76.
EPE011 2.2.37
Large Break LOCA
Ability to determine operability and/or availability of safety related equipment.

NEW
Given the following Unit 1 conditions:

Initial
- With the Unit initially at 100% power, a large break LOCA has occurred.
- Containment sump level is currently 3.4 feet and increasing slowly.
- ES-1.3, (Transfer to Cold Leg Recirculation) has been completed through Step 11 and proper recirculation flow has been verified.

Subsequent
- 1A and 1B ND Pump amps have begun to oscillate.

For the above conditions, which ONE of the following describes;

(1) the procedure that will be implemented,

AND

(2) the actions contained in that procedure which will mitigate the conditions?

A. (1) ECA-1.1, (Loss of Emergency Coolant Recirculation)
(2) Secure the ND, NV, AND NI pumps, and initiate FWST makeup.

B. (1) ECA-1.3, (Containment Sump Blockage)
(2) Secure the NV and NI pumps ONLY, and perform valve alignments to reduce ND flow.

C. (1) ECA-1.1, (Loss of Emergency Coolant Recirculation)
(2) Secure the NV and NI pumps ONLY, and perform valve alignments to reduce ND flow.

D. (1) ECA-1.3, (Containment Sump Blockage)
(2) Secure the ND, NV, AND NI pumps, and initiate FWST makeup.

Ans: B

References:
ECA-1.1, (Loss of Emergency Coolant Recirculation), Rev. 034
ECA-1.3, (Containment Sump Blockage), Rev. 007
ES-1.3, Background Document

Distractor Analysis

A. Incorrect. Plausible, if the applicant confuses the sump level as being inadequate. The sump level given in the stem is 3.4 feet; the level listed in ES-1.3, (Transfer to Cold Leg Recirc.) as adequate is > 3.3 ft. If the applicant believes the sump level is NOT adequate, then implementing ECA-1.1 would be correct, per ES-1.3, Step 2, RNO column, step J. With this misconception it is also reasonable to believe that additional inventory is needed, and can be provided by initiating FWST makeup.

B. **CORRECT.** With adequate sump level (3.4 feet and rising), the amps response indicates the ND pump is cavitating, due to sump blockage, per the Background Document for ES-1.3. The NV (high head injection) and NI (intermediate head injection) pumps are receiving suction from the ND (low head injection) in a "piggyback mode". If ND pumps are in distress, step 4 of ECA-1.3, (Containment Sump Blockage), directs shutting off the NV and NI pumps to alleviate the cavitation on the ND pumps. Further valve alignments are directed relating to the ND pump flowpaths in a graduated fashion, in an effort to alleviate the cavitation. The correct sub-procedure to accomplish these actions is only in ECA-1.3, and do not appear in ECA-1.1.

   A NOTE prior to Step 12 of ECA-1.3, (Containment Sump Blockage) alerts the SRO that sump blockage should be suspected if adequate sump level exists and pumps cavitate. Step 12.a. specifies that if sump blockage is suspected, to go to ECA-1.3, (Containment Sump Blockage).

C. Incorrect. Plausible, since the pump and valve alignments are correct. ECA-1.1 is plausible if the applicant confuses the sump level as being inadequate. The sump level given in the stem is 3.4 feet; the level listed in ES-1.3, (Transfer to Cold Leg Recirc.) as adequate is > 3.3 ft. If the applicant believes the sump level is NOT adequate, then implementing ECA-1.1 would be correct, per ES-1.3, Step 2, RNO column, step J. With this misconception it is also reasonable to believe that additional inventory is needed, and can be provided by initiating FWST makeup.

D. Incorrect. Plausible, since the procedure selection (ECA-1.3) is correct. The pumps are cavitating and it is plausible to take action to protect the pumps. However, the action in the second part of this distractor, though plausible, is only directed ECA-1.1, not in ECA-1.3.

K/A Match

The K/A is matched because the question involves a Large Break LOCA that has progressed to the point of a Transfer to Cold Leg Recirculation. The applicant is tested on the ability to determine if the safety related low head injection pumps are operable or available by analyzing plant conditions involving amps oscillation, and making a decision that the pumps are NOT available. With that determination, the applicant goes on to select a sub-procedure for mitigation.

Basis for SRO Only

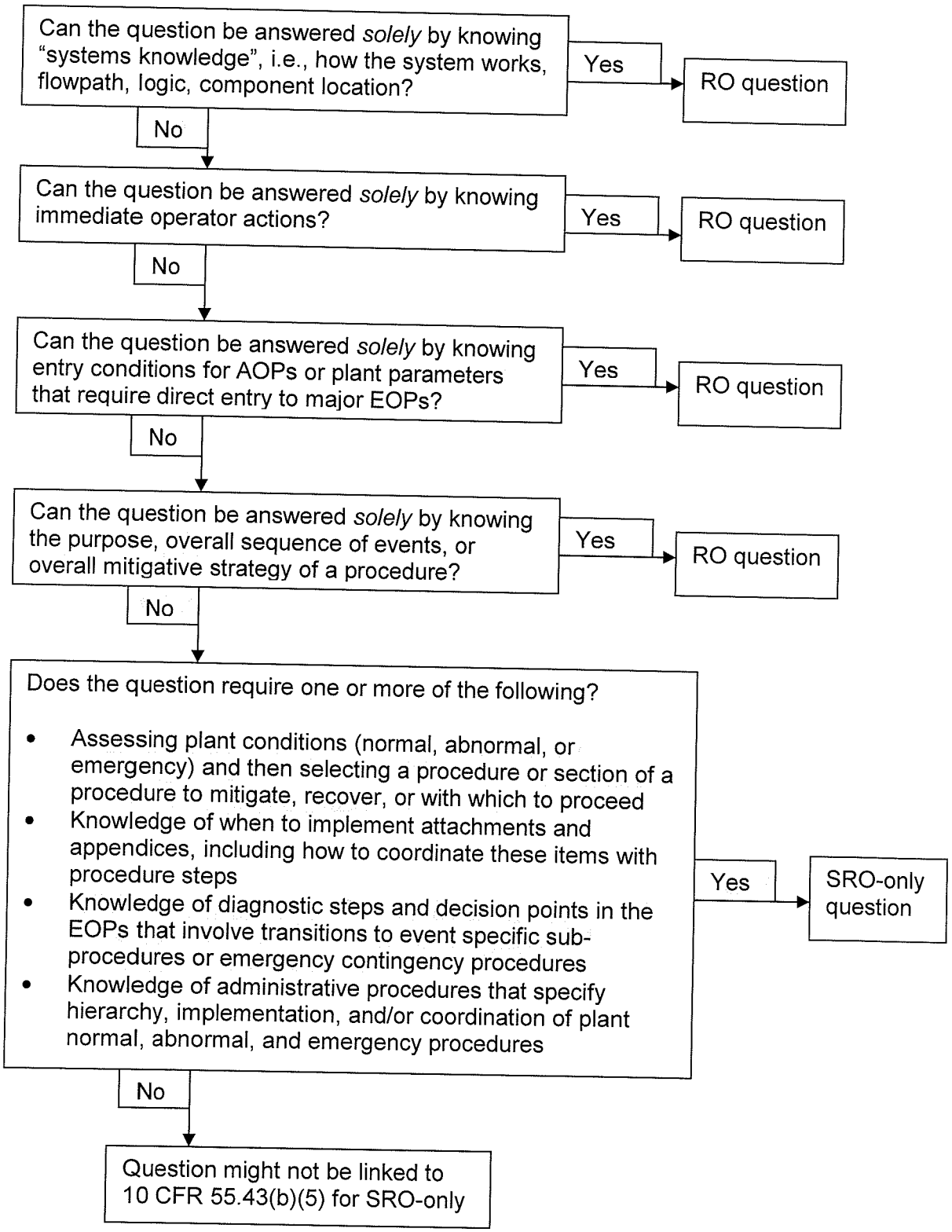
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):

1) The question can NOT be answered by knowing systems knowledge alone.
4) The question can NOT be answered by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.
5) The question requires the applicant to recall procedure content from several sub-procedures (ECA-1.1, ECA-1.3, ES-1.3), assess plant conditions, and then select which sub-procedure contains the actions for mitigation. Specifically, the applicant is placed in a condition where ES-1.3, (Transfer to Cold Leg Recirc.) is being implemented. Plant conditions then change which impact whether the actions in ES-1.3 are appropriate. The applicant has to determine that they are NOT, and then recall detailed content from two additional sub-procedures, and make a determination on which sub-procedure contains the actions for further mitigation of these new plant conditions.

Cognitive Level - High

This is a high cognitive level question because the applicant must analyze a configuration of several operating pumps taking suction from a source which may be degrading. The applicant is given conditions where pump amps begin oscillating, analyze those conditions, and draw a conclusion that will be used to select the appropriate procedure.

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)



STEP 9: IF AT ANY TIME ECCS or NS pumps indicate signs of cavitation, OR loss of S/I recirc flow to NC system occurs, THEN perform the following:

PURPOSE:

To provide a transition to Containment Sump Blockage procedure. 11

APPLICABLE ERG BASIS:

PLANT SPECIFIC INFORMATION:

The containment sump blockage procedure is written as a contingency to address beyond design basis event of containment sump blockage. Pump cavitation and/or loss of flow from running pumps with adequate sump level would indicate that the containment sump has significant blockage. In this case the operator should transition to ECA-1.3 for sump blockage. If containment sump level is low or valve alignments or loss of pumps is the reason for the loss of recirc flow, then ECA-1.1 Loss of Emergency Coolant Recirculation should be entered. 11

KNOWLEDGE/ABILITY:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **NV and NI pumps taking suction from ND pumps must be secured prior to stopping ND pumps.**

4. **IF AT ANY TIME ND pumps are cavitating, THEN perform the following:**

__ a. Ensure NV and NI pumps taking suction from affected ND pump - OFF.

__ b. Reset NS.

__ c. Stop NS pumps.

d. Ensure ND spray valves - CLOSED:

__ • 1NS-43A (ND Pmp 1A To Cont Spray Hdr)

__ • 1NS-38B (ND Pmp 1B To Cont Spray Hdr).

__ e. Verify at least one ND pump - ON.

__ e. **GO TO** Step 5.

f. Ensure the following signals - RESET:

__ • "1ND-26 ND HX 1A OTLT CTRL Ss RESET"

__ • "1ND-60 ND HX 1B OTLT CTRL Ss RESET"

g. **IF** cavitation continues, **THEN** close the following valves:

__ • 1ND-26 (ND Hx 1A Outlet Ctrl)

__ • 1ND-60 (ND Hx 1B Outlet Ctrl).

h. **IF** ND 1A pump continues to cavitate, **THEN** perform the following:

__ 1) Place the "PWR DISCON FOR 1NI-173A" in "ENABLE".

__ 2) Close 1NI-173A (ND Hdr 1A To Cold Legs C&D).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. (Continued)

i. **IF** ND Pump 1B continues to cavitate, **THEN** perform the following:

__ 1) Place the "PWR DISCON FOR 1NI-178B" in "ENABLE".

__ 2) Close 1NI-178B (ND Hdr 1B To Cold Legs A&B).

__ j. Verify 1NI-183B (ND Hdr A&B Hot Leg Inj Isol) - CLOSED.

j. **IF** any ND pump cavitating, **THEN** perform the following:

__ 1) Place the "PWR DISCON FOR 1NI-183B" in "ENABLE".

__ 2) Close 1NI-183B (ND Hdr A&B Hot Leg Inj Isol).

__ k. **IF** ND pump(s) continue to cavitate, **THEN** stop affected ND pump.

l. Ensure proper operation of ND pump miniflow valves:

__ • 1ND-25A (ND Pump 1A Miniflow)
__ • 1ND-59B (ND Pump 1B Miniflow).

__ 5. **Monitor for signs of cavitation following any change in flow from containment sump.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Monitoring for signs of containment sump blockage must be performed as long as ECCS pumps are aligned to sump.

12. **IF AT ANY TIME ECCS or NS pumps indicate signs of cavitation, OR loss of S/I recirc flow to NC system occurs, THEN perform the following:**

NOTE If adequate sump level exists and pumps cavitate, sump blockage should be suspected, unless other cause is known.

a. **IF** at least one train of Cold Leg Recirc cannot be maintained, **THEN** perform one of the following:

__ • **IF** sump blockage is suspected, **THEN GO TO** EP/1/A/5000/ECA-1.3 (Containment Sump Blockage). ← CORRECT PATH WITH PROPER SUMP LEVEL.

OR

__ • **IF** loss of emergency coolant recirc is known to be caused by failure other than sump blockage, **THEN GO TO** EP/1/A/5000/ECA-1.1 (Loss Of Emergency Coolant Recirculation). ← DISTRACTOR

1. **Emergency Coolant Recirc Capability Restoration:**

   - **WHEN** emergency coolant recirc capability is restored during this procedure, **THEN**:

     a. **IF** transfer to Cold Leg Recirc is required, **THEN** perform the following:

        1) Ensure the following valves -OPEN:

        __ • 1NS-29A (NS Spray Hdr 1A Cont Isol)
        __ • 1NS-32A (NS Spray Hdr 1A Cont Isol)
        __ • 1NS-15B (NS Spray Hdr 1B Cont Isol)
        __ • 1NS-12B (NS Spray Hdr 1B Cont Isol).

        __ 2) **GO TO** EP/1/A/5000/ES-1.3 (Transfer To Cold Leg Recirculation).

     __ b. **RETURN TO** procedure and step in effect.

2. **ECCS Suction Source Monitoring Criteria:**

   __ • **IF** the suction source is lost to any ECCS **OR** NS pump, **THEN** stop the affected pump.

   __ • **IF** FWST level decreases to less than 5%, **THEN** stop all pumps taking suction from the FWST.

   __ • **IF** both "CONT. SUMP LEVEL >2.5 ft" annunciators on 1AD-20 and 1AD-21 dark, **THEN** stop all pumps taking suction from the containment sump.

3. **CA Suction Source Switchover Criteria:**

   - **IF** either of the following annunciators are lit, **THEN REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater):

   __ • 1AD-5, H/4 "CACST LO LEVEL"

   OR

   __ • 1AD-8, B/1 "UST LO LEVEL".

1. **S/I Reinitiation Criteria:**

__ • **IF** NC subcooling based on core exit T/Cs is less than 0°F **OR** Pzr level cannot be maintained greater than 11% (20% ACC), **THEN** manually start S/I pumps and align valves as required to restore subcooling and Pzr level.

2. **Loss Of Emergency Coolant Recirculation:**

• **IF** Step 5 has been completed **AND** recirc flow is subsequently lost, **THEN** perform the following:

__ a. **IF** a valid red **OR** orange path procedure is in effect, **THEN RETURN TO** procedure in effect.

__ b. **GO TO** EP/1/A/5000/ECA-1.1 (Loss Of Emergency Coolant Recirculation).

3. **Loss Of FWST Supply To ECCS Pumps:**

__ • **IF** FWST level decreases to less than 11%, **THEN** stop NS pumps taking suction from the FWST.

__ • **IF** FWST level decreases to less than 5%, **THEN** stop all pumps taking suction from the FWST.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. **Align NS spray valves as follows:**

__ a. Verify NS Pump 1A - ON.

a. Perform the following:

__ 1) Ensure NS Train A - RESET.

2) Close the following valves:

__ • 1NS-29A (NS Spray Hdr 1A Cont Isol)

__ • 1NS-32A (NS Spray Hdr 1A Cont Isol).

__ b. Verify NS Pump 1B - ON.

b. Perform the following:

__ 1) Ensure NS Train B - RESET.

2) Close the following valves:

__ • 1NS-15B (NS Spray Hdr 1B Cont Isol)

__ • 1NS-12B (NS Spray Hdr 1B Cont Isol).

c. **IF AT ANY TIME** NS pumps are stopped or started, **THEN**:

__ • Ensure associated NS Train - RESET.

__ • Close associated spray valves after securing a pump.

__ • Open associated spray valves prior to starting a pump.

__ 10. **Initiate makeup to FWST. REFER TO OP/1/A/6200/014 (Refueling Water System).**

77.
APE025 2.1.7
Loss of Residual Heat Removal System (RHRS)
Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

NEW
Given the following Unit 1 conditions:

Initial
- As part of a planned shutdown, the Unit has just entered Mode 5.
- NC temperature is 190°F and slowly decreasing.
- Train 1A of ND is in service.

Subsequent
- 1AD-11, A/1 4KV ESS PWR TRAIN A TROUBLE, alarms.
- Status lights for UV on 1A Train 4KV LIT momentarily, AND are now DARK.
- NC temperature is now 191°F and slowly increasing.

Which ONE of the following describes the abnormal procedure which will be used to restore ND cooling at the EARLIEST time, and what is the action directed by that procedure?

A. AP/07, (Loss of Normal Power);
Restart 1A ND pump.

B. AP/07, (Loss of Normal Power);
Start 1B ND pump from the opposite essential train.

C. AP/019, (Loss of Residual Heat Removal System);
Restart 1A ND pump.

D. AP/019, (Loss of Residual Heat Removal System);
Start 1B ND pump from the opposite essential train.

Ans: A

References:
AP/1/A/5500/019, (Loss of Residual Heat Removal System), Rev. 54, Step 1 - 28, and page 1 of Enclosure 8.
AP/7/A/5500/007, (Loss of Normal Power), Rev. 59
Annunciator Response Procedure, 1AD-11, A/1 4KV ESS PWR TRAIN A TROUBLE

Distractor Analysis

A. **CORRECT.** The conditions given in the stem for the undervoltage status lights for 1A Essential Train, combined with the 4KV ESS PWR TRAIN A TROUBLE alarm, indicate that 1A 4KV Train initially lost power (trouble alarm PLUS undervoltage indication), and then that power was automatically restored when the associated D/G started and repowered the bus, as follows:

- The alarm for 4KV ESS PWR TRAIN A TROUBLE came in
- The UV status lights came ON (power lost)
- The UV status lights then went DARK (power restored by the 1A D/G).

These conditions warrant implementation of AP/07, (Loss of Normal Power), Case I (Loss of Normal Power to an Essential Train). This section of the AP requires verifying proper operation of the D/G and that the bus has reenergized, and then manually restarting the ND pump to restore RHR. The ND (RHR) pump which was running, will NOT automatically sequence back onto the bus. The appropriate section of AP/07 addresses this by having the crew manually restart the ND pump (AP/07, Step 8.d). This is relatively early in the procedure.

AP/19, (Loss of Residual Heat Removal System) would restore RHR, but it is all the way back at Step 28 that refers you to Enclosure 8 (Restoring an ND Train to Operation) for starting an ND pump. This requires significantly longer to arrive at this point, than using AP/07. Further, once Enclosure 8 has been implemented, it is back at Step 21 before the ND pump is actually restored.

B. Incorrect. Plausible, since the procedure is correct. Also plausible, if the applicant believes that power has not been restored to A train , by misinterpreting status lights (i.e., if applicant reverses the response of the UV light being ON as meaning voltage is acceptable, and when light goes OFF, an undervoltage exists). With this misinterpretation of status lights, it is plausible for an applicant to reason that starting the ND pump on the opposite essential power train is a correct action, and would result in restoring RHR at the earliest time.

C. Incorrect. AP/19 is plausible because it WILL restore RHR eventually, and the title of the procedure makes this even more plausible. The question is clear in testing the evaluative ability to analyze the conditions and determine which actions in which procedure will restore RHR at the EARLIEST time. AP/07 is the procedure which contains instructions to manually restart the ND pump much earlier in the procedure than AP/19, and also has them verify power was restored.

D. Incorrect. AP/19 is plausible because it WILL restore RHR eventually, and the title of the procedure makes this even more plausible. The question is clear in testing the evaluative ability to analyze the conditions and determine which actions in which procedure will restore RHR at the EARLIEST time. Starting 1B ND pump from the opposite essential train is plausible, if the applicant believes that power has not been restored to A train , by misinterpreting status lights (i.e., if applicant reverses the response of the UV light being ON as meaning voltage is acceptable, and when light goes OFF, an undervoltage exists). With this misinterpretation of status lights, it is plausible for an applicant to reason that starting the ND pump on the opposite essential power train is a correct action, and would result in restoring RHR at the earliest time.

KA Match

The K/A is matched because the applicant is required to evaluate plant conditions involving a loss of RHR, including indications of essential train power and interpreting that to make an operational judgement, based on two operating characteristics: 1.) the fact that NC temperature was decreasing, and now it is increasing (reactor behavior, since this is an indication of heat input from decay heat from the core); and 2.) that the blackout sequencer will NOT automatically sequence on the ND pump to the power train, and that it must be started manually, in order to restore RHR.

The "instrument interpretation" aspect is met because the applicant is required to analyze NC temperature indication, including trend, and the status lights for undervoltage on the essential power train, and then make an operational judgement on which procedure will address the conditions to achieve a desired result.

Cognitive Level **High**

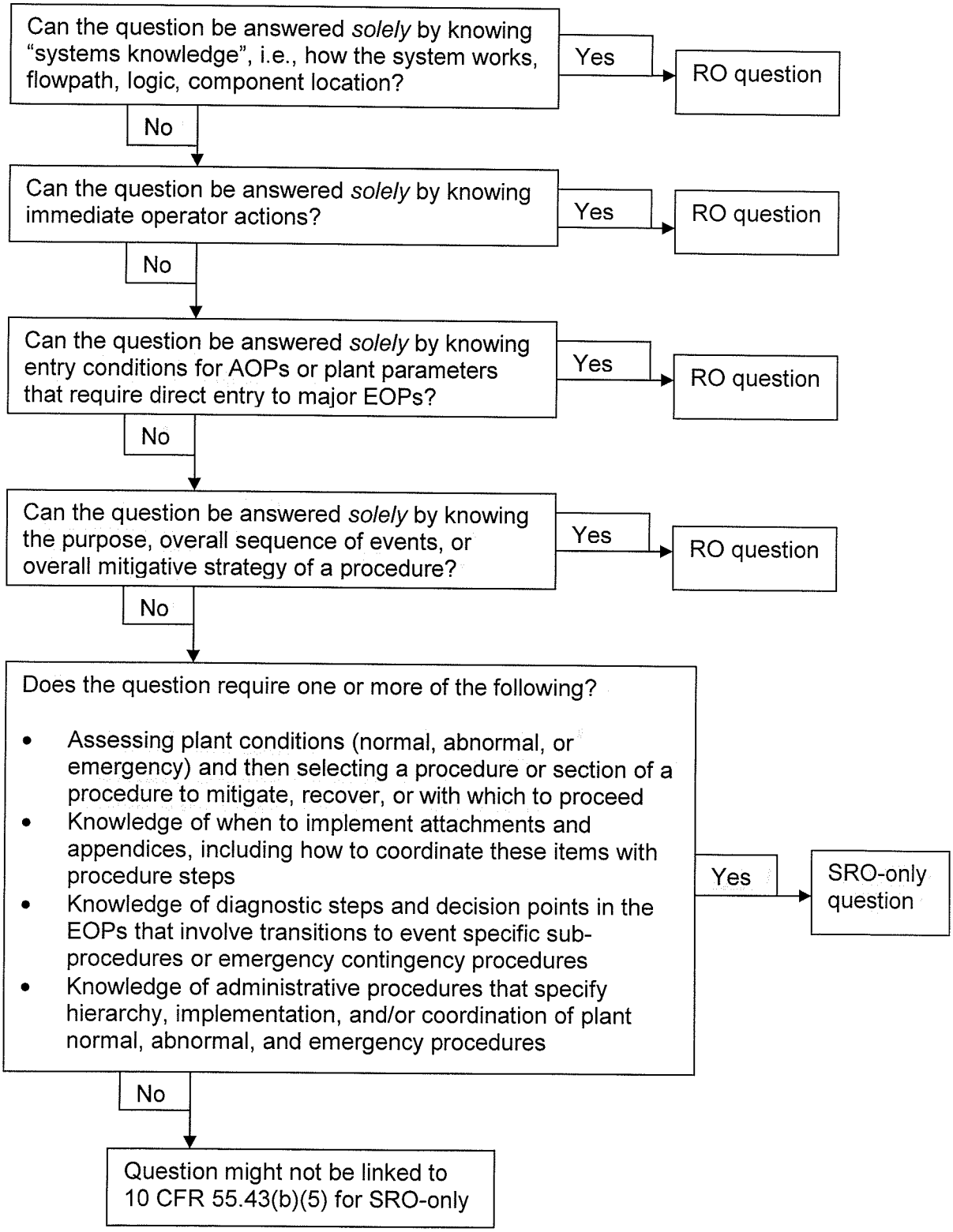
This is a high cognitive level question because it involves a level of analysis of a given situation, and then apply system knowledge (undervoltage response and indication, RHR operations) to solve a problem involving a comparison of two procedures. The applicant recall the detailed content of these two procedures, apply the system knowledge, and then perform an analysis to determine which one of the procedures will be used for a desired result.

SRO Only Justification

This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):

1.) The question canNOT be answered by knowing systems knowledge alone.
2.) The question canNOT be answered solely by knowing immediate operator actions.
3.) The question canNOT be answered solely by knowing entry conditions for AOPs. Though an AOP entry conditions are involved, the SRO applicant canNOT answer this question solely by knowing what the entry conditions are.
4.) The question canNOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigating strategy of a procedure.
5.) The question does require the applicant to assess plant conditions and then select a procedure to mitigate. This procedure selection can be done only by having detailed knowledge of procedure content for TWO procedures, and then applying that detailed knowledge to make a comparison of the content of the two procedures, and then making the procedure selection for the specific purpose of achieving a desired result (restoring RHR at the earliest time).

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)



PANEL: 1AD-11

4KV ESS PWR TRAIN A TROUBLE

A/1

SETPOINT: Local alarm actuated on 1RFMP3

ORIGIN: 1RFMP3: Module 1RFM48, 1RFM47, 1RFM46

PROBABLE CAUSE:

1. Loss of control power to breaker failure circuit
2. Loss of control power to the breaker mode select circuit
3. Loss of control power to any 4.16KV essential breaker
4. Loss of control power to 1ETA degraded bus voltage circuit
5. Any 4.16KV breaker is **NOT** in the CONNECT position

AUTOMATIC ACTIONS: None

IMMEDIATE ACTIONS: Dispatch an operator to 1RFM-48 located on 1RFMP3 (AB-560, BB-49) to determine the cause of alarm.

SUPPLEMENTARY ACTIONS:

1. **IF** alarm is due to loss of control power, dispatch an operator to 1EDE-F01C (SWGR 1ETA Control Power) and 1ETA to determine cause.
2. Ensure proper operation per OP/1/A/6350/008 (125 VDC/120VAC Vital Instrument and Control Power System).
3. Verify proper operation of 125VDC Diesel Auxiliary Power System per OP/1/A/6350/006 (125 VDC Diesel Auxiliary System).
4. **IF** due to a breaker being out of the CONNECT position, ensure this condition is desirable and return to normal as soon as possible.
5. Refer to Tech Specs 3.8.9 and 3.8.10.

REFERENCES:

1. CNEE-0115-01.42
2. CNEE-0115.01.20
3. CNLT-1705-01.01-01
4. CNLT-1765-02.01

STEP 4: Verify 1ETA and 1ETB - ENERGIZED.

PURPOSE:

To ensure electrical power to at least one emergency bus.

APPLICABLE ERG BASIS:

AC power must be verified from either offsite sources or the diesel generators to ensure adequate power sources to operate the safeguards equipment. At least one train of safeguards equipment is required to deal with emergency conditions.

ECA-0.0 is developed and structured to address the condition where all AC emergency power is lost. It is entered on the symptom of all AC emergency busses being de-energized. Its objective is to cope with the loss of AC emergency power until at least one AC emergency bus can be energized. ECA-0.0 should not be entered if at least one AC emergency bus is energized since the other optimal recovery procedures and functional restoration procedures contain guidance that accommodates multiple failures. They use available equipment to mitigate events whether plant systems are at full capacity, minimum safeguards capacity or degraded capacity. The availability of minimum safeguards capacity is not a requirement for being in the other optimal recovery procedures and function restoration procedures. For example, the core cooling function restoration procedures provide guidance for the use of available equipment in degraded systems to mitigate inadequate core cooling (ICC) (e.g., ICC analyses show that only one NI pump is needed to prevent ICC even though one NI pump may not be sufficient to mitigate design basis transients within their design basis acceptance criteria) (DW-92-033).

It is also desirable to have power to all AC emergency busses. If power is available to only one train, the operator should initiate attempts to restore power to the other train while continuing with the next step in the procedure to deal with the emergency condition.

PLANT SPECIFIC INFORMATION:

The status of ETA/ETB is used in many Emergency and Abnormal Operating procedures as a decision point. There are many possible means to make this determination, but not all provide accurate results under all conditions. The Undervoltage Status lights on MC-14 are easily recognizable, and provide correct indication in most cases. If the status lights are LIT, it IS a reliable indication that the associated bus is deenergized. However, the status light DARK does NOT always mean the bus is energized. The status light also remains dark if the sequencer power is failed. If the status light is DARK, the bus status must be confirmed by other means. The line volts for the associated bus can be checked, but only if the 4160 incoming breaker from 6.9KV is closed. The D/G volts can be checked, but only if the D/G breaker is closed. The presence of AMPS on running equipment can be used, with the bus associated RN pump as a good example. In using indication on running equipment, it is important that enough time has passed for the sequencer to load the equipment. Various annunciators LIT and train related indicators dark are also an indication that the bus may be deenergized.

KNOWLEDGE/ABILITY:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **Monitor Enclosure 1 (Foldout Page).**

__ 2. **Verify affected bus - ENERGIZED.**

__ **GO TO Case II (Loss of All Power to an Essential Train).**

3. **Verify proper diesel generator operation as follows:**

__ a. Dispatch operator to affected D/G room(s) to monitor D/G operation. **REFER TO** OP/1/A/6350/002 (Diesel Generator Operation).

__ b. Verify RN cooling flow to the affected D/G.

b. Notify dispatched operator to manually open RN isolation valve for the affected D/G:

__ • 1RN-232A (1A D/G Hx Inlet Isol) (DB-562, DD-38)

__ • 1RN-292B (1B D/G Hx Inlet Isol) (DB-562, BB-38).

__ 4. **Stop any dilutions in progress.**

__ 5. **Verify CA Pump #1 - ON.**

__ **IF CA Pump #1 is required to maintain S/G levels, THEN start CA Pump #1.**

__ 6. **Maintain reactor power less than or equal to 100%.**

7. **Verify S/I status as follows:**

__ a. S/I - HAS ACTUATED.

__ a. Observe Caution prior to Step 8 and **GO TO** Step 8.

__ b. **GO TO** Step 9.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **Resetting sequencer will prevent further automatic loading of B/O loads.**

8. **Verify ND System status as follows:**

__ a. Verify ND on affected train(s) - PREVIOUSLY OPERATING IN RESIDUAL HEAT REMOVAL MODE.

__ a. **GO TO** Step 9.

__ b. Verify AP/1/A/5500/019 (Loss of Residual Heat Removal System) - **NOT** IMPLEMENTED.

__ b. **GO TO** Step 9.

__ c. Reset affected D/G load sequencer.

__ d. Start previously operating ND pump.

__ d. **REFER TO** AP/1/A/5500/019 (Loss of Residual Heat Removal System).

9. **Verify B/O busses are energized as follows:**

__ a. 1AD-11, K/3 "4KV B/O BUS FTA VOLTAGE LO" - DARK.

a. Perform the following:

NOTE Both ND Hx Bypass valves fail closed on loss of 1LXI (1FTA).

1) **IF** ND Pump 1A is operating in Residual Heat Removal Mode, **THEN** perform the following:

__ a) Place the "PWR DISCON FOR 1NI173A" in "THROT".

__ b) Throttle 1NI-173A (ND Hdr 1A To Cold Legs C&D) to stabilize NC temperature.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

16. **Determine ND availability as follows:**

__ a. Verify at least one ND train - OPERATING IN RESIDUAL HEAT REMOVAL MODE. → __ a. Observe Notes prior to Step 16.c and **GO TO** Step 16.c.

__ b. **GO TO** Step 27.

NOTE If loss of ND due to ND leak, neither ND train is considered available until affected train identified.

__ c. Verify at least one ND train - AVAILABLE FOR RESIDUAL HEAT REMOVAL.

c. **IF** no ND train is available, **THEN**:

__ 1) **IF** ND pump(s) are not available due to damage by fire, **THEN** notify IAE to repair cables to the ND pump(s). **REFER TO** IP/1/A/3890/027A (Fire Damage Control Procedure).

__ 2) **GO TO** Step 17.

d. Verify at least one available ND train suction - ALIGNED FOR RHR:

__ • **IF** ND Train 1A available, **THEN** verify 1FW-27A (ND Pump 1A Suct From FWST) - CLOSED.

__ • **IF** ND Train 1B available, **THEN** verify 1FW-55B (ND Pump 1B Suct From FWST) - CLOSED.

d. Perform the following:

__ 1) Concurrently align available ND train suction to NC loop while continuing in this procedure. **REFER TO** Enclosure 23 (Align ND Suction to NC Loop).

__ 2) **GO TO** Step 17.

__ e. **GO TO** Step 27.

__ 17. **Verify at least two S/Gs - AVAILABLE FOR NC SYSTEM HEAT REMOVAL.**

__ **GO TO Step 20.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

27. **Determine cause of loss of ND train as follows:**

__ a. Verify ND train(s) - LOST DUE TO A LEAK IN THE ND SYSTEM. → __ a. **GO TO** Step 28.

__ b. Verify Case II (Leak in ND), Step 23 - PREVIOUSLY PERFORMED. __ b. **GO TO** Case II (Leak in ND), Step 23.

__ 28. **Verify at least one ND train - OPERATING IN RESIDUAL HEAT REMOVAL MODE.**

NOTE If loss of ND due to ND leak, neither ND train is considered available until affected train identified.

__ **WHEN at least one ND train available, THEN GO TO Enclosure 8 (Restoring An ND Train To Operation).**

__ 29. **Verify at least one ND train - OPERATING IN RESIDUAL HEAT REMOVAL MODE.** __ **RETURN TO Step 17.**

30. **WHEN NC T-Hot has stabilized below 186°F, THEN perform the following:**

__ a. Verify feed and bleed established in Step 22 or Step 24. __ a. **GO TO** Step 31.

__ b. Verify at least one NI pump - IN SERVICE. __ b. **GO TO** Step 30.d.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. **Verify the following:**

   __ • CASE I - IN PROGRESS

   OR

   __ • CASE II - IN PROGRESS

   OR

   __ • CASE III - IN PROGRESS.

   __ **GO TO Step 3.**

2. **Verify the following:**

   __ • NC pressure - LESS THAN 385 PSIG

   __ • NC temperature - LESS THAN 350°F

   __ • NC subcooling based on core exit T/Cs - GREATER THAN 0°F

   • NC System inventory as follows:

   • **IF** the NC System is in loops not filled condition, **THEN** verify both of the following:

   __ • NC level - GREATER THAN OR EQUAL TO 11%

   __ • NC level - STABLE OR INCREASING.

   OR

   • **IF** the NC System is in loops filled condition, **THEN** verify both of the following:

   __ • Pzr level - GREATER THAN OR EQUAL TO 10%

   __ • Pzr level - STABLE OR INCREASING.

   Perform the following:

   __ a. Increase dumping steam with steam dumps to reduce NC System temperature and NC System pressure.

   __ b. Reduce letdown as necessary to stabilize NC System level.

   __ c. Increase charging as necessary to stabilize NC System level.

   __ d. Do not continue in this enclosure until the conditions are satisfied.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 3. **Verify Case IV (Loss of ND in Mid Loop) - IN PROGRESS.**	__ **GO TO Step 5.**
4. **Verify the following:** __ • NC temperature based on core exit T/Cs - LESS THAN 186°F • NC System inventory as follows: __ • NC level - GREATER THAN OR EQUAL TO 11% __ • NC level - STABLE OR INCREASING.	**Perform the following:** __ a. Establish S/I Hot Leg Injection flow with one NI pump. **REFER TO** Enclosure 7 (Assured NC System Makeup Alignments). __ b. **IF** core exit T/Cs continue to increase, **THEN** establish additional S/I flow using at least one NV pump. **REFER TO** Enclosure 7 (Assured NC System Makeup Alignments). __ c. **WHEN** the ACTION/EXPECTED RESPONSE conditions are satisfied, **THEN GO TO** Step 5. __ d. **RETURN TO** step in effect while continuing attempts to restore one train of ND.
__ 5. **Verify S/I - HAS ACTUATED.**	__ **GO TO Step 7.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. **Ensure the following signals - RESET:**

__ a. ECCS.

__ b. D/G load sequencers.

c. Temperature control valves:

__ • "1RN-291 KC HX 1A OTLT T/V SS RESET"

__ • "1RN-351 KC HX 1B OTLT T/V SS RESET"

__ • "1KC-57A ND HX 1A FLOW CTRL SS RESET"

__ • "1KC-82B ND HX 1B FLOW CTRL SS RESET"

__ • "1ND-26 ND HX 1A OTLT CTRL SS RESET"

__ • "1ND-60 ND HX 1B OTLT CTRL SS RESET"

__ • "1ND-27 ND HX 1A BYP CTRL SS RESET"

__ • "1ND-61 ND HX 1B BYP CTRL SS RESET".

__ 7. **Verify at least one train of ND - AVAILABLE TO BE PLACED IN SERVICE.**

IF AT ANY TIME one train of ND cannot be placed in service, THEN perform the following:

__ a. Continue attempts to return one train of ND to service.

__ b. **WHEN** a train of ND is available, **THEN RETURN TO** Step 1.

__ c. **RETURN TO** step in effect.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 8. **Verify Enclosure 7 (Assured NC System Makeup Alignments) - IN PROGRESS.**	__ **GO TO Step 10.**
9. **Verify the following valves - CLOSED:** __ • 1ND-33 (ND System Return To FWST) __ • 1FW-27A (ND Pump 1A Suct From FWST) __ • 1FW-55B (ND Pump 1B Suct From FWST).	**IF the valves are opened as required by Enclosure 7 (Assured NC System Makeup Alignments), THEN:** a. **REFER TO** Enclosure 7 (Assured NC System Makeup Alignments) to align the assured NC System makeup through one of the following: __ • The ND Train that is to remain shutdown. OR __ • The FWST through 1ND-33 (ND System Return To FWST) to the NC System hot leg. b. **IF** the NC System makeup alignment cannot be aligned as required from the previous step, **THEN** do not continue in this procedure until one of the following is satisfied: __ • Another train of ND becomes available to place in operation. OR __ • The assured NC System makeup flowpath is aligned as required in the previous step. (RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
	c. **WHEN** the assured makeup has been aligned, **THEN** notify dispatched operator to close the affected valve(s) not used for assured makeup: __ • 1ND-33 OR __ • 1FW-27A OR __ • 1FW-55B.
__ 10. **Verify KC flow to the desired ND heat exchanger - GREATER THAN 5000 GPM.**	**Perform the following:** __ a. Establish KC flow to the desired ND Hx. __ b. **IF** KC flow cannot be established, **THEN REFER TO** AP/1/A/5500/021 (Loss of Component Cooling).
__ 11. **Verify at least one RN pump - ON.**	__ **REFER TO AP/0/A/5500/020 (Loss of Nuclear Service Water).**
__ 12. **Verify it is desired to place Train A ND in service.**	__ **GO TO Step 28.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 13. **Verify 1ETA - ENERGIZED.**	**Perform the following:** __ a. Attempt to restore power to affected bus. **REFER TO** AP/1/A/5500/007 (Loss of Normal Power). __ b. Do not continue in this enclosure until power is restored to 1ETA.
14. **Verify the following valves - OPEN:** __ • 1ND-2A (ND Pump 1A Suct Frm Loop B) __ • 1ND-1B (ND Pump 1A Suct Frm Loop B).	**Perform the following:** • **IF** power not available, **THEN** perform the following: __ a. Dispatch operator to restore normal power to the A Train ND loop suction isolation valves. **REFER TO** Enclosure 4 (ND Pump Loop Suction Valve Power Supplies). __ b. **IF** normal power cannot be restored to 1ND-1B (ND Pump 1A Suct Frm Loop B), **THEN** dispatch operator to align alternate power. **REFER TO** OP/1/A/6200/004 (Residual Heat Removal System). • **IF** NC pressure is less than 385 PSIG, **THEN**: a. Open the following valves: __ • 1ND-2A (ND Pump 1A Suct Frm Loop B) __ • 1ND-1B (ND Pump 1A Suct Frm Loop B). __ b. **IF** the valves cannot be opened, **THEN** request maintenance assistance to open the valve(s). (RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

14. (Continued)

- **IF** NC pressure is greater than 385 PSIG, **THEN**:

__ a. Use Pzr spray or PORV to decrease NC pressure to less than 385 PSIG.

b. **WHEN** NC pressure is less than 385 PSIG, **THEN** open the following valves:

__ • 1ND-2A (ND Pump 1A Suct Frm Loop B)

__ • 1ND-1B (ND Pump 1A Suct Frm Loop B).

NOTE 1ND-27 (ND Hx 1A Bypass Ctrl) fails closed on loss of 1LXI.

__ 15. **Verify the A Train ND Hx outlet and bypass valves - ABLE TO BE OPERATED FROM THE CONTROL ROOM.**

Control ND flow rate as follows:

__ a. Place the "PWR DISCON FOR 1NI-173A" in "THROT".

__ b. Close 1NI-173A (ND Hdr 1A To Cold Legs C&D).

__ c. Ensure 1ND-27 (ND Hx 1A Bypass Ctrl) - IN MANUAL.

__ d. Increase the output for 1ND-26 (ND Hx 1A Outlet Ctrl) to 100%.

__ e. Decrease the output for 1ND-27 (ND Hx 1A Bypass Ctrl) to 0%.

__ f. Throttle 1NI-173A (ND Hdr 1A To Cold Legs C&D) to maintain the desired flowrate in subsequent steps.

__ g. **GO TO** Step 18.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 16. **Verify 1NI-173A (ND Hdr 1A To Cold Legs C&D) - OPEN.**	**Perform the following:** __ a. Place the "PWR DISCON FOR 1NI-173A" in "ENABL". __ b. Open 1NI-173A (ND Hdr 1A To Cold Legs C&D). __ c. Place the "PWR DISCON FOR 1NI-173A" in "DISCON".
17. **Manually close the following valves:** __ • 1ND-26 (ND Hx 1A Outlet Ctrl) __ • 1ND-27 (ND Hx 1A Bypass Ctrl).	**Control ND flow rate as follows:** __ a. Place the "PWR DISCON FOR 1NI-173A" in "THROT". __ b. Close 1NI-173A (ND Hdr 1A To Cold Legs C&D). __ c. Ensure 1ND-27 (ND Hx 1A Bypass Ctrl) - IN MANUAL. __ d. Increase the output for 1ND-26 (ND Hx 1A Outlet Ctrl) to 100%. __ e. Decrease the output for 1ND-27 (ND Hx 1A Bypass Ctrl) to 0%. __ f. Throttle 1NI-173A (ND Hdr 1A To Cold Legs C&D) to maintain the desired flowrate in subsequent steps.
__ 18. **Verify Enclosure 3 (ND Suction Header and Pump Casing Venting) - IN PROGRESS.**	__ **GO TO Step 20.**
__ 19. **Do not continue in this enclosure until Enclosure 3 (ND Suction Header and Pump Casing Venting) is completed.**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 20. **Ensure D/G 1A load sequencer - RESET.**

__ 21. **Start ND Pump 1A.**

__ 22. **Verify 1ND-25A (ND Pump 1A Miniflow) - OPENS.**

Perform the following:

__ a. Open 1ND-25A (ND Pump 1A Miniflow).

__ b. **WHEN** flow through ND Train 1A is greater than 1400 GPM, **THEN** close 1ND-25A (ND Pump 1A Miniflow).

23. **Determine any required ND flow restrictions as follows:**

__ a. Verify the NC System - IN A LOOPS NOT FILLED CONDITION.

__ a. **GO TO** Step 24.

CAUTION **Flashing may occur in the high point of the ND pump suction line if the following ND flowrate limits are exceeded.**

__ b. Determine the maximum allowable ND flow from the table below:

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

__ c. **IF AT ANY TIME** NC Level changes, **THEN** repeat Step 23.b.

78.
APE026 AA2.05
Loss of Component Cooling Water (CCW)
Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: The normal values for CCW-header flow rate and the flow rates to the components cooled by the CCWS .

BANK CNS 584 - 2008 NRC Exam
Unit 2 is at 100% power when an NEO reports the breaker for 2KC-56A (KC To ND Hx 2A Sup Isol) looks damaged. The SPOC crew determines that the valve will NOT open.

What is the MINIMUM KC flow required through this valve when aligned for cold leg recirculation;

AND

for the situation above, what system is required to be declared INOPERABLE?

A. 5000 gpm
2A Train of KC

B. 5000 gpm
2A Train of ND

C. 5700 gpm
2A Train of ND

D. 5700 gpm
2A Train of KC

Ans: B

Reference:
1AD-9, F/5, KC TRAIN A SINGLE PUMP RUNOUT, Rev. 66
ES-1.3, (Transfer to Cold Leg Recirculation), Rev. 22
T.S. 3.7.7 Bases

Distractor Analysis

A. Incorrect. Plausible, since the flowrate given is correct. Believing that the associated train of KC is inoperable is plausible if the applicant recalls the Tech. Spec. Basis for CCW train operability (3.7.7, LCO) as requiring that the associated piping, valves, etc. be operable in order to consider the TRAIN operable. However, the applicant has misapplied it here, by failing to recall additional guidance in the Basis that explains that the isolation of the CCW flow to individual components may render those components inoperable, but does not affect the OPERABILITY of the CCW System.

B. **CORRECT.** The KC (CCW) Tech. Spec. 3.7.7 LCO Basis is modified by a Note indicating that the isolation of the CCW flow to individual components may render those components inoperable but does not affect the OPERABILITY of the CCW System. Per ES-1.3, step 3, 5000 gpm per train is required. 5700 gpm is the single pp runout value given in ARP.

C. Incorrect. Plausible, since the required inoperability (2A Train of ND) is correct. 5700 gpm is plausible, if the applicant misapplies the flowrate value for single pump runout, as given in the alarm response procedure for KC Train B Single Pump Runout.

D. Incorrect. 5700 gpm is plausible, if the applicant misapplies the flowrate value for single pump runout, as given in the alarm response procedure for KC Train B Single Pump Runout. Believing that the associated train of KC is inoperable is plausible if the applicant recalls the Tech. Spec. Basis for CCW train operability (3.7.7, LCO) as requiring that the associated piping, valves, etc. be operable in order to consider the TRAIN operable. However, the applicant has misapplied it here, by failing to recall additional guidance in the Basis that explains that the isolation of the CCW flow to individual components may render those components inoperable, but does not affect the OPERABILITY of the CCW System.

K/A Match

This question matches the K/A because it involves a damaged valve on the Component Cooling Water System. The applicant must interpret the conditions, consider the component involved, and then determine what is the required minimum flow normally required through that component when aligned in a cold leg recirc. configuration. One aspect of "interpret" is to apply the basis information form the Tech. Specs. and decide on the effect of operability on which component.

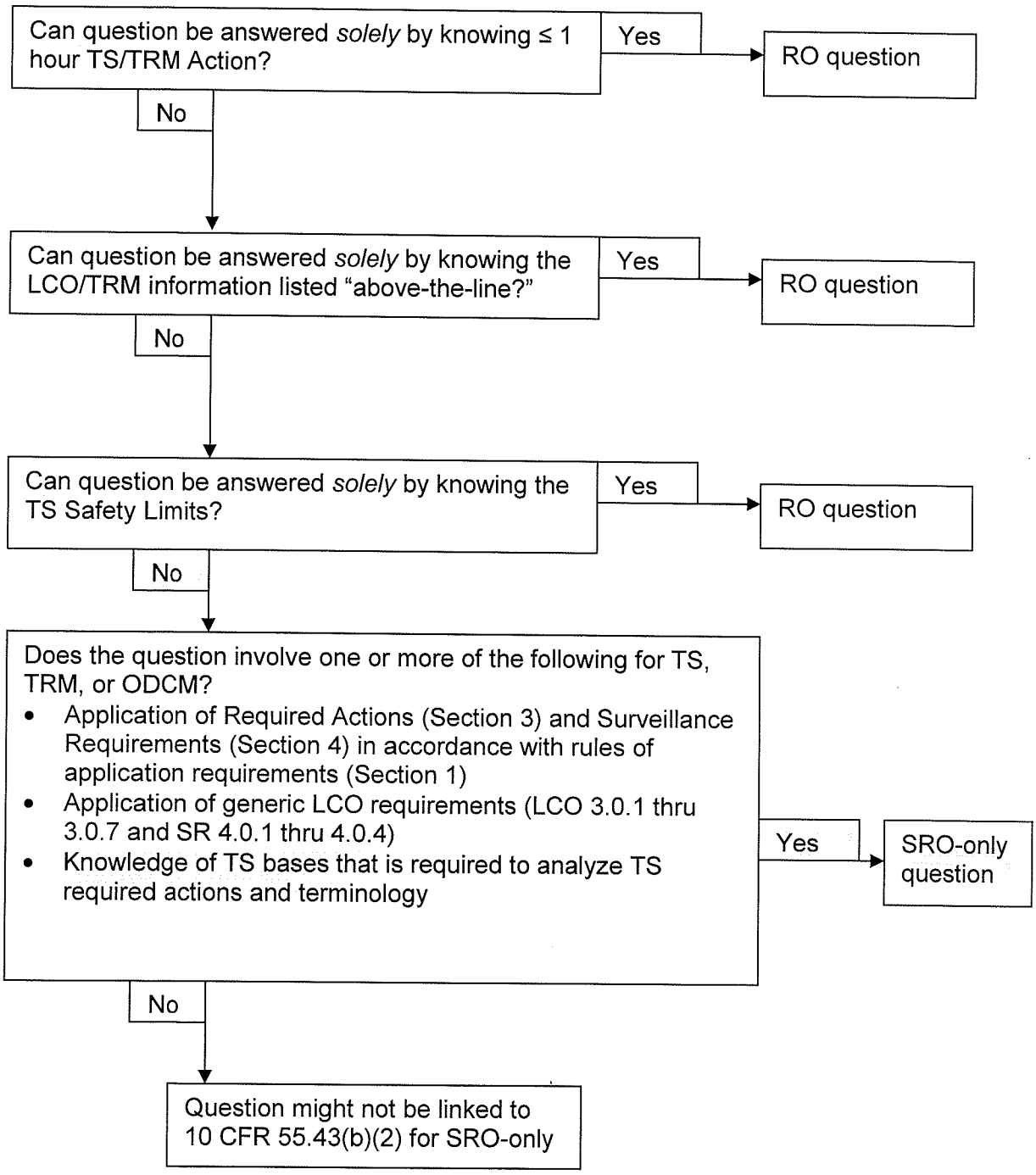
Basis for SRO Only

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

1) It can NOT be answered solely by knowing < 1 hour Tech Specs.
2) It can NOT be answered solely by knowing the LCO/SLC information listed "above-the-line".
4) It requires the applicant to have detailed knowledge of Tech Spec 3.7.7 (CCW) operability basis information, and apply the basis information, along with analysis of a component failure to determine the effect on operability of the CCW system.

Cognitive Level - Low

Figure 1: Screening for SRO-only linked to 10 CFR 55.43(b)(2) (Tech Specs)



BASES

APPLICABLE SAFETY ANALYSES (continued)

assumed (Ref. 1). This 120°F limit is to prevent thermal degradation of the large pump motors supplied with cooling water from the CCW System.

The CCW System is designed to perform its function with a single failure of any active component, assuming a loss of offsite power.

The CCW System also functions to cool the unit from RHR entry conditions (T_{cold} < 350°F), to MODE 5 (T_{cold} < 200°F), during normal and post accident operations. The time required to cool from 350°F to 200°F is a function of the number of CCW and RHR trains operating. One CCW train is sufficient to remove decay heat during subsequent operations with T_{cold} < 200°F. This assumes a maximum service water temperature of 100°F occurring simultaneously with the maximum heat loads on the system.

The CCW System satisfies Criterion 3 of 10 CFR 50.36 (Ref. 2).

LCO

The CCW trains are independent of each other to the degree that each has separate controls and power supplies and the operation of one does not depend on the other. In the event of a DBA, one CCW train is required to provide the minimum heat removal capability assumed in the safety analysis for the systems to which it supplies cooling water. To ensure this requirement is met, two trains of CCW must be OPERABLE. At least one CCW train will operate assuming the worst case single active failure occurs coincident with a loss of offsite power.

A CCW train is considered OPERABLE when:

a. Both pumps and associated surge tank are OPERABLE; and

b. The associated piping, valves, heat exchanger, and instrumentation and controls required to perform the safety related function are OPERABLE.

The isolation of CCW from other components or systems not required for safety may render those components or systems inoperable but does not affect the OPERABILITY of the CCW System.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 3. **Verify KC flow to ND heat exchangers - GREATER THAN 5000 GPM.**	__ **Establish KC flow to affected ND Hx(s).**
4. **Ensure S/I - RESET:**	
__ a. ECCS.	a. Perform the following: __ 1) **IF** either reactor trip breaker is closed, **THEN** dispatch operator to open Unit 1 reactor trip breakers. __ 2) **WHEN** reactor trip breakers open, **THEN** reset ECCS.
__ b. D/G load sequencers.	b. Dispatch operator to open affected sequencer(s) control power breaker: __ • 1EDE-F01F (Diesel Generator Load Sequencer Panel 1DGLSA) (AB-577, BB-46, Rm 496) __ • 1EDF-F01F (Diesel Generator Load Sequencer Panel 1DGLSB) (AB-560, BB-46, Rm 372).
__ c. **IF AT ANY TIME** a B/O occurs, **THEN** restart S/I equipment previously on.	

KC TRAIN B SINGLE PUMP RUNOUT

F/6

SETPOINT: 5700 gpm increasing and KC Pump 1B1 or 1B2 running.

ORIGIN: 1KCFT5540

PROBABLE CAUSE:
1. **NOT** enough flow restriction in the KC pump flow path
2. Pipe rupture
3. Loss of power at power panelboard 1EKPB Breaker #34

AUTOMATIC ACTIONS: None

IMMEDIATE ACTIONS:
1. Close 1KC-C40B (Trn 1B Miniflow Isol).
2. **IF** closing miniflow valve does **NOT** clear alarm, start an additional B Train KC pump per OP/1/A/6400/005 (Component Cooling System).
3. **IF** an additional B Train KC pump is **NOT** available, **OR** > 10,800 gpm flow is required, i.e. two trains of ND are in service, start additional KC pumps as required to achieve required flow per OP/1/A/6400/005 (Component Cooling System).
4. Verify 1EKPB Breaker #34 is "ON" (AB-560, FF-56, in 1EMXB).

SUPPLEMENTARY ACTIONS:
1. Monitor KC flow.
2. Monitor KC discharge pressure.
3. **IF** pipe rupture is found,
   3.1 **IF** possible, isolate the rupture.
   OR
   3.2 **IF NOT** isolable, secure the running pumps.
4. Refer to AP/1/A/5500/021 (Loss of Component Cooling).
5. Refer to Tech Spec 3.7.7.

REFERENCES:
1. CNEE-0142-01.58
2. CNEE-0142-01.35
3. CNEE-0142-01.60
4. CN-11372

KC54B is a motor operated valve which serves to isolate the recirculation line to the KC 'B' train surge tank. This valve is normally opened only to mix the contents of the surge tank after chemical manipulations. This valve shall have the ability to close during a design basis event to prevent 'B' train KC flow from bypassing the Essential Header. This valve is remotely controlled only from the control room by its control switch on MC11 which consists of 'OPEN-CLOSE' pushbuttons and 'red-green' indicating lights and receives no signals to auto-actuate.

RECOMMENDED ACTION STATEMENT:

With KC54B open, operability of the KC System is not degraded since the small amount of essential flow that would be diverted to the surge tank does not affect the LOCA balance (Ref. PIP 95-1697).

With KC54B closed and blocked, operability of the KC System is not degraded, however, normal chemical addition procedures may be affected.

Valve:	KC56A		
Description:	KC to Residual Heat Removal Heat Exchanger 'A' Supply Isolation Valve		
Active:	Yes	1E Power:	Yes
ESF:	Yes	IWV:	Category B
ESF Position:	Open	Stroke Time:	60 seconds
ESF Response Time:	76 seconds	Cont. Iso. Time:	N/A
Tech. Spec.:	3.5.2, 3.5.3, 3.7.7		

KC56A is a motor operated valve which serves to isolate KC flow to the ND heat exchanger during normal operations; diverting flow to the non-essential headers. Since the ND system is required to mitigate the consequences of a large break LOCA, this valve automatically opens to admit cooling flow to the ND heat exchanger 'A' when the following signals have been generated:

1. Lo FWST level following a safety injection
2. Sp (Phase 'B' isolation signal)

Controls for KC56A are provided on ASP 'A' and MC11 in the control room which consists of 'OPEN-CLOSE' pushbuttons and 'red-green' indicating lights and give the operator the ability to control this valve as desired to achieve a controlled cooldown of the Unit. When ASP 'A' is activated, this valve receives no auto-actuation signals but transfers 'as is'.

