76. 003AG2.1.30 001/1/2/DROP ROD-LCL CONTROL/C/A-4.0/B-VOGTLE 09/HL-15R NRC/SRO/TNT/DS

Initial conditions:

- Unit at 100% power for last 10 weeks
- All rods out at 228 steps

Current conditions:

- "ROD AT BOTTOM" alarm is alarming
- Control Bank D rod H-8 rod bottom LED lit
- Tave is lowering
- QPTR & AFD remain within limits

Which of the following choices identifies the correct procedure entry and actions to take?

A. Enter AOP 18003-C, Section A, Dropped Rods in Mode 1.

   Do not exceed 75% thermal power during rod recovery, rod pulls are limited to 3 step increments. Reset the Bank Overlap Unit to restore the RIL alarm to operable status.

B. Enter AOP 18003-C, Section C, Misaligned Rods in Mode 1.

   Do not exceed 65% thermal power during rod recovery, rod pulls are limited to 3 step increments. Reset the Bank Overlap Unit to restore the RIL alarm to operable status.

C. Enter AOP 18003-C, Section A, Dropped Rods in Mode 1.

   Do not exceed 75% thermal power during rod recovery, the 3 step rod pull limit may be suspended for this condition. Reset the P/A converter to restore the RIL alarm to operable status.

D. Enter AOP 18003-C, Section C, Misaligned Rods in Mode 1.

   Do not exceed 65% thermal power during rod recovery, the 3 step rod pull limit may be suspended for this condition. Reset the P/A converter to restore the RIL alarm to operable status.

**K/A**

**003 Dropped Control Rod**

# HL-15R SRO NRC EXAM

**G2.1.30 Ability to locate and operate components, including local controls.**

## K/A MATCH ANALYSIS

This question requires correct diagnosis of plant indications to determine correct procedures to enter and then the appropriate mitigative actions to take which are not immediate actions.

Question meets 10CFR55.43(b) criteria item #5 - Assessment of facility conditions and selection of procedures during normal, abnormal, and emergency conditions making this an SRO only question.

## ANSWER / DISTRACTOR ANALYSIS

A. Incorrect. Plausible since section A is the correct section and power is required to be maintained < 75% during the dropped rod recovery. The 3 step rod pull increments are normally required and the RIL alarm is INOP when rod recovery is begun.

B. Incorrect. Plausible since power is required to be reduced to < 65% prior to rod recovery, rod pull increments are normally limited to 3 steps, and the RIL alarm is INOP when rod revovery is begun.

C. Correct.

D. Incorrect. Plausible since power is required to be reduced to < 65% prior to rod recovery, the 3 step rod pull is suspended for this condition, and the RIL alarm is INOP for the reason listed.

## REFERENCES

1. AOP 18003-C, Rod Control System Malfunction.

## VEGP learning objectives:

1. LO-LP-60303-04:

Describe the effects of failing to reset the P/A converter (Bank Demand Position Display) following a dropped rod retrieval.

2. LO-LP-60303-07:

Describe why reactor power must be less than 65% or 10% below most limited power distribution restriction prior to dropped rod retrieval.

3. LO-LP-60303-15:

Describe the effects of failing to reset the P/A converter (Bank Demand Position Display) following a misaligned rod recovery.

4. LO-LP-60303-18:

Given conditions and/or indications, determine the required AOP to enter (including subsections, as applicable).

1. 003AG2.4.35 001

VOGTLE 2009
SRO

Initial conditions:

- Unit at 100% power for last 10 weeks
- All rods out at 228 steps

Current conditions:

- Rod at bottom alarm is alarming
- Control Bank D rod H-8 rod bottom LED lit
- Tave is lowering
- QPTR & AFD remain within limits

Which of the following choices identifies the correct procedure entry and actions to take?

A. Enter AOP 18003-C, Section A, Dropped Rods in Mode 1.

   Do not exceed 75% thermal power during rod recovery, rod pulls are limited to 3 step increments. Reset the Bank Overlap Unit to restore the RIL alarm to operable status.

B. Enter AOP 18003-C, Section C, Misaligned Rods in Mode 1.

   Do not exceed 65% thermal power during rod recovery, rod pulls are limited to 3 step increments. Reset the Bank Overlap Unit to restore the RIL alarm to operable status.

C. Enter AOP 18003-C, Section A, Dropped Rods in Mode 1.

   Do not exceed 75% thermal power during rod recovery, the 3 step rod pull limit may be suspended for this condition. Reset the P/A converter to restore the RIL alarm to operable status.

D. Enter AOP 18003-C, Section C, Misaligned Rods in Mode 1.

   Do not exceed 65% thermal power during rod recovery, the 3 step rod pull limit may be suspended for this condition. Reset the P/A converter to restore the RIL alarm to operable status.

Abnormal Operating Procedures

# ROD CONTROL SYSTEM MALFUNCTION

PURPOSE

PRB REVIEW REQUIRED

This procedure provides instructions for malfunctions of the Rod Control System resulting in uncontrolled rod motion, dropped or misaligned rods.

SYMPTOMS

SECTION A, DROPPED RODS IN MODE 1

- ALB10-E5 ROD AT BOTTOM
- ALB10-F2 POWER RANGE HI NEUTRON FLX RATE ALERT
- ALB10-C2 POWER RANGE CHANNEL DEVIATION
- Rod bottom LED on digital rod position indication.
- Tavg dropping.

SECTION B, UNCONTROLLED CONTINUOUS ROD RODS IN ALL MODES

- Rod motion with invalid demand from the Automatic Rod Control System.
- Failure of rods to stop moving when the Rod Motion Switch is released.

SECTION C, MISALIGNED RODS IN MODE 1

- ALB10-C2 POWER RANGE CHANNEL DEVIATION
- ALB10-D2 POWER RANGE UP DET HI FLX DEV
- ALB10-E2 POWER RANGE LWR DET HI FLX DEV
- Failure of ALB10-C4 ROD BANK LO LIMIT or ALB10-D4 ROD BANK LO-LO LIMIT to reset during rod withdrawal.
- Misaligned rod.
- Quadrant power tilt ratio calculation exceeds 1.02.

Sheet 1 of 1

SYMPTOMS (CONT'D)

SECTION D, DROPPED OR MISALIGNED RODS IN MODES 2 THROUGH 5

- Unexpected ALB10-E5 ROD AT BOTTOM
- Unexpected ALB10-F5 TWO
- Unexpected ALB10-D6 ROD DEV
- Unexpected Rod bottom LED on digital rod position indication.
- Misaligned rod.
- Lowering flux and negative SUR on source or intermediate range nuclear instruments.

MAJOR ACTIONS

- Respond to Uncontrolled Continuous Rod Motion.
- Respond to Dropped Rods in Mode 1.
- Respond to Misaligned Rods in Mode 1.
- Respond to Dropped or Misaligned Rods in Modes 2 through 5.

Sheet 1 of 1

## CONTINUOUS ACTIONS

Step Actions

SECTION A, DROPPED RODS IN MODE 1

[ ] A5 - Maintain Tavg at program.

[ ] A6 - Maintain power distribution when at or above 50% power.

[ ] A12 - Maintain power level during recovery.

[ ] A13 - Maintain Tavg within 3°F of Tref during recovery.

SECTION B, UNCONTROLLED CONTINUOUS ROD MOTION

[ ] B5 - Maintain power distribution when at or above 50% power.

SECTION C, MISALIGNED RODS IN MODE 1

[ ] C6 - Maintain Tavg at program.

[ ] C7 - Maintain power distribution when at or above 50% power.

[ ] C13 - Maintain power level during realignment.

[ ] C14 - Maintain Tavg within 3°F of Tref during realignment.

## A DROPPED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| ☐A1. Stop any turbine loading changes. | |
| A2. Check the following: | A2. Perform the following: |
| ☐a. DRPI - AVAILABLE | ☐1) Trip the Reactor. |
| ☐b. Only one Rod dropped by observing DRPI. | ☐2) Go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION. |
| ☐A3. Initiate TS 3.1.4. | |
| ☐A4. Initiate the Continuous Actions Page. | |
| * A5. **Maintain Tavg at program by performing the following as appropriate:** | |
| ☐• Adjust turbine load. | |
| ☐• Dilute or borate. | |
| ☐• Use manual Rod control. | |
| * A6. **Maintain power distribution when greater than or equal to 50% power:** | |
| ☐a. AFD - WITHIN PLUS OR MINUS 5% OF TARGET | a. Reduce power until one of the following are met:<br>☐ AFD within plus or minus 5% of target.<br>-OR-<br>☐ Reactor power less than 50%. |
| ☐b. QPTR - LESS THAN OR EQUAL TO 1.02 | ☐b. Initiate TS 3.2.4. |

## A DROPPED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |

A7. Perform the following:

☐a. Initiate action to determine cause and repair Rod Control malfunction.

☐b. With Maintenance's concurrence disconnect lift coil for the dropped rod.

☐A8. Record the following in the Unit Control Log:

- Time of Rod drop.
- Dropped Rod number.
- Initial power level.
- Affected group step counter position.

☐A9. Reduce Thermal Power to less than 75% within 2 hours from time of Rod drop. (TS 3.1.4)

## A DROPPED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| A10. Check if Rod retrieval should be initiated: | |
| ☐a. Time of dropped Rod known. | ☐a. Shut down the unit. Go to 12004-C, POWER OPERATION (MODE 1). |
| ☐b. Direct cause of dropped Rod known and corrective actions taken. | b. Perform the following:<br>☐1) Consult Reactor Engineering and Operations Management.<br>2) Do not continue until one of the following is satisfied:<br>☐ IF recovery plan developed to retrieve dropped rod, THEN continue with Step A10.c.<br>-OR-<br>☐ IF decision made to shut down the unit, THEN go to 12004-C, POWER OPERATION (MODE 1). |
| c. Dropped Rod withdrawal will be initiated within the following time limits:<br>☐ Within 6 hours - for cycle burnup less than 10,000 MWD/MTU.<br>-OR-<br>☐ Within 4 hours - for cycle burnup greater than or equal to 10,000 MWD/MTU. | ☐c. Shut down the unit. Go to 12004-C, POWER OPERATION (MODE 1). |

## A DROPPED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |

A11. Prior to initiating Rod retrieval, reduce Thermal Power to the most limiting of the following:

☐ 65% (10% below TS 3.1.4 restriction)

-OR-

☐ 10% below most limiting power distribution restriction:

- AFD
- QPTR

*A12. **Maintain power level during recovery:**

☐ Less than 75%.

-OR-

☐ Less than power distribution restrictions:

- AFD
- QPTR

☐ *A13. **Maintain Tavg within 3°F of Tref during recovery.**

☐ A14. Position the ROD BANK SELECTOR SWITCH to the affected bank.

☐ A15. Reset the affected group step counter to zero.

☐ A16. Reconnect dropped Rod lift coil.

☐ A17. Disconnect all lift coils in the affected bank except for the dropped Rod.

## A DROPPED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| ☐A18. Check Rod being realigned - GROUP 1 CONTROL OR SHUTDOWN BANK ROD | ☐A18. Go to Step A20. |
| A19. Initiate 14915, SPECIAL CONDITIONS SURVEILLANCE LOGS:<br>☐• Rod Insertion Limit Monitor (if control bank)<br>☐• Rod Position Deviation Monitor | |
| ☐A20. Check Unit operation at or above 75% for at least 72 cumulative hours in a 7 day period. | ☐A20. Limit dropped Rod withdrawal to 3 steps per hour.<br>distractor |
| ☐A21. Record the affected bank's group step counter positions in the Unit Control Log. | |

## A DROPPED RODS IN MODE 1

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

NOTE:

- ALB10-B06 ROD CONTROL URGENT FAILURE will illuminate when withdrawal of dropped Rod is initiated (unless Shutdown Bank C, D, or E Rod).
- Per 10000-C, CONDUCT OF OPERATIONS, the 3 step rod withrawal limitation may be suspended during abnormal conditions.

☐A22. Withdraw the Rod in Bank Select to the affected bank's current position.

A22. IF the Rod fails to move, THEN:

☐a. Connect lift coils opened in Step A17.

☐b. Reset the step counter to value recorded in Step A21.

☐c. Continue applicable action items of TS 3.1.4.

☐d. Reset Rod Control Urgent Failure alarm using 1HS-40039 ROD CONTROL ALARM RESET.

☐e. Place ROD BANK SELECTOR SWITCH in MAN.

☐f. Return to Step A10.

☐A23. Record the following in the Unit Control Log:

- Recovery completion time.
- Affected Bank position.

☐A24. Connect the lift coils opened in Step A17.

## A DROPPED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| ☐A25. Reset Rod Control Urgent Failure alarm using 1HS-40039 ROD CONTROL ALARM RESET. | |
| ☐A26. Reset the Master Cycler using 13502, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM. | |
| A27. Check if P/A converter should be reset: | |
| ☐a. Check recovered Rod - CONTROL BANK ROD | ☐a. Go to Step A28. |
| ☐b. Reset the P/A converter BANK POSITION DISPLAY to match the position recorded in Step A23 using 13502, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM.<br><br>UNIT 1 CB-B71<br>UNIT 2 CB-B07 | |
| ☐c. Discontinue 14915, SPECIAL CONDITIONS SURVEILLANCE LOGS for Rod Insertion Limit Monitor. | |

NOTE: If possible, Maintenance should observe Rod exercise to determine required corrective actions.

| | |
| --- | --- |
| ☐A28. Exercise the affected bank using 14410, CONTROL ROD OPERABILITY TEST. | ☐A28. IF the Rod drops again, THEN return to Step A1. |
| ☐A29. Place ROD BANK SELECTOR SWITCH in MAN or AUTO position, as desired. | |

A DROPPED RODS IN MODE 1

ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

☐A30. Limit power ascension to 3% per hour as detailed in Engineering procedure 87073-C, LIMITATIONS AND CONDITIONS FOR FUEL OPERATION.

A31. Perform the following:

☐a. Notify Duty Engineer of Rod drop recovery.

☐b. Notify Duty Engineer that plant computer Rod position adjustment may be necessary.

☐c. Discontinue 14915, SPECIAL CONDITIONS SURVEILLANCE LOGS for Rod Deviation Monitor when Rod demand position input to the IPC is reset.

☐A32. Return to procedure and step in effect.

END OF SUB-PROCEDURE TEXT

## B UNCONTROLLED CONTINUOUS ROD MOTION

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| **IMMEDIATE OPERATOR ACTIONS** | |
| B1. Stop uncontrolled Rod motion by performing the following: | |
| ☐a. Place ROD BANK SELECTOR SWITCH in MAN position. | |
| ☐b. Place the Rod Motion Switch in hold. | |
| ☐B2. Check Rod motion - STOPPED | B2. Perform the following: |
| | ☐a. Trip the Reactor. |
| | ☐b. IF in Modes 1, 2, or 3, THEN go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION. |
| | c. IF IN Modes 5 or 6, THEN perform the following: |
| | ☐1) Verify Reactor trip. |
| | ☐2) Initiate repairs of Rod Control System. |
| | ☐3) Return to procedure and step in effect. |
| **SUBSEQUENT OPERATOR ACTIONS** | |
| B3. Check the following alarms - EXTINGUISHED | B3. IF in Mode 1 or 2, THEN perform the following: |
| ☐• ALB10-C4 ROD BANK LO LIMIT | ☐• Borate as necessary to restore Rod height. |
| ☐• ALB10-D4 ROD BANK LO-LO LIMIT | • Initiate the following: |
| | ☐• TS 3.1.5 |
| | ☐• TS 3.1.6 |
| ☐B4. Restore Tavg to program by adjusting turbine load. | ☐B4. Adjust RCS boron concentration to restore Tavg to program. |

B UNCONTROLLED CONTINUOUS ROD MOTION

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| * B5. **Maintain power distribution when greater than or equal to 50% power:** | |
| ☐a. AFD - WITHIN THE LIMITS OF PTDB TAB 6.0 | ☐a. Reduce power to less than 50% within 30 minutes. (TS 3.2.3) |
| ☐b. QPTR - LESS THAN OR EQUAL TO 1.02 | ☐b. Initiate TS 3.2.4. |
| ☐B6. Initiate repairs of Rod Control System. | |
| ☐B7. Return to procedure and step in effect. | |

END OF SUB-PROCEDURE TEXT

## C MISALIGNED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| ☐C1. Stop any turbine loading changes. | |
| ☐C2. Check misaligned Rod - MISALIGNED BY GREATER THAN 12 STEPS | ☐C2. Go to 13502, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM |
| C3. Check the following: | ☐C3. Shut down the unit. Go to 12004-C, POWER OPERATION (MODE 1). (TS 3.1.4) |
| ☐a. DRPI - AVAILABLE | |
| ☐b. Only one Rod - MISALIGNED BY GREATER THAN 12 STEPS | |
| ☐C4. Initiate TS 3.1.4. | |
| ☐C5. Initiate the Continuous Actions Page. | |
| * C6. **Maintain Tavg at program by performing the following as appropriate:** | |
| ☐• Adjust turbine load. | |
| ☐• Dilute or borate. | |
| ☐• Use manual Rod control. | |
| * C7. **Maintain power distribution when greater than or equal to 50% power:** | |
| ☐a. AFD - WITHIN PLUS OR MINUS 5% OF TARGET | a. Reduce power until one of the following are met:<br>☐ AFD within plus or minus 5% of target.<br>-OR-<br>☐ Reactor power less than 50%. |
| ☐b. QPTR - LESS THAN OR EQUAL TO 1.02 | ☐b. Initiate TS 3.2.4. |

## C MISALIGNED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| ☐C8. Initiate action to determine cause of and repair Rod control malfunction. | |
| ☐C9. Record the following in the Unit Control Log:<br>• Time of Rod misalignment.<br>• Misaligned Rod number.<br>• Misaligned Rod position (DRPI).<br>• Affected bank position (Demand and DRPI).<br>• Initial power level. | ☐C9. IF exact time of Rod misalignment is NOT known, THEN use time of previous Rod alignment verification performed in 14000, OPERATIONS SHIFTLY AND DAILY SURVEILLANCE LOGS as the time of misalignment. |
| ☐C10. Reduce Thermal Power to less than 75% within 2 hours from time of Rod misalignment. (TS 3.1.4) | |

## C MISALIGNED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| C11. Check if Rod realignment should be initiated: | |
| ☐a. Direct cause of misaligned Rod known and corrective actions have been taken. | a. Perform the following:<br>☐1) Consult Reactor Engineering and Operations Management.<br>2) Do not continue until one of the following is satisfied:<br>☐ IF recovery plan developed to realign rod, THEN continue with Step B11.c.<br>-OR-<br>☐ IF decision made to shut down the unit, THEN go to 12004-C, POWER OPERATION (MODE 1). |
| b. Misaligned Rod withdrawal will be initiated within the following time limits:<br>☐ Within 6 hours - for cycle burnup less than 10,000 MWD/MTU.<br>-OR-<br>☐ Within 4 hours - for cycle burnup greater than or equal to 10,000 MWD/MTU. | ☐b. Shut down the unit. Go to 12004-C, POWER OPERATION (MODE 1). |

## C MISALIGNED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |

C12. Prior to initiating Rod realignment, reduce Thermal Power to the most limiting of the following:

☐ 65% (10% below TS 3.1.4 restriction)

-OR-

☐ 10% below most limiting power distribution restriction:

- AFD
- QPTR

*C13. **Maintain power level during realignment:**

☐ Less than 75%.

-OR-

☐ Less than power distribution restrictions:

- AFD
- QPTR

☐ *C14. **Maintain Tavg within 3°F of Tref during realignment.**

☐ C15. Record the following in the Unit Control Log:

- Misaligned rod position (DRPI).
- Affected bank position (Demand and DRPI).

☐ C16. Position ROD BANK SELECTOR SWITCH to affected bank.

## C MISALIGNED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| ☐C17. Determine if it is desirable to position the Misaligned Rod to Affected Bank position. | ☐C17. Go to Step C29 to position the Affected Bank to the Misaligned Rod. |
| ☐C18. Disconnect all lift coils in affected bank except for misaligned Rod. | |
| ☐C19. Check Rod being realigned - GROUP 1 CONTROL OR SHUTDOWN BANK ROD | ☐C19. Go to Step C21. |
| C20. Initiate 14915, SPECIAL CONDITIONS SURVEILLANCE LOGS:<br>☐• Rod Insertion Limit Monitor (if control bank)<br>☐• Rod Position Deviation Monitor | |
| ☐C21. Check Unit operation at or above 75% for at least 72 cumulative hours in a 7 day period. | ☐C21. Limit misaligned Rod withdrawal to 3 steps per hour. |

## C MISALIGNED RODS IN MODE 1

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

NOTE:

- ALB10-B06 ROD CONTROL URGENT FAILURE will illuminate when movement of misaligned Rod is initiated (unless Shutdown Bank C, D, or E Rod).
- Per 10000-C, CONDUCT OF OPERATIONS, the 3 step rod withrawal limitation may be suspended during abnormal conditions.

☐ C22. Withdraw or insert the misaligned Rod in Bank Select to align with current bank DRPI position.

C22. IF the misaligned Rod fails to move,
THEN perform the following:

☐ a. Connect lift coils opened in Step C18.

☐ b. Reset step counter(s) to value recorded in Step C15.

☐ c. Notify I&C to determine cause of and repair Rod control malfunction.

d. Determine if misaligned ROD is trippable:

☐ 1) IF rod control system malfunction is preventing rod motion,
THEN misaligned rod is considered trippable.

☐ 2) IF rod control system is properly demanding motion and no motion occurs,
THEN misaligned rod is considered untrippable.

C MISALIGNED RODS IN MODE 1

ACTION/EXPECTED RESPONSE

(Step 22 continued from previous page)

☐C23. Record the following in the Unit Control Log:

- Recovery completion time.
- Affected Bank position.

☐C24. Connect the lift coil(s) opened in Step C18.

☐C25. Reset Rod Control Urgent Failure alarm using 1HS-40039 ROD CONTROL ALARM RESET.

☐C26. Reset the Master Cycler using 13502, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM.

☐C27. Reset affected step counters to position recorded in Step C23.

RESPONSE NOT OBTAINED

☐e. IF misaligned Rod determined to be trippable, THEN go to Step C29 after repairs are complete.

f. IF misaligned Rod determined to be untrippable, THEN:

☐1) Be in HOT STANDBY in 6 hours. (TS 3.1.4)

☐2) Go to 12004-C, POWER OPERATION (MODE 1).

## C MISALIGNED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| C28. Check if P/A converter should be reset: | |
| ☐a. Check recovered Rod - CONTROL BANK ROD | ☐a. Go to Step C38. |
| ☐b. Reset the P/A converter BANK POSITION DISPLAY to match the position recorded in Step C23 using 13502, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM.<br><br>UNIT 1 CB-B71<br>UNIT 2 CB-B07 | |
| ☐c. Discontinue 14915, SPECIAL CONDITIONS SURVEILLANCE LOGS for Rod Insertion Limit Monitor. | |
| ☐d. Go to Step C38. | |
| ☐C29. Reset Rod Control Urgent Failure alarm using 1HS-40039 ROD CONTROL ALARM RESET. | |
| ☐C30. Reset the Master Cycler using 13502, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM. | |
| ☐C31. Disconnect misaligned Rod lift coil. | |

## C MISALIGNED RODS IN MODE 1

ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

CAUTION: Realigning the affected bank to the misaligned rod must be done without violating the bank sequence, overlap, and insertion limits.

C32. Review the following:

- ☐ TS 3.1.5
- ☐ TS 3.1.6

☐ C33. Withdraw or insert the affected bank in Manual Rod Control to the misaligned Rod DRPI position recorded in Step C15.

☐ C34. Record the following in the Unit Control Log:

- Recovery completion time.
- Affected Bank position.

☐ C35. Connect misaligned Rod lift coil.

☐ C36. Verify affected bank step counter readings are at the misaligned Rod DRPI position recorded in Step C15.

C MISALIGNED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| C37. Check if Bank Overlap Unit should be reset: | |
| ☐a. Check if affected bank position was less than All Rods Out position during the event. | ☐a. Go To Step C38. |
| ☐b. Record control bank position in the Unit Control Log. | |
| ☐c. Reset the Bank Overlap Unit Counter using 13502, CONTROL ROD DRIVE AND POSITION INDICATION SYSTEM.<br><br>UNIT 1 CB-B71<br>UNIT 2 CB-B14 | |

NOTE: If possible, Maintenance should observe Rod exercise to determine required corrective actions.

| | |
| --- | --- |
| ☐C38. Exercise the affected bank using 14410, CONTROL ROD OPERABILITY TEST. | ☐C38. IF the Rod misaligns again, THEN return to Step C1. |
| ☐C39. Place ROD BANK SELECTOR SWITCH in MAN or AUTO, as desired. | |

C MISALIGNED RODS IN MODE 1

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |

C40. Perform the following:

☐a. Notify Duty Engineer of Rod drop recovery.

☐b. Notify Duty Engineer that plant computer Rod position adjustment may be necessary.

☐c. Discontinue 14915, SPECIAL CONDITIONS SURVEILLANCE LOGS for Rod Deviation Monitor when Rod demand position input to the IPC is reset.

☐C41. Return to procedure and step in effect.

END OF SUB-PROCEDURE TEXT

## D DROPPED OR MISALIGNED RODS IN MODES 2 THROUGH 5

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| D1. Check if Reactor shutdown is required: | |
| ☐a. Check normal Reactor startup using 12003-C, REACTOR STARTUP (MODE 3 TO MODE 2) - IN PROGRESS | ☐a. Go to Step D2. |
| ☐b. Check one or more rods - DROPPED | ☐b. IF one or more Rods are misaligned, THEN trip the Reactor and go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION. |
| c. Perform one of the following:<br>☐ Go to 12005-C, REACTOR SHUTDOWN TO HOT STANDBY (MODE 2 TO MODE 3) and perform normal Reactor shutdown.<br>-OR-<br>☐ Trip the Reactor and go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION. | |

## D DROPPED OR MISALIGNED RODS IN MODES 2 THROUGH 5

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| ☐D2. Check if physics testing in progress. | D2. Perform the following:<br>☐a. Trip the Reactor.<br>☐b. IF in Modes 1, 2, or 3, THEN go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION.<br>c. IF in Modes 4 or 5, THEN perform the following:<br>☐1) Verify Reactor trip.<br>☐2) Initiate repairs of Rod Control System.<br>☐3) Go to the applicable UOP. |

NOTE: Both the Reactivity Computer and Main Control Board Instruments should be observed for reactivity and startup rate indications.

| | |
| --- | --- |
| ☐D3. Check reactivity - WITHIN 40 PCM OF ZERO REACTIVITY OR ZERO SUR | ☐D3. Go to Step D5. |

D4. Perform the following:

☐a. Stop dilution and boration.

☐b. Move Rods to maintain flux and reactivity in the range for physics testing.

☐c. Initiate repairs of Rod Control System.

☐d. Return to procedure in effect.

## D DROPPED OR MISALIGNED RODS IN MODES 2 THROUGH 5

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| ☐D5. Check reactivity - MORE POSITIVE THAN +40 PCM OR SUSTAINED POSITIVE SUR | D5. Perform the following:<br>☐a. Trip the reactor.<br>☐b. Go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION. |

D6. Perform the following:

☐a. Stop dilution.

☐b. Insert Rods and/or borate to return and maintain flux and reactivity in the range for physics testing.

☐c. Initiate repairs of Rod Control System.

☐d. Return to procedure in effect.

END OF PROCEDURE TEXT

77. 003G2.4.41 001/2/1/RCP-CLASSIFICATIONS/C/A-4.6/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

An RCP seal LOCA is in progress
The OATC is unable to maintain PRZR level with normal charging
SI is manually actuated
1NAA de-energizes 30 seconds after the reactor trip
All RCP breakers remain closed

Current conditions:

19010-C, "E-1 Loss of Reactor or Secondary Coolant" in progress

CSFST monitoring is in progress:
- Core Cooling Orange due to low RVLIS Dynamic Range reading 40%
- CNMT Yellow due to radiation levels ~ 800 mR/hr
- Inventory Yellow due to low PRZR level of 0%

RCS pressure is 1450 psig and slowly lowering with both CCPs and SIPs running.

**REFERENCES PROVIDED**

The SS should...

A. direct the OATC to open the breakers for RCPs 1 & 3 and then delcare an Alert emergency.

B. direct the OATC to open the breakers for all four RCPs and then declare a Site Area emergency.

C. direct the OATC to open the breakers for RCPs 1 & 3 and then delcare a Site Area emergency.

D. direct the OATC to open the breakers for all four RCPs and then declare an Alert emergency.

**K/A**

**003 Reactor Coolant Pump System (RCPS).**

**G2.4.41 Knowledge of action level thresholds and classifications.**

**K/A MATCH ANALYSIS**

The question presents a scenario with a small RCS LOCA in progress and a failure of the fast bus transfer mechanism for the bus powering 2 of the RCPs. The RCP

which drives the core cooling status tree to orange with incorrect data. Ultimately this affects the proper emergency classification since it appears that a second fission product barrier is potentially lost.

This question is appropriate for an SRO since it involves detailed diagnostic knowledge and correct use of EPIP classification procedures.

**ANSWER / DISTRACTOR ANALYSIS**

A. Correct. EOP 19200-C requires opening RCP breakers for any RCP that is de-energized (RCPs 1 & 3 are powered from 1NAA). The correct core cooling status tree challenge is yellow making the RCS barrier the only lost or potentially lost barrier. This requires an Alert emergecy declaration due to the leakage being greater than the capacity of one charging pump in normal charging mode or RCS leak in progress with RCS subcooling < 24 F.

B. Incorrect. RCS pressure is above the RCP trip criteria of 1375 psig so the running RCPs (2 & 4) should NOT be tripped. The incorrect core cooling status tree challenge of Orange results in a potential loss of the fuel clad barrier and a loss of the RCS barrier. This leads to an incorrect event classification of Site Area emergency.

C. Incorrect. EOP 19200-C requires opening RCP breakers for any RCP that is de-energized (RCPs 1 & 3 are powered from 1NAA). If the student does not recognize the impact of the RCP breaker positions on the core cooling status tree then s/he would incorrectly diagnose a Site Area emergency due to potential loss of the fuel clad in addition to the loss of the RCS barrier.

D. Incorrect. RCS pressure is low but still above the RCP trip criteria of 1375 psig so the running RCPs (2 & 4) should NOT be tripped. The correct emergency classification for this event is an Alert emergency due to the loss of the RCS barrier.

**REFERENCES**

19010-C, "E-1 Loss of Reactor or Secondary Coolant" page 25

19200-C, "F-0 Critical Safety Function Status Trees" NOTES, and Core Cooling tree

91001-C, "Emergency Classification and Implementing Instructions" Figures 1, 2, and 4 **(PROVIDED TO THE STUDENTS)**

V-LO-TX-01101 Electrical Distribution Text page 17

V-LO-TX-16001 Primary Systems Text page 32

**VEGP learning objectives:**

LO-LP-37002-9:

# HL-15R SRO NRC EXAM

LO-LP-37003-9:

Explain how various combinations of RCPs running effect RVLIS indication.

LO-LP-40101-10:

List the three fission product barriers that are part of the criteria for classifying an emergency.

LO-LP-40101-11:

Describe how the status of fission product barrier integrity is obtained.

LO-LP-40101-13:

Given an emergency scenario, and the procedure, classify the emergency (SRO only).

FOLDOUT PAGE

1. RCP TRIP CRITERIA
   Trip all RCPs if BOTH conditions listed below occur:

   a. CCPs or SI pumps - AT LEAST ONE RUNNING.

   b. RCP Trip Parameter - RCS PRESSURE LESS THAN 1375 psig.

2. SI REINITIATION CRITERIA
   Operate ECCS pumps as necessary if EITHER condition listed below occurs.

   - RCS subcooling - LESS THAN 24°F [38°F ADVERSE].
   - PRZR level - CANNOT BE MAINTAINED GREATER THAN 9% [37% ADVERSE].

   Initiate ATTACHMENT A if it is necessary to re-establish CCP Cold Leg Injection.

3. SECONDARY INTEGRITY CRITERIA
   Go to 19020-C, E-2 FAULTED STEAM GENERATOR ISOLATION, if any SG pressure is lowering in an uncontrolled manner or has been completely depressurized, and has not been isolated.

4. E-3 TRANSITION CRITERIA
   Go to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE, if any SG level rises in an uncontrolled manner or any SG has abnormal radiation.

5. COLD LEG RECIRCULATION SWITCHOVER CRITERION
   Go to 19013-C, ES-1.3 TRANSFER TO COLD LEG RECIRCULATION, if RWST level lowers to less than 29%.

6. AFW SUPPLY SWITCHOVER CRITERION
   Switch to alternate CST by initiating 13610, AUXILIARY FEEDWATER SYSTEM when CST level lowers to less than 15%.

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE:

- If SPDS display of the Plant Computer is not operable or questionable, manual monitoring of CSFSTs should be performed by a licensed operator.
- CSFSTs should be monitored continuously if a RED or ORANGE condition is present or each 10 to 15 minutes if the highest priority CSFST is no higher than YELLOW.
- CSFSTs should be checked in order listed.
- Priority of operator action is given by the following:
  - Red (Solid) Path - Extreme challenge, in Tree Order per Step 1.
  - Orange (Dashed) Path - Severe challenge, in the Tree Order per Step 1.
  - Yellow (Dotted) Path - Not satisfied, in Tree Order per Step 1.
  - Green (Outlined) Path - Satisfied.
- If using the Plant Computer (if available) to monitor CSFSTs:
  - The mode indication of the Plant Computer CSFSTs should be indicating zero.
  - RCP breakers should be opened for RCPs NOT running in order to provide proper RVLIS indication.
  - If SPDS is operable, CSFSTs may be checked by scanning the display console for alarm conditions.
  - Color status of CSFSTs will also be indicated by letter R for red, O for orange, Y for yellow, G for green, and M for magenta.
  - CSFSTs will indicate active (alarming) paths as solid lines and non-active paths as empty or hollow lines.

1. Check CSFSTs - SATISFIED:

   ☐ a. Subcriticality (F-0.1)

   ☐ b. Core Cooling (F-0.2)

   ☐ c. Heat Sink (F-0.3)

   ☐ d. Integrity (F-0.4)

   ☐ e. Containment (F-0.5)

   ☐ f. Inventory (F-0.6)

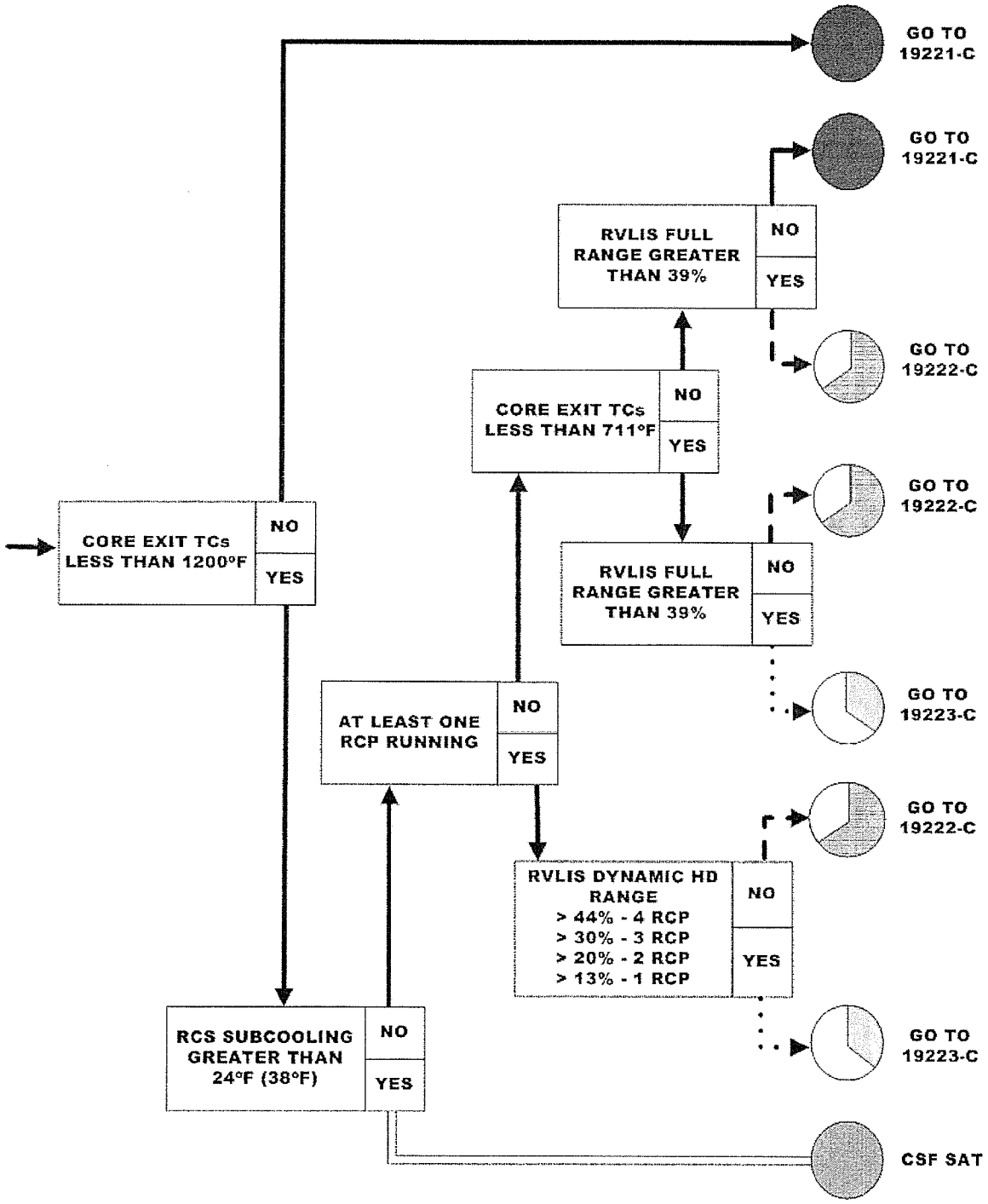
☐ 1. IF a Red condition exists, THEN immediately go to FRP.

☐ IF an Orange condition exists, THEN go to FRP after completion of present pass thru CSFSTs.

☐ IF a Yellow condition exists, THEN initiate FRP after evaluating plant conditions with Shift Supervisor's approval.

Sheet 1 of 1

# F- 0.2
# CORE COOLING



REFERENCE USE

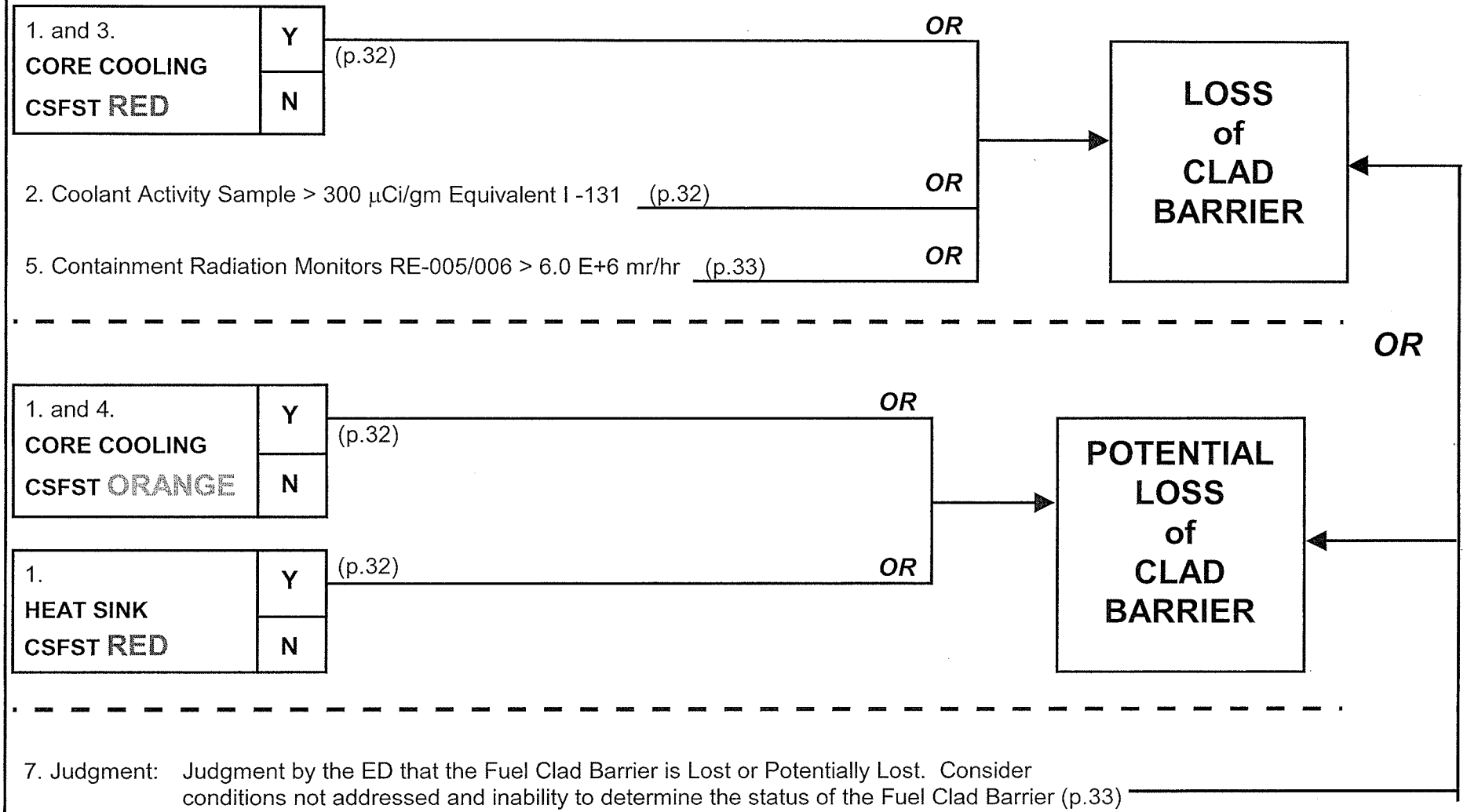



**FIGURE 1 – FUEL CLADDING INTEGRITY** ***(Modes 1, 2, 3 and 4 only)***

REFERENCE USE

2. RCS Leak in progress ***AND*** RCS Subcooling is Less Than 24 °F [38 ° F ADVERSE] (p.33) *OR*

3. SGTR Resulting in an SI Actuation (p.34) *OR*

4. Containment Radiation Monitors RE-005/006 > 2.0 E+4 mr/hr (p.34) *OR*

**LOSS of RCS BARRIER**

*OR*

| | | |
|---|---|---|
| 1. **HEAT SINK** **CSFST RED** | Y | *OR* (p. 33) |
| | N | |

| | | |
|---|---|---|
| 1. **RCS INTEGRITY** **CSFST RED** | Y | *OR* (p. 33) |
| | N | |

**POTENTIAL LOSS of RCS BARRIER**

2. NON-Isolable RCS leak (including SG tube leakage) GREATER THAN the Capacity of One Charging Pump in the normal charging mode (p.34) *OR*

5. Unexplained level rise in any of the following: containment sump, Reactor Coolant Drain Tank (RCDT), Waste Holdup Tank (WHT) (p.34)

6. Judgment: Judgment by the ED that the RCS Barrier is Lost or Potentially Lost. Consider conditions not addressed and the inability to determine the status of the RCS Barrier (p. 34)

## FIGURE 2 – REACTOR COOLANT SYSTEM (RCS) INTEGRITY *(Modes 1, 2, 3 and 4 only)*

inhalation, at OR beyond the site boundary.

## SITE AREA EMERGENCY

**RS1 - Offsite Dose Resulting from an Actual or Imminent Release of Gaseous Radioactivity Exceeds 100 mR TEDE OR 500 mR Thyroid CDE for the Actual or Projected Duration of the Release. (pg 25)**

See Notes 3 and 4 →

1. VALID reading on any of the following radiation monitors that exceeds OR is expected to exceed the reading shown for 15 minutes OR longer:
   - RE-12839 — $1.5 \times 10^{4}$ µCi/cc
   - RE-12444 — $7.0 \times 10^{3}$ µCi/cc
   - RE-13119 thru 13123 — $3.1 \times 10^{6}$ µCi/cc

OR

2. Dose assessment using actual meteorology indicates doses greater than 100 mR TEDE OR 500 mR thyroid CDE at OR beyond the site boundary.

OR

3. Field survey results indicate closed window dose rates exceeding 100 mR/hr expected to continue for more than one hour; OR analyses of field survey samples indicate thyroid CDE of 500 mR for one hour of inhalation, at OR beyond the site boundary.

*Note 3: If dose assessment results are available at the time of declaration, the classification should be based on Threshold Value #2 instead of Threshold Value #1. While necessary declarations should not be delayed awaiting results, the dose assessment should be initiated / completed in order to determine if the classification should be subsequently escalated.*

*Note 4: The Emergency Duration should not wait until 15 minutes has elapsed, but should declare the event as soon as it is determined that the release duration has or will likely exceed 15 minutes.*

**FS1 - Loss or Potential Loss of ANY Two Barriers (pg 33)**

See Fission Product Barrier Matrix

## ALERT EMERGENCY

**RA1 - Any UNPLANNED Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds 200 Times the Radiological Effluent Technical Specifications for 15 Minutes or Longer. (pg. 19)**

Note: The Emergency Director should not wait until 15 minutes has elapsed, but should declare the event as soon as it is determined that the release duration has or will likely exceed 15 minutes.

1. VALID reading on any of the following effluent monitor that exceeds 200 times the alarm setpoint established by a current radioactivity discharge permit for 15 minutes OR longer.

| Monitor | 200 X Setpoint Value |
|---|---|
| • RE-0018 | $2.8 \times 10^{-3}$ µCi/cc |
| • RE-0021 | $4.0 \times 10^{-3}$ µCi/cc |
| • RE-0848 | $3.5 \times 10^{-3}$ µCi/cc |
| • ARE-0014 | $2.4 \times 10^{-03}$ µCi/cc |
| • RE-12839 | $7.9 \times 10^{-1}$ µCi/cc |
| • RE-12442C/12444C | $1.3 \times 10^{-1}$ µCi/cc |

OR

2. VALID reading on any of the following radiation monitors that exceeds the reading shown for 15 minutes OR longer:
   Main Steam RE-13119 thru 13123 2.5 µCi/cc

OR

**RA2 - Damage to Irradiated Fuel OR Loss of Water Level that Has or Will Result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel (pg. 22)**

1. UNPLANNED VALID alarm on any of the following radiation monitors:
   - Fuel Handling Building RE-008
   - Fuel Handling BLDG EFFL ARE-2532 A/B
   - Fuel Handling BLDG EFFL ARE-2533 A/B

OR

2. Loss of water level that has or will result in the uncovering of irradiated fuel outside the Reactor Vessel as indicated by ANY of the following:
   Personnel report during fuel assembly movement in: Spent Fuel Pool Storage Less than El 188'-7"; Transfer Canal Transit El Less than El 185'10"; Reactor Core El Less than El 181'-10" (62% on Full Range RVLIS)

**RA3 - Release of Radioactive Material or Rises in Radiation Levels Within the Facility That Impedes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown (pg. 24)**

1. VALID radiation monitor readings greater than 15 mR/hr in areas requiring continuous occupancy to maintain plant safety functions:
   Control Room radiation monitor RE-001 OR Central Alarm Station (by survey)

OR

**FA1 - ANY Loss or ANY Potential Loss of EITHER Fuel Clad Barrier OR RCS Barrier (pg. 31)**

See Fission Product Barrier Matrix

9/001-C
FIGURE 4

A **fast bus transfer** scheme is utilized on the 13.8kV buses to shift the bus power supply from the UATs to the RATs if a Main Generator Trip occurs quickly enough to maintain voltage on the bus and prevent a Reactor Trip due to loss of RCPs. When the Main Generator Trips, the feeder breakers from the UATs to the 13.8kV buses trip open. As soon as the UAT feeder to the bus trips, and provided that the phase relationship between the voltage on the bus and incoming voltage from the RAT is within a preset tolerance, the RAT feeder to the bus will close. All of this occurs within about **0.1 seconds**. If the phase relationship between the voltages is not within the preset tolerance, the fast bus transfer will not occur. However, the 13.8kV buses are also equipped with a residual voltage transfer that acts as a backup to the fast bus transfer. The **residual voltage transfer** is also actuated by a Main Generator lockout relay. If a fast bus transfer does not occur following a Generator Trip, when the bus voltage decays to about 30% of normal, (as sensed by 2 UV relays per bus) the residual voltage transfer will close the bus feeder from the RAT. This occurs only if the feeder from the UAT has opened. There is no requirement for the voltages to be in phase in this case because by the time RAT feeder breaker re-energizes the bus, the existing bus voltage has decayed to essentially zero. The residual voltage transfer takes about **0.9 seconds** to occur. The UV (under voltage) trips for the load feeder breakers have been defeated because many loads were tripping off prior to the residual bus transfer. Since the UV trips have now been defeated, if the bus is de-energized the handswitch indication for the loads on the dead bus will give false indication that the pump or motor is still energized. This is why when verifying a pump or other equipment is running that the operator must look at indications such as discharge pressure, flows, or voltages.

Loads supplied by the 13.8kV buses are fed through breakers that will trip automatically on instantaneous overcurrent or ground overcurrent to protect the switchgear and the motor loads. Reactor Coolant Pumps are supplied by two breakers in series to provide redundant interruption of power for the containment Electrical penetration over current protection. The following starting duty cycle for the RCP should be observed:

a. Only one RCP shall be started at any one time.

b. Two successive starts are permitted, provided the motor is permitted to coast to a stop between starts.

c. A third start may be made when the winding and core have cooled by running for a period of 20 minutes, or by standing idle for a period of 45 minutes.

The proper order for breaker operation to start a RCP is to place the RCP 1E Control handswitch in START and then to place the RCP Non-1E Control handswitch in Start. The stopping order for the RCP involves placing its Non-1E Control handswitch in STOP and then PLACING its 1E Control handswitch in Stop. This process minimizes the power transferred across the 1E breaker upon opening and closing thereby lowering the possibility of damage to the more expensive component.

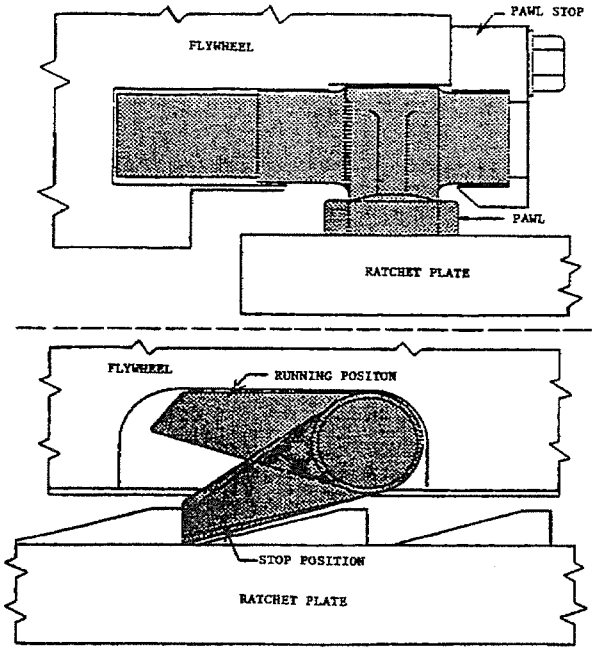
During normal operation, transferring the 13.8kV bus from a UAT to a RAT or from a RAT to a UAT simply involves verifying incoming and bus voltages are approximately 13.8kV, placing the breaker synchronizing switch is on, and closing the associated incoming breaker. The alternate incoming breaker will immediately trip open.

V-LO-TX-01101

BEARING TEMPERATURE DETECTORS: One shoe of each bearing (upper thrust, lower thrust, upper radial, and lower radial) is provided with a temperature detector.

16.20 ANTI-REVERSE-ROTATION DEVICE

The anti-reverse-rotation device used on the RCP motor is a simple ratchet and pawl arrangement requiring no lubrication and having no parts to wear during normal operation. The device prevents reverse rotation with 100 percent torque applied in that direction and with a maximum reverse movement of less than 5 degrees. At an approximate speed of 70 rpm the pawls drop and bounce across the ratchet plate. At zero speed, one pawl will engage the ratchet plate, preventing rotation in the reverse direction. The pawl and associated parts are designed to support up to five times normal torque without exceeding safe working stresses. There are a number of such pawls spaced equally around the periphery, and any one can contain the reverse forces. The ratchet plate is normally stationary except when it absorbs shock. It is attached to its support with spring-return shock absorbers which prevent reverse shock from being transmitted to other motor parts. At startup, the pawls are kicked up by the ratchet notches, and they continue to bounce until the motor attains a speed of about 70 rpm. At this speed, the centrifugal force is sufficient to overcome the force of gravity and hold the pawls in the running position. While the motor is running at speed, there is no contact between the pawls and the ratchet plate.




16.21 FLYWHEEL

It is important to reactor protection that the reactor coolant continues to flow for a short time after reactor trip. In order to provide this flow following loss of offsite electrical power, each reactor coolant pump is provided with a flywheel. Thus the rotating inertia of the pump, motor, and flywheel is employed during the coast down period to continue the reactor coolant flow. The pump/motor is designed for the safe shutdown earthquake at the site. Hence, it is concluded that the coast down capability of the pumps is maintained even under the most adverse case of loss of offsite electrical power coincident with the safe shutdown earthquake.

16.22 RCP BREAKERS

Reactor coolant pumps are powered from 13.8 KV non-ESF busses through a non-class 1E Tie Breaker and a class 1E motor breaker. RCP 1 and 3 are supplied from bus 1NAA and RCP 2 and 4 are supplied from bus 1NAB. Only one RCP is started at a time to prevent over loading its associated 13.8 KV bus. Both the non-class 1E and class 1E breaker are in series. The reactor coolant pump non-class 1E tie breakers (HS-0495B, 0496B, 0497B, 0498B) receive their control power from 125 VDC non-ESF busses. In order to close these breakers the respective oil lift pump must be running and the oil lift pump discharge pressure must be at least (600 psig) as indicated by a blue light on the oil lift pump hand switch. These non-class 1E tie breakers will automatically trip on: over voltage, instantaneous or time delay over current,



V-CO-TX-16001

78. 007A2.03 001/2/1/PRT-PZR OVERPRESSURE/C/A-3.9/NEW/HL-15R NRC/SRO/TNT/DS

19241-C, "FR-P.1 Response to Imminent Pressurized Thermal Shock" is being implemented.

RCS WR pressure is 2335 psig
RCS WR cold leg temperatures are 190 F and stable
All RCPs are stopped
PRZR level is 15%

The SS is at the step 23 of 19241-C which reads:

23. Depressurize RCS to lower RCS subcooling:

    a. Check any if ANY of the following conditions are satisfied:

    ___ RCS subcooling - 24 F to 34 F [38 F to 48 F ADVERSE]

    -OR-

    ___ PRZR level - GREATER THAN 75% [52% ADVERSE]

    -OR-

    ___ RCS pressure - LESS THAN 125 PSIG

The SS should direct the OATC to depressurize the RCS to...

**REFERENCE PROVIDED**

A. 125 psig with auxiliary spray.

B. 125 psig with one train of COPS.

C. 34 F subcooling with auxiliary spray.

D. 34 F subcooling with one train of COPS.

**K/A**

**007 Pressurizer Relief Tank/Quench Tank System (PRTS)**

**A2.03 Ability to (a) predict the impacts of the following malfunctions or**

**operations on the P S; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations.**

**Overpressurization of the PZR.**

## K/A MATCH ANALYSIS

The question presents a PTS scenario requiring the use of FR-P.1 to mitigate the condition. The scenario requires the student to determine which depressurization method should be used, and what the target for the depressurization is.

This question requires the student to assess the plant conditions and then prescribe a section of the procedure to mitigate this problem making this an SRO question.

## ANSWER / DISTRACTOR ANALYSIS

A. Incorrect. 125 psig is the most restrictive criteria for this step in the procedure. Auxiliary spray is a plausible choice since it is a possible branch in the procedure steps.

B. Correct. Since flow through the regenerative heat exchanger is isolated and the RCPs are stopped, the correct action by procedure is to use one train of COPS. 125 psig is the most restrictive criteria for depressurization.

C. Incorrect. 34 F subcooling is one of the possible depressurization criteria for this step of the procedure, but it is not the most restrictive for the plant conditions given. Auxiliary spray is a plausible choice since it is a possible branch in the procedure steps.

D. Incorrect. 34 F subcooling is one of the possible depressurization criteria for this step of the procedure, but it is not the most restrictive for the plant conditions given. Since flow through the regenerative heat exchanger is isolated and the RCPs are stopped, the correct action by procedure is to use one train of COPS.

## REFERENCES

19241-C, "FR-P.1 Response to Imminent Pressurized Thermal Shock Condition" steps 23 & 24

LO-HO-37071-002 "19241-C, FR-P.1 Imment Pressurized Thermal Shock" pages 22 & 23

Steam Tables **(PROVIDED TO STUDENTS)**

## VEGP learning objectives:

V-LO-LP-37071-04:

State the actions for preventing or mitigating the severity of overcooling and

repressurizing transients.

V-LO-LP-37071-06:

Using EOP 19241 as a guide, briefly describe how each step is accomplished.

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

NOTE

The Upper Head region of the vessel may void during RCS depressurization if RCPs are NOT running. This will result in a rapidly rising PRZR level.

**CAUTION**

RCS depressurization may result in RCP seal $\Delta P$ lowering to less than 200 psid. Shutdown of RCPs is required in this case.

23. Depressurize RCS to lower RCS subcooling:

    a. Check if ANY of the following conditions are satisfied:

    __ RCS subcooling - 24°F to 34°F [38°F to 48°F ADVERSE].

    -OR-

    __ PRZR level - GREATER THAN 75% [52% ADVERSE].

    -OR-

    __ RCS pressure - LESS THAN 125 PSIG.

    __a. Go to Step 23.c.

    __b. Go to Step 27.

° Step 23 continued on next page

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __c. Check Normal PRZR Spray - AVAILABLE. | __c. IF letdown is in service, THEN go to Step 24.<br><br>IF letdown is NOT in service, THEN use one PRZR PORV by performing the following:<br><br>__1) Arm one train of COPS and verify PRZR PORV Block Valve - OPEN.<br><br>__2) Open associated PRZR PORV.<br><br>__3) Go to Step 25.<br><br>__ IF RCS can NOT be depressurized using any PRZR PORV, THEN go to Step 24 even though letdown is NOT in service. |

__d. Open Normal PRZR Spray Valves.

__e. Go to Step 25.

24. Establish Auxiliary Spray by performing the following:

__a. Verify PRZR Heaters - OFF.

__b. Verify at least one CCP running.

* Step 24 continued on next page

displace water into the PRZR, causing rapidly increasing PRZR level with the potential for water relief through the PRZR PORVs. The PRZR may fill with water within a few minutes. This note informs the operator of the potential for this condition, so that RCS depressurization can be stopped quickly to avoid a water solid PRZR.

***STEPS:*** ***Depressurize RCS To Decrease RCS Subcooling***
***Establish Auxiliary Spray by performing the following***
***Check if any of the following conditions are satisfied***
***Stop RCS depressurization***

PURPOSE: To decrease RCS pressure to the lowest pressure possible without losing subcooling

BASIS:

The RCS pressure reduction is intended to decrease pressure stress on the vessel wall as much as possible. The RCS should be depressurized until RCS subcooling is between 24-34°F [38-48°F for adverse containment]. If a PORV is used and RCS subcooling decreases to less than 24°F [38°F for adverse containment] before a PORV is closed or isolated, the operator should allow adequate time for the PORV or its associated block valve to close (i.e., the time necessary for the valve to stroke) before manually operating ECCS pumps as necessary to restore subcooling per the previous continuous action step.

If normal PRZR spray is not available, and the RCS cannot be depressurized using any PRZR PORV, then the operator is instructed to use auxiliary spray. This preferred order of the means to depressurize the RCS takes into account that letdown has not been established yet to heat the auxiliary spray flow and minimize the thermal shock to the spray nozzle.

Once letdown has been established, using auxiliary spray for depressurization is preferred before using a PRZR PORV. If the operator is directed to return to this step after letdown has been established, and normal PRZR spray is not available, auxiliary spray should be used for depressurization.

A second criterion, in addition to subcooling, for stopping the pressure reduction is PRZR level greater than 75% [52% for adverse containment]. Limiting PRZR level ensures a substantial steam bubble which facilitates further pressure control.

A third criterion for stopping the pressure reduction is RCS pressure less than 125 psig. For certain postulated accidents, it is possible to start this step with a low RCS pressure (less than approximately 200

V- LO-AO-37071-002

psig) and greater than the required 10°F subcooling. It may be difficult to reduce RCS pressure any further per the RNO column. Since the intent of the step has been met, no further pressure reduction is necessary.

KNOWLEDGE:

RCS depressurization should be stopped when RCS subcooling based on core exit TCs is between 24°F [38°F for adverse containment] and 34°F [48°F for adverse containment]

If subcooling decreases below the setpoint for reinitiating ECCS during the depressurization, the operator should take the appropriate actions such as closing the PORV or the block valve for a stuck open PORV, and wait to see if the actions are successful (i.e., allow adequate time for valves to stroke closed), before reinitiating ECCS. If the actions stop the depressurization and subcooling is restored, ECCS reinitiation is not necessary.

PLANT-SPECIFIC INFORMATION:

34°F The sum of temperature and pressure measurement system errors, including allowances for normal channel accuracies, translated into temperature using saturation tables, plus 10°F.

48°F The sum of temperature and pressure measurement system errors, including allowances for normal channel accuracies and post accident transmitter errors, translated into temperature using saturation tables, plus 10°F.

75% PRZR level at the upper tap, including allowances for normal channel accuracy, minus 20% for operating margin.

52% PRZR level at the upper tap, including allowances for normal channel accuracy, post accident transmitter errors, and reference leg process errors, minus 20% for operating margin.

125 psig Saturation pressure for temperature T1, including allowances for normal channel accuracy, plus 10 psi, not to exceed 200 psig.

***STEP: Check PRZR Level - GREATER THAN 19% [50% FOR ADVERSE CONTAINMENT]***

PURPOSE: To determine if PRZR level is above the heaters

# HL-15R SRO NRC EXAM

79. 008AA2.28 001/1/1/PZR VAPOR ACC-SPDS/C/A - 3.9/NEW/HL-15R NRC/SRO/TNT/DS

Safety Injection has actuated from 100% power
SS is implementing EOP 19010-C, "E-1 Loss of Reactor or Secondary Coolant"

SPDS indications for CSFSTs:

Subcriticality - GREEN
Core Cooling - YELLOW due to RCS subcooling < 24 F
Heat Sink - GREEN
Integrity - GREEN
Containment - YELLOW due to CNMT radiation > 750 mR/hr
Inventory - YELLOW due to PRZR level > 92%

PRZR level is 100%
RCS pressure is 1040 psig

The SS is at the step 15 which reads:

15. Check RCS and SG pressures:

___• Pressure in all SGs - STABLE OR RISING

___• RCS pressure - STABLE OR LOWERING

The correct actions to take are to...

A. return to an eariler step in 19010-C until RCS subcooling is > 24 F, then transition to 19011-C, "SI Termination".

B. return to an eariler step in 19010-C until SG pressures stabilize then continue with 19010-C.

C. continue with the next step in 19010-C, then start an RCS cooldown in 19012-C, "ES-1.2 Post LOCA Cooldown and Depressurization".

D. continue with the next step in 19010-C, then transition to 19011-C when RCS pressure starts increasing.

**K/A**

**008 Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)**

# HL-15R SRO NRC EXAM

**Pressurizer Vapor Space Accident.**

**Safety parameter display system indications.**

## K/A MATCH ANALYSIS

The question presents a plausible scenario using the expected SPDS indications for a PRZR vapor space accident due to a stuck open safety valve. The examinee must properly interpret the CSFST challenges to determine that an RCS LOCA is in progress. Then s/he must be able to select the approppriate EOP strategy for step 15 of E-1 and the appropriate EOP transition. The question requires detailed knowledge of diagnostic steps and decision points in the EOPs that invovles a transition to an event specific sub-procedure making this an SRO level question.

## ANSWER / DISTRACTOR ANALYSIS

A. Incorrect. The yellow condition on the core cooling CSFST is indicative of a primary LOCA. Returning to the earlier step in 19010-C would be applicable for a secondary LOCA. The choice is plausible since the return to the earlier step is in 19010-C and the PRZR level indication is a possible indication of RCS inventory after the faulted SG has completed blowing down.

B. Incorrect. The yellow condition on core cooling CSFST is indicative of a primary LOCA. Returning to the earlier step in 19010-C while waiting for SG pressures to stablize would be applicable for a secondary LOCA. The expected procedure flow path for a secondary LOCA would be a transition to 19011-C after SG pressures stabilized.

C. Correct. The yellow condition on core cooling indicates inadequate RCS subcooling. The correct procedure flow path would be to continue with 19010-C and transition to ES-1.2 (19012-C) since RCS pressure is > 300 psig. An RCS cooldown is performed in 19012-C to establish RCS subcooling.

D. Incorrect. The yellow condition on core cooling indicates inadequate RCS subcooling. A transition to 19011-C for SI termination is plausible since this is a continuous action from an eariler step in 19010-C. However, without adequate RCS subcooling, the transition criteria to 19011-C would not met.

## REFERENCES

19010-C, "E-1 Loss of Reactor or Secondary Coolant" steps 11, 15, 21
19200-C, "F-0 Critical Safety Function Status Trees" core cooling
V-LO-HO-37111-001 pages 25 & 26

## VEGP learning objectives:

| NO_OBJ | TX_OBJ |
|---|---|
| LO-LP-37111-01 | State the physical bases for establishing equilibrium temperature and pressure in the RCS. |

LO-LP-37111-01 State the physical bases for establishing equilibrium temperature and pressure in the RCS.

LO-LP-37111-02 State the effect of various size breaks on the Primary System with respect to temperatures and pressures.

NO_OBJ TX_OBJ

LO-LP-37111-05 State how a LOCA is initially detected. State how the proper procedure is entered.

NO_OBJ TX_OBJ

LO-LP-37111-08 Using EOP 19010 as a guide, briefly describe how each step is accomplished.

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| *11. **Check if ECCS flow should be reduced:** | |
| __a. RCS Subcooling - GREATER THAN 24°F [38°F ADVERSE]. | __a. Go to Step 12. |
| b. Secondary Heat Sink: | __b. Go to Step 12. |
| __ Total feed flow to intact SG(s) - GREATER THAN 570 GPM.<br>-OR-<br>__ NR level in at least one intact SG - GREATER THAN 10% [32% ADVERSE]. | |
| __c. RCS pressure - STABLE OR RISING. | __c. Go to Step 12. |
| __d. PRZR level - GREATER THAN 9% [37% ADVERSE]. | d. Try to stabilize RCS pressure:<br>__• Use Normal PRZR Spray if Instrument Air to Containment available.<br>__• Do NOT use PRZR PORVs to stabilize RCS pressure.<br>__Go to Step 12. |
| __e. Go to 19011-C, ES-1.1 SI TERMINATION. | |

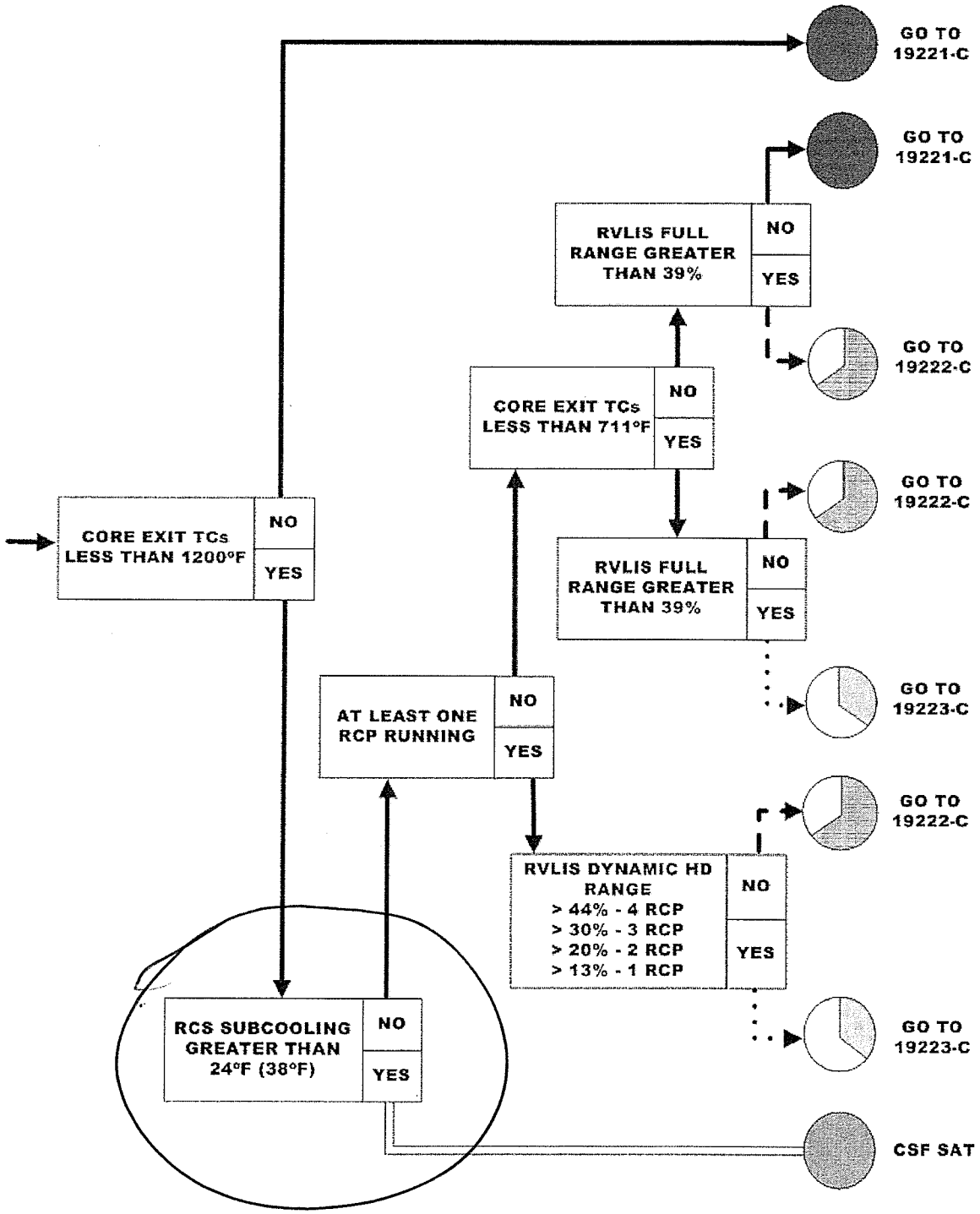
| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| 15. Check RCS and SG pressures:<br>__• Pressure in all SGs - STABLE OR RISING.<br>__• RCS pressure - STABLE OR LOWERING. | __15. Return to Step 4. |
| 16. Check if DGs should be stopped: | |
| __a. AC Emergency Busses - ENERGIZED BY OFFSITE POWER. | __a. Try to restore offsite power to AC Emergency Busses by initiating 13427A/B, 4160V AC AA02/BA03 ELECTRICAL DISTRIBUTION SYSTEM. |
| __b. Reset SI, if necessary. | |
| __c. Stop any unloaded DG and place in standby by initiating 13145, DIESEL GENERATORS. | |
| d. Check Stub Busses - ENERGIZED:<br>__• NB01<br>__• NB10 | __d. Energize Stub Busses by performing the following as necessary: |

| NB01 | NB10 |
|---|---|
| 1) Open breaker NB01-01 | 1) Open breaker NB10-01 |
| 2) Close breaker AA02-22 | 2) Close breaker BA03-18 |
| 3) Close breaker NB01-01 | 3) Close breaker NB10-01 |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| *21. **In the event of a Design Basis Accident, the following apply concerning conservation of Ultimate Heat Sink inventory:** | |
| __• IF a DBA LOCA coincident with a LOSP has occurred, THEN secure one train of NSCW within 24 hours of the initiating event per 13150, NUCLEAR SERVICE COOLING WATER SYSTEM. | |
| __• IF a DBA LOCA without an LOSP has occurred and normal NSCW makeup is lost, THEN secure one train of NSCW within 24 hours of the loss of makeup capability per 13150, NUCLEAR SERVICE COOLING WATER SYSTEM. | |
| 22. Check if RCS cooldown and depressurization is required: | |
| __a. RCS pressure - GREATER THAN 300 PSIG. | __a. IF RHR Pump flow is greater than 500 gpm, THEN go to Step 23. |
| __b. Go to 19012-C, ES-1.2 POST LOCA COOLDOWN AND DEPRESSURIZATION. | |

Sheet 1 of 1

# F- 0.2
# CORE COOLING



LO-HO-37111-001

PURPOSE: To alert the operator that if RCS pressure should decrease in an uncontrolled manner to less than the shutoff head of the RHR pumps, they must be manually restarted since the SI signal has been reset.

BASIS:

Except for relatively large LOCAs, the RCS pressure should remain greater than the shutoff head pressure of the RHR pumps until later in the recovery following a controlled cooldown and depressurization. To avoid damage to the RHR pumps, these pumps are stopped early in the recovery if RCS pressure is greater than their shutoff head. An automatic signal to restart these pumps may not be available if RCS pressure subsequently decreases uncontrollably to less than their shutoff head. In that case, manual action is required to restart these pumps.

PLANT-SPECIFIC INFORMATION:

300 psig Shutoff head pressure of the RHR pumps, including allowances for normal channel accuracy and post accident transmitter errors.

***STEP:*** ***Check RCS And SG Pressures***

PURPOSE: To determine if the SI termination criteria should be rechecked

BASIS:

Since procedure 19010-C is used to recover from both a LOCA and secondary side break, a second check on SG pressures is necessary in case there is a faulted SG which was not fully depressurized at the time the SI termination criteria were checked. A check on RCS pressure is also necessary in case the SG pressures are stable and there is a faulted SG which is depressurizing at the time the SI termination criteria were checked. If there is a faulted SG which is still depressurizing in an uncontrolled manner or if the RCS pressure is increasing, the operator is directed to return to the step that checks RCP trip criteria, since the initial steps in 19010-C should be rechecked. Eventually, the faulted SG will blow down to atmospheric pressure and dry out, RCS pressure will stabilize or increase, and all SI termination criteria in 19010-C should be met. If the operator proceeds past this step in 19010-C with a depressurizing SG, he could be directed to 19012-C, ES-1.2 POST LOCA COOLDOWN AND DEPRESSURIZATION, and encounter more restrictive SI termination criteria than necessary.

KNOWLEDGE:

With a LOCA and no faulted SG the SG pressure could be decreasing slightly. This is considered a "stable" SG pressure. **The concern addressed by this step is the presence of a secondary side break in which the faulted SG is still depressurizing in an uncontrolled manner. If this is the case, the SI termination criteria may not be met at the time the check is encountered, and the operator should return to the RCP trip criteria step** (4) in 19010-C and not proceed to 19012-C, ES-1.2 POST LOCA COOLDOWN AND DEPRESSURIZATION, until all SG pressures have been stabilized or are increasing and RCS pressure has stabilized or is decreasing.

**"Uncontrolled"** means not under the control of the operator, and incapable of being controlled by the operator using available equipment.

***STEP:*** ***Check If Diesel Generators Should Be Stopped***

PURPOSE: To stop emergency diesel generators if they have started and are running unloaded

BASIS:

Diesels not be run extensively unless carrying load. Diesels should auto-start on an SI signal, but will not load if offsite power is available. If DGs are supplying the emergency busses, then stub busses are re-energized to aid the recovery process.

If SI has not been previously reset and the diesel generators should be stopped, SI should be reset prior to stopping the diesels.

When the emergency diesels are stopped, they are placed in standby to be ready to start either manually or automatically.

PLANT-SPECIFIC INFORMATION:

Additional equipment loaded on stub busses includes DG air compressors, PRZR backup heater groups A & B, Reactor Makeup Water pumps, CRDM fans, and Reactor Cavity cooling fans.

# HL-15R SRO NRC EXAM

80. 010G2.1.20 001/2/1/PZR PRESS-PROC STEPS/C/A-4.6/NEW/HL-15R NRC/SRO/TNT/DS

Given the following conditions:

19030-C, "E-3 Steam Generator Tube Rupture" is being implemented
Rapid RCS cooldown and depressurization have been completed
The loop 1 PRZR spray valve is stuck open
PRZR level is 76% and rapidly rising
RCS pressure is 1150 psig and lowering

The SS should direct the OATC to...

A. stop RCP 1 then stop RCP 4 if pressure continues to lower.

   Operate ECCS pumps as necessary if RCS pressure continues to lower after stopping both RCPs. Then transition to 19133-C, "ECA-3.3 SGTR Without Pressurizer Pressure Control".

B. stop RCP 4 then stop RCP 1 if pressure continues to lower.

   Transition to 19131-C, "ECA-3.1 SGTR With Loss of Reactor Coolant: Subcooled Recovery Desired" if pressure continues to lower after stopping both RCPs.

C. stop RCP 4 then stop RCP 1 if pressure continues to lower.

   Operate ECCS pumps as necessary if RCS pressure continues to lower after stopping both RCPs. Then transition to 19133-C, "ECA-3.3 SGTR Without Pressurizer Pressure Control".

D. stop RCP 1 then stop RCP 4 if pressure continues to lower.

   Transition to 19131-C, "ECA-3.1 SGTR With Loss of Reactor Coolant: Subcooled Recovery Desired" if pressure continues to lower after stopping both RCPs.

**K/A**

**010 Pressurizer Pressure Control System (PZR PCS)**

**G2.1.20 Ability to interpret and execute procedure steps.**

**K/A MATCH ANALYSIS**

The question presents a scenario where rapid RCS cooldown and depressurization have just been completed and the OATC is unable to shut one of the normal spray

valves. This question evaluates the students' ability to properly execute procedure steps related to the PRZR pressure control system and therefore matches the K/A.

This question also requires detailed knowledge of decision points in EOP E-3 steps 42 & 43 that involves a transition to emergency contingency procedure ECA- 3.1 which meets SRO question construction criteria.

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. The procedural requirements are to stop RCP 4 first. Stopping RCP 1 is plausible since it provides spray flow for loop 1. The transition to ECA-3.3 (SGTR Without PRZR Pressure Control) is plausible due to the loss of the normal spray control function and the continued loss of RCS pressure.

B. Correct. RCP 4 is always the first RCP to be stopped if a spray valve fails open since it has been demonstrated to provide the majority of the spray flow to the normal spray valves. The transition to ECA-3.1 (SGTR With Reactor Coolant System LOCA: Subcooled Recovery Desired) is required on the next EOP step if RCS pressure continues to lower.

C. Incorrect. RCP 4 is always the first RCP to be stopped if a spray valve fails open since it has been demonstrated to provide the majority of the spray flow to the normal spray valves. The transition to ECA-3.3 (SGTR Without PRZR Pressure Control) is plausible due to the loss of the normal spray control function and the continued loss of RCS pressure.

D. Incorrect. The procedural requirements are to stop RCP 4 first. Stopping RCP 1 is plausible since it provides spray flow for loop 1. The transition to ECA-3.1 (SGTR With Reactor Coolant System LOCA: Subcooled Recovery Desired) is required on the next EOP step if RCS pressure continues to lower.

**REFERENCES**

19030-C, "E-3 Steam Generator Tube Rupture" steps 42 and 43

V-LO-HO-37311-001 pages 51 & 52

**VEGP learning objectives:**

LO-LP-37311-07:

Using EOP 19030 as a guide, briefly describe how each step is accomplished.

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| 42. Terminate RCS depressurization: | |
| __a. Verify Normal PRZR Spray valve(s) - CLOSED. | __a. IF a Normal Spray valve can NOT be closed, THEN stop RCP 4.<br><br>__ IF PRZR pressure continues lowering uncontrollably, THEN stop RCP 1. |
| __b. Verify PRZR PORV(s) - CLOSED. | __b. Close PORV Block Valve. |
| __c. Block COPS. | |
| __d. Check Auxiliary Spray - IN SERVICE. | __d. Go to Step 43. |
| e. Stop Auxiliary Spray: | __e. Isolate Auxiliary Spray line. |
| 1) Open CHARGING TO LOOP ISO VALVE:<br><br>__ HV-8146<br><br>-OR-<br><br>__ HV-8147 | |
| 2) Close PRZR AUX SPRAY VALVE:<br><br>__• HV-8145 | |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __43. Check RCS pressure - RISING. | __43 Close PRZR PORV Block Valve.<br>__IF RCS pressure stabilizes or rises,<br>THEN go to Step 44.<br>IF pressure continues to lower,<br>THEN perform the following:<br>a. Check the following conditions for indication of leakage from PRZR PORV:<br>__• Valve status indications<br>__• PORV discharge line temperature<br>__b. Go to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED. |

**CAUTION**

ECCS FLOW SHOULD BE TERMINATED when termination criteria are satisfied to prevent overfilling of the ruptured SGs.

| | |
|---|---|
| *44. **Check if ECCS flow should be terminated:** | |
| __a. RCS Subcooling - GREATER THAN 24°F [38°F ADVERSE]. | __a. Go to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED. |

° Step 44 continued on next page

***Terminate RCS depressurization***

PURPOSE: To determine if RCS depressurization criteria are satisfied

BASIS:

RCS depressurization will be stopped if any one of the following 3 basic criteria are met:

1. ***RCS pressure < ruptured SG pressure and the PRZR level is at least on span (9%).***

   This is the target you are ideally shooting for. However leak size, ECCS injection flow rates, and RCS depressurization rates may result in you meeting one of the other 2 criteria.

2. ***Loss of RCS subcooling (24°F).***

   For multiple tube failures or reduced ECCS capacity for a smaller tube failure, it may be necessary to decrease RCS pressure below that of the ruptured steam generator pressure in order to restore pressurizer level. In that case backfill flow (secondary to primary leakage) will supplement ECCS flow to restore pressurizer level. If pressure continued to be reduced to saturation, voiding in the primary system may result in an unreliable pressurizer level indication and delay SI termination. To avoid this, depressurization of the RCS is terminated if minimum RCS subcooling is reached.

3 ***PRZR level is approaching the upper level tap (75%).***

   In some cases, pressurizer level may approach the upper tap (top of the indicating range) before RCS pressure is reduced to the ruptured steam generator pressure. This may be a symptom of a smaller tube failure, voiding in the upper head during natural circulation conditions, or injection of the SI accumulators. Depressurization of the RCS is terminated on high pressurizer level to prevent filling the pressurizer and loss of pressurizer pressure control. Following SI termination, pressurizer level decreases which further reduces RCS pressure to equilibrium with the ruptured steam generator. In some cases, such as a small tube failure, the pressurizer may be sufficiently full such that no depressurization of the RCS is necessary prior to SI termination.

***STEP: Check RCS Pressure - RISING***

V-LO-HO-37311-001

PURPOSE: To detect excessive leakage from the pressurizer PORV and ensure isolation by closing its block valve

BASIS:

The use of a pressurizer PORV results in a loss of reactor coolant. Since all safety injection pumps will be stopped in subsequent steps, this PORV must close properly to ensure that adequate coolant inventory can be maintained with only normal charging capacity. Although SI reinitiation criteria are provided to ensure that adequate core cooling will be maintained, stopping all ECCS pumps with a loss of coolant through the PORV in excess of normal makeup capacity may result in unnecessary cycling of the ECCS pumps.

The mass flow rate through a leaking PORV will be approximately within the capacity of the normal reactor coolant makeup system if RCS pressure increases when the PORV is closed. Consequently, the operator is instructed to check that RCS pressure is increasing as additional verification that the SI pumps will not be needed to maintain coolant inventory. If pressure does not increase after the PORV and block valve are closed, excessive leakage from the PORV is suspected. In that case, the operator is transferred to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT-SUBCOOLED RECOVERY DESIRED, to stop ECCS pumps one at a time after it is demonstrated that the reduced ECCS capacity is sufficient to maintain adequate coolant inventory.

PLANT-SPECIFIC INFORMATION:

This step is a redundant check on RCS pressure response to ensure minimal leakage from the pressurizer PORV since increasing RCS pressure is also a necessary condition for SI termination in E-3.

***CAUTION:*** ***ECCS FLOW SHOULD BE TERMINATED when termination criteria are satisfied to prevent overfilling the ruptured SG(s).***

PURPOSE: To alert the operator that primary-to-secondary leakage will continue until ECCS flow is terminated.

BASIS:

SI termination is necessary to control reactor coolant inventory and stop primary-to-secondary leakage. If ECCS flow is not terminated, leakage into the secondary will eventually fill the steam generator with water and lift the atmospheric relief valves. This could damage the relief valve and main steamline which would

# HL-15R SRO NRC EXAM

81. 011EG2.4.11 001/1/1/LARGE LOCA-AOPS/ARPS/C/A - 4.2/NEW/HL-15R NRC/SRO/TNT/DS

The SS is implementing 19010-C, "E-1 Loss of Reactor or Secondary Coolant"

CNMT pressure is 12 psig
The event occurred 125 minutes ago
Cold leg recirculation cooling was aligned 28 minutes ago
RWST EMPTY level alarm has just actuated

The SS is at the step in 19010-C to "Check if CNMT spray should be stopped"

The SS should direct the OATC to reset CNMT spray and...

A. stop both CNMT spray pumps and close the pump discharge valves. This is done to prevent damaging the CNMT spray pumps and to isolate the CNMT spray penetrations.

B. align both CNMT spray pumps for recirculation. This is done to scrub radioactive Iodine from the CNMT atmosphere.

C. stop both CNMT spray pumps and close the pump discharge valves. This is done because sufficent radioactive Iodine has been scrubbed from the CNMT atmosphere.

D. align both CNMT spray pumps for recirculation. This is done to continue lowering CNMT pressure below 3.8 psig while preventing damage to the CNMT spray pumps.

**K/A**

**011 Large Break LOCA**

**G2.4.11 Knowledge of abnormal condition procedures.**

**K/A MATCH ANALYSIS**

The question presents a plausible scenario where a large RCS LOCA has occurred. The examinee must diagnose that this is a primary LOCA from the conditions given and then correctly apply the actions of step 12 in 19010-C and step 16 of 19013-C. The correct answer is based on a transition back into 19013-C to place CNMT spray on recirculation.

This is an SRO question since it involves detailed knowledge of diagnostic steps and decision points in the EOPs that involves a transition to an event specific sub-procedure.

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. This would be the correct answer if 19010-C were being implemented for a large secondary LOCA.

B. Correct. An RCS LOCA is in progress. CNMT spray is aligned for recirculation when RWST level reaches 8% (Empty Level) per 19013-C. CNMT spray must operated in recirculation for 1.5 hours for a primary LOCA before stopping the pumps.

C. Incorrect. This choice meets one of the 2 requirements for stopping CNMT spray on a primary LOCA.

D. Incorrect. This choice is correct on the alignment of the CNMT spray system, but is incorrect with respect to the CNMT pressure requirement. The RWST empty level requies stopping all ECCS pumps to prevent damage but the CNMT spray pumps should remain running.

**REFERENCES**

19010-C "E-1 Loss of Reactor or Secondary Coolant" step 12
19013-C, "ES-1.3 Transfer to Cold Leg Recirculation", steps 7, 16-18
V-LO-HO-37111-001 page 23

**VEGP learning objectives:**

| NO_OBJ | TX_OBJ |
|---|---|
| LO-LP-37111-08 | Using EOP 19010 as a guide, briefly describe how each step is accomplished. |

| NO_OBJ | TX_OBJ |
|---|---|
| LO-LP-37113-02 | Using EOP 19013 as a guide, briefly describe how each step is accomplished. |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| *12. **Check if Containment Spray should be stopped:** | |
| __a. CS Pumps - RUNNING. | __a. Go to Step 13. |
| b. Containment pressure - LESS THAN 15 PSIG. | __b. WHEN Containment pressure is less than 15 psig, THEN go to Step 12.c.<br><br>__Go to Step 13. |
| c. Any Containment radiation levels - INDICATE HIGH DUE TO PRIMARY LOCA:<br><br>__ RE-002<br>__ RE-003<br>__ RE-005<br>__ RE-006 | c. Perform the following:<br><br>__1) Reset Containment Spray signal.<br><br>__2) Stop Containment Spray Pumps.<br><br>3) Close CNMT SPRAY ISO VLV:<br><br>__• HV-9001A<br>__• HV-9001B<br><br>__Go to Step 13. |
| d. Operate CS Pumps:<br><br>__• Minimum of 2 hours.<br><br>__• At least 1.5 hours in recirculation mode. | __d. WHEN CS Pumps have operated for at least 2 hours AND in the recirculation mode for at least 1.5 hours, THEN perform Step 12.c RNO. |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __3. Initiate ATTACHMENT A to align ECCS Pumps to the Cold Leg Recirculation flowpath and continue with Step 4. | |
| __4. Notify Health Physics that radiation levels in the Auxiliary Building will change when Cold Leg Recirculation is established. | |
| __5. Make a page announcement to clear personnel from the Auxiliary Building prior to initiating Cold Leg Recirculation. | |
| __6. Initiate Continuous Actions Page. | |
| __*7. **Check RWST level – GREATER THAN 8%.** | __*7. Stop any ECCS Pumps taking suction from the RWST. |
| *8. **Check if SI pumps should be stopped.** | |
| __a. RCS pressure - GREATER THAN 1625 PSIG. | __a. IF RCS pressure rises to greater than 1625 psig, THEN stop SI Pumps.<br>__ Go To Step 9. |
| __b. Stop SI Pumps. | |
| __9. Check ATTACHMENT A - COMPLETE. | __9. Do NOT continue with this procedure until ATTACHMENT A has been COMPLETED. |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| b. At Shutdown Panel B:<br>__• Place HS-0112F in local.<br>__• Verify LV-0112E is closed. | |
| *15. **Monitor RHR Pumps suction condition:**<br>__• RHR Pump Amps – STABLE.<br>IPC Points:<br>J9623<br>J9624<br>__• Discharge Flow - NORMAL FOR RCS PRESSURE.<br>IPC Points:<br>F0626<br>F0627<br>__• Discharge Pressure - STABLE.<br>IPC Points:<br>P6310<br>P6311 | *15. IF CNMT Sump blockage is suspected and at least one ECCS train appears to be unaffected, THEN:<br>__a. Request guidance from the TSC.<br>__b. Establish more frequent monitoring of RHR Pump suction conditions for blockage.<br>__IF suspected CNMT Sump blockage prevents maintaining at least one ECCS train in the recirculation mode, THEN go to 19113-C, ECA-1.3 RECIRCULATION SUMP BLOCKAGE. |
| __*16. **Check RWST level – LESS THAN OR EQUAL TO 8%.** | __*16. WHEN RWST level lowers to less than 8%, THEN return to Step 16 of this procedure.<br>__Go to procedure and step in effect. |

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

**CAUTIONS**

- The specified actions in Steps 17 through 19 should be promptly completed to avoid loss of CS Pump suction.
- Local observation of CS Pump suction and discharge pressure gauges should only be performed if radiation levels permit.

  UNIT 1 (AB D75) UNIT 2 (AB D06)

__17. Reset Containment Spray.

18. Align CS Pump A for recirculation:

a. Open CS Pump A suction valves from Containment Emergency Sump:

__• HV-9002A, CNMT SPRAY PUMP A CNMT SUMP SUCT IRC

__• HV-9003A, CNMT SPRAY PUMP A CNMT SUMP SUCT ORC

b. Close CNMT SPRAY PUMP A RWST SUCT ISO VLV:

__• HV-9017A

a. Locally open:

__ 1-HV-9003A (AB-C134)
__ 2-HV-9003A (AB-C124)

__ IF valves can NOT be opened, THEN stop CS Pump A.

__ Go to Step 19.

° Step 18 continued on next page

LO-HO-37111-001

9% PRZR level just in range, including allowances for normal channel accuracy and reference leg process errors.

37% PRZR level just in range, including allowances for normal channel accuracy, post accident transmitter errors (Adverse Containment Conditions), and reference leg process errors.

***STEP:*** ***Check If Containment Spray Should Be Stopped***

PURPOSE: To stop containment spray pumps if running and no longer needed

BASIS:

Spray pumps are automatically actuated on HI-3 containment pressure. In 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION, the operator verifies that the Containment Spray System is operating if it is required. During a LOCA, the need for continued operation of the spray system is monitored by this step in 19010-C. After containment pressure is reduced and the spray pumps have operated for at least 2 hours (1.5 hours in the recirculation mode) to ensure mixing of the TSP with the liquid and adequate time to absorb Iodine from the containment atmosphere, the pumps can be stopped. If at any time the containment pressure increases above the HI-3 containment pressure setpoint, the ORANGE path of the Containment Status Tree sends the operator to FR-Z.1, RESPONSE TO HIGH CONTAINMENT PRESSURE which checks the need for containment spray and verifies that the spray system is operational if it is required.

KNOWLEDGE:

As part of the action to terminate containment spray, the operator closes the motor operated valve on the containment spray pump discharge line when stopping the containment spray pump. This action will ensure containment isolation.

PLANT-SPECIFIC INFORMATION:

15 psig Pressure for resetting spray signal, minus allowances for normal channel accuracy.

***STEP:*** ***IF offsite power is lost after SI reset, THEN restart the following ESF equipment if plant conditions require their operation:***
***RHR Pumps***

# HL-15R SRO NRC EXAM

82. 025AG2.4.31 001/1/1/LOSS OF RHR-ALARMS/MEM - 4.1 / 4.3/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:
A loss of RCS level during mid-loop operations occurred
AOP 18019-C, "Loss of Residual Heat Removal" was implemented
RHR pump 1B has been stopped

Current conditions:

Core exit TCs have been verified at 129 F and increasing
RCS MIDLOOP LO LEVEL alarm is lit
RCS level is currently 185' 10" and lowering
RCS cold and hot legs are intact (no openings)

The SS is at step B11 which reads:

B11. Check RCS level:

__a. LESS THAN 188 FEET

__b. LESS THAN 186 FEET

The correct method to restore RCS level is to make up from the...

A. VCT through the normal charging path into an intact cold leg.

B. RWST through the normal charging path into an intact cold leg.

C. RWST through the BIT with the normal charging path isolated.

D. RWST using an SI pump through the RCS cold legs.

# HL-15R SRO NRC EXAM

**K/A**

**025 Loss of Residual Heat Removal System (RHRS)**

**G2.4.31 Knowledge of annunciator alarms, indications, or response procedures.**

**K/A MATCH ANALYSIS**

The question presents a scenario for a loss of RCS level while at mid loop conditions. The examinee must correctly determine the proper method of RCS makeup per 18019-C Attachment D for the conditions given in the stem (lo level alarm and RCS level trends). This is an SRO question because the examinee must use detailed knowledge of when and how to implement Attachment D to AOP 18019-C.

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. Charging through the normal path into an intact cold leg is correct except the source is aligned to the VCT, and the crew is past this point in the AOP.

B. Incorrect. The flow path is plausible from other steps in the AOP with regards to the normal charging line as well as the RWST as the source of the makeup. The flowpath should be through the BIT at this point in the AOP.

C. Correct. Attachment D lists the CCPs from the RWST through the BIT as one of the two allowable flowpaths.

D. Incorrect. Everything is correct with respect to Attachment D other than the SIP flowpath, it should be through the RCS **hot** legs.

**REFERENCES**

18019-C, steps B11 and B12, Attachment D

**VEGP learning objectives:**

| NO_OBJ | | TX_OBJ |
|---|---|---|
| LO-LP-60315-04 | Given the entire AOP, describe:<br>a. Purpose of selected steps<br>b. How and why the step is being performed<br>c. Expected response of the plant/parameter(s) for the step | |

B. LOSS OF RHR - MODE 5 OR 6 BELOW PRZR IR OR SG NOZZLE DAMS INSTALLED

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| | b. IF Core Exit TCs continue to rise, THEN establish Cold Leg injection using CCPs:<br>__1) Align CCPs for cold leg injection using ATTACHMENT D.<br>__2) Start at least one CCP. |
| | __c. Go to Step B16. |
| B11. Check RCS level: | |
| __a. LESS THAN 188 FEET. | __a. Go to Step B16. |
| __b. LESS THAN 186 FEET. | __b. Go to Step B14. |
| B12. Refill RCS:<br>a. Align one of the following using ATTACHMENT D.<br>__ SIPs for hot leg injection.<br>-OR-<br>__ CCPs for cold leg injection. | |
| __b. Start at least one SIP or CCP. | |

° Step 12 continued on next page

ATTACHMENT D
ECCS ALIGNMENTS



1. SI Pumps for Hot Leg Injection:

   a. SIP suction valves - OPEN

      __ • HV-8806
      __ • HV-8923A
      __ • HV-8923B

   b. SIP miniflow valves - OPEN

      __ • HV-8813
      __ • HV-8814
      __ • HV-8920

   __c. HV-8835 CL INJ FROM SIS - CLOSED

   d. SIP Hot Leg Isolation valves - OPEN

      __ • HV-8802A
      __ • HV-8802B

ATTACHMENT D
ECCS ALIGNMENTS



**CAUTION**

The NCP will NOT have miniflow when the CCP normal miniflow valves are closed.

2. CCPs for Cold Leg Injection (BIT Flow):

a. RWST TO CCP A&B SUCTION VALVES - OPEN

- __ LV-112D
- __ LV-112E

b. VCT OUTLET ISOLATION valves - CLOSED

- __ LV-0112B
- __ LV-0112C

c. RV TO RWST ISOLATION valves - ENABLE PTL

- __ HV-8508A
- __ HV-8508B

d. CCP Normal Miniflow valves - CLOSED

- __ HV-8110
- __ HV-8111A
- __ HV-8111B

e. CHARGING TO RCS ISOLATION valves - CLOSED

- __ HV-8105
- __ HV-8106

f. BIT DISCH ISOLATION valves - OPEN

- __ HV-8801A
- __ HV-8801B

END OF ATTACHMENT D

# HL-15R SRO NRC EXAM

83. 026A2.03 001/2/1/C.SPRAY- ESF FAILURE/C/A-4.4/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

An RCS LOCA has occurred
19010-C, "E-1 Lost of Reactor or Secondary Coolant" has been implemented
The OATC is monitoring CSFSTs

Current conditions:

CNMT CSFST is Orange due to high containment pressure

The OATC reports transition to 19251-C, "FR-Z.1 Response to High Containment Pressure" is required

Neither train of CNMT spray is operating
RWST LO-LO LEVEL alarm is active

Which one of the following choices describes the correct diagnosis and actions to take?

A. CNMT spray has failed to automatically actuate. Go to 19251-C and remain in that procedure until directed to return to "procedure and step in effect".

B. CNMT spray has failed to automatically actuate. Go to 19013-C, "ES-1.3 Transfer to Cold Leg Recirculation" and place at least one train of of ECCS in the cold leg recirculation mode of operation prior to transitioning to 19251-C.

C. CNMT spray actuation is not required. Go to 19251-C and return to 19010-C after both trains of CNMT coolers (low speed) are verified in service and proper CIA and CVI are verified.

D. CNMT spray actuation is not required. Go to 19013-C, and place at least one train of ECCS in the cold leg recirculation mode of operation prior to transitioning to 19251-C.

**K/A**

**026 Containment Spray System (CSS)**

**A2.03 Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations.**

**Failure of ESF**

**K/A MATCH ANALYSIS**

The question presents a scenario where the student must diagnose the failure of CNMT Spray to automatically actuate based on the CNMT CSFST challenge. Additionally the student is required to determine the appropriate procedure to use for the plant conditions given and prioritize the mitigative actions.

This question requires the student to assess plant conditions and then prescribe a prcoedure with which to proceed. This requires detailed knowledge of the CNMT CSFST and procedures 19251-C, and 19013-C which are an emergency contingency procedure and an event specific sub-procedure, respectively. These attributes meet the SRO question requirements evaluation tool.

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. An orange path on CNMT due to high CNMT pressure means the CNMT Spray actuation setpoint has been reached. The required procedure transition in response to the orange condition is to go to 19251-C. However, with the RWST Lo-Lo Level alarm active, the ECCS system must first be placed in cold leg recirculation per the caution contained in procedure 19013-C and step 2 of procedure 19251-C.

B. Correct. An orange path on CNMT due to high CNMT pressure means the CNMT Spray actuation setpoint has been reached. The RWST Lo-Lo Level alarm directs implementation of 19013-C which contains a caution that the first 12 steps of the procedure must be completed to place at least one train of ECCS on cold leg recirculation prior to implmenting any FRPs.

C. Incorrect. CNMT pressure exceeds the CNMT Spray actuation setpoint. The actions listed in this choice for procedure 19251-C are all correct. The procedure also contains actions to align CNMT spray which has been omitted from this choice to make it consistent with the first part of this choice.

D. Incorrect. CNMT pressure exceeds the CNMT Spray actuation setpoint. The RWST Lo-Lo Level alarm directs implementation of 19013-C which contains a caution that the first 12 steps of the procedure must be completed to place at least one train of ECCS on cold leg recirculation prior to implmenting any FRPs.

**REFERENCES**

19200-C, "F-0 Critical Safety Function Status Trees" F-0.5 Containment Tree

19251-C, "FR-Z.1 Response to High Containment Pressure" Step 2

19013-C, "ES-1.3 Transfer to Cold Leg Recirculation" page 4 NOTES

17006-1, "Annunciator Response Procedure for ALB06 on Panel 1A2 on MCB" Window F06

**VEGP learning objectives:**

LO-LP-15101-06:

List all actuation signals for containment spray, including the parameter, coincidence, and setpoint.

LO-LP-37113-02:

Using EOP 19013 as a guide, briefly describe how each step is accomplished.

LO-LP-37113-04:

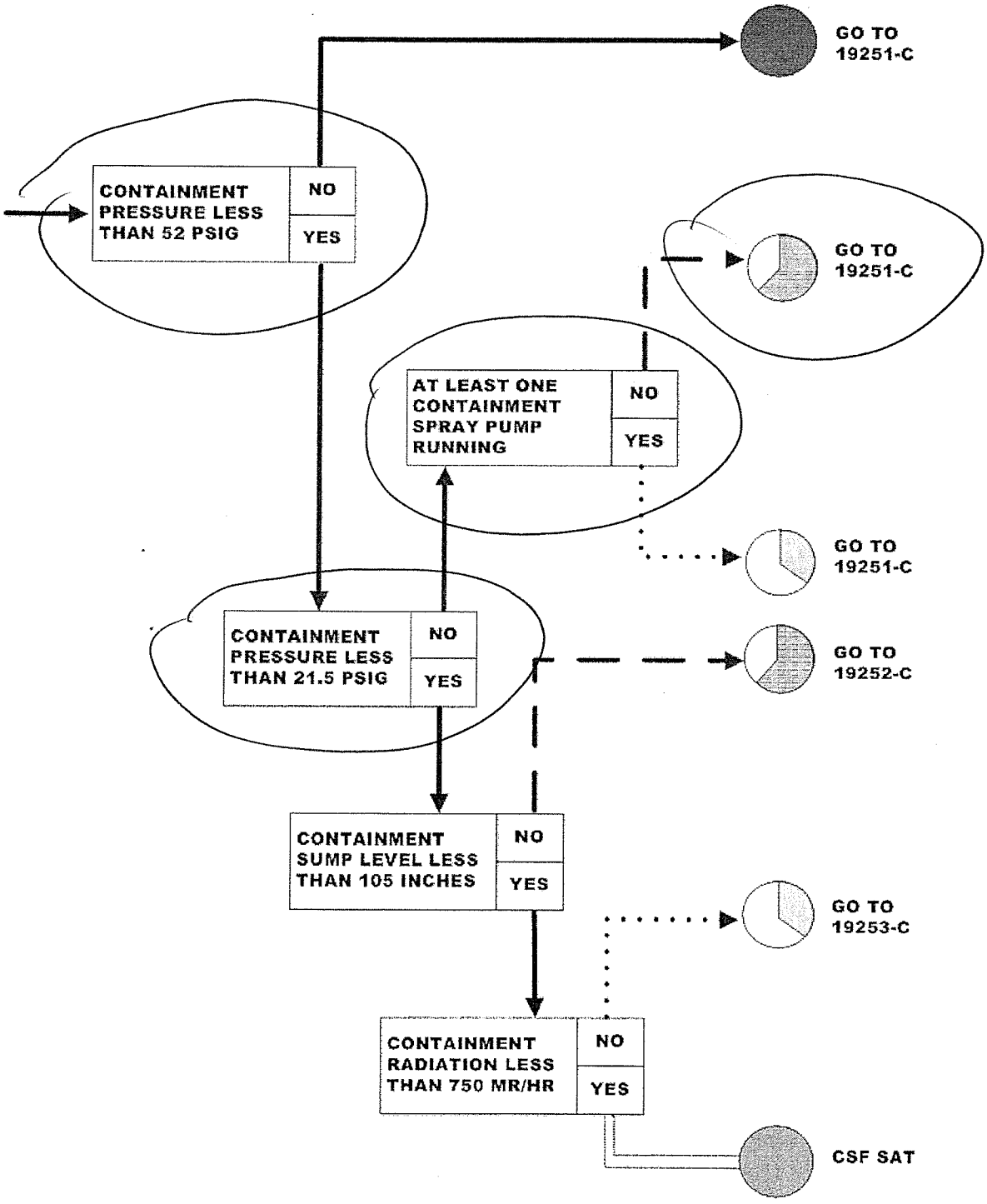
State when cold leg recirculation lineup is performed.

LO-LP-37113-05:

Given a NOTE or CAUTION statement from the EOP, state the bases for that NOTE or CAUTION statement.

Sheet 1 of 1

# F- 0.5
# CONTAINMENT



| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| 1. Initiate the following:<br>__• Continuous Actions Page.<br>__• 91001-C, EMERGENCY CLASSIFICATION AND IMPLEMENTING INSTRUCTIONS. | |
| __*2. **Check RWST level – GREATER THAN 29%.** | __*2. Go to 19013-C, ES-1.3 TRANSFER TO COLD LEG RECIRCULATION. |
| 3. Check Containment Isolation Phase A - ACTUATED:<br>__• CIA MLB indication | __3. Actuate CIA.<br>__IF valves do NOT close, THEN close valves. |
| 4. Check Containment Ventilation Isolation:<br>a. Dampers and Valves - CLOSED:<br>__• CVI MLB indication | a. Perform the following:<br>__1) Close Dampers and Valves.<br>__2) Start Piping Pen Units. |

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

NOTES

- FRPs should not be implemented until at least one flow path exists from the CNMT Sump to the RCS Cold Legs and the completion of Step 12.
- Steps 1 through 12 should be performed without delay.
- The RWST inventory between the RWST LO-LO and Empty alarms is sufficient for a minimum of approximately 11 minutes of ECCS injection flow assuming that the RHR pumps are isolated from the RWST or stopped within the first 6 minutes after the RWST LO-LO alarm is received.

**CAUTION**

If offsite power is lost after SI reset, action is required to restart the following ESF equipment if plant conditions require their operation:

- RHR Pumps
- SI Pumps
- Post-LOCA Cavity Purge Units
- Containment Coolers in low speed (Started in high speed on a UV signal).
- ESF Chilled Water Pumps (If CRI is reset).

| | | |
|---|---|---|
| __1. | Verify SI Reset. | |
| __2. | CNMT Emergency Sump level - GREATER THAN OR EQUAL TO 13.5 INCHES:<br><br>LI-764<br>LI-765 | __2. IF CNMT Sump level indicators LI-764 and LI-765 are both less than 13.5 INCHES, THEN stop RHR Pumps A and B and go to 19111-C, ECA-1.1 LOSS OF EMERGENCY COOLANT RECIRCULATION. |

WINDOW F04

RWST
LO-LO LEVEL

| ORIGIN | SETPOINT |
|---|---|
| 1-LT-0990<br>1-LT-0991<br>1-LT-0992<br>1-LT-0993 | 29%<br>(2/4 channels by relay K1614) |

1.0 **PROBABLE CAUSE**

1. Refueling Water Storage Tank (RWST) in use for Safety Injection (SI).
2. RWST in use for refueling.
3. System leakage.

2.0 **AUTOMATIC ACTIONS**

Safety Injection transfers from injection to recirculation mode on a 2 out of 4 LO-LO level logic, if the SI signal has not been reset.

3.0 **INITIAL OPERATOR ACTIONS**

NONE

NOTE

Actions for RWST LO-LO level during SI are governed by 19013-C, "ES-1.3 Transfer to Cold Leg Recirculation."

4.0 **SUBSEQUENT OPERATOR ACTIONS**

1. While in Modes 5 or 6 and the RCS or Reactor cavity filling operations are not in progress, **dispatch** personnel to locate and isolate the leak.
2. **Makeup** to the RWST, if necessary, per 13701-1, "Boric Acid System."

5.0 **COMPENSATORY OPERATOR ACTIONS**

NONE

END OF SUB-PROCEDURE

REFERENCES: 1X4DB121, PLS, 1X5DT0066, 1X6AU01-201, 1X6AV01-242, 1X6AX01-334, 1X6AX01-409

84. 028AG2.4.20 001/1/2/PZR LVL MALF-NOTES/C/A-4.3/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

PRZR level channel 459 failed low 6 hours ago
LCO 3.3.1 condition M is applicable for the failed channel
PRZR LVL CNTL SELECT switch is in the 461/460 position
AOP 18001-C, Section D, is being implemented

Current conditions:

I&C needs to perform an ACOT on PRZR level channel 461
The surveillance will be late in 8 hours
PRZR level channel 459 time to repair is 24 hours
Reactor power is 15%

The correct action for the SS to take per cautions in AOP 18001-C is to...

A. bypass channel 459 using the BTI Panel AND trip channel 461 per Table D1 of AOP 18001-C.

B. Place the unit in mode 3 within the next 6 hours to meet LCO 3.0.3 requirements.

C. trip channel 459 per Table D1 of AOP 18001-C AND bypass channel 461 using the BTI Panel.

D. leave channel 459 as is AND reduce power to less than P7 (10%) prior to bypassing channel 461 using the BTI Panel.

# HL-15R SRO NRC EXAM

**K/A**

**028 Pressurizer (PZR) Level Control Malfunction**

**G2.4.20 Knowledge of the operational implications of EOP warnings, cautions, and notes.**

**K/A MATCH ANALYSIS**

The question presents a plausible scenario where the SS must properly apply a caution from AOP 18001-C, Section D, for a PRZR level malfunction. This question also involves the application of administrative procedures (technical specifications and system operating procedures) requirements in conjunction with the AOP meeting the SRO question requirements for procedures.

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. Plausible since bypassing a failed channel is allowed per AOP 18001-C, however the caution in Table D1 requires bypassing the channel to be tested.

B. Incorrect. Plausible since LCO 3.0.3 would be applicable for 2 PRZR level channels out of service above 10% power.

C. Correct. These actions are in accordance with the cautions in Table D1 of AOP 18001-C.

D. Incorrect. Plausible because the normal practice is to leave the failed channel as is during its allowed out of service time per technical specifications to faciliate troubleshooting efforts. This is allowable per AOP 18001-C. Also plausible since the LCO is NOT applicable below 10% power and the Unit is at 15% power. The AOP does not address this option.

**REFERENCES**

AOP 18001-C, Steps D12-D14 and Table D1

VEGP LCO 3.3.1 function 9 (PRZR hi level) condition M

**VEGP learning objectives:**

LO-LP-39207-02:

Given a set of Tech Specs and the bases, determine for a specific set of plant conditions, equipment availability, and operational mode:

a. Whether any Tech Spec LCOs of section 3.3 are exceeded.

b. The required actions for all section 3.3 LCOs.

## D. FAILURE OF PRZR LEVEL INSTRUMENTATION

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __*D10. **Check PRZR level is maintained at program by auto control.** | __*D10. Maintain PRZR level at program using manual control. |
| __D11. Notify I&C to initiate repairs. | |
| __D12. Bypass the affected instrument channel using 13509-C, BYPASS TEST INSTRUMENTATION (BTI) PANEL OPERATION, if desired. | |
| __D13. Trip affected channel bistable and place associated MASTER TEST switch in TEST position per TABLE D1 within 72 hours. (TS 3.3.1) | |
| __D14. Initiate the applicable actions of Technical Specification 3.3.1. | |
| __*D15. **Check repairs and surveillances - COMPLETE.** | *D15. Perform the following:<br>__a. WHEN repairs and surveillances are complete, THEN perform step D16.<br>__b. Return to procedure and step in effect. |

D16. Perform the following:

__a. Return tripped bistables to NORMAL position.

__b. Return MASTER TEST switch to NORMAL position.

__c. Return LS-459D to the desired position. (CH459/460 normal position.)

° Step 16 continued on next page

TABLE D1

Sheet 1 of 1

**CAUTIONS**

- Only one channel should be tripped.
- The bistable input is placed in the tripped state by positioning the selector switch on the specified test card to TEST.
- The bistable input identified by the switch number should agree with the location specified by CAB, CARD, and B/S before tripping a bistable input. If a discrepancy exists, CAB-CARD-B/S should be used, not switch number.
- Bypassing another channel for Surveillance Testing with a channel inoperable is permitted provided the inoperable channel is in the tripped condition and the channel being tested is not bypassed for more than 12 hours.

| SSPS INPUT | CAB | FRAME /CARD | B/S | SWITCH | Initial |
|---|---|---|---|---|---|
| **LT-459** Failure (Channel 1)<br>High Level Reactor Trip<br>**MASTER TEST SWITCH** | 1 | 8/47<br>8/73 | 1 | LS-459A<br>7 | (____)<br>(____) |
| **LT-460** Failure (Channel 2)<br>High Level Reactor Trip<br>**MASTER TEST SWITCH** | 2 | 8/47<br>8/73 | 1 | LS-460A<br>7 | (____)<br>(____) |
| **LT-461** Failure (Channel 3)<br>High Level Reactor Trip<br>**MASTER TEST SWITCH** | 3 | 8/44<br>8/73 | 1 | LS-461A<br>7 | (____)<br>(____) |

END OF TABLE D1

Table 3.3.1-1 (page 3 of 9)
Reactor Trip System Instrumentation

| FUNCTION | APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS | REQUIRED CHANNELS | CONDITIONS | SURVEILLANCE REQUIREMENTS | ALLOWABLE VALUE | NOMINAL TRIP SETPOINT(n) |
|---|---|---|---|---|---|---|
| 8. Pressurizer Pressure | | | | | | |
| a. Low | 1(f) | 4 | M | SR 3.3.1.1<br>SR 3.3.1.7<br>SR 3.3.1.10<br>SR 3.3.1.15 | ≥ 1950 psig | 1960(g) psig |
| b. High | 1,2 | 4 | E | SR 3.3.1.1<br>SR 3.3.1.7<br>SR 3.3.1.10<br>SR 3.3.1.15 | ≤ 2395 psig | 2385 psig |
| 9. Pressurizer Water Level - High | 1(f) | 3 | M | SR 3.3.1.1<br>SR 3.3.1.7<br>SR 3.3.1.10 | ≤ 93.9% | 92% |
| 10. Reactor Coolant Flow - Low | | | | | | |
| a. Single Loop | 1(h) | 3 per loop | N | SR 3.3.1.1<br>SR 3.3.1.7<br>SR 3.3.1.10<br>SR 3.3.1.15 | ≥ 89.4% | 90% |
| b. Two Loops | 1(i) | 3 per loop | M | SR 3.3.1.1<br>SR 3.3.1.7<br>SR 3.3.1.10<br>SR 3.3.1.15 | ≥ 89.4% | 90% |

(continued)

(f) Above the P-7 (Low Power Reactor Trips Block) interlock.

(g) Time constants utilized in the lead-lag controller for Pressurizer Pressure-Low are 10 seconds for lead and 1 second for lag.

(h) Above the P-8 (Power Range Neutron Flux) interlock.

(i) Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.

(n) A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established calibration tolerance band of the Nominal Trip Setpoint. A Trip Setpoint may be set more conservative than the Nominal Trip Setpoint as necessary in response to plant conditions.

ACTIONS (continued)

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| M. One channel inoperable. | ----------NOTES----------<br>1. For RCP bus undervoltage or underfrequency instrument functions; the inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels.<br>2. For other instrument functions; a channel may be bypassed for up to 12 hours for surveillance testing.<br>----------<br>M.1 Place channel in trip.<br>OR<br>M.2 Reduce THERMAL POWER to < P-7. | <br><br><br><br><br><br>72 hours<br><br>78 hours |
| N. One Reactor Coolant Flow-Low (single loop) channel inoperable. | ----------NOTE----------<br>A channel may be bypassed for up to 12 hours for surveillance testing.<br>----------<br>N.1 Place channel in trip.<br>OR<br>N.2 Reduce THERMAL POWER to < P-8. | <br><br><br><br>72 hours<br><br>76 hours |

(continued)

# HL-15R SRO NRC EXAM

85. 034G2.4.20 001/2/2/FH EQUIP-NOTES, ETC./C/A-4.3/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

Core off-load is in progress on Unit 2
The CNMT equipment hatch is open with a designated closure crew
Both personnel airlock doors are open with a designated door operator
Reactor cavity water level is 219 feet

Current conditions:

A loss of all AC power occurs on Unit 2
A spent fuel assembly is fully withdrawn in the refueling machine
The mast is over the CNMT upender

The Fuel Handling Supervisor should suspend fuel movement and...

A. direct manual operation of the refueling machine to place the fuel assembly in a safe location.

   Direct closure of the containment equipment hatch and ONE of the personnel airlock doors to meet technical specification action requirements.

B. direct manual operation of the refueling machine to place the fuel assembly in a safe location.

   Direct closure of the containment equipment hatch and BOTH of the personnel airlock doors to meet technical specification action requirements.

C. leave the fuel assembly in its current position. Operation of the refueling machine is not possible without AC power.

   Direct closure of the containment equipment hatch and ONE of the personnel airlock doors to meet technical specification action requirements.

D. leave the fuel assembly in its current position. Operation of the refueling machine is not possible without AC power.

   Direct closure of the containment equipment hatch and BOTH of the personnel airlock doors to meet technical specification action requirements.

**K/A**

**034 Fuel Handling Equipment (FHES)**

**G2.4.20 Knowledge of the operational implications of EOP warnings, cautions, and notes.**

## K/A MATCH ANALYSIS

The question presents a loss of all AC power during a core off-load scenario. The student is required to apply the correct technical specification action requirements from cascading LCOs due to the loss of AC power. The student is also required to know that emergency manual operation of the refuleing machine is possible without AC power. This question requires knowledge of the operational implication of EOP warnings, cautions and notes for fuel handling equipment meeting the K/A topic.

The question is written at the SRO level because it requires the student to apply required actions of technical specifications and application of LCO 3.0.6 requirements.

## ANSWER / DISTRACTOR ANALYSIS

A. Correct. Per base LCO 3.8.10 Distribution Systems - Shutdown, action A.1 requires suspending core alterations and action A.2 requires suspending movement of irradiated fuel assemblies. The definition of core alterations further states that suspension shall not preclude completion of movement of a component to a safe position. LCO 3.8.10 action A2.5 requires declaring associated required residual heat removal subsystem(s) inoperable and not operation. Supported system LCO 3.9.5 action A.4 requires closure of all containment penetrations providing direct access from containment atmosphere to outside atmosphere in 4 hours.

B. Incorrect. Per base LCO 3.8.10 Distribution Systems - Shutdown, action A.1 requires suspending core alterations and action A.2 requires suspending movement of irradiated fuel assemblies. The definition of core alterations further states that suspension shall not preclude completion of movement of a component to a safe position. LCO 3.8.10 action A2.5 requires declaring associated required residual heat removal subsystem(s) inoperable and not operation. Supported system LCO 3.9.5 action A.4 requires closure of all containment penetrations providing direct access from containment atmosphere to outside atmosphere in 4 hours. ONLY ONE personnel airlock door is required to be closed.

C. Incorrect. Manual operation of the refueling machine without AC power is possible using 93500-C making this choice incorrect. Leaving the fuel assembly in its current position is debatable. The actions listed for the containment hatch and personnel airlock doors are correct per technical specificaitions

D. Incorrect. Manual operation of the refueling machine without AC power is possible using 93500-C making this choice incorrect. Leaving the fuel assembly in its current position is debatable. LCO 3.8.10 action A2.5 requires declaring associated required residual heat removal subsystem(s) inoperable and not operation. Supported system LCO 3.9.5 action A.4 requires closure of all containment penetrations providing direct access from containment atmosphere to outside atmosphere in 4 hours. ONLY ONE

**REFERENCES**

VEGP Tech Specs - Core Alteration definition

LCO 3.0.2 LCO applicability - Required actions

LCO 3.0.6 LCO applicability - Supported systems

LCO 3.8.10 Distribution Systems - Shutdown

LCO 3.9.4 Containment Penetrations

LCO 3.9.5 RHR & Coolant Circulation - High Water Level

93500-C Manual Operation of Fuel Handling Equipment, section 4.2.3 hoist failure

**VEGP learning objectives:**

LO-LP-39212-02:

Given a set of Tech Specs and the bases, determine for a specific set of plant conditions, equipment availability, and operational mode:

a. Whether any Tech Spec LCOs of section 3.8 are exceeded.

b. The required actions for all section 3.8 LCOs.

LO-LP-39213-02:

Given a set of Tech Specs and the bases, determine for a specific set of plant conditions, equipment availability, and operational mode:

a. Whether any Tech Spec LCOs of section 3.9 are exceeded.

b. The required actions for all section 3.9 LCOs.

1.1 Definitions (continued)

| | |
|---|---|
| CHANNEL CHECK | A CHANNEL CHECK shall be the qualitative assessment, by observation, of channel behavior during operation. This determination shall include, where possible, comparison of the channel indication and status to other indications or status derived from independent instrument channels measuring the same parameter. |
| CHANNEL OPERATIONAL TEST (COT) | A COT shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify the OPERABILITY of required alarm, interlock, and trip functions. The COT shall include adjustments, as necessary, of the required alarm, interlock, and trip setpoints so that the setpoints are within the required range and accuracy. |
| CORE ALTERATION | CORE ALTERATION shall be the movement of any fuel, sources, or other reactivity control components within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position. |
| CORE OPERATING LIMITS REPORT (COLR) | The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific parameter limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Unit operation within these limits is addressed in individual Specifications. |
| DOSE EQUIVALENT I-131 | DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in EPA Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," EPA-520/1-88-020, September 1988. |

(continued)

## 3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

LCO 3.0.1 LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2 and LCO 3.0.8.

LCO 3.0.2 Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met, except as provided in LCO 3.0.5 and LCO 3.0.6.

If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required unless otherwise stated.

LCO 3.0.3 When an LCO is not met and the associated ACTIONS are not met, an associated ACTION is not provided, or if directed by the associated ACTIONS, the unit shall be placed in a MODE or other specified condition in which the LCO is not applicable. Action shall be initiated within 1 hour to place the unit, as applicable, in:

a. MODE 3 within 7 hours;

b. MODE 4 within 13 hours; and

c. MODE 5 within 37 hours.

Exceptions to this Specification are stated in the individual Specifications.

Where corrective measures are completed that permit operation in accordance with the LCO or ACTIONS, completion of the actions required by LCO 3.0.3 is not required.

LCO 3.0.3 is only applicable in MODES 1, 2, 3, and 4.

LCO 3.0.4 When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall only be made:

a. When the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time; or

(continued)

## 3.0 LCO APPLICABILITY

LCO 3.0.4 (continued)

b. After performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the MODE or other specified condition in the Applicability, and establishment of risk management actions, if appropriate; exceptions to this Specification are stated in the individual Specifications; or

c. When an allowance is stated in the individual value, parameter, or other Specification.

This Specification shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

---

LCO 3.0.5

Equipment removed from service or declared inoperable to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to LCO 3.0.2 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

---

LCO 3.0.6

When a supported system LCO is not met solely due to a support system LCO not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. Only the support system LCO ACTIONS are required to be entered. This is an exception to LCO 3.0.2 for the supported system. In this event, additional evaluations and limitations may be required in accordance with Specification 5.5.15, "Safety Function Determination Program (SFDP)." If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

When a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2.

---

(continued)

BASE LCO

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems – Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 5 and 6

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| A. One or more required AC, DC, or AC vital bus electrical power distribution subsystems inoperable. | A.1 Declare associated supported required feature(s) inoperable. | Immediately |
| | OR | |
| | A.2.1 Suspend CORE ALTERATIONS. | Immediately |
| | AND | |
| | A.2.2 Suspend movement of irradiated fuel assemblies. | Immediately |
| | AND | |
| | A.2.3 Initiate action to suspend operations involving positive reactivity additions. | Immediately |
| | AND | |

(continued)

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| A. (continued) | A.2.4 Initiate actions to restore required AC, DC, and AC vital bus electrical power distribution subsystems to OPERABLE status.<br><br>AND<br><br>A.2.5 Declare associated required residual heat removal subsystem(s) inoperable and not in operation. | Immediately<br><br><br><br>Immediately |

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE | | FREQUENCY |
|---|---|---|
| SR 3.8.10.1 | Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution subsystems. | 7 days |

## 3.9 REFUELING OPERATIONS

### 3.9.4 Containment Penetrations

LCO 3.9.4 The containment penetrations shall be in the following status:

a. The equipment hatch is capable of being closed and held in place by four bolts;

b. The emergency and personnel air locks are isolated by at least one air lock door, or if open, the emergency and personnel air locks are isolable by at least one air lock door with a designated individual available to close the open air lock door(s); and

c. Each penetration providing direct access from the containment atmosphere to the outside atmosphere either:

1. closed by a manual or automatic isolation valve, blind flange, or equivalent, or

2. capable of being closed by at least two OPERABLE Containment Ventilation Isolation valves

APPLICABILITY: During CORE ALTERATIONS,
During movement of irradiated fuel assemblies within containment.

ACTIONS

| CONDITION | REQUIRED ACTION | | COMPLETION TIME |
|---|---|---|---|
| A. One or more containment penetrations not in required status. | A.1 | Suspend CORE ALTERATIONS. | Immediately |
| | AND | | |
| | A.2 | Suspend movement of irradiated fuel assemblies within containment. | Immediately |

SUPPORTED SYSTEM LCO

3.9 REFUELING OPERATIONS

## 3.9.5 Residual Heat Removal (RHR) and Coolant Circulation – High Water Level

LCO 3.9.5 One RHR loop shall be OPERABLE and in operation.

---NOTE---
The required RHR loop may be removed from operation for ≤ 1 hour per 8 hour period, provided no operations are permitted that would cause a reduction of the Reactor Coolant System boron concentration.
---

APPLICABILITY: MODE 6 with the water level ≥ 23 ft above the top of reactor vessel flange.

ACTIONS

| CONDITION | REQUIRED ACTION | | COMPLETION TIME |
|---|---|---|---|
| A. RHR loop requirements not met. | A.1 | Suspend operations involving a reduction in reactor coolant boron concentration. | Immediately |
| | AND | | |
| | A.2 | Suspend loading irradiated fuel assemblies in the core. | Immediately |
| | AND | | |
| | A.3 | Initiate action to satisfy RHR loop requirements. | Immediately |
| | AND | | |
| | | | (continued) |

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| A. (continued) | A.4 Close all containment penetrations providing direct access from containment atmosphere to outside atmosphere. | 4 hours |

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE | | FREQUENCY |
|---|---|---|
| SR 3.9.5.1 | Verify one RHR loop is in operation and circulating reactor coolant at a flow rate of ≥ 3000 gpm. | 12 hours |

INITIALS

## 4.2 REFUELING MACHINE

### 4.2.1 Bridge Motor Failure

4.2.1.1 **De-energize** power to the motor by turning OFF breaker CB-D located in the back of the RFM console on the right side.

4.2.1.2 **Lift** and **secure** deck plates to gain access to the drive line.

4.2.1.3 Manually **release** the drive motor brake.

4.2.1.4 **Install** the emergency handwheel on the speed reducer shaft.

4.2.1.5 **Hand crank** the handwheel, as required, to move the bridge in the desired direction.

4.2.1.6 **Confirm** position of the bridge by means of the bridge index marks.

### 4.2.2 Trolley Motor Failure

4.2.2.1 **De-energize** power to the motor by turning OFF breaker CB-D located in the back of the RFM console on the right side.

4.2.2.2 **Lift** and **secure** deck plates to gain access to the drive line.

4.2.2.3 Manually **release** the trolley motor brake.

4.2.2.4 **Install** the emergency handwheel on the speed reducer shaft.

4.2.2.5 **Hand crank** the handwheel as required to move the trolley in the desired direction.

4.2.2.6 **Confirm** position of the trolley by means of the trolley index marks.

### 4.2.3 Hoist Motor Failure (AC powered)

4.2.3.1 **De-energize** power to the motor by turning OFF breaker CB-D located in the back of the RFM console on the right side.

4.2.3.2 Manually **release** the hoist motor brake using the release (T-handle) on the housing.

4.2.3.3 **Install** the emergency chain wheel (stored in trolley drive compartment) on the hoist winch shaft.

INITIALS

4.2.3.4 **Operate** the chain wheel up or down to move hoist as required.

4.2.3.5 **Confirm** position of the hoist by means of the Z-tape or other positive means (e.g.; underwater TV camera).

**4.2.4 Solenoid Air Valve Failure**

4.2.4.1 Each solenoid air valve is equipped with a manual operator to be used in the event of electrical failure. A small button located just below the solenoid on the valve body is depressed by using a small round pin approximately 1/8 inch diameter.

**4.2.5 Fuel Gripper Cylinder Failure**

4.2.5.1 **Raise** the mast to full up.

4.2.5.2 **Locate** the 2 eyebolts on the top of the gripper cylinder and **attach** cables to them.

4.2.5.3 **Lower** the fuel assembly to the desired location.

4.2.5.4 **Select** the gripper unlatch position on the gripper selector switch located on the control console OR, if necessary, manually **operate** the unlatch solenoid as in Step 4.3.4.1 above.

4.2.5.5 **Apply** upward force to the cables to **unlatch** the fuel assembly.

**4.2.6 Auxiliary Hoist Motor Failure**

4.2.6.1 **De-energize** power to the motor.

4.2.6.2 **Pull out** the brake release knob on the end of the motor.

4.2.6.3 **Install** the emergency handwheel on the motor extension shaft.

4.2.6.4 **Hand crank** the handwheel up or down to the desired location.

# HL-15R SRO NRC EXAM

86. 056AA2.73 001/1/1/LOSS OFFSITE PWR-HTR/C/A-3.6/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

The reactor is tripped following a loss of both RATs
1AA02 is energized by DG-1A
DG-1B is running with its output breaker open
The SAT is available
AOP 18017-C, Section B for "Loss of Grid" is being implemented

Current conditions:

The OATC reports he is able to energize only Group A of the PRZR backup heaters.

The correct actions to take for this conditon are to:

A. Emergency trip DG-1B and re-energize1BA03 from the SAT.

   All required groups of PRZR heaters are operable due to these actions.

B. Emergency trip DG-1B and re-energize 1BA03 from the SAT.

   All required PRZR heaters are still inoperable, enter LCO 3.0.3 and take the appropriate actions.

C. Manually close DG-1B output breaker to re-energize 1BA03.

   One required group of PRZR heaters is inoperable, but NO technical specification action is required.

D. Manually close DG-1B output breaker to re-energize 1BA03.

   All required groups of PRZR heaters are operable due to these actions.

**K/A**

**056 Loss of Offsite Power**

**AA2.73 Ability to determine and interpret the following as they apply to the Loss of Offsite Power.**

**PZR heater on/off.**

**K/A MATCH ANALYSIS**

The question presents a plausible scenario where a loss of off-site power has occurred. One DG has failed to re-energize its associated bus. The examinee is required to determine the correct AOP actions for this failure and to properly apply technical specifications, including LCO 3.0.6, making this an SRO question.

**ANSWER / DISTRACTOR ANALYSIS**

A. Correct. Tripping DG-1B is required per AOP 18017-C. Student must also recognize that required PRZR heaters are operable when their power supply is energized.

B. Incorrect. Tripping DG-1B is required per AOP 18017-C. Entering LCO 3.0.3 is correct for both required PRZR heaters being inoperable but both of the required 2 groups are operable.

C. Incorrect. Manually closing a DG output breaker is a plausible action because earlier revisons of plant procedures directed this action. PRZR heaters are operable when the bus is energized.

D. Incorrect. Manually closing a DG output breaker is a plausible action because earlier revisons of plant procedures directed this action. The second half of this question choice is correct.

**REFERENCES**

AOP 18017-C, Steps B2 and B34.

VEGP Technical Specifications:

LCO 3.8.1 AC Sources-Operating (Action E)
LCO 3.8.9 Distribution Systems-Operating
LCO 3.4.9 Pressurizer
LCO 3.0.6 Supported Systems

**VEGP learning objectives:**

LO-LP-60330-10

Given that a loss of grid has occurred from 100% power, describe the expected flow through the EOPs and AOP 18017-C.

LO-LP-39202-02

Demonstrate a working knowledge of the application of all Technical Specification definitions.

LO-LP-39202-03

time extensions.

LO-LP-39204-05

State the conditions when an action does not need to be completed.

LO-LP-39212-02

Given a set of Tech Specs and the bases, determine for a specific set of plant conditions, equipment availability, and operational mode:

a. Whether any Tech Spec LCOs of section 3.8 are exceeded.

b. The required actions for all section 3.8 LCOs.

B. LOSS OF GRID

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __B1. Implement 91001-C, EMERGENCY CLASSIFICATION AND IMPLEMENTING INSTRUCTIONS. | |
| B2. Check both emergency buses - ENERGIZED BY DIESEL GENERATORS: | |
| __a. Both Class 1E 4160V busses - ENERGIZED. | a. Perform the following:<br>__ • Emergency trip affected DG.<br>• Perform the following to re-energize affected 4160V 1E bus:<br>__ From the SAT by initiating 13418-C, STANDBY AUXILIARY TRANSFORMER.<br>-OR-<br>__ From the Diesel Generator by initiating 13145, DIESEL GENERATORS. |
| __b. Buses frequency - AT 60HZ. | __b. Adjust frequency using DG speed control pushbuttons as necessary. |
| __c. Buses voltage - BETWEEN 4025V AND 4330V. | __c. Adjust voltage using DG voltage control pushbuttons as necessary. |

° Step 2 continued on next page

B. LOSS OF GRID

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __B32. Transfer any de-energized NYS, NYRS, and NYR busses to alternate sources by initiating 13432, 120V AC NON 1E INSTRUMENT DISTRIBUTION SYSTEM. | |
| __B33. Check DRPI - ENERGIZED. | __B33. Swap DRPI power supply using 13432, 120V AC NON 1E INSTRUMENT DISTRIBUTION SYSTEM. |
| B34. Initiate applicable Technical Specification requirements:<br>__AC electrical power sources - LCO 3.8.1 or LCO 3.8.2.<br>__AFWS - LCO 3.7.5.<br>__RCS Specific Activity - SR 3.4.16.2. | |
| __B35. Check expected diesel generator operation time - LESS THAN FOUR HOURS. | B35. Order fuel for the following:<br>__• Emergency Diesel Generators<br>__• Security Diesel Generator<br>__• Diesel Fire Pumps |
| __B36. Check Offsite power - RESTORED. | __B36. Return to Step B35. |

| UNIT | LOCATION | NORMAL SUPPLY | ALTERNATE SUPPLY |
|---|---|---|---|
| 1 | 1NYC2 (CB-B66) | 1BBC-20 | 1ABC-20 |
| 2 | 2NYC2 (CB-B12) | 2BBC-20 | 2ABC-20 |

## 3.8 ELECTRICAL POWER SYSTEMS

### 3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System; and

b. Two diesel generators (DGs) capable of supplying the onsite Class 1E power distribution subsystem(s).

Automatic load sequencers for Train A and Train B ESF buses shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

---NOTE---
LCO 3.0.4b is not applicable to DGs.

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| A. One required offsite circuit inoperable. | A.1 Perform SR 3.8.1.1 for required OPERABLE offsite circuit.<br><br>AND | 1 hour<br><br>AND<br><br>Once per 8 hours thereafter<br><br>(continued) |

ACTIONS

| CONDITION | REQUIRED ACTION | | COMPLETION TIME |
|---|---|---|---|
| A. (continued) | A.2 | Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable. | 24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s) |
| | AND | | |
| | A.3 | Restore required offsite circuit to OPERABLE status. | 72 hours<br>AND<br>14 days from discovery of failure to meet LCO |

(continued)

ACTIONS (continued)

| CONDITION | REQUIRED ACTION | | COMPLETION TIME |
|---|---|---|---|
| B. One DG inoperable. | B.1 | Perform SR 3.8.1.1 for the required offsite circuit(s). | 1 hour<br>AND<br>Once per 8 hours thereafter |
| | AND | | |
| | B.2 | Verify SAT available. | 1 hour<br>AND<br>Once per 12 hours thereafter |
| | AND | | |
| | B.3 | Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable. | 4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s) |
| | AND | | |
| | B.4.1 | Determine OPERABLE DG is not inoperable due to common cause failure. | 24 hours |
| | OR | | |
| | B.4.2 | Perform SR 3.8.1.2 for OPERABLE DG. | 24 hours |
| | AND | | |

(continued)

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| B. (continued) | ----------NOTE----------<br>Required Action B.5.1 is only applicable if the combined reliability of the enhanced black-start combustion turbine generators (CTG) and the black-start diesel generator is ≥ 95%. Otherwise, Required Action B.5.2 applies.<br>---------- | |
| | B.5.1 Verify an enhanced black-start CTG is functional by verifying the CTG and the black-start diesel generator starts and achieves steady state voltage and frequency. | 72 hours<br><br>OR<br><br>Within 72 hours prior to entry into Condition B |
| | OR | |
| | B.5.2 Start and run at least one CTG while in Condition B. | 72 hours<br><br>OR<br><br>Prior to entry into Condition B for preplanned maintenance |
| | AND | |

(continued)

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| B. (continued) | B.6 Restore DG to OPERABLE status. | 14 days from discovery of failure to meet LCO |
| C. Required Actions B.2, B.5.1, or B.5.2 and associated Completion Times not met. | C.1 Restore DG to OPERABLE status. | 72 hours |
| D. Two required offsite circuits inoperable. | D.1 Declare required feature(s) inoperable when its redundant feature(s) is inoperable.<br><br>AND<br><br>D.2 Restore one required offsite circuit to OPERABLE status | 12 hours from discovery of Condition D concurrent with inoperability of redundant required features<br><br>24 hours |
| E. One required offsite circuit inoperable.<br><br>AND<br><br>One DG inoperable. | ----------NOTE----------<br>Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating," when Condition E is entered with no AC power source to one or more trains.<br>---------- | (continued) |

ACTIONS (continued)

| CONDITION | REQUIRED ACTION | | COMPLETION TIME |
|---|---|---|---|
| E. (continued) | E.1 | Restore required offsite circuit to OPERABLE status. | 12 hours |
| | OR | | |
| | E.2 | Restore DG to OPERABLE status. | 12 hours |
| F. Two DGs inoperable. | F.1 | Restore one DG to OPERABLE status. | 2 hours |
| G. One automatic load sequencer inoperable. | G.1 | Restore automatic load sequencer to OPERABLE status. | 12 hours |
| H. Required Action and associated Completion Time of Condition A, C, D, E, F, or G not met.<br><br>OR<br><br>Required Action B.1, B.3, B.4.1, B.4.2, or B.6 and associated Completion Time not met. | H.1 | Be in MODE 3. | 6 hours |
| | AND | | |
| | H.2 | Be in MODE 5. | 36 hours |
| I. Three or more required AC sources inoperable. | I.1 | Enter LCO 3.0.3. | Immediately |

## 3.4 REACTOR COOLANT SYSTEM (RCS)

### 3.4.9 Pressurizer

LCO 3.4.9 The pressurizer shall be OPERABLE with:

a. Pressurizer water level ≤ 92%; and

b. Two groups of pressurizer heaters OPERABLE with the capacity of each group ≥ 150 kW and capable of being powered from an emergency power supply.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

| CONDITION | REQUIRED ACTION | | COMPLETION TIME |
|---|---|---|---|
| A. Pressurizer water level not within limit. | A.1 | Be in MODE 3 with reactor trip breakers open. | 6 hours |
| | AND | | |
| | A.2 | Be in MODE 4. | 12 hours |
| B. One required group of pressurizer heaters inoperable. | B.1 | Restore required group of pressurizer heaters to OPERABLE status. | 72 hours |
| C. Required Action and associated Completion Time of Condition B not met. | C.1 | Be in MODE 3. | 6 hours |
| | AND | | |
| | C.2 | Be in MODE 4. | 12 hours |

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE | | FREQUENCY |
|---|---|---|
| SR 3.4.9.1 | Verify pressurizer water level is ≤ 92%. | 12 hours |
| SR 3.4.9.2 | Verify capacity of each required group of pressurizer heaters is ≥ 150 kW. | 18 months |

BASES

BACKGROUND (continued)

Two groups of pressurizer heaters can be administratively loaded onto the non-Class 1E emergency buses. The Class 1E 4160-V breakers supplying the non-Class 1E buses are automatically opened upon a safety injection signal, but they can be closed under administrative procedure.

APPLICABLE SAFETY ANALYSES

In MODES 1, 2, and 3, the LCO requirement for a steam bubble is reflected implicitly in the accident analyses. Safety analyses performed for lower MODES are not limiting. All analyses performed from a critical reactor condition assume the existence of a steam bubble and saturated conditions in the pressurizer. In making this assumption, the analyses neglect the small fraction of noncondensible gases normally present.

Safety analyses presented in the FSAR (Ref. 1) do not take credit for pressurizer heater operation; however, an implicit initial condition assumption of the safety analyses is that the RCS is operating at normal pressure.

The maximum pressurizer water level limit satisfies Criterion 2 of 10 CFR 50.36 (c)(2)(ii). Although the heaters are not specifically used in accident analysis, the need to maintain subcooling in the long term during loss of offsite power, as indicated in NUREG-0737 (Ref. 2), is the reason for providing an LCO.

LCO

The LCO requirement for the pressurizer to be OPERABLE with a water volume $\leq$ 1656 cubic feet, which is equivalent to 92% (LI-0459A, LI-0460A, LI-0461A), ensures that a steam bubble exists. Limiting the LCO maximum operating water level preserves the steam space for pressure control. The LCO has been established to ensure the capability to establish and maintain pressure control for steady state operation and to minimize the consequences of potential overpressure transients. Requiring the presence of a steam bubble is also consistent with analytical assumptions.

The LCO requires two groups of OPERABLE pressurizer heaters, each with a capacity $\geq$ 150 kW, capable of being powered from an emergency power supply. This means that the two required groups of pressurizer heaters must be capable of being powered from a Class 1E 4160-V power supply. This is accomplished by administratively loading the two required

(continued)

BASES

LCO (continued)

groups of pressurizer heaters onto the non-Class 1E emergency buses. These non-Class 1E emergency buses are in turn fed from the Class 1E 4160-V buses which can in turn be supplied from the emergency diesel generators or offsite power sources. The minimum heater capacity required is sufficient to maintain the RCS near normal operating pressure when accounting for heat losses through the pressurizer insulation. By maintaining the pressure near the operating conditions, a wide margin to subcooling can be obtained in the loops.

APPLICABILITY

The need for pressure control is most pertinent when core heat can cause the greatest effect on RCS temperature, resulting in the greatest effect on pressurizer level and RCS pressure control. Thus, applicability has been designated for MODES 1 and 2. The applicability is also provided for MODE 3. The purpose is to prevent solid water RCS operation during heatup and cooldown to avoid rapid pressure rises caused by normal operational perturbation, such as reactor coolant pump startup.

In MODES 1, 2, and 3, there is the need to maintain the availability of pressurizer heaters, capable of being powered from an emergency power supply. In the event of a loss of offsite power, the initial conditions of these MODES give the greatest demand for maintaining the RCS in a hot pressurized condition with loop subcooling for an extended period. For MODE 4, 5, or 6, it is not necessary to control pressure (by heaters) to ensure loop subcooling for heat transfer when the Residual Heat Removal (RHR) System is in service, and therefore, the LCO is not applicable.

ACTIONS

A.1 and A.2

Pressurizer water level control malfunctions or other plant evolutions may result in a pressurizer water level above the nominal upper limit, even with the plant at steady state conditions. Normally the plant will trip in this event since the upper limit of this LCO is the same as the Pressurizer Water Level — High Trip.

If the pressurizer water level is not within the limit, action must be taken to restore the plant to operation within the bounds of the safety analyses. To achieve this status, the unit must be brought to MODE 3, with the reactor trip breakers open, within 6 hours and to MODE 4 within 12 hours. This takes the unit out of the applicable MODES

(continued)

## 3.0 LCO APPLICABILITY

LCO 3.0.4 (continued)

b. After performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the MODE or other specified condition in the Applicability, and establishment of risk management actions, if appropriate; exceptions to this Specification are stated in the individual Specifications; or

c. When an allowance is stated in the individual value, parameter, or other Specification.

This Specification shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

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LCO 3.0.5

Equipment removed from service or declared inoperable to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to LCO 3.0.2 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

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LCO 3.0.6

When a supported system LCO is not met solely due to a support system LCO not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. Only the support system LCO ACTIONS are required to be entered. This is an exception to LCO 3.0.2 for the supported system. In this event, additional evaluations and limitations may be required in accordance with Specification 5.5.15, "Safety Function Determination Program (SFDP)." If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

When a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2.

---

(continued)

## 3.8 ELECTRICAL POWER SYSTEMS

### 3.8.9 Distribution Systems – Operating

LCO 3.8.9 The required AC, DC, and AC vital bus electrical power distribution subsystems shall be OPERABLE.

---NOTE---
The redundant emergency buses of 4160 V switchgear 1/2AAO2 and 1/2BAO3 may be manually connected within the unit by tie breakers in order to allow transfer of preferred offsite power sources provided SR 3.8.1.1 is successfully performed within 12 hours prior to the interconnection. The interconnection shall be implemented without adversely impacting the ability to simultaneously sequence both trains of LOCA loads.
---

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| A. One or more AC electrical power distribution subsystems inoperable. | A.1 Restore AC electrical power distribution subsystems to OPERABLE status. | 8 hours<br><br>AND<br><br>16 hours from discovery of failure to meet LCO |
| B. One or more AC vital bus electrical power distribution subsystems inoperable. | B.1 Restore AC vital bus electrical power distribution subsystems to OPERABLE status. | 2 hours<br><br>AND<br><br>16 hours from discovery of failure to meet LCO |

(continued)

ACTIONS (continued)

| CONDITION | REQUIRED ACTION | | COMPLETION TIME |
|---|---|---|---|
| C. One or more DC electrical power distribution subsystems inoperable. | C.1 | Restore DC electrical power distribution subsystems to OPERABLE status. | 2 hours<br><br>AND<br><br>16 hours from discovery of failure to meet LCO |
| D. Required Action and associated Completion Time not met. | D.1 | Be in MODE 3. | 6 hours |
| | AND | | |
| | D.2 | Be in MODE 5. | 36 hours |
| E. Two or more electrical power distribution subsystems inoperable that result in a loss of function. | E.1 | Enter LCO 3.0.3. | Immediately |

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE | | FREQUENCY |
|---|---|---|
| SR 3.8.9.1 | Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution subsystems. | 7 days |

# HL-15R SRO NRC EXAM

87. 065AG2.1.30 001/1/1/LOSS OF AIR-LOCAL/C/A-4.0/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

Both units are at 100% power
AOP 18028-C, "Loss of Instrument Air" is being implemented for Unit 2

Current conditions:

Unit 2 instrument air header pressure is 90 psig and lowering

The Turbine Building Operator (TBO) reports the unit 2 reciprocating air compressor is not fully loading

The SS should direct the TBO to...

A. close the air compressor filter inlet valve (2-2401-U4-627).

   Locally isolate the the instrument air supply to the turbine building when air pressue drops < 80 psig.

B. isolate instrument air to the controller (PY-19315A) and depress the water drain valve at the air inlet damper.

   Locally isolate the the instrument air supply to the turbine building when air pressure drops < 70 psig.

C. isolate instrument air to the controller (PY-19315A) and depress the water drain valve at the air inlet damper.

   Locally isolate the the instrument air supply to the turbine building when air pressure drops < 80 psig.

D. close the air compressor filter inlet valve (2-2401-U4-627), and

   Locally isolate the the instrument air supply to the turbine building when air pressure drops < 70 psig.

# HL-15R SRO NRC EXAM

**K/A**

**065 Loss of Instrument Air**

**G2.1.30 Ability to locate and operate components, including local controls.**

**K/A MATCH ANALYSIS**

The question presents a plausible scenario where local actions in AOP 18028-C for loss of instrument air (including attachment A) must be correctly applied. Attachment A is implemented if air pressure drops < 70 psig. The use of 18028-C Attachment A meets the SRO question requirements instructions.

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. The actions listed for the first part of this choice are corect making this very plausible. Isolating the turbine building instrument air header is also an action contained in attachment A of the AOP.

B. Incorrect. The actions given for fully loading the air compressor are correct for a rotory air compressor. The action for isolating the turbine building instrument air header is correct per Attachment A.

C. Incorrect. The actions given for fully loading the air compressor are correct for a rotory air compressor. The action to locally isolate the trubine building instrument air header is plausible since this is an action performed in the attachment. 80 psig is the setpoint for separating the instrument air headers.

D. Correct. All actions listed are correct for the pressures given.

**REFERENCES**

AOP 18028-C. "Loss of Instrument Air" steps 16, 19, 20, and A2

**VEGP learning objectives:**

LO-LP-60321-06:

Describe the operator actions required during normal full power operation when instrument air header pressure fails below 80 psig and/or below 70 psig.

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|

INITIAL ACTIONS

1. Check proper operation of all available air compressors on affected unit:

__a. All air compressors - RUNNING.

__a. Start all available air compressors on affected unit.

__b. All air compressors - PROPERLY LOADING AND UNLOADING.

b. Dispatch operator to fully load any air compressor not loading properly:

__1) Reciprocating - close service air compressor filter inlet valves:

UNIT 1 (TB-A-T11)
- 1-2401-U4-627
- A-2401-U4-629

UNIT 2 (TB-A-T10)
- 2-2401-U4-627

2) Rotary

__a) Isolate instrument air to controllers PY-19315A and/or PY-19314A using local air isolation valves.

__b) Verify air pressure is bled off by depressing water drain pushbutton on Sullicon Controllers at air inlet dampers.

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __*19. **Check Instrument Air header pressure - REMAINS GREATER THAN 70 PSIG.** | *19. Perform the following:<br>__a. Trip the reactor.<br>__b. Initiate 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION.<br>__c. Go to ATTACHMENT A, LOSS OF INSTRUMENT AIR IN MODE 3. |
| __20. Check header pressure – STABLE OR RISING. | 20. IF leakage source can NOT be isolated, THEN restore/isolate UNAFFECTED unit Instrument Air as follows:<br>a. Perform one of the following:<br>__ IF Unit 1 is selected for the swing compressor, THEN close 2-2401-U4-510.<br>-OR-<br>__ IF Unit 2 is selected for the swing compressor, THEN close 1-2401-U4-510.<br>__b. Verify swing compressor is running (TB-A-TC11). |
| __21. Check Instrument Air header pressure on PI-9361 - GREATER THAN 100 PSIG. | __21. Go to Step 24. |

ATTACHMENT A

Sheet 1 of 8

LOSS OF INSTRUMENT AIR IN MODE 3

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __A1. Check Instrument Air supply header pressure on PI-9361 - LESS THAN 100 PSIG. | __A1. Go to Step A8. |
| __*A2. **Check Instrument Air header pressure - REMAINS GREATER THAN 70 PSIG.** | __*A2. Dispatch an operator to close Turbine Building instrument air isolation valve:<br>UNIT 1: 1-2420-U4-512 (TB-1-TE12)<br>UNIT 2: 2-2420-U4-512 (TB-1-TE10) |
| __A3. Check SG ARVs - MAINTAINING SG PRESSURE BETWEEN 1080 AND 1140 PSIG. | A3. Perform the following:<br>__a. Verify SG atmospheric relief valves in AUTO:<br>SG 1: PIC-3000A<br>SG 2: PIC-3010A<br>SG 3: PIC-3020A<br>SG 4: PIC-3030A<br>__b. Verify controller setpoint potentiometers set at 7.5. |
| __*A4. **Maintain SG NR levels - BETWEEN 60% AND 70%.** | |

88. 068AA2.03 001/1/2/CR EVAC-RCS TEMPS/C/A-4.2/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

- The unit tripped from 100% power due to a control room fire
- AOP 18038-1 "Operation from Remote Shutdown Panels" was entered
- The CCPs and SI pumps were running when local control was established

Current conditions:

- RCS Cold legs 1 - 4 temperatures - 557 F
- RCS Hot legs 1 - 4 temperatures - 559 F
- RCS Core exit temperatures - 565 F
- WR RCS pressure - 1900 psig and rising
- PRZR level is 5% and rising
- AFW flow - 0 GPM
- SG WR levels - 50%

The SS is at the step of AOP 18038-1 to "check if SI is actuated"

Which one of the following correctly describes the SI actuation status and follow up actions to take per 18038-1?

A. SI is actuated and SI termination criteria are met. Stop all but 1 CCP and both SI pumps.

B. SI is actuated and SI termination criteria are NOT met. Both DGs should be locally emergency stopped if their busses are powered by the RATs.

C. SI is NOT actuated. RCS temperature should be raised by closing the MSIVs, BSIVs and SGBD valves by locally opening power supply breakers for these components.

D. SI is NOT actuated. Locally raise charging flow using to fill the PRZR to 17% before energizing the PRZR backup heaters to prevent damage.

**K/A**

**068 Control Room Evacuation**

**AA2.03 Ability to determine and interpret the following as they apply to the Control Room Evacuation.**

**T-hot, T-cold, and in-core temperatures.**

**K/A MATCH ANALYSIS**

a fire. The SS must use the remote S/D panel indications to determine if SI was actuated prior to taking local control, if SI termination criteria are met using core exit temperatures, and followup actions to take per the AOP. The question requires applying detailed knowledge of diagnostic steps and decision points that involve transition to event specific steps.

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. SI is actuated based on the CCP and SI pumps status, however SI termination criteria (PRZR level and SG levels) are NOT met. The follow up actions are correct for meeting SI termination criteria.

B. Correct. SI is actuated based on the CCP and SI pumps status, however SI termination criteria (PRZR level and SG levels) are NOT met. The follow up actions are correct per AOP 18038-1 steps 35 and 37.

C. Incorrect. SI is actuated, however this choice is plausible because PRZR pressure is > 1870 psig for SI actuation and pumps could have spuriously started due to the control room fire. The followup action is correct per continuous action step 33.

D. Incorrect. SI is actuated, however this choice is plausible because PRZR pressure is > 1870 psig for SI actuation and pumps could have spuriously started due to the control room fire. The follow up action is correct per continuous action step 39.

**REFERENCES**

AOP 18038-1, "Operation from Remote Shutdown Panels" steps 33 through 39.

LO-PP-60327 slides 15-18, and 36.

**VEGP learning objectives:**

LO-PP-60327-02:

List the instruments and controls that are "fire event" qualified and how they are identified.

LO-PP-60327-07:

Describe the response of ECCS equipment to Safety Injection signal after the "Local/Remote" transfer switch has been taken to "Local" position.

LO-PP-60327-08:

State the expected response of the plant/parameter(s) for a given step in AOP 18038-1/2.

# HL-15R SRO NRC EXAM

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

**CAUTION**

Closing BSIVs by opening 1AD12-03 and 1BD12-03 will isolate RMW to VCT blender.

__ *33. **CHECK RCS temperature - STABLE AT OR TRENDING TO 557°F.**

*33. IF temperature is less than 557°F and lowering, THEN:

a. Verify SGARVs are closed.

__ IF SGARV can NOT be closed, THEN control RCS temperature by initiating ATTACHMENT E.

-OR-

Close SGARV by opening its breaker:

__ Brkr 17 on 1AY2A for 1-PV-3000 (AB-118)

__ Brkr 18 on 1AY2A for 1-PV-3030 (AB-118)

__ Brkr 10 on 1BYC1 for 1-PV-3010 (CB-B61)

__ Brkr 12 on 1BYC1 for 1-PV-3020 (CB-B61)

__ b. IF cooldown continues, THEN throttle total AFW flow to a minimum of 570 gpm, OR less if at least one SG level is above 10% NR.

* Step 33 continued on next page

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

c. IF cooldown continues, THEN close MSIVs, BSIVs and SGBD valves by opening:

__• Breakers 8 and 3 on 1AD12 (CB-B52)

__• Breaker 8 on 1AD11 (CB-B52)

__• Breakers 8 and 3 on 1BD12 (CB-B47)

IF temperature greater than 557°F and rising, AND IF a control room fire, THEN control RCS temperature by performing the following:

__ Initiate ATTACHMENT G.

-OR-

__ Use SG ARVs 1-PV-3010 and 1-PV-3020 by initiating ATTACHMENT E.

* Step 33 continued on next page

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| | IF temperature greater than 557°F and rising,<br>AND IF NOT a control room fire,<br>THEN control RCS temperature by performing the following:<br><br>__ Use SG ARVs on Shutdown Panel A or Shutdown Panel B.<br><br>-OR-<br><br>__ By initiating ATTACHMENT E. |

NOTE

If an SI actuation occurs, TSC consultation may be necessary after it is staffed.

| | |
|---|---|
| __ *34. **Check if SI is actuated.** | __ *34. Go to Step 39. |
| correct path | distractor path |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| 35. Check if ECCS flow should be reduced:<br>__ • RCS subcooling - GREATER THAN 24°F (using Core Exit Temperature and RCS WR pressure)<br>__ • RCS pressure - STABLE OR RISING<br>__ • PRZR level - GREATER THAN 9%<br>• Secondary heat sink:<br>__ Total feed flow to SGs - GREATER THAN 570 gpm.<br>-OR-<br>__ WR level in at least one SG GREATER THAN 65%. | 35. Do not reduce ECCS flow.<br>__ Consult TSC when it is staffed.<br>__ Go to Step 37. |

correct path

NOTE

Train B is the preferred charging train for a Control Room fire when operating from Remote Shutdown Panels.

36. Reduce ECCS flow by stopping the following equipment:

distracter path

__ • All but 1 CCP

__ • SI Pumps

__ • RHR Pumps

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __37. IF preferred normal power is supplying Emergency 4160V Busses, THEN stop emergency Diesel Generators using local emergency stop pushbuttons. | |
| __38. Check NCP stopped - BREAKER 1NA05-08 TRIPPED (AB-A52). | 38. Perform the following:<br>__a. Turn 1NA05-08 control power breaker off.<br>__b. Trip 1NA05-08. |

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

**CAUTIONS**

- 1-LV-0112B, 0112C, 0112D, 0112E will NOT reposition on VCT low-low level after they have been transferred to the Shutdown Panels.
- PRZR Heaters will NOT cut off on low PRZR level after controls have been transferred to the Shutdown Panels.
- When operating from the Shutdown Panels, Train B is the preferable charging train.
- Closing BSIVs by opening 1AD12-03 and 1BD12-03 will isolate RMW to VCT blender.

*39. **Control PRZR level 50% to 70%:** distractor path

a. ~~Check charging pump suction~~ aligned to VCT:

__• Letdown in service (1-FI-0132B on Shutdown Panel A).

__• 1-LV-0112B VCT OUTLET ISOLATION on Shutdown Panel A - OPEN.

__• 1-LV-0112C VCT OUTLET ISOLATION on Shutdown Panel B - OPEN.

__• 1-LV-0112D RWST TO CCP-A&B SUCTION on Shutdown Panel A - CLOSED.

__• 1-LV-0112E RWST TO CCP-A&B SUCTION on Shutdown Panel B - CLOSED.

a. Align charging pump suction to RWST:

At Shutdown Panel B:

__• Open 1-LV-0112E.

__• Close 1-LV-0112C.

-OR-

At Shutdown Panel A:

__• Open 1-LV-0112D.

__• Close 1-LV-0112B.

* Step 39 continued on next page

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| b. Open CHARGING TO RCS ISOLATION valves:<br>__• 1-HV-8105 (Shutdown Panel B)<br>__• 1-HV-8106 (Shutdown Panel A) | |
| c. IF SI actuated, THEN at discretion of Shift Supervisor, close BIT DISCH ISOLATION valves:<br>__• 1-HV-8801A (Shutdown Panel A)<br>__• 1-HV-8801B (Shutdown Panel B) | |
| __d. Start CCP B on Shutdown Panel B or CCP A on Shutdown Panel A. | __d. Start additional CCP if desired while waiting for local charging valve 1-FHC-0121 (AB-C113) to be manned. |
| __e. Stop NCP by locally tripping breaker 1NA05-08 (AB-A52). | |

° Step 39 continued on next page

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

NOTES

- At SS discretion, ATTACHMENT F may be used to establish Safety Grade Charging even if Instrument Air is available.
- CCP motor starting limitations are two consecutive starts from ambient temperature, one start from operating temperature; subsequent start after 15 minutes running or 45 minutes standstill.

f. Maintain PRZR level between 50% and 70%:

__• Throttle charging using 1-FHC-0121 (outside NCP Room in AB-C113).

__• Control seal injection flow 8 to 13 gpm per RCP by throttling 1-1208-U6-136 and closing 1-1208-U6-134 (both in NCP valve gallery AB-C112).

-OR-

__• IF instrument air is NOT available, THEN maintain PRZR level between 50% and 70% by using ATTACHMENT F.

f. Maintain PRZR level between 50% and 70% using either of the following:

With CCP B running:

1) Verify mini-flow path:

__• 1-HV-8110 CCP-A&B COMMON MINIFLOW open (Shutdown Panel A).

__• 1-HV-8111B CCP-B MINIFLOW open (Shutdown Panel B).

° Step 39 continued on next page

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

__2) Isolate letdown by closing LETDOWN ISOLATION VLV UPSTREAM 1-LV-460 AND LETDOWN ISOLATION VLV DOWNSTREAM 1-LV-459 (Shutdown Panel A).

__3) Close CHARGING TO RCS ISOLATION 1-HV-8106 (Shutdown Panel A).

__4) Open 1-HV-8801B BIT DISCH ISOLATION (Shutdown Panel B).

5) Control PRZR level by:

__ Closing and opening 1-HV-8801B (Shutdown Panel B).

-OR-

__ Stopping and starting CCP B.

° Step 39 continued on next page

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

__6) At Shift Supervisor's discretion, establish control of seal injection flow by closing 1-1208-U6-153 to isolate 1-FV-0121 (handwheel in NCP valve gallery AB-C112), and throttle seal injection using 1-1208-U6-151, (handwheel in CCP B valve gallery AB-C119). Flows can be monitored locally on 1-FI-0143B and 1-FI-0142B (FHB-A10) or on Plant Computer.

-OR-

With CCP A running:

1) Verify mini-flow path:

__• 1-HV-8110 CCP-A&B COMMON MINIFLOW open (Shutdown Panel A).

__• 1-HV-8111A CCP-A MINIFLOW open (Shutdown Panel B).

° Step 39 continued on next page

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

__2) Isolate letdown by closing LETDOWN ISOLATION VLV UPSTREAM 1-LV-460 AND LETDOWN ISOLATION VLV DOWNSTREAM 1-LV-459 (Shutdown Panel A).

__3) Close 1-HV-8105 CHARGING TO RCS ISOLATION (Shutdown Panel B).

__4) Open 1-HV-8801A BIT DISCH ISOLATION (Shutdown Panel A).

5) Control PRZR level by:

__ Closing and opening 1-HV-8801A (Shutdown Panel A).

-OR-

__ Stopping and starting CCP A.

° Step 39 continued on next page

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| | __6) At Shift Supervisor's discretion, establish control of seal injection flow by closing 1-1208-U6-153 to isolate 1-FV-0121 (handwheel in NCP valve gallery AB-C112) and throttle seal injection using 1-1208-U6-152 (handwheel in CCP A valve gallery AB-C114). Flows can be monitored locally on 1-FI-0144B and 1-FI-0145B (AB-A09) or on Plant Computer. |

° Step 39 continued on next page

ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

NOTE

Power may need to be restored by closing breakers 1AD12-03 (CB-B52) and 1BD12-03 (CB-B47) to establish safety grade letdown.

g. IF PRZR level can NOT be maintained less than 88%, THEN open the following until PRZR level lowers to less than 70%:

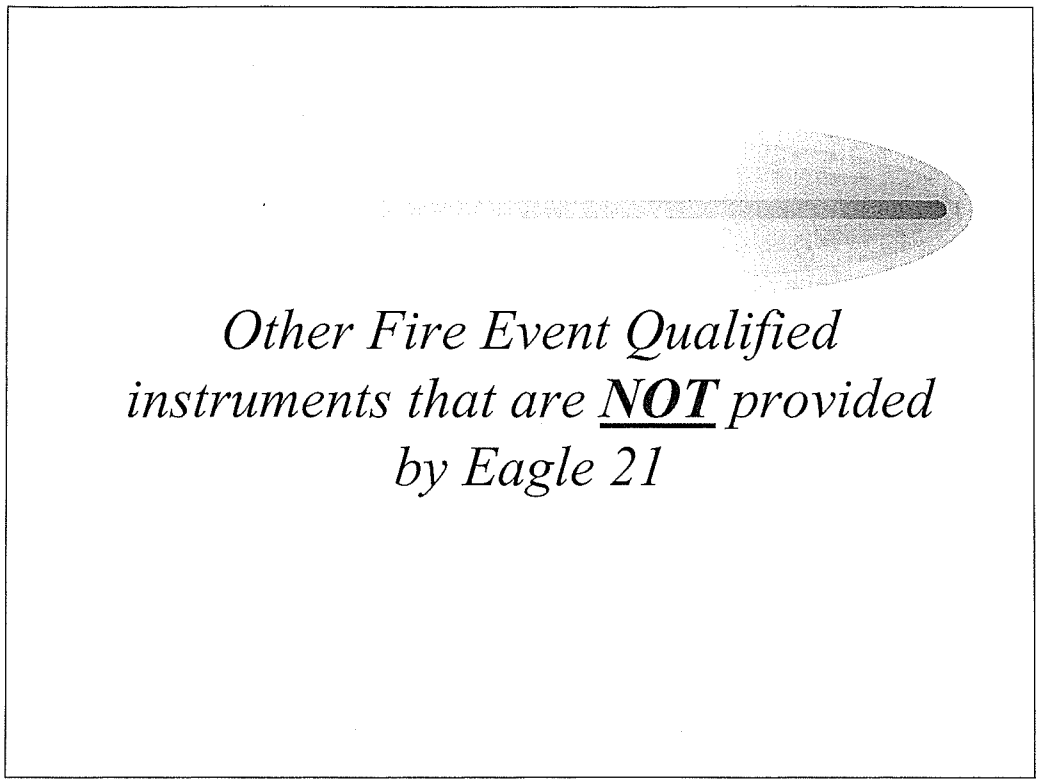
- Train B head vent:
  - __ 1-HV-8095B RX HEAD VENT TO LETDOWN ISOLATION VLV
  - __ 1-HV-8096B RX HEAD VENT TO LETDOWN ISOLATION VLV
  - __ 1-HV-0442B REACTOR HEAD VENT TO PRT
- Train A head vent:
  - __ 1-HV-8095A RX HEAD VENT TO LETDOWN ISOLATION VLV
  - __ 1-HV-8096A RX HEAD VENT TO LETDOWN ISOLATION VLV
  - __ 1-HV-0442A REACTOR HEAD VENT TO PRT

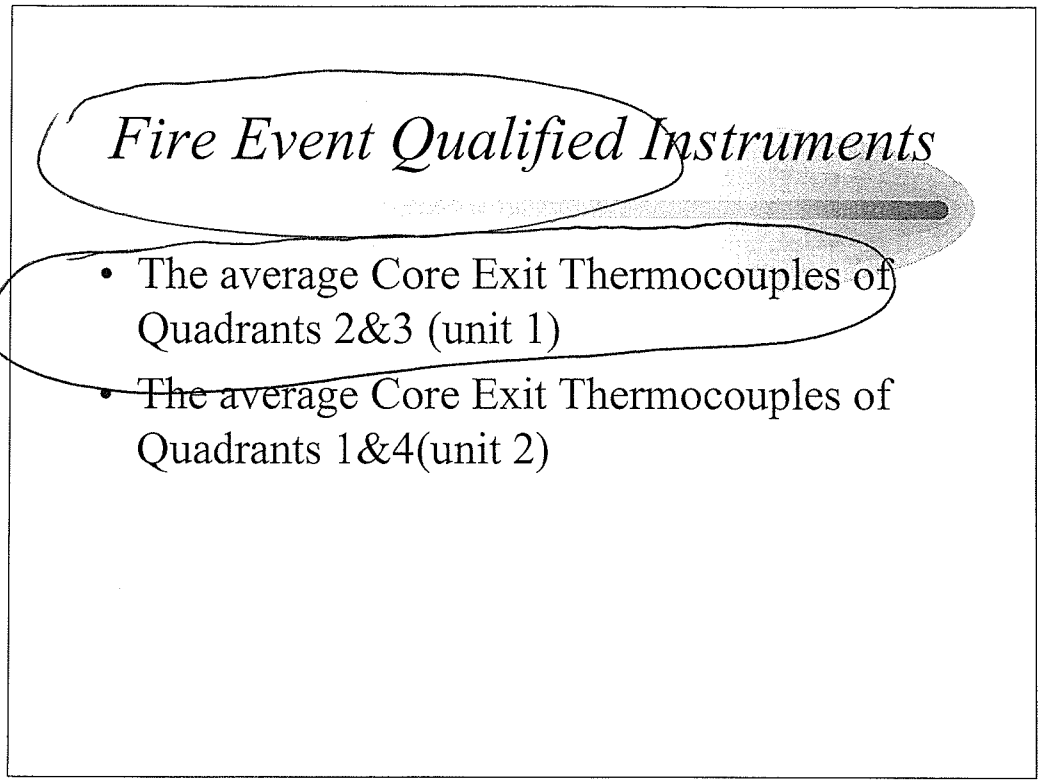
*Fire Qualified Instruments and Controls provided by the Eagle 21 System*

- RCS Loop 2 Wide Range Cold Leg Temperature TI-423B
- RCS Loop 3 Wide Range Cold Leg Temperature TI-433B
- RCS Wide Range Pressure PI-403
- Pressurizer Level LI-460
- S/G #2 Wide Range Level LI-502
- S/G #3 Wide Range Level LI-503
- Head Vent Controller HV-442B
- Accumulator Vent Controller HV-943B

List of instruments and controls that are provided by Eagle 21.

CO-PP-60327


*Other Fire Event Qualified instruments that are **NOT** provided by Eagle 21*

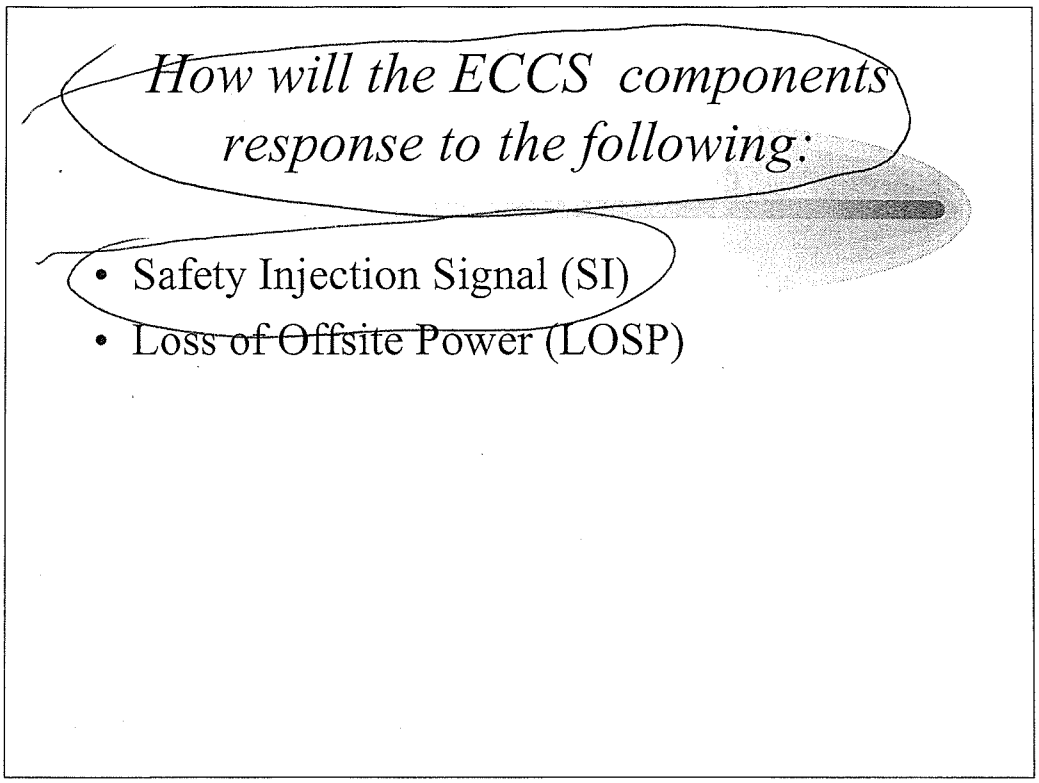



This information is provided by the Display Processing Units (DPU) which are located outside the Main Control Room on level 2 of the Control Building. Due their location and the signals that they provide which are optically isolated, certifies it as Fire Event Qualified.

## *Fire Event Qualified Instruments*

- Train "B" Extended Range Neutron Flux Lower Range Indication
- Train "B" Extended Range Neutron Flux Upper Range Indication

Indication is provided by Channel Gamma Metrics System.




Safety Injection Pump Elementary Drawing 1X3D-BD-D01C

During a LOSP "Load Shed" will always occur in "Local" or "Control Room" position but for load sequencing on SI or UV the transfer switch must be in the "Control Room" position.

# HL-15R SRO NRC EXAM

89. 072A2.03 001/2/2/ARM-BLOWN FUSES/C/A-2.9/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

RCS Tavg is 300 F
RE-2565 has been taken out of service for maintenance
The following rad monitors are delcared inoperable:

RE-2565A, Containment Particulate Monitor
RE-2565B, Containment Iodine Monitor
RE-2565C, Containment Gaseous Monitor

Current conditions:

The DPM power supply fuse for RE-002, Containment Area Low Range Monitor, blows.

Which one of the following correctly describes the expected system response and corrective actions to take?

A. CVI actuation occurred.

Enter actions of LCO 3.3.6 (CVI Instrumentation).

B. CVI actuation did NOT occur.

Enter an INFO ONLY LCO 3.6.3 (Containment Isolation Valves).

C. CVI actuation occurred.

Enter an INFO ONLY LCO 3.6.3 (Containment Isolation Valves).

D. CVI actuation did NOT occur.

Enter the actions of LCO 3.3.6 (CVI Instrumentation).

**K/A**

**072 Area Radiation Monitoring (ARM) System**

**A2.03 Ability to (a) predict the impacts of the following malfunctions or operations on the ARM system and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations.**

**Blown power-supply fuses.**

# HL-15R SRO NRC EXAM

## K/A MATCH ANALYSIS

This question presents a scenario where a power supply fuse for RE-002 blows. The student must determine if this will result in CVI actuation and the appropriate technical specification actions to correct, control, or mitigate the consequences matching the K/A.
The question requires the student to determine the impact on operability of CVI instrumentation / valves and the correct required actions making this an SRO level question.

## ANSWER / DISTRACTOR ANALYSIS

A. Correct. Loss of power to the Data Processing Module (DPM) for RE-002 will result in a high radiation CVI actuation. With the skid for RE-2565 out of service, all 3 associated detectors are inoperable. RE-2565A, B, and C count as only one channel. When RE-002 fails due to the blown power supply fuse, only one CVI containment radiation channel is operable requiring entery into LCO 3.3.6 for CVI instrumentation.

B. Incorrect. CVI actuation will occur due to the loss of power to the DPM for RE-002. Since LCO 3.6.3 is a cascaded technical specification from LCO 3.3.6 an INFO only LCO for 3.6.3 would be incorrect but plausible.

C. Incorrect. CVI actuation did occur as stated in the first part of this choice making this plausible. Since LCO 3.6.3 is a cascaded technical specification from LCO 3.3.6 an INFO only LCO for 3.6.3 would be incorrect but plausible.

D. Incorrect. CVI actuation will occur when the power supply to the DPM for RE-002 fails. The techncial specification action statements in the second half of this choice are correct making this a plausible choice.

## REFERENCES

1. LCO 3.3.6, Containment Ventilation Isolation Instrumentation.
2. 18032-1, "Loss of Vital 120 VAC Power" section B.

## VEGP learning objectives:

LO-PP-32101-03:

Describe how DPM's are affected by a loss of power and subsequently re-energized.

## B. LOSS OF VITAL INSTRUMENT PANEL 1AY2A (AB-118)

ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

NOTES

- Train A ESF sequencer will not operate following loss of Panel 1AY2A.
- Loss of power to Panel 1AY2A will result in a Containment Ventilation Isolation.
- SG-1 and SG-4 ARVs will NOT operate from QMCB following loss of 1AY2A.

B1. Notify Chemistry that the following radiation monitors will be out of service and will need to be reset when power is restored:

- __ 1RE-0002 (CVI)
- __ 1RE-0005
- __ 1RE-2532A (FHBI)
- __ 1RE-2532B (FHBI)
- __ 1RE-12116 (CRI)
- __ 1RE-13119
- __ 1RE-13120

__B2. Dispatch an operator to restore Panel 1AY2A by initiating 13431, 120V AC 1E VITAL INSTRUMENT DISTRIBUTION SYSTEM.

__B3. Refer to ATTACHMENT B to determine affected instrumentation.

__B4. Refer to Technical Specifications and complete any applicable action statements.

B. LOSS OF VITAL INSTRUMENT PANEL 1AY2A (AB-118)

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __*B5. **Check power to 1AY2A – RESTORED.** | *B5. Perform the following:<br>__a. WHEN power to 1AY2A is restored, THEN perform Step B6.<br>__b. Return to procedure and step in effect. |
| __B6. Restore equipment to normal by initiating 11886, RECOVERY FROM ESF ACTUATIONS. | |
| __B7. Return to procedure and step in effect. | |

° END OF SUB-PROCEDURE TEXT

ATTACHMENT B

Sheet 1 of 1

TABLE 1 PANEL 1AY2A LOAD LIST

| BREAKER | LOAD |
|---|---|
| 03 | SAFETY RELATED DISPLAY CONSOLE DRMS |
| 04 | DATA MODULE 1RX0005 - CNMT AREA MONITOR |
| 05 | DATA MODULE 1RX0002 - CNMT AREA MONITOR |
| 06 | DATA MODULE ARX-2532 - FUEL HANDLING BLDG HVAC MONITOR |
| 07 | DATA MODULE 1RX-12116 - CR AIR INTAKE MONITOR |
| 08 | SEQUENCER BOARD 1-1821-U3-001 |
| 09 | BOP SAFETY ACTUATION CABINET 11CQESF |
| 10 | TRAIN A SYSTEM STATUS MONITORING PANEL |
| 11 | PREAMP 1RT-005 |
| 12 | DATA MODULE 1RX-13119 - MAIN STEAMLINE MONITOR |
| 13 | DATA MODULE 1RX-13120 - MAIN STEAMLINE MONITOR |
| 14 | DISPLAY PROCESSING UNIT (DPU-A) |
| 15 | REMOTE PROCESSING UNIT A1, CHANNEL I |
| 16 | REMOTE PROCESSING UNIT A2, CHANNEL I |
| 17 | SERVO-AMP FOR ATM DUMP VALVE 1ATPY3000 |
| 18 | SERVO-AMP FOR ATM DUMP VALVE 1ATPY3030 |
| 19 | SPARE |
| 20 | SPARE |
| 21 | SPARE |
| 22 | SPARE |
| 23 | SPARE |
| 24 | SPARE |

END OF ATTACHMENT B

3.3 INSTRUMENTATION

3.3.6 Containment Ventilation Isolation Instrumentation

LCO 3.3.6 The Containment Ventilation Isolation instrumentation for each Function in Table 3.3.6-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.6-1.

ACTIONS

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

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| A. Only one radiation monitoring channel OPERABLE. | A.1 Restore at least two channels to OPERABLE status. | 4 hours |

(continued)

ACTIONS (continued)

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| B. ----------NOTE---------- Only applicable in MODE 1, 2, 3, or 4. ---------- One or more Functions with one or more manual or automatic actuation channels inoperable. OR No radiation monitoring channels OPERABLE. OR Required Action and associated Completion Time of Condition A not met. | B.1 Enter applicable Conditions and Required Actions of LCO 3.6.3, "Containment Isolation Valves," for containment purge supply and exhaust isolation valves made inoperable by isolation instrumentation. | Immediately |

(continued)

ACTIONS (continued)

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| C. ----------NOTE---------- Only applicable during CORE ALTERATIONS or movement of irradiated fuel assemblies within containment. ---------- | C.1 Place and maintain containment purge and exhaust valves in closed position. | Immediately |
| | OR | |
| No radiation monitoring channels OPERABLE. | C.2 Enter applicable Conditions and Required Actions of LCO 3.9.4, "Containment Penetrations," for containment purge supply and exhaust isolation penetrations not in required status. | Immediately |
| OR | | |
| Required Action and associated Completion Time for Condition A not met. | | |

SURVEILLANCE REQUIREMENTS

----------NOTE----------
Refer to Table 3.3.6-1 to determine which SRs apply for each Containment Purge and Exhaust Isolation Function.
---

| | SURVEILLANCE | FREQUENCY |
|---|---|---|
| SR 3.3.6.1 | Perform CHANNEL CHECK. | 12 hours |
| SR 3.3.6.2 | Perform ACTUATION LOGIC TEST. | 92 days on a STAGGERED TEST BASIS |
| SR 3.3.6.3 | Perform MASTER RELAY TEST. | 92 days on a STAGGERED TEST BASIS |
| SR 3.3.6.4 | Perform COT. | 92 days |
| SR 3.3.6.5 | Perform SLAVE RELAY TEST. | 18 months |
| SR 3.3.6.6 | ----------NOTE----------<br>Verification of setpoint not required.<br>---<br>Perform TADOT. | 18 months |
| SR 3.3.6.7 | Perform CHANNEL CALIBRATION. | 18 months |
| SR 3.3.6.8 | Verify RESPONSE TIMES are within limits. | 18 months on a STAGGERED TEST BASIS |

Table 3.3.6-1 (page 1 of 1)
Containment Ventilation Isolation Instrumentation

| FUNCTION | APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS | REQUIRED CHANNELS | SURVEILLANCE REQUIREMENTS | TRIP SETPOINT |
|---|---|---|---|---|
| 1. Manual Initiation | 1,2,3,4 | 2 | SR 3.3.6.6 | NA |
| 2. Automatic Actuation Logic and Actuation Relays | 1,2,3,4 | 2 | SR 3.3.6.2<br>SR 3.3.6.3<br>SR 3.3.6.5 | NA |
| 3. Containment Radiation | 1,2,3,4,6(c) | 2(a) | SR 3.3.6.1<br>SR 3.3.6.4<br>SR 3.3.6.7<br>SR 3.3.6.8 | |
| a. Gaseous (RE-2565C) | | | | (b) |
| b. Particulate (RE-2565A) | | | | (b) |
| c. Iodine (RE-2565B) | | | | (b) |
| d. Area Low Range (RE-0002, RE-0003) | | | | ≤ 15 mr/h(c)<br>≤ 50x background(d) |
| 4. Safety Injection(d) | 1,2,3,4 | Refer to LCO 3.3.2, "ESFAS Instrumentation," Function 1, for all initiation functions and requirements. | | |

(a) Containment ventilation radiation (RE-2565) is treated as one channel and is considered OPERABLE if the particulate (RE-2565A) and iodine monitors (RE-2565B) are OPERABLE or the noble gas monitor (RE-2565C) is OPERABLE.

(b) Setpoints will not exceed the limits of Specifications 5.5.4.h and 5.5.4.i of the Radioactive Effluent Controls Program.

(c) During CORE ALTERATIONS and movement of irradiated fuel assemblies within containment.

(d) During MODES 1, 2, 3, and 4.

# HL-15R SRO NRC EXAM

90. 073A2.02 001/2/1/PROC RM-DECTR FAILS/C/A-3.2/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

Unit 1 is at 100% power
CNMT pressure relief is in progress per 13125-1, "Containment Purge System"
1RE-12442C, Plant Vent Effluent Radiogas Monitor (Low Range), is out of service

Current conditions:

1RE-12444C, Plant Vent Effluent Wide Range-Low Radiogas Monitor, fails low

The SS should...

A. direct the termination of the CNMT pressure relief and ensure periodic grab samples of the Plant Vent occur to comply with ODCM action requirements.

B. direct the termination of the CNMT pressure relief and enter LCO 3.0.3, be in mode 3 within the next 6 hours.

C. allow CNMT pressure relief to continue and verify 1RE-2565C, Containment Vent Effluent Radiogas Monitor, remains operable and in service to monitor the release.

D. allow CNMT pressure relief to continue and ensure periodic grab samples of the Plant Vent occur to comply with ODCM action requirements.

**K/A**

**073 Process Radiation Monitoring (PRM) System**

**A2.02 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.**

**Detector failure.**

**K/A MATCH ANALYSIS**

The question presents a scenario with a containment pressure relief in progress when the remaining required plant vent radiogas monitor detector fails low The ODCM requires that periodic grab samples be taken on the plant vent and that containment purging operations be immediately terminated. This question addresses the effects of a detector failure and the correct procedures (ODCM) used to mitigate the failure.

This question is an SRO question because it involves application of required actions from the ODCM.

# HL-15R SRO NRC EXAM

**ANSWER / DISTRACTOR ANALYSIS**

A. Correct. Action 48 of the ODCM requires immediate termination of containment purging operations. Action 47 of the ODCM requires periodic grab samples be taken while release via this pathway continue.

B. Incorrect. Action 48 of the ODCM requires immediate termination of containment purging operations. Even though both plant vent noble gas monitors are inoperable, the ODCM provides actions for this condition and LCO 3.0.3 entry is not required.

C. Incorrect. Action 47 of the ODCM allows continued effluent releases via the plant vent and RE-2565C is one of the required radiation monitors in the discharge path making this choice plausible.

D. Incorrect. Action 47 of the ODCM allows continued effluent releases via the plant vent as long as periodic grab samples are taken and analyzed. Continuation of effluent releases in conjunction with a compensitory action is allowed with all other ODCM action requirements except action 48 making this choice plausible.

**REFERENCES**

ODCM Table 3-1 and action 47 & 48

13125-1, "Containment Purge System" section 4.4.1 Containment Pressure Relief, step 4.4.1.3

**VEGP learning objectives:**

LO-PP-29101-12:

Describe the importance of RE-12442C and RE-12444C on Containment Mini-Purge.

INITIALS

## 4.4 NON PERIODIC OPERATION

NOTE

When monitoring and changing containment pressure during this procedure, computer point P-9871 OR 1-PI-10945 (QHVC) should be used. These are the only containment pressure instruments that will indicate a negative pressure.

### 4.4.1 Containment Pressure Relief

4.4.1.1 IF the Unit is in MODE 1, 2, 3 or 4:

a. **Review** Limitations 2.2.5c, 2.2.7, 2.2.8, and 2.2.10. _____

b. **Place** additional containment cooling units in service if desired, to correct the high pressure condition. _____

4.4.1.2 **Notify** Chemistry of the upcoming Mini-Purge operation or Pressure Relief operation:

**Obtain** the current approved Containment Gaseous Release Permit. _____

OR

IF an updated permit is unavailable, **request** that Chemistry sample the containment atmosphere and **prepare** for the gaseous release. _____

INITIALS

4.4.1.3 WHEN a current approved Containment Gaseous Release Permit is obtained, perform the following:

a. **Verify** at least two of the following radiation monitors are operable for CVI purposes (TS 3.3.6):

- 1-RE-2565A&B OR 1-RE-2565C _____
- 1-RE-002 _____
- 1-RE-003 _____

b. **Verify** at least one of the following radiation monitors is operable for ODCM purposes:

- 1-RE-12442C _____
- 1-RE-12444C _____

**CAUTION**

The pressure relief should NOT be initiated until the current approved Containment Gaseous Release Permit is obtained.

4.4.1.4 **Verify** that the release will be initiated within 24 hours of the sample collection date/time indicated on the Release Permit and prior to the 'Permit must be initiated before (Date/Time)' indicated on 36022-C Data Sheet 1. The release must be terminated no later than the 'Release may not continue beyond (Date/Time)' indicated on 36022-C Data Sheet 1. _____

Table 3-1. Radioactive Gaseous Effluent Monitoring Instrumentation

| Instrument | OPERABILITY Requirements | | |
|---|---|---|---|
| | Minimum Channels OPERABLE | Applicability | ACTION |
| 1. GASEOUS RADWASTE TREATMENT SYSTEM (Common) | | | |
| a. Noble Gas Activity Monitor, with Alarm and Automatic Termination of Release (ARE-0014) | 1 | During releases[a] | 45 |
| b. Effluent System Flowrate Measuring Device (AFT-0014) | 1 | During releases[a] | 46 |
| 2. Turbine Building Vent (Each Unit) | | | |
| a. Noble Gas Activity Monitor (RE-12839C) | 1 | During releases[a] | 47 |
| b. Iodine and Particulate Samplers (RE-12839A & B) | 1 | During releases[a] | 51 |
| c. Flowrate Monitor (FT-12839 or FIS-12862)[b] | 1 | During releases[a] | 46 |
| d. Sampler Flowrate Monitor (FI-13211) | 1 | During releases[a] | 46 |
| 3. Plant Vent (Each Unit) | | | |
| a. Noble Gas Activity Monitor (RE-12442C or RE-12444C) | 1 | At all times | 47,48 |
| b. Iodine Sampler/Monitor (RE-12442B or RE-12444B) | 1 | At all times | 51 |
| c. Particulate Sampler/Monitor (RE-12442A or RE-12444A) | 1 | At all times | 51 |
| d. Flowrate Monitor (FT-12442 or 12835) | 1 | At all times | 46 |
| e. Sampler Flowrate Monitor (FI-12442 or FI-12444) | 1 | At all times | 46 |
| 4. Radwaste Processing Facility Vent (Common) | | | |
| a. Particulate Monitor (ARE-16980) | 1 | During releases[a] | 51 |

a. "During releases" means "During radioactive releases via this pathway."

b. During emergency filtration.

Table 3-1 (contd). Notation for Table 3-1 — ACTION Statements

ACTION 45 — With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the tank(s) may be released to the environment for up to 14 days provided that prior to initiating the release:

a. At least two independent samples of the tank's contents are analyzed, and

b. At least two technically qualified members of the Facility Staff independently verify the discharge line valving, and verify the release rate calculations.

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 46 — With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flowrate is estimated at least once per 4 hours.

ACTION 47 — With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are taken at least once per 12 hours and these samples are analyzed for radioactivity within 24 hours.

ACTION 48 — With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, immediately suspend containment purging of radioactive effluents via this pathway.

ACTION 49 — (Not Used)

ACTION 50 — (Not Used)

ACTION 51 — With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via the affected pathway may continue provided samples are continuously collected with auxiliary sampling equipment.

# HL-15R SRO NRC EXAM

92. G2.1.35 001/3/N/A/FHS RESPONSIBILITIES/MEM-3.9/B-VOGTLE 09/HL-15R NRC/SRO/TNT/DS

Which of the following correctly describes the Refueling SRO responsibilities per the VEGP Technical Requirements Manual (TRM)?

The Refueling SRO must observe and directly supervise all...

A. fuel shuffle activities inside the FHB. Approve FME zone 2 entries while refueling is in progress.

B. all core alteration activities. Approve FME zone 2 entries while refueling is in progress.

C. fuel shuffle activities inside the FHB. No other concurrent duties are allowed.

D. ✓ core alteration activities. No other concurrent duties are allowed.

# HL-15R SRO NRC EXAM

**K/A**

**G2.1.35 Conduct of Operations.**

**Knowledge of the fuel handling responsiblities of SRO's.**

**K/A MATCH ANALYSIS**

The question requires the student to recall the specific duties and responsibilities of the Fuel Handling Supervisor in accordance with the Technical Requirements Manual matching the topic of the K/A.

This question is written for an SRO since it requires knowledge of the refueling floor SRO per the published guidance for SRO only questions.

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. Plausible since this choice is for fuel handling activities in the FHB. The TR requires the SRO to directly observe core alterations which occurs in the CNMT building only. The refueling SRO can restrict FME zone 2 activities if desired, but entry does not require refueling SRO permission per the TRM.

B. Incorrect. All CORE ALTERATIONS shall be observed and directly supervised by either a licensed Senior Operator or licensed Senior Operator Limited to Fuel Handling is correct. However, the SRO is not allowed to have any other duties during core alterations. The refueling SRO can restrict FME zone 2 activities if desired, but entry does not require refueling SRO permission per the TRM.

C. Incorrect. Plausible since the refueling SRO must directly observe refueling (core alterations). This choice is for fuel handling activities in the fuel handling building.

D. Correct. All CORE ALTERATIONS shall be observed and directly supervised by either a licensed Senior Operator or licensed Senior Operator Limited to Fuel Handling who has no other concurrent responsibilities during this operation.

**REFERENCES**

TR 15.1.1

**VEGP learning objectives:**

LO-PP-25101-20:

Describe the restrictions placed on the Fuel Handling Supervisor per the Technical Requirement 15.1.1.

1. G2.1.35 001

Which of the following correctly describes the Refueling SRO responsibilities per the VEGP Technical Requirements Manual (TRM)?

A. Must observe and directly supervise all fuel shuffle activities inside the FHB. Approves FME zone 2 entries while refueling is in progress.

B. Must observe and directly supervise all core alteration activities. No other concurrent duties are allowed.

C. Must observe and directly supervise all core alteration activities. Approves FME zone 2 entries while refueling is in progress.

D. Must observe and directly supervise all fuel shuffle activities inside the FHB. No other concurrent duties are allowed.

VOGTLE BANK

15.0 Administrative Controls

TR 15.1 Unit Staff

| | |
|---|---|
| TR 15.1.1 | All CORE ALTERATIONS shall be observed and directly supervised by either a licensed Senior Operator or licensed Senior Operator Limited to Fuel Handling who has no other concurrent responsibilities during this operation. |
| TR 15.1.2 | Each on-duty shift shall be composed of at least the minimum shift crew composition shown in Table 15.1.2-1. |

# HL-15R SRO NRC EXAM

93. G2.1.40 001/3/N/A/RF ADMIN REQUIREMENT/C/A-3.9/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

Core reload is in progress
A once burned fuel assembly is in transent with the refueling machine

Current conditions:

A shift in CNMT HVAC drastically increased the noise level
SRNI count rate is inaudible on the refueling machine

The Fuel Handlng Supervisor should...

A. verify that the control room can still hear the audible count rate. If the control room does **not** hear audible counts, then he should suspend all operations involving core alterations.

   The FHS may direct that the assembly be placed into the reactor core.

B. assign a designee to monitor the audible count rate from containment. If the designee **cannot** hear an audible count rate then he should suspend all operations involving core alterations.

   The FHS may direct that the assembly be placed into the reactor core.

C. verify that the control room can still hear the audible count rate. If the control room does **not** hear audible counts, then he should suspend all operations involving core alterations.

   The FHS may direct that the assembly be placed in the containment upender.

D. assign a designee to monitor the audible count rate from containment. If the designee **cannot** hear an audible count rate then he should suspend all operations involving core alterations.

   The FHS may direct that the assembly be placed in the containment upender.

**K/A**

**G2.1.40 Conduct of Operations.**

**Knowledge of refueling administrative requirements.**

# HL-15R SRO NRC EXAM

## K/A MATCH ANALYSIS

The question presents a scenario where the Fuel Handling Supervisor can no longer hear the audible count rate in containment after a shift in HVAC causing an increase in noise levels. Ability to answer this question requires the knowledge of the administrative requirements in procedures 93300-C, "Conduct of Refueling Operations" and the Technical Requirements Manual " TR 13.9.6 which mathces the K/A topic.

This question also requires specific knowledge of Fuel Handling Supervisor duties per 93300-C and the specific actions of TR 13.9.6 making this an SRO only question.

## ANSWER / DISTRACTOR ANALYSIS

A. Incorrect. If the control room cannot hear the audible count rate you must also suspend core alterations making this choice plausible. The issue here is weather you need to hear it from containment. Also, placing fuel assembly in a safe location (the core) is not allowed since it would be adding positive reactivity.

B. Incorrect. Per 93300-C, step 4.2.12 in times of high noise levels in containment during CORE ALTERATIONS, the Fuel Handling Supervisor may assign a designee to monitor the Audible Count Rate. TR 13.9.6 requires suspension of core alterations and positive reactivity changes, which precludes placing the fuel assembly in the core as a safe location.

C. Incorrect. If the control room cannot hear the audible count rate you must also suspend core alterations making this choice plausible. The issue here is weather you need to hear it from containment. Also, placing fuel assembly in a safe location (the upender) is allowed since it would NOT be adding positive reactivity.

D. Correct. Per 93300-C, step 4.2.12 in times of high noise levels in containment during CORE ALTERATIONS, the Fuel Handling Supervisor may assign a designee to monitor the Audible Count Rate. TR 13.9.6 requires suspension of core alterations and positive reactivity changes, which precludes placing the fuel assembly in the core as a safe location.

## REFERENCES

93300-C, "Conduct of Refueling Operations" step 4.2.12

TR 13.9.6 Source Range Monitor Audible Indication

## VEGP learning objectives:

LO-PP-25101-24:

Describe the responsibilities that each of the following positions have during refueling operations:

b. Fuel Handling Supervisor
c. Unit Shift Superintendent
d. Reactor Operator
e. Shift Superintendent
f. Reactor Engineer

LO-LP-39213-06:

Given the TRM, determine for a specific set of plant conditions, equipment availability, and operational mode:

a. Whether any TR of section 13.9 has been exceeded.

b. The required actions for all section 13.9 TRs.

13.9 Refueling Operations

TR 13.9.6 Source Range Monitor Audible Indication

TR 13.9.6 At least one source range monitor shall provide audible indication in the containment and control room.

APPLICABILITY: MODE 6

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| A. Required source range monitor audible indication inoperable or not operating. | A.1 ----------NOTE---------- Makeup to the reactor coolant system (RCS) is allowed, provided the makeup source has been verified to be greater than the required refueling boron concentration (reference Technical Specifications Paragraph 3.9.1) ---------- Suspend all operations involving CORE ALTERATIONS or positive reactivity changes. | Immediately |

TECHNICAL REQUIREMENT SURVEILLANCES

| | SURVEILLANCE | FREQUENCY |
|---|---|---|
| TRS 13.9.6.1 | Perform CHANNEL CHECK | 12 hours |
| TRS 13.9.6.2 | ---------- NOTE ---------- Neutron detectors are excluded from CHANNEL CALIBRATION. ---------- Perform CHANNEL CALIