The time at which the recirc pump failed is **UNKNOWN**.

- (1) The CRS _____ use the guidance of OP/0/B/6500/060 (Discharge of an AMT to the Environment) which allows the release to be re-initiated a maximum of two more times.
- (2) Per SLC 16.11-4 (Liquid Radwaste Treatment System), the Liquid Radwaste Treatment System shall be demonstrated Functional by meeting _____ .

- A. (1) should
(2) SLC 16.11-1 (Liquid Effluents) AND 16.11-3 (Dose)
- B. (1) should NOT
(2) SLC 16.11-1 (Liquid Effluents) AND 16.11-3 (Dose)**
- C. (1) should
(2) SLC 16.11-1 (Liquid Effluents) ONLY
- D. (1) should NOT
(2) SLC 16.11-1 (Liquid Effluents) ONLY

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 92

Distractor Analysis

- A. Incorrect. First part is plausible is the applicant uses only the guidance of the listed OP. Second part is correct.
- B. **CORRECT.** Although guidance of the listed OP allows a release to be initiated twice following an EMF spike, the release should not be continued after discovering that recirculation is not occurring. Per a note contained in SLC 16.11-4, SLCs 16.11-1 and 16.11-3 are used in demonstrating the Liquid Radwaste Treatment System functional.
- C. Incorrect. First part is plausible is the applicant uses only the guidance of the listed OP. Second part is plausible if the applicant assumes that the dose specification does not apply to treatment systems.
- D. Incorrect. First part is correct. Second part is plausible if the applicant assumes that the dose specification does not apply to treatment systems.

References:

- SLC 16.11-4 (Liquid Radwaste Treatment System), Rev. 001
- OP/0/B/6500/060 (Discharge of an AMT to the Environment), Rev. 048, L&P 2.21

KA Match:

Question tests the impact of improper tank recirculation during a Liquid Radwaste Release. The "procedure and controlling, mitigating, or correcting" aspect is met by application of a Selected Licensee Commitment which controls / directs functionality assessment of the Liquid Radwaste Treatment System.

Cognitive Level: High

The applicant must analyze a situation and apply operational knowledge to determine the proper course of action.

Source of Question: New

SRO Only Basis:

Part 1 of Question:

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 Screen Criteria for questions linked to 10CFR55.43(b)(4) (**Radiation Hazards** that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions):

1. It involves the process for a liquid release approval.

Part 2 of Question:

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

This question requires the applicant to decide the application of a limit and precaution and recall basis information from a SLC.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 93

071A2.02

Waste Gas Disposal System

**Ability to (a) predict the impacts of the following malfunctions or operations on the Waste Gas Disposal System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
Use of waste gas release monitors, radiation, gas flow rate, and totalizer**

Regarding the Waste Gas Disposal System:

- (1) In accordance with SLC 16.11-7 (Radioactive Gaseous Effluent Monitoring Instrumentation), a release from Waste Gas Decay Tank "C" _____ be initiated with OMF-50 (Waste Gas Discharge Monitor) non-functional.
- (2) In accordance with SLC 16.11-19 (Gas Storage Tanks), the activity limit is based on preventing exposure to a member of the public (at the nearest site boundary) from exceeding _____ rem total body upon an uncontrolled release.

- A. (1) may
(2) 0.5
- B. (1) may
(2) 1.5
- C. (1) may NOT
(2) 0.5
- D. (1) may NOT
(2) 1.5

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 93

Distractor Analysis

- A. **CORRECT.** Per SLC 16.11-7 Condition C, a waste gas release may be allowed if EMF-36 is functional or independent samples and valve line-ups are performed. Per the basis of SLC 16-11-19, 0.5 rem is the correct value.
- B. **Incorrect.** First part is correct. Second part is plausible because it is in Tech. Spec. 5.5.5.7.ii as a value for dose to any organ for I-131, I-133 and for all radionuclides in particulate form with half-lives > 8 days.
- C. **Incorrect.** First part is plausible because EMF-50 has an automatic function to isolate a waste gas upon Trip 2 actuation. Applicant may believe this prevents release or that SLC does prohibits. Second part is correct.
- D. **Incorrect.** First part is plausible because EMF-50 has an automatic function to isolate a waste gas upon Trip 2 actuation. Applicant may believe this prevents release or that SLC does prohibits. Second part is plausible because it is in Tech. Spec. 5.5.5.7.ii as a value for dose to any organ for I-131, I-133 and for all radionuclides in particulate form with half-lives > 8 days.

References:

- SLC 16.11-7 (Radioactive Gaseous Effluent Monitoring Instrumentation), Rev. 007, Table 16.11-7-1 and Condition C
- SLC 16.11-19 (Gas Storage Tanks), Rev. 000, Basis
- OP-CN-WE-EMF (Radiation Monitoring System Lesson Plan), Rev. 102, Section 6.20
- T.S. 5.0 (Administrative Controls), Amend Nos. 173/165, Section 5.5.5.7

KA Match:

Predicting the impact of the use of waste gas rad monitors is tested in question (1) as follows: if the monitor is non-functional can the release be initiated? Question (1) also in some sense, tests procedure knowledge for controlling or correcting by either allowing or not allowing the release.

Use of procedures to control is tested in question (2): SLC 16.11-19 controls the amount of exposure to a member of the public.

Cognitive Level: **Low**

Source of Question: **New**

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.
3. It cannot be answered solely by knowing the TS Safety Limits.
4. The applicant must recall basis information from SLC 16.11-9 and detailed information contained within the conditions of SLC 16.11-7.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 94

G2.1.13

Conduct of Operations

Knowledge of facility requirements for controlling vital/controlled access

Given the following Unit 2 conditions:

- The Unit is at 100% power.
- Maintenance has requested entry into the lower airlock.
- This work will require physically restraining open the airlock vestibule door (CAD door) and the outer airlock door.
- The inner airlock door will remain closed.

(1) During this work, the Annulus Ventilation System will _____ (1) _____, in accordance with Technical Specifications.

(2) Per Site Directive 3.1.2 (Access to Reactor Building and Areas Having High Pressure Steam Relief Devices), this _____ (2) _____ considered a containment entry.

A. (1) remain OPERABLE
(2) is

B. (1) remain OPERABLE
(2) is NOT

C. (1) be INOPERABLE
(2) is

**D. (1) be INOPERABLE
(2) is NOT**

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 94

Distractor Analysis

- A. Incorrect. First part is plausible if the inoperability is applied only to the Reactor Building. Second part is plausible because this would constitute a Reactor Building entry.
- B. Incorrect. First part is plausible if the inoperability is applied only to the Reactor Building. Second part is correct.
- C. Incorrect. First part is correct. Second part is plausible because this would constitute a Reactor Building entry.
- D. **CORRECT.** Per SD 3.1.2, Section 4.2 if inner airlock door is not opened, then this is not a containment entry. If it is the outer airlock door (as given in the stem), this does NOT constitute a containment entry.

(NOTE: "PIP" is the corrective action system.)

Per OP-CN-CNT-VE, Lesson Plan for Annulus Ventilation System, page 25 of 55, PIP C-09-05319 (Annulus Ventilation System/Reactor Building Operability), if an annulus door is propped open, this impacts the ability to meet operability requirements in TS 3.6.16 and TS 3.6.10.

References:

- OP-CN-CNT-VE (Annulus Ventilation System Lesson Plan), Rev. 100, Section 10.2
- T.S.B. 3.6.16 (Reactor Building Basis), Rev. 003, Background Section
- Site Directive 3.1.2 (Access to Reactor Building and Areas Having High Pressure Steam Relief Devices), Rev. 031, Section 4.2, TS 5.7

KA Match:

The applicant is required to demonstrate knowledge of the requirements for access to controlled areas through evaluation of the type of entry along with associated Tech Spec requirements.

Cognitive Level: High

Involves analysis of the condition of the airlock doors, and then predict the effect of that on the operability of the Annulus Ventilation System. Several mental steps are involved, and is therefore a higher cognitive level question.

Source of Question: Bank 4927 Modified

SRO Only Basis:

Part 1 of Question:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

3. It cannot be answered solely by knowing the TS Safety Limits.
4. The applicant must recall and apply related Tech Spec basis information along with site administrative requirements, regarding Containment entry and effects on equipment operability.

Part 2 of Question:

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 Screen Criteria for questions linked to 10CFR55.43(b)(4) (**Radiation Hazards** that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions):

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 95

G2.2.21

Equipment Control

Knowledge of pre- and post-maintenance operability requirements

Given the following:

- | | |
|-----------------|---|
| 10/10/13 @ 1000 | While changing oil in the 1A D/G governor, a technician inadvertently moved an adjustment knob. |
| 10/11/13 @ 1200 | 1A D/G failed to meet the acceptance criteria during a scheduled PT. Misadjusted governor control is found during the PT. |
| 10/11/13 @ 1800 | 1A D/G is tagged for governor repair. |
| 10/12/13 @ 1000 | All tags are cleared and 1A D/G is returned to service. |
| 10/12/13 @ 2000 | 1A D/G surveillance PT is completed successfully. |

(1) The 1A D/G was required to be declared inoperable at _____ .

(2) The 1A D/G can be declared operable at _____ .

A. (1) 10/10/13 @ 1000
(2) 10/12/13 @ 1000

B. (1) 10/10/13 @ 1000
(2) 10/12/13 @ 2000

C. (1) 10/11/13 @ 1200
(2) 10/12/13 @ 1000

D. (1) **10/11/13 @ 1200**
(2) **10/12/13 @ 2000**

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 95

Distractor Analysis

- A. Incorrect. First part is plausible because this is time at which the function of the D/G was affected. Second part is plausible because the D/G was available for operation at this time.
- B. Incorrect. First part is plausible because this is time at which the function of the D/G was affected. Second part is correct.
- C. Incorrect. First part is correct. Second part is plausible because the D/G was available for operation at this time.
- D. **CORRECT.** LCO 3.0.2 states that actions shall be met and completion times will be assigned upon discovery of a failure to meet the LCO. S.R. 3.0.1 states that post maintenance testing is required in order to declare equipment operable.

References:

- T.S.B. 3.0 (Limiting Condition for Operation Applicability), Rev. 001, Section LCO 3.0.2 and S.R. 3.0.1

KA Match:

The applicant is required to demonstrate knowledge of both pre and post maintenance operability determinations.

Cognitive Level: High

Requires analysis and association of multiple data points to determine the correct times for inoperability and operability of a component.

Source of Question: New

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(2) (**Tech Specs**):

1. It cannot be answered solely by knowing \leq 1 hour TS/ SLC Action.
2. It cannot be answered solely by knowing the LCO/SLC information listed above the line.
3. It cannot be answered solely by knowing the TS Safety Limits.
4. Requires the proper application of Technical Specifications per the basis and station administrative requirements for maintenance on the D/G.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 96

G2.2.5

Equipment Control

Knowledge of the process for making design or operating changes to the facility

Which ONE of the following changes requires a 10CFR50.59 review?

- A. A change to the Site Physical Security Plan that reduces the shift staffing requirements for security guards.
- B. A system modification that adds a backup Nitrogen accumulator to an air operated containment isolation valve.**
- C. A revision to the Site Emergency Plan that changes the designated assembly areas for accountability.
- D. A change to the Nuclear Quality Assurance Plan.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 96

Distractor Analysis

- A. Incorrect. Security Guard staffing is not covered under Tech Specs but under 10CFR50.72. Plausible: If the applicant is not familiar with the requirements for USQs. Some station staffing requirements are covered under Tech Specs.
- B. **CORRECT.** Containment isolation valves are Tech Spec SSCs, and therefore require the 10CFR50.59 review.
- C. Incorrect. The emergency plan is changed under the 10CFR50.54q process which is similar in concept to 10CFR50.59 but not the same. Plausible: If the applicant is not familiar with the requirements for USQs.
- D. Incorrect. Does not require a 10CFR50.59 evaluation. The QA Plan is not a Tech Spec SSC. Plausible: If the applicant is not familiar with the requirements for USQs. NQA is covered under 10CFR50 Appendix B.

References:

- NSD 209 (10CFR50.59 Process), Rev. 014

KA Match:

The KA is matched because it tests knowledge of 10CFR50.59 reviews and for which situations this type of review would be required.

Cognitive Level: **Low**

Source of Question: **Bank 2012 NRC Exam Q97**

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(3) (**Facility licensee procedures required for operating changes in the facility**):

1. It involves processes for changing the plant or plant procedures.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 97

G2.3.14

Radiation Control

Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities

Given the following Unit 1 conditions:

- A LOCA has occurred with 10% failed fuel.
- 1NI-184B (1B ND Pump Suction from Cont Sump Isol) must be manually aligned to protect the health and safety of the general public.
- Dose rates in the area of the valve are 150 REM/hr.
- Valve operation will take 12 minutes.

In accordance with RP/0/A/5000/018 (Emergency Worker Dose Extension):

- (1) Approval by the Site Vice President for this Emergency Exposure (1) required.
- (2) The plant operator _____ required to be a volunteer.

- A. (1) is
 (2) is
- B. (1) is
 (2) is NOT
- C. (1) is NOT
 (2) is**
- D. (1) is NOT
 (2) is NOT

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 97

Distractor Analysis

- A. Incorrect. First part is plausible because the Site Vice President is required to approve a Planned Special Exposure, but not Emergency Dose Extension. Second part is correct.
- B. Incorrect. First part is plausible because the Site Vice President is required to approve a Planned Special Exposure, but not Emergency Dose Extension. Second part is plausible because a volunteer is not required if dose will not exceed 25 Rem.
- C. **CORRECT.** Per RP/18, emergency dose extensions require Emergency Coordinator approval. Exposures above 25 rem require a volunteer. Since the dose rate in the area is 150 R/hr, and stay is projected as 1/5 of an hour (12 minutes), the projected dose will be 30R.
- D. Incorrect. First part is correct. Plausible to conclude that a volunteer is not required, since the task is to protect the health and safety of the public. This could be confused with life-saving activities, and also could be plausible if projected dose is miscalculated.

References:

- OP-CN-RAD-HP (Radiation Protection Lesson Plan), Rev. 101, Section 2.11 and 2.13.2
- RP/0/A/5000/018 (Emergency Worker Dose Extension), Rev. 002, Enclosure 4.2

KA Match:

Given conditions involving high radiation levels encountered during an emergency condition, the applicant is required to demonstrate knowledge of the administrative requirements for granting an emergency dose extension.

Cognitive Level: High

Involves a calculation to determine a dose value, and then application of that result to the requirements for categorization of the type of exposure and authorizations required.

Source of Question: New

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(4) (**Radiation Hazards** that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions):

1. This question is SRO level knowledge because it cannot be answered solely by RO knowledge of radiological safety principles (e.g., RWP requirements, stay-time, DAC-hours, etc.).
2. The applicant is required to analyze a projected dose, and then apply administrative requirements of the emergency worker dose response procedure (RP) which is considered SRO applicable information.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 98

G2.3.6

Ability to approve release permits

For a planned release of discharging the contents of a Monitor Tank to the Low Pressure Service Water discharge (RL) via the Nuclear Service Water System (RN), which ONE of the following describes a condition that does NOT meet the requirements for approving the release?

- A. The pH of the contents is 8.8.
- B. A boron release with a boron concentration at 480 ppm.
- C. Planned release flowrate is 95 gpm.
- D. RN is aligned to the Standby Nuclear Service Water Pond.**

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 98

Distractor Analysis

- A. Incorrect. The cutoff point for approval is pH at 9.0, close to the value listed in "A".
- B. Incorrect. It's > 500 ppm, and you can still approve the release, but for only 3 hrs. in a 24 hr. period.
- C. Incorrect. Required flowrates shall be 35 - 100 gpm. Plausible to select that 95 gpm is not acceptable with an incomplete understanding of the flowrate requirements.
- D. **CORRECT.** With RN aligned to the Standby Nuclear Service Water Pond, release cannot be approved.

References:

- OP/0/B/6500/015 (Discharging a Monitor Tank to the Environment), Rev. 110, L&P 2.5, 2.7, and 2.8
- OP/0/B/6500/113 (Operations Liquid Waste Release), Rev. 007, L&P 2.2

KA Match:

The KA is matched because the SRO applicant is presented with conditions involving a proposed liquid radwaste release, and then tested on conditions affecting whether the release should be approved.

Cognitive Level: **Low**

Source of Question: **New**

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 Screen Criteria for questions linked to 10CFR55.43(b)(4) (**Radiation Hazards** that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions):

1. It involves the process for a liquid release approval.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 99

G2.4.14

Emergency Procedures/Plans

Knowledge of general guidelines for EOP usage

Given the following:

- Unit 1 is responding to a main steam line break inside containment.
- The operators completed E-0 (Reactor Trip and Safety Injection) and transitioned to EP/1/A/5000/E-2 (Faulted Steam Generator Isolation)
- A RED PATH on Containment Integrity occurred and the operators transitioned to EP/1/A/5000/FR-Z.1 (Response to High Containment Pressure) at Step 8 of E-2.
- A RED PATH on NC Integrity occurred and the operators transitioned to EP/1/A/5000/FR-P.1 (Response to Imminent Pressurized Thermal Shock Condition) from Step 4 of FR-Z.1.

Following a completion of FR-P.1 and a report from the STA that all CSFs are now GREEN, what is the correct procedure transition?

- A. Return to E-2 Step 1 and continue.
- B. Return to E-2 step 8 and continue.
- C. Return to FR-Z.1 Step 4 and complete the procedure, then return to E-2 step 8.**
- D. Enter EP/1/A/5000/ES-0.0 (Rediagnosis) and use guidance for procedure entry.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 99

Distractor Analysis

- A. Incorrect. Plausible because all CSFs are green. Applicant could reason that a return to Step 1 is appropriate based on this.
- B. Incorrect. Plausible since the condition causing procedure entry has cleared. This would be correct if FR-Z.1 had been completed.
- C. **CORRECT.** Per OMP 1-7, once a procedure is entered due to a valid red or orange condition, that procedure shall be performed to completion unless preempted by some higher priority condition. It is expected that the actions in the procedure will clear the red or orange condition before all the operator actions are complete. However, these procedures shall be performed to the point of the defined transition to a specific procedure. At this point, any lower priority red or orange paths currently indicating or previously started but not completed shall be addressed.
- D. Incorrect. Plausible because ES-0.0 can be used at any time, but entering this procedure would neglect addressing the CSF, as required.

References:

- OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), Rev. 040, Section 7.3 E

KA Match:

The applicant is required to demonstrate knowledge of order of entry and completion requirements of EOPs.

Cognitive Level: High

Requires analysis of several conditions involving flowpaths of EOP usage and Success Paths. This analysis involves knowledge of CSF priorities, and of administrative requirements for EOP usage.

Source of Question: Bank 279

SRO Only Basis:

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 Screen Criteria for questions linked to 10CFR55.43(b)(5) (**Assessment and Selection of Procedures**):

1. It cannot be answered solely by knowing "systems knowledge", i.e., how the system works, flowpath, logic, component location.
2. It cannot be answered solely by knowing immediate operator actions.
3. It cannot be answered solely by knowing entry conditions for AOPs or plant parameters that require direct entry to major EOPs.
4. It cannot be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

5. This question requires the applicant to use administrative guidelines to make determinations concerning procedure implementation/completion, and prioritization that would be required of an SRO.

Therefore, this is an SRO only question.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

Question 100

G2.4.40

Emergency Procedures/Plans

Knowledge of SRO responsibilities in emergency plan implementation

Given the following Unit 2 conditions:

- An Unusual Event was declared on Unit 2.
- Initial Notification to the States, Counties and the NRC has been completed.
- The Emergency Coordinator has just made the decision to upgrade the classification to an Alert.

- (1) The **NRC** is required to be notified immediately, but no later than, (1) after change of classification.
- (2) After the initial notification, any changes to Protective Action Recommendations (PARs) shall be communicated to the states and counties within (2) .

Which ONE of the following completes the statements above?

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

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

QUESTION 100

Distractor Analysis

- A. **CORRECT.** RP/13 requires an immediate NRC notification following an emergency classification. Immediate has been quantified to mean not later than one hour. RP/05A requires PAR changes be communicated within 15 minutes.
- B. Incorrect. Part 1 is correct. Second part is plausible because normal follow-up notifications are required in 1 hour.
- C. Incorrect. First part is plausible because local agency notification is required within 15 minutes. Second part is correct.
- D. Incorrect. First part is plausible because local agency notification is required within 15 minutes. Second part is plausible because normal follow-up notifications are required in 1 hour.

References:

- RP/0/A/5000/006A (Notifications to States and Counties from the Control Room), Rev. 028, Note prior to Step 3.1
- RP/0/B/5000/013 (NRC Notification Requirements), Rev. 036, Enclosure 4.1

KA Match:

The applicant is required to demonstrate knowledge of SRO responsibility during emergency plan implementation.

Cognitive Level: **Low**

Source of Question: **Bank 2800 - Modified**

SRO Only Basis:

This question is not tied to 10CFR50.43 (b) but can be classified as an **SRO Plant Specific Example**. This question requires additional knowledge required for the higher license level and is unique to the SRO/OSM position. At CNS it is the responsibility of the SRO to classify the event in the event that an emergency is declared.

Objective 17, (Prepare Emergency Notification Forms), and Objective #24 (PARs) are designated as SRO only. Both the understanding of the requirements and the actual completion of the required paperwork, along with the transmittal are SRO ONLY tasks at CNS.

This question tests the application of RP/13 which is solely a function of the SRO along with RP/05. Although the State/County notification function is not specific to an SRO, this questions specific requirements about NRC notification and subsequent requirements.

**Catawba Nuclear Station 2014 NRC Initial License Written Exam
T-45 As Submitted - Senior Reactor Operator**

KC Surge Tank Volume vs Level