RECOMMENDED ACTION STATEMENT:

With KC56A closed and incapable of automatically opening, the ability of the 'A' train KC System to serve as a heat sink for the 'A' train ND System is eliminated, thereby rendering 'A' train of ND and NS systems inoperable.

With KC56A open, a LOCA with Loss of instrument air may cause KC pump runout, thereby rendering KC "A" train inoperable. Operability with KC56A open may be assured by closing the "A" train crossover isolation valves KC50A and KC230A to ensure that KC pump runout will not occur.

NOTE: This compensatory measure has been reviewed and accepted for application under 10CFR50.59 per Minor Modification CE-61508.

	Objective	ISS	NLO	LPRO	LPSO	PTRQ
1	State the purpose of the KC System.	X	X	X	X	
2	Describe how the KC System is cooled.	X	X	X	X	
3	Describe the normal flowpath of the KC System, including each header and the type of loads serviced by each.	X	X	X	X	X
4	Explain what happens in the KC System during: - Safety Injection (Ss) - Phase A Containment Isolation (St) - Phase B Containment Isolation (Sp) - Blackout - Low Low KC Surge Tank Level	X	X	X	X	X
5	Given appropriate plant conditions, apply limits and precautions associated with OP/1(2)/A/6400/005 (Component Cooling Water System)	X	X	X	X	X
6	State the typical values of the KC pump discharge pressure, KC Hx outlet temperature and KC pump flow.	X	X	X	X	X
7	State the basic actions required of an NLO for a loss of Component Cooling Water and why.	X	X			
8	Describe KC system makeup.	X	X			
9	Draw a block diagram of the KC system per the KC System Simplified Drawing.	X	X			
10	Describe the purpose of the EMF's associated with the KC System and what is indicated by a high level radiation alarm.	X	X	X	X	X
11	List the instrumentation available in the control room for the KC System.			X	X	
12	When given a set of plant conditions and access to reference materials, determine the actions necessary to comply with Tech Spec/SLC's.			X	X	X
13	Discuss the supplementary actions for the loss of KC AP.			X	X	X
14	State the function of all KC System controls, interlocks, instrumentation, and minimum flow requirements.			X	X	X

d) Precautions for chemicals used in the KC system:

1) Wash off any KC water thoroughly.

2) The chemicals may cause an irritation to the skin and it will burn the eyes.

3) The chemicals may cause gastrointestinal irritation with nausea, vomiting and diarrhea if ingested.

11. Level Indication in CR. (OBJ. #4 and #11)

a) Low level in Surge tank (computer point) 37.3%

b) Low low level

1) 34% (1/1 instrument per tank causes valve closure. A separate instrument is used for indication and alarms.)

2) Closes the train related Auxiliary and Reactor Building non-essential header isolation valves.

3) Ensures at least one train will provide adequate NPSH if a leak develops with the trains cross-connected.

B. KC Pumps (Obj. #17)

1. Two per train - one pump normally running.
2. Power Supply - 1(2) ETA/B
3. Normal Parameters (OBJ. #6, 11)

a) Pressure

1) Normally approximately 100 psig.

2) Indication available in Control Room and at each pump.

b) Flow (OBJ. # 6, #11)

1) CR indication

2) Aux. S/D Panel indication

3) Flow will depend on the components in service

(a) ND Hx ~ 5000 gpm

(b) KF Hx as required (1000-3000 gpm)

(c) other components normally in service supply 3500 gpm

4. Runout Flow (OBJ. #16)

a) Annunciators

1) 5700 gpm increasing with either KC Pump running (Train A(B) single pump runout)

2) 10,800 gpm increasing with 2 KC Pumps running (Train A(B) two pump runout)

D. EMF's (OBJ. #10)

1. Sample Flow is taken from the KC supply header.
2. EMF46A and B monitor the KC System and provide an alarm on high radiation. (No auto action associated with the EMF's.)
3. High radiation in the KC System is indicative of:
   a) NC in-leakage
   b) Possible KC activation

E. Essential Header (OBJ. #3 & 4)

1. Provides cooling to ESF Components
2. Any manual valves are normally open.
3. The only component normally isolated on essential header is ND HX.
   a) The ND HX inlet opens on:
      1) Sp or
      2) Low Level in FWST (37%) following S_S.
   b) Normal KC flow for the ND HX is 5000 gpm
   c) Low Flow Alarm at 4300 gpm (Annunciator)
   d) High flow alarm at 5600 gpm (Computer)
   e) Whenever the ND Heat Exchanger is automatically aligned for flow during accident conditions (Sp or Low Level in FWST following Ss), the Aux. Building and Rx. Building Non-Essentials Headers will be automatically isolated to prevent running out the KC Pumps.
   f) ND HX outlet valve is normally open and set to maintain 5000 gpm. This valve receives a fail open signal on Ss or loss of VI.
   g) Controls provided for isolation and flow control by the operator during Normal operations.
   h) S_s resets located on MC-11 for KC-57 and KC-82 (ND HX outlets)

d) Precautions for chemicals used in the KC system:

1) Wash off any KC water thoroughly.

2) The chemicals may cause an irritation to the skin and it will burn the eyes.

3) The chemicals may cause gastrointestinal irritation with nausea, vomiting and diarrhea if ingested.

11. Level Indication in CR. (OBJ. #4 and #11)

a) Low level in Surge tank (computer point) 37.3%

b) Low low level

1) 34% (1/1 instrument per tank causes valve closure. A separate instrument is used for indication and alarms.)

2) Closes the train related Auxiliary and Reactor Building non-essential header isolation valves.

3) Ensures at least one train will provide adequate NPSH if a leak develops with the trains cross-connected.

B. KC Pumps (Obj. #17)

1. Two per train - one pump normally running.
2. Power Supply - 1(2) ETA/B
3. Normal Parameters (OBJ. #6, 11)

a) Pressure

1) Normally approximately 100 psig.

2) Indication available in Control Room and at each pump.

b) Flow (OBJ. # 6, #11)

1) CR indication

2) Aux. S/D Panel indication

3) Flow will depend on the components in service

(a) ND Hx ~ 5000 gpm

(b) KF Hx as required (1000-3000 gpm)

(c) other components normally in service supply 3500 gpm

4. Runout Flow (OBJ. #16)

a) Annunciators

1) 5700 gpm increasing with either KC Pump running (Train A(B) single pump runout)

2) 10,800 gpm increasing with 2 KC Pumps running (Train A(B) two pump runout)

Table 4. Component Cooling Water System Flow Rates

Component	Startup Mode			Normal Operation Mode			Normal Unit Shutdown Mode			Shutdown With LOCA ON Other Unit MOde			Refueling Mode			Engineered Safeguards Mode		
	Flow (GPM)	#Rcv Flow	Notes	Flow (GPM)	#Rcv Flow	Notes	Flow (GPM)	#Rcv Flow	Notes	Flow (GPM)	#Rcv Flow	Notes	Flow (GPM)	#Rcv Flow	Notes	Flow (GPM)	#Rcv Flow	Notes
ND Residual Heat Removal Heat Exch	5000	1	1	0	0		10000	2	6	5000	1	7	10000	2	8	10000	2	10
ND Pump Mech Seal Heat Exchanger	10	2		10	2		10	2		10	2		10	2		10	2	
KC Pump Motor Coolers	120	4		120	4		120	4		120	4		120	4		120	4	
CA Pump Motor Coolers	60	2		60	2		60	2		60	2		60	2		60	2	
ND Pump Motor Coolers	40	2		40	2		40	2		40	2		40	2		40	2	
NS Pump Motor Coolers	60	2		60	2		60	2		60	2		60	2		60	2	
NI Pump Motor Coolers	40	2		40	2		40	2		40	2		40	2		40	2	
NI Pump Bearing Oil Coolers	40	2		40	2		40	2		40	2		40	2		40	2	
NV Pump Motor Coolers	60	2		60	2		60	2		60	2		60	2		60	2	
NV Pump Speed Reducer Oil Cooler	40	2		40	2		40	2		40	2		40	2		40	2	
NV Pump Bearing Oil Cooler	40	2		40	2		40	2		40	2		40	2		40	2	
Letdown Heat Exchanger	1000	1		1000	1	4,5	1000	1	4,5	1000	1	4,5	1000	1	15	0	0	
Sealwater Heat Exchanger	250	1		250	1		250	1		250	1		250	1		0	0	

Note:

1. Discontinued after Reactor Coolant Pumps are started.
2. Only 1 KF Heat Exchanger is assumed in service. However, it is also assumed that there exists sufficient capacity in the KC System to cool both KF Heat Exchangers if necessary in the Startup Mode.
3. The PALS Panel is normally not in service during the Startup Mode, Normal Operation Mode, Normal Unit Shutdown Mode, Unit Shutdown with a LOCA on the Other Unit, or the Refueling Mode (no flow or heat load) but it could be tested at any time.
4. 1000 GPM is the fail open cooling flow to the Letdown Heat Exchanger. Usually the flow rate would range from 250 to 660 GPM.
5. The heat load for the Letdown Heat Exchanger may be as low as 6.52 E6 BTU/HR and as high as 10.42 E6 BTU/HR in the Normal Operation Mode, Normal Unit Shutdown Mode, and a Unit Shutdown with a LOCA on the Other Unit Mode.
6. Maximum heat load which occurs when the heat load is first transferred to the ND Heat Exchangers during Normal Unit Shutdown.
7. Maximum heat load with no sensible heat removal. Sensible heat can gradually be removed as the decay heat load decreases.
8. Heat load is core decay at 4 days after zero power, at which time transfer of fuel assemblies is expected to begin.
9. One KF Heat Exchanger is assumed for normal refueling. Since both ND Heat Exchangers are in operation during refueling, flow should be blocked to Non-Essential equipment with no heat load if both KF Heat Exchangers are necessary.
10. Maximum ND Heat Exchanger heat load is on Table II in CNC-1223.23-00-0022.
11. In addition to the Interlocks listed in Note 14, KC lines to components inside of Containment are isolated upon St and Sp signals. Upon St, KC lines to the Excess Letdown Heat Exchanger and RCDT Heat Exchanger are isolated. Upon Sp, lines to all other components inside Containment served by KC are isolated.
12. The PALS Panel would receive flow from one, but not both KC essential headers following train separation.
13. Total flow and heat load of both trains. See Notes 12 and 14.
14. The Engineered Safegards Mode has three signals. The Safety Injection Signals (Ss), Containment High Pressure Signal (St) and the Containment High-High Pressure Signal (Sp). Upon Ss, all of the KC pumps on the affected unit receive a signal to start. Upon low-low level in the Refueling Water Storage Tank following Ss, or upon Sp, KC flow is automatically established to the ND Heat Exchangers and the KC non-essential headers are isolated. Isolating the KC non-essential headers effect KC train separation. Table VIII in CNC-1223.23-00-0022, shows KC flows and heat loads after non-essential headers are isolated and a heat load is put on the ND Heat Exchangers.
15. 1000 GPM is the fail open cooling flow to the Letdown Heat Exchanger. Since there is no heat load on the Letdown Heat Exchanger, one would expect the control valve to modulate closed.
16. Reciprocating Charging Pump No. 2 Bearing Oil Cooler has been abandoned in place per NSM CN-21392/00.
17. CD200950 abandoned in place the thermal function of the Unit 2 Reactor Vessel Support Coolers and deleted piping and their supports in the Reactor Building Pipe Chase to/from the coolers.

79.
APE056 AA2.72
Loss of Offsite Power
Ability to determine and interpret the following as they apply to the Loss of Offsite Power:
Auxiliary feed flow

NEW
Given the following Unit 1 conditions:

Initial
- A loss of offsite power has occurred.
- 1A D/G did NOT start, due to an 86N relay actuation.
- 1B D/G started and all blackout sequencer loads on 1ETB have been energized.

Subsequent
- Three (3) hours later, the following parameters for 1A S/G are noted:
  - CA flow to 1A S/G indicates 0 gpm.
  - 1A S/G Narrow Range levels indicate:
    - Channel 1: 0% and stable
    - Channel 2: 40% and stable
    - Channel 3: 0% and stable
    - Channel 4: 40% and stable

For the above conditions, which ONE of the following describes the Required Action per T.S. 3.3.3 (PAM Instrumentation) for the CA flow; and if the Completion Time for this Required Action is NOT met, what is required?

A. 30 days;
Submit a report to the NRC within 14 days.

B. 7 days;
Submit a report to the NRC within 14 days.

C. 30 days;
Be in Mode 4 in 12 hours.

D. 7 days
Be in Mode 4 in 12 hours.

Ans: A

References:
T.S. 3.3.3, page 3.3.3-1 and 2
T.S. 3.3.3, Bases, page 3.3.3-9 and 10

Distractor Analysis

A. **CORRECT.** Channel 1 and 3 of SG level are indicating 0% because there was a loss of offsite power, with a failure of 1A D/G to start. The subsequent stem conditions are for three hours later, a time at which the vital batteries are beyond their two hour design capacity. This means there is NO power on A train essential equip. Channels 1 and 3 of will read 0, based on no power available. This also affects the CA flow instrument (no power = inoperable).

Channel 2 and 4 have power because 1B D/G DID start and load. They are indicating properly (and are operable).

The CA (AFW) flow instrument indicating 0% is inoperable. Narrow Range SG level instruments in the stem are considered as diverse indication for aux. feed flow (CA), per Tech. Spec. 3.3.3 (PAM Instrumentation) Bases Document, Item 15, on page 3.3.3-9.

The above conditions meet Condition C of LCO 3.3.3, PAM Instrumentation: "One or more functions with one required channel inoperable AND Diverse channel OPERABLE," and has a Completion Time of 30 days. If this Completion Time is not met, then Condition D applies, with an immediate completion time, per 5.6.7 (Submit a report to the NRC within 14 days.)

B. Incorrect. Plausible, since the required action is correct. A 7 day Completion Time is plausible because if the diverse indication is INOPERABLE, it IS the 7 days which applies. If the applicant believes that the two S/G level instruments which indicate 0% are the only ones which can be considered as diverse indication for CA flow, then the 7 day completion time would be correct.

C. Incorrect. Plausible, since the 30 day Completion Time is correct. The Required Action of Mode 4 in 12 hours if the Completion Time is not met is plausible if the applicant is similarly confused for diverse indication INOPERABILITY vs. OPERABLITY as described in B.

D. Incorrect. A 7 day Completion Time is plausible because if the diverse indication is INOPERABLE, it IS the 7 days which applies. If the applicant believes that the two S/G level instruments which indicate 0% are the only ones which can be considered as diverse indication for CA flow, then the 7 day completion time would be correct. The Required Action of Mode 4 in 12 hours if the Completion Time is not met is plausible if the applicant is similarly confused for diverse indication INOPERABILITY vs. OPERABLITY as described in B.

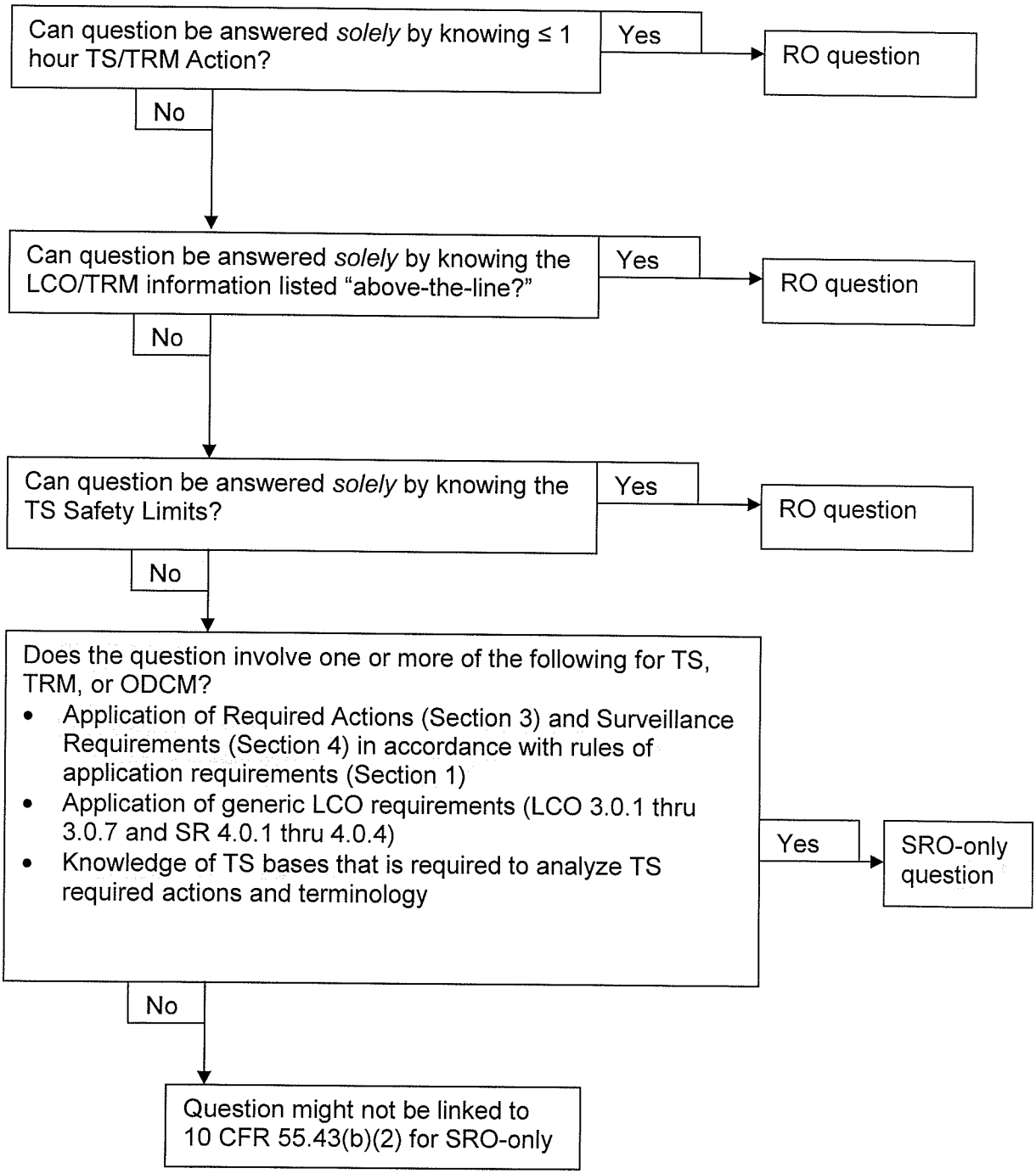
K/A Match
This question meets the K/A because the applicant is presented with plant conditions involving a loss of offsite power, and a failure of one train of essential power (due to a D/G failure to start). The applicant is then tested on the ability to determine what auxiliary feed flow is, and then to interpret the indication in three ways:

- Analyzing the significance of three hours later in the event and the effect on the vital batteries, and how that impacts auxiliary feed flow indication.
- Recall Tech. Bases information on diverse indication requirements, and then analyze additional stem information (S/G Narrow Range level) to determine if these instruments can be used as indication of auxiliary feed flow.
- Finally, the applicant must demonstrate the ability to interpret apply Tech. Specs. to the conditions, and determine required actions and completion times which apply.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(2) (Tech Specs):
1.) The question canNOT be answered solely by knowing $\leq$ 1 hour Tech. Specs.
2.) The question canNOT be answered solely by knowing LCO/TRM information listed "above-the-line."
4.) The question requires the applicant to determine and apply Required Actions for auxiliary feedwater flow instrumentation inoperability, and use Tech. Basis information regarding diverse indication functions to analyze Tech. Spec. required actions.

Cognitive Level - High
This is a high cognitive level question because it involves a level of analysis of a given situation, including application of system knowledge, Tech. Spec. Basis information, and Required Actions, and then make a decision based on a detailed analysis of the effects of a power loss, to determine what action is required.

Figure 1: Screening for SRO-only linked to 10 CFR 55.43(b)(2) (Tech Specs)



LCO (continued)

11, 12, 13, 14. Core Exit Temperature

Core Exit Temperature is provided for verification and long term surveillance of core cooling.

Adequate core cooling is ensured with two valid Core Exit Temperature channels per quadrant with two CETs per required channel. Core inlet temperature data is used with core exit temperature to give radial distribution of coolant enthalpy rise across the core. Core Exit Temperature is used to determine whether to terminate SI, if still in progress, or to reinitiate SI if it has been stopped. Core Exit Temperature is also used for unit stabilization and cooldown control.

Two OPERABLE channels of Core Exit Temperature are required in each quadrant to provide indication of radial distribution of the coolant temperature rise across representative regions of the core.

Two sets of two thermocouples (1 set per redundant power train) ensure a single failure will not disable the ability to determine the radial temperature gradient.

15. Auxiliary Feedwater Flow

AFW Flow is provided to monitor operation of decay heat removal via the SGs.

The AFW flow to each SG is determined by flow indicators, pump operational status indicators, and NSWS and condensate supply valve indicators in the control room. The AFW flow indicators are category 1 variables which are used to demonstrate AFW assured source.

AFW flow is used three ways:

- to verify delivery of AFW flow to the SGs;
- to determine whether to terminate SI if still in progress, in conjunction with SG water level (narrow range); and
- to regulate AFW flow so that the SG tubes remain covered.

LCO (continued)

One channel per SG of AFW flow is required to be OPERABLE. Diverse indication of AFW flow is provided by SG level.

16. RCS Radiation Level

The RCS radiation monitor provides indication of radiation levels within the primary coolant and alerts the operator to possible fuel clad failures.

One channel of RCS radiation level is required OPERABLE. This monitor was not installed to quantify accident conditions and cannot be assured flow following an accident. Diverse or backup information for this variable is provided by sampling and analysis of the primary coolant.

17. RCS Subcooling Margin Monitor

RCS subcooling margin monitoring indication is provided to allow unit stabilization and cooldown control. RCS subcooling margin monitoring indication will provide information to the operators to allow termination of SI, if still in progress, or reinitiation of SI if it has been stopped.

The margin to saturation is calculated from RCS pressure and temperature measurements. The average of the five highest core exit thermocouples are used to represent core conditions and the wide range hot leg RTDs are used to measure loop hot leg temperatures. The ICCM System performs the calculations and comparisons to saturation curves. A graphic display over the required range gives the operator a representation of primary system conditions compared to various curves of importance (saturation, NDT, etc.). Two trains of RCS Subcooling Margin Monitor are provided and two trains are required to be OPERABLE.

A backup program exists to ensure the capability to accurately monitor RCS subcooling. The program includes training and a procedure to manually calculate subcooling margin, using control room pressure and temperature instruments.

18. Steam Line Pressure

Steam Line Pressure is provided to monitor operation of decay heat removal via the SGs. Steam line pressure is also used to determine if a high energy secondary line rupture occurred and which SG is faulted.

3.3 INSTRUMENTATION

3.3.3 Post Accident Monitoring (PAM) Instrumentation

LCO 3.3.3 The PAM instrumentation for each Function in Table 3.3.3-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one or more required channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.3-1 for the channel.	Immediately
B. One or more Functions with one required channel inoperable.	B.1 Restore required channel to OPERABLE status.	30 days
C. One or more Functions with one required channel inoperable. AND Diverse channel OPERABLE.	C.1 Restore required channel to OPERABLE status.	30 days CORRECT ANSWER

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition B or C not met.	D.1 Initiate action in accordance with Specification 5.6.7.	Immediately CORRECT ANSWER
E. One or more Functions with one required channel inoperable. AND Diverse channel inoperable.	E.1 Restore required channel to OPERABLE status. OR E.2 Restore diverse channel to OPERABLE status.	7 days DISTRACTOR 7 days
F. One or more Functions with two required channels inoperable.	F.1 Restore one channel to OPERABLE status.	7 days
G. Not Used	G.1 Not Used	
H. Required Action and associated Completion Time of Condition E or F not met.	H.1 Be in MODE 3. AND H.2 Be in MODE 4.	6 hours DISTRACTOR 12 hours

SURVEILLANCE REQUIREMENTS

----------NOTE----------
SR 3.3.3.1 and SR 3.3.3.3 apply to each PAM instrumentation Function in Table 3.3.3-1.

	SURVEILLANCE	FREQUENCY
SR 3.3.3.1	Perform CHANNEL CHECK for each required instrumentation channel that is normally energized.	31 days
SR 3.3.3.2	Not Used	
SR 3.3.3.3	----------NOTES---------- 1. Neutron detectors are excluded from CHANNEL CALIBRATION. 2. CHANNEL CALIBRATION may consist of an electronic calibration of the Containment Area - High Range Radiation Monitor, not including the detector, for range decades above 10 R/h and a one point calibration check of the detector below 10 R/h with an installed or portable gamma source. --- Perform CHANNEL CALIBRATION.	18 months

Table 3.3.3-1 (page 1 of 1)
Post Accident Monitoring Instrumentation

	FUNCTION	REQUIRED CHANNELS	CONDITIONS
1.	Reactor Coolant System (RCS) Hot Leg Temperature (Wide Range)	2	B,D,F,H
2.	RCS Cold Leg Temperature (Wide Range)	2	B,D,F,H
3.	RCS Pressure (Wide Range)	2	B,D,F,H
4.	Reactor Vessel Water Level	2	B,D,F,H
5.	Containment Sump Water Level (Wide Range)	2	B,D,F,H
6.	Containment Pressure (Wide Range)	2	B,D,F,H
7.	Containment Area Radiation (High Range)	1	B,D
8.	Not Used		
9.	Pressurizer Level	2	B,D,F,H
10.	Steam Generator Water Level (Narrow Range)	2 per steam generator	B,D,F,H
11.	Core Exit Temperature - Quadrant 1	2(a)	B,D,F,H
12.	Core Exit Temperature - Quadrant 2	2(a)	B,D,F,H
13.	Core Exit Temperature - Quadrant 3	2(a)	B,D,F,H
14.	Core Exit Temperature - Quadrant 4	2(a)	B,D,F,H
15.	Auxiliary Feedwater Flow	1 per steam generator	C,D,E,H
16.	RCS Radiation Level	1	B,D
17.	RCS Subcooling Margin Monitor	2	B,D,F,H
18.	Steam Line Pressure	2 per steam generator	B,D,F,H
19.	Refueling Water Storage Tank Level	2	B,D,F,H
20.	Neutron Flux (Wide Range)	2	B,D,F,H
21.	Steam Generator Water Level (Wide Range)	1 per steam generator	C,D,E,H

DIVERSE INDICATION FOR AFW FLOW

(a) A channel consists of two core exit thermocouples (CETs).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Vital And Aux Control Power Batteries are capable of carrying their associated loads for at least 2 hours.

__ 1. **IF AT ANY TIME a DC bus is deenergized, THEN RETURN TO Section C. (Operator Actions), Step 1.**

2. **Verify the following buses - ENERGIZED.**

   __ • 1ETA

   __ • 1ETB.

__ **Restore power to the affected bus. REFER TO AP/1/A/5500/007 (Loss Of Normal Power).**

80.
APE077 2.1.28
Generator Voltage and Electric Grid Disturbances
Knowledge of the purpose and function of major system components and controls.

NEW
Given the following conditions:

- Unit 1 is at 100% power.
- Unit 2 is at 60%.
- At 1059 the Shift Manager receives notification from TCC (Transmission Control Center) that a grid frequency disturbance is developing.
- The operating crew begins trending generator frequency as follows:

Time	Unit 1	Unit 2
1100	60.0 Hz	59.9 Hz
1102	59.7 Hz	59.9 Hz
1103	58.7 Hz	58.7 Hz
1104	58.6 Hz	58.7 Hz
1105	59.3 Hz	59.6 Hz
1106	59.2 Hz	59.1 Hz
1107	58.8 Hz	58.8 Hz
1108	58.7 Hz	58.8 Hz

For the above conditions:

1. What guidance is contained in AP-37, (Generator Voltage and Electric Grid Disturbances) which the SRO will use to address the above conditions?

2. What components will be operated as part of the mitigative actions, per AP-37?

A. WHICH Unit to separate from the grid first.
Open associated Generator PCBs ONLY.

B. WHICH Unit to separate from the grid first.
Open associated Unit tie PCBs ONLY.

C. WHEN to separate Unit generator(s) from the grid.
Open associated Generator PCBs ONLY.

D. WHEN to separate Unit generator(s) from the grid.
Open associated Unit tie PCBs ONLY.

Ans: D

References:
AP/1/A/5500/037, Generator Voltage and Electric Grid Disturbances, Rev. 0

Distractor Analysis

A. Incorrect. Plausible, if the applicant recalls a section from the abnormal procedure which contains guidance on coordination of separating the two units from the grid, but misapplies it. The abnormal procedure has specific guidance that the separation from the grid of the two units must be coordinated such that they are separated at the SAME time; NOT in a prescribed sequence of this one first, and then the next one.

Opening the associated Generator PCBs (instead of the Unit tie PCBs) is plausible, if the applicant has a misconception of the layout and function of these components. Opening the Generator PCBs will separate the generator from the grid; however, this is NOT the method specified in AP/37 for these conditions. Opening the Generator PCBs results in losing power to house loads, and a unit trip.

B. Incorrect. Plausible, since Part 2 (open associated Unit tie PCBs) is correct. The applicant could recall a section from the abnormal procedure which contains guidance on coordination of separating the two units from the grid, but misapplies it. The abnormal procedure has specific guidance that the separation from the grid of the two units must be coordinated such that they are separated at the SAME time; NOT in a prescribed sequence of this one first, and then the next one.

C. Incorrect. Plausible, since Part 1 (guidance contained in the AP) is correct. Opening the associated Generator PCBs (instead of the Unit tie PCBs) is plausible, if the applicant has a misconception of the layout and function of these components. Opening the Generator PCBs will separate the generator from the grid; however, this is NOT the method specified in AP/37 for these conditions. Opening the Generator PCBs results in losing power to house loads, and a unit trip.

D. **CORRECT.** The generator frequency trend matrix provides context to the applicant as to the nature of the grid disturbance, and that the disturbance is continuing to worsen. There is guidance contained in AP/37, Grid Disturbance, for trending generator frequency based on frequency value, and time sustained at certain values. For instance, if generator frequency remains below 59.0 Hz for more than 5 minutes, the generator must be separated from the grid immediately. Also, there is a note explaining that this time is cumulative, such that any previously accumulated time below the specified frequency counts towards the 5 minutes. Therefore, there is detailed guidance on WHEN to separate the Unit generators from the grid.

The METHOD of separating the Unit generators from the grid is also specified in AP/37 in Step 9 of Case II (Abnormal Generator or Grid Frequency) as follows: open the PCBs (pneumatic circuit breakers in the switchyard) associated with that particular generator, and NOT the Generator PCBs. If the Generator PCBS are opened (erroneously, for example), this would result in loss of power to all house loads. By specifying that the Unit tie PCBs be used, house loads are maintained from the turbine generator output. A turbine runback will initiate to match the reduced load.

K/A Match

The K/A is matched because the question presents conditions involving a generator frequency and electric grid disturbance. The K/A specifies generator voltage; however generator frequency is closely tied to that parameter, and one of the functions of the major components and controls of this system is to control frequency and voltage of the generator. Therefore, this aspect of the K/A is matched. "Knowledge of the purpose and function of major system components and controls" is tested as follows: the applicant must determine which method is used to separate the generators from the grid (requiring knowledge of system components and controls - major, since these are either the generator breakers, or the unit tie breakers). To answer this question requires detailed knowledge of the function of these components by knowing WHERE in the system these components are located, and what their function is; i.e., what it means to separate from the grid using the Unit tie PCBs vs. the Generator PCBs.

Basis for SRO Only

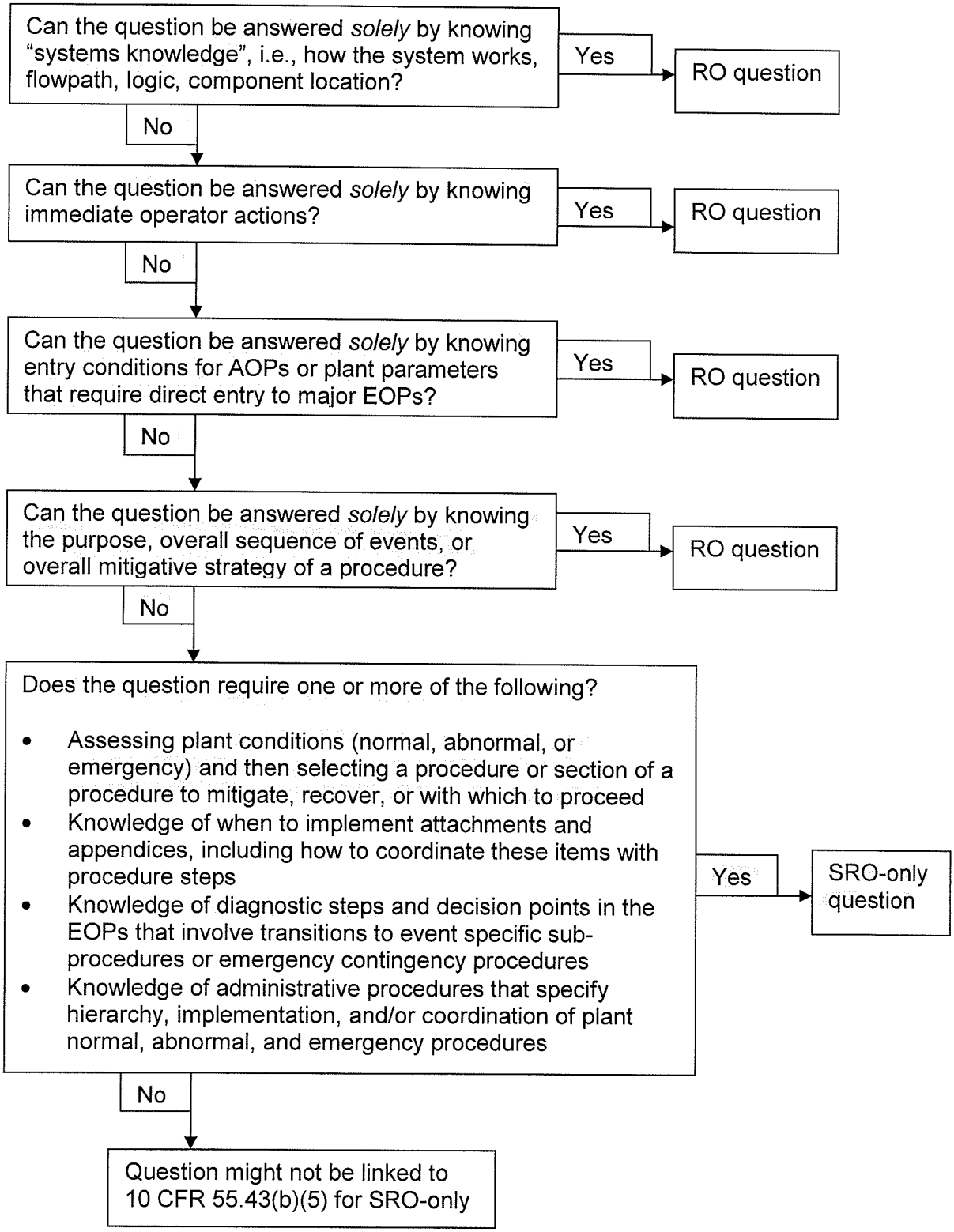
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):

1) The question can NOT be answered by knowing systems knowledge alone. The applicant is required to recall and apply detailed procedure content to make a decision on the method to use for separating the Units from the grid.
4) The question can NOT be answered by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.
5) The question does require the applicant to select the appropriate detailed procedure content and section from AP/37 regarding parameters that require separating the Unit(s) from the grid, the specified method of doing it, and at what point is it required.

Cognitive Level - High

This is a high cognitive level question because the applicant must analyze a given set of conditions, and recall system component design and layout of switchyard breakers and generator breakers, and apply this knowledge to make a determination on the appropriate method of performing a required operation. More than one mental step is required, contributing to the high cognitive level of this question.

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)



ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

5. **Monitor Generator frequency as follows:**

__ a. Monitor Enclosure 2 (Generator Frequency Surveillance).

CAUTION **If any frequency/time limits of table are exceeded, the generator must be separated from the Grid without delay.**

NOTE If frequency temporarily returns to normal, any previously accumulated time below a frequency limit does **NOT** reset to zero.

__ b. Verify generator operation time is less than each limit in table below.

__ b. Observe Note prior to Step 9 and **GO TO** Step 9.

FREQUENCY LIMIT	TIME LIMIT	INITIAL TIME AT FREQUENCY LIMIT
≤ 59.5 Hz	20 Minutes	
≤ 59.0 Hz	5 Minutes	
≤ 58.5 Hz	0 Minutes	

__ c. **IF AT ANY TIME** the limits of table are exceeded, **THEN** observe Note prior to Step 9 and **GO TO** Step 9.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. **Evaluate the following:**

   __ a. Stopping any surveillance testing in progress.

   __ b. Stopping any ongoing maintenance activities.

   __ c. Returning systems to normal or functional status.

__ 7. **WHEN notified by SOC/TCC that the Grid is stable and reliable, THEN exit this procedure and return to procedure and step in effect.**

__ 8. **Do not continue in this procedure unless a limit in Step 5 table is reached.**

NOTE Actions to separate from the Grid shall not be delayed. Both units shall separate from the Grid at the same time.

9. **Separate generator from the Grid as follows:**

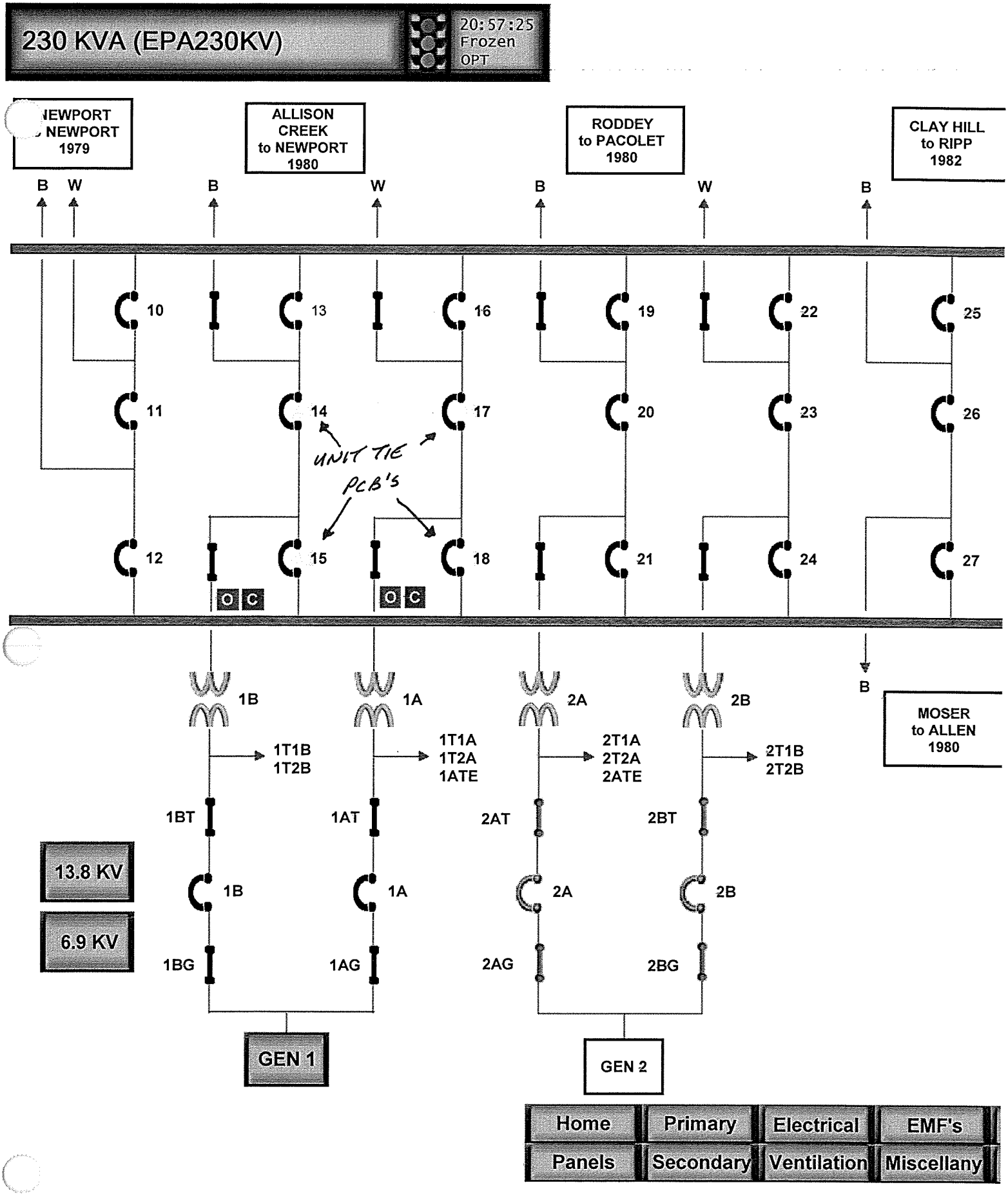
   __ a. Notify Unit 2 Operator that Unit 1 is separating from the Grid.

   b. Ensure the following PCBs - OPEN:

   __ • PCB 14
   __ • PCB 15
   __ • PCB 17
   __ • PCB 18.

__ 10. **GO TO AP/1/A/5500/003 (Load Rejection), Case II (Switchyard Not Available).**

END


230 KVA (EPA230KV)
20:57:25
Frozen
OPT
NEWPORT
NEWPORT
1979
ALLISON
CREEK
to NEWPORT
1980
RODDEY
to PACOLET
1980
CLAY HILL
to RIPP
1982
B
W
B
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UNIT TIE
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MOSER
to ALLEN
1980
1B
1A
2A
2B
1T1B
1T2B
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1A
2A
2B
1BG
1AG
2AG
2BG
13.8 KV
6.9 KV
GEN 1
GEN 2
Home
Primary
Electrical
EMF's
Panels
Secondary
Ventilation
Miscellany

81.
WE05 EA2.2
Loss of Secondary Heat Sink
Ability to determine and interpret the following as they apply to the (Loss of Secondary Heat Sink) Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

NEW
Given the following Unit 1 conditions:

Initial
- The Unit was at 100% power.
- A feedwater line break inside containment has occurred.
- 1A and 1B CA Pumps did NOT auto start.
- CAPT #1 tripped on mechanical overspeed.
- The operating crew entered FR-H.1, (Response to Loss of Secondary Heat Sink).
- Bleed and feed of the NC System has been initiated.
- Step 34 and Step 35 have been completed for closing CA flow control valves, and to continue attempts to establish secondary heat sink.

Subsequently
- 1A CA Pump has been repaired and has been started, per Step 7, "Attempt to establish CA flow to at least one S/G," of FR-H.1.

What procedural guidance will be implemented for restoring CA flow to the 1A S/G;

AND

what operational concern is addressed by implementing that particular procedural guidance?

A. OPEN CA flow control valve per Step 7.
Minimize the time that bleed and feed is used for vessel integrity concerns.

B. OPEN CA flow control valve per Step 7.
Limit the vulnerability of thermal stress damage to only ONE S/G.

C. OPEN CA flow control valve per Enclosure 8, "S/G CA Flow Restoration."
Minimize the time that bleed and feed is used for vessel integrity concerns.

D. OPEN CA flow control valve per Enclosure 8, "S/G CA Flow Restoration."
Limit the vulnerability of thermal stress damage to only ONE S/G.

Ans: D

References:
FR-H.1, (Response of Loss of Secondary Heat Sink), Rev. 36, Step 7, Step 34, and Enclosure 8.
EBG/1/5000/FR-H.1, (Response to Loss of Secondary Heat Sink), Page 10, Rev. 3

Distractor Analysis

A. Incorrect. Plausible, since Step 7.e could be confused by the applicant as appropriate, if the applicant fails to recognize that if bleed and feed has been previously established (which it has for the given conditions), the FCVs will already be closed. The RNO for this step directs the SRO to continue by starting available CA pumps; i.e., the FCVs would be opened at Step 7 only if bleed and feed had not been previously established.

Part 2 of this distractor is plausible if the applicant correctly recalls the Background Document from FR-H.1 which explains bleed and feed in the context of vessel integrity concerns, but misapplies it, by reversing it - vessel integrity concern has already occurred, and is no longer present.

B. Incorrect. Plausible, since Step 7.e could be confused by the applicant as appropriate, if the applicant fails to recognize that if bleed and feed has been previously established (which it has for the given conditions), the FCVs will already be closed. The RNO for this step directs the SRO to continue by starting available CA pumps; i.e., the FCVs would be opened at Step 7 only if bleed and feed had not been previously established. Part 2 of this distractor is correct, and therefore adds plausibility to the distractor.

C. Incorrect. Plausible, since the CA pump which was started in the stem (1A CA Pump) can feed both SGs (1A and 1B SG). It is reasonable that an applicant could misapply this design and incorrectly conclude that both SGs would be fed. Part 2 of this distractor is plausible if the applicant correctly recalls the Background Document from FR-H.1 which mentions bleed and feed in the context of vessel integrity concerns, but misapplies it, by reversing it - vessel integrity concern has already occurred, and is no longer present.

D. **CORRECT.** During the implementation of FR-H.1 the CA FCVs were closed per Step 34. The stem conditions specify that all steps through Step 35 have been taken. Step 35 directs that attempts to establish a secondary heat sink be continued and refers the SRO to Steps 6 and 7. The RNO for Step 7.e has you go to Step f, which starts the CA pp. Step 7.g says to verify flow, but it will be 0 gpm, since all FCVs are still closed. The RNO for step 7.g is to implement Enclosure 8 for CA flow restoration. Enclosure 8, Step 1 specifies that only ONE S/G be selected for feeding.

Per the Background Document for FR-H.1, for Step 7, the basis for one S/G is that if a failure in a S/G occurs due to excessive thermal stresses, the failure is isolated to only one steam generator.

K/A Match
This K/A is matched because the applicant must review conditions involving a loss of secondary heat sink and then tests the ability to determine the appropriate procedure and make an interpretation of how that procedure ensures operating within the facility license. This aspect is tested by recognizing the correct basis for the action, specifically, that it will ensure that thermal stress damage is limited (i.e., within limitations) to a single S/G.

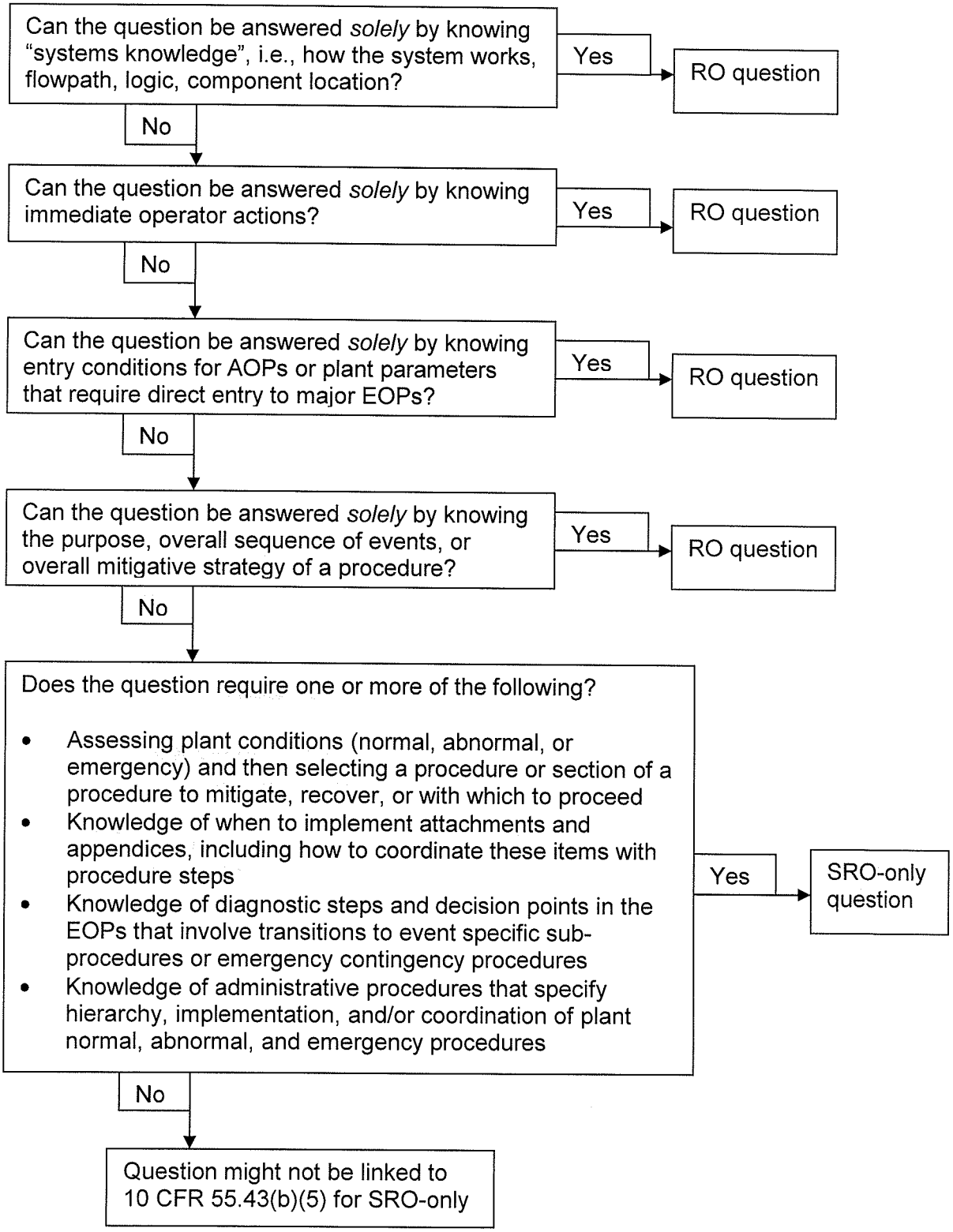
Operation within the limitations of the license is also tested by the ability to select the appropriate section of the procedure for restoring auxiliary feed flow.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):

1.) The question can NOT be answered by knowing systems knowledge alone.
4) The question can NOT be answered by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.
5) The question requires the applicant to recall and apply detailed procedure content from FR-H.1 for restoring auxiliary feed flow to a S/G. Additionally, the applicant must recall why that particular section, or enclosure, of the procedure must be used, by recalling basis information from the Background Document for FR-H.1, i.e., the basis for selecting a single S/G for feeding and how that relates to Step 7 vs. Enclosure 8 implementation. Step 7 does not specify feeding a single S/G, but Enclosure 8 does.

Cognitive Level - High
This is a high cognitive level question because the applicant must analyze plant conditions and make a determination on which procedure section provides the correct actions. Also, the applicant must recall and apply basis information from emergency procedures in determining the correct section of the procedure to us for achieving desired operating results.

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)



ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

33. (Continued)

__ d. Verify operating NS pump(s) - HAVE REMAINED RUNNING SINCE INITIAL PHASE B SIGNAL.

__ d. **IF** NS pump(s) has previously been stopped, **THEN GO TO** Step 34.

__ e. Reset NS.

__ f. Stop NS pumps.

g. CLOSE the following valves:

__ • 1NS-29A (NS Spray Hdr 1A Cont Isol)

__ • 1NS-32A (NS Spray Hdr 1A Cont Isol)

__ • 1NS-15B (NS Spray Hdr 1B Cont Isol)

__ • 1NS-12B (NS Spray Hdr 1B Cont Isol).

THIS IS FOLLOWING FEED AND BLEED INITIATION

34. **Align CA to establish control of S/G feed as follows:**

__ a. Ensure CA System valve control - RESET.

__ b. CLOSE CA flow control valves on S/Gs not presently being fed.

35. **Continue attempts to establish secondary heat sink in at least one S/G as follows:**

__ • CA. **REFER TO** Steps 6 through 7

__ • CF or CM. **REFER TO** Steps 10 through 17.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. (Continued)

4) Verify the following valves - OPEN:

__ • 1SA-2 (S/G 1B SM To CAPT)
__ • 1SA-5 (S/G 1C SM To CAPT).

__ 4) Place CA Pump #1 to "ON".

__ d. Ensure all CA isolation valves - OPEN.

__ e. Verify all CA flow control valves - OPEN.

PROCEDURE FLOWPATH FOLLOWING FEED + BLEED INITIATION + PAST STEP 34 IN THIS PROCEDURE

e. Perform the following:

__ 1) **IF** valve(s) are closed as required by Step 34, **THEN GO TO** Step 7.f.

__ 2) Open affected valve(s).

__ f. Start all available CA pumps.

__ g. Verify total CA flow - GREATER THAN 450 GPM.

g. Perform the following:

__ 1) **IF** any CA pump is on, **AND** Step 34 has been implemented, **THEN GO TO** Enclosure 8 (S/G CA Flow Restoration).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- It may be preferable to feed 1B or 1C S/G first, to maintain steam supply to CAPT.
- Selecting S/G with highest level will reduce risk of thermal shock to S/G when reestablishing feed flow.
- The available feed source will also determine which S/G can be fed.

__ 1. **Select one S/G to be fed.**

__ 2. **Verify core exit T/Cs - STABLE OR DECREASING.**

Perform the following:

__ a. Throttle open CA flow control valve to establish flow rate required to decrease core exit T/Cs temperature.

__ b. **IF** core exit T/Cs continue to increase, **THEN** throttle open CA flow control valves to feed other S/Gs as needed to decrease core exit T/Cs temperature.

c. **IF** CA flow cannot be established to at least one S/G, **THEN** perform the following:

__ 1) Dispatch operator to verify proper CA valve alignment. **REFER TO** Enclosure 2 (Local CA Flowpath Restoration).

__ 2) **GO TO** Section C. (Operator Actions), Step 34.

__ d. **GO TO** Step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 3. **Throttle open CA flow control valve to selected S/G to establish feed flow rate less than or equal to 100 GPM.**

IF CA flow cannot be established to at least one S/G, THEN perform the following:

__ a. Dispatch operator to verify proper CA valve alignment. **REFER TO** Enclosure 2 (Local CA Flowpath Restoration).

__ b. **GO TO** Section C. (Operator Actions), Step 34.

__ 4. **Maintain feed flow rate less than or equal to 100 GPM until W/R S/G level is greater than 12% (21% ACC).**

CAUTION **Feed flow rates should be controlled to increase S/G level and prevent excessive NC system cooldown.**

__ 5. **WHEN W/R S/G level is greater than 12% (21% ACC), THEN feed flow can be increased to the desired rate.**

__ 6. **Slowly establish flow to any intact S/G with W/R level greater than 12% (21% ACC).**

7. **Verify the following:**

__ • NC T-Hot associated with the S/G(s) being fed - DECREASING

__ • Core Exit T/Cs - DECREASING.

__ **Do not continue in this enclosure until both conditions are met.**

STEP 7: Attempt to establish CA flow to at least one S/G as follows:

PURPOSE:

To restore operation of the CA system to re-establish an adequate secondary heat sink.

To alert the operator that CACST level should be monitored and that an alternate water supply may be necessary.

To alert the operator, when using Enclosure 8, to the potential for rapid NC system cooling if feedwater flow rate is high.

APPLICABLE ERG BASIS:

The first attempt to restore feed flow is through operation of the CA system. Initially, control room indications are checked for the potential causes of the CA system failure to provide feed flow. If the cause of the failure cannot be corrected from the control room or feed flow is not restoring S/G level, an operator is dispatched to continue the CA system restoration locally while the control room operators continue with the next step.

If 450 gpm of CA flow is established, the operator returns to the guideline and step in effect. If CA flow less than 450 gpm is verified to at least one S/G, the operator checks the S/G level indications to determine if CA flow is restoring the secondary heat sink. If narrow range level has been restored to at least one S/G, an adequate heat sink exists and the operator transfers to the guideline in effect.

If CACST level or UST level decreases to the low level alarm setpoint, inadequate suction pressure may result in CA pump trip. An alternate suction source should be provided.

If proper CA flow is established, the operator returns to the procedure in effect.

Continued On Next Page.

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If bleed and feed had been initiated, then when feedwater flow is restored to a steam generator, high flow rates may cause NC system temperature to rapidly decrease. This is especially applicable when main feedwater is used to restore steam generator inventory. Although rapid cooldown of the NC system can produce temperature induced stress with the potential for loss of vessel integrity under high pressure conditions, it is likely that the vessel would have already been subjected to a rapid cooldown prior to reestablishing feedwater flow, due to the injection of relatively cold SI water during bleed and feed. After reestablishing feedwater flow, minimizing the rate of NC system cooldown is more beneficial for operator controllability of the plant (by minimizing coolant shrinkage and pressure transients) than integrity of the vessel. Guidance for preventing excessive NC system cooling is included in FR-H.1 to enhance operator control of the transient.

It should be noted that increasing the time to termination of bleed and feed by minimizing feedwater flow is not a concern, since the greatest threat to vessel integrity has already occurred and the containment atmosphere has already been subjected to a mass release.

Following bleed and feed, once feedwater flow is restored, its effectiveness as a heat sink for the NC system can be determined by decreasing NC system temperatures (cold legs, hot legs, core exit thermocouples) with increasing steam generator level. These parameters should be monitored when controlling feedwater flow, to prevent excessive NC system cooldown. After feedwater flow has been restored, feedwater flow should be maintained on scale and controlled as necessary to maintain increasing steam generator level and slowly decreasing NC system temperatures.

PLANT SPECIFIC INFORMATION:

The CA suction alignment is verified first by checking the normal suction source, CA CST. If inadequate, AP/06 (Loss of S/G Feedwater), provides direction to align alternate suction sources to the CA pumps in the appropriate priority. If CA CST level is adequate, then the CA pump suction isolation valves from the CA CST and UST should be opened and are verified open. In the unlikely event that an the valve alignment cannot be restored then RN is aligned to provide an assured source to the CA pumps.

The RNO for substeps e and g ensure that if the valve lineup and feed flow is restricted as required by the hot dry S/G feed flow restoration limits, conflicting procedure guidance does not exist by accounting for this condition.

The response of the cold leg temperature indication may vary when re-establishing natural circulation (while feeding) based on the location of the cold leg temperature instrumentation with respect to the safety injection line.

KNOWLEDGE/ABILITY:

Continued On Next Page.

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This step is a continuous action step based on the ERG high level step wording to "Try to establish AFW flow". The continuous action is to return to step 7 if local efforts are successful in restoring CA flow prior to initiation of bleed and feed. Per DW 93-025 the word "try" as used in the ERGs is an implied continuous action.

It is possible to return to step 7 while performing actions to establish flow from CM. If the required CA flow is restored in this case, then the actions to establish flow from CM need to be terminated prior to exiting the procedure.

The following items apply after bleed and feed initiation:

- During restoration of secondary heat sink following bleed and feed, it may become necessary to establish feedwater to a hot, dry steam generator. A hot, dry steam generator is defined as a steam generator in which the primary side of the steam generator tubes is above 55O°F and the secondary side has no liquid inventory. 55O°F is a temperature evaluated to be low enough that thermal stress would not lead to a failure when feedwater is established to any remaining dry steam generator. The primary side S/G tube temperature is determined from hot leg temperature readings. Re-establishment of feedwater is the more desirable mode of recovery from a loss of secondary heat sink than remaining on bleed and feed and establishing cold leg recirculation for long term cooling. However, care must be taken if feedwater is to be reestablished to a hot, dry steam generator.

- Since the heat removal capability of one steam generator is always greater than decay heat, it is advisable to reestablish feedwater to only one steam generator regardless of the size of the plant or number of loops. Thus, if a failure in an S/G occurs due to excessive thermal stresses, the failure is isolated to one steam generator.

Continued On Next Page.

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Once feedwater is established, the feeding process should continue until the NC System hot leg temperature is less than 550°F. At that time the active steam generator should be checked for symptoms indicating a faulted or ruptured condition. If the active steam generator is faulted or ruptured, then feedwater should be established to another intact steam generator. If an intact steam generator does not exist, then a decision should be made to use the best available steam generator, which may be the currently active steam generator. Once the heat load has been transferred to a backup steam generator, the original steam generator should be isolated to prevent further radiation releases.

When feedwater is established to a hot, dry steam generator, the feedwater source should be permitted to inject at the highest possible flow rate, if bleed and feed has been initiated and NC System temperatures are increasing, to mitigate core damage possibilities. If bleed and feed has been initiated and NC System temperatures (thermocouple indication) are stable or decreasing, feed flow restoration can be initiated as directed in FR-H.5, RESPONSE TO STEAM GENERATOR LOW LEVEL, for a dry steam generator till level indication is regained. Once a normal operating level is established the feedwater source should be regulated to maintain level. Thus, the process of initiating feedwater to a hot, dry steam generator, as described here, is one of selective use of steam generators to isolate failures, if they occur, and to save other steam generators until the primary side is cool enough (hot leg temperature $\leq$ 550°F) such that thermal stresses pose less problems for initiating feedwater in the remaining dry steam generators.

If feedwater is restored prior to the operator reaching this step in the procedure, due to local operator correcting the problem and restoring a CA pump, then when this step is reached and hot/dry S/G conditions exist, then the operating crew shall take the actions required to comply with the enclosure requirements. This concern is one of timing. The steps to control feed flow to a hot/dry S/G are not found in the ERG guideline itself, but in the background information. To provide procedure guidance to cover every possible occurrence of feedwater restoration is not considered practical and would unduly complicate the procedure. A reasonable attempt is made to limit thermal stresses to a hot/dry S/G and additional coverage is not warranted (PPRB FR-H.1/94-049).

Enclosure 8 is used to re-establish CA flow following bleed and feed. Several Notes are contained prior to Step 1 of the Enclosure to assist the operator in determining which S/G to select for feeding. The selection process should include a determination of which CA pump(s) is available, since this will determine which S/Gs can be fed. If the CAPT is the only available feed source, then B or C S/G should be fed to maintain a steam supply to the CAPT. Once the determination is made as to which S/Gs can be fed, the operator should select the S/G with the highest level. Once one S/G is being fed then other S/Gs with W/R levels greater than 12% (21% ACC) can also be fed.

82.
APE032 AA2.09
Loss of Source Range Nuclear Instrumentation
Ability to determine and interpret the following as they apply to the Loss of Source Range Nuclear Instrumentation: Effect of improper HV setting

NEW
Given the following Unit 1 conditions:

- A Unit startup is in progress.
- Power is currently at 1 X 10 E-11 amps.
- An IAE technician has adjusted the high voltage settings for Source Range NIs.

After the high voltage setting adjustment, the indications are as follows:

- SR NIs now indicate as follows:
  - N-31: 3 X 10 E 2 CPS
  - N-32: 3 X 10 E 3 CPS

Which ONE of the following describes;

(1) how this adjustment affects the operability of the Source Range NIs;

AND

(2) what is the basis for any required action per Technical Specification 3.3.1, Reactor Trip System (RTS) Instrumentation?

A. (1) ONLY N-31 is INOPERABLE.
(2) To place the core in a more stable condition.

B. (1) N-31 AND N-32 are INOPERABLE.
(2) To place the core in a more stable condition.

C. (1) ONLY N-31 is INOPERABLE.
(2) To preclude any power escalation.

D. (1) N-31 AND N-32 are INOPERABLE.
(2) To preclude any power escalation.

Ans: C

Reference:
PT/1/A/4600/002B, Mode 2 Surveillance, page 2 of 30, Rev. 167
Technical Specification 3.3.1, Reactor Trip System (RTS) Instrumentation, pages 3.3.1-1,2,3,4
OP-CN-IC-ENB, Lesson Plan for Excore Nuclear Instrumentation, page 46 of 47, NI Overlap Scales for Source Range NIs, Rev. 41

Distractor Analysis

A. Incorrect. Plausible, since Part 1 is correct and adds overall plausibility to this distractor. Part 2 is plausible, since it in the Tech. Spec. basis for Source Range inoperability, however, the applicant has confused the basis for ONE SR inoperable, with the basis for TWO SRs inoperable.

B. Incorrect. The plausibility of an applicant determining that both Source Range instruments would be inoperable due to an incorrect voltage setting on only ONE of the instruments is as follows: The applicant correctly recalls the Mode 2 Surveillance acceptance criteria for the Source Range Monitor Channel Check as "each indication is within 1/2 decade of the other channel.," There is no "Qualifying Condition" listed in the surveillance to explain how many instruments are to be considered inoperable if the channels are NOT within 1/2 decade of each other. Based on this, the applicant could have the misconception that it impacts the operability of BOTH, since the comparative values are outside the acceptance band from the other channel.

With the above misconception, the applicant then selects the "correct basis" (for two SRs inoperable) as placing the core in a more stable condition. This is the basis for Condition J (two SRs inoperable).

C. **CORRECT.** Per the NI overlap scales, with reactor power at 1 X 10 E-11 amps, the Source Range NIs should be indicating approximately 3 X 10 E3 CPS. Therefore, N-32 is indicating properly, and is therefore operable. Per the Mode 2 Surveillance acceptance criteria, both Source Range NIs must indicate within 1/2 decade of each other, when the unit is below P-6 (1 X 10 E-10 amps). To be considered operable, N-31 should be indicating within 1/2 decade of that. Since it is indicating a whole decade LOWER, it is therefore inoperable.

With ONE Source Range inoperable, Tech. Spec. Basis 3.3.1, Condition I explains that with ONE source range NI inoperable, the required action is taken for the purpose of precluding any power escalation. The action is to suspend activities involving any positive reactivity additions.

D. Incorrect. The plausibility of an applicant determining that both Source Range instruments would be inoperable due to an incorrect voltage setting on only ONE of the instruments is as follows: The applicant correctly recalls the Mode 2 Surveillance acceptance criteria for the Source Range Monitor Channel Check as "each indication is within 1/2 decade of the other channel.," There is no "Qualifying Condition" listed in the surveillance to explain how many instruments are to be considered inoperable if the channels are NOT within 1/2 decade of each other. Based on this, the applicant could have the misconception that it impacts the operability of BOTH, since the comparative values are outside the acceptance band from the other channel.

Part 2 (basis) is correct and adds overall plausibility to this distractor.

K/A Match
The K/A is matched because the applicant is tested on conditions involving a high voltage setting of a Source Range NI. The applicant must analyze these conditions and determine the effect of this improper high voltage setting; i.e., is the SR operable? After making that determination, the applicant must interpret the significance of that effect by applying knowledge of Tech. Spec. requirements, and (at the SRO level), the basis for the required action.

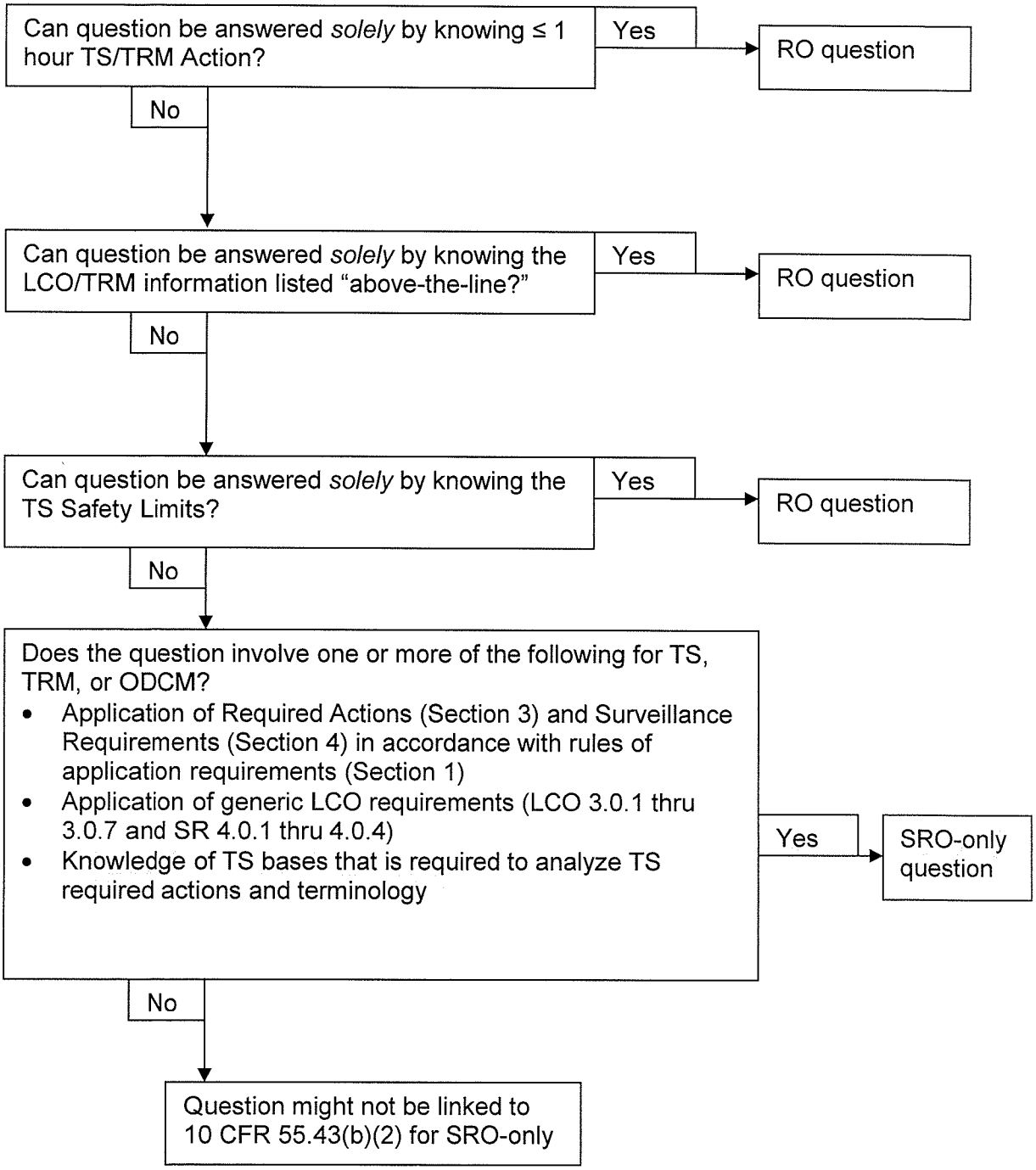
Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(2) (Tech Specs):

1.) Though this question does involve ≤ 1 hour TS/TRM actions, it canNOT be answered solely based on that knowledge.
2.) The question canNOT be answered solely by knowing the LCO/TRM information listed "above-the-line."
3.) The question canNOT be answered solely by knowing the Tech Spec Safety Limits or their bases.
4.) The question requires the applicant to apply detailed knowledge of Source Range NI Tech. Spec. 3.3.1 requirements and to apply those requirements, combined with information from the Tech. Spec. 3.3.1 Basis Document to determine the correct answer.

Cognitive Level - High
This is a high cognitive level question because it requires more than one mental step to determine the correct answer. The applicant must first analyze the given unit power level as being below P-6, and then recall the acceptance criteria for a Mode 2 Surveillance for SR NIs and determine that this acceptance criteria DOES apply for the given conditions.

Then the applicant must compare the given CPS for the SRs that exist after an improper HV setting, and determine if they meet the acceptance criteria from the Mode 2 Surveillance. The applicant applies the requirements of Tech. Spec. 3.3.1 to determine the required action (which is tested by testing knowledge of the basis for the action).

Figure 1: Screening for SRO-only linked to 10 CFR 55.43(b)(2) (Tech Specs)



#	SURVEILLANCE ITEM (Tech Spec Reference)	ACCEPTANCE CRITERIA	QUALIFYING CONDITIONS	COMPUTER POINT ID	DAY SHIFT INITIALS	NIGHT SHIFT INITIALS
3	Shutdown and Control Rod Position (SR 3.1.4.1)	Each rod's indicated position shall be within ± 12 steps of its group step demand position and Rod Position Deviation Monitor operable.	(6)(7)(8)	C1P1546 - C1P1550 C1P1390 - C1P1393		
4	Shutdown Rod Position (SR 3.1.5.1)	All shutdown banks shall be within the limits specified in the COLR as indicated by DRPI indication (± 4 steps).	(6)(9)			
5	Power Range Monitor Channel Check (SR 3.3.1.1, Table 3.3.1-1 Item 2a & 2b)	Each indication is within 2% of the average of all power range channels.		C1P0738		
6	Intermediate Range Monitor Channel Check (SR 3.3.1.1, Table 3.3.1-1 Item 4)	Each indication is within ½ decade of the other channel.	(10)	C1A0766 - C1A0767		
7	Source Range Monitor Channel Check (SR 3.3.1.1, Table 3.3.1-1 Item 5)	Each indication is within ½ decade of the other channel.	(11)	C1A1500 / C1A1506		

(6) Digital Rod Position Indication for individual rods may be obtained from the OAC Control Rod Interface Program, RODS.

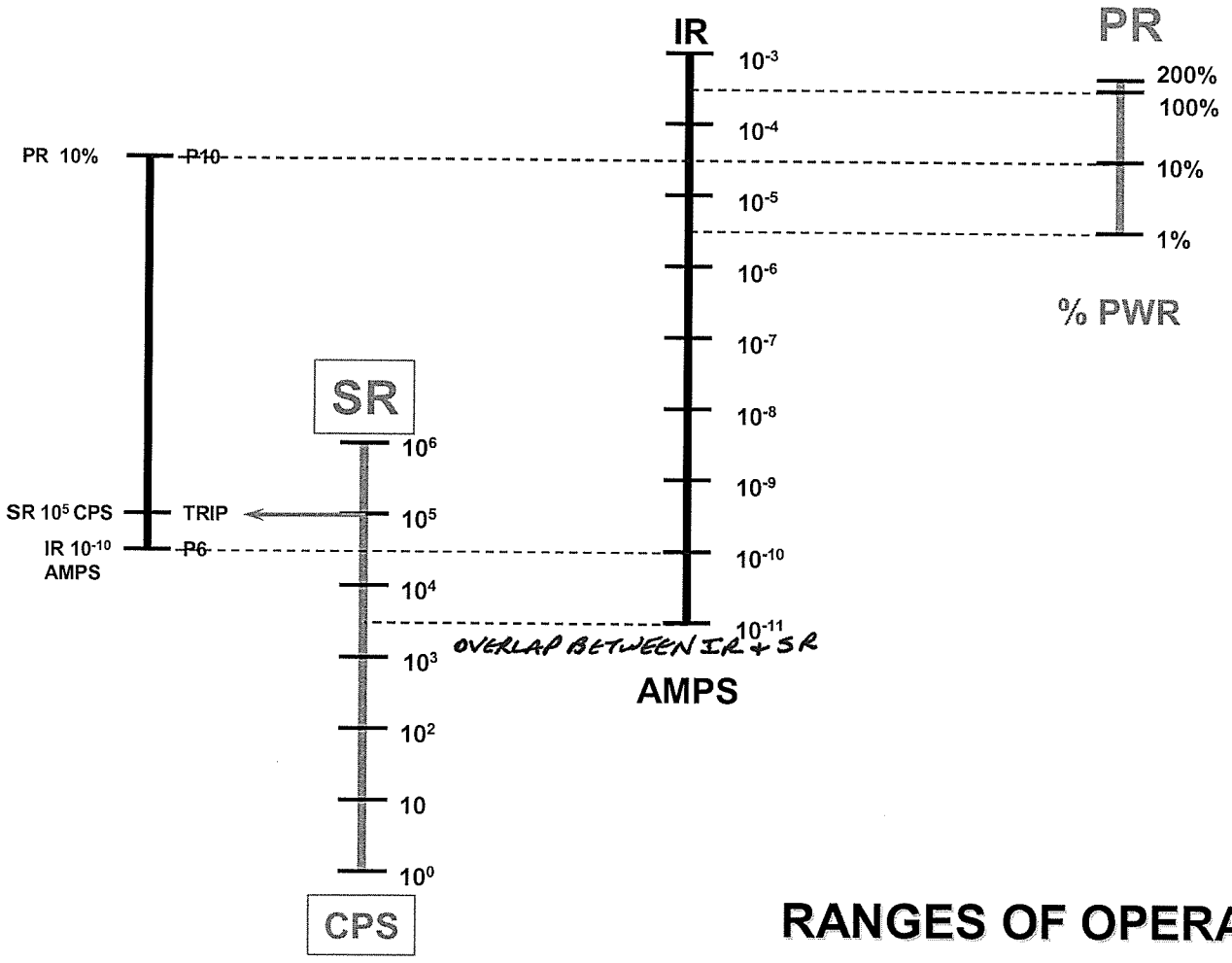
(7) If the Group Demand Counter is inoperable, refer to Technical Specification 3.1.7 for required actions.

(8) Record data on PT/1/A/4600/009 (Loss of Operator Aid Computer) every 4 hours when the rod position deviation monitor (OAC Points C1P1551 through C1P1559) is inoperable, as indicated by points C1L4406 or C1L4407 in alarm, the acceptance criteria of Surveillance Item 2A or 2B **NOT** met, or points with NCAL quality code and/or magenta quality color.

(9) DRPI system accuracy of ± 4 steps or +4/ -10 steps for rods at half accuracy is applicable for this surveillance.

(10) In Mode 2 < P-10 and > P-6 or in Mode 2 < P-6 prior to increasing Thermal Power > P-6.

(11) In Mode 2 below P-6.



RANGES OF OPERATION

Table 3.3.1-1 (page 2 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4. Intermediate Range Neutron Flux	1(b), 2(c)	2	F,G	SR 3.3.1.1 SR 3.3.1.8(l)(m) SR 3.3.1.11(l)(m)	≤ 31% RTP* ≤ 38% RTP	25% RTP
	2(d)	2	H	SR 3.3.1.1 SR 3.3.1.8(l)(m) SR 3.3.1.11(l)(m)	≤ 31% RTP* ≤ 38% RTP	25% RTP
5. Source Range Neutron Flux	2(d)	2	I,J	SR 3.3.1.1 SR 3.3.1.8(l)(m) SR 3.3.1.11(l)(m)	≤ 1.4 E5 cps** ≤ 1.44 E5 cps	1.0 E5 cps
	3(a), 4(a), 5(a)	2	J,K	SR 3.3.1.1 SR 3.3.1.7(l)(m) SR 3.3.1.11(l)(m)	≤ 1.4 E5 cps** ≤ 1.44 E5 cps	1.0 E5 cps
6. Overtemperature ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 1 (Page 3.3.1-19)	Refer to Note 1 (Page 3.3.1-19)

(continued)

* The ≤ 31% RTP Allowable Value applies to the Westinghouse-supplied compensated ion chamber Intermediate Range neutron detectors. The compensated ion chamber neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors. The ≤ 38% RTP Allowable Value applies to the replacement fission chamber Intermediate Range neutron detectors.

** The ≤ 1.4 E5 cps Allowable Value applies to the Westinghouse-supplied boron triflouride (BF_3) Source Range neutron detectors. The BF_3 neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors. The ≤ 1.44 E5 cps Allowable Value applies to the replacement fission chamber Source Range neutron detectors.

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) Below the P-10 (Power Range Neutron Flux) interlocks.

(c) Above the P-6 (Intermediate Range Neutron Flux) interlocks.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(l) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(m) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the NOMINAL TRIP SETPOINT (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in the UFSAR.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. THERMAL POWER < P-6, one or two Intermediate Range Neutron Flux channels inoperable.	H.1 Restore channel(s) to OPERABLE status.	Prior to increasing THERMAL POWER to > P-6
I. One Source Range Neutron Flux channel inoperable.	I.1 ----------NOTE---------- Limited boron concentration changes associated with RCS inventory control or limited plant temperature changes are allowed. ---------- Suspend operations involving positive reactivity additions.	Immediately
J. Two Source Range Neutron Flux channels inoperable.	J.1 Open RTBs.	Immediately
K. One Source Range Neutron Flux channel inoperable.	K.1 Restore channel to OPERABLE status. OR K.2 Open RTBs.	48 hours 49 hours

(continued)

BASES

ACTIONS (continued)

Action.

H.1

Condition H applies to the Intermediate Range Neutron Flux trip when THERMAL POWER is below the P-6 setpoint and one or two channels are inoperable. Below the P-6 setpoint, the NIS source range performs the monitoring and protection functions. The inoperable NIS intermediate range channel(s) must be returned to OPERABLE status prior to increasing power above the P-6 setpoint. The NIS intermediate range channels must be OPERABLE when the power level is above the capability of the source range, P-6, and below the capability of the power range, P-10.

I.1

Condition I applies to one inoperable Source Range Neutron Flux trip channel when in MODE 2, below the P-6 setpoint, and performing a reactor startup. With the unit in this Condition, below P-6, the NIS source range performs the monitoring and protection functions. With one of the two channels inoperable, operations involving positive reactivity additions shall be suspended immediately. This will preclude any power escalation. With only one source range channel OPERABLE, core protection is severely reduced and any actions that add positive reactivity to the core must be suspended immediately. Required Action I.1 is modified by a Note to indicate that normal plant control operations that individually add limited positive reactivity (e.g., temperature or boron fluctuations associated with RCS inventory management or temperature control) are not precluded by this Action.

J.1

Condition J applies to two inoperable Source Range Neutron Flux trip channels when in MODE 2, below the P-6 setpoint, and performing a reactor startup, or in MODE 3, 4, or 5 with the RTBs closed and the CRD System capable of rod withdrawal. With the unit in this Condition, below P-6, the NIS source range performs the monitoring and protection functions. With both source range channels inoperable, the RTBs must be opened immediately. With the RTBs open, the core is in a more stable condition and the unit exits this Condition.

83.
APE060 AA2.04
Accidental Gaseous-Waste Release
Ability to determine and interpret the following as they apply to the Accidental Gaseous Radwaste: The effects on the power plant of isolating a given radioactive-gas leak

NEW
Given the following conditions:

Initial
- Both Units are at 100% power.
- A failure of an isolation valve in the Waste Gas (WG) System has initiated an unintentional release of radioactive gas into the Auxiliary Building.
- The pressure in one (1) of the Waste Gas Decay Tanks is decreasing.
- EMF-41, Aux. Bldg. Radiation Monitor, receives a Trip 2 signal.
- 1EMF-36, Unit Vent Radiation Monitor, receives a Trip 2 signal.

Subsequent
- The leak is then isolated using a manual valve.
- Chemistry has calculated that 92,000 curies of noble gases were released before the leak was isolated.

Reference Provided

1. The effect of manually isolating this leak ensures that radiation exposure to a MEMBER OF THE PUBLIC located at _____ (on the referenced drawing) will be less than 0.5 rem.

2. AFTER the leak is isolated, which procedure contains the detailed steps for restoring the VA system to normal?

A. (1) Location 1
(2) OP/0/A/6450/003, (Auxiliary Building Ventilation System)

B. (1) Location 2
(2) OP/0/A/6450/003, (Auxiliary Building Ventilation System)

C. (1) Location 1
(2) OP/1/B/6100/010X, (Annunciator Response for 1RAD-1)

D. (1) Location 2
(2) OP/1/B/6100/010X, (Annunciator Response for 1RAD-1)

Ans: A

References:
OP/1/B/6100/010X, 1RAD-1, B/3, EMF-41 AUX BLDG VENT HI RAD, Rev. 63
OP/1/B/6100/010Y, 1RAD-2, A/2, EMF-36, UNIT VENT GAS HI RAD, Rev. 41
OP/0/A/6450/003, (Auxiliary Building Ventilation System), Rev. 56
SLC 16.11.19 (Gas Storage Tanks), Pages 1, 2, Rev. 0

Distractor Analysis

A. **CORRECT**. As specified in (SLC) Selected Licensee Commitment 16.11.19 each gas storage tank is limited to ≤ 97,000 Curies of noble gases. The basis section explains that this limit ensures that the whole body exposure of a member of the public will not exceed 0.5 rem. The basis also specifies that this exposure is at the nearest SITE BOUNDARY. A reference is provided to the applicant for the purpose of determining at which location (Point 1 or Point 2) this limit applies. Since the basis specifies at the nearest site boundary (i.e., nearest to the tank release), this is Point 1.

When radiation monitor EMF-41 goes to Trip 2 alarm condition, the Aux. Bldg. HVAC (VA) system automatically aligns to "FILTER" mode. This alarm response procedure refers the SRO to OP/0/A/6450/003, (Auxiliary Building Ventilation System) for the detailed steps to restore the VA (Aux. Bldg. HVAC) to normal.

B. Incorrect. Plausible, since the procedure selection is correct. It is plausible for an applicant to recall that the SLC limits basis applies to members of the public at the site boundary, but incorrectly recall WHERE on the site boundary. The applicant could reason that a location farther away from the release area is a more conservative approach, and thereby select Location 2.

C. Incorrect. Plausible, since the location for radiation exposure limits is correct. Selection of the OP/1/B/6100/010Y is plausible since this is the correct response procedure for one of the radiation monitors alarming in the stem conditions, and it does contain information regarding Aux. Bldg. Ventilation realigning to "FILTER" mode, but does not contain the detailed steps for restoring it to normal.

D. Incorrect. It is plausible for an applicant to recall that the SLC limits basis applies to members of the public at the site boundary, but incorrectly recall WHERE on the site boundary. The applicant could reason that a location farther away from the release area is a more conservative approach, and thereby select Location 2. Selection of the OP/1/B/6100/010Y is plausible since this is the correct response procedure for one of the radiation monitors alarming in the stem conditions, and it does contain information regarding Aux. Bldg. Ventilation realigning to "FILTER" mode, but does not contain the detailed steps for restoring it to normal.

K/A Match
The K/A is matched because the question involves conditions involving an accidental gaseous waste release due to failure of an isolation valve. Radiation monitors have gone into alarm, resulting in automatic actuation of a ventilation system to filter mode. The "effect on the plant" aspect of the K/A is met as follows: the applicant must recall both the limit specification of Curie content (Noble gases) in a single waste gas tank, and the basis for it (location of a member of the public), and then determine the "effect" on the plant of getting the leak isolated. The effect is that at a specific location on the plant site, the exposure limits will be maintained. To correctly answer this, the applicant must recognize that 92,000 Curies is not quite at the limit, and conclude that the effect of isolating the leak ensures that the limit is not exceeded at the plant site boundary.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(2) (Tech Specs):
1) It can NOT be answered solely by knowing < 1 hour Tech Specs.
2) It can NOT be answered solely by knowing the LCO/SLC information listed "above-the-line".
4) It requires the applicant to have detailed knowledge of SLC 16.11.19 (Gas Storage Tanks), Curie content in a single waste gas tank, then apply information from the SLC Basis Document to determine the correct answer, and evaluate how isolation of the leak will affect whether the plant has maintained these limits.

This question also meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):
1) The question can NOT be answered by knowing systems knowledge alone.
4) The question can NOT be answered by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.
5) The question requires the applicant to recall procedure content from . OP/1/B/6100/010X, 1RAD-1, B/3, EMF-41 AUX BLDG VENT HI RAD, OP/1/B/6100/010Y, 1RAD-2, A/2, EMF-36, UNIT VENT GAS HI RAD, and OP/0/A/6450/003, (Auxiliary Building Ventilation System) and select which procedure contains the detailed steps for restoring the ventilation system to normal configuration.

Cognitive Level - High
This is an analysis level question because the applicant must evaluate a given set of plant conditions, recall a specification of release content from memory, including the basis for it, and apply the basis information to a map of the plant site, to determine if release limits have been maintained for the given plant conditions, and at which correct site location.

THIS IS THE REFERENCE PROVIDED TO APPLICANT

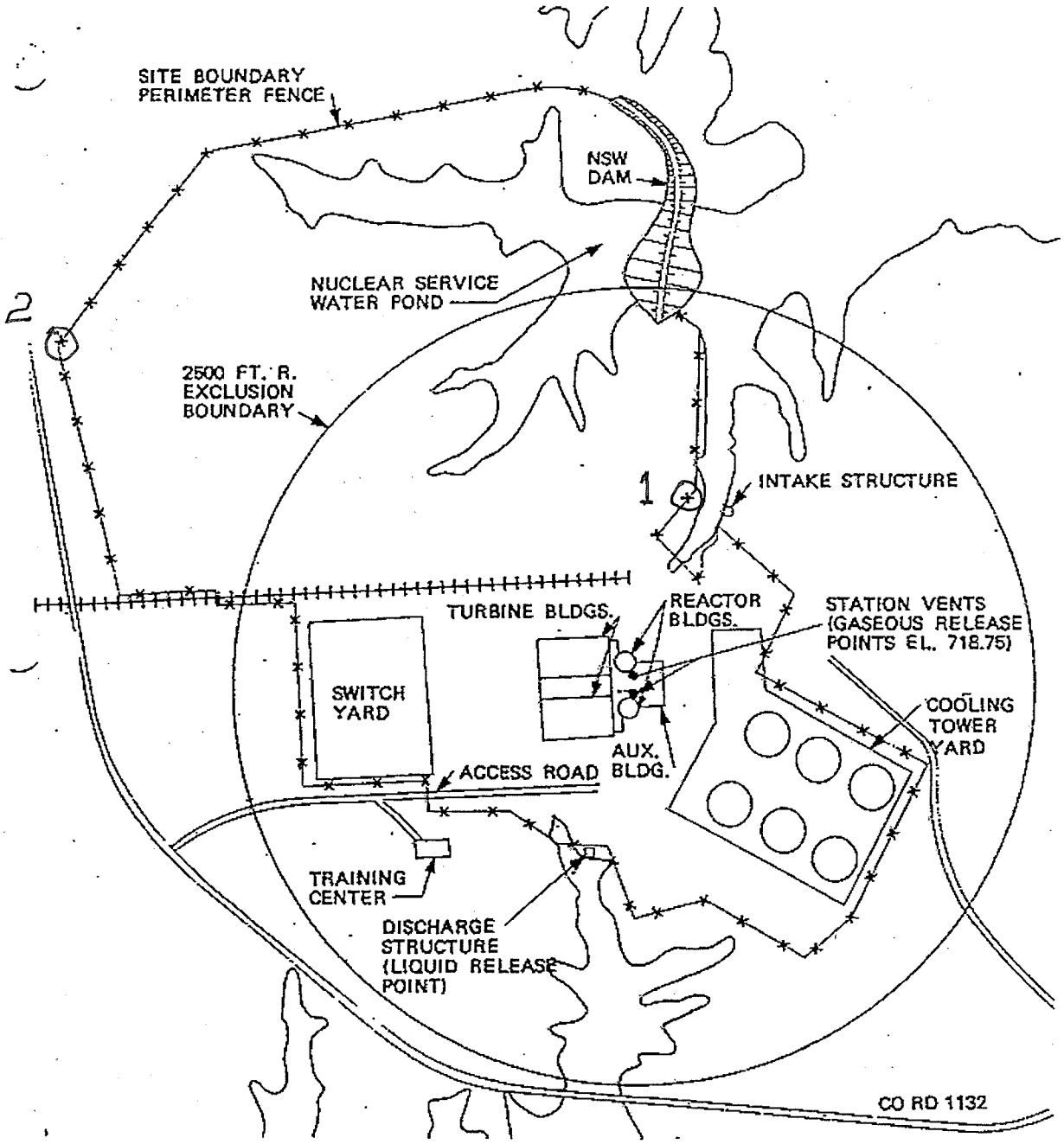
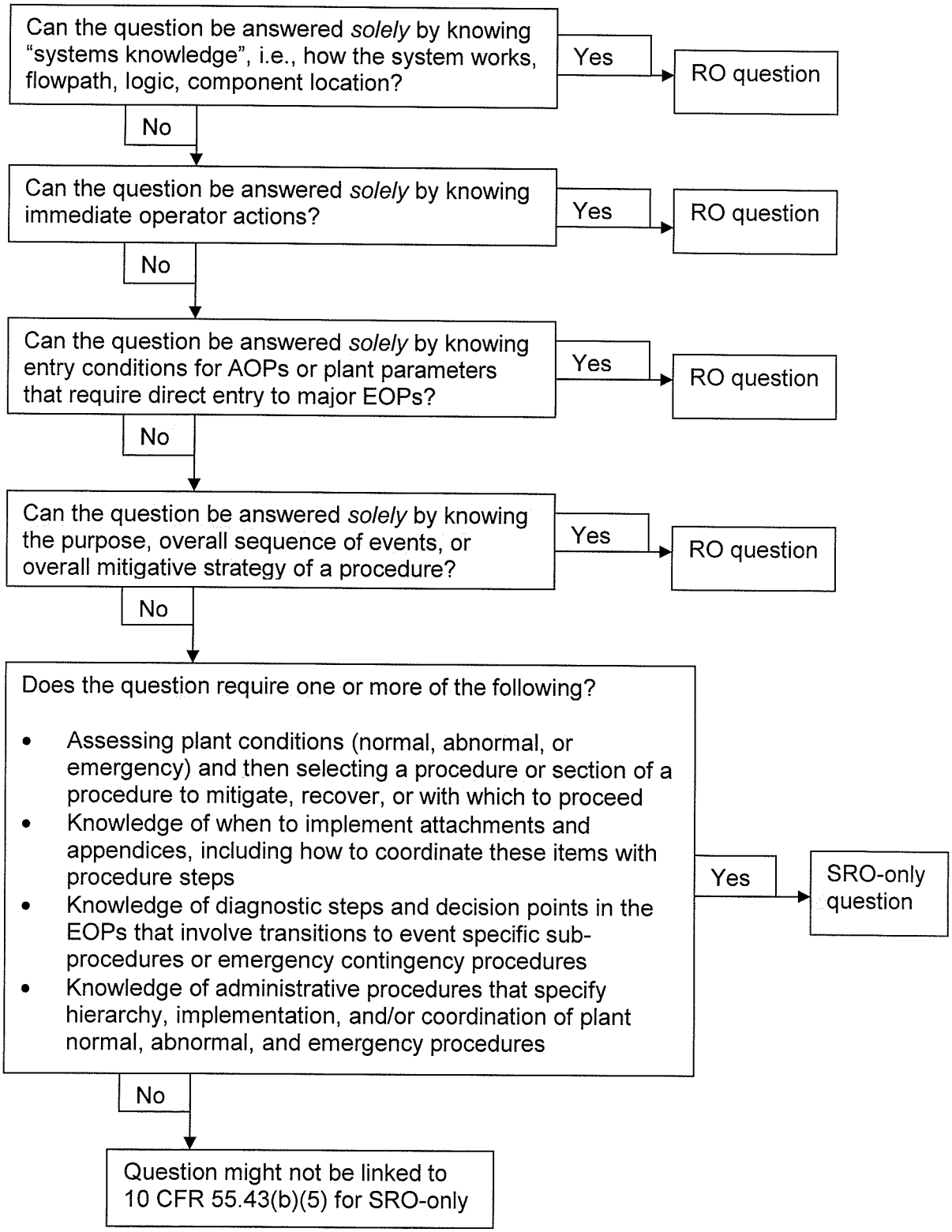


Figure 16.11-16-1

UNRESTRICTED AREA and SITE BOUNDARY for Radioactive Effluents

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)



16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-19 Gas Storage Tanks

COMMITMENT The quantity of radioactivity contained in each gas storage tank shall be limited to ≤ 97,000 Curies of noble gases (considered as Xe-133 equivalent).

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Quantity of radioactive material in tank(s) exceeding limit.	A.1 Suspend all additions of radioactive material to the tank(s).	Immediately
	AND	
	A.2 Reduce tank(s) contents to within limit.	48 hours
	AND	
	A.3 Describe the events leading to this condition in the Radioactive Effluent Release Report.	In the next scheduled Radioactive Effluent Release Report pursuant to Technical Specification 5.6.3

TESTING REQUIREMENTS

TEST	FREQUENCY
TR 16.11-19-1 Verify that the quantity of radioactive material contained in each tank is within limits when radioactive materials are being added to the tank(s).	24 hours

BASES

The tanks included in this SLC are those tanks for which the quantity of radioactivity contained is not limited directly or indirectly by another SLC. Restricting the quantity of radioactivity contained in each gas storage tank provides assurance that in the event of an uncontrolled release of the tank's contents, the resulting whole body exposure to a MEMBER OF THE PUBLIC at the nearest SITE BOUNDARY will not exceed 0.5 rem. This is consistent with Standard Review Plan 11.3, Branch Technical Position ETSB 11-5, "Postulated Radioactive Releases Due to a Waste Gas System Leak or Failure," in NUREG-0800, July 1981.

REFERENCES

1. Letter from NRC to Gary R. Peterson, Duke, Issuance of Improved Technical Specifications Amendments for Catawba, September 30, 1998.

2. Technical Specification 5.5.12, Explosive Gas and Storage Tank Radioactivity Monitoring Program.

1EMF 36 UNIT VENT GAS HI RAD

A/2

SETPOINT: Per HP/0/B/1000/010 (Determination of Radiation Monitor Setpoints)

ORIGIN: 1EMF-36 beta scintillation detector (low range)

PROBABLE CAUSE:
1. High gaseous activity from one of the combined ventilation system discharges to the unit vent
2. PZR degas to the Sample Hood during shutdown

NOTE:
1. When VC/YC is taken to "LOCAL", this trip of the unfiltered exhaust fans is bypassed.
2. Various other VA equipment receiving run permissives from the unfiltered fans also stop.
3. EMF-41 is inoperable when the VA System is shutdown.

AUTOMATIC ACTIONS:
1. The following Auxiliary Building Ventilation System components stop:
   - ABUXF-1A and ABUXF-1B which shutdown their respective supply units ABSU-1A and ABSU-1B.
2. The Auxiliary Building Ventilation (VA) System aligns to the "FILTER" mode.
3. The Fuel Pool Ventilation (VF) System aligns to the "FILTER" mode.
4. 1VQ-10 (VQ Fans Disch To Unit Vent) closes.
5. 1WG-160 (WG Decay Tank Outlet To Unit Vent Control) closes.

IMMEDIATE ACTIONS:
1. Verify automatic actions occur.
2. **IF** PZR degas is in progress during shutdown, perform the following:
   2.1 Ensure the following valves are closed:
   - 1NM-6A (Pzr Stm Smpl Line Cont Isol)
   - 1NM-7B (Pzr Smpl Hdr Cont Isol)

   2.2 Notify Chemistry to secure the PZR degas.
3. **IF** in Mode 5, 6 or No Mode, ensure Containment and Incore Room Purge is shutdown per OP/1/A/6450/015 (Containment Purge System).

CONTINUED ON THE NEXT PAGE

EMF-41 AUX BLDG VENT HI RAD

B/3

SETPOINT: Per HP/0/B/1000/010 (Determination of Radiation Monitor Setpoints)

ORIGIN: EMF-41 beta scintillation detector

PROBABLE CAUSE:
1. Radioactive spill/leak in the auxiliary building
2. PZR degas to the Sample Hood during shutdown

AUTOMATIC ACTIONS: The Auxiliary Building Ventilation (VA) System aligns to the "FILTER" mode.

IMMEDIATE ACTIONS:
1. IF EMF-41 > $1x10^6$CPM, conduct a site assembly per RP/0/A/5000/010 (Conducting A Site Assembly or Evacuation).
2. Verify automatic actions occur.
3. Ensure that all Control Room doors are closed and that a positive pressure is being maintained.
4. IF PZR degas is in progress during shutdown on either unit, perform the following:
   - 4.1 Ensure the applicable valves are closed:
     - Unit 1
       - 1NM-6A (Pzr Stm Smpl Line Cont Isol)
       - 1NM-7B (Pzr Smpl Hdr Cont Isol)
     - Unit 2
       - 2NM-6A (Pzr Stm Smpl Line Cont Isol)
       - 2NM-7B (Pzr Smpl Hdr Cont Isol)
   - 4.2 Notify Chemistry to secure the PZR degas.
5. Monitor 12-points via VA graphic to determine location of activity.
   - 5.1 Reference next page for EMF point inputs.
6. Monitor activity levels for EMF-35 and 36.
7. Refer to AP/1/A/5500/010 (Reactor Coolant Leak).

SUPPLEMENTARY ACTIONS:
1. Notify Radiation Protection personnel of this alarm.
2. Attempt to isolate leak if one exists.
3. Refer to SLC 16.7-10.
4. Refer to RP/0/A/5000/001 (Classification of Emergency).
5. After alarm clears, restore VA System to normal per OP/0/A/6450/003 (Auxiliary Building Ventilation System)..

CONTINUED ON THE NEXT PAGE

NOTE: 1. The selected Aux Building Filter Unit is now in the Filter Mode, subsequent steps will return the selected ABFU to normal alignment per Enclosure 4.1 (Startup and Operation) of this procedure.

2. Both trains bypass damper pushbuttons are manipulated due to in line air supply solenoid valve configuration.

_____ 3.3 **IF** returning Unit 1 Aux Building Filter Units (ABFU-1A, ABFU-1B) to Bypass Mode, perform the following:

_____ 3.3.1 Depress the "OPEN" pushbutton on "1ABF-D-12 & 19 VA FILTER A BYPASS DAMPERS" switch. (1MC3)

_____ 3.3.2 Depress the "OPEN" pushbutton on "1ABF-D-5 & 20 VA FILTER B BYPASS DAMPERS" switch. (1MC3)

_____ 3.3.3 Verify the red "OPEN" light illuminated on "1ABF-D-12 & 19 VA FILTER A BYPASS DAMPERS" switch.

_____ 3.3.4 Verify the red "OPEN" light illuminated on "1ABF-D-5 & 20 VA FILTER A BYPASS DAMPERS" switch.

_____ 3.3.5 Verify the following Unit 1 dampers are closed using the OAC **OR** local indications:

- ☐ VA FILTER A INLET ISOL DAMPER ABF-D-10 (OAC point C1D1553) (AB-594, LL-54, Rm 500)
- ☐ VA FILTER A OUTLET ISOL DAMPER ABF-D-14 (OAC point C1D1552) (AB-594, LL- MM, 54, Rm 500)
- ☐ VA FILTER B INLET ISOL DAMPER ABF-D-3 (OAC point C1D1556) (AB-601, KK-54, Rm 500)
- ☐ VA FILTER B OUTLET ISOL DAMPER ABF-D-7 (OAC point C1D1555) (AB-594, JJ-55, Rm 500)

84.
APE061 2.4.46
Area Radiation Monitoring (ARM) System Alarms
Ability to verify that the alarms are consistent with the plant conditions.

NEW
Given the following Unit 1 conditions:

- The Unit was at 50% power.
- A LOCA occurred.

Other plant conditions are:
- Pressurizer level is 0% and stable.
- Containment pressure is 1.3 psig and increasing.
- Lower Containment humidity is 70% and increasing.
- Subcooling is (-) 10°F and decreasing.
- Phase A RESET lights are DARK.
- The RO reports the following indications on alarm panel 1RAD-1:
  - "1EMF-39 Containment Gas Hi Rad" is LIT.
  - "1EMF-38, 39 Containment Loss of Sample Flow" is DARK.

Per, RP/01, (Classification of Emergency), the above conditions are consistent with which Initial Classification (IC);

AND

will the release "Is Occurring" block be checked on Line 6 of the Emergency Notification Form?

Reference Provided

A. 4.1.S.3
NO

B. 4.1.A.1
NO

C. 4.1.S.3
YES

D. 4.1.A.1
YES

Ans: C

References:
RP/01, (Classification of Emergency), Enclosure 4.1, (Fission Product Barrier Matrix), Pages 1 through 5, Rev. 23
RP/06A, (Notifications to States and Counties from the Control Room), Enclosure 4.1, (Emergency Notification Form Completion), Step 2.9.1, Rev. 24

Distractor Analysis

A. Incorrect. Plausible, because Phase A RESET lights being DARK indicates that the containment isolation signal has actuated. Applicant may conclude this means a complete isolation. With this misconception, it is reasonable and logical for an applicant to select NO for a release occurring, since the applicant believes that a complete containment isolation occurred.

B. Incorrect. 4.1.A.1 (loss or potential loss of nuclear coolant system) is plausible if applicant fails to recognize the significance of the sample flow light being dark, as indicating a loss of containment barrier. Since the applicant then has the misconception that there is only a loss of the NCS barrier, due to subcooling, 4.1.A.1 would be correct. Selecting NO to is a release occurring is therefore also plausible, if the applicant reasons that a loss of only one barrier does not constitute a release.

C. **CORRECT.** The two listed alarms for Containment Gas Hi Rad, and Containment Loss of Sample Flow are indicative of an incomplete containment isolation, as follows: the loss of sample flow being DARK indicates that the sample valves are open. These are containment isolation valves, and should have closed for the given conditions.

Per RP/01, Enclosure 4.1, Fission Product Barrier Matrix, the above conditions constitute a LOSS of Containment Barrier (See 4.1.C), and a loss of NCS Barrier (See 4.1.N), as indicated by the subcooling value being less than 0°.

Loss of Containment Barrier AND a Loss or Potential Loss of Any Other Barrier requires a 4.1.S.3 classification, per the matrix provided, page 1 of 5.

The Containment Gas Hi Rad alarm, combined with containment pressure being > 0.3 psig requires the SRO to mark that a release is occurring, in accordance with Enclosure 4.1 of RP/06A (EP procedure for notifications).

D. Incorrect. 4.1.A.1 is plausible if applicant fails to recognize the significance of the sample flow light being dark, as indicating a loss of containment barrier. Since the applicant then has the misconception that there is only a loss of NCS barrier, due to subcooling, 4.1.A.1 would be correct. Selecting YES to is a release occurring is plausible if the applicant believes that a loss of the nuclear coolant system meets the conditions for a release occurring. The NCS is a fission product barrier, and the applicant has confused how this information is applied when implementing the Fission Product Barrier Matrix.

K/A Match
The K/A is matched because the applicant is presented with conditions involving a Containment Gas Hi Rad monitor which provides indication of a high radiation condition in that area. The applicant must then analyze various plant conditions and conclude that there is indeed a high radiation condition in containment, and diagnose that the containment isolation was not complete.

With that determination, the applicant is then tested on the ability to verify that the given alarms are consistent with the previously analyzed conditions, and determine that they ARE consistent with the previous conditions in the stem.

Basis for SRO Only
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 Catawba Nuclear Station it is the responsibility of the SRO to complete notifications to offsite agencies, and to use the Fission Product Barrier Matrix to make determinations for the emergency plan. The learning objective from the lesson plan for the Emergency Plan,Objective 17, "Prepare and evaluate Emergency Notification Forms for both initial and follow-up notification for any given accident scenario" is designated as an SRO only learning objective.

Cognitive Level - High
This is an analysis level question because the applicant must evaluate a given set of plant conditions, and apply knowledge of Phase A actuations and indications, to arrive at a conclusion on whether the plant has responded per design. Based on that conclusion, the applicant then applies that information to a provided reference to diagnose the effect on the plant (fission product barrier condition) and then recall from memory the criteria for what requires selecting YES to a question on the Emergency Notification Form for is a release occurring.

III. Justification for Plant Specific Exemptions

The 25 SRO-only questions ***shall*** evaluate the additional knowledge and abilities required for the higher license level in accordance with 10 CFR 55.43(b). [NUREG 1021, Section ES-401D.2.d]

The fact that a facility licensee trains its ROs to master certain 10 CFR 55.43 knowledge, skills, and abilities does NOT mean that they can no longer be used as a basis for SRO-only questions. [Operator Licensing Feedback Web page Item 401.36 @ http://www.nrc.gov/reactors/operator-licensing/op-licensing-files/ol-feedback.pdf]

The SRO-only test item is required to be tied to one of the 10 CFR 55.43(b) items. However, if a licensee desires to evaluate a knowledge/ability that is not tied to one of the 10 CFR 55.43(b) items, then the licensee can classify the knowledge/ability as "*unique to the SRO position*" provided that there is documented evidence that ties the knowledge/ability to the licensee's SRO job position duties in accordance with the systematic approach to training (SAT).

- **Justification**: A question that is not tied to one of the 10 CFR 55.43(b) items can still be classified as "SRO-only" provided the licensee has documented evidence to prove that the knowledge/ability is "*unique to the SRO position*" at the site. An example of documented evidence includes:

  - The question is linked to a learning objective that is specifically labeled in the lesson plan as being SRO-only (e.g., some licensee lesson plans have columns in the margin that differentiate AO, RO, and SRO learning objectives) [NUREG 1021, ES-401, Section D.2.d]

    AND/OR

  - A question is linked to a task that is labeled as an SRO-only task, and the task is NOT listed in the RO task list.

APPLICANT WILL BE PROVIDED A COPY OF ENCLOSURE 4.1 FOR THEIR REFERENCE

Enclosure 4.1

Fission Product Barrier Matrix

1. Use EALs to determine Fission Product Barrier status (Intact, Potential Loss, or Loss). Add points for all barriers. Classify according to the table below.

Note 1: An event (or multiple events) could occur which results in the conclusion that exceeding the Loss or Potential Loss thresholds is IMMINENT (i.e., within 1-3 hours). In this IMMINENT LOSS situation, use judgement and classify as if the thresholds are exceeded.

Note 2: When determining Fission Product Barrier status, the Fuel Clad Barrier should be considered to be lost or potentially lost if the conditions for the Fuel Clad Barrier loss or potential loss EALs were met previously **validated and sustained**, even if the conditions do not currently exist.

Note 3: Critical Safety Function (CSF) indications are not meant to include transient alarm conditions which may appear during the start-up of engineered safeguards equipment. A CSF condition is satisfied when the alarmed state is **valid** and **sustained**. The STA should be consulted to affirm that a CSF has been validated prior to the CSF being used as a basis to classify an emergency.

Example: If ECA-0.0, Loss of All AC Power Procedure, is implemented with an appropriate CSF alarm condition **valid** and **sustained**, the CSF should be used as the basis to classify an emergency prior to any function restoration procedure being implemented within the confines of ECA-0.0.

IC	Unusual Event	IC	Alert	IC	Site Area Emergency	IC	General Emergency
4.1.U.1	Potential Loss of Containment	4.1.A.1	Loss **OR** Potential Loss of Nuclear Coolant System	4.1.S.1	Loss **OR** Potential Loss of Both Nuclear Coolant System **AND** Fuel Clad	4.1.G.1	Loss of All Three Barriers
4.1.U.2	Loss of Containment	4.1.A.2	Loss **OR** Potential Loss of Fuel Clad	4.1.S.2	Loss **AND** Potential Loss Combinations of Both Nuclear Coolant System **AND** Fuel Clad	4.1.G.2	Loss of Any Two Barriers **AND** Potential Loss of the Third
		4.1.A.3	Potential Loss of Containment **AND** Loss **OR** Potential Loss of Any Other Barrier	4.1.S.3	Loss of Containment **AND** Loss **OR** Potential Loss of Any Other Barrier		

INCORRECT EAL CLASSIFICATION IF APPLICANT DOESN'T REALIZE THAT INCOMPLETE CONTAINMENT ISOLATION EXISTS.

CORRECT EAL CLASSIFICATION

Enclosure 4.1

Fission Product Barrier Matrix

NOTE: If a barrier is affected, it has a single point value based on a "potential loss" or a "loss." "Not Applicable" is included in the table as a place holder only, and has no point value assigned.

Barrier	Points (1-5)	Potential Loss (X)	Loss (X)	Total Points	Classification
Containment		1	3	1 – 3	Unusual Event
NCS		4	5	4 – 6	Alert
Fuel Clad		4	5	7 – 10	Site Area Emergency
Total Points				11 - 13	General Emergency

1. Compare plant conditions against the Fission Barrier Matrix on pages 3 through 5 of 5.
2. Determine the "potential loss" or "loss" status for each barrier (Containment, NCS and Fuel Clad) based on the EAL symptom description.
3. For each barrier, write the highest single point value applicable for the barrier in the "Points" column and mark the appropriate "loss" column.
4. Add the points in the "Points" column and record the sum as "Total Points".
5. Determine the classification level based on the number of "Total Points".
6. In the table on page 1 of 5, under one of the four "classification" columns, select the event number (e.g. 4.1.A.1 for Loss of Nuclear Coolant System) that best fits the loss of barrier descriptions.
7. Using the number (e.g. 4.1.A.1), select the preprinted notification form **OR** a blank notification form and complete the required information for Emergency Coordinator approval and transmittal.

Enclosure 4.1

Fission Product Barrier Matrix

4.1.C CONTAINMENT BARRIER

POTENTIAL LOSS - (1 Point)	LOSS – (3 Points)
1. Critical Safety Function Status	
• Containment-RED	• Not applicable
• Core cooling-RED Path is indicated for >15 minutes	
2. Containment Conditions	
• Containment Pressure > 15 PSIG	• Rapid unexplained decrease in containment pressure following initial increase
• H2 concentration > 9%	
• Containment pressure greater than 3 psig with less than one full train of NS and a VX-CARF operating.	• Containment pressure or sump level response not consistent with LOCA conditions. **NOTE:** Refer to Emergency Plan, Sect. D, 4.1.C.2, last paragraph for inability to maintain normal annulus pressure.

CONTINUED

4.1.N NCS BARRIER

POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)
1. Critical Safety Function Status	
• NCS Integrity-Red	• Not applicable
• Heat Sink-Red	
2. NCS Leak Rate	
• Unisolable leak exceeding the capacity of one charging pump in the normal charging mode with letdown isolated.	• GREATER THAN available makeup capacity as indicated by a loss of NCS subcooling. IN QUESTION STEM SUBCOOLING IS (-)10°F.

CONTINUED

4.1.F FUEL CLAD BARRIER

POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)
1. Critical Safety Function Status	
• Core Cooling-Orange	• Core Cooling-Red
• Heat Sink-Red	
2. Primary Coolant Activity Level	
• Not applicable	• Coolant Activity GREATER THAN 300 µCi/cc Dose Equivalent Iodine (DEI) I-131

CONTINUED

Enclosure 4.1
Fission Product Barrier Matrix

4.1.C CONTAINMENT BARRIER

POTENTIAL LOSS - (1 Point)	LOSS – (3 Points)
3. Containment Isolation Valves Status After Containment Isolation Actuation	
• Not applicable	• Containment isolation is incomplete and a direct release path from containment exists to the environment
4. SG Secondary Side Release With Primary-to-Secondary Leakage	
• Not applicable	• Release of secondary side to the environment with primary to secondary leakage GREATER THAN Tech Spec allowable

IEMF-38+39 SAMPLE ISOLATION VALVES DID NOT CLOSE ON THE PHASE 'A' SIGNAL THAT WAS RECEIVED.

CONTINUED

4.1.N NCS BARRIER

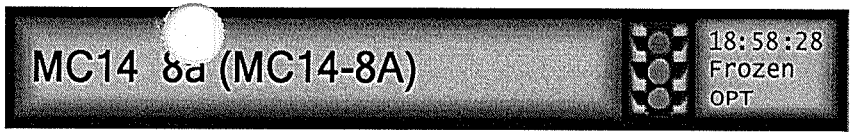
POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)
3. SG Tube Rupture	
• Primary-to-Secondary leak rate exceeds the capacity of one charging pump in the normal charging mode with letdown isolated.	• Indication that a SG is Ruptured and has a Non-Isolable secondary line fault • Indication that a SG is ruptured and a prolonged release of contaminated secondary coolant is occurring from the affected SG to the environment
4. Containment Radiation Monitoring	
• Not applicable	• Not applicable

CONTINUED

4.1.F FUEL CLAD BARRIER

POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)
3. Containment Radiation Monitoring	
• Not applicable	• Containment radiation monitor 53 A or 53 B Reading at time since Shutdown. 0-0.5 hrs > 99 R/hr 0.5-2 hrs > 43 R/hr 2-4 hrs > 31 R/hr 4-8 hrs > 22 R/hr >8 hrs > 13 R/hr
4. Emergency Coordinator/EOF Director Judgement	
• Any condition, including inability to monitor the barrier that in the opinion of the Emergency Coordinator/EOF Director indicates **LOSS** or POTENTIAL **LOSS** of the fuel clad barrier.	

END



THESE ARE GROUP 5 PHASE 'A' CONTAINMENT ISOLATION VALVES.

	1	2	3	4	5	6	7	8	9	10	11	12
A	NC PMP SEAL RET C/I INSD RV89 CLOSED	S/G A BLOWDOWN C/I INSD BB56 CLOSED	S/G B BLOWDOWN ISOL BB19 CLOSED	S/G C BLOWDOWN C/I INSD BB60 CLOSED	S/G D BLOWDOWN C/I INSD BB8 CLOSED	NW SUPPLY TO NS29A NW200A OPEN	NW SUPPLY TO NS12B NW217B OPEN	S/G D BLOWDOWN C/I OTSD BB10 CLOSED	S/G C BLOWDOWN C/I OTSD BB61 CLOSED	S/G B BLOWDOWN C/I OTSD BB21 CLOSED	S/G A BLOWDOWN C/I OTSD BB57 CLOSED	NC PUMP SEAL RET C/I OTSD NV91 CLOSED
B	LETDN ORIF B CONT ISOL NV10 CLOSED	NCDT HX RTN HDR C/I OTSD KC333 CLOSED	RX BLDG DRN HDR C/I OTSD KC430 CLOSED	NCDT HX SUP HDR CONT ISOL KC320 CLOSED		NW SUPPLY TO NS32A NW165A OPEN	NW SUPPLY TO NS15B NW222B OPEN	S/G C BLOWDOWN C/I OTSD BYP BB149 CLOSED	S/G B BLOWDOWN C/I OTSD BYP BB150 CLOSED	RX BLDG DRN HDR D/I INSD KC429 CLOSED	NCDT HX RTN HDR C/I INSD KC332 CLOSED	LETDN CONT ISOL OTSD NV15 CLOSED
C	NCDT PMP DISCH CONT ISOL WL805 CLOSED	NCDT VENT CONT ISOL WL450 CLOSED	CONT BLDG SUMP PMP DISCH C/I WL825 CLOSED	INST AIR SUP TO ANNULUS VI312 CLOSED		NW SUPPLY TO NS43A NW180A OPEN	S/G D BLOWDOWN C/I OTSD BYP BB147 CLOSED	BREATHING AIR CONT ISOL VB83 CLOSED	NW SUPPLY TO NS38B NW227B OPEN	CONT BLDG SUMP PMP DISCH C/I WL827 CLOSED	NCDT VENT CONT ISOL WL451 CLOSED	NCDT PMP DISCH CONT ISOL WL807 CLOSED
D	NW SURGE CHAMBER A OUTLET NW020 OPEN	CONT EMF INLET C/I OTSD NI230 CLOSED	CONT EMF OUTLET C/I OTSD N15232 CLOSED	NW CONT HDR A ISOL NW035 OPEN	GLYCOL SUPPLY CONT ISOL NF228 CLOSED	GLYCOL RETURN CONT ISOL NF234 CLOSED	GLYCOL RETURN CONT ISOL NF233 CLOSED	NW SURGE CHAM B OTLT HW069 OPEN	HW CONT HDR B ISOL NW105 OPEN	CONT EMF OUTLET C/I INSD MI5233 CLOSED	CONT EMF INLET C/I INSD M15231 CLOSED	MAKEUP DEMIN WTR CONT ISOL YM119 CLOSED
E	PZR LIQ SMPL LINE CONT ISOL NM3 CLOSED	NC HOT LEG A SMPL LINE C/I NM22 CLOSED	S/G A BLOWDOWN LINE SMPL C/I NM22 CLOSED	S/G B SMPL HDR CONT ISOL NM201 CLOSED	S/G C UPR SHELL SMPL C/I NM210 CLOSED	S/G D SMPL HDR CONT ISOL NM221 CLOSED	S/G D BLOWDOWN LINE SMPL C/I NM220 CLOSED	S/G C SMPL HDR CONT ISOL NM211 CLOSED	S/G B BLOWDOWN LINE SMPL C/I NM200 CLOSED	S/G A SMPL HRD CONT ISOL NM191 CLOSED	NC HOT LEG SMPL HDR C/I NM26 CLOSED	NW SUPPLY TO NI152B NW232B OPEN
F	NW SUPPLY TO NI173A NW175A OPEN	NW SUPPLY TO NI162A NW185A OPEN	NW SUPPLY TO NI121A NW190A OPEN		UPPER PAL AIR SUP C/I IA8V5080 CLOSED	UPPER PAL LEAK TEST C/I IASV5400 CLOSED	LOWER PAL LEAK TEST C/I IASV5410 CLOSED	LOWER PAL AIR SUP C/I IASV5160 CLOSED	RX MAKEUP WATER C/I OTSD VLV NB260 CLOSED	STATION AIR CONT ISOL VS54 CLOSED	S/G A BLOWDOWN C/I OTSD BYP BB148 CLOSED	NW SUPPLY TO NI178B NW237B OPEN
G	UPR CONT PURGE SUP INSD ISOL VP2 CLOSED	UPR CONT PUREGE INSD ISOL VP4 CLOSED	LWR CONT PURGE SUP INSD ISOL VP7 CLOSED	LWR CONT PURGE SUP INSD ISOL VP9 CLOSED	UPR CONT PURGE EXH INSD ISOL VP10 CLOSED		UPR CONT PURGE EXH OTSD ISOL VP11 CLOSED	LWR CONT PURGE SUP OTSD ISOL VP8 CLOSED	LWR CONT PURGE SUP OTSD ISOL VP6 CLOSED	UPR CONT PURGE SUP OTSD ISOL VP3 CLOSED	UPR CONT PURGE SUP OTSD ISOL VP1 CLOSED	NI ACCUM D SMPL LINE C/I NM81 CLOSED

1EMF-38/39 CONTAINMENT LOSS OF FLOW

D/4

SETPOINT: 3.0 scfm

ORIGIN: 1EMFT5280

PROBABLE CAUSE:

1. No sample points selected on "SAMPLE FLOW SELECT" module on control cabinet
2. Line blockage in the particulate detector
3. Pump/motor fault
4. S_T (Phase A Isol)
5. Flow switch failure
6. Loss of power to blackout MCC 1MX0

AUTOMATIC ACTIONS: Gas sample pump trips

IMMEDIATE ACTIONS:

1. Verify that the following containment isolation valves are open (1MC8):
   - 1MISV5230 (Cont EMF Sup Otsd Cont Isol)
   - 1MISV5231 (Cont EMF Sup Insd Cont Isol)
   - 1MISV5232 (Cont EMF Ret Otsd Cont Isol)
   - 1MISV5233 (Cont EMF Ret Insd Cont Isol)

NOTE: 1EMF-38 and 39 sampling valves must be selected to "Lower Containment" and/or "Incore Instrument". If both valves, "Lower Containment" and "Incore Instrument" are closed 1EMF-38 and 39 must be considered inoperable for Tech. Spec. 3.4.15.

2. Ensure at least one sample point is selected on "SAMPLE FLOW SELECT" module.
3. Notify the RP Shift Group to check EMF particulate paper and replace if necessary.
4. Verify 1MXO-F05A (Cont Rad Mon 1EMF-38, 39 Sample Pump Motor) (AB-577, BB-52) closed.
5. **IF** power has been lost to blackout MCC 1MX0, cycle the local disconnect located on the 1EMF-38, 39 package (AB-577, HH-53), after power has been restored.
6. Restart gas sample pump.
7. **IF** loss of sample flow annunciator **CANNOT** be cleared:
   - 7.1 **IF** VP is in operation, perform Actions for EMF-39 Inoperability With VP in Service per OP/1/A/6450/015 (Containment Purge System).
   - 7.2 **IF** in operation **AND** 1EMF-36 is inoperable, secure VQ.

CONTINUED ON THE NEXT PAGE

NOTE: An Emergency Release is an unplanned, quantifiable radiological release to the environment during an emergency event. The release does not have to be related to the declared emergency. Base determinations on information such as EMF readings, containment pressure and other instrument indications, field monitoring results, and knowledge of the event and its impact on system operation and resultant release pathways.

☐ 2.9 Complete Line 6 by determining if an emergency release is in progress as follows:

☐ 2.9.1 **IF** any of the following indications exist, mark B (is occurring) **OR** C (has occurred) as appropriate:

- EMF 38 or 39 readings indicate an increase in activity **AND** containment pressure greater than 0.3 psig
- EMF 38 or 39 readings indicate an increase in activity **AND** a known leak path existing from containment
- EMFs 35 or 36 readings indicate an increase in activity.
- EMF 33 or other alternate means indicate Steam Generator tube leakage.
- A known release path of radioactive material exists
- Alternate method of release determination

☐ 2.9.2 **IF** no release is in progress, mark box A (None). Go to step 2.10.

☐ 2.10 Complete Line 7 as follows:

☐ 2.10.1 **IF** no release is in progress, mark box A (Not Applicable). **Go to** step 2.11.

NOTE: Release significance is determined by RP.

☐ 2.10.2 **IF** release significance is known, mark box B (Within normal operating limits) **OR** C (Above normal operating limits) as appropriate, **go to** step 2.11.

☐ 2.10.3 **IF** release significance is unknown, check box D (Under evaluation).

85.
WE13 2.1.27
Steam Generator Overpressure
Knowledge of system purpose and/or function.

NEW
Given the following Unit 1 conditions:

- The Unit was initially at 100% power.
- The reactor tripped due to a spurious turbine trip.
- The crew has performed and exited E-0, (Reactor Trip or Safety Injection).
- A Main Steam Isolation signal was received.
- 1B S/G pressure is being maintained at approximately 1210 psig.

Note: FR-H.2, (Response to Steam Generator Overpressure)
FR-H.4, (Response to Loss of Normal Steam Release Capabilities)

Based on the above conditions ...

1. What is the MAXIMUM number of safety relief valves associated with 1B S/G that did NOT function as designed?

2. Which functional recovery procedure will be selected for mitigation?

A. 3
FR-H.2

B. 5
FR-H.2

C. 3
FR-H.4

D. 5
FR-H.4

Ans: C

References:
FR-H.2, (Response to Steam Generator Overpressure), Rev. 07
FR-H.4, (Response to Loss of Normal Steam Release Capabilities), Rev. 10
F-0, Critical Safety Function Status Trees (for Heat Sink), Rev. 07
OP-CN-STM-SM, Lesson Plan for Main Steam System, page 11 of 21, Rev. 41

Distractor Analysis

A. Incorrect. Plausible, since the number of S/G safeties is correct. FR-H.2 is plausible if the applicant recalls the purpose of that FR as being an overpressure condition affecting and SG where pressure has increased above the highest steamline safety valve setpoint. H.2 is also a common misconception, based on validation results. The applicant may think that H.2 is used if you're above the PORV setting (i.e., the PORV hasn't worked), and that H.4 would be if all the safeties haven't worked properly.

B. Incorrect. The maximum number of safeties that did not function per design is plausible if the applicant fails to recall the setpoint values for the S/G safety reliefs, and recalls an incorrect value for the S/G PORV setpoint, and believes that 1B S/G pressure is being maintained by the S/G PORV. FR-H.2 is plausible if the applicant recalls the purpose of that FR as being an overpressure condition affecting and SG where pressure has increased above the highest steamline safety valve setpoint. H.2 is also a common misconception, based on validation results. The applicant may think that H.2 is used if you're above the PORV setting (i.e., the PORV hasn't worked), and that H.4 would be if all the safeties haven't worked properly.

C. **CORRECT.** The lift setpoints for the SG PORVs and safeties are as follows:

1125 psig - PORV	1205 psig - Safety
1175 psig - Safety	1220 psig - Safety
1190 psig - Safety	1230 psig - Safety

For the given conditions (1B S/G pressure at 1210 psig), 3 safety valves will have already lifted to control pressure. They have NOT functioned as designed, since pressure has risen above their lift setpoints.

In accordance with F-0, Critical Safety Function Status Trees for Heat Sink, if pressure is less 1230 psig, but greater than 1175 psig, the SRO implements FR-H.4.

D. Incorrect. Plausible, since implementation of FR-H.4 is correct. The maximum number of safeties that did not function per design is plausible if the applicant fails to recall the setpoint values for the S/G safety reliefs, and recalls an incorrect value for the S/G PORV setpoint, and believes that 1B S/G pressure is being maintained by the S/G PORV.

K/A Match

The K/A requires testing of the purpose and/or function of the Steam Generator Overpressure system. The question also had to be written at the SRO level. The K/A is matched because the applicant must apply system knowledge of the S/G PORVs, and code safeties to aid in making a decision on which FR to implement. The other aspect of matching this K/A (including at the SRO level) is that the applicant must recall detailed information from the F-0, Critical Safety Function Status Trees, evaluate the conditions given in the stem, and combine those items with knowledge of the purpose of the Steam Generator Overpressure system, to arrive at a conclusion for which yellow path (FR) applies.

Basis for SRO Only

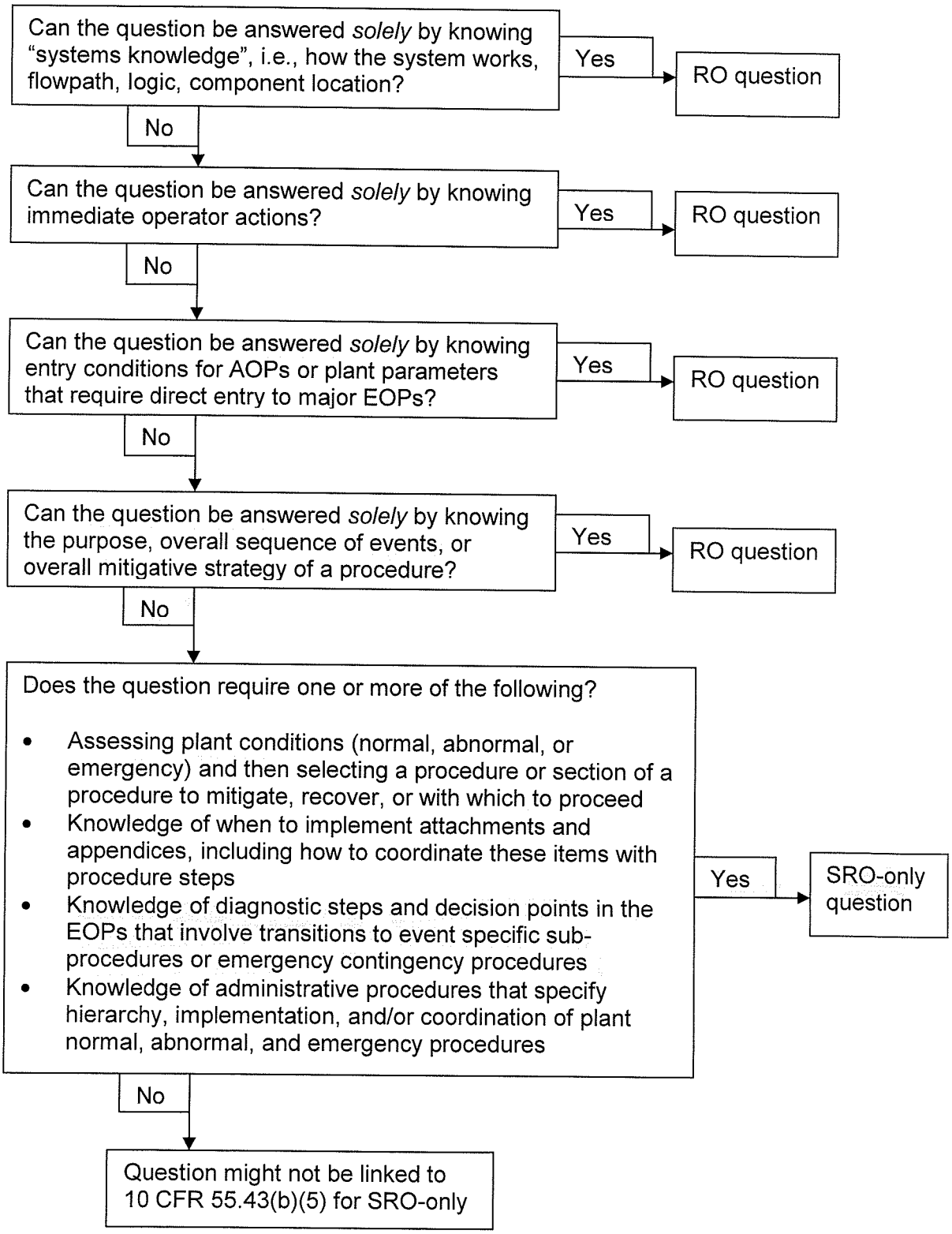
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):

1.) The question canNOT be answered solely by knowing systems knowledge. Even though the K/A is a systems K/A, the question does NOT solely depend on that knowledge to answer the question.
4.) The question canNOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.
5.) The question requires the applicant to assess plant conditions, and then select the FR which applies, and to apply detailed procedure knowledge and criteria for yellow path selection from the F-0 document for Status Trees.

Cognitive Level - High

This is a high cognitive level question because it involves a level of analysis of a given set of conditions, and applying system knowledge to make a conclusion on which success path is implemented for the conditions.

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)



	SM System Objectives	ISS	NLO	LPRO	LPSO	PTRQ
1	Explain the purpose of the SM system	X	X	X	X	
2	Explain the purpose of the Flow Restrictor in each S/G outlet	X	X	X	X	
3	Describe the purpose of the S/G PORV's	X	X	X	X	
4	Describe the operation of the S/G PORV's	X	X			
5	Describe the location of the S/G PORV's	X	X	X	X	
6	Describe the controls and indications for the S/G PORV's			X	X	X
7	Discuss the procedure for locally operating the S/G PORV's	X	X	X	X	X
8	List the opening and closing setpoints for the S/G PORV's	X	X	X	X	X
9	List the requirements of entry into a space that has a high pressure steam relief device per Site Directive 3.1.2	X	X	X	X	X
10	Discuss the purpose of the S/G safety valves	X	X	X	X	
11	List the setpoints for the S/G safety valves	X	X	X	X	X
12	List the controls associated with the MSIV's			X	X	X
13	List the loads supplied by the SM system	X	X	X	X	X
14	List the signals that cause a SM Isolation	X	X			
15	List the signals and setpoints and coincidence that cause a SM Isolation			X	X	X
16	Describe the response of the SM system to a SM Isolation Signal	X	X	X	X	X
17	Draw the Main Steam System per Figure 1	X	X			
18	Describe the flowpath for a SM system valve lineup for unit heatup			X	X	
19	Given appropriate plant conditions, apply limits and precautions associated with related station procedures.	X	X	X	X	X
20	Describe the procedure for warming, pressurizing and securing the SM system			X	X	X
21	List the parameters used to monitor the SM system during operation			X	X	
22	Describe how the MSIV's operate			X	X	
23	List the safety signals that go to ESF from SM			X	X	

(b) "MANUAL" - can be selected again and the PORV repositioned by using the "0" to "10" pot. (SM isolation signal does not have to be RESET to select "MANUAL"). "MANUAL" will allow reopening the PORV with an SM Isol Signal present.

c) If a "MANUAL" SM Isolation Signal is initiated and the S/G PORV's are selected to "MANUAL", the PORV's will stay in manual and will not close on the SM Isolation signal.

5. S/G PORV Isolation Valves

a) Safety Related and powered from 600 volt ESS MCC's.

b) S/G PORV Isolation valves receive an "OPEN" signal when ASP "LOCAL" control of PORV's is selected.

C. S/G Safety Valves (Obj. #10 & 11)

1. Provide over pressure protection for SM.
2. 5 valves per steam line STEAM PRESSURE IN THE QUESTION IS 1210 PSIG => 3 SAFETIES DID NOT WORK.
3. Open at setpoints of 1175,1190,1205,1220 and 1230 psig. These setpoints are set at different values to prevent valve chatter.
4. Provide 100% steam relief capacity. (5% per valve).
5. No manual controls provided except local lever
6. Safety Gags - Mechanical devices may be installed to prevent actuation of the safety valves should hydrostatic pressure testing of the SM piping be required. These devices will be brightly colored or otherwise clearly and easily identifiable.

D. Instrumentation Taps (Obj. #21)

1. Upstream of MSIV's has 5 pressure transmitters.
2. Pressure transmitters provide functions for:

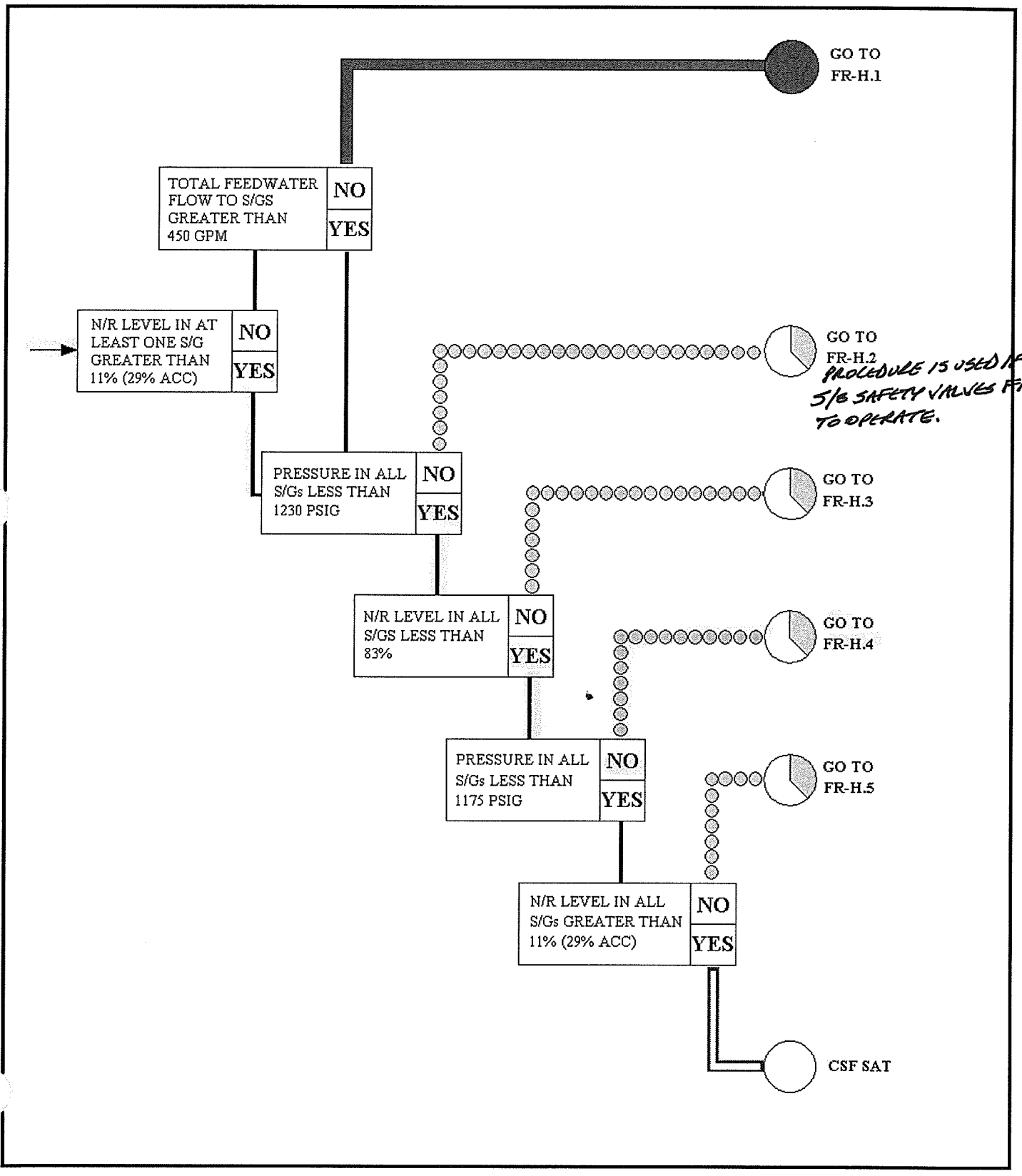
a) Main steam isolation signals

b) Low pressure alert annunciators

c) S/G PORV operation

d) Indication on MC-2, (Gage and Recorder) ASP, computer and AFWPTCP.

3. Taps located in the doghouse.
4. Flow transmitters off of restrictor provide flow indication to MC-2 and ASP. They are also used for SGWLC and FWPT speed control.
5. Steam temperature taps provide input to computer.
6. One pressure transmitter on equalization header for steam dump control and indication on MC-2.


GO TO FR-H.1
TOTAL FEEDWATER FLOW TO S/GS GREATER THAN 450 GPM
NO
YES
N/R LEVEL IN AT LEAST ONE S/G GREATER THAN 11% (29% ACC)
NO
YES
GO TO FR-H.2
PROCEDURE IS USED IF ALL S/G SAFETY VALVES FAIL TO OPERATE.
PRESSURE IN ALL S/Gs LESS THAN 1230 PSIG
NO
YES
GO TO FR-H.3
N/R LEVEL IN ALL S/GS LESS THAN 83%
NO
YES
GO TO FR-H.4
PRESSURE IN ALL S/Gs LESS THAN 1175 PSIG
NO
YES
GO TO FR-H.5
N/R LEVEL IN ALL S/Gs GREATER THAN 11% (29% ACC)
NO
YES
CSF SAT

A. Purpose

This procedure provides actions for an overpressure condition affecting any S/G where pressure has increased above the highest steamline safety valve setpoint.

B. Symptoms or Entry Conditions

This procedure is entered from EP/1/A/5000/F-0 (Critical Safety Function Status Trees) (HEAT SINK) on a YELLOW condition.

A. Purpose

This procedure provides actions to respond to a failure of the S/G power operated relief valves (PORVs) and condenser dump valves.

B. Symptoms or Entry Conditions

This procedure is entered from EP/1/A/5000/F-0 (Critical Safety Function Status Trees) (HEAT SINK) on a YELLOW condition.

86.
SYS004 A2.21
Chemical and Volume Control System
Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
Excessive letdown flow, pressure, and temperatures on ion exchange resins (also causes)

NEW
Given the following Unit 1 conditions:

- The Unit is at 100% power.
- The operators have determined that due to a controller malfunction, 1KC-132 (Letdn Hx Otlt Temp Ctrl) percent (%) output is steadily INCREASING.
- All other plant parameters appear normal.

Considering the impact of the above conditions, what procedure will be implemented which contains the correct action for mitigation?

A. Per OP/1/B/6100/010H, 1AD-7, F/3, LETDN HX OUTLET HI TEMP, take manual control of 1KC-132.

B. Per AP/13, (Boron Dilution), bypass the mixed bed demineralizers.

C. Per OP/1/B/6100/010H, 1AD-7, F/3, LETDN HX OUTLET HI TEMP, bypass the mixed bed demineralizers.

D. Per AP/13, (Boron Dilution), take manual control of 1KC-132.

Ans: B

References:
OP/1/A/6200/001, CVCS, Enclosure 4.28, Adjusting Letdown (VCT) Temperature, Page 2, Rev. 140
AP/13, (Boron Dilution), Rev. 20
1AD-7, F/3, LETDN HX OUTLET HI TEMP, Rev. 75

Distractor Analysis

A. Incorrect. Taking manual control of 1KC-132 is plausible as the correct action if the applicant reverses the response of the letdown heat exchanger outlet temperature controller as CLOSING as the output increases (instead of OPENING). Taking manual control for this type of failure (high outlet temperature) is correct, per OP/1/B/6100/010H, LETDN HX OUTLET HI TEMP, however, the applicant has confused the failure response to arrive at believing the outlet temperature is high.

B. **CORRECT.** As the output of 1KC-132 increases, the valve opens further, resulting in a LOWER letdown temperature. As letdown temperature decreases, the mixed bed demineralizers remove MORE boron, reducing boron concentration in the NC system. The purpose of AP/13, Boron Dilution, is to mitigate this type of condition. The SRO uses AP/13, Case I, (Boron Dilution at Power), and ensure that reactor power is maintained stable at less than 100% power. The next step (Step 3) in the abnormal procedure provides guidance for addressing a dilution, including steps to isolate (bypass) the mixed bed demineralizers, thereby terminating the "dilution."

C. Incorrect. Plausible, since the required action is correct. That the guidance would be found in OP/1/B/6100/010H, LETDN HX OUTLET HI TEMP, is plausible if the applicant reverses the response of the letdown heat exchanger outlet temperature controller, as CLOSING as the output increases. With this misconception, this answer would be correct. The response would be a high temperature and addressed by implementing the procedure above.

D. Incorrect. Plausible, since the procedure (AP/13) is correct. Taking manual control of 1KC-132 is plausible as the correct action if the applicant reverses the response of the letdown heat exchanger outlet temperature controller as CLOSING as the output increases (instead of OPENING). Taking manual control for this type of failure (high outlet temperature) is correct, per OP/1/B/6100/010H, LETDN HX OUTLET HI TEMP, however, the applicant has confused the failure response to arrive at believing the outlet temperature is high.

K/A Match
The K/A is matched because the question conditions involve a malfunction of the letdown heat exchanger outlet temperature controller, which impacts the CVCS letdown parameters. To answer the question, the applicant must have the ability to predict the impact of this failure on letdown temperature on the resins in the mixed bed demineralizers, specifically how it affects their ability to retain boron.

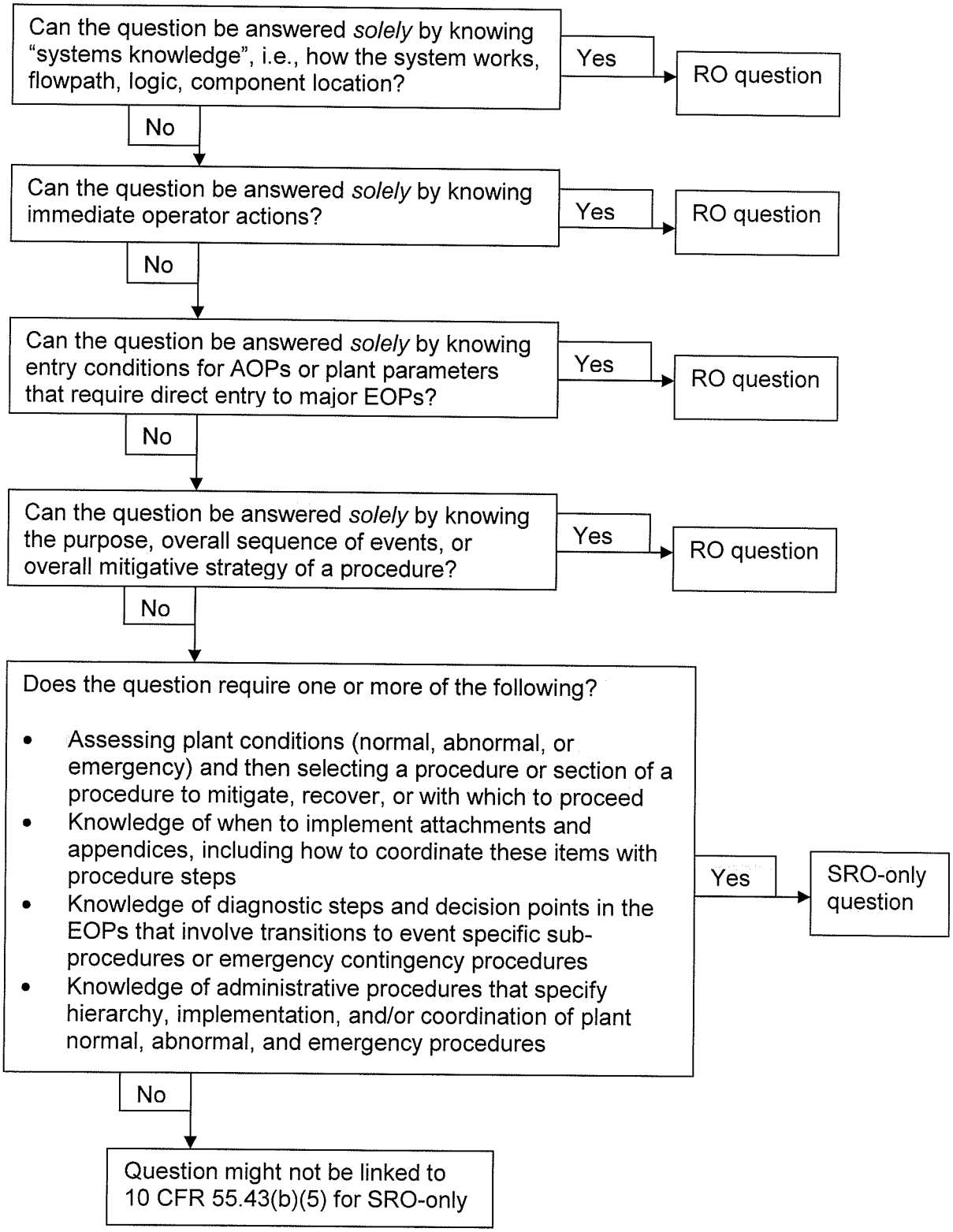
With this prediction, the applicant is then tested on which procedure to use for guidance for mitigating the condition.

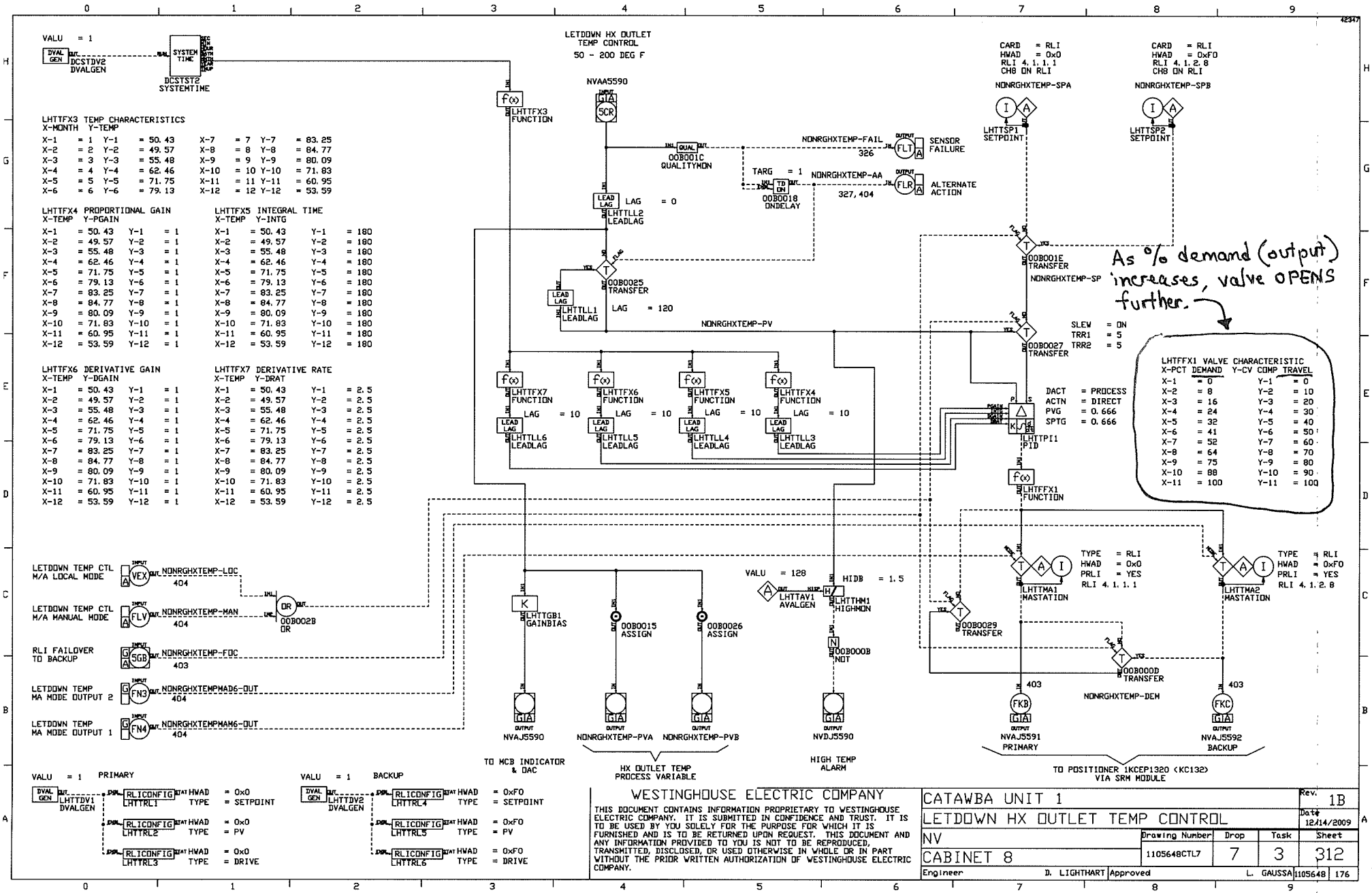
Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):

1) The question can NOT be answered by knowing systems knowledge alone.
4) The question can NOT be answered by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.
5) The question requires the applicant to recall and apply detailed procedure content from AP/13, including application of knowledge from the abnormal procedure basis document which describes the effect of temperature on the ion exchange resins and the effect on boron concentration.

Cognitive Level - High
This is a high cognitive level question because the applicant must recall several facts regarding reactivity effects based on a letdown temperature, recall the significance of a failure mode of a controller, and how that affects the letdown temperature, and therefore reactivity. The applicant must analyze the stem conditions, and then apply this knowledge to arrive at a conclusion on procedure selection for mitigation.

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)





CATAWBA UNIT 1

LETDOWN HX OUTLET TEMP CONTROL

NV	Drawing Number	Drop	Task	Sheet
CABINET 8	1105648CTL7	7	3	312

Rev. 1B
Date 12/14/2009

Engineer D. LIGHTHART Approved L. GAUSSA 1105648 176

F/3

LETDN HX OUTLET HI TEMP

SETPOINT: 128°F

ORIGIN:

Instrument	DCS	Description
1NVPT5590	NVAA5590	LETDOWN HX OTLT TEMP

PROBABLE CAUSE:

1. Letdown flow too high
2. 1KC-132 (Letdn Hx Otlt Temp Ctrl) (controlled by 1NVSS5590) malfunction

AUTOMATIC ACTIONS:

IF letdown temp. continues to rise, at 136°F 1NV-153A (Ltdn Hx Otlt 3-Way Vlv) will divert Letdown to volume control tank.

IMMEDIATE ACTIONS:

1. **IF** due to hi letdown flow, reduce flow rate by removing orifices from service and/or taking manual control of 1NV-148 (Letdn Press Control Valve) as necessary.
2. **IF** due to a low KC flow, attempt to restore normal flow, by taking manual control of 1KC-132 (Letdn Hx Otlt Temp Ctrl).

SUPPLEMENTARY ACTIONS:

1. Ensure letdown flow does **NOT** exceed 120 gpm.
2. Ensure ND letdown flow in Modes 5, 6 or No Mode does **NOT** exceed 185 gpm.
3. Verify that 1NV-148 (Letdn Press Control) is maintaining proper back pressure of 350 psig.
4. **IF** letdown temperature exceeds 136°F, ensure 1NV-153A (Ltdn Hx Otlt 3-Way Vlv) diverts flow to the VCT.
   - 4.1 **WHEN** letdown temperature decreases below 136°F, ensure 1NV-153A (Ltdn Hx Otlt 3-Way Vlv) directs letdown flow to the NV demineralizers.

NOTE: Completion of the evaluation/inspection in the following step shall **NOT** delay a return to normal operation.

5. **IF** KC flow is lost to the Letdown Hx for greater than 30 seconds, contact Engineering to evaluate/inspect for any possible damage due to water hammer.

REFERENCES:

1. Westinghouse Precautions, Limitations and Setpoints Document (CNM-1201.00-39)
2. CNCE-10993
3. CNM 1399.03-0269.001 Drop 7 Sheet 312

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **Ensure reactor power - MAINTAINED LESS THAN 100%.**

__ 2. **Verify reactor power - STABLE.**

Perform the following:

__ a. Stabilize unit at current power level.

__ b. Maintain control rods above insertion limits.

c. Adjust the following as required to maintain T-Avg within 1°F of T-Ref:

__ • Turbine load
__ • Control rods
__ • Boron concentration.

3. **Stop any dilutions in progress as follows:**

__ a. Place "NC MAKEUP CONTROL" switch to "STOP".

__ b. Place both reactor makeup water pumps to "OFF".

c. Isolate the NV demineralizers as follows:

__ 1) Place 1NV-153A (Letdn Hx Otlt 3-Way Valve) in the "VCT" position.

2) Ensure the following valves - CLOSED:

__ • 1NV-353 & 364 (Mixed Bed Demin 1A Isol)

__ • 1NV-368 & 379 (Mixed Bed Demin 1B Isol).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. **Verify boration of NC System required as follows:**

   a. Verify one of the following:

   __ • OAC point C1L4409 (Ctrl Bank Tech Spec Insertion Lmt Reached) - IN ALARM.

   OR

   __ • Control rods below insertion limits. **REFER TO** R.O.D. Book (Section 2.2).

   a. Perform the following:

   1) **IF AT ANY TIME** either of the following occurs, **THEN RETURN TO** Step 4.

   __ • OAC point C1L4409 (Ctrl Bank Tech Spec Insertion Lmt Reached) alarms.

   OR

   __ • Control rods are below the insertion limits of the R.O.D. Book.

   __ 2) **GO TO** Step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **Failure to initiate boration within one hour of exceeding rod insertion limits may violate Tech Spec 3.1.6.**

__ 5. **Borate NC system as required, to restore rods above insertion limits. REFER TO OP/1/A/6150/009 (Boron Concentration Control).**

Borate NC system from the FWST as required, to restore rods above insertion limits:

a. Open the following valves:

__ • 1NV-252A (NV Pumps Suct From FWST)

__ • 1NV-253B (NV Pumps Suct From FWST).

b. Close the following valves:

__ • 1NV-188A (VCT Otlt Isol)
__ • 1NV-189B (VCT Otlt Isol).

c. **WHEN** desired to stop borated water flow from the FWST, **THEN:**

1) Open the following valves:

__ • 1NV-188A (VCT Otlt Isol)

__ • 1NV-189B (VCT Otlt Isol).

2) Close the following valves:

__ • 1NV-252A (NV Pumps Suct From FWST)

__ • 1NV-253B (NV Pumps Suct From FWST).

__ d. Repeat Step 5 RNO as required, to restore rods above insertion limits.

__ 6. **Ensure compliance with Tech Spec 3.1.6 (Control Bank Insertion Limits).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. **Determine and correct cause of dilution to include the following:**

   a. Notify Primary Chemistry to perform the following:

   __ • Sample the mixed bed demineralizers.

   • Investigate any possible BAT changes as follows:

   __ • Level changes
   __ • Batching evolutions
   __ • Concentration changes.

   __ b. Evaluate recent trends in VCT level and boron concentration.

__ 8. **Borate control rods to desired height. REFER TO OP/1/A/6150/009 (Boron Concentration Control).**

9. **Request Chemistry sample the following for boron concentration:**

   __ • NC H-Legs
   __ • Pzr.

10. **Determine required notifications:**

   __ • **REFER TO** RP/0/A/5000/001 (Classification Of Emergency)

   __ • **REFER TO** RP/0/B/5000/013 (NRC Notification Requirements).

__ 11. **Notify Reactor Group Engineer of occurrence.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **To prevent an inadvertent dilution of the NC system, Boron Saturation of the Mixed Bed Demineralizer may be required prior to returning it to service.**

__ 12. **WHEN the cause of the dilution has been corrected, THEN realign NV System to normal operation. REFER TO OP/1/A/6200/001 (Chemical and Volume Control System).**

__ 13. **Determine long term plant status. RETURN TO procedure in effect.**

END

87.
SYS013 2.2.38
Engineered Safety Features Actuation System (ESFAS)
Knowledge of conditions and limitations in the facility license.

NEW
Regarding the requirements of Table 3.3.2-1, Engineered Safety Feature Actuation System Instrumentation:

Which ONE of the following bistables is required to be placed in BYPASS if it is declared INOPERABLE?

A. Containment Pressure - High

B. Containment Pressure - High High

C. SG Water Level – Low Low

D. Nuclear Service Water Suction Transfer - Low Pit Level

Ans: B

References:
T.S. 3.3.2, Table 3.3.2-1
T.S. 3.3.2, Conditions D, E, J, K, M, N, and Q, including Bases.
OP/1/A/6200/014, Refueling Water System
1AD-9, B/8, FWST at Makeup Level
1AD-9, C/8, FWST LO LEVEL

Distractor Analysis

A. Incorrect. It is plausible that an applicant could have a misconception that the associated bistable be placed in BYPASS, since there IS an ESFAS instrument associated with Containment High Pressure which does require its associated bistable be placed in BYPASS if the instrument is inoperable (Containment Pressure High High). Also plausible is that the applicant may correctly recall that the Containment Pressure - High instrument is associated with a Safety Injection, and arrive at the misconception that the instrument should be placed in BYPASS for the correct basis (but misapplied) of the correct answer in choice B (to prevent the potential severe consequences of an inadvertent actuation).

B. **CORRECT.** With a channel of Containment Pressure High High inoperable, per Function 4.c of Table 3.3.2-1, ESFAS Instrumentation, Condition E of Tech. Spec. 3.3.2 applies, requiring that its associated bistable be placed in BYPASS within 72 hours.

This is one of the two functions which require the bistable output to energize to perform its required action. It is not desirable to have a loss of power actuate containment spray, since the consequences of an inadvertent actuation of containment spray could be serious. Note that this function also has the inoperable channel placed in BYPASS rather than to decrease the probability of an inadvertent actuation.

C. Incorrect. Plausible, since there is an ESFAS instrument associated with a low level which requires placing the inoperable instrument's bistable to BYPASS if the instrument is inoperable. The applicant has misapplied the requirement for the RWST to arrive at this answer. Another applicant may correctly recall that the basis for placing a failed channel's bistable to BYPASS is to prevent the severe consequences of inadvertent actuation. Per the Tech. Spec. Basis for 3.3.2, there are TWO ESFAS instruments which require placing the associated bistable to BYPASS - done for the purpose of preventing inadvertent actuation and the accompanying severe consequences. These are spraying of containment (Containment Pressure High High) and sump swapover (RWST low level). Here, the applicant has recalled some of these requirements and misapplied their basis to an Aux. Feed Actuation (S/G Water Level Low-Low), believing that an inadvertent AFAS could have severe consequences and that therefore the instrument's associated bistable is placed to BYPASS.

D. Incorrect. Plausible, if the applicant recalls the correct basis for why there are certain (TWO) ESFAS instruments which have their bistables placed in BYPASS when the instrument is inoperable. The applicant recalls that this is done to prevent the severe consequences of an inadvertent actuation (with a channel's bistable in TRIP, vs. BYPASS) and reasons that an inadvertent actuation of this ESFAS feature may result in severe perturbations of the Nuclear Service Water System (which provides cooling to safety related components), since there are valves which realign, and certain crossover valves which CLOSE.

K/A Match
The K/A is matched since the question tests detailed knowledge and application of Tech. Spec. requirements for ESFAS instrumentation.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(2) (Tech Specs):
1.) It can NOT be answered solely by knowing < 1 hour Tech Specs.
2.) It can NOT be answered solely by knowing the LCO/TRM information listed "above-the-line".
4.) It requires the applicant to have specific and detailed knowledge of Tech. Spec. basis information for evaluating several ESFAS instruments, and apply that knowledge in making a selection of the required action for inoperability.

Cognitive Level - Low
It is possible that certain applicants may answer this question from recall of detailed requirements in Table 3.3.2-1.

Figure 1: Screening for SRO-only linked to 10 CFR 55.43(b)(2) (Tech Specs)

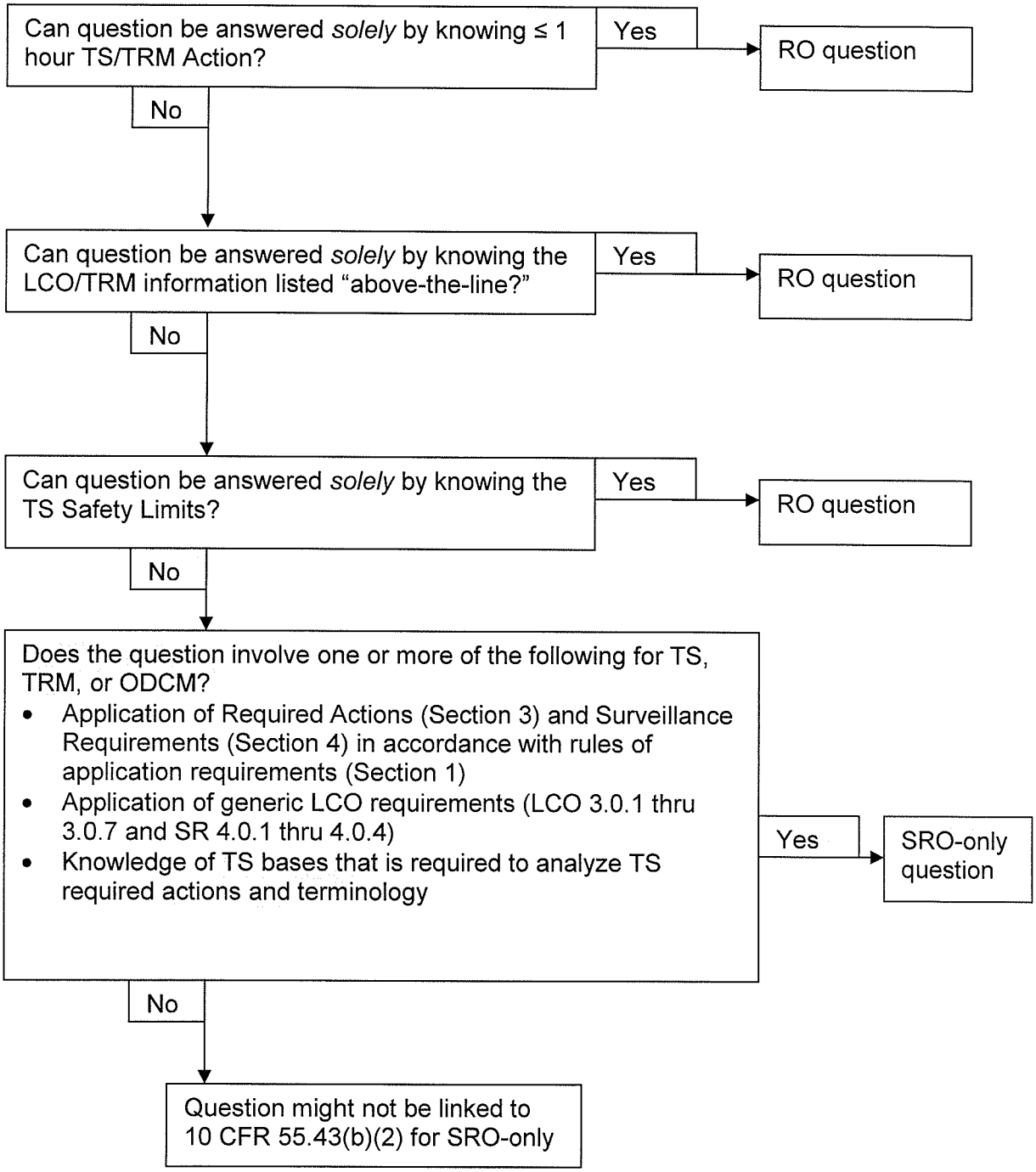


Table 3.3.2-1 (page 1 of 5)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Safety Injection[(b)]						
a. Manual initiation	1,2,3,4	2	B	SR 3.3.2.8	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure - High	1,2,3	3	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 1.4 psig	1.2 psig
d. Pressurizer Pressure - Low	1,2,3[(a)]	4	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 1839 psig	1845 psig
2. Containment Spray						
a. Manual Initiation	1,2,3,4	1 per train, 2 trains	B	SR 3.3.2.8	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure - High High	1,2,3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 3.2 psig	3.0 psig
3. Containment Isolation[(b)]						
a. Phase A Isolation						
(1) Manual Initiation	1,2,3,4	2	B	SR 3.3.2.8	NA	NA
(2) Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
(3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					

(continued)

(a) Above the P-11 (Pressurizer Pressure) interlock.

(b) The requirements of this Function are not applicable to Containment Purge Ventilation System and Hydrogen Purge System components, since the system containment isolation valves are sealed closed in MODES 1, 2, 3, and 4.

Table 3.3.2-1 (page 4 of 5)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
(2) SG Water Level- High High (P-14)	1,2(e),3(e)	4 per SG	D	SR 3.3.2.1 SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.5 SR 3.3.2.6 SR 3.3.2.9 SR 3.3.2.10	≤ 85.6% (Unit 1) ≤ 78.9% (Unit 2)	83.9% (Unit 1) 77.1% (Unit 2)
(3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements. See Item 5.b.(1) for Applicable MODES.					
(4) Tavg-Low	1,2(e)	4	J	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9	≥ 561°F	564°F
coincident with Reactor Trip, P-4	Refer to Function 8.a (Reactor Trip, P-4) for all initiation functions and requirements.					
(5) Doghouse WaterLevel - High High	1,2(e)	(1/1 logic) 2 per doghouse	L	(1/1 logic) SR 3.3.2.8	≤ 12 inches above 577 ft floor level	11 inches above 577 ft floor level
		(2/3 logic) 3 per train per doghouse		(2/3 logic) SR 3.3.2.8 SR 3.3.2.9 SR 3.3.2.12		
6. Auxiliary Feedwater						
a. Automatic Actuation Logic and Actuation Relays	1,2,3	2 trains	H	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
b. SG Water Level - Low Low	1,2,3	4 per SG	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 9% (Unit 1) ≥ 35.1% (Unit 2)	10.7% (Unit 1) 36.8% (Unit 2)
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d. Loss of Offsite Power	1,2,3	3 per bus	D	SR 3.3.2.3 SR 3.3.2.9 SR 3.3.2.10	≥ 3242 V	3500 V
e. Trip of all Main Feedwater Pumps	1,2	3 per pump	K	SR 3.3.2.8 SR 3.3.2.10	NA	NA
f. Auxiliary Feedwater Pump Train A and Train B Suction Transfer on Suction Pressure - Low	1,2,3	3 per train	M	SR 3.3.2.8 SR 3.3.2.10	A) ≥ 9.5 psig B) ≥ 5.2 psig (Unit 1) ≥ 5.0 psig (Unit 2)	A) 10.5 psig B) 6.2 psig (Unit 1) 6.0 psig (Unit 2)

(continued)

(e) Except when all MFIVs, MFCVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

Table 3.3.2-1 (page 5 of 5)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
7. Automatic Switchover to Containment Sump						
a. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
b. Refueling Water Storage Tank (RWST) Level – Low	1,2,3,4	4	N	SR 3.3.2.1 SR 3.3.2.7 SR 3.3.2.9 SR 3.3.2.10	≥ 162.4 inches	177.15 inches
Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
8. ESFAS Interlocks						
a. Reactor Trip, P-4	1,2,3	1 per train, 2 trains	F	SR 3.3.2.8	NA	NA
b. Pressurizer Pressure, P-11	1,2,3	3	O	SR 3.3.2.5 SR 3.3.2.9	≥ 1944 and ≤ 1966 psig	1955 psig
c. T_{avg} - Low Low, P-12	1,2,3	1 per loop	O	SR 3.3.2.5 SR 3.3.2.9	≥ 550°F	553°F
9. Containment Pressure Control System						
a. Start Permissive	1,2,3,4	4 per train	P	SR 3.3.2.1 SR 3.3.2.7 SR 3.3.2.9	≤ 1.0 psid	0.9 psid
b. Termination	1,2,3,4	4 per train	P	SR 3.3.2.1 SR 3.3.2.7 SR 3.3.2.9	≥ 0.25 psid	0.35 psid
10. Nuclear Service Water Suction Transfer - Low Pit Level	1,2,3,4	3 per pit	Q,R	SR 3.3.2.1 SR 3.3.2.9 SR 3.3.2.11 SR 3.3.2.12	≥ El. 555.4 ft	El. 557.5 ft

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One train inoperable.	C.1 ----------NOTE---------- One train may be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE. ---------- Restore train to OPERABLE status.	24 hours
	OR	
	C.2.1 Be in MODE 3.	30 hours
	AND	
	C.2.2 Be in MODE 5.	60 hours
D. One channel inoperable. *	D.1 ----------NOTE---------- The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. ---------- Place channel in trip.	72 hours
	OR	
	D.2.1 Be in MODE 3.	78 hours
	AND	
	D.2.2 Be in MODE 4.	84 hours

*[For the function Auxiliary Feedwater Loss of Offsite Power proposed changes to this Condition will be evaluated in a future amendment. *The existing Technical Specification requirements for Bypass test time of 4 hours and Required Action D:1 Place channel in trip time of 6 hours and Required Action D.2.1 Be in MODE 3 in 12 hours and Action D.2.2 Be in MODE 4 in 18 hours in remains in effect]*

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. One Containment Pressure channel inoperable.	E.1 ----------NOTE---------- One additional channel may be bypassed for up to 12 hours for surveillance testing. ---------- Place channel in bypass.	72 hours
	OR	
	E.2.1 Be in MODE 3.	78 hours
	AND	
	E.2.2 Be in MODE 4.	84 hours
F. One channel or train inoperable.	F.1 Restore channel or train to OPERABLE status.	48 hours
	OR	
	F.2.1 Be in MODE 3.	54 hours
	AND	
	F.2.2 Be in MODE 4.	60 hours
G. One Steam Line Isolation Manual Initiation - individual channel inoperable.	G.1 Restore channel to OPERABLE status.	48 hours
	OR	
	G.2 Declare associated steam line isolation valve inoperable.	48 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
O. One channel inoperable.	O.1 Verify interlock is in required state for existing unit condition. OR O.2.1 Be in MODE 3. AND O.2.2 Be in MODE 4.	1 hour 7 hours 13 hours
P. One or more Containment Pressure Control System channel(s) inoperable.	P.1 Declare affected supported system inoperable.	Immediately
Q. One Nuclear Service Water Suction Transfer-Low Pit Level channel in one or more pits inoperable.	Q.1 ----------NOTE---------- The inoperable channel may be bypassed for up to 2 hours for surveillance testing of other channels. ---------- Place channel in trip. OR Q.2 Align the Nuclear Service Water System for Standby Nuclear Service Water Pond recirculation. OR Q.3.1 Be in MODE 3. AND Q.3.2 Be in MODE 5.	 4 hours 4 hours 10 hours 40 hours

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Each train consists of one push button and the interconnecting wiring to the actuation logic cabinet. This configuration does not allow testing at power.

b. Safety Injection-Automatic Actuation Logic and Actuation Relays

This LCO requires two trains to be OPERABLE. Actuation logic consists of all circuitry housed within the actuation subsystems, including the initiating relay contacts responsible for actuating the ESF equipment.

Manual and automatic initiation of SI must be OPERABLE in MODES 1, 2, and 3. In these MODES, there is sufficient energy in the primary and secondary systems to warrant automatic initiation of ESF systems. In MODE 4, adequate time is available to manually actuate required components in the event of a DBA, but because of the large number of components actuated on a SI, actuation is simplified by the use of the manual actuation push buttons. Automatic actuation logic and actuation relays must be OPERABLE in MODE 4 to support system level manual initiation.

These Functions are not required to be OPERABLE in MODES 5 and 6 because there is adequate time for the operator to evaluate unit conditions and respond by manually starting individual systems, pumps, and other equipment to mitigate the consequences of an abnormal condition or accident. Unit pressure and temperature are very low and many ESF components are administratively locked out or otherwise prevented from actuating to prevent inadvertent overpressurization of unit systems.

c. Safety Injection-Containment Pressure-High

This signal provides protection against the following accidents:

- SLB inside containment;
- LOCA; and
- Feed line break inside containment.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Containment Pressure-High provides no input to any control functions. Thus, three OPERABLE channels are sufficient to satisfy protective requirements with a two-out-of-three logic.

Containment Pressure-High must be OPERABLE in MODES 1, 2, and 3 when there is sufficient energy in the primary and secondary systems to pressurize the containment following a pipe break. In MODES 4, 5, and 6, there is insufficient energy in the primary or secondary systems to pressurize the containment.

d. Safety Injection-Pressurizer Pressure-Low

This signal provides protection against the following accidents:

- Inadvertent opening of a steam generator (SG) relief or safety valve;
- SLB;
- A spectrum of rod cluster control assembly ejection accidents (rod ejection);
- Inadvertent opening of a pressurizer relief or safety valve;
- LOCAs; and
- SG Tube Rupture.

Pressurizer pressure provides both control and protection functions: input to the Pressurizer Pressure Control System, reactor trip, and SI. Therefore, the actuation logic must be able to withstand both an input failure to control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Thus, four OPERABLE channels are required to satisfy the requirements with a two-out-of-four logic.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

c. Containment Spray-Containment Pressure - High High

This signal provides protection against a LOCA or an SLB inside containment.

This is one of the only Functions that requires the bistable output to energize to perform its required action. It is not desirable to have a loss of power actuate containment spray, since the consequences of an inadvertent actuation of containment spray could be serious. Note that this Function also has the inoperable channel placed in bypass rather than trip to decrease the probability of an inadvertent actuation.

Containment Pressure-High High uses four channels in a two-out-of-four logic configuration. Since containment pressure is not used for control, this arrangement exceeds the minimum redundancy requirements. Additional redundancy is warranted because this Function is energize to trip. Containment Pressure-High High must be OPERABLE in MODES 1, 2, and 3 when there is sufficient energy in the primary and secondary sides to pressurize the containment following a pipe break. In MODES 4, 5, and 6, there is insufficient energy in the primary and secondary sides to pressurize the containment and reach the Containment Pressure-High High setpoints.

3. Containment Isolation

Containment Isolation provides isolation of the containment atmosphere, and all process systems that penetrate containment, from the environment. This Function is necessary to prevent or limit the release of radioactivity to the environment in the event of a large break LOCA.

There are two separate Containment Isolation signals, Phase A and Phase B. Phase A isolation isolates all automatically isolable process lines, except component cooling water (CCW) and nuclear service water system (NSWS), at a relatively low containment pressure indicative of primary or secondary system leaks. For

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

same features and operate in the same manner as described for ESFAS Function 1.b.

b. Auxiliary Feedwater-Steam Generator Water Level-Low Low

SG Water Level-Low Low provides protection against a loss of heat sink. A feed line break, inside or outside of containment, or a loss of MFW, would result in a loss of SG water level. SG Water Level-Low Low provides input to the SG Level Control System. Therefore, the actuation logic must be able to withstand both an input failure to the control system which may then require a protection function actuation and a single failure in the other channels providing the protection function actuation. Thus, four OPERABLE channels are required to satisfy the requirements with two-out-of-four logic. The setpoints are based on percent of narrow range instrument span.

SG Water Level—Low Low in any operating SG will cause the motor driven AFW pumps to start. The system is aligned so that upon a start of the pump, water immediately begins to flow to the SGs. SG Water Level—Low Low in any two operating SGs will cause the turbine driven pumps to start.

c. Auxiliary Feedwater—Safety Injection

An SI signal starts the motor driven AFW pumps. The AFW initiation functions are the same as the requirements for their SI function. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead, Function 1, SI, is referenced for all initiating functions and requirements.

d. Auxiliary Feedwater-Loss of Offsite Power

A loss of offsite power to the service buses will be accompanied by a loss of reactor coolant pumping power and the subsequent need for some method of decay heat removal. The loss of offsite power is detected by a voltage drop on each essential service bus. Loss of power to either essential service bus will start the turbine driven and motor driven AFW pumps to ensure that at least two SGs contain enough water to serve as the heat sink for reactor decay heat and sensible heat removal following the reactor trip.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

decreasing temperature, the P-12 interlock removes the arming signal to the Steam Dump System to prevent an excessive cooldown of the RCS due to a malfunctioning Steam Dump System.

Since T_{avg} is used as an indication of bulk RCS temperature, this Function meets redundancy requirements with one OPERABLE channel in each loop. These channels are used in two-out-of-four logic. This Function must be OPERABLE in MODES 1, 2, and 3 when a secondary side break or stuck open valve could result in the rapid depressurization of the steam lines. This Function does not have to be OPERABLE in MODE 4, 5, or 6 because there is insufficient energy in the secondary side of the unit to have an accident.

9. Containment Pressure Control System Permissives

The Containment Pressure Control System (CPCS) protects the Containment Building from excessive depressurization by preventing inadvertent actuation or continuous operation of the Containment Spray and Containment Air Return Systems when containment pressure is at or less than the CPCS permissive setpoint. The control scheme of CPCS is comprised of eight independent control circuits (4 per train), each having a separate and independent pressure transmitter and current alarm module. Each pressure transmitter monitors the containment pressure and provides input to its respective current alarm. The current alarms are set to inhibit or terminate containment spray and containment air return systems when containment pressure falls to or below 0.25 psid. The alarm modules switch back to the permissive state (allowing the systems to operate) when containment pressure is greater than or equal to 1.0 psid.

This function must be OPERABLE in MODES 1, 2, 3, and 4 when there is sufficient energy in the primary and secondary sides to pressurize containment following a pipe break. In MODES 5 and 6, there is insufficient energy in the primary and secondary sides to significantly pressurize the containment.

10. Nuclear Service Water System Suction Transfer – Low Pit Level

Upon an emergency low pit level signal from either NSWS pit, interlocks isolate the NSWS from Lake Wylie, align NSWS to the standby nuclear service water pond, close particular crossover

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

valves, and start the NSWS pumps. This function is initiated on a two-out-of-three logic from either NSWS pump pit.

This function must be OPERABLE in MODES 1, 2, 3, and 4 to ensure cooling water remains available to essential components during a DBA. In MODES 5 and 6, the sufficient time exists for manual operator action to realign the NSWS pump suction, if required.

Unlike other shared NSWS equipment, the pit level interlocks do not require both normal and emergency power for OPERABILITY. This is because unlike mechanical components such as pumps and valves, the interlocks are designed to fail safe upon a loss of power, initiating a transfer from Lake Wylie to the standby nuclear service water pond. The definition of OPERABILITY, which requires either normal or emergency power, provides sufficient power supply requirements and these interlocks can be considered OPERABLE provided they are powered from either an inverter or regulated power.

The ESFAS instrumentation satisfies Criterion 3 of 10 CFR 50.36 (Ref. 6).

ACTIONS

A Note has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed on Table 3.3.2-1. When the Required Channels in Table 3.3.2-1 are specified (e.g., on a per steam line, per loop, per SG, etc., basis), then the Condition may be entered separately for each steam line, loop, SG, etc., as appropriate.

A channel shall be OPERABLE if the point at which the channel trips is found more conservative than the Allowable Value. In the event a channel's trip setpoint is found less conservative than the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected. If plant conditions warrant, the trip setpoint may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT. If the trip setpoint is found outside of the NOMINAL TRIP SETPOINT calibration tolerance band and non-conservative with respect to the NOMINAL TRIP SETPOINT, the setpoint shall be re-adjusted.

ACTIONS (continued)

D.1, D.2.1, and D.2.2

Condition D applies to:

- Containment Pressure-High;
- Pressurizer Pressure-Low;
- Steam Line Pressure-Low;
- Steam Line Pressure-Negative Rate-High;
- Loss of offsite power (refer to Condition D footnote);
- SG Water level—Low Low; and
- SG Water level—High High (P-14) for the Feedwater Isolation Function.

If one channel is inoperable, 72 hours are allowed to restore the channel to OPERABLE status or to place it in the tripped condition. Generally this Condition applies to functions that operate on two-out-of-three logic. Therefore, failure of one channel places the Function in a two-out-of-two configuration. One channel must be tripped to place the Function in a one-out-of-two configuration that satisfies redundancy requirements. The 72 hours allowed to restore the channel to OPERABLE status or to place it in the tripped condition is justified in Reference 13.

Failure to restore the inoperable channel to OPERABLE status or place it in the tripped condition within 72 hours requires the unit be placed in MODE 3 within the following 6 hours and MODE 4 within the next 6 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems. In MODE 4, these Functions are no longer required OPERABLE.

The Required Actions are modified by a Note that allows the inoperable channel to be bypassed for up to 12 hours for surveillance testing of other channels. The 12 hours allowed for testing is justified in Reference 13.

ACTIONS (continued)

E.1, E.2.1, and E.2.2

Condition E applies to:

- Containment Spray Containment Pressure-High High;
- Containment Phase B Isolation Containment Pressure-High High; and
- Steam Line Isolation Containment Pressure - High High.

None of these signals has input to a control function. Thus, two-out-of-three logic is necessary to meet acceptable protective requirements. However, a two-out-of-three design would require tripping a failed channel. This is undesirable because a single failure would then cause spurious containment spray initiation. Spurious spray actuation is undesirable because of the cleanup problems presented. Therefore, these channels are designed with two-out-of-four logic so that a failed channel may be bypassed rather than tripped. Note that one channel may be bypassed and still satisfy the single failure criterion. Furthermore, with one channel bypassed, a single instrumentation channel failure will not spuriously initiate containment spray.

To avoid the inadvertent actuation of containment spray and Phase B containment isolation, the inoperable channel should not be placed in the tripped condition. Instead it is bypassed. Restoring the channel to OPERABLE status, or placing the inoperable channel in the bypass condition within 72 hours, is sufficient to assure that the Function remains OPERABLE and minimizes the time that the Function may be in a partial trip condition (assuming the inoperable channel has failed high). The Completion Time is further justified based on the low probability of an event occurring during this interval. Failure to restore the inoperable channel to OPERABLE status, or place it in the bypassed condition within 72 hours, requires the unit be placed in MODE 3 within the following 6 hours and MODE 4 within the next 6 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems. In MODE 4, these Functions are no longer required OPERABLE.

The Required Actions are modified by a Note that allows one additional channel to be bypassed for up to 12 hours for surveillance testing. Placing a second channel in the bypass condition for up to 12 hours for testing purposes is acceptable based on the results of Reference 13.

ACTIONS (continued)

Q.1, Q.2, Q.3.1, and Q.3.2

With one channel of NSWS Suction Transfer - Low Pit Level inoperable in one or more NSWS pits, 4 hours are allowed to place it in the tripped condition or align the NSWS to the Standby NSWS Pond. The failure of one channel places the Function in a two-out-of-two configuration. The failed channel must either be tripped to place the Function in a one-out-of-two configuration that satisfies redundancy requirements, or the NSWS realigned to fulfill the safety function.

Failure to place the channel in the tripped condition or to realign the NSWS suction and discharge within 4 hours requires the unit be placed in MODE 3 within the following 6 hours and MODE 5 within the next 30 hours.

The requirement to align the NSWS to the Standby NSWS Pond only applies to OPERABLE trains of the system.

The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems. In MODE 5, this Function is no longer required OPERABLE.

R.1, R.2.1, and R.2.2

With two or more channels of NSWS Suction Transfer - Low Pit Level inoperable in one or more pits, the NSWS must be aligned to the Standby NSWS Pond within 4 hours. Failure to accomplish the realignment within 4 hours requires the unit be placed in MODE 3 within the following 6 hours and MODE 5 within the next 30 hours.

The requirement to align the NSWS to the Standby NSWS Pond only applies to OPERABLE trains of the system.

The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems. In MODE 5, this Function is no longer required OPERABLE.

88.
SYS022 2.4.11
Containment Cooling System (CCS)
Knowledge of abnormal condition procedures.

NEW
Given the following Unit 1 conditions:

At 1000
- The Unit was at 100% power.
- A Zone A and Zone B lockout occurs.
- The CRS has implemented AP/07, (Loss of Normal Power).

At 1010
- The crew performs Step 13 of AP/07, and notes that that the "YV Operable" light is NOT lit.

Which ONE of the following describes;

(1) the present status of the "YV Isolated" and the "RN Operable" lights,

AND

(2) what action is required which will maintain containment cooling for these conditions, per AP/07?

A. (1) LIT.
(2) Ensure at least two (2) RN pumps operating.

B. (1) LIT.
(2) Return YV to normal operation.

C. (1) DARK.
(2) Ensure at least two (2) RN pumps operating.

D. (1) DARK.
(2) Return YV to normal operation.

Ans: A

References:
AP/07, (Loss of Normal Power), Case I, Step 13, Rev. 59
1AD-19, B/11, VV CONT AUX CHARCOAL FILT A HI TEMP,
1AD-19, B/12, LOWER CONT PRESS 0.5 PSIG INITIATE HI SPEED,
OP/1/A/6450/001, (Containment Ventilation System)
OP/1/A/6450/020, (Containment Chilled Water System)

Distractor Analysis

A. **CORRECT.** For the given conditions, AP/07, Case I "Loss of Normal Power to an Essential Train is implemented. The RNO for Step 13, ensures two RN pumps in service. Per the abnormal procedure (NOTE just prior to Step 13, on page 8 of 154), there is a five minute time delay after the loss of offsite power and the automatic swapover from YV (Chilled Water) to RN (Nuclear Service Water). Five minutes after the loss of offsite power occurs, YV transfers to RN, the YV isolated light will be lit, and RN operable light will be lit. In the same RNO column for Step 13, instructions are given to ensure at least two RN pumps are in service.

B. Incorrect. Plausible, since the light response is correct. Returning YV to normal operation is plausible, if the applicant misapplies the RNO for SP/07, Step 13; i.e., believing that offsite power is restored. With that misconception, realigning YV to normal operation would be correct.

C. Incorrect. Plausible, since Part 2 is correct. The status of the YV Isolated and RN Operable lights as DARK is plausible, if applicant believes the conditions involve a manual transfer, instead of automatic. In certain cases, this is true, depending on switch position; e.g., if the YV/RN switch on MC7R was in LOCAL, a manual transfer would be needed. However, in this case, a normal alignment is involved. If a manual alignment is performed, the YV Isolated and RN Operable lights would be DARK until manual transfer is complete.

D. Incorrect. The status of the YV Isolated and RN Operable lights as DARK is plausible, if applicant believes the conditions involve a manual transfer, instead of automatic. In certain cases, this is true, depending on switch position; e.g., if the YV/RN switch on MC7R was in LOCAL, a manual transfer would be needed. However, in this case, a normal alignment is involved. If a manual alignment is performed, the YV Isolated and RN Operable lights would be DARK until manual transfer is complete.

Returning YV to normal operation is plausible, if the applicant misapplies the RNO for SP/07, Step 13; i.e., believing that offsite power is restored. With that misconception, realigning YV to normal operation would be correct.

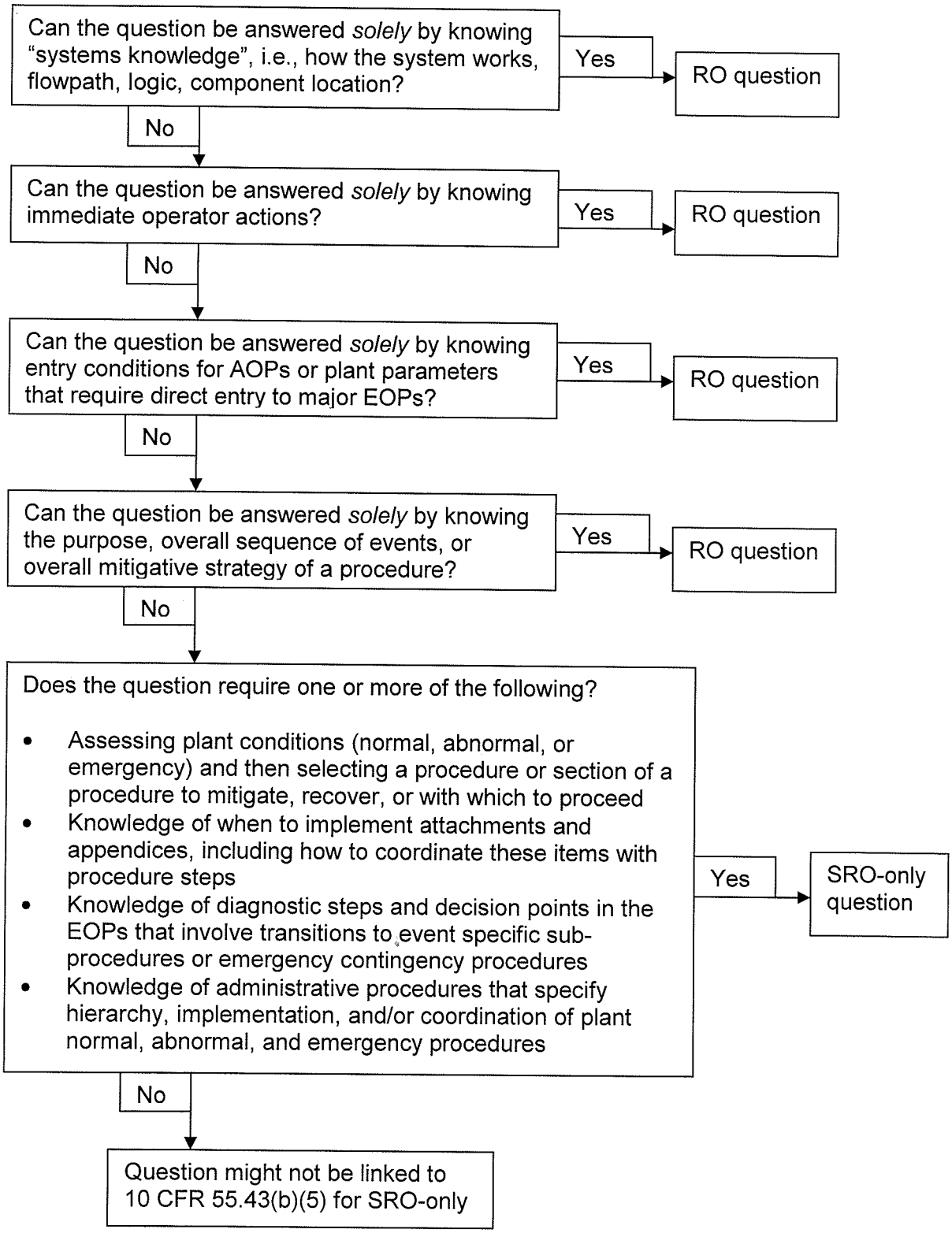
K/A Match
The K/A is matched because the question involves a plant condition (Loss of Normal Power) which affects the Containment Cooling System (YV and RN provide cooling water). The applicant is tested on knowledge of the abnormal procedure for the loss of power, and how the actions of that procedure are used to restore the containment cooling system.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):

1.) The question canNOT be answered solely by knowing systems knowledge.
3.) The question canNOT be answered solely by knowing entry conditions for AOPs.
4.) The question canNOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.
5.) The question does require the applicant to recall procedure detailed content from AP/07 and select which actions to use for achieving a desired result (mitigative actions to restore containment cooling water).

Cognitive Level - High
This is a high cognitive level question because it requires more than one mental step to arrive at the correct answer. The applicant must evaluate a given set of conditions, recall the function of electrical lockout functions, and apply that knowledge to conclude the effect on plant components. Once that determination is made, the applicant must then recall detailed content from a procedure and apply that to make a decision on which action will achieve the desire results.

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)



ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE There is a five minute time delay for the automatic swapover from YV to RN.

__ 13. **Verify "YV OPERABLE" light - LIT.** → **Perform the following:**

a. Ensure YV swap to RN as follows:

__ • "YV/RN AUTO SWAP RESET" light - DARK

__ • "YV ISOLATED" light - LIT

__ • "RN OPERABLE" light - LIT

__ • "RN ISOLATED" light - DARK.

__ b. **WHEN** YV swap to RN is complete, **THEN** ensure at least two RN pumps in service. **REFER TO** OP/0/A/6400/006C (Nuclear Service Water System). RIGHT ANSWER

__ c. **WHEN** offsite power is restored, **THEN** realign YV to normal operation. **REFER TO** OP/1/A/6450/020 (Containment Chilled Water System). DISTRACTOR

	Objective	ISS	NLO	LPRO	LPSO	PTRQ
14	Explain the purpose of the YV system and basic operation of the system. • Purpose • Normal Alignment • Flow Path • Control switch alignments & parameters required for auto swap. • Parameters required for YV operable status.	X	X	X	X	X
15	Explain the purpose of the VZ system and basic operation of the system. • Purpose • Normal Alignment • Describe how temperature is controlled.	X	X	X	X	
16	Given appropriate plant conditions, apply limits and precautions associated with related station procedures.	X	X	X	X	X
17	Be able to perform the following associated with a Loss of RN per AP/0/A/5500/020. • State the basic actions required of an NLO • Explain the symptoms. • Discuss the supplementary actions.	X	X	X X X	X X X	X X X
18	Explain what indications for the RN system are available in the control room and what the operator should expect to see on these indications during normal operation.			X	X	
19	Given a set of specific plant conditions and access to reference materials, determine the actions necessary to comply with Tech Specs/SLCs.			X	X	X
20	State the basis and required time for the RN system "mission time".			X	X	X

pressure condition would result causing a safety injection. (This is why RN is not isolated to the non-essential header following a blackout). (Obj. #12). The following are the components on the non-essential header:

1) Auxiliary Building Supply Vent Units (2 per Unit)
   (a) Auxiliary Building Fuel Handling Rad Area Header Supply and Return Isolation Valves (1 & 2RN839A and 841B) These valves are normally open, but are closed upon a "S_s" signal (LOCA unit only).
2) Upper Containment Vent Units (4 per Unit)
3) Lower Containment Vent Units (4 per Unit)
4) Incore Instrumentation Room Vent Units (2 per Unit)
5) Reactor Coolant Pump Motor Coolers (4 per Unit)

   The cooling water throttle valves on all the equipment in containment cooled by YV normally, will fail open on loss of power (i.e. unit 120VAC power) or loss of air.

The non-essential supplies YV to all the loads in containment, and to VA.

4. YV Containment Chilled Water System

Purpose is to supply chilled water to equipment in containment, to the VA supply units, and to the VF supply units. (Obj. #14)

a) YV is located in a separate mechanical equipment building in the yard. It is not safety related and does not receive power during a loss of station power or a LOCA condition. During a loss of station power, cooling is provided by the RN system.

b) Consists of:
   1) 3 50% capacity double suction chilled water pumps (Powered from MXI, MXE, and MXL)
   2) 3 50% capacity water chillers (Powered from 6.9 KV buses)
   3) 2 compression tanks
      (a) 240 gallons capacity each
   4) Piping and valves necessary to allow chilled water to service containment cooling.

c) Valves RNCO2 and RNCO3 are normally open providing YV supply and return flow path respectively, with RNA83 and RNC04 normally closed to isolate the chilled water system from RN. When swapover to RN occurs, RNC02 and C03 will close and RNA83 and RNC04 will open, aligning RN to supply the non-essential header and isolating YV.
   1) A 3 Position switch "YV/RN Cool Water Mode", in the Control Room controls the above 4 valves (The "YV/RN Cool Water Ctrl" switch must be selected to "CTRL-RM").

(a) In the "YV" position, chilled water will be supplied to the YV loads with no time delay.

(b) In "RN" position, the RN supply and return valves open and the YV supply and return valves close with no time delay to allow RN to containment.

(c) In "Auto", if an undervoltage is actuated, the RN supply and return valves to containment will open, and YV valves close (1(2) RNA83,CO4 open; 1(2) RNCO2, CO3 close) (This will occur after a 5 minute time delay).

(1) Loss of two or more of the YV MCCs (i.e.MXI, MXE, MXL) will cause the above to occur.

(d) The "YV operable" light will be lit if the following exists.

- YV supply and return valves open
- YV supply temperature less than 54°F
- YV supply pressure greater than 40 psig

(e) The "RN operable" light will be lit if the RN supply and return valve are open.

(f) The RN and YV isolated lights will light if their respective supply and return valves are closed.

d) A two-position "YV/RN Cool Water Ctrl", switch in the control room allows selection of where the supply and return valves are controlled.

1) CTRL-RM - Control Room Control (Must be in this position for Auto Swap to RN on undervoltage as described above to occur).

2) Local - Containment Mechanical Equipment Building Control (Will block Auto Swap to RN if in this position).

e) A bleed line to WC is provided for system cleanup.

1) This would be necessary if swap to RN is made.

f) Auto makeup is supplied by YM.

g) Auto Swap reset.

1) The swap in auto may be prevented if prior to 5 minute timer completion:

(a) Power is restored to MCC's and Auto swap reset PB is depressed.

(b) or, the "YV/RN Cool Water Mode" switch can be taken to the "YV" position.

(c) or, the "YV/RN Cool Water Ctrl" switch can be taken to "local".

2) To return to YV following an auto swap to RN, a procedure enclosure directs the return.

(a) The only control manipulation necessary is to depress the Auto Swap reset PB to realign the valves to YV.

89.
SYS064 2.4.1
Emergency Diesel Generator (ED/G) System
Knowledge of EOP entry conditions and immediate action steps.

NEW
Given the following Unit 1 conditions:

- The Unit is operating at 100% power.
- A loss of all off-site power occurs.
- The reactor tripped.
- The undervoltage status lights for 1ETA and 1ETB are LIT.
- 1A D/G failed to automatically start.
- 1B D/G automatically started but the output breaker has NOT closed.
- The crew enters E-0, (Reactor Trip or Safety Injection) and begins performing the Immediate Actions.

Based on the conditions above, the SRO is directed to GO TO a different procedure ____(1)____ completing all E-0 Immediate Actions, and will implement a contingency procedure which contains direction to FIRST _____(2)_____.

A. (1) prior to
(2) initiate automatic load sequencing for 1ETB by manually initiating SI.

B. (1) prior to
(2) attempt a manual start of 1A D/G from the Control Room.

C. (1) immediately after
(2) attempt a manual start of 1A D/G from the Control Room.

D. (1) immediately after
(2) initiate automatic load sequencing for 1ETB by manually initiating SI.

Ans: B

References:
E-0, (Reactor Trip or Safety Injection), Steps 1 through 6, Rev. 36
ECA-0.0, (Loss of All AC Power), Rev. 38
AP/1/A/5500/07, (Loss of Normal Power), Rev. 59

Distractor Analysis

A. Incorrect. Plausible, the first part of the distractor is correct. The second part is plausible, since 1B D/G IS running, but not loaded. Manually initiating S/I potentially could start the load sequencer, however, there is specific guidance in the EPAP Background Document against using this method of initiating load sequencing and it has been deemed as an unreliable method. Manually initiating S/I is to be used only for STARTING a D/G, not for loading it.

B. **CORRECT.** There are four Immediate Actions in E-0, Reactor Trip or Safety Injection. For the given conditions, the SRO is first directed to GO TO another procedure (ECA-0.0, Loss of All AC Power) at the third immediate action, which is to verify the two safety busses are energized (1ETA and 1ETB). Since neither of the busses are energized, the SRO will stop performance of E-0, and go to the ECA. Step 7 of ECA-0.0 contains direction on how to get at least one D/G started and loaded, so that at least one safety bus will have power. Until this action occurs, continuance in E-0 will not be effective. The methods prescribed on how to accomplish this are: attempt starting both D/Gs from the control room; if that is not effective, then initiate both trains of SI for the purpose of getting the D/Gs started. This bypasses the normal start interlocks for the D/Gs.

   This step also contains instructions that if at least one D/G IS running, but not loaded, to attempt to energize the sequencer by ensuring the normal and alternate feeder breakers for the bus are open.

C. Incorrect. It is plausible that all Immediate Actions of the reactor trip procedure would be completed prior to implementing other procedures, since they are immediate actions, implying that they must all be completed first. However, the last immediate action in this procedure is to verify S/I is actuated and contains actions which will not be effective UNTIL power is restored to at least one safety bus. The second half of this distractor is also plausible, since it contains actions for local starting and loading of D/Gs for re-energizing 1ETA and 1ETB, the safety busses. Since the stem of the question contains similar conditions, it is plausible that the Enclosure 10 of AP/07, Loss of Normal Power would be used to re-energize at least one safety bus.

D. Incorrect. Plausible, since 1B D/G IS running, but not loaded. Manually initiating S/I potentially could start the load sequencer, however, there is specific guidance in the EPAP Background Document against using this method of initiating load sequencing and it has been deemed as an unreliable method. Manually initiating S/I is to be used only for STARTING a D/G, not for loading it.

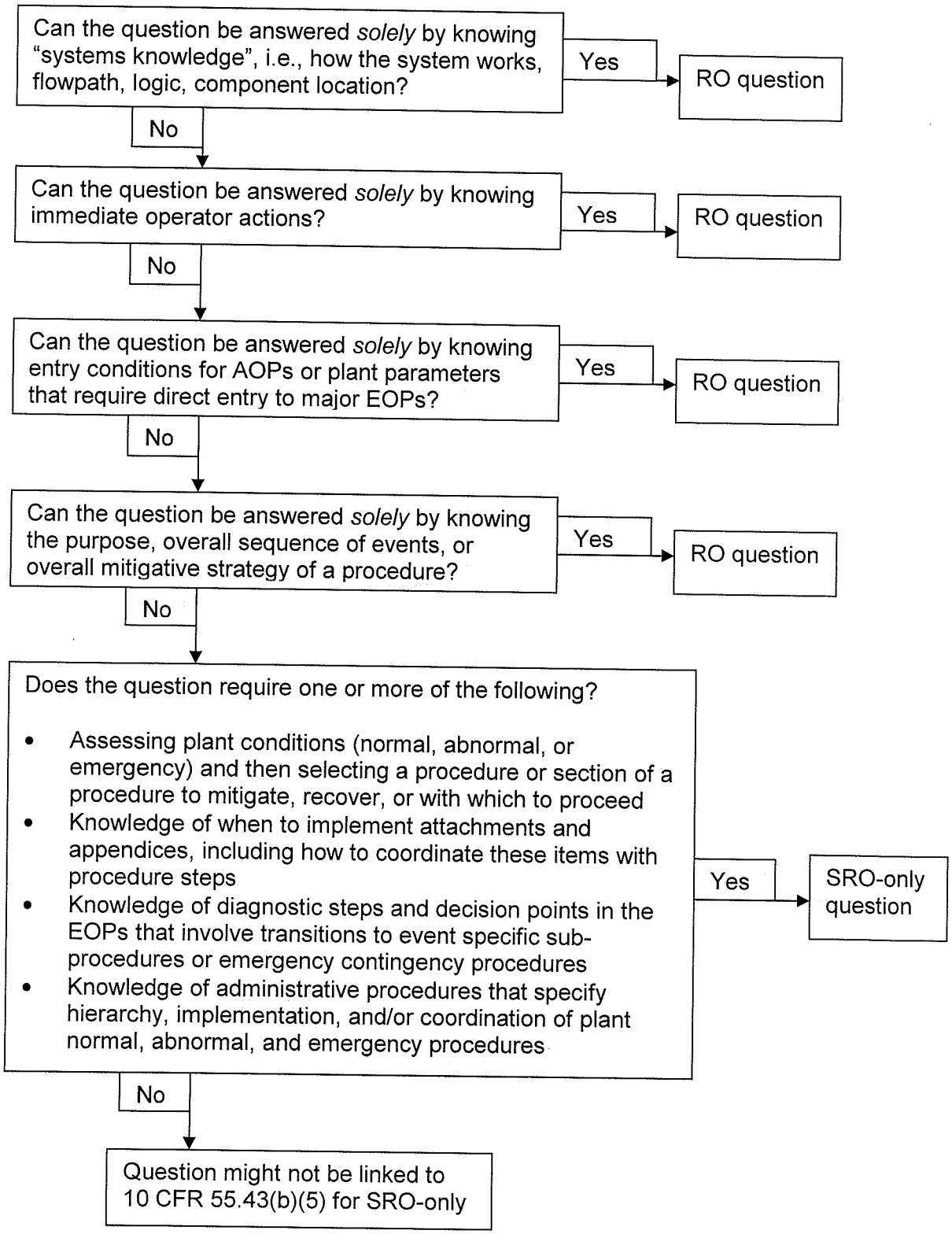
K/A Match
The K/A is matched because the applicant is tested on plant conditions which involve E-0 entry conditions, and on the immediate action steps.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):

1) The question can NOT be answered by knowing systems knowledge alone.
4) The question can NOT be answered by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure. The applicant must assess overall plant conditions involving a loss of all offsite power, and then apply detailed knowledge of procedure content for determining how to implement the procedure, in the context of where the actions occur in relation to E-0 immediate actions, and then make a selection of a contingency procedure for continuing mitigation of the event.

Cognitive Level - High
This is a high cognitive level question because it involves a level of analysis of plant conditions, detailed knowledge of procedures, knowledge of load sequencing and D/G operation, and then to synthesize this information to arrive at a decision of which contingency procedure to implement.

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)



ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **Monitor Enclosure 1 (Foldout Page).**

(2.) **Verify Reactor Trip:**

__ • All rod bottom lights - LIT

__ • All reactor trip and bypass breakers - OPEN

__ • I/R amps - DECREASING.

Perform the following:

__ a. Manually trip reactor.

b. **IF** reactor will not trip, **THEN** concurrently:

__ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).

__ • **GO TO** EP/1/A/5000/FR-S.1 (Response To Nuclear Power Generation/ATWS).

(3.) **Verify Turbine Trip:**

__ • All turbine stop valves - CLOSED

Perform the following:

__ a. Manually trip the turbine.

b. **IF** turbine will not trip, **THEN**:

__ 1) Depress the "MANUAL" pushbutton on the turbine control panel.

__ 2) Rapidly unload turbine by simultaneously depressing the "CONTROL VALVE LOWER" and "FAST RATE" pushbuttons.

3) **IF** turbine will not runback, **THEN** close:

__ • All MSIVs
__ • All MSIV bypass valves.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 4. **Verify 1ETA and 1ETB - ENERGIZED.**

Perform the following:

CREW WILL LEAVE E-0 PRIOR TO COMPLETION OF ALL IMMEDIATE ACTIONS.

__ a. **IF** 1ETA **AND** 1ETB are de-energized, **THEN GO TO** EP/1/A/5000/ECA-0.0 (Loss Of All AC Power).

__ b. **WHEN** time allows, **THEN** attempt to restore power to de-energized switchgear while continuing with this procedure. **REFER TO** AP/1/A/5500/007 (Loss of Normal Power).

5. **Verify S/I is actuated:**

__ a. "SAFETY INJECTION ACTUATED" status light (1SI-13) - LIT.

a. Perform the following:

1) Verify conditions requiring S/I:

__ • Pzr pressure - LESS THAN 1845 PSIG

OR

__ • Containment pressure - GREATER THAN 1.2 PSIG.

__ 2) **IF** S/I is required, **THEN** manually initiate S/I.

3) **IF** S/I is not required, **THEN** concurrently:

__ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).

__ • **GO TO** EP/1/A/5000/ES-0.1 (Reactor Trip Response).

__ b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.

__ b. Manually initiate S/I.

__ 6. **Announce "Unit 1 Safety Injection".**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. **Attempt to restore power to 1ETA or 1ETB as follows:**

__ a. Start both D/Gs from control room.
MANUAL START IS ATTEMPTED FIRST.

a. Perform the following:

__ 1) Initiate both trains S/I.

__ 2) **IF** no D/G can be started, **THEN GO TO** Step 8.

__ b. Verify at least one D/G load sequencer - AUTOMATICALLY LOADING BUS.

b. Perform the following for affected train(s):

- 1ETA:

1) **IF** 1ETA is de-energized, **THEN** perform the following:

a) Ensure the following breakers - OPEN:

__ • "ETA NORM FDR FRM ATC"
__ • "ETA ALT FDR FRM SATA".

b) **IF** 1ETA is still de-energized, **THEN** perform the following:

__ (1) **IF** D/G 1A running, **THEN** depress and hold the D/G "OFF" pushbutton.

__ (2) Dispatch operator to open 1EDE-F01F (Diesel Generator Load Sequencer Panel 1DGLSA) (AB-577, BB-46, Rm 496).

__ (3) **WHEN** 1EDE-F01F is open, **THEN** ensure D/G "OFF" pushbutton released.

(RNO continued on next page)

90.
SYS073 A2.01
Process Radiation Monitoring (PRM) System
Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Erratic or failed power supply

NEW
Given the following Unit 1 conditions:

- The Unit is at 100% power.
- Fuel shuffles are in progress in the Spent Fuel Pool.
- The gas sample pump for EMF-42A, Fuel Bldg. Ventilation Monitor, loses power.

Which ONE of the following describes:

(1) per Tech. Specs., whether fuel moves may continue (YES or NO);

AND

(2) which procedure will the SRO use for directing an operator on checking the status of the individual power supply breaker for the gas sample pump?

A. (1) YES
(2) OP/1/B/6100/010Y, (Annunciator Response for 1RAD-2), E/3, 1EMF 42 FUEL BLDG VENT LOSS OF FLOW

B. (1) NO
(2) OP/1/B/6100/010Y, (Annunciator Response for 1RAD-2), E/3, 1EMF 42 FUEL BLDG VENT LOSS OF FLOW

C. (1) YES
(2) OP/1/A/6350/001, (Normal Power Checklist)

D. (1) NO
(2) OP/1/A/6350/001, (Normal Power Checklist)

Ans: A

References:
OP/1/B/6100/010Y, (Annunciator Response for 1RAD-2), B/1 and E/3, Rev. 41
OP/1/A/6350/001, (Normal Power Checklist), Rev. 68, Enclosure 4.18, page 3 of 10, and Enclosure 4.5, page 2 of 7.
SLC 16.7-10, (Radiation Monitoring for Plant Operations), Rev. 2
T.S. 3.7.13, (Fuel Handling Ventilation Exhaust System)

Distractor Analysis

A. **CORRECT.** There are no conditions given which would require stopping fuel moves. The Annunciator Response Procedure used for the gas sample pump losing power is as listed. It contains guidance referring the SRO to Selected Licensee Commitment (SLC) 16.7-10, Radiation Monitoring for Plant Operations. This SLC does contain guidance requiring fuel moves to be stopped if the EMF-42 monitor is non-functional. Condition F applies, and is an OR statement; i.e., fuel movement must be stopped OR verify that the requirements of Technical Specification 3.7.13, Fuel Handling Ventilation Exhaust System are met. Since these requirements ARE met (based on the conditions in the stem of the question; i.e., 3.7.13 applies for recently irradiated fuel, and there are no conditions given in the stem indicating any additional component inoperability), fuel movement may continue.

B. Incorrect. Plausible, since the procedure is correct. Stopping fuel moves is plausible, if applicant confuses a required action for an actual high radiation condition, versus, the condition in the stem of the question, which is a loss of power to the monitor's sample pump.

C. Incorrect. Plausible, since Part 1 (continuing fuel moves) is correct. The use of OP/1/A/6350/001, (Normal Power Checklist), is plausible because the procedure contains significant detail of locations, including breaker numbers and compartment designations, for power supply lineups for various plant equipment. It also contains this type of guidance for a number of radiation monitors; e.g., EMF57 and 58 in Enclosure 4.18, page 3 of 10, and 1EMF 38/39 in Enclosure 4.5, page 2 of 7.

D. Incorrect. Stopping fuel moves is plausible, if applicant confuses a required action for an actual high radiation condition, versus, the condition in the stem of the question, which is a loss of power to the monitor's sample pump. See explanation of plausibility for Normal Power Checklist in "C" analysis above.

K/A Match
This K/A is matched because the question involves conditions for a failed power supply on the Process Radiation Monitoring System - a gas sample pump on the radiation monitor for the Fuel Building Ventilation system. The applicant must determine the impact of this failure on the radiation monitor, and how that affects allowing fuel shuffles to continue in the Spent Fuel Pool. The "impact on the PRM system" aspect is met as follows: the applicant must determine that the failed power supply of the gas sample pump DOES render the Process Radiation Monitor non-functional, and then interpret the significance of that fact in relation to Selected Licensee Commitments to decide if fuel moves may continue.

Once this determination is made, the applicant is tested on selection of a procedure which is used to diagnose and restore the power to the radiation monitor's gas sample pump.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):
1.) The question canNOT be answered solely by knowing systems knowledge.
2.) The question canNOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question also meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(2) (Tech Specs):
1.) It canNOT be answered solely by knowing $\leq$ 1 hour Tech. Specs.
2.) It canNOT be answered solely by knowing the LCO/SLC information listed above-the-line.
4.) The question requires the applicant to have detailed knowledge of Tech. Spec. 3.7.13, Fuel Handling Ventilation Exhaust System, for ventilation requirements during fuel moves, and then compare plant conditions with the detailed requirements of the specification, and determine which, if any, actions are required (continuing fuel moves).

Cognitive Level - High
This is a high cognitive level question because it requires analysis of plant conditions to determine if Tech. Spec. requirements are met, and to make a prediction on the effect that these conditions have on the process radiation monitoring system.

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)

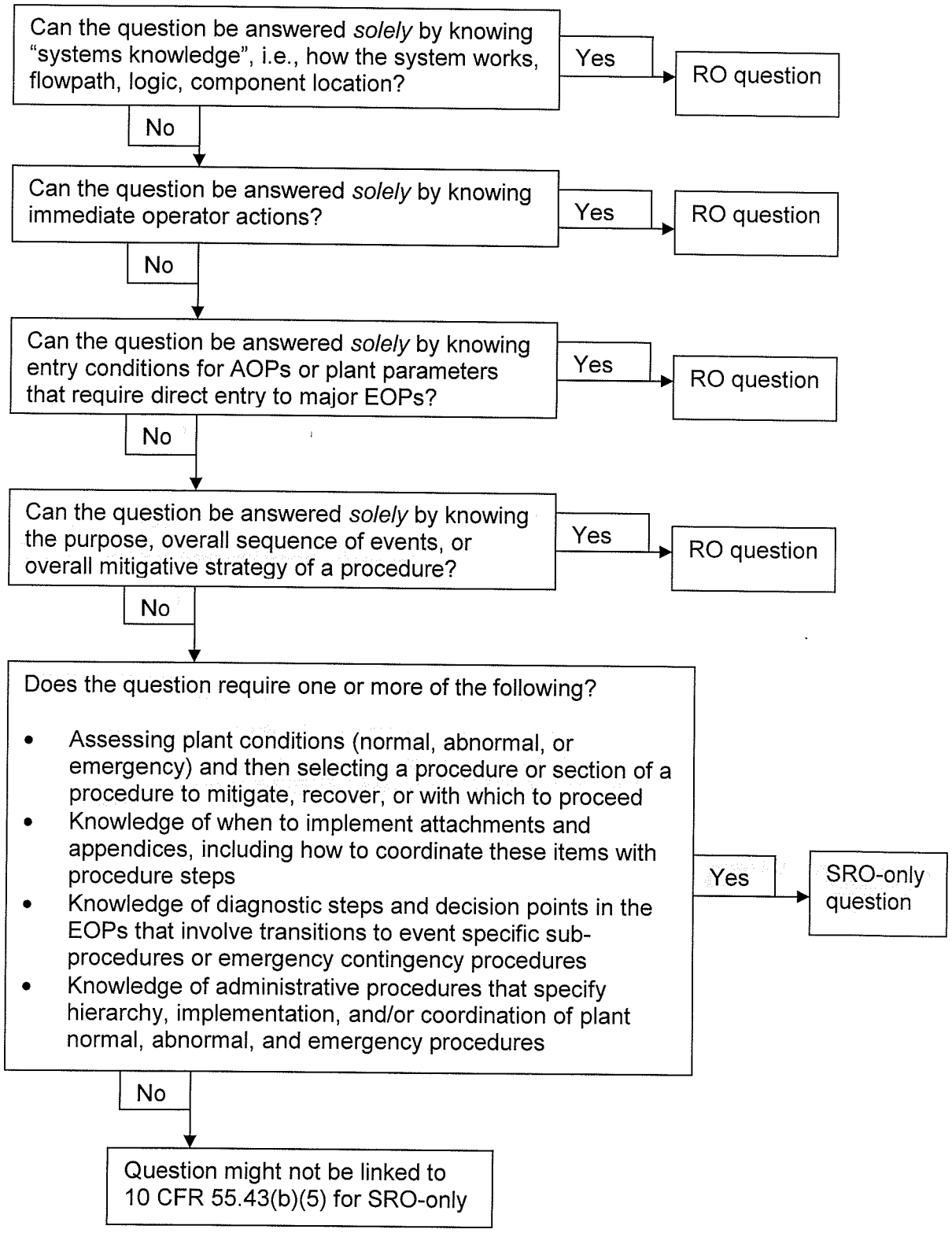
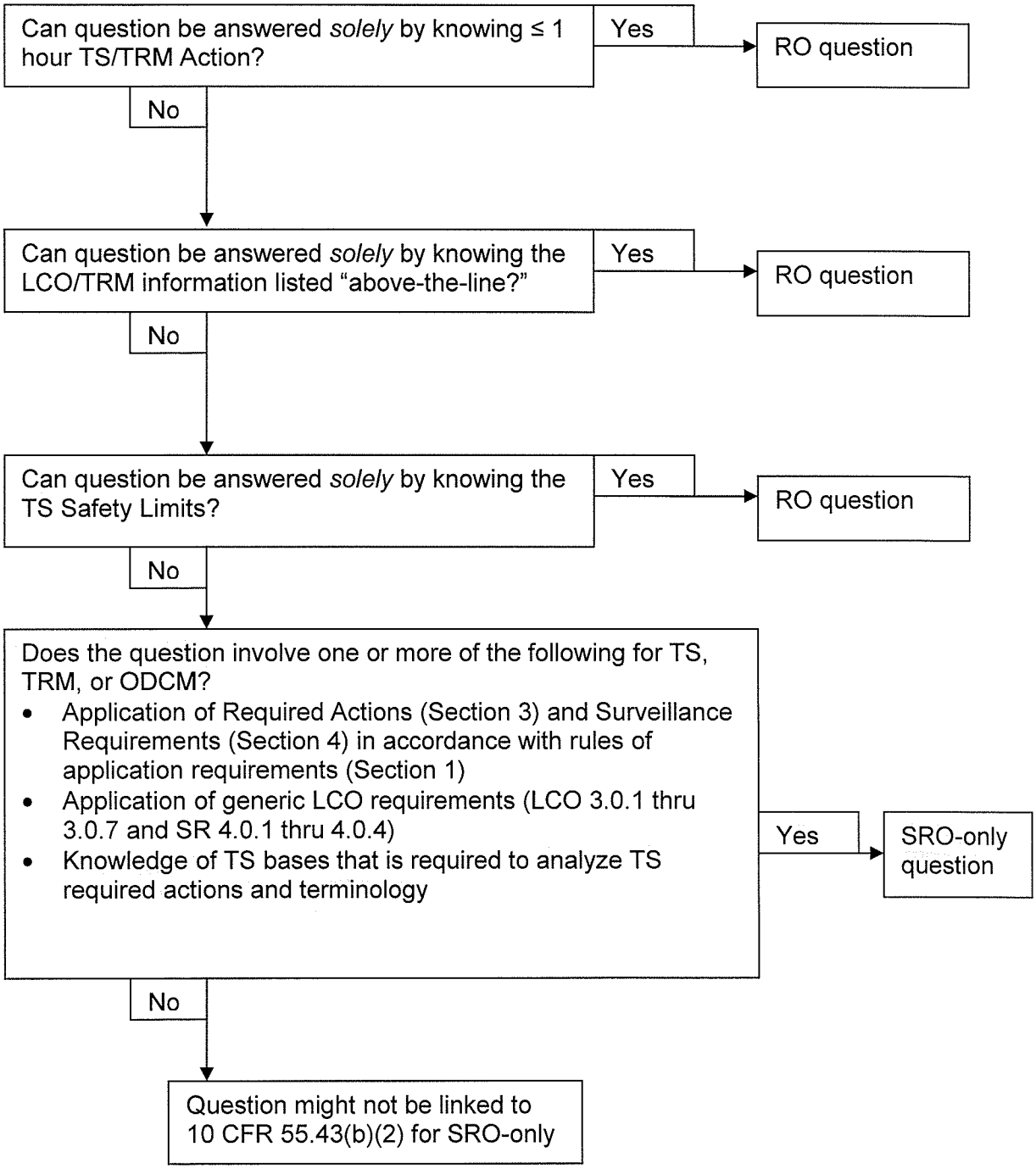


Figure 1: Screening for SRO-only linked to 10 CFR 55.43(b)(2) (Tech Specs)



PANEL: 1RAD-2

1EMF 42 FUEL BLDG VENT LOSS OF FLOW

E/3

SETPOINT: 1 scfm

ORIGIN: 1EMF-42 sample flow switch

PROBABLE CAUSE:
1. Line blockage upstream or downstream
2. Pump/motor fault
3. Pipe leak upstream of the flow switch

AUTOMATIC ACTIONS: The gas sample pump trips

IMMEDIATE ACTIONS: Verify the automatic action occurs.

SUPPLEMENTARY ACTIONS:
1. Verify 1MXX-F05G (Fuel Bldg Vent Rad Mon 1EMF-42 Sample Pump Motor) (TB-594, 1L-34) closed.
2. **IF** the cause of the alarm **CANNOT** be determined **AND** corrected, perform the following:
   2.1 Notify Radiation Protection personnel of this alarm.
   2.2 Issue a work request to initiate corrective action.
3. **WHEN** condition causing alarm has been corrected, restart the gas sample pump motor.
4. Refer to SLC 16.7-10.
5. During accident conditions, have the Operations TSC representative notify the RP Dose Assessment Coordinator of this alarm.

REFERENCES:
1. CNM-1346.05-33
2. NSM CN-60056

Table 16.7-10-1

Radiation Monitoring Instrumentation for Plant Operations

MONITOR	APPLICABLE MODES	REQUIRED CHANNELS	ALARM/TRIP SETPOINT	TESTING REQUIREMENTS
1. Containment Atmosphere – High Gaseous Radioactivity (EMF-39 – Low Range)	At all times	1	Note (a)	TR 16.7-10-1 TR 16.7-10-2 TR 16.7-10-3
2. Fuel Storage Pool Areas – High Gaseous Radioactivity (EMF-42)	With irradiated fuel in the fuel storage pool areas	1	$\leq 1.7 \times 10^{-4}$ µCi/ml	TR 16.7-10-1 TR 16.7-10-2 TR 16.7-10-3
3. Fuel Storage Pool Areas – Criticality – Radiation Level (Fuel Bridge – 1EMF-15, 2EMF-4)	With fuel in the fuel storage pool areas	1	$\leq$ 15 mR/h	TR 16.7-10-1 TR 16.7-10-2 TR 16.7-10-3
4. Control Room Air Intake – Radiation Level – High Gaseous Radioactivity (EMF-43A & B – Low Range)	At all times	2 (1/intake)	$\leq 1.7 \times 10^{-4}$ µCi/ml	TR 16.7-10-1 TR 16.7-10-2 TR 16.7-10-3
5. Auxiliary Building Ventilation – High Gaseous Radioactivity (EMF-41)	1, 2, 3, 4	1	$\leq 1.7 \times 10^{-4}$ µCi/ml	TR 16.7-10-1 TR 16.7-10-2 TR 16.7-10-3
6. Component Cooling Water System (EMF-46A & B)	At all times	1[(b)]	$\leq 1 \times 10^{-3}$ µCi/ml	TR 16.7-10-1 TR 16.7-10-2 TR 16.7-10-3
7. N-16 Leakage Monitor (EMF-71, 72, 73, & 74)	1 (40-100% reactor power)	4 (1/steamline)	Note (c)	TR 16.7-10-1 TR 16.7-10-2 TR 16.7-10-3
8. Condenser Evacuation System Noble Gas Activity Monitor (EMF-33)	When air ejectors are in operation (apply Required Action J.3 when air ejectors are not in operation)	1	Note (c)	TR 16.7-10-1 TR 16.7-10-2 TR 16.7-10-3

REMEDIAL ACTIONS (continued)

CONDITION		REQUIRED ACTION		COMPLETION TIME
F.	One Fuel Storage Pool Area – High Gaseous Radioactivity (EMF-42) channel non-functional.	F.1	Verify the requirements in Technical Specification 3.7.13, Fuel Handling Ventilation Exhaust System (FHVES), are met.	Immediately
		OR		
		F.2	Suspend all operations involving fuel movement in the fuel building.	Immediately
G.	One Auxiliary Building Ventilation – High Gaseous Radioactivity (EMF-41) channel non-functional.	G.1	Ensure one Auxiliary Building Filtered Ventilation Exhaust System (ABFVES) train is OPERABLE and in operation.	Immediately
H.	One Component Cooling Water System (EMF-46A & B) channel non-functional.	H.1	Collect and analyze grab samples for principal gamma emitters (listed in Table 16.11-1-1, NOTE 3) at a lower limit of detection of no more than $5x10^{-7}$ μCi/ml.	Once per 12 hours
		AND		
		H.2	Restore non-functional channel to FUNCTIONAL status.	30 days

(continued)

3.7 PLANT SYSTEMS

3.7.13 Fuel Handling Ventilation Exhaust System (FHVES)

LCO 3.7.13 Two FHVES trains shall be OPERABLE and one train in operation.

APPLICABILITY: During movement of recently irradiated fuel assemblies in the fuel building.

THERE ARE NO MOVEMENT OF RECENTLY IRRADIATED FUEL.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more FHVES trains inoperable.	----------NOTE---------- LCO 3.0.3 is not applicable. ---------- A.1 Suspend movement of recently irradiated fuel assemblies in the fuel building.	Immediately
B. Required FHVES train heater inoperable.	B.1 Restore FHVES train heater to OPERABLE status. OR B.2 Initiate action in accordance with Specification 5.6.6.	7 days 7 days

SWGR	COMPT	BREAKER NAME	POSITION	DATE INITIAL
1MXW	F06G	Automatic Transfer Switch SAXE (TSC) Normal Supply	On	
1MXA	F04A	Normal Incoming Breaker Fed From Load Center 1LXA	On	
1MXA	F04C	Power Panelboard Transformer 1KTA Feeder	On	
1MXA	F07A	Alternate Incoming Breaker Fed From Load Center 1LXF	On	
1MXX	F02A	Normal Incoming Breaker Fed From Load Center 1LXH	On	
1MXX	F04A	Alternate Incoming Breaker Fed From Load Center 1LXG	On	
1MXX	F05D	Power Panelboard Transformer 1KTX Feeder	On	
1MXH	F04A	Normal Incoming Breaker Fed From Load Center 1LXN	On	
1MXH	F07A	Alternate Incoming Breaker Fed From Load Center 1LXG	On	
1MXG	F04A	Normal Incoming Breaker Fed From Load Center 1LXG	On	
1MXG	F07A	Alternate Incoming Breaker Fed From Load Center 1LXN	On	
1MXG	R04H	Power Panelboard Transformer 1KTG Feeder	On	
1MXD	F03A	Normal Incoming Breaker Fed From Load Center 1LXF	On	
1MXD	F05A	Alternate Incoming Breaker Fed From Load Center 1LXE	On	
1MXD	R03E	1KTD Power Pnl Transformer Feeder	On	
		TURBINE BLDG 4160V SWITCHGEAR		
1GTA	1	Incoming Feeder From Xfmr 1ATC	Closed	
1GTB	1	Incoming Feeder From Xfmr 1ATD	Closed	

91.
SYS028 2.2.25
Hydrogen Recombiner and Purge Control System (HRPS)
Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

NEW
With Unit 1 in Mode 2, how is the requirement to "seal closed" Containment Purge Exhaust Valve 1VP-10A administratively satisfied, and what is the Technical Specification basis for the requirement?

A. Manually close the operating air isolation valve.
A detailed analysis has not been performed to prove it will close during a LOCA in time to ensure offsite dose remains within limits.

B. Use of a keyswitch which removes power from the solenoid valve for the operating air.
A detailed analysis has not been performed to prove it will close during a LOCA in time to ensure offsite dose remains within limits.

C. Manually close the operating air isolation valve.
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.

D. Use of a key switch which removes power from the solenoid valve for the operating air.
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.

Ans: B

References:
SR 3.6.3.1, (Containment Isolation Valves) Basis, page 3.6.3-10, Rev. 0
SR 3.6.3.6, (Containment Isolation Valves) Basis, page 3.6.3-13, Rev. 0
DBD for Containment Purge System, Section 1.2.2, "VP System Role in Plant Operations," Section 2.4.2.
OP/1/A/6100/001, Enclosure 4.4, Step 1.18

Distractor Analysis

A. Incorrect. Plausible, since Part 2, the basis, is correct. Manually closing the operating air isolation valve as the method for sealing the valve closed is plausible, since that IS a method described SR 3.6.3.1 that could be used, however, in this case the applicant has failed to correctly apply the basis information and compare it with the actual requirement per operating procedures, which utilizes a key switch design, and functions by removing power from the solenoid.

B. **CORRECT.** Each containment purge supply and exhaust isolation valve is required to be verified as sealed closed at 31 day intervals, per Surveillance Requirement 3.6.3.1. The Basis for SR 3.6.3.1 describes that this can be accomplished by either by de-energizing its solenoid valve, OR by removing the air supply to the valve operator.

This valve is a pneumatic operated butterfly valve. During normal unit operations (modes 1 through 4), this valve is administratively locked closed by de-energizing its solenoid valve (using a keyswitch). This valve may be opened only during cold shutdown and refueling activities. The valve closes on a containment ventilation isolation signal (S_H), high radiation (EMF 39), or a fan unit trip signal when the VP System is in operation.

The SR Basis also describes that the reason the valve is required to be sealed closed is because a detailed analysis has not been performed to conclusively demonstrate that it will close during a LOCA in time to ensure offsite dose limits maintained.

C. Incorrect. Manually closing the operating air isolation valve as the method for sealing the valve closed is plausible, since that IS a method described SR 3.6.3.1 that could be used, however, in this case the applicant has failed to correctly apply the basis information and compare it with the actual requirement per operating procedures, which utilizes a key switch design, and functions by removing power from the solenoid.

The basis is plausible since the applicant could recall and incorrectly apply the basis from another SR related to similar containment isolation valves, but the basis is for VQ (Air Release and Addition) containment isolation valves (SR 3.6.3.6 - Leakage Rate Testing).

D. Incorrect. Plausible, since the method of sealing the valve closed is correct. The basis is plausible since the applicant could recall and incorrectly apply the basis from another SR related to similar containment isolation valves, but the basis is for VQ (Air Release and Addition) containment isolation valves (SR 3.6.3.6 - Leakage Rate Testing).

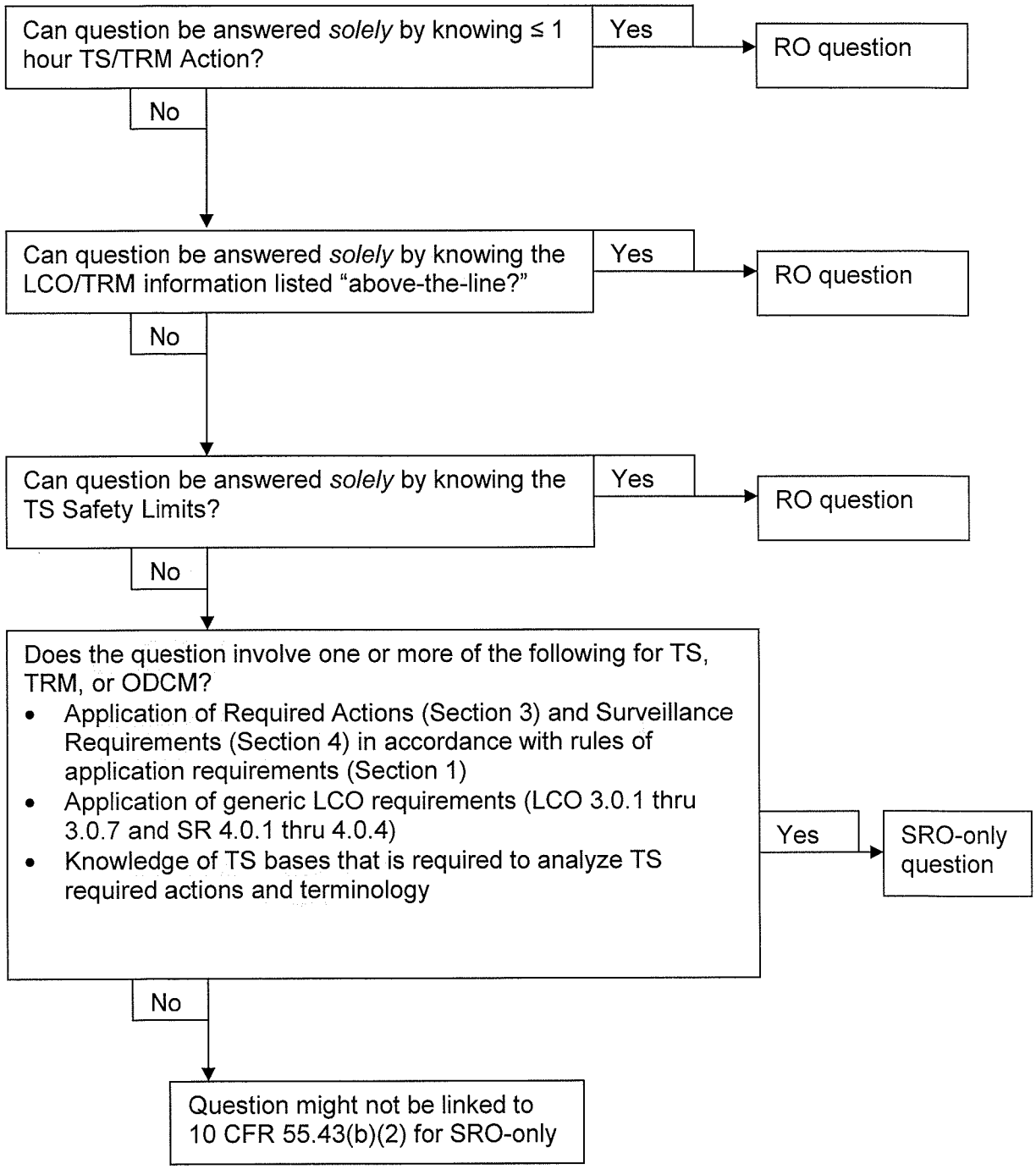
K/A Match
The K/A is matched because it tests knowledge of the bases for a Tech. Spec. surveillance requirement for Purge Control System valves. If the results of a Tech. Spec. surveillance does not meet acceptance criteria, an LCO applies, therefore, this K/A is matched.

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

1) It can NOT be answered solely by knowing < 1 hour Tech Specs.
2) It can NOT be answered solely by knowing the LCO/TRM information listed "above-the-line".
4) It requires the applicant to have detailed knowledge of Tech Spec 3.6.3 surveillance requirements, including application of the basis information to determine what operational method is used to satisfy the requirement.

Cognitive Level - Low

Figure 1: Screening for SRO-only linked to 10 CFR 55.43(b)(2) (Tech Specs)



NOTE: NS may be considered operable in Mode 4 without ND Spray capability. Reference the Design Basis Document for NS for more detail.

_____ 1.14 Verify both NS trains operable and aligned for standby readiness per OP/1/A/6200/007 (Containment Spray System) (TS 3.6.6).

_____ 1.15 Verify the ice condenser inlet doors, intermediate deck doors and top deck doors are closed and operable (TS 3.6.13):

- ☐ "ICE COND LOWER INLET DOORS OPEN" alarm (1AD-13, A/7) is dark.
- ☐ PT/1/A/4200/014 A (Ice Condenser Intermediate Deck Door and Inlet Door Position Monitoring System Inspection) is complete.
- ☐ PT/1/A/4200/014 B (Ice Condenser Top Deck Door Inspection) is complete.

_____ 1.16 Verify primary containment internal pressure is between -0.1 and +0.3 psig (TS 3.6.4).

NOTE:
1. The minimum Containment average air temperature limit may be reduced to ≥60°F in Modes 4, 3, and 2.
2. The minimum average air temperature limit for Mode 1 entry is ≥75°F for Upper Containment and ≥100°F for Lower Containment.

_____ 1.17 Verify containment average air temperature maintained as follows: (TS 3.6.5):

☐ Containment Upper Compartment ≥75 and ≤100°F for Mode 1 entry. (C1P1500)

☐ Containment Lower Compartment ≥100 and ≤120°F for Mode 1 entry. (C1P1501)

OR

☐ Containment average air temperature ≥ 60°F for Modes 4, 3, and 2 entry.

1.18 Ensure each containment purge supply and/or exhaust isolation valve for the lower and the upper containment (24-inch), instrument room (12-inch), and the Hydrogen Purge System (4-inch) is sealed closed by ensuring the following (TS 3.6.3):

_____ _____ • "VP Trn A Upr And Lwr Cont Vlvs Enable" key switch on 1MC5 is in the "BLK CLSD" position.

_____ _____ • "VP Trn B Upr And Lwr Cont Vlvs Enable" key switch on 1MC5 is in the "BLK CLSD" position.

_____ _____ • "Incore VP Tr A Enable" key switch on 1MC5 is in the "NORM" position with the "Blk Clsd" light lit.

_____ _____ • "Incore VP Tr B Enable" key switch on 1MC5 is in the "NORM" position with the "Blk Clsd" light lit.

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.6.3.1	Verify each containment purge supply and exhaust isolation valves for the lower compartment and the upper compartment, instrument room, and the Hydrogen Purge System is sealed closed, except for one purge valve in a penetration flow path while in Condition E of this LCO.	31 days
SR 3.6.3.2	Verify each Containment Air Release and Addition System isolation valve is closed, except when the valves are open for pressure control, ALARA or air quality considerations for personnel entry, or for Surveillances that require the valves to be open.	31 days
SR 3.6.3.3	----------NOTE---------- Valves and blind flanges in high radiation areas may be verified by use of administrative controls. ---------- Verify each containment isolation manual valve and blind flange that is located outside containment or annulus and not locked, sealed, or otherwise secured and required to be closed during accident conditions is closed, except for containment isolation valves that are open under administrative controls.	31 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. ----------NOTE---------- Only applicable to penetration flow paths with only one containment isolation valve and a closed system. ---------- One or more penetration flow paths with one containment isolation valve inoperable.	C.1 Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange. AND C.2 ----------NOTE---------- Isolation devices in high radiation areas may be verified by use of administrative means. ---------- Verify the affected penetration flow path is isolated.	72 hours Once per 31 days
D. Reactor building bypass leakage not within limit.	D.1 Restore leakage within limit.	4 hours
E. One or more penetration flow paths with one or more containment purge, hydrogen purge, or containment air release and addition valves not within leakage limits.	E.1 Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange. AND	24 hours

(continued)

BASES

BACKGROUND (continued)

Containment Air Release and Addition System

The Containment Air Release and Addition System is only used for controlling Containment pressure during normal unit operation. Isolation valves are located both inside and outside of the Containment on each containment penetration.

APPLICABLE SAFETY ANALYSES

The containment isolation valve LCO was derived from the assumptions related to minimizing the loss of reactor coolant inventory and establishing the containment boundary during major accidents. As part of the containment boundary, containment isolation valve OPERABILITY supports leak tightness of the containment. Therefore, the safety analyses of any event requiring isolation of containment is applicable to this LCO.

The DBAs that result in a release of radioactive material within containment are a loss of coolant accident (LOCA) and a rod ejection accident (Ref. 1). In the analyses for each of these accidents, it is assumed that containment isolation valves are either closed or function to close within the required isolation time following event initiation. This ensures that potential paths to the environment through containment isolation valves (including containment purge valves) are minimized. The safety analyses assume that the containment purge supply and/or exhaust isolation valves for the lower compartment and the upper compartment, instrument room, and the Hydrogen Purge System are closed at event initiation. Since the Containment Purge Ventilation System and the Hydrogen Purge System isolation valves are sealed closed in MODES 1 – 4, they are not analyzed mechanistically in the dose calculations.

The DBA analysis assumes that, within $\leq$ 76 seconds after the accident, isolation of the containment is complete and leakage terminated except for the design leakage rate, L_a. The containment isolation total response time of $\leq$ 76 seconds includes signal delay, diesel generator startup (for loss of offsite power), and containment isolation valve stroke times.

The single failure criterion required to be imposed in the conduct of plant safety analyses was considered in the original design of the containment purge valves. Two valves in series on each purge line provide assurance that both the supply and exhaust lines could be isolated even if a single failure occurred.

BASES

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause a release of radioactive material to containment. In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Therefore, the containment isolation valves are not required to be OPERABLE in MODE 5. The requirements for containment isolation valves during MODE 6 are addressed in LCO 3.9.3, "Containment Penetrations."

ACTIONS

The ACTIONS are modified by a Note allowing penetration flow paths, except for containment purge supply and exhaust isolation valves for the lower and upper compartment, instrument room, and hydrogen purge penetration flow paths, to be unisolated intermittently under administrative controls. These administrative controls consist of stationing a dedicated operator at the valve controls, who is in continuous communication with the control room. In this way, the penetration can be rapidly isolated when a need for containment isolation is indicated. For valve controls located in the control room, an operator may monitor containment isolation signal status rather than be stationed at the valve controls. Due to the size of the containment purge line penetration and the fact that those penetrations exhaust directly from the containment atmosphere to the environment, the penetration flow path containing these valves may not be opened under administrative controls. A single purge valve in a penetration flow path may be opened to effect repairs to an inoperable valve, as allowed by SR 3.6.3.1.

A second Note has been added to provide clarification that, for this LCO, separate Condition entry is allowed for each penetration flow path. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable containment isolation valve. Complying with the Required Actions may allow for continued operation, and subsequent inoperable containment isolation valves are governed by subsequent Condition entry and application of associated Required Actions.

The ACTIONS are further modified by a third Note, which ensures appropriate remedial actions are taken, if necessary, if the affected systems are rendered inoperable by an inoperable containment isolation valve.

In the event the containment isolation valve leakage results in exceeding the overall containment leakage rate, Note 4 directs entry into the applicable Conditions and Required Actions of LCO 3.6.1.

BASES

ACTIONS (continued)

For the isolation devices inside containment, the time period specified as "prior to entering MODE 4 from MODE 5 if not performed within the previous 92 days" is based on engineering judgment and is considered reasonable in view of the inaccessibility of the isolation devices and other administrative controls that will ensure that isolation device misalignment is an unlikely possibility.

For the valve with resilient seal that is isolated in accordance with Required Action E.1, SR 3.6.3.6 must be performed at least once every 92 days. This assures that degradation of the resilient seal is detected and confirms that the leakage rate of the containment purge valve does not increase during the time the penetration is isolated.

F.1 and F.2

If the Required Actions and associated Completion Times are not met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.6.3.1

Each containment purge supply and exhaust isolation valve for the lower compartment and the upper compartment, instrument room, and the Hydrogen Purge System is required to be verified sealed closed at 31 day intervals. This Surveillance is designed to ensure that a gross breach of containment is not caused by an inadvertent or spurious opening of a containment purge valve. Detailed analysis of these valves to conclusively demonstrate their ability to close during a LOCA in time to limit offsite doses has not been performed. Therefore, these valves are required to be in the sealed closed position during MODES 1, 2, 3, and 4. A valve that is sealed closed must have motive power to the valve operator removed. This can be accomplished by de-energizing the source of electric power or by removing the air supply to the valve operator. In this application, the term "sealed" has no connotation of leak tightness.

4.3.2 CONTROLS

4.3.2.1 Containment Purge Exhaust and Supply Fans

There are two exhaust fans and two supply fans for each unit. The fans are grouped so that one exhaust fan and supply fan form a train of ventilation. These fans are controlled from local panel 1RB-ECP-1. An "Emergency Stop" switch is located on 1MC5. The containment valves' and fans' enable switches of both trains must be in AUTO, and the Emergency Stop switch must be in NORMAL before the fans may be started. Starting the fans will provide a permissive contact to the valve circuits which will permit the valves to open.

4.3.2.1.1 Supply AHUs Heating Controls

Instrumentation located in the supply fan ducts activate various YH system pumps to provide supply air heating needs.

Instrument No.	Vendor No.	Description
1VPTS5210	1VP-TE-1	Activates 1RB-P-1 or 1RB-P-2 (YH System Pumps)
1VPTS5220	1VP-TE-2	Activates 1RB-P-3 or 1RB-P-4 (YH System Pumps)
1VPTS5360	1VP-TE-3	Activates 1RB-P-5 or 1RB-P-6 (YH System Pumps)

4.3.2.2 Containment Purge Train A Isolation Valves (1VP2, 4, 7, 9, 10, 12, 15)

These containment isolation valves are controlled from 1MC5. All of these valves are controlled by a momentary Train "A" AUTO-BLOCK pushbutton and a Train "A" key-locked BLOCKED/CLOSED-AUTO selector switch. The Train "A" AUTO-BLOCK pushbutton serves as the MASTER switch. Once the MASTER switch is placed in AUTO and the key- locked BLOCKED/CLOSED-AUTO switch is placed in AUTO, then the valves will open automatically when the fan units are started. All valves will close upon receipt of an SSPS, HI RADIATION, fan units trip signal, or the Master Switch is placed in the NORMAL or BLOCK position. In order to reopen the valves, the MASTER switch must be placed in AUTO again after the SSPS signal has cleared. However, if closed on EMF actuation, the fans will start and the valves will open automatically once the EMF signal is cleared. The key-locked selector switch allows one to "lock-closed" the isolation valves when the BLOCKED/CLOSED position is selected. Key removal is from the BLOCKED/CLOSED position.

4.3.2.3 Containment Purge Train B Isolation Valves (1VP1, 3, 6, 8, 11, 13, 16)

These containment isolation valves are controlled from 1MC5. All of these valves are controlled by a momentary Train "B" AUTO-BLOCK pushbutton and a Train "B" key-locked BLOCKED/CLOSED-AUTO selector switch. The Train "B" AUTO-BLOCK pushbutton serves as the MASTER switch. Once the

92.
SYS068 A2.04
Liquid Radwaste System (LRS)
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: Failure of automatic isolation

NEW
Given the following conditions:

At 0815

- A planned release of the contents of Waste Monitor Tank (WMT) B was initiated per the following procedures:
  - OP/0/B/6500/113, (Operations Liquid Waste Release)
  - OP/0/B/6500/015, (Discharging a Monitor Tank to the Environment)
  - Per Liquid Waste Release Permit Report, minimum discharge flow for dilution for this release is 30,000 gpm.
  - System is aligned as required for the release and the release has begun.
- 1AD-12, F/3, RL DISCHARGE LO FLOW alarms.

At 0840

- RL flow is 22,000 gpm.
- 1WL-124 (Waste Monitor Tank Pumps Discharge) is OPEN.
- 1WL-187 (Waste Monitor Tank B Pump Disch to Radiation Monitor) is OPEN.

Which ONE of the following describes:

(1) which WL valve(s) should be CLOSED,

AND

(2) based on that assessment, what procedure is used to accomplish this action?

A. (1) 1WL-124 ONLY.
(2) PT/0/A/4250/011, (RL Temperature and Discharge Flow Determinations)

B. (1) 1WL-124 AND 1WL-187.
(2) PT/0/A/4250/011, (RL Temperature and Discharge Flow Determinations)

C. (1) 1WL-124 ONLY.
(2) OP/0/B/6500/113, (Operations Liquid Waste Release)

D. (1) 1WL-124 AND 1WL-187.
(2) OP/0/B/6500/113, (Operations Liquid Waste Release)

Ans: C

References:
1AD-12, F/3, RL DISCHARGE LO FLOW, Rev. 40
OP/0/B/6500/113, (Operations Liquid Waste Release), Rev. 003
PT/0/A/4250/011, (RL Temperature and Discharge Flow Determinations), Rev. 47
System Drawing, Liquid Waste Systems (WL)

Distractor Analysis

A. Incorrect. Plausible, since Part 1 (valve closure) is correct. Use of this PT is also plausible, since the alarm response procedure does refer the SRO to PT/0/A/4240/011, (RL Temperature and Discharge Flow Determinations), but it is for a failed flow instrument. Use of the Period Test (PT) procedure is plausible because it contains actions for manually calculating dilution flow every 4 hours if the RL flow instrument is inoperable - i.e., it is related to a problem with dilution (RL) flow. It is plausible for an applicant to recall this procedure content, but misapply it in the context of the given conditions.

B. Incorrect. Plausible, since 1WL-124 does automatically close. Believing that 1WL-187 automatically closes is plausible if the applicant misinterprets the function of the valve by believing the title of it (Waste Monitor Tank B Pump Disch to Radiation Monitor) implies that the valve is part of the main release flowpath, when it actually is the manual isolation valve for the radiation monitor. Use of this PT is also plausible, since the alarm response procedure does refer the SRO to PT/0/A/4240/011, (RL Temperature and Discharge Flow Determinations), but it is for a failed flow instrument. Use of the Period Test (PT) procedure is plausible because it contains actions for manually calculating dilution flow every 4 hours if the RL flow instrument is inoperable - i.e., it is related to a problem with dilution (RL) flow. It is plausible for an applicant to recall this procedure content, but misapply it in the context of the given conditions.

C. **CORRECT.** Preparations for a liquid radwaste release include determining and setting the setpoint of dilution flow, per the release permit. Once the release is initiated, if dilution flow (RL) decreases to below that setpoint, the liquid waste discharge is automatically terminated by closing valve 1WL-124, as described in the alarm response for low dilution flow, 1AD-12, F/3 alarm. In the stem conditions, 1WL-124 has failed to close, and valve 1WL-187 (radiation monitor isolation) also remains open. 1WL-124 should have automatically closed; 1WL-187 is a manual valve and receives no automatic positioning signals.

There are several sections of OP/0/B/6500/113, (Operations Liquid Waste Release) containing instructions on the operation of valve 1WL-124; e.g., including Limits and Precautions, 2.3 which explains that if dilution flow rate drops below the setpoint, 1WL-124 should be closed.

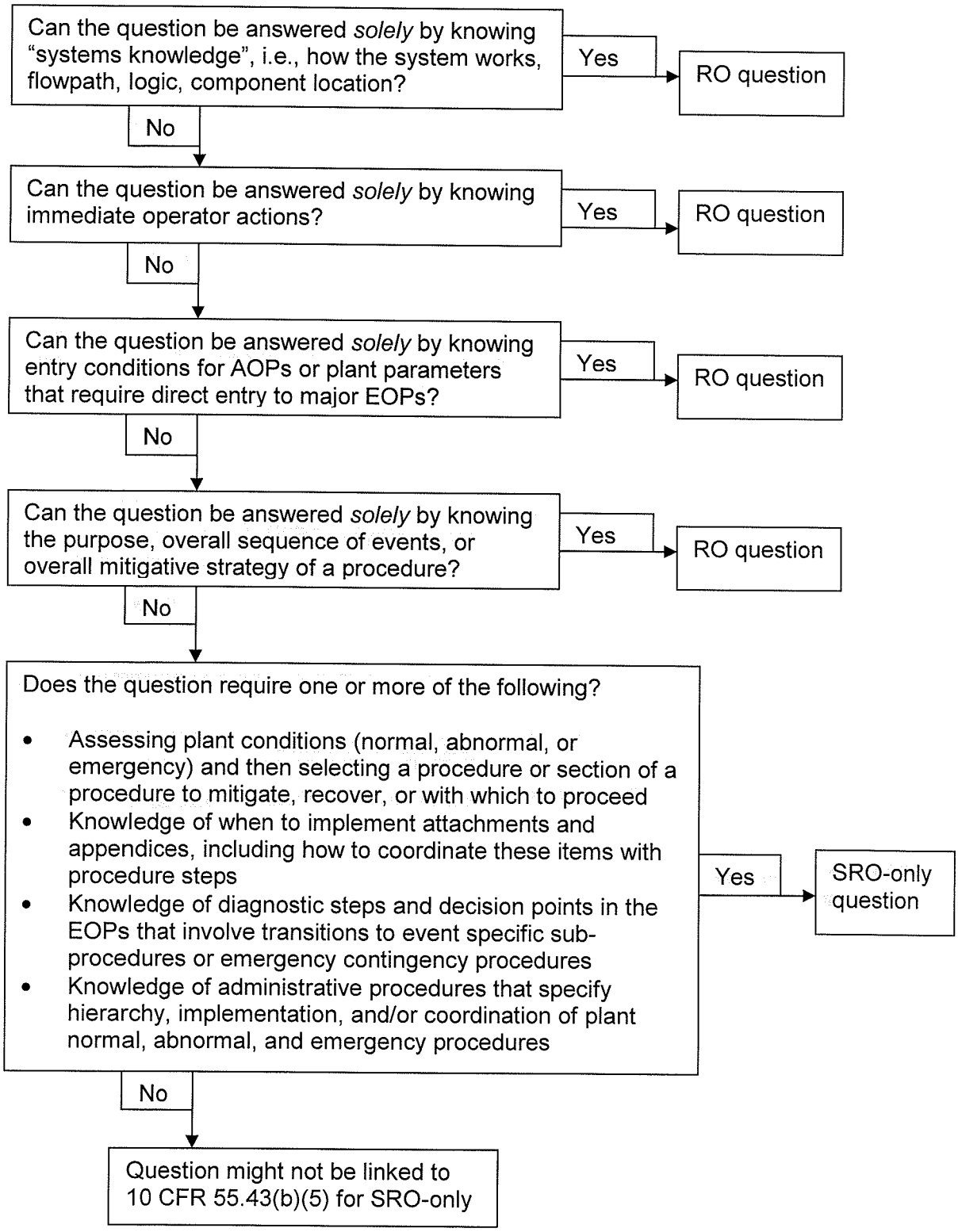
D. Incorrect. Plausible, since Part 2 (procedure selection) is correct. Also plausible, since 1WL-124 does automatically close. Believing that 1WL-187 automatically closes is plausible if the applicant misinterprets the function of the valve by believing the title of it (Waste Monitor Tank B Pump Disch to Radiation Monitor) implies that the valve is part of the main release flowpath, when it actually is the manual isolation valve for the radiation monitor.

K/A Match
The K/A is matched because the applicant is presented with conditions involving a planned liquid radwaste release, and a failure to automatically isolate upon a high radiation condition, as detected by the radiation monitor. "Predicting the impacts" on the system is met by testing the ability to determine which valve or valves on the system have malfunctioned, which is an indication of the overall condition of the liquid radwaste system. The applicant must analyze these conditions to determine required actions, and then select the procedure which contains the detailed steps for accomplishing the desire result.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):
1) The question can NOT be answered by knowing systems knowledge alone.
4) The question can NOT be answered by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.
5.) To correctly answer the question, the applicant must assess plant conditions involving a failure of automatic isolation of a liquid radwaste release, and then select a procedure which contains detailed guidance on mitigating the consequences of the failure.

Cognitive Level - High
This is a high cognitive level question involving a level of analysis of plant conditions, and based on that analysis determining the appropriate procedure guidance to implement.

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)



F/3

RL DISCHARGE LO FLOW

SETPOINT: Per LWR in progress.

ORIGIN: 0RLP5080

PROBABLE CAUSE:
1. RL discharge flow below minimum discharge setpoint.
2. Faulty instrument.
3. Loss of RL pumps.

AUTOMATIC ACTIONS:
1. 1WL-124 (Waste Monit Tnk Pmps Disch) closes.
2. 1WL-X28 (MTB Disch to RL Isol) closes.

IMMEDIATE ACTIONS: Verify that WL release in progress has been terminated by verifying 1WL-124 **OR** 1WL-X28 is closed.

SUPPLEMENTARY ACTIONS:
1. **IF** alarm is due to an instrument failure, perform PT/0/A/4250/011 (RL Temperature and Discharge Flow Determinations) as required.
2. Refer to SLC 16.11-2, Table 16.11-2-1.

REFERENCES:
1. CN-1575-1.0
2. NSM 50136
3. CNEE 0026-01.24
4. CNEE-0025-01.63

Continuous Use

LWR# _____
DESKTOP# _____
_____

1. Initial Conditions

_____ 1.1 Limits and Precautions have been reviewed.

_____ 1.2 R&R and Area Logs have been reviewed and determined to allow operation.

2. Procedure

NOTE:
- Inoperable/Non-functional is defined as a component's inability to perform its intended function. **IF** a component/instrument required by Tech Specs/SLCS is listed in TSAIL it is inoperable/non-functional accordingly.
- 0WLP 6160 (WL Disch Flow to RL Via RN) and EMF-49 are referenced to meet Selected Licensee Commitments. These instruments are verified functional per TSAIL (OMP 2-29 Technical Specifications Action Item Log).

_____ 2.1 Indicate functionality of each instrument/component (by circling):

0WLP 6160 (WL Disch Flow to RL Via RN)
Functional/Non-functional

EMF-49
Functional/Non-functional

EMF-49 Low Flow Alarm Light
Illuminated/**NOT** Illuminated/NA (if EMF-49 is non-functional)

_____ 2.2 **IF** any of the following conditions exist initiate Enclosure for (Releasing a Monitor Tank with EMF-49 Non-functional):

- EMF-49 is listed in TSAIL as non-functional
- "Low Flow Alarm Light" located on EMF-49 is **NOT** illuminated, **AND** changing light bulb does **NOT** correct problem.

_____ 2.3 **IF** "Low Flow Alarm Light" does **NOT** illuminate after changing bulb, request Operations declare EMF-49 non-functional.

Continuous Use

_____ 2.4 **IF** 0WLP 6160 (WL Disch Flow to RL via RN) is non-functional, initiate Enclosure for (Using Alternate Flow Instruments, Data and Data Sheets with 0WLP 6160 Non-functional).

NOTE: **NO** additions shall be made to a monitor tank from time of isolation for recirc, until release is complete.

2.5 Recirculate WMT B:

_____ 2.5.1 Ensure closed 1WL-174 (Waste Monitor Tank B Inlet).

_____ 2.5.2 Start Waste Monitor Pump B.

_____/_____
Date Time

_____ 2.5.3 Throttle 1WL-188 (Waste Monitor Tank B Outlet to Recirc X-over) to achieve one of the following:

- ☐ Flow rate of 95-105 gpm, as read on 0WLP 5290 (Waste Monitor Tank Pump B Disch Flow)
- ☐ Recirc Pressure between 101 - 114 psig as read on 0WLPG 5280 (Waste Monitor Tank Pump B Disch Pressure)
- ☐ As directed by Chemistry Management/Staff

_____ 2.6 Notify RP Count Room personnel LWR sample will be delivered.

2.7 Sample WMT B:

_____ 2.7.1 Ensure Waste Monitor Tank B has been in recirc for ≥ 60 minutes.

_____ 2.7.2 **If** defoamer has been added to this tank or to a tank that has been transferred to this tank, recirc for ≥ 3 hours.

_____ 2.7.3 Throttle 1WL-D46 (Waste Monitor Tank B Pump Disch Sample Isol).

_____ 2.7.4 Purge at least 6 liters to sample sink.

_____ 2.7.5 Obtain sample.

Continuous Use

_____ 2.7.6 Close 1WL-D46 (Waste Monitor Tank B Pump Disch Sample Isol).

_____ 2.8 Fill out sample requisition requesting analysis required per CMP 3.4.17.9 (Radwaste Chemistry Sampling Frequency and Specifications).

_____ 2.9 Record Chemistry Desktop number on Page 1of this enclosure.

_____ 2.10 Record WMT B level after sample taken: _____%

_____ 2.11 **IF** defoamer has not been added to this tank or to a tank that has been transferred to this tank, secure Waste Monitor Tank Pump B

_____ 2.12 Take applicable samples and working copy of procedure to Count Room and Hot Lab.

2.13 Radiation Protection Personnel:

_____ 2.13.1 Verify all gamma isotopic analysis values are within administrative limits, **OR** is approved for release by Chemistry Management/Staff.
RP

_____ _____/_____
Chemistry Contact Date Time

_____ 2.13.2 Assign LWR number to release package, and record on Page 1 of this enclosure.
RP

_____ 2.13.3 Attach copy of sample requisition and isotopic results to procedure and Liquid Waste Release Permit Report.
RP

_____ 2.13.4 **IF** applicable, attach Enclosure for (Releasing a Monitor Tank with EMF-49 Non-functional).
RP

_____ 2.13.5 Deliver procedure to Radwaste Personnel.
RP

2.14 Radwaste Personnel:

_____ _____ 2.14.1 Ensure all analysis required by CMP 3.4.17.9 (Radwaste Chemistry Sampling Frequency and Specifications) have been performed.
SV

Continuous Use

_____ 2.14.2 **IF** any of the following apply, notify Chemistry Management/Staff **AND** go to Step 2.14.3 to terminate Liquid Release Process:

☐ pH is ≥ 9.3
☐ Boron is ≥ 3400 ppm
☐ sample foamed during analysis

_____ _____/_____
Chemistry Contact Date Time

_____ 2.14.3 **IF** Liquid Release Process is to be terminated:

2.14.3.1 Secure Waste Monitor Pump B.

2.14.3.2
☐ Notify RP release is terminated.
☐ Add comment in chemdesk
☐ Add comment on Liquid Waste Release Permit Report
☐ N/A remainder of this enclosure

_____ _____/_____
RP Contacted Date Time

_____ 2.14.4 Ensure release is **NOT** in progress from MTB.

_____ _____ 2.14.5 Ensure tank to be discharged on Liquid Waste Release Permit Report is WMT B.
SV

_____ 2.14.6 Ensure Liquid Waste Release Permit Report is complete up to this point.

_____ 2.14.7 Ensure all analysis results have been recorded in Desktop and on Sample Analysis Requisition form in package.

_____ 2.14.8 **IF** desktop is unavailable, make entries on screen copies for later entry.

NOTE: For the following steps, tanks containing only LHST water are **NOT** required to be analyzed for Boron, but are known to be < 500 ppm Boron.

_____ 2.15 **IF** Boron is < 500 ppm **AND** pH is < 9.0 go to Step 2.22.

_____ 2.16 **IF** Boron is < 500 **AND** pH is ≥ 9.0, go to Step 2.19.

Continuous Use

_____ 2.17 Evaluate whether the limit of 3 hours releasing with ≥ 500 ppm boron in a 24 hour period is expected to be impacted by this release. (PIP-C-99-1682) Consider the following factors:

- Estimated start time for this release.
- Estimated duration of any release ≥ 500 ppm boron that will be released between now and the estimated start time for this release.

_____ 2.18 **IF** it is determined that the limit of 3 hours releasing with ≥ 500 ppm boron in a 24 hour period will potentially be impacted, consult with Chemistry Management/Staff before proceeding. Management may elect to:

- Terminate the release package.
- Delay the start of the release until which time the limit will **NOT** be impacted.
- Release a portion of the tank stopping the release prior to exceeding the 3 hour limit.

Circle and initial the option chosen above.

_____ _____/_____
Chemistry Contact Date Time

_____ 2.19 Obtain actual RL Discharge Flow Rate from Operations.

RL Discharge Flow Rate _____ gpm

NOTE: For an evaluated worst case Boron of 3400 ppm, calculations prove that pH is always more restrictive than Boron, therefore Boron limitation on RL Discharge Flow Interlock and Release Flow Rate do **NOT** need to be considered **WHEN** pH is ≥ 9.0.

_____ 2.20 **IF** pH is ≥ 9.0:

_____ 2.20.1 In column A of table below, look up RL Discharge Flow Rate recorded in Step 2.19 and determine corresponding Minimum RL Flow Rate Interlock (Column B) and Release Flow Rate (Column C).

Minimum RL Flow Interlock (Column B) _____ gpm

Release Flow Rate (Column C) _____gpm

RL Discharge Flow Rate (Column A)	Minimum RL Flow Interlock Setting (Column B)	Release Flow Rate (Column C)
22000	17600	35
23000	18400	36

Continuous Use

RL Discharge Flow Rate (Column A)	Minimum RL Flow Interlock Setting (Column B)	Release Flow Rate (Column C)
24000	19200	38
25000	20000	40
26000	20800	41
27000	21600	43
28000	22400	44
29000	23200	46
30000	24000	48
31000	24800	49
32000	25600	51
33000	26400	52
34000	27200	54
35000	28000	56
36000	28800	57
37000	29600	59
38000	30400	60
39000	31200	62
40000	32000	64
41000	32800	65
42000	33600	67
43000	34400	68
44000	35200	70
45000	36000	72
46000	36800	73
47000	37600	75
48000	38400	76
49000	39200	78
50000	40000	80
51000	40800	81
52000	41600	83
53000	42400	84
54000	43200	86
55000	44000	88
56000	44800	89
57000	45600	91
58000	46400	92
59000	47200	94
60000	48000	96
61000	48800	97
62000	49600	99

Continuous Use

RL Discharge Flow Rate (Column A)	Minimum RL Flow Interlock Setting (Column B)	Release Flow Rate (Column C)
63000	50400	100
>63000	50400	100

Where: Column A = RL Discharge Flow Rate obtained in Step 2.19

Column B = RL Discharge Flow Rate X 0.8

Column C = $\frac{Column\ \mathbf{B}}{500}$

0.8 = Factor to add in conservatism

500 = dilution factor

NOTE: In Step 2.20.2 the more conservative RL Flow Interlock setting would be the highest and the more conservative Release Flow Rage would be the lowest.

_____ 2.20.2 **IF** either the RL Flow Interlock setting **OR** Release Flow rate from Step 2.20.1 is more conservative than those already recorded on the Liquid Waste Release Permit Report, revise the report to reflect the new Minimum RL Flow Interlock setting and/or Release Flow Rate.

_____ 2.20.3 **IF** either the RL Flow Interlock setting or Release Flow Rate was revised on the Liquid Waste Release Permit Report in Step 2.20.2, enter a comment in the special instructions section of the Liquid Waste Release Permit Report: "Conservative Interlock/Release Rate needed for dilution of Boron and/or pH".

_____ 2.20.4 Go to Step 2.22.

_____ 2.21 **IF** Boron ≥ 500 ppm and pH is < 9.0:

_____ 2.21.1 Record RL Discharge Flow Rate from Step 2.19. _____ GPM

_____ 2.21.2 Calculate conservative RL Flow Interlock setting:

(RL Disch Flow Rate) X (0.75) = (Minimum RL Flow Interlock Setting)

(_____) GPM X (0.75) = (_____) GPM

Where: 0.75 = conservative factor

_____ 2.21.3 Revise Liquid Waste Release Permit Report minimum RL Flow Interlock value to value recorded in Step 2.21.2.

Continuous Use

_____ 2.21.4 Enter comment in the special instructions section of the Liquid Waste Release Permit Report: "Conservative Interlock/Release Rate needed for dilution for Boron".

_____ 2.21.5 Using the Minimum RL Flow Interlock from Step, 2.21.2 calculate the Conservative Release Flow Rate:

$$Conservative\ \text{Re}\ lease\ Flow\ Rate = \frac{(Minimum\ RL\ Flow\ Interlock)\ X(12\ ppm)}{Monitor\ Tank\ Boron\ (ppm)}$$

New Release Flow Rate _____ gpm

_____ 2.21.6 **IF** the Conservative Release Flow Rate from Step 2.21.5 is less than that already recorded on the Liquid Waste Release Permit Report, revise the report to reflect the Conservative Release Flow Rate.

_____ 2.21.7 Enter a comment in the special instructions section of the Liquid Waste Release Permit Report: "Conservative Interlock/Release Rate needed for dilution of Boron and/or pH".

_____ 2.22 Deliver LWR package to Control Room for setup of release.
CHEM

2.23 Operations Personnel:

NOTE:	RL/RN flow should be maintained at greater than flow interlock setpoint for duration of release to prevent inadvertent release termination.

_____ 2.23.1 Verify RN System is discharging through RL with 1RL-62 (RN System Disch to B RL Header) and/or 1RL-54 (RL System Disch to A RL Header), open as applicable
OPS

_____ 2.23.2 Ensure all applicable items on Liquid Waste Release Permit Report are complete up to this point
OPS

_____ 2.23.3 Contact Radwaste Chemistry to pick up LWR package
OPS

_____ 2.24 Ensure locked closed:

☐ 1WL-949 (RMT Outlet to Waste Monitor Tank Disch Radiation Monitor EMF-49)

☐ 1WL-113 (Waste Monitor Tank A Pump Disch to Radiation Monitor 1EMF-49)

☐ 1WL-187 (Waste Monitor Tank B Pump Disch to Radiation Monitor)

Continuous Use

_____ 2.25 Ensure closed:

☐ 1WL-174 (Waste Monitor Tank B Inlet)

☐ 1WL-D12 (YM Flush to Radiation Monitor EMF-49) [OPS]

☐ 1WL-D11 (Radiation Monitor EMF-49 Drain Isol) [OPS]

☐ 1WL-354 (Radiation Monitor EMF-49 Inlet Sample/Vent Isol)

☐ 1WL-408 (Radiation Monitor EMF-49 Inlet Drain Isol) [OPS]

☐ 1WL-47 (WMT Pump A Disch Radiation Monitor EMF-49 Outlet Sample)

2.26 EMF-49 Functionality:

_____ 2.26.1 Indicate (by circling) functionality status of EMF-49.
Functional/Non-functional

_____ 2.26.2 **IF** EMF-49 is non-functional, ensure Enclosure for (Releasing a Monitor Tank with EMF-49 Non-functional) is complete.

2.27 Align EMF-49 based on functionality status:

_____ 2.27.1 **IF** functional, ensure open:

☐ 1WL-931 (Waste Monitor Tank Radiation Monitor EMF-49 Inlet)
☐ 1WL-366 (Radiation Monitor EMF-49 Inlet) [OPS]
☐ 1WL-932 (Waste Monitor Tank Radiation Monitor EMF-49 Outlet) [OPS]

_____ 2.27.2 **IF** non-functional, ensure closed:

☐ 1WL-931 (Waste Monitor Tank Radiation Monitor EMF-49 Inlet)
☐ 1WL-366 (Radiation Monitor EMF-49 Inlet) [OPS]
☐ 1WL-932 (Waste Monitor Tank Radiation Monitor EMF-49 Outlet) [OPS]

_____ 2.28 Throttle 1WL-893 (Waste Monitor Tank Radiation Monitor EMF-49 Bypass) ½ to 2 turns.

_____ 2.29 Ensure Waste Monitor Tank B is in recirculation:

_____ 2.29.1 Throttle 1WL-188 (Waste Monitor Tank B Outlet to Recirc X-over) to achieve one of the following:

☐ Flow rate of 95-105 gpm, as read on 0WLP 5290 (Waste Monitor Tank Pump B Disch Flow)

Continuous Use

☐ Recirc Pressure between 101 - 114 psig as read on 0WLPG 5280 (Waste Monitor Tank Pump B Disch Pressure)

☐ As directed by Chemistry Management/Staff

_____ 2.30 Verify WMT B level has **NOT** changed from Step 2.10.

WMT B Level _____%

_____ 2.30.1 **IF** an increase of ≥ one percent has occurred, secure release.

_____ 2.30.1.1 Identify and secure source of input. Explain below:

_____

_____

_____ 2.30.1.2 Notify Chemistry Management/Staff.

_____ 2.30.1.3 Secure Waste Monitor Pump B.

_____ 2.30.1.4 Close 1WL-893 (Waste Monitor Tank Radiation Monitor EMF-49 Bypass).

_____ 2.30.1.5 Request Operations close 1WL-124 (Waste Monitor Tank Pumps Disch [OPS].

_____ 2.30.1.6 Go to Step 2.55.

_____ 2.30.2 **IF** decrease of > one percent has occurred, find cause and secure.

_____ 2.30.2.1 Explain decrease.

_____

_____

_____ 2.30.2.2 Continue release.

Continuous Use

_____ 2.31 Verify Operations set up:

☐ Request Operations ensure 0WLP 6160 (WL Disch Flow to RL Via RN) reads zero

☐ Request Operations ensure 1WL-124 (Waste Monitor Tank Pumps Disch) [OPS] is set to required discharge flow per Liquid Waste Release Permit Report

_____ _____/_____
Operations Contact Date Time

☐ Flow Set @ _____ gpm

☐ **IF** 0WLP 6160 (WL Disch Flow to RL Via RN) is non-functional, initiate Enclosure for (Using Alternate Flow Instruments, Data and Data Sheets with 0WLP 6160 Non-functional)

☐ Notify Operations they should receive an "EMF Low Flow Alarm" when pump trips on low tank level at end of release

_____ 2.32 Visually verify 1WL-124 (Waste Monitor Tank Pumps Disch) [OPS] is open.

_____ 2.32.1 **IF** 1WL-124 (Waste Monitor Tank Pumps Disch) [OPS] is **NOT** open, request Operations completely close and then reopen 1WL-124 (Waste Monitor Tank Pumps Disch) [OPS].

_____ 2.32.2 **IF** 1WL-124 (Waste Monitor Tank Pumps Disch) [OPS] still does **NOT** open, terminate release:

_____ 2.32.2.1 Secure Waste Monitor Pump B.

_____ 2.32.2.2 Notify RP discharge has been terminated.

_____ 2.32.2.3 Go to Step 2.55.

_____ 2.33 Open 1WL-125 (Waste Monitor Tank Clean Disch) [OPS].

_____ _____ 2.34 Unlock and open 1WL-187 (Waste Monitor Tank B Pump Disch to Radiation Monitor).
DV

_____ 2.35 Close 1WL-188 (Waste Monitor Tank B Outlet to Recirc X-over).

_____ 2.36 Record release start date and time.

_____/_____
Date Time

Continuous Use

_____ 2.37 **IF** release is with EMF-49 functional, verify "EMF-49 Lo Sample Flow" alarm clears within 60 seconds after initiating release:

_____ 2.37.1 **IF** "EMF-49 Lo Sample Flow" alarm does **NOT** clear within 30 seconds, throttle 1WL-893 (Waste Monitor Tank Radiation Monitor EMF-49 Bypass) until alarm clears.

_____ 2.37.2 **IF** alarm does **NOT** clear within 60 seconds, return WMT B to recirc:

_____ 2.37.2.1 Throttle 1WL-188 (Waste Monitor Tank B Outlet to Recirc X-over).

_____ 2.37.2.2 Close 1WL-187 (Waste Monitor Tank B Pump Disch to Radiation Monitor).

_____ 2.37.2.3 Investigate why alarm did **NOT** clear.

_____ 2.37.2.4 **IF** problem can be corrected, return to Step 2.34.

_____ 2.37.2.5 **IF** problem **CANNOT** be corrected, close out procedure:

_____ A. Secure Waste Monitor Pump B.

_____ B. Record time/date the release was started from Step 2.36:

☐ In Autolog
☐ On liquid Waste Release Permit Report

_____ C. Go to Step 2.47.

_____ 2.38 **IF** 0WLP 6160 (WL Disch Flow to RL via RN) is non-functional **AND** alternate flow instrumentation is being used:

_____ 2.38.1 Throttle 1WL-186 (Waste Monitor Tank B Pump Disch) to specified flow per Liquid Waste Release Permit Report

_____ 2.38.2 Initiate Enclosure for (Using Alternate Flow Instruments, Data and Data Sheets with 0WLP 6160 Non-functional)

_____ 2.39 **IF** Discharge Totalizer is functional, verify per Operations that 0WLP 6160 (WL Disch Flow to RL via RN) is registering flow.

_____ _____/_____
Operations Contact Date Time

Continuous Use

_____ 2.40 Notify RP discharge has been initiated.

_____ _____/_____
RP Contact Date Time

_____ 2.41 Record time/date release was started from Step 2.36.

☐ In Autolog
☐ On Liquid Waste Release Permit Report

_____ 2.42 **IF** boron is > 500 ppm for this release, determine the allowable duration: (PIP C-99-1682)

_____ 2.42.1 Determine from Autolog total accrued release minutes in the past 24 hours for tanks containing > 500 ppm Boron:

Total Accrued Release minutes *in past* 24 *Hours for* tanks *containing* > 500 *ppm Boron* = _____ mins

_____ 2.42.2 Calculate the allowable release duration for this release:

$$\text{Allowable Release Duration} = (180\ \text{mins}) - \begin{pmatrix}\text{Total Accrued Release Minutes in the past 24 hours for tanks containing} > 500\ \text{ppm Boron from Step 2.42.1}\end{pmatrix}$$

Allowable Release Duration = _____ mins

_____ 2.42.3 Determine the required release stop time: (PIP-C-99-1862)

$$\text{Required Release Stop Time} = \begin{pmatrix}\text{Start Time from Step 2.36}\end{pmatrix} + \begin{pmatrix}\text{Allowable Release Duration from Step 2.42.2}\end{pmatrix}$$

Required Release Stop Time = _____

Continuous Use

NOTE:
- **WHEN** releasing a tank that has received chemical and metal cleaning waste an official NPDES sample may be required.
- **IF** a site assembly occurs, release shall be suspended.

_____ 2.43 **IF** an official NPDES sample is required, go to Enclosure for (Obtaining NPDES Samples at EMF-49).

_____ 2.44 **IF** a problem occurs during release, secure release and return WMT B to recirc:

_____ 2.44.1 Throttle 1WL-188 (Waste Monitor Tank B Outlet to Recirc X-over).

_____ 2.44.2 Close 1WL-187 (Waste Monitor Tank B Pump Disch to Radiation Monitor).

_____ 2.44.3 Lock 1WL-187 (Waste Monitor Tank B Pump Disch to Radiation Monitor).

_____ 2.44.4 Record tank level and time:

Level_____ Time_____

_____ 2.44.5 **IF** necessary contact Chemistry Management/Staff and RP. Both groups shall agree on a course of action per applicable Selected Licensee Commitments.

_____ 2.44.6 **IF** release is to be reinitiated, return to Step 2.34.

_____ 2.44.7 **IF** release is to be terminated:

_____ 2.44.7.1 Secure Waste Monitor Pump B.

_____ 2.44.7.2 Go to Step 2.47.

_____ 2.45 **IF** 1WL-124 (Waste Monitor Tank Pumps Disch) [OPS] closes during release due to a Hi-Rad Trip, **OR IF** EMF-49 fails to function properly, terminate release and place WMT B in recirc:

_____ 2.45.1 Throttle 1WL-188 (Waste Monitor Tank B Outlet to Recirc X-over).

_____ 2.45.2 Close 1WL-187 (Waste Monitor Tank B Pump Disch to Radiation Monitor).

_____ 2.45.3 Lock 1WL-187 (Waste Monitor Tank B Pump Disch to Radiation Monitor).

_____ 2.45.4 Stop Waste Monitor Pump B.

_____ 2.45.5 Go to Step 2.47.

Continuous Use

NOTE: **WHEN** release is complete tank may **NOT** be at low level, pump would need to be tripped manually. (Examples: Hi-Rad Trip or EMF-49 malfunction).

_____ 2.46 Monitor the Liquid Waste Release for automatic trip **OR** conditions that require a manual trip:

_____ 2.46.1 **IF** the required Release Stop Time determined in Step 2.42.3 is reached:

_____ 2.46.1.1 Manually trip Waste Monitor Tank Pump B.

_____ 2.46.1.2 Go to Step 2.47.

_____ 2.46.2 **IF** an automatic trip of Waste Monitor Tank Pump B does **NOT** occur prior to Waste Monitor Tank B level reaching 10%:

_____ 2.46.2.1 Manually trip Waste Monitor Tank Pump B at 10%.

_____ 2.46.2.2 Go to Step 2.47.

_____ 2.46.3 **IF** an automatic trip of 1WL-124 (Waste Monitor Tank Pumps Disch) occurs due to High Rad:

_____ 2.46.3.1 Flush EMF per Enclosure for (Flushing EMF-49 Prior to or During a Release).

_____ 2.46.3.2 Go to Step 2.47.

_____ 2.46.4 **IF** an automatic trip of 1WL-124 (Waste Monitor Tank Pumps Disch) occurs due to RL Low Flow go to Step 2.47.

_____ 2.46.5 **IF** an automatic trip of Waste Monitor Tank Pump B occurs due to Waste Monitor Tank B low level, go to Step 2.47.

_____ 2.47 Record time/date release was secured on Liquid Waste Release Permit Report.

_____/_____
Date Time

Continuous Use

_____ 2.48 Contact Control Room:

- Notify Operations discharge has been secured

_____ _____/_____
Operations Contact Date Time

- Obtain gallons released _____
- Record gallons released in Autolog
- Record gallons released in Chemistry Desktop
- Record gallons released on Liquid Waste Release Permit Report, and sign form
- **IF** EMF is to be flushed at this time, notify Operations that they should receive an "EMF Low Flow Alarm" **WHEN** flush is secured

_____ 2.49 **IF** this release is with EMF-49 functional, flush EMF-49 and discharge piping:

_____ 2.49.1 Close:

☐ 1WL-931 (Waste Monitor Tank Radiation Monitor EMF-49 Inlet)
☐ 1WL-893 (Waste Monitor Tank Radiation Monitor EMF-49 Bypass)

_____ 2.49.2 Open 1WL-D12 (YM Flush to Radiation Monitor EMF-49) [OPS] to initiate flush of EMF-49.

_____ 2.49.3 Flush until background counts from EMF-49 stabilize at lowest point.

_____ 2.49.4 Close 1WL-D12 (YM Flush to Radiation Monitor EMF-49) [OPS].

_____ 2.49.5 Open 1WL-931 (Waste Monitor Tank Radiation Monitor EMF-49 Inlet).

_____ 2.50 Notify RP discharge is complete/has been terminated.

_____ _____/_____
RP Contact Date Time

_____ 2.51 Request Operations close 1WL-124 (Waste Monitor Tank Pumps Disch) [OPS].

_____ _____/_____
Operations Contact Date Time

_____ 2.52 Ensure locked closed 1WL-187 (Waste Monitor Tank B Pump Disch to Radiation Monitor).

Continuous Use

_____ 2.53 Ensure throttled 1WL-188 (Waste Monitor Tank B Outlet to Recirc X-over) to approximately 50%.

_____ 2.54 Ensure closed 1WL-893 (Waste Monitor Tank Radiation Monitor EMF-49 Bypass).

_____ 2.55 Ensure all applicable sections of Liquid Waste Release Permit Report are complete.

_____ 2.56 Remove all portions of OP/0/B/6500/015 (Discharging a Monitor Tank to the Environment) from release package except:

- Completed sample requisitions with all RP and Chemistry information, including EMF-49 Non-functional duplicate samples and replicate samples
- Liquid Waste Release Permit Report
- **IF** EMF-49 is Non-functional, Enclosure for (Releasing a Monitor Tank With EMF-49 Non-functional)
- **IF** 0WLP 6160 is Non-functional, Enclosure for (Using Alternate Flow Instruments, Data and Data Sheets with 0WLP 6160 Non-functional)

DV _____ 2.57 Close 1WL-125 (Waste Monitor Tank Clean Disch). [OPS]

_____ 2.58 Route completed OP/0/B/6500/015 (Discharging a Monitor Tank to the Environment) to day shift for review.

_____ 2.59 Deliver release package to Operations.

93.
SYS071 2.4.4
Waste Gas Disposal System (WGDS)
Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.

NEW
Given the following Unit 1 conditions:

- The Unit is in Mode 2.
- A Containment Air Release (VQ) is in progress.
- Annunciator 1RAD-1, A/2, 1EMF-39 CONTAINMENT GAS HI RAD, goes into alarm (Trip 2) due to a valid condition.
- Containment Ventilation Isolation Train A and B RESET lights are LIT.

Which ONE of the following describes if the release has automatically terminated (YES or NO);

AND

per the annunciator response above, what procedure will the SRO FIRST refer to for mitigating the consequences of these conditions?

A. YES
Go to AP/10, (Reactor Coolant Leak) for steps on mitigating the leak in containment.

B. NO
Go to OP/1/A/6450/017, (Containment Air Release and Addition System), for steps on manual termination of the release.

C. YES
Go to OP/1/A/6450/017, (Containment Air Release and Addition System), for determining whether a new Gaseous Waste Release permit is required prior to reinitiating the release.

D. NO
Go to AP/10, (Reactor Coolant Leak) for steps on mitigating the leak in containment.

Ans: D

References:
1RAD-1, A/2, 1EMF-39 CONTAINMENT GAS HI RAD, Rev. 63
OP/1/A/6450/017, Containment Air Release and Addition System, Rev. 67
AP/1/A/5500/010, Reactor Coolant Leak, Rev. 53
OP-CN-ECCS-ISE, Lesson Plan for ESFAS, Page 20, Rev. 44

Distractor Analysis

A. Incorrect. Plausible, since the procedure selection is correct. That the containment air release automatically terminated is plausible if the applicant misinterprets the Containment Ventilation Train A and B RESET lights being LIT as meaning ventilation has isolated. Further, it is a common misconception that EMF-39 directly sends an isolation signal to VQ also, however, it only sends an isolation signal to Containment Purge.

B. Incorrect. Plausible, since the release termination response is correct. Also plausible, since the alarm response procedure does refer you to an operating procedure (OP), but it is for OP/015, Containment Purge System. The stem conditions of the question do not include a purge being in service; however, the applicant must diagnose that leak inside containment is occurring, based on the radiation monitor alarm. The alarm response procedure refers the SRO to the AP for reactor coolant leak.

C. Incorrect. Plausible, that the release HAS terminated is plausible if applicant misinterprets Cont. Ventilation Train A and B RESET lights being LIT as meaning ventilation has isolated. Further, it is a common misconception that EMF-39 directly sends an isolation signal to VQ also, however, it only sends an isolation signal to Containment Purge.

D. **CORRECT.** A Containment Air Release (VQ) was in progress. A leak inside containment then occurred, as indicated by a valid Trip 2 alarm condition on radiation monitor 1EMF-39, Containment Gas Hi Rad. This radiation monitor initiates a (CVI) containment ventilation isolation signal (S_H), which generates a signal to terminate any containment air release (VQ). The stem conditions are that the CVI RESET lights are LIT, indicating that the CVI signal did NOT initiate, although it should have initiated.

The correct procedure to implement is the AP/10 for leak inside containment, and not the OP, based on directions given in the alarm response procedure for the radiation monitor alarm, and symptoms section of AP/10 for Reactor Coolant Leak.

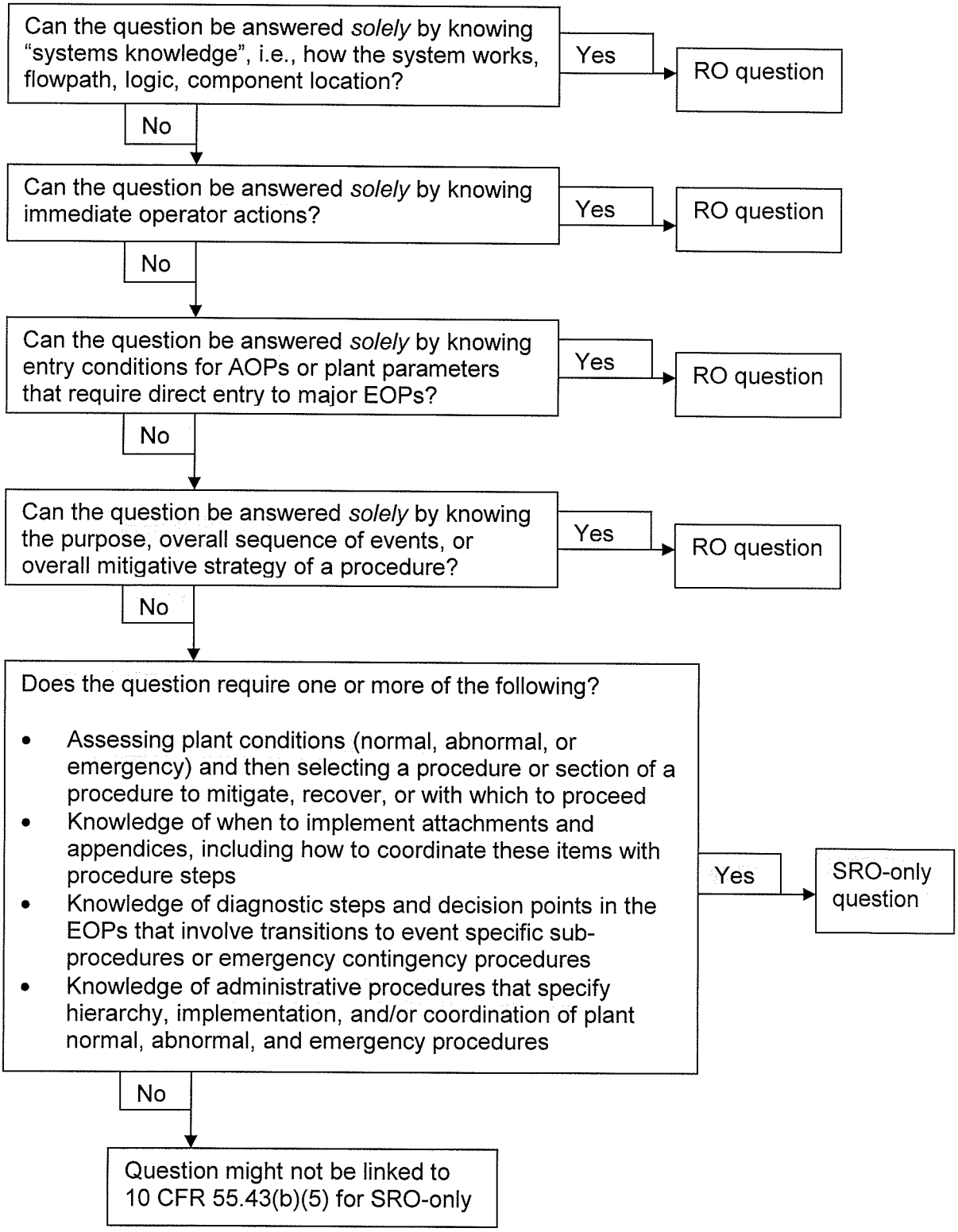
K/A Match
The K/A is matched because the applicant is presented with conditions involving a planned gaseous waste release, using Waste Gas Disposal equipment. An abnormal indication is then presented, and the applicant is tested on the ability to recognize the abnormal indication (actually, TWO abnormal indications), and determine the significance of it in the context of emergency or abnormal procedure entry.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):

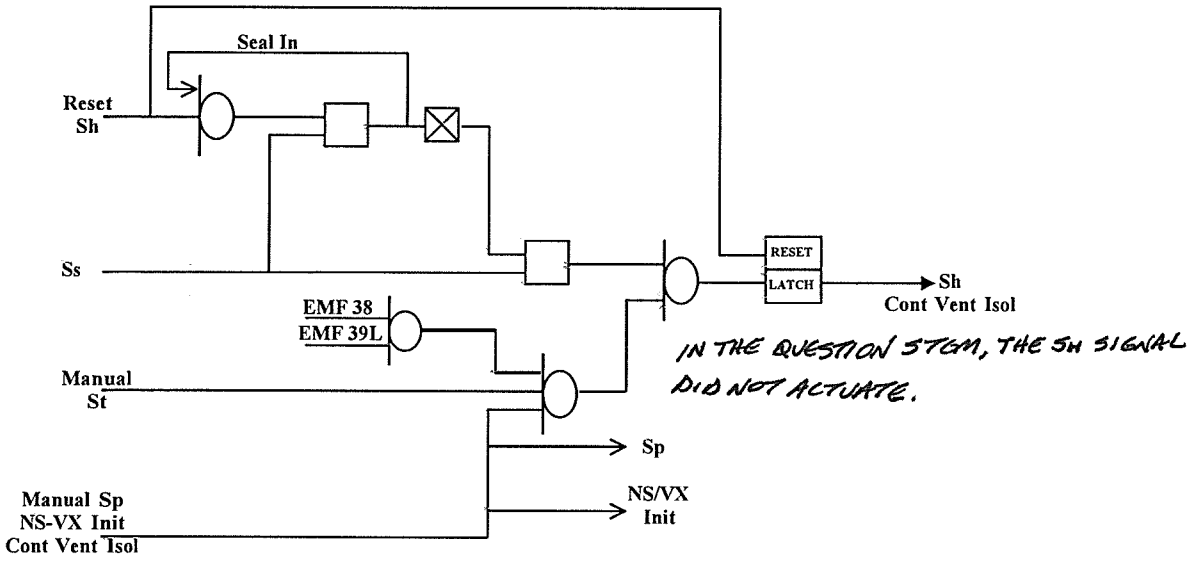
1.) The question canNOT be answered solely by knowing systems knowledge.
2.) The question canNOT be answered solely by knowing immediate operator actions.
3.) The question canNOT be answered solely by knowing entry conditions for AOPs.
4.) The question canNOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.
5.) The question does require the applicant to assess plant conditions involving a radiation alarm, and response procedure. The SRO must apply detailed knowledge of that procedure to determine another procedure to use, and which has detailed steps for isolating a reactor coolant leak.

Cognitive Level - High
This is a high cognitive level question because the applicant must evaluate a set of plant conditions, then recall a component design feature, to evaluate if a proper system response occurred, and based on that conclusion, make a determination on what steps are needed to accomplish a desired result (after having determined WHAT the desired result is).

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)



(Sh) Containment Ventilation Isolation



D. Containment Ventilation Isolation (S_H)

1. 4 Signals can actuate an S_H.
   a) Manual "Phase A" (S_T): Train A (B) S_T will actuate train A (B) S_H.
   b) Manual "Phase B, NS-VX Initiate, Cont Vent Isol": Train A (B) (Phase B, NS-VX Initiate, Cont Vent Isol) will actuate train A (B) S_H. This is a single pushbutton that actuates three functions.
   c) S_S Signal: Train A (B) S_S will actuate Train A (B) S_H.
   d) EMF 38, or 39 L, TRIP 2: High Containment Particulate or Gas will actuate BOTH Trains of S_H.
2. S_H will shutdown and will isolate VP and isolate VQ Containment Isolation valves.
3. Reset (Cont Vent Isol Reset)
   a) One pushbutton per train (NS Board)
   b) Functional with S_S present as long as EMF Signals are not present.
4. Indication of the isolation is via the ESF Monitor lights.

A/2

1EMF-39 CONTAINMENT GAS HI RAD

SETPOINT: Per HP/0/B/1000/010 (Determination of Radiation Monitor Setpoints)

ORIGIN: 1EMF-39 beta scintillation detector (low range)

PROBABLE CAUSE: Radioactive spill/leak inside containment

AUTOMATIC ACTIONS:

1. **IF** below P-6, the containment evacuation alarm is actuated.
2. **IF** at least one train of SSPS is **NOT** in test, the containment ventilation isolation signal is actuated (S_H).
3. The Containment Purge System (VP) is isolated.

IMMEDIATE ACTIONS:

1. Verify that the Containment Purge System (VP) has isolated.
2. **IF** at least one train of SSPS is **NOT** in test, verify that the Containment Air Release and Addition System has isolated. IN THE QUESTION VQ ISOLATION DID NOT OCCUR.
3. **IF** valid alarm, ensure all personnel are evacuated from containment.
4. **IF** below P-6, contact upper and lower RP Hatch Watches and report the validity of the alarm.

NOTE: 1EMF-38 and 39 sampling valves must be selected to "Lower Containment" and/or "Incore Instrument". If both valves, "Lower Containment" and "Incore Instrument" are closed 1EMF-38 and 39 must be considered inoperable for Tech. Spec. 3.4.15.

5. Use "SAMPLE FLOW SELECT" module to determine if alarm is from upper containment, lower containment or incore instrument room.
6. Refer to AP/1/A/5500/010 (Reactor Coolant Leak).

CONTINUED ON THE NEXT PAGE

1EMF-39 CONTAINMENT GAS HI RAD (Cont'd)

A/2

SUPPLEMENTARY ACTIONS:

1. Notify Radiation Protection personnel of this alarm.

NOTE: If the EMF is reset prior to securing VP per the following step, the system will restart automatically.

2. Secure VP per OP/1/A/6450/015 (Containment Purge System).
3. **IF** actuated, reset the containment ventilation isolation signal when this alarm clears.

NOTE: If annunciator alarm is due to an actual hi rad signal, a new GWR will be required before reinitiating VP or VQ.

4. Manually reinitiate the Containment Purge System (VP) or Containment Air Release and Addition System (VQ) as needed.
5. Refer to Tech Specs 3.4.13, 3.4.14 and 3.4.15.

REFERENCES:

1. CNM-1346-05-33
2. CNEE-0174-01.06
3. NSM CN-00001
4. CNEE-0156-03.03
5. NSM CN-11440

Case II. NC System Leak:

- Charging flow indication - INCREASING
- Pzr level - DECREASING
- Pzr pressure - DECREASING
- Any of the following EMF indications - INCREASING OR IN ALARM:
  - EMF-41 (Aux Bldg Ventilation)
  - 1EMF-38 (Containment Particulate)
  - 1EMF-39 (Containment Gas)
  - 1EMF-46A (Component Cooling Train A)
  - 1EMF-46B (Component Cooling Train B).
- Containment floor and equipment sump level(s) - INCREASING.

1. Limits and Precautions

1.1 Do **NOT** exceed Containment Pressure Limits of -0.08 psig and +0.25 psig. Tech Spec Containment Pressure Limits are -0.1 psig to +0.3 psig.

1.2 When manually operating any motor operated valve, minimize the torque applied to the handwheel.

1.3 After manual operation, maintenance, or packing adjustment of any motor operated Safety Related valve, it shall be cycled electrically to ensure reliable automatic operation.

1.4 Pressure switches for valve operation shall **NOT** be manually overridden since ice condenser doors are very sensitive to over or under pressure conditions.

1.5 When Containment Air Release Filter unit pre-filter or absolute filter differential pressure reaches 2.5 inches H_2O, the standby fan is placed in service and action initiated to replace the dirty filter(s).

1.6 A new Gaseous Waste Release (GWR) sample is required if:

- 24 hours has elapsed since the last sample.
- VQ release is automatically terminated due to a valid controlling EMF actuation. If actuation is due to an EMF spike, the release may be re-attempted twice before a new sample is required.

1.7 A VP, VQ, or Unit Vent Sample is required if:

- Rx Trip or Startup occurs.
- Rated Thermal Power change of ≥ 15% in one hour occurs followed by a Thermal Power Stabilization (power level constant at desired power level).

1.8 If in Modes 5 or 6 and automatic termination of a release is **NOT** available, actions of SLC 16.11-7 apply.

2. Initial Conditions

_____ 2.1 Verify Containment Pressure > 0.09 psig.

_____ 2.2 Verify Control Room Supervisor has signed and dated the appropriate sheet of the Gaseous Waste Release (GWR) Record authorizing releases:

☐ "VQ release monitored by EMF 39L"
☐ "VQ release monitored by EMF 36L"

_____ 2.3 Verify Containment pressure increase is **NOT** due to a LOCA or steam line break.

_____ 2.4 Review the "SPECIAL INSTRUCTIONS FOR RELEASE" section on the Gaseous Waste Release Permit Report.

3. Procedure

_____ 3.1 Ensure the following enclosures are complete:

- ☐ Enclosure 4.4 (Auxiliary Building Valve Checklist)
- ☐ Enclosure 4.5 (Reactor Building Valve Checklist)
- ☐ Enclosure 4.6 (Auxiliary Building Independent Verification Valve Checklist)
- ☐ Enclosure 4.7 (Reactor Building Independent Verification Valve Checklist)

3.2 Perform one of the following:

_____ 3.2.1 **IF** 1EMF-39 (low range) is operable, perform the following:

_____ 3.2.1.1 Verify 1EMF-39L is specified for use on the Gaseous Waste Release Permit Report.

_____ 3.2.1.2 Verify 1EMF-39L is operable per SLC 16.11-7 using OP/0/A/6500/080 (EMF RP86A Output Modules).

_____ 3.2.1.3 Set 1EMF-39 (low range) setpoints to the value specified on the Gaseous Waste Release Permit Report using OP/0/A/6500/080 (EMF RP86A Output Modules).

☐ 3.2.1.4 Sign off the "EMF39L Operable and Source Checked" blank on the "VQ release monitored by EMF 39L" sheet of the Gaseous Waste Release (GWR) Record.

_____ 3.2.2 **IF** 1EMF-39 (low range) is inoperable **AND** 1EMF-36 (low range) is to be used to monitor this release, perform the following:

☐ 3.2.2.1 Verify 1EMF-36L is specified for use on the Gaseous Waste Release Permit Report.

☐ 3.2.2.2 Verify 1EMF-36L is operable using OP/0/A/6500/080 (EMF RP86A Output Modules).

NOTE: 1EMF-36 (low range) trip setpoints are pre-established for offsite dose.

☐ 3.2.2.3 Verify trip setpoints are set to the values as specified on the Gaseous Waste Release Permit Report using OP/0/A/6500/080 (EMF RP86A Output Modules).

☐ 3.2.2.4 Sign off the "EMF36L Operable and Source Checked" blank on the "VQ release monitored by EMF 36L" sheet of the Gaseous Waste Release (GWR) Record.

☐ 3.2.2.5 N/A the "IV" blank on the "VQ release monitored by EMF 36L" sheet of the Gaseous Waste Release (GWR) Record.

_____ 3.2.3 **IF** 1EMF-39L **AND** 1EMF-36L are inoperable, perform the following:

☐ 3.2.3.1 Verify EMF39L **AND** EMF36L are N/A'd on the Gaseous Waste Release Permit Report.

☐ 3.2.3.2 Notify RP to take grab samples per HP/0/B/1004/005 (Radioactive Gaseous Waste Release - VQ & VP System).
Person notified _____

☐ 3.2.3.3 N/A the "EMF36L **AND** EMF39L are both inoperable" blank on the "VQ release with EMF 39L **AND** EMF 36L Inoperable" sheet of the Gaseous Waste Release (GWR) Record.

☐ 3.2.3.4 N/A the "IV" blank on the "VQ release with EMF 39L **AND** EMF 36L Inoperable" sheet of the Gaseous Waste Release (GWR) Record.

☐ 3.2.3.5 N/A steps 3.3, 3.18 and 3.21.4.

3.3 Perform one of the following:

☐ 3.3.1 Monitor OAC point C1E0155 (EMF39L Containment Gas Monitor) for highest count rate during release.

OR

_____ 3.3.2 Set up EMF Chart recorder as follows:

☐ 3.3.2.1 Ensure the paper drive is on for the applicable EMF chart recorder:

- 1MICR6640 if 1EMF-39L is used
- 1MICR6650 if 1EMF-36L is used

☐ 3.3.2.2 Stamp and record the following on the chart paper:

- Date
- Time
- GWR #
- Initials

3.4 Adjust "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller (1MC5) by performing the following:

_____ 3.4.1 Depress the "A/M" pushbutton until the "A" light (auto) is illuminated.

_____ 3.4.2 Verify "VQ0100.S" appears in the display window.

_____ 3.4.3 Rotate the manual loader in the clockwise direction to open the valve to ≤ the "Recommended Release Rate (cfm)" on the Gaseous Waste Release Permit Report.

NOTE: The person performing Step 3.5 shall **NOT** be the same individual who originally performed the associated actions in Steps 3.2.1.3 and 3.4.3.

3.5 Perform the following:

_____ IV 3.5.1 **IF** 1EMF-39L is operable, independently verify trip setpoints are set to the values as specified on the Gaseous Waste Release Permit Report using OP/0/A/6500/080 (EMF RP86A Output Modules).

_____ IV 3.5.2 Independently verify "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller is set to ≤ the "Recommended Release Rate (cfm)" on the Gaseous Waste Release Permit Report.

3.6 Reset Totalizer on "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller (1MC5) by performing the following:

_____ 3.6.1 Depress the "D" pushbutton until "VQ0100.T" appears in the display window.

_____ 3.6.2 Depress the "Reset Total" pushbutton and verify a "0" appears in the display window.

_____ 3.7 Open the following valves (1MC5):
Record time first valve is opened _____

☐ 1VQ-2A (VQ Fan Suct From Cont Isol)
☐ 1VQ-3B (VQ Fan Suct From Cont Isol)

3.8 Place one VQ train in service as follows (1MC5):

_____ 3.8.1 **IF** placing A train in service, perform the following:

☐ 3.8.1.1 Place "VQ Filt Htr A" in the "AUTO" position.

☐ 3.8.1.2 Start "Cont Air Rel Fan 1A".

_____ 3.8.2 **IF** placing B train in service, perform the following:

☐ 3.8.2.1 Place "VQ Filt Htr B" in the "AUTO" position.

☐ 3.8.2.2 Start "Cont Air Rel Fan 1B".

NOTE: The procedure may continue while performing the following step.

_____ 3.9 Notify RP that the VQ release has been started and give start time as recorded in Step 3.7.
Person notified _____

3.10 Perform the following:

_____ 3.10.1 Record the VQ start date/time on the following:

☐ Appropriate Gaseous Waste Release (GWR) Record
☐ Control Room Autolog

_____ 3.10.2 Enter "0" in the "Initial Integrator Reading" blank of the appropriate Gaseous Waste Release (GWR) Record.

NOTE: Containment pressure is monitored to ensure 1VQ-10 (VQ Fans Disch To Unit Vent) closes at 0 psig to prevent a negative pressure inside containment.

_____ 3.11 **IF** the OAC **OR** Computer Point C1P1112 (Average Containment Pressure, Best) is out of service, record containment pressure as read on 1VQP5040 (Containment Pressure) on 1MC5 every 30 minutes in the Control Room Log for the duration of the VQ Release. {PIP 93-0074}

_____ 3.12 **IF** the VQ fan does **NOT** automatically shutdown at approximately 0 psig, perform the following:

- N/A Step 3.13.
- Perform Step 3.14.

_____ 3.13 **WHEN** Containment pressure decreases to approximately 0 psig, verify that "1VQ-10 VQ FANS DISCH TO UNIT VENT" closes by performing the following:

☐ 3.13.1 Depress the "D" pushbutton until "VQ0100.P" appears in the display window.

☐ 3.13.2 Verify no flow indicated on the controller display window.

NOTE: Solenoid 1VQSV0100 (VQ Containment Purge Flow Sol) will **NOT** reset 1VQSS0100 (VQ Fans Disch To Unit Vent) until a low containment pressure (lower containment pressure greater than 0psig) or high radiation signal condition (EMF35 or EMF36) is no longer present.

_____ 3.14 Reset solenoid 1VQSV0100 (VQ Containment Purge Flow Sol) by performing the following at"1VQ-10 VQ FANS DISCH TO UNIT VENT" controller:

☐ 3.14.1 Depress the "A/M" pushbutton until the "M" light (manual) is illuminated.

☐ 3.14.2 Verify "VQ0100.V" appears in the display window.

☐ 3.14.3 Rotate the manual loader counterclockwise until the display reads ≤ 0.

3.15 Secure the VQ train placed in service in Step 3.8 as follows:

_____ 3.15.1 **IF** securing A train, perform the following:

☐ 3.15.1.1 Ensure "Cont Air Rel Fan 1A" has stopped.

☐ 3.15.1.2 Place "VQ Filt Htr A" in the "OFF" position.

_____ 3.15.2 **IF** securing B train, perform the following:

☐ 3.15.2.1 Ensure "Cont Air Rel Fan 1B" has stopped.

☐ 3.15.2.2 Place "VQ Filt Htr B" in the ""OFF" position.

_____ 3.16 Close the following valves:
Record time both valves are closed _____

☐ 1VQ-2A (VQ Fan Suct From Cont Isol)
☐ 1VQ-3B (VQ Fan Suct From Cont Isol)

_____ 3.17 Obtain the totalized flow by performing the following:

☐ 3.17.1 On "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller, depress the display ("D") pushbutton until "VQ0100.T" (Totalized Flow) is displayed.

☐ 3.17.2 Record the totalizer reading _____

_____ 3.18 **IF** a chart recorder was used per Step 3.3.2, stamp and record the following on the chart paper:

- Date
- Time
- GWR #
- Initials

NOTE: The procedure may continue while performing the following step.

_____ 3.19 Notify RP that the VQ release has been terminated and give termination time as recorded in Step 3.16.
Person notified _____

_____ 3.20 Record the VQ terminate date/time on the Control Room Autolog.

_____ 3.21 Perform the following on the appropriate Gaseous Waste Release (GWR) Record:

☐ 3.21.1 Record the VQ terminate date/time.

☐ 3.21.2 Record totalizer value from Step 3.17.2 in "Final Integrator Reading" blank.

☐ 3.21.3 Record the "Final Integrator Reading" value in the 'Volume" blank.

☐ 3.21.4 Enter the "Highest EMF Reading" during the release as read on the chart recorder **OR** the highest reading from the OAC.

☐ 3.21.5 Sign the "Control Room Operator" blank.

NOTE: Trip setpoints greater than 1000 cpm are round down to the nearest 100 prior to entering to ensure the entered setpoint remains conservative.

_____ 3.22 **IF** 1EMF-39L was used for this release, reset 1EMF-39 (low range) trip setpoints using OP/0/A/6500/080 (EMF RP86A Output Modules):

_____ 3.22.1 **IF** in Mode 5, 6, or No Mode, the trip setpoints shall be as follows:

- Trip 2 = 10,000 cpm
- Trip 1 = 7000 cpm

_____ 3.22.2 **IF** in Mode 1, 2, 3, or 4, the trip setpoints shall be set as follows:

- Trip 2 = 3 X Containment Atmosphere Activity as indicated by EMF allowing about 15 minutes for indication to stabilize.
- Trip 1 = Trip 2 X .70

☐ 3.22.3 Signoff "EMF39L Setpoints reset to non-release value" blank on the "VQ release monitored by EMF 39L" sheet of the Gaseous Waste Release (GWR) Record.

NOTE: The person performing Step 3.23 shall **NOT** be the same individual who originally performed the associated actions in Steps 3.14.3, 3.22.1, or 3.22.2.

3.23 Perform the following:

_____ IV 3.23.1 **IF** 1EMF-39L is operable, independently verify trip setpoints are reset as described in Step 3.22.1 or 3.22.2 using OP/0/A/6500/080 (EMF RP86A Output Modules).

_____ IV 3.23.2 Independently verify "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller is reset by performing the following:

☐ 3.23.2.1 On "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller depress the "D" pushbutton until "VQ0100.V" appears in the display window.

☐ 3.23.2.2 Display reads ≤ 0.

_____ 3.24 **IF** 1EMF-36L was used for this release, perform the following:

_____ 3.24.1 Verify 1EMF-36L setpoints are set to the values recorded in the Operations EMF setpoint log.

_____ 3.24.2 Sign the "EMF36L Setpoints per OPS Setpoint Log" blank on the "VQ release monitored by EMF 36L" sheet of the Gaseous Waste Release (GWR) Record.

3.25 Do **NOT** file this enclosure in the Control Copy folder of this procedure.

94.
G 2.1.17
Conduct of Operations
Ability to make accurate, clear, and concise verbal reports.

NEW
A Security Event **NOT** involving a **HOSTILE ACTION** is in progress.

Which ONE of the following completes the statement below?

To determine IF a PA announcement to the site is needed, per the appropriate procedure, the Shift Manager will conduct a discussion with _____**(1)**_____; and use _____**(2)**_____ as guidance for what specific information to include in the PA announcement.

	(1)	**(2)**
A.	Security	RP/02, (Notification of Unusual Event)
B.	Security	NSD 217, (Nuclear Security Program)
C.	Station Manager	RP/02, (Notification of Unusual Event)
D.	Station Manager	NSD 217, (Nuclear Security Program)

Ans: A

References:
RP/0/A/5000/002, (Notification of Unusual Event)
NSD 217, (Nuclear Security Program), Section 217.11

Distractor Analysis

A. **CORRECT**. The procedure for Notification of Unusual Event is the only procedure which contains the specific information on what to include when making a PA announcement during a Security Event. For example, it contains two phone numbers which are to be announced so that site personnel can call to report any suspicious activity. This procedure also contains guidance on conducting a discussion with Security to aid in determining IF a PA announcement is to be made.

B. Incorrect. Plausible, since the Shift Manager will discuss with Security whether or not a PA announcement should be made. The Nuclear Security Program procedure is plausible, since it contains guidance on Security Events, and contains guidance on public address announcements, but it is directed toward plant personnel, and instructs them that they should follow the directions given over the PA.

C. Incorrect. Plausible, since the procedure is correct. Conducting a discussion with the Station Manager to aid in determining if a PA announcement needs to be made is plausible, for two reasons: 1.) the Station Manager is listed in several sections of the procedure for Notification of Unusual Event as someone to consult with. For instance, the Station Manager position is listed, along with the Shift Manager, as individuals who can decide to activate the Emergency Response Organization during an Unusual Event, if deemed necessary. 2.) It is also plausible that the Station Manager would be consulted on whether to make a plant announcement which affects the entire site, especially during a Security Event.

D. Incorrect. Conducting a discussion with the Station Manager to aid in determining if a PA announcement needs to be made is plausible, for two reasons: 1.) the Station Manager is listed in several sections of the procedure for Notification of Unusual Event as someone to consult with. For instance, the Station Manager position is listed, along with the Shift Manager, as individuals who can decided to activate the Emergency Response Organization during an Unusual Event, if deemed necessary. 2.) It is also plausible that the Station Manager would be consulted on whether to make a plant announcement which affects the entire site, especially during a Security Event.

The Nuclear Security Program procedure is plausible, since it contains guidance on Security Events, and guidance on public address announcements, but it is for plant personnel, and that they should follow the directions given over the PA.

K/A Match
The ability to make accurate, clear, and concise verbal reports is tested through knowledge of Public Address announcements for a particular type of event at the plant. The knowledge being tested matches the K/A because an important method of making verbal reports is the Public Address System, especially during implementation of the Emergency Plan; in this case, a Security Event involving a non-hostile action.

The "ability" aspect of making verbal reports is tested by knowledge of how to determine what information should be included in making the PA announcement (verbal report) to the entire site.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment and Selection of Procedures):
1.) The question canNOT be answered solely by knowing entry conditions for AOPs or plant parameters that require direct entry to major EOPs.
5.) The question requires the applicant to assess plant conditions involving a non-hostile action security event, and then select a procedure that will be used for guidance on making a decision on whether a Public Address announcement will be made, and whom would be consulted in making this decision.

This question also meets the following criteria for an SRO only question:
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 implement the requirements of the Emergency Plan procedures, including determining if plant announcements are to be made during a Security Event.

Lesson Plan OP-CN-EP-SEP, Learning Objective #18, (Apply the Immediate Actions required for a Notification of Unusual Event) is an SRO level learning objective.

Cognitive Level - Low

III. Justification for Plant Specific Exemptions

The 25 SRO-only questions ***shall*** evaluate the additional knowledge and abilities required for the higher license level in accordance with 10 CFR 55.43(b). [NUREG 1021, Section ES-401D.2.d]

The fact that a facility licensee trains its ROs to master certain 10 CFR 55.43 knowledge, skills, and abilities does NOT mean that they can no longer be used as a basis for SRO-only questions. [Operator Licensing Feedback Web page Item 401.36 @ http://www.nrc.gov/reactors/operator-licensing/op-licensing-files/ol-feedback.pdf]

The SRO-only test item is required to be tied to one of the 10 CFR 55.43(b) items. However, if a licensee desires to evaluate a knowledge/ability that is not tied to one of the 10 CFR 55.43(b) items, then the licensee can classify the knowledge/ability as "*unique to the SRO position*" provided that there is documented evidence that ties the knowledge/ability to the licensee's SRO job position duties in accordance with the systematic approach to training (SAT).

- **Justification**: A question that is not tied to one of the 10 CFR 55.43(b) items can still be classified as "SRO-only" provided the licensee has documented evidence to prove that the knowledge/ability is "*unique to the SRO position*" at the site. An example of documented evidence includes:

  - The question is linked to a learning objective that is specifically labeled in the lesson plan as being SRO-only (e.g., some licensee lesson plans have columns in the margin that differentiate AO, RO, and SRO learning objectives) [NUREG 1021, ES-401, Section D.2.d]

    AND/OR

  - A question is linked to a task that is labeled as an SRO-only task, and the task is NOT listed in the RO task list.

Enclosure 4.6

Fire/Explosion and Security Events

UNUSUAL EVENT

4.6.U.1-2 Report by plant personnel of an unanticipated **explosion** within **protected area** boundary resulting in **visible damage** to permanent structure or equipment or a loaded cask in the **ISFSI**.

4.6.U.2 **Confirmed SECURITY CONDITION or Threat Which Indicates a Potential Degradation in the Level of Safety of the Plant.**

OPERATING MODE: All

4.6.U.2-1 A **SECURITY CONDITION** that does **NOT** involve a **HOSTILE ACTION** as reported by the CNS Security Shift Supervision.

4.6.U.2-2 A credible site-specific security threat notification.

4.6.U.2-3 A validated notification from NRC providing information of an aircraft threat.

END

ALERT

- Plant personnel report **visible damage** to permanent structures or equipment within the specified area required to establish or maintain safe shutdown within the specifications.

Note: Only one train of a system needs to be affected or damaged in order to satisfy this condition.

4.6.A.2 **Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown.**

OPERATING MODE: No Mode

4.6.A.2-1 The following conditions exist:
(Non-security events)
Fire or **explosion** in any of the following areas:
- Spent Fuel Pool
- Auxiliary Building.
- RN Pump house

AND

One of the following:
- Spent Fuel Pool level and/or temperature show degraded performance

(Continued)

SITE AREA EMERGENCY

GENERAL EMERGENCY

Notification of Unusual Event

1. Symptoms

1.1 This condition exists when events are in process or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated.

2. Immediate Actions

NOTES: 1. Lines in left margin are for place keeping. Immediate actions may be performed simultaneously.

2. Only the Emergency Coordinator can complete Item 17 of the Emergency Notification Form to approve message for transmission

_____ 2.1 **Notify off-site agencies within 15 minutes of Emergency declaration time** using Emergency Notification Form. Refer to the appropriate notification procedure:

- RP/0/A/5000/006A, "Notifications to States and Counties from the **Control Room**"
- RP/0/A/5000/006B, "Notifications to States and Counties from the **Technical Support Center**"
- SR/0/B/2000/004, "Notifications to States and Counties from the **Emergency Operations Facility**"

_____ 2.2 **IF** there is an indication of a radioactive release **AND** the TSC is not activated, contact RP shift to perform off-site dose assessment per HP/0/B/1009/026

_____ 2.3 **IF** a radioactive release or hazardous material spill is occurring or has occurred **AND** the TSC is not activated, contact Environmental Management (EM), ext. 3333 for assistance in reporting to state, local or federal authorities. After hours, contact the Environmental Duty person by phone or pager. **IF** no answer, page 999-777-3333 which will page all Environmental Management personnel.

_____ 2.4 **IF** a Security Event exists, discuss the need to make the following announcement over the PA system with Security at extension 5364:

RIGHT ANSWER

"This is the Operations Shift Manager. A Security Event is in progress. Do not move about the site. Remain at your present location until further notice. Report any suspicious activities to the SAS at extension 5765 or 5766." **Repeat announcement.**

_____ 2.8.3 **IF** neither facility can take turnover, maintain command and control until one of the facilities is capable of accepting turnover.

3. Subsequent Actions

NOTE:	Subsequent Actions are not required to be followed in any particular sequence.

_____ 3.1 **IF** ERO has not been activated, notify Duty Station Manager (see current duty list).
DISTRACTOR

_____ 3.2 Make Follow-up Notifications using applicable "Notifications to States and Counties" procedure.

_____ 3.3 **IF** Security Event announcement, discussed above, was made over the PA system, make the following announcement over the PA system after the Security Event has been terminated:

"This is the Operations Shift Manager. The Security Event has been terminated. Return to normal work activity." **Repeat announcement**.

_____ 3.4 Augment shift resources to assess and respond to the emergency situation as needed.

_____ 3.5 Assign the Emergency Planning Manager (or delegate) to close out the Emergency by a verbal summary to county and state authorities. Document this summary using Enclosure 4.3.

_____ 3.6 Assign an individual to provide a written summary to state and county authorities within thirty days. This report could be an LER or written report if an LER is not required.

Person assigned responsibility _____

4. Enclosures

4.1 Emergency Organization Activation

4.2 OSM to TSC Emergency Coordinator Turnover Form

4.3 Unusual Event Close Out Briefing with States and Counties

call is received in an area where the recording system is available, it should be activated as soon as the call is determined to be a bomb threat. Another individual should listen to the call using another extension if possible.

Immediately after receipt of the call, the person receiving the call shall dial 4911 and ensure notification of the Operations Shift Manager. The Emergency Coordinator / Operations Shift Manager (in coordination with the Security Shift Supervisor) will determine the extent of the threat and shall consider the need to assemble personnel and evacuate any affected areas (based on information available). The need to initiate a search of the station will be based upon information from the person who received the call, Bomb Threat Checklist and other available information. The search will be conducted by the designated group (e.g. security force / fire brigade). Plant personnel may be asked to check their areas for unusual objects prior to departure.

Note: If a bomb threat should occur during backshifts or on weekends, it may be necessary for the Emergency Coordinator/ Security Shift Supervisor to call out additional personnel through appropriate supervision to assist in the bomb threat search.

Caution: Personnel should not move, tamper with, or handle any suspected explosive device. Do not turn on/off lights, or use radio systems for communications. The Security Shift Supervisor will ensure all personnel involved in the search are advised of these precautions.

If a suspected explosive device is found the Emergency Coordinator/Security Shift Supervisor shall take actions as required by station security/emergency procedures.

It is possible that a bomb threat could develop by mere detection of a suspicious device. Any person discovering a suspected explosive device, or any suspicious object that appears to be out of place, should immediately notify his/her supervisor of the location, time discovered, and other pertinent information. This situation would then be handled similar to the case of finding the device during the response to a bomb threat phone call.

217.11 SECURITY EVENTS/DRILLS *DISTRACTOR*

To aid in ensuring employee safety during a security event or drill at the site, personnel are expected to follow the directions of plant public address announcements and/or security officers. Unless otherwise instructed by the Control Room, Security Shift Supervisor or immediate supervision, station personnel should remain at their current location and take necessary protective cover. Do not attempt to return to your work location during a security event.

217.12 CAMERAS/PHOTOGRAPHY

All photography within or immediately adjacent to the Owner-Controlled Area (OCA) is restricted to approved work-related purposes only. Security should be notified of any photography to be conducted in the exterior areas of the OCA. All news media and public requests for photography must be coordinated through Public Affairs and approved by Security. There are no restrictions on personally owned photographic devices/equipment being carried in vehicles within the Owner-Controlled Area.

Cameras for personal use are prohibited within the protected and vital areas. Employees and vendors with unescorted access may bring personally owned electronic devices with integral cameras (cell phones, PDAs, laptop computers, etc.) inside the protected area. The camera feature in these electronic devices **shall not** be utilized within the protected area. Use of personal cameras within the protected area will result in corrective action and/or denial of site access. Employees and vendors with escorted access only (Visitors) will not normally be allowed to bring cameras or electronic equipment with integral cameras inside the protected area. Exceptions must be approved by the Security Manager/designee.

Use of company owned photographic equipment (Duke or vendor) is permitted within the Protected or Vital Area for work related purposes. An authorization form is required for approved photographic use. This form can be obtained from Security or from the Security site web page. The form should identify the equipment, the areas and/or purpose it will be used, the individual(s) or Group(s) approved to use, and an expiration date. Camera/Photography Authorization Forms must be approved by a Duke Energy manager.

Photography will NOT be allowed unless a valid business/operational need exists. No photographs, video or digital images of structures, systems, equipment, facilities, grounds or other items which contain proprietary information

95.
G 2.1.7
Conduct of Operations
Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

BANK CNS #503
Given the following initial conditions:

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

Subsequent 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 whether to transition to FR-I.3, (Response to Voids in Reactor Vessel).

Which ONE of the following describes the correct action which will control void growth such that natural circulation is not interrupted, and which procedure will be used for this action?

A. Open reactor vessel head vents per FR-I.3.

B. Open reactor vessel head vents per ES-0.3.

C. Energize pressurizer heaters per FR-I.3.

D. Energize pressurizer heaters per ES-0.3.

Ans: D

References:
ES-0.3, (Natural Circulation Cooldown)
ES-0.2, (Natural Circulation Cooldown)
FR-I.3, (Response to Voids in Reactor Vessel)

Distractor Analysis

A. Incorrect. Plausible, since this is an action in FR-I.3 to vent a non-condensible bubble, but these conditions are NOT for a non-condensible 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-condensible 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).

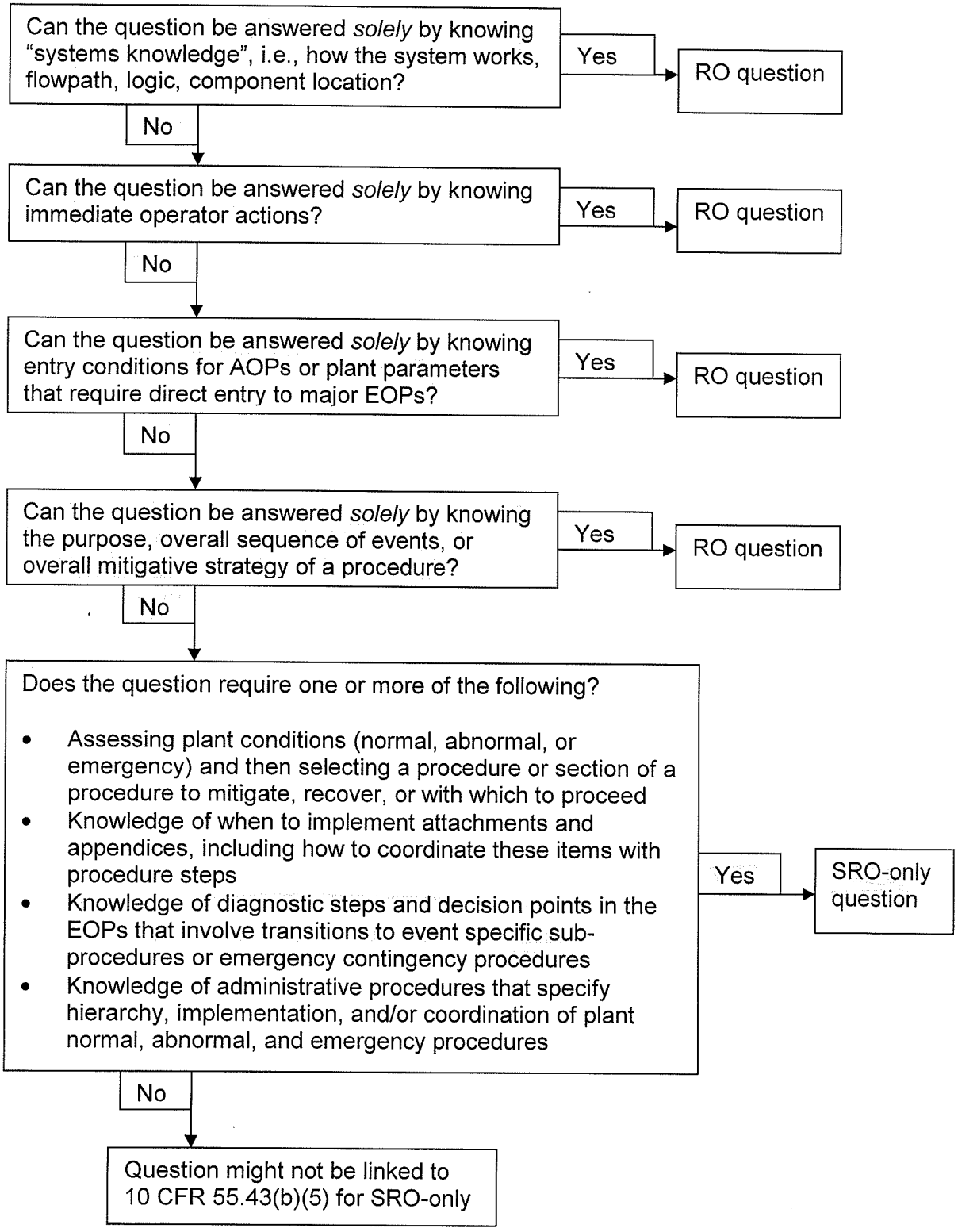
D. **CORRECT**. ES-0.3 is implemented if the 50°F/hr cooldown of ES-0.2 limit is not fast enough. ES-0.3 is designed to perform a plant cooldown on natural circulation, assuming that a void will develop in the reactor vessel head region. The operator monitors the void growth and the procedure requires 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.

K/A 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 sub-procedure for the conditions.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010)" under the Screening Criteria for question linked to 10CFR55.43(b)(5) (Assessment of conditions and selection of appropriate procedures):
1.) The question canNOT be answered solely by knowing systems knowledge.
3.) The question canNOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure. 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).
5.) The question does require the applicant to assess plant conditions and then selecting a sub-procedure with which to proceed.

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.

Figure 2: Screening for SRO-only linked to 10 CFR 55.43(b)(5) (Assessment and selection of procedures)



ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

5. **Control Pzr level as follows:**

__ a. Verify Pzr Level - GREATER THAN 25%.

a. Perform the following:

__ • Control charging and letdown as necessary to increase Pzr level to greater than 25%.

__ • Maintain charging flow less than 180 GPM.

__ b. Verify Pzr Level - LESS THAN 90%. → b. Perform the following:

__ 1) Operate Pzr heaters to maintain Pzr pressure stable.

2) Decrease Pzr level to less than 90% by one of the following methods:

__ • Control charging and letdown

OR

__ • Continue cooldown to shrink NC System inventory.

__ 6. **Verify "REACTOR VESSEL UR LEVEL" - GREATER THAN 73%.** → **Perform the following:**

__ a. Increase NC System pressure to restore "REACTOR VESSEL UR LEVEL" to greater than 73%.

__ b. Control NC System depressurization in subsequent steps to maintain "REACTOR VESSEL UR LEVEL" greater than 73%.

__ c. **RETURN TO** Step 4.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **IF EP/1/A/5000/ES-0.3 (Natural Circulation Cooldown With Steam Void In Vessel) is in progress, THEN RETURN TO procedure and step in effect.**

2. **Verify S/I has been terminated as follows:**

__ **RETURN TO procedure and step in effect.**

__ • Both NI pumps - OFF

__ • 1NI-9A (NV Pmp C/L Inj Isol) - CLOSED

__ • 1NI-10B (NV Pmp C/L Inj Isol) - CLOSED.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. **Establish stable NC System conditions as follows:**

___ a. Verify Pzr level - GREATER THAN 90%.

___ a. Control charging and letdown as required to increase Pzr level to greater than 90%.

___ b. Verify NC pressure - STABLE. → b. Perform the following:

___ 1) Energize Pzr heaters and use normal Pzr spray to stabilize NC pressure.

2) **IF** normal Pzr spray is not available **AND** letdown is in service, **THEN** use NV aux spray as follows:

a) Ensure the following valves - CLOSED:

___ • 1NC-27 (Pzr Spray Ctrl Frm Loop A)

___ • 1NC-29 (Pzr Spray Ctrl Frm Loop B)

___ • 1NV-39A (NV Supply To Loop D Isol)

___ • 1NV-32B (NV Supply To Loop A Isol).

___ b) Maintain charging flow less than 180 GPM.

___ c) Throttle 1NV-37A (NV Supply To Pzr Aux Spray) and charging flow as required to stabilize NC pressure.

___ c. Verify all NC T-Hots - STABLE.

___ c. Dump steam as necessary to stabilize NC T-Hots.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

23. **Vent reactor vessel head as follows:**

__ a. Ensure operator monitors Enclosure 6 (Reactor Vessel Venting Termination Criteria).

b. Align vent path by opening the following valves:

__ • 1NC-250A (Rx Head Vent Block)
__ • 1NC-251B (Rx Head Vent).

DISTRACTOR

b. **IF** vent path cannot be aligned, **THEN** perform the following:

1) Ensure the following valves - CLOSED:

__ • 1NC-250A (Rx Head Vent Block)
__ • 1NC-251B (Rx Head Vent).

2) Dispatch operator to remove white tags and close the following breakers:

__ • 1EMXL-F10C (Reactor Vessel Head Vent Motor (1NC252B)) (AB-560, BB-47, Rm 372)

__ • 1EMXS-F03E (Reactor Vessel Head Vent Motor (1NC253A)) (AB-577, BB-49, Rm 496).

3) Align alternate vent path by opening the following valves:

__ • 1NC-252B (Rx Head Vent Block)

__ • 1NC-253A (Rx Head Vent).

__ c. Verify any venting termination criterion - EXCEEDED.
Refer to Enclosure 6 (Reactor Vessel Venting Termination Criteria).

c. Perform the following:

__ 1) Continue venting.

__ 2) Do not continue in this procedure until any venting termination criterion is exceeded.

d. Ensure all of the following vent valves - CLOSED:

__ • 1NC-250A (Rx Head Vent Block)
__ • 1NC-251B (Rx Head Vent)
__ • 1NC-252B (Rx Head Vent Block)
__ • 1NC-253A (Rx Head Vent).

96.
G 2.2.20
Equipment Control
Knowledge of the process for managing troubleshooting activities.

NEW
A planned troubleshooting activity will involve the following two items:

ITEM #1. Placing a jumper on a non-Tech. Spec. component

ITEM #2. Rendering a separate component INOPERABLE, per Tech. Specs.

Which ONE of the following describes an individual who is required to sign for approval of this particular troubleshooting plan, and why?

A. Superintendent of Operations, because of ITEM #1.

B. Superintendent of Operations, because of ITEM #2.

C. Engineering Supervisor, because of ITEM #1.

D. Engineering Supervisor, because of ITEM #2.

Ans: B

Reference:
OP/0/A/6350/014, (Troubleshooting Guidelines), 2.1, 2.11, 2.12, and Enclosure 4.2, page 4 of 4.

Distractor Analysis

A. Incorrect. Plausible, since guidance for placing of jumpers (for any equipment, Tech. Spec. related, or otherwise) is listed in the Troubleshooting Guidelines procedure. The applicant could easily misapply this and reason that since it involves a jumper, approval by Operations would be required. However, the question is testing knowledge of the signature approval aspect of the troubleshooting process. The placing of jumpers only requires a review of the plan by Engineering, and does not require any signature.

B. **CORRECT.** Per Operating Procedure OP/0/A/6350/014, (Troubleshooting Guidelines), if the troubleshooting plan will render a system or component inoperable, the plan shall be approved by the Superintendent of Operations. This guidance is given in the body of the procedure, and in Enclosure 4.2, "Troubleshooting Plan Record," Signature Blank 7.2 for approval by the Superintendent of Operations.

C. Incorrect. Plausible, since Engineering does review troubleshooting plans which will involve placement of jumpers. However, there is no approval nor signature obtained from Engineering.

D. Incorrect. Plausible, because Engineering does get involved in several aspects of the troubleshooting process, per the Troubleshooting Guidelines procedure; e.g., sliding links, jumpers, lifting leads, etc.. It is plausible for an applicant to misapply these aspects and conclude that they extend to inoperability of Tech. Spec. equipment, and therefore requires approval. However, the only signature approval is from the Superintendent of Operations.

K/A Match
Question matches the K/A because it tests knowledge of key elements of the process for managing troubleshooting activities: Assessing the type of planned troubleshooting activity and review and approval requirements.

Basis for SRO Only
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 be knowledgeable of the troubleshooting process, and manage that process, including knowledge of review and approval requirements, based on the type of troubleshooting that is planned, and the effect on plant equipment.

The following tasks are from CNS SRO Task List, and are SRO only, and do not appear on the RO task list.

301ADM018 Perform a Troubleshooting Plan Procedure
301ADM019 Complete a Troubleshooting Plan Record

Cognitive Level - Low

III. Justification for Plant Specific Exemptions

The 25 SRO-only questions ***shall*** evaluate the additional knowledge and abilities required for the higher license level in accordance with 10 CFR 55.43(b). [NUREG 1021, Section ES-401D.2.d]

The fact that a facility licensee trains its ROs to master certain 10 CFR 55.43 knowledge, skills, and abilities does NOT mean that they can no longer be used as a basis for SRO-only questions. [Operator Licensing Feedback Web page Item 401.36 @ http://www.nrc.gov/reactors/operator-licensing/op-licensing-files/ol-feedback.pdf]

The SRO-only test item is required to be tied to one of the 10 CFR 55.43(b) items. However, if a licensee desires to evaluate a knowledge/ability that is not tied to one of the 10 CFR 55.43(b) items, then the licensee can classify the knowledge/ability as "*unique to the SRO position*" provided that there is documented evidence that ties the knowledge/ability to the licensee's SRO job position duties in accordance with the systematic approach to training (SAT).

- **Justification**: A question that is not tied to one of the 10 CFR 55.43(b) items can still be classified as "SRO-only" provided the licensee has documented evidence to prove that the knowledge/ability is "*unique to the SRO position*" at the site. An example of documented evidence includes:

  - The question is linked to a learning objective that is specifically labeled in the lesson plan as being SRO-only (e.g., some licensee lesson plans have columns in the margin that differentiate AO, RO, and SRO learning objectives) [NUREG 1021, ES-401, Section D.2.d]

    AND/OR

  - A question is linked to a task that is labeled as an SRO-only task, and the task is NOT listed in the RO task list.

Operations Troubleshooting Guidelines

1. Purpose

To establish controls and boundaries for the purpose of troubleshooting components/systems under Operations Group control.

2. Limits And Precautions

CORRECT ANSWER

2.1 Superintendent of Operations (or Duty Superintendent) should concur with any troubleshooting plan that results in making any system or component incapable of performing intended function and/or inoperable per Technical Specifications.

2.2 Operations Shift Manager shall approve all troubleshooting plans.

2.3 Unit/WCC SRO shall approve all troubleshooting plans for assigned unit.

2.4 Use extreme caution during troubleshooting activities to minimize risk of inadvertent Reactor or Turbine trips, isolations, or equipment inoperability.

2.5 Consider the need for red tags if the troubleshooting activity could jeopardize the safety of personnel involved.

2.6 Independent Verification shall be performed per OMP 1-5 (Independent Verification).

2.7 Do **NOT** exceed design limits of operating parameters (temperature, pressure, etc.) for any system or component.

2.8 Plant Configuration shall be controlled by approved method:

- Approved procedures
- R&R process

2.9 Troubleshooting Plan procedure shall **NOT** be used if existing plant procedures (including those requiring procedure changes) are available to perform task(s) under consideration.

2.10 Every effort should be made to **NOT** turnover troubleshooting activity to on-coming shift. If it becomes necessary, a thorough turnover of procedure in-progress is required. Supervisor in charge of troubleshooting activity and operator that performed steps shall (at a minimum) be present with on-coming supervisor. This may require on-station turnover.

DISTRACTOR

2.11 If any of the following is affected, review of plan by Engineering shall be performed:

- Maintenance Rule Risk Significant System (PRA Matrix)
- System/component interlocks
- Lifting leads
- Placing jumpers
- Sliding Links

2.12 When manually operating any motor operated valve, minimize the torque applied to the handwheel.

2.13 After manual operation, maintenance or packing adjustment of any motor operated safety related valve, it shall be cycled electrically to ensure reliable automatic operation.

3. Procedure

Refer to Section 4 (Enclosures).

4. Enclosures

4.1 Troubleshooting Plan Procedure

4.2 Troubleshooting Plan Record

4.3 Troubleshooting Plan Record Addendum

7. Review and Approval:

   7.1 Reviews:

   SRO _____

   Cross Disciplinary Review By (if required) _____

   Additional Review By (if required) ENGINEERING (DISTRACTOR)

   7.2 Approvals:

   Unit/WCC SRO for affected unit _____

   Operations Shift Manager _____

   Superintendent of Operations/Duty Superintendent (if required) CORRECT ANSWER

8. Troubleshooting Results:

9. Thoroughness and effectiveness of plan:

SRO TASKLIST

300ASP001	Apply generic knowledge of the ASP (Auxiliary Shutdown Panel Complex) Component
300CCM001	Apply generic knowledge of the CCM (Core Cooling Monitor) System
300CDG001	Apply Generic Knowledge of the D/G (Diesel Generator) Component
300CMT001	Apply generic knowledge of the MT (Main Turbine) Component and ITE (Turbine Supervisory Instrumentation) System
300CNT001	Apply Generic knowledge of the CNT (Containment) Component
300CSG001	Apply Generic knowledge of the S/G (Steam Generator) Component
300EBH001	Apply generic knowledge of the EBH (230kV Switchyard 125VDC Power Supply) System
300EBI001	Apply Generic Knowledge of the EBI (Switchyard 480/208/120 VAC Power Subsystem) system.
300EDA001	Apply Generic Knowledge of the EDA (Digital Rod Position Indication (DRPI)) System.
300EGB001	Apply generic knowledge of the EGB (Main Generator) System
300EMB001	Use Annunciators and associated Response Procedures to address alarms
300EMD001	Apply generic knowledge of the EMD (Loose Parts Monitoring) system.
300EMF001	Apply Generic knowledge of the EMF (Radiation Monitoring) Component
300ENA001	Apply Generic Knowledge of ENA (Movable Incore Detector) System
300ENB001	Apply Generic Knowledge of the ENB (Excore Nuclear Instrumentation) system.
300ENC001	Apply Generic Knowledge of the ENC (Neutron Flux Monitoring) system.
300EPA001	Apply generic knowledge of the EPA (230 KV/22KV Main Power) System
300EPB001	Apply generic knowledge of the EPB (6.9 kV Electrical Distribution) System
300EPC001	Apply generic knowledge of the EPC (4.16 Essential Electrical Distribution) System
300EPD001	Apply generic knowledge of the EPD (600v Electrical Distribution System - Unit & Shared) System
300EPE001	Apply generic knowledge of the EPE (600V Essential Power Distribution) System
300EPF001	Apply Generic Knowledge of the EPF/EPR (240/120VVAC Aux. Control Power / 125/120VAC Aux. Control Power) Systems
300EPJ001	Apply Generic Knowledge of the EPJ (250V DC Power Distribution) System
300EPL001	Apply Generic Knowledge of the EPG/EPL (125 VDC/120 VAC Vital Instrumentation and Control Power) System
300EPLAN1	Apply generic knowledge of the Emergency Plan (RPs)
300EPM001	Apply Generic Knowledge of the EPM (13.8 KV Power) System
300EPQ001	Apply Generic knowledge of the EPQ (125V D/G Auxiliary Power) System
300EQB001	Apply generic knowledge of the EQB (Diesel Generator Load Sequencer) system.
300ETB001	Apply generic knowledge of the ETB (4.16kv Blackout Power) System
300ETC001	Apply generic knowledge of the ETC (600V Blackout Distribution) System
300ETF001	Apply generic knowledge of the ETF (600V Cooling Tower) System
300ETM001	Apply generic knowledge of the ETM (SSF Auxiliary Power) System
300IDE001	Apply generic knowledge of the IDE (Steam Dump Control) system.
300IEE001	Apply generic knowledge of the IEE (Seismic Monitoring) system.
300IFE001	Apply Generic knowledge of the IFE/IWE (Steam Generator Level Control/ Feedpump Speed Control) systems.
300ILE001	Apply generic knowledge of the ILE (Pressurizer Level Control) System
300IPB001	Apply generic knowledge of the IPB (Isolated Phase Bus Cooling) System
300IPE001	Apply generic knowledge of the IPE (Pressurizer Pressure Control) System
300IPX001	Apply generic knowledge of the IPX (Reactor Protection) System.
300IRE001	Apply Generic Knowledge of the IRE (Full Length Rod Control)system.
300IRX001	Apply generic knowledge of IRX (Reactor Control) System
300ISE001	Apply Generic Knowledge of the ISE (Engineered Safeguard Actuation) System.
300LRT001	Apply generic knowledge of LRT (Containment Leak Rate Testing)
300MAD001	Apply generic knowledge of the AD/ETL (SSF Diesel Generator) System

300MVE001	Apply Generic Knowledge of the VE (Annulus Ventilation) system.
300MVF001	Apply Generic Knowledge of the VF (Spent Fuel Building Ventilation) system.
300MVG001	Apply generic knowledge of the VG (Diesel Generator Starting Air) System
300MVH001	Apply Generic Knowledge of the VH (TSC Ventilation) system.
300MVI001	Apply Generic Knowledge of the VI (Instrument Air) and VS (Station Air) systems.
300MVJ001	Apply Generic Knowledge of the VJ/YJ (Computer Room Ventilation/Chilled Water) system.
300MVP001	Apply Generic Knowledge of the VP (Containment Purge) system.
300MVQ001	Apply generic knowledge of the VQ (Containment Air Release/ Addition) System
300MVV001	Apply generic knowledge of the VV (Containment Ventilation) System
300MVX001	Apply generic knowledge of the VX / VY (Containment Hydrogen Control/ Hydrogen Purge) System
300MVZ001	Apply Generic Knowledge of the VZ (RN Pump Structure Ventilation) system.
300MWC001	Apply generic knowledge of WC/WD/WY (conventional waste water/ roof drain, Yard Drain) systems
300MWG001	Apply Generic Knowledge of the WG (Waste Gas) system.
300MWL001	Apply generic knowledge of the WL (Liquid Waste) System
300MWN001	Apply generic knowledge of the WN (D/G Room Sump) system
300MWP001	Apply Generic Knowledge of the WP (Turbine Building Sump) system.
300MWZ001	Apply generic knowledge of the WZ (Groundwater Drainage) System
300MYH001	Apply Generic Knowledge of the YH (Plant Heating Water) system.
300MYN001	Apply generic knowledge of the YN (Auxiliary Building Cooling Water) System
300MYV001	Apply generic knowledge of the YV (Containment Chill Water) System
300MZM001	Apply generic knowledge of the ZM/ZJ (Main Condenser Vacuum/ Cindenser Air Removal) System
300MZP001	Apply Generic Knowledge of the ZP (Vacuum Priming) system.
300NCP001	Apply generic knowledge of the NCP (Reactor Coolant Pump) Component
300SAM001	Apply Generic Knowledge of SAMG (Severe Accident Mitigation Guidelines) and Diagnostic Flow Charts (DFCs).
300SSF001	Apply generic knowledge of the SSF (Standby Shutdown Facility)
301ADM001	Authorize a liquid or Gaseous Waste release.
301ADM005	Comply with the requirements of SLC 16.13-4 (Minimum Station Staffing Requirements)
301ADM011	Comply with the requirements of SLC 16.13-1 (Fire Brigade)
301ADM017	Perform a Quarterly Self-Assessment and Complete the Manager Observation Report Form
301ADM018	Perform a Troubleshooting Plan Procedure
301ADM019	Complete a Troubleshooting Plan Record } 3 SRO ONLY TASKS
301ADM020	Complete a Troubleshooting Plan Record Addendum
301ADM050	Correctly apply the Maintenance Rule to plant situations
301ADM054	Comply with the requirements of 10CFR50.54; Conditions of Licenses
301EPS001	Evaluate 4160 V Essential Switchgear Positioning for Tech Spec Applicability
301NSD001	Comply with the requirments for Shift Manning and Overtime Requirements including fire brigade coverage per NSD200, NSD211, and OMP 1-10.
301NSD002	Determine if an Operational Event was Directed Against Plant Equipment
301NSD004	Determine the Operability Status of a Structure, System, Subsystem, Train, Component, or Device
301NSD006	Complete the Required Entries in Operational Response to Acts Directed Against Plant Equipment
301NSD007	Determine if an Operational Event has Affected Station Operations or Operating Indications
301NSD009	Determine/Authorize Bypassing a Fuel Handling Interlock
301NSD010	Approve a Hazard Barrier to Maintain Operability of Systems, Structures and Components

97.
G 2.3.12
Radiation Control
Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

NEW
Given the following Unit 1 conditions:

- Following a refueling outage, the Unit is in Mode 2.
- Containment integrity was initially established.
- Subsequently, it was determined that the status of the Personnel Air Locks (PAL) is as follows:
  - Upper Airlock Inner Door Operable
  - Upper Airlock Outer Door Operable
  - Lower Airlock Inner Door Inoperable
  - Lower Airlock Outer Door Operable
- Repairs required are on the barrel (airlock side of the inner door).

Which ONE of the following describes;

(1) which PAL door(s) the maintenance personnel will use for entering containment to make the needed repair,

AND

(2) which document provides guidance to the WCC SRO for determining which door is to be used for the entry?

A. (1) Lower Airlock Outer Door
(2) Bases for Tech. Spec. 3.6.2, (Containment Air Locks)

B. (1) Lower Airlock Outer Door
(2) Site Directive 3.1.2, (Access to Reactor Building and Areas Having High Pressure Steam Relief Devices)

C. (1) Upper Airlock Outer and Inner Doors
(2) Bases for Tech. Spec. 3.6.2, (Containment Air Locks)

D. (1) Upper Airlock Outer and Inner Doors
(2) Site Directive 3.1.2, (Access to Reactor Building and Areas Having High Pressure Steam Relief Devices)

Ans: A

References:
Site Directive 3.1.2, Access to Reactor Building and Areas Having High Pressure Steam Relief Devices
LCO 3.6.2, Action Note 1, Bases

Distractor Analysis

A. **CORRECT.** TS 3.6.2 Bases (Containment Air Locks), contains a Note that allows entry and exit to perform repairs on air lock components. The conditions in the stem involve repairs on the barrel side (inside the airlock) of an INNER door. In this case, the OUTER door is opened, and the barrel side of the INNER door is accessed for making the repairs. Per the Tech. Spec. basis, there is a period of time (when the OUTER door is opened for access) that the containment boundary may not be intact. However, it is a short period of time, and there is a low probability of an event which could pressurize containment, and therefore is reasonable, per the Bases document.

B. Incorrect. Plausible, since the door used for entry is correct. The use of Site Directive 3.1.2, (Access to Reactor Building and Areas Having High Pressure Steam Relief Devices) is plausible, since it does provide guidance for containment entry, and stem conditions involve a containment entry. Site Directive 3.1.2 also contains several detailed notes and steps pertaining to inner and outer doors, and actions required after an entry has been made. Therefore, it is plausible that an applicant could misapply this directive as the source of guidance for the conditions in the question.

C. Incorrect. Plausible, since the second part is correct. Entry via the Upper Airlock Outer and Inner Doors is plausible, since there is a Note in LCO 3.6.2, Containment Air Locks which says that "Entry and exit is permissible to perform repairs on the affected air lock components." The Tech. Spec. Basis further states that it is preferred that the air lock be accessed from inside primary containment by entering through the other operable air lock. However, the Bases also states that if the repairs to be performed are on the barrel side of the door, that entry is then made through the operable door.

D. Incorrect. Plausible, since the use of Site Directive 3.1.2, (Access to Reactor Building and Areas Having High Pressure Steam Relief Devices) does provide guidance for containment entry, and the stem conditions involve a containment entry. Site Directive 3.1.2 also contains several detailed notes and steps pertaining to inner and outer doors, and actions required after an entry has been made. Therefore, it is plausible that an applicant could misapply this directive as the source of guidance for the conditions in the question.

Entry via the Upper Airlock Outer and Inner Doors is plausible, since there is a Note in LCO 3.6.2, Containment Air Locks which says that "Entry and exit is permissible to perform repairs on the affected air lock components." The Tech. Spec. Basis further states that it is preferred that the air lock be accessed from inside primary containment by entering through the other operable air lock. However, the Bases also states that if the repairs to be performed are on the barrel side of the door, that entry is then made through the operable door.

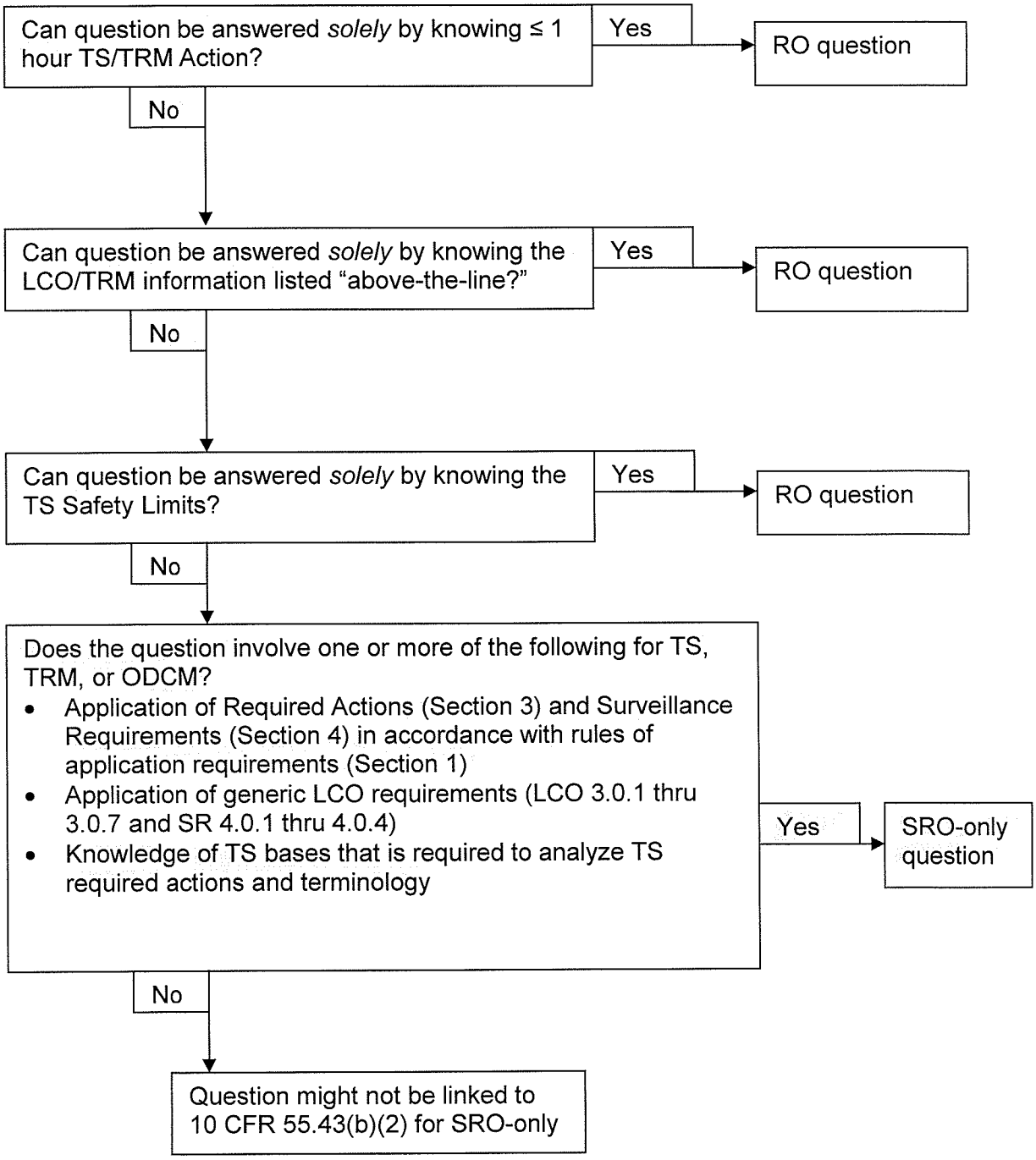
K/A Match
The applicant must apply knowledge of containment entry requirements to analyze a set of conditions pertaining to a required repair on one of the Personnel Air Locks. Therefore, the K/A is matched.

Basis for SRO Only
This question meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010" under the Screening Criteria for questions linked to 10CFR55.43(b)(2) (Tech Specs):
1) It can NOT be answered solely by knowing < 1 hour Tech Specs.
2) It can NOT be answered solely by knowing the LCO/TRM information listed "above-the-line".
3) It can NOT be answered by knowing the Tech Spec Safety Limits or their bases.
4) It requires the applicant to have detailed knowledge of Tech Spec 3.6.2 (Containment Air Locks) and to apply knowledge of the TS 3.6.2 Basis Document to determine the correct answer.

This question ALSO meets the following criteria for an SRO only question as described in the "Clarification Guidance for SRO-only Questions (Rev 1 dated 03/11/2010" under the Screening Criteria for questions linked to 10CFR55.43(b)(2) (Assessment of conditions and selection of appropriate procedures):
1) The question canNOT be answered solely by knowing systems knowledge. The question requires detailed knowledge and understanding of "below the line" and basis information from Tech. Spec. 3.6.2.
5) The question does require the applicant to recall and apply Tech. Spec. basis information, analyze the needed repair, including the significance of its location, and then determine the appropriate method of containment entry in order to make the repair.

Cognitive Level - HIGH
This is a higher cognitive level question because it involves a level of analysis of the given situation, applying knowledge of containment entry requirements, including Technical Specifications for Containment Air Locks, and predicting the method which should be used to accomplish a needed repair on one of the airlock doors.

Figure 1: Screening for SRO-only linked to 10 CFR 55.43(b)(2) (Tech Specs)



3. References

3.1 CNS Technical Specifications 3.5.2, 3.6.2, and 3.6.14

3.2 OP/0/A/6700/006, Personnel Air Lock Operation

3.3 CNS Selected Licensee Commitment 16.6-1

4. Additional Information

4.1 For this directive, the following definitions apply:

4.1.1 Reactor Building - Includes both the Annulus area and Containment structure.

4.1.2 Annulus - Area between the concrete Reactor Building structure and steel Containment structure.

4.1.3 Containment - Steel structure inside the Reactor Building which is typically accessed by the Personnel Air Locks or the Equipment Hatch.

4.1.4 Buddy System - Organizing two (2) or more employees into work groups in such a manner that each employee of the work group is designated to be observed by at least one other employee in the work group for the purpose of providing rapid assistance in the event of an emergency.

4.2 Opening the outer airlock door does not constitute a Containment entry. The inner door must be opened for a Containment entry to have been made. However, if the outer door is opened, it still must be leak tested per Tech Spec surveillance SR 3.6.2.1. Opening the CAD door to enter the airlock is considered an Annulus entry.

4.3 Security Considerations

- When the unit is in Modes 5 or 6, the CADs may be propped open and remote cards readers or other methods will be utilized by Security to maintain access documentation.
- Security is not required to use the Buddy System during CAD door testing.

5.1.4.1 Lower Containment

CAUTION: No entry is permitted into the lower containment during ENA (Incore Instrumentation System) detector movement.

- The group entering shall obtain approval from Radiation Protection and pre-job brief from the WCCSRO.
- Unless otherwise stipulated, the pre-job authorization is intended for one job.

A. In Modes 1 or 2, entry into Lower Containment outside the crane wall (Entrance Area, Incore Table, Pipe Chase) requires pre-job authorization for each job from a Radiation Protection General Supervisor or designee.

B. Entry into Lower Containment inside the crane wall (Labyrinth) requires management approval based on reactor power level.

1. Entry at > 0% and < 5% power requires pre-job authorization for each job from the Radiation Protection Manager or designee.

2. Entry at > 5% power requires pre-job authorization for each job from Radiation Protection Manager or designee and Station Manager or designee.

C. Entry into the Lower Ice Condenser in Modes 1 or 2 requires management approval based on reactor power level.

1. Entry at >0% and <5% power requires pre-job authorization for each job from the Radiation Protection Manager or designee.

2. Entry at $\geq$ 5% power level requires pre-job authorization for each job from the Radiation Protection Manager or designee and the Station Manager or designee.

BASES

APPLICABLE SAFETY ANALYSES (continued)

containment was designed with an allowable leakage rate of 0.30% of containment air weight per day (Ref. 2). This leakage rate is defined in 10 CFR 50, Appendix J, ~~Option B~~ Option B (Ref. 1), as L_a = 0.30% of containment air weight per day, the maximum allowable containment leakage rate at the calculated peak containment internal pressure P_a = 14.68 psig following a ~~DBA~~design basis LOCA. This allowable leakage rate forms the basis for the acceptance criteria imposed on the SRs associated with the air locks.

The containment air locks satisfy Criterion 3 of 10 CFR 50.36 (Ref. 3).

LCO

Each containment air lock forms part of the containment pressure boundary. As part of the containment pressure boundary, the air lock safety function is related to control of the containment leakage rate resulting from a DBA. Thus, each air lock's structural integrity and leak tightness are essential to the successful mitigation of such an event.

Each air lock is required to be OPERABLE. For the air lock to be considered OPERABLE, the air lock interlock mechanism must be OPERABLE, the air lock must be in compliance with the Type B air lock leakage test, and both air lock doors must be OPERABLE. The interlock allows only one air lock door of an air lock to be opened at one time. This provision ensures that a gross breach of containment does not exist when containment is required to be OPERABLE. Closure of a single door in each air lock is sufficient to provide a leak tight barrier following postulated events. Nevertheless, both doors are kept closed when the air lock is not being used for normal entry into or exit from containment.

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause a release of radioactive material to containment. In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Therefore, the containment air locks are not required in MODE 5 to prevent leakage of radioactive material from containment. The requirements for the containment air locks during MODE 6 are addressed in LCO 3.9.3, "Containment Penetrations."

ACTIONS

The ACTIONS are modified by a Note that allows entry and exit to perform repairs on the affected air lock component. If the outer door is inoperable, then it may be easily accessed for most repairs. It is

BASES

ACTIONS (continued)

preferred that the air lock be accessed from inside primary containment by entering through the other OPERABLE air lock. However, if this is not practicable, or if repairs on either door must be performed from the barrel side of the door then it is permissible to enter the air lock through the OPERABLE door, which means there is a short time during which the containment boundary is not intact (during access through the OPERABLE door). The ability to open the OPERABLE door, even if it means the containment boundary is temporarily not intact, is acceptable due to the low probability of an event that could pressurize the containment during the short time in which the OPERABLE door is expected to be open. After each entry and exit, the OPERABLE door must be immediately closed. If ALARA conditions permit, entry and exit should be via an OPERABLE air lock.

A second Note has been added to provide clarification that, for this LCO, separate Condition entry is allowed for each air lock. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable air lock. Complying with the Required Actions may allow for continued operation, and a subsequent inoperable air lock is governed by subsequent Condition entry and application of associated Required Actions.

In the event the air lock leakage results in exceeding the overall containment leakage rate, Note 3 directs entry into the applicable Conditions and Required Actions of LCO 3.6.1, "Containment."

A.1, A.2, and A.3

With one air lock door in one or more containment air locks inoperable, the OPERABLE door must be verified closed (Required Action A.1) in each affected containment air lock. This ensures that a leak tight containment barrier is maintained by the use of an OPERABLE air lock door. This action must be completed within 1 hour. This specified time period is consistent with the ACTIONS of LCO 3.6.1, which requires containment be restored to OPERABLE status within 1 hour.

Note that for the purpose of Required Action A.1, A.2 and A.3, the bulkhead associated with an air lock door is considered to be part of the door. For example, an air lock door may be declared inoperable if the equalizing valve becomes inoperable or if it is replaced. It is appropriate to treat the associated bulkhead as part of the door because a leak path through the bulkhead is no different than a leak path past the door seals.

98.
G 2.3.14
Radiation Control
Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.

BANK WBN May 2009 NRC Exam (SIG MOD)
Given the following conditions:

- A LOCA has occurred and a Site Area Emergency has been declared.
- The EOF, TSC, and OSC have been activated.
- It is necessary to enter 1A NI Pump Room to prevent core damage.
- Projected dose rate in the pump room is 1.16E+5 mr/hr.
- Duration of the exposure will be 3 minutes.

Which ONE of the following describes the requirements for approving this exposure, as specified in RP-18, (Emergency Worker Dose Extension)?

A. Approval may be obtained from EITHER the Emergency Coordinator OR the EOF Director.

B. Requires approval from BOTH the Emergency Coordinator AND the EOF Director.

C. Approval may be obtained from EITHER the RP Manager OR EOF Director.

D. Requires approval from BOTH the RP Manager AND EOF Director.

Ans: A

References:
RP-18, (Emergency Worker Dose Extension)

Distractor Analysis

A. **CORRECT.** A dose rate of 116,000 mr/hr. for 3 minutes is calculated as follows:

3 minutes = 1/20 hr.
116,000 mr = 116R
116 R / hr / 20 hr. = 5.8R total projected dose.

This dose requires an Emergency Worker Dose Extension in accordance with RP-18, Emergency Worker Dose Extension. Since the EOF has been activated, either the EOF Director OR the Emergency Coordinator can authorize this exposure.

B. Incorrect. Plausible, since both of these positions are listed as approval authority for this exposure. Also plausible, since an applicant could misinterpret that the EOF being activated means therefore, that the EOF Director's signature approval is also required.

C. Incorrect. Plausible, since one of the signatures is correct. Also plausible, since the RP Manager is involved when a dose extension is processed, but it is only to acknowledge the request, not to approve it.

D. Incorrect. Plausible, since one of the signatures is correct. Also plausible, since the RP Manager is involved when a dose extension is processed, but it is only to acknowledge the request, not to approve it. It is also plausible for an applicant to believe that both signatures are required by misinterpreting the meaning of the EOF being activated as also requiring the second signature.

K/A Match
This question matches the K/A because it tests knowledge of the level of a projected radiation exposure and who would have to approve the exposure, during an emergency condition.

Basis for SRO Only
This question is SRO level knowledge because it cannot be answered solely by RO knowledge of radiation hazards. Further, this question requires additional knowledge required for the higher license level and is unique to the SRO/OSM position. Per Lesson Plan OP-CN-EP-SEP, Emergency Plan, Objective 23, (State emergency worker exposure limits.), this knowledge is designated as SRO only.

Cognitive Level - HIGH
This is a higher cognitive level question because the applicant must first calculate the projected dose received and then apply that result to dose extension requirements to conclude whether a dose extension is required and who must approve it.

III. Justification for Plant Specific Exemptions

The 25 SRO-only questions ***shall*** evaluate the additional knowledge and abilities required for the higher license level in accordance with 10 CFR 55.43(b). [NUREG 1021, Section ES-401D.2.d]

The fact that a facility licensee trains its ROs to master certain 10 CFR 55.43 knowledge, skills, and abilities does NOT mean that they can no longer be used as a basis for SRO-only questions. [Operator Licensing Feedback Web page Item 401.36 @ http://www.nrc.gov/reactors/operator-licensing/op-licensing-files/ol-feedback.pdf]

The SRO-only test item is required to be tied to one of the 10 CFR 55.43(b) items. However, if a licensee desires to evaluate a knowledge/ability that is not tied to one of the 10 CFR 55.43(b) items, then the licensee can classify the knowledge/ability as "*unique to the SRO position*" provided that there is documented evidence that ties the knowledge/ability to the licensee's SRO job position duties in accordance with the systematic approach to training (SAT).

- **Justification**: A question that is not tied to one of the 10 CFR 55.43(b) items can still be classified as "SRO-only" provided the licensee has documented evidence to prove that the knowledge/ability is "*unique to the SRO position*" at the site. An example of documented evidence includes:

  - The question is linked to a learning objective that is specifically labeled in the lesson plan as being SRO-only (e.g., some licensee lesson plans have columns in the margin that differentiate AO, RO, and SRO learning objectives) [NUREG 1021, ES-401, Section D.2.d]

    AND/OR

  - A question is linked to a task that is labeled as an SRO-only task, and the task is NOT listed in the RO task list.

	Objective	ISS	NLO	LPRO	LPSO	PTRQ
1	Recognize the symptoms for entry into RP/007 (Natural Disaster and Earthquake).				X	X
2	When given a set of plant conditions and access to appropriate reference materials, correctly implement RP/007 (Natural Disaster and Earthquake).				X	X
3	Recognize the symptoms for entry into RP/008 (Spill Response), including the definitions of a spill.				X	X
4	Define On-Site per RP/008 (Spill Response).				X	X
5	Define Off-Site per RP/008 (Spill Response).				X	X
6	Define the term "Navigable Waters" per RP/008 (Spill Response).				X	X
7	When given a set of plant conditions and access to appropriate reference materials, correctly implement RP/008 (Spill Response).				X	X
8	Recognize the symptoms for entry into RP/009 (Collision/Explosion).				X	X
9	When given a set of plant conditions and access to appropriate reference materials, correctly implement RP/009 (Collision/Explosion).				X	X
10	DELETED					
11	DELETED					
12	Recognize the symptoms for entry into RP/018 (Emergency Worker Dose Extension).				X	X
13	When given a set of plant conditions and access to appropriate reference materials, correctly implement RP/018 (Emergency Worker Dose Extension).				X	X
14	Recognize the symptoms for entry into RP/024 (OSC activation Procedure).				X	X
15	When given a set of plant conditions and access to appropriate reference materials, correctly implement RP/024 (OSC activation Procedure).				X	X

Emergency Worker Dose Extension

1. Symptoms

1.1 Workers performing emergency service during a declared emergency event may be expected to exceed Duke administrative occupational radiation exposure blanket dose extension limits authorized by the Radiation Protection Manager, and potentially even exceed normal NRC (10CFR20) occupational radiation exposure limits.

1.2 This procedure **shall not be** used for "Planned Special Exposures".

2. Immediate Actions

2.1 Select Personnel based on the following:

2.1.1 Personnel shall be Duke Power Emergency Response Organization Members or Off-site Agency Emergency Workers. All personnel should be volunteers; however, personnel whose exposure during an emergency event is expected to exceed 25 rem TEDE shall be volunteers.

2.1.2 Personnel shall be advised of the risks involved, including the numerical levels of dose at which acute effects of radiation may be incurred and numerical estimates of the risks of delayed effects per EPA 400, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents." This information is summarized in Enclosure 4.1, "Health Risks Associated With Dose Extensions."

2.1.3 Performance of emergency services should be limited to non pregnant adults.

2.1.4 All factors being equal, older volunteers should be selected.

2.2 Document personnel information including Emergency Worker signature on Enclosure 4.2, "Authorization For Emergency Worker Dose Extensions."

2.3 Obtain Radiation Protection Manager (RPM) or designee signature or verbal acknowledgment of the need for extending Emergency Worker Dose Limits. Document this acknowledgment on Enclosure 4.2, "Authorization For Emergency Worker Dose Extensions."

NOTE: The Radiation Protection Manager or designee may not be readily available; therefore, this acknowledgment is optional.

2.4 Obtain Emergency Coordinator or EOF Director signature or verbal approval prior to extending the Emergency Worker Dose Limits. Document this approval on Enclosure 4.2, "Authorization For Emergency Worker Dose Extensions."

ORIGINAL BANK QUESTION FOR QUESTION #98

Given the following plant conditions:

- A LOCA has occurred and a Site Area Emergency has been declared.
- The TSC and OSC have been activated.
- It is necessary to enter Safety Injection Pump Room 1A to prevent core damage.
- Projected dose rate in the pump room is 1.16E+5 mr/hr.
- Duration of the exposure is expected to be 3 minutes.

Which ONE of the following is the lowest authority (by title) who can authorize the exposure as specified in EPIP-15, "Emergency Exposure Guidelines?"

a. Radcon Manager

b. Site Emergency Director

c. Plant Manager

d. Site Vice President

99.
G 2.4.29
Emergency Procedures / Plan
Knowledge of the emergency plan.

BANK CNS #1399
With Unit 2 at 100% power, which ONE of the following describes:

(1) the control rod drive event which requires the EARLIEST notification to an offsite agency;

AND

(2) which agency is notified of this event using the Selective Signaling Telephone?

A. (1) Two dropped rods
(2) Joint Information Center

B. (1) Two dropped rods
(2) the States and Counties

C. (1) One ejected rod
(2) Joint Information Center

D. (1) One ejected rod
(2) the States and Counties

Ans: D

References:
AP/14, (Control Rod Misalignment), Step 1, Rev. 16
RP/13, (NRC Notification Requirements)
RP/01, (Classification of Emergency), Enclosure 4.1, (Fission Product Barrier Matrix), Rev. 23

Distractor Analysis

A. Incorrect. Plausible, since two dropped rods requires a manual trip, which is reportable. However the time limit is longer than 15 minutes. Notifying the Joint Information Center is plausible, because when the Emergency Notification Form is initially FAXed to offsite agencies (including the Joint Information Center), a followup contact is made to ensure the FAX was received, but this contact is for the States and Counties (via the Selective Signaling Telephone) only. It is reasonable that an applicant could confuse to whom, and how, this followup is made, and believe that the Joint Information Center needs to be contacted, if they misdiagnose the event and conclude that this event does not warrant an emergency classification.

B. Incorrect. Plausible, since two dropped rods requires a manual trip which is reportable. However the time limit is longer than 15 minutes. The second part is correct, and therefore adds plausibility to this distractor.

C. Incorrect. Plausible, since the event is correct. Notifying the Joint Information Center is plausible, because when the Emergency Notification Form is initially FAXed to offsite agencies (including the Joint Information Center), a followup contact is made to ensure the FAX was received, but this contact is for the States and Counties (via the Selective Signaling Telephone) only. It is reasonable that an applicant could confuse to whom, and how, this followup is made, and believe that the Joint Information Center needs to be contacted, if they misdiagnose the event and believe that this event does not warrant an emergency classification.

D. **CORRECT**. An ejected rod in Mode 3 is classifiable as an Unusual Event for leakage > 10 gpm or possibly an Alert based on NCS leak rate. 2 dropped rods is plausible because according to AP/14, (Control Rod Misalignment), two dropped rods requires a manual plant trip. However, the event is NOT a classifiable emergency event and is only reportable per RP/13, (NRC Notification Requirements). The other event is an emergency classification which requires a 15 minute notification. The states and counties are notified via the selective signaling phone.

K/A Match
This K/A is matched because it tests various aspects of the emergency plan, and at the SRO level: one aspect is knowledge of what type of event constitutes entry into the emergency plan. The other aspect is knowledge of notification requirements based on the type of event.

Basis for SRO Only
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 complete the notifications to offsite agencies and NRC notification to the NRC in the event that an emergency is declared.

The following four learning objectives are from Lesson Plan OP-CN-EP-SEP, Emergency Plan, and are each designated as SRO only level learning objectives:
16. State the time frames in which immediate and follow-up notifications are to be made to various offsite agencies.
17. Prepare and evaluate Emergency Notification Forms for both initial and follow-up notification for any given accident scenario.
18. When given a copy of RP/0/A/5000/002, apply the Immediate Actions required for a Notification of Unusual Event.
19. Summarize the subsequent actions required for the Notification of Unusual Event procedure per RP/0/A/5000/002: Describe the procedure to terminate the emergency. Describe the procedure to give a follow-up message.
    1. For events lasting greater than one hour.
    2. Significant change in the situation.
    3. Escalation to a higher classification.

Cognitive Level - HIGH
This is a higher cognitive level question because it requires more than one mental step to arrive at the correct answer. The applicant must first analyze the given events (two dropped rods, one ejected rod) and determine if the event is a classifiable event per the Emergency Plan. The applicant must then apply knowledge of notification requirements, based on the type of event, and determine which of the events requires the earliest notification.

III. Justification for Plant Specific Exemptions

The 25 SRO-only questions ***shall*** evaluate the additional knowledge and abilities required for the higher license level in accordance with 10 CFR 55.43(b). [NUREG 1021, Section ES-401D.2.d]

The fact that a facility licensee trains its ROs to master certain 10 CFR 55.43 knowledge, skills, and abilities does NOT mean that they can no longer be used as a basis for SRO-only questions. [Operator Licensing Feedback Web page Item 401.36 @ http://www.nrc.gov/reactors/operator-licensing/op-licensing-files/ol-feedback.pdf]

The SRO-only test item is required to be tied to one of the 10 CFR 55.43(b) items. However, if a licensee desires to evaluate a knowledge/ability that is not tied to one of the 10 CFR 55.43(b) items, then the licensee can classify the knowledge/ability as "*unique to the SRO position*" provided that there is documented evidence that ties the knowledge/ability to the licensee's SRO job position duties in accordance with the systematic approach to training (SAT).

- **Justification**: A question that is not tied to one of the 10 CFR 55.43(b) items can still be classified as "SRO-only" provided the licensee has documented evidence to prove that the knowledge/ability is "*unique to the SRO position*" at the site. An example of documented evidence includes:

  - The question is linked to a learning objective that is specifically labeled in the lesson plan as being SRO-only (e.g., some licensee lesson plans have columns in the margin that differentiate AO, RO, and SRO learning objectives) [NUREG 1021, ES-401, Section D.2.d]

    AND/OR

  - A question is linked to a task that is labeled as an SRO-only task, and the task is NOT listed in the RO task list.

Enclosure 4.1

Fission Product Barrier Matrix

1. Use EALs to determine Fission Product Barrier status (Intact, Potential Loss, or Loss). Add points for all barriers. Classify according to the table below.

Note 1: An event (or multiple events) could occur which results in the conclusion that exceeding the Loss or Potential Loss thresholds is IMMINENT (i.e., within 1-3 hours). In this IMMINENT LOSS situation, use judgement and classify as if the thresholds are exceeded.

Note 2: When determining Fission Product Barrier status, the Fuel Clad Barrier should be considered to be lost or potentially lost if the conditions for the Fuel Clad Barrier loss or potential loss EALs were met previously **validated and sustained**, even if the conditions do not currently exist.

Note 3: Critical Safety Function (CSF) indications are not meant to include transient alarm conditions which may appear during the start-up of engineered safeguards equipment. A CSF condition is satisfied when the alarmed state is **valid** and **sustained**. The STA should be consulted to affirm that a CSF has been validated prior to the CSF being used as a basis to classify an emergency.

Example: If ECA-0.0, Loss of All AC Power Procedure, is implemented with an appropriate CSF alarm condition **valid** and **sustained**, the CSF should be used as the basis to classify an emergency prior to any function restoration procedure being implemented within the confines of ECA-0.0.

IC	Unusual Event	IC	Alert	IC	Site Area Emergency	IC	General Emergency
4.1.U.1	Potential Loss of Containment	4.1.A.1	Loss **OR** Potential Loss of Nuclear Coolant System	4.1.S.1	Loss **OR** Potential Loss of Both Nuclear Coolant System **AND** Fuel Clad	4.1.G.1	Loss of All Three Barriers
4.1.U.2	Loss of Containment	4.1.A.2	Loss **OR** Potential Loss of Fuel Clad	4.1.S.2	Loss **AND** Potential Loss Combinations of Both Nuclear Coolant System **AND** Fuel Clad	4.1.G.2	Loss of Any Two Barriers **AND** Potential Loss of the Third
		4.1.A.3	Potential Loss of Containment **AND** Loss **OR** Potential Loss of Any Other Barrier	4.1.S.3	Loss of Containment **AND** Loss **OR** Potential Loss of Any Other Barrier		

Alert

1. Symptoms

1.1 Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of **HOSTILE ACTION**.

2. Immediate Actions

NOTE:
1. Lines in left margin are for place keeping. Immediate actions may be performed simultaneously.
2. Security events may require the suspension of access to and movement about the site. Staffing and activation of the on-site emergency response facilities could complicate or interfere with security operations resulting in unwarranted casualties.

_____ 2.1 **IF** a security event exists, discuss the feasibility of conducting a site assembly and activating the TSC/OSC with the Security Captain at 5765 or 5766.

_____ 2.1.1 **IF** site assembly and activation of the TSC/OSC are not feasible, refer to the following procedure enclosures for guidance and N/A the steps in this procedure under Immediate Actions concerning site assembly and ERO activation:

_____ A. RP/0/B/5000/026, "Site Response to Security Events," Enclosure 4.2 - Step 5 that evaluates taking protective action

_____ B. RP/0/B/5000/026, "Site Response to Security Events," Enclosure 4.3 - Activation of ERO during an Imminent Security Event

_____ 2.1.2 **IF** the security event involves an insider threat, implement 2-person rule for access to all vital areas.

_____ 2.1.3 Consider delaying other actions in this procedure that could endanger site personnel until the security threat is terminated.

_____ 2.2 **IF** TSC, OSC and EOF have **NOT** been previously activated, notify the ERO to staff emergency response facilities by performing the following steps (2.2.1 and 2.2.2):

_____ 2.2.1 Notify site personnel to activate the TSC and OSC by making the following announcement **twice** over public address system:

"This is the Operations Shift Manager. An Alert has been declared. Unit(s) _____ is (are) affected. Activate the TSC, OSC, and EOF."

_____ 2.2.2 Activate Emergency Response Organization by completing Enclosure 4.1 of this procedure.

_____ 2.3 Notify off-site agencies within 15 minutes of Emergency declaration time using an Emergency Notification Form. Refer to one of the following notification procedures for instructions:

- RP/0/A/5000/006A, "Notifications to States and Counties from the Control Room"
- RP/0/A/5000/006B, "Notifications to States and Counties from the Technical Support Center"
- SR/0/B/2000/004, "Notifications to States and Counties from the Emergency Operations Facility"

_____ 2.4 **IF** there is an indication of a radioactive release **AND** the TSC is not activated, contact RP shift to perform off-site dose assessment per HP/0/B/1009/026.

_____ 2.5 **IF** a radioactive release or hazardous material spill is occurring or has occurred **AND** the TSC is not activated, contact Environmental Management (EM), ext. 3333 for assistance in reporting to state, local or federal authorities. After hours, contact the Environmental Duty person by phone or pager. **IF** no answer, page 999-777-3333 which will page all Environmental Management personnel.

_____ 2.6 Conduct a Site Assembly using RP/0/A/5000/010, "Conducting a Site Assembly or Preparing the Site for an Evacuation."

_____ 2.7 Notify the NRC using RP/0/B/5000/013, "NRC Notification Requirements." This notification should be made as quickly as possible but shall be made within one hour of the emergency declaration time.

2.8 Initiate Emergency Response Data System (ERDS) transmission by performing the following:

_____ 2.8.1 Type "**ERDS**" or select "**Main**," then "**General**," then "**ERDS**" on a Control Room OAC workstation connected to the affected unit's OAC

_____ 2.8.2 Initiate ERDS transmission by depressing **F1** or clicking "**Activate**."

_____ 2.8.3 **IF** ERDS transmission will not connect to the NRC, inform the NRC using ENS. The TSC Data Coordinator will troubleshoot and initiate ERDS transmission upon arrival in the TSC.

3. Subsequent Actions

NOTE: Subsequent Actions are not required to be followed in any particular sequence.

3.1 **IF** a security event has occurred, perform the following to account for site personnel:

_____ 3.1.1 **WHEN** Security notifies the OSM that the security threat has been terminated, make the following announcement **twice** over the public address system:

"This is the Operations Shift Manager. The security event has been terminated. The security event has been terminated."

NOTE:
1. The Selective Signal phone is the primary communication device. The Bell line (regular telephone) is the first back-up, the TSC satellite phone is the second back-up and the hand-held satellite phone is the third back-up.
2. Information regarding back-up communication devices is located in the CNS Emergency Phone Directory (EP Group Manual Section 5.3.6).
3. Selective Signaling is an open line that is capable of connecting all agencies together at the same time. The line is always active (no dial tone). The handset has a "push to talk" button which must be pressed in order for the parties on the other end to hear you. To use the headset instead of the handset, the switch on the headset controller must be set to "headset" and the handset removed from the phone cradle.
4. Although the official transmittal time is designated as the time the first agency answers the call, it is important to assure that every effort is made to communicate to all of the agencies at the same time.
5. Authentication is not required when using the Selective Signaling phone unless requested by an Off-site Agency.
6. The "Received by" and the "Received by Time and Date" section of Line 17 is not used by Duke Energy and may be left blank.

1. Emergency Notification Transmission

☐ 1.1 Fax the notification form to the various locations using Enclosure 4.4 allowing sufficient time for the agencies to receive the fax.

☐ 1.2 Establish communications with Off-site Agencies using the Selective Signaling phone:

☐ 1.2.1 Use *5 to call all primary agencies simultaneously or each agency may be dialed individually.

☐ 1.2.2 As each agency answers, say: ***"This is Catawba Nuclear Station, Hold Please."***

	SELECTIVE SIGNAL			BELL LINE
Time	**Selective Signal #**	Agency		Individual phone numbers OR one touch dial button
	513	York County (WP/EOC)		803-329-1110
	116	Mecklenburg County (WP/EOC)		704-943-6200
	112	Gaston County (WP/EOC)		704-866-3300
	518	S.C. (WP/EOC)		803-737-8500
	314	N.C. (WP/EOC)		919-733-3300

☐ 1.3 **Document the time the first agency** answers the call as the Notification Time on line 2 (Notification Time & Date) of Emergency Notification Form.

☐ 1.3.1 Perform a roll call to verify that all agencies are on the line.

☐ 1.4 **WHEN** all agencies are "on the line," say the following:

> *"This is the Catawba Nuclear Station Control Room. This is a drill/emergency. You have been faxed a copy of message # _____. Has everyone received the faxed message?"*

☐ 1.5 **IF** everyone has received the fax, proceed to step 1.8.

☐ 1.6 **IF** any of the agencies have not received the faxed message, send the fax again to the appropriate agencies.

☐ 1.7 **IF** any of the agencies have not received the faxed message on the second fax attempt, prepare to verbally transmit the message per the following:

☐ 1.7.1 Ask the specific agencies to obtain a blank notification form.

☐ 1.7.2 Slowly read Emergency Notification Message line by line to the agencies allowing time for them to copy the information.

☐ 1.7.3 **IF** the message is being transmitted by Selective Signaling, Authentication is not required, **go to** step 1.7.5

☐ 1.7.4 **IF** authentication is needed, perform the following:

- Ask one of the agencies to give you a number (document on line 2)
- Give the corresponding word
- Refer to Enclosure 4.3 if authentication instructions are needed

☐ 1.7.5 Continue reading the Emergency Notification message until completed.

☐ 1.8 Provide the agencies with the name of the Communicator making the notification and, if not already performed, write in the name on Line 17, Notified by.

☐ 1.9 Ask if there are any questions.

☐ 1.9.1 **IF** there are no questions, **go to** step 1.10.

☐ 1.9.2 **IF** the question is in reference to information on the Emergency Notification Form, provide the information to the requesting agency.

☐ 1.9.3 **IF** the question is not in reference to information on the Emergency Notification Form, perform the following:

A. Document the question in the Communicator's logbook.

B. Document the name of the agency making the request.

C. Document the name of the individual making the request.

1. Faxing Process

☐ 1.1 This enclosure provides instruction for faxing the ENF to the primary WP/EOCs. Refer to the following sections of this enclosure for the desired method:

1.1.1 Section 2 - Fax Machine Preprogrammed Button Method
1.1.2 Section 3 - Fax Machine Individual Dialing Method

2. Fax Machine (Pre-programmed Button Method)

☐ 2.1 To send a fax to multiple locations using the one touch dialing or direct dialing:

☐ 2.1.1 Place the Fax you are transmitting face down into the Fax machine.

NOTE: The preprogrammed buttons must be pressed in rapid succession to prevent the fax machine from timing out.

☐ 2.1.2 Press the following preprogrammed one-touch speed dial numbers in order rapidly:

	York Co. Warning Point (WP)
	Gaston Co. Warning Point (WP)
	Meck Warning Pt. (WP)
	S.C. WP/EOC
	N.C. WP/EOC
	TSC
	EOF
	Energy Quest
	Joint Information Ctr. (JIC)
	Duke ECOC
	York EOC
	Gaston EOC
	Mecklenburg EOC
	Mecklenburg Em Mgt

DOES GET THE FAXED EMERGENCY NOTIFICATION FORM, BUT DOES NOT GET CALLED ON THE SELECTIVE SIGNALING PHONE.

☐ 2.1.3 Press **Start**.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **Verify only one rod - DROPPED OR MISALIGNED.** → **IF two or more rods are dropped OR misaligned by greater than 24 steps, THEN:**

__ a. Manually trip Reactor.

__ b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).

__ 2. **Ensure "CRD BANK SELECT" switch - IN MANUAL.**

__ 3. **Adjust turbine load to maintain T-Avg within 1°F of T-Ref.**

__ 4. **Verify 1AD-2, A/10 "ROD CONTROL URGENT FAILURE" - DARK.**

Perform the following:

__ a. Do not move control rods.

__ b. **IF AT ANY TIME** reactor power must be reduced, **THEN** use boron to reduce reactor power.

__ c. Dispatch operator to Rod Control System cabinets to determine location of failure.

d. Request IAE to perform the following:

__ 1) Determine and correct cause of dropped rod.

__ 2) Reset alarm.

__ e. **WHEN** the "ROD CONTROL URGENT FAILURE" alarm is reset, **THEN** control rods and boron may be used for power changes.

Events Requiring 4-HOUR NRC Notification

Complete the reporting requirements for the following events as soon as practical and in all cases within 4 hours after the occurrence becomes known to the licensee:

10CFR Section	Event Description	Reporting Requirement
10CFR50.72(b)(2)(iv)(A) **ECCS discharge into the Reactor Coolant System**	Any event that results or should have resulted in ECCS discharge into the reactor coolant system as a result of a valid signal except when the actuation results from and is part of a pre-planned sequence during testing or reactor operation. • Valid signal refers to those signals automatically initiated by measurement of an actual physical system parameter that was within the established setpoint band of the sensor that provides the signal to the protection system logic, or manually initiated in response to plant conditions. Valid signals also include passive system actuations that occur as a function of system conditions like differential pressure (i.e., cold leg accumulators) whereby no SSPS or other electrical signal is involved. The validity of an ECCS signal may not be determined within 1 hour; ECCS signals that result or should have resulted in injections should be considered valid until firm evidence proves otherwise. • Invalid ECCS injections are still considered a System actuation, but are **NOT** reportable to the NRC per 10 CFR 50.72. It is still reportable under 10 CFR 50.73 as an LER. **(Refer to Enclosure 4.8 for guidance as to what constitutes a System actuation.)**	Notify the NRC Operations Center
10CFR50.72(b)(2)(iv)(B) **RPS Actuation**	Any event or condition that results in actuation of the reactor protection system (RPS) when the reactor is **critical** except when the actuation is part of a pre-planned sequence during testing or reactor operation.	Notify the NRC Operations Center
10CFR50.72(b)(2)(xi) 10CFR72.75(b)(2) ISFSI **Offsite Notification (News Release)**	Any event or situation related to the health and safety of the public or on-site personnel, or protection of the environment, for which a news release is planned or notification to other government agencies has been or will be made. Such an event may include an on-site fatality, transport of an injured or ill employee to a hospital by ambulance, or an inadvertent release of radioactively contaminated materials.	Notify the NRC Operations Center

100.
G 2.4.44
Emergency Procedures / Plan
Knowledge of emergency plan protective action recommendations.

BANK WBN May 2009 NRC Exam
Given the following conditions:

- A General Emergency has been declared.
- The TSC, OSC, and EOF have NOT been activated.

The **RESPONSIBILITY** of the Emergency Coordinator to ensure that the event is properly classified _____ be delegated; and the **RESPONSIBILITY** for determining Protective Action Recommendations _____ be delegated.

A. CAN; CANNOT

B. CAN; CAN

C. CANNOT; CANNOT

D. CANNOT; CAN

Ans: C

References:
RP/0/A/5000/020, (TSC Activation Procedure), Note just prior to Step G of Enclosure 4.1, (Emergency Coordinator Checklist), Rev. 26

Distractor Analysis

A. Incorrect. Plausible because the second part is correct. PARs cannot be delegated, per the reference. Since the Emergency Coordinator may assign someone to actually perform other aspects of the Emergency Plan (e.g., perform initial notifications), it is plausible that the applicant could confuse "perform" and "responsibility" and believe that another aspect of the emergency plan (classification) could be delegated. Delegating is also plausible, since the Emergency Coordinator can delegate PARs, for example, but only if the EOF has been activated.

B. Incorrect. Since the Emergency Coordinator may assign someone to actually perform other aspects of the Emergency Plan (e.g., perform initial notifications), it is plausible that the applicant could confuse "perform" and "responsibility" and believe that another aspect of the emergency plan (classification) could be delegated. Delegating is also plausible, since the Emergency Coordinator can delegate PARs, for example, but only if the EOF has been activated.

C. **CORRECT**. Until the EOF has been activated, the Emergency Coordinator remains responsible to classify the event, and that PARs are made.

D. Incorrect. Plausible, because the first part is correct. Delegating PARs is plausible, since the Emergency Coordinator can delegate this responsibility, but only if the EOF has been activated.

K/A Match

The K/A is matched because the question tests knowledge of SRO responsibilities for making protective action recommendations and notifications during implementation of the Emergency Plan.

Basis for SRO Only

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), 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.

Cognitive Level - LOW

Recall of specific facts regarding Emergency Coordinator duties and requirements for which of those cannot be delegated.

III. Justification for Plant Specific Exemptions

The 25 SRO-only questions ***shall*** evaluate the additional knowledge and abilities required for the higher license level in accordance with 10 CFR 55.43(b). [NUREG 1021, Section ES-401D.2.d]

The fact that a facility licensee trains its ROs to master certain 10 CFR 55.43 knowledge, skills, and abilities does NOT mean that they can no longer be used as a basis for SRO-only questions. [Operator Licensing Feedback Web page Item 401.36 @ http://www.nrc.gov/reactors/operator-licensing/op-licensing-files/ol-feedback.pdf]

The SRO-only test item is required to be tied to one of the 10 CFR 55.43(b) items. However, if a licensee desires to evaluate a knowledge/ability that is not tied to one of the 10 CFR 55.43(b) items, then the licensee can classify the knowledge/ability as "*unique to the SRO position*" provided that there is documented evidence that ties the knowledge/ability to the licensee's SRO job position duties in accordance with the systematic approach to training (SAT).

- **Justification**: A question that is not tied to one of the 10 CFR 55.43(b) items can still be classified as "SRO-only" provided the licensee has documented evidence to prove that the knowledge/ability is "*unique to the SRO position*" at the site. An example of documented evidence includes:

  - The question is linked to a learning objective that is specifically labeled in the lesson plan as being SRO-only (e.g., some licensee lesson plans have columns in the margin that differentiate AO, RO, and SRO learning objectives) [NUREG 1021, ES-401, Section D.2.d]

    AND/OR

  - A question is linked to a task that is labeled as an SRO-only task, and the task is NOT listed in the RO task list.

_____ 3.1.2 Conduct a site assembly per RP/0/A/5000/10, "Conducting a Site Assembly or Preparing the Site for an Evacuation."

_____ 3.2 Ensure RP has dispatched technicians for on-site monitoring/surveys per HP/0/B/1009/009, "Guidelines for Accident and Emergency Response."

_____ 3.3 Make Follow-up Notifications using applicable "Notifications to States and Counties" procedure.

_____ 3.4 RP/0/A/5000/018, "Emergency Worker Dose Extension," shall be used to authorize emergency worker doses expected to exceed normal occupational exposure limits during a declared emergency event or exceed blanket dose extension limits authorized by the Radiation Protection Manager.

_____ 3.5 Augment shift resources to assess and respond to the emergency situation as needed.

_____ 3.6 Announce over the plant public address system the current emergency classification level and summary of plant status.

_____ 3.7 Assess emergency conditions and the corresponding emergency classification. See RP/0/A/5000/001, "Classification of Emergency," then:

Remain in an Alert

OR

Escalate to a more severe emergency classification

OR

Reduce to a less severe emergency classification

(Refer to Enclosure 4.3)

OR

Terminate the emergency (Refer to RP/0/A/5000/020 or SR/0/B/2000/003 for Termination Criteria).

- Announce any emergency classification level changes over the plant public address system, including a summary of plant status.

NOTE:	Turnover of command and control to the TSC or EOF relieves the OSM/Emergency Coordinator of classification, notification and Protective Action Recommendation (PAR) responsibilities allowing a focused effort on plant response.

_____ 3.8 Turnover the responsibility of command and control for the emergency as follows:

_____ 3.8.1 Provide turnover to the TSC Emergency Coordinator using Enclosure 4.2.

Initial

Activate TSC/OSC (Station Manager or designee assumes role of TSC Emergency Coordinator) **by completing the following steps:**

_____ A. Ensure Enclosure 4.18, "TSC Pre-activation Checklist," is being completed:

_____ 1. Contact TSC Emergency Planner to determine status.

_____ 2. **IF** TSC Emergency Planner is not available, assign Enclosure 4.18 completion to a TSC Off-site Agency Communicator.

> **NOTE:** Job aids (Emergency Coordinator Site Update and TSC/OSC/EOF Update Briefing) are available in the position notebook for use in the preparation of announcements to be made over the public address system.

_____ B. Contact OSM to determine the current status of the emergency situation.

_____ C. Inform the TSC and OSC of the status of the emergency situation.

_____ D. **WHEN** Public Affairs calls in on the Bell Line in preparation for the Public Spokesperson's media briefing, be prepared to:

_____ Discuss the details of the event.

_____ Provide requested information from the TSC and OSC staffs.

_____ E. Conduct a pre-activation conference with the TSC staff and OSC Coordinator:

_____ 1. Ensure TSC is adequately staffed (minimum to activate).

_____ 2. Ensure OSC is adequately staffed (minimum to activate).

_____ 3. Ensure TSC Off-site Communicators are prepared to perform off-site notifications.

_____ F. Ensure Enclosure 4.18, "TSC Pre-activation Checklist," is complete (Emergency Planner or Off-site Communicator).

> **NOTE:**
> 1. Upon activation of the TSC, the Emergency Coordinator is responsible for classifying emergencies, notifying off-site agencies and making Protective Action Recommendations. This responsibility shall not be delegated and remains in effect until the EOF is activated.
> 2. Command and control of the event shall be transferred from the Control Room to the TSC in a manner that does not interfere with emergency response actions or notifications/recommendations to off-site agencies.

_____ G. **WHEN** conditions allow, contact the Operations Shift Manager (OSM) to take turnover of command and control as follows:

_____ 1. Complete the "OSM to Emergency Coordinator Turnover Form."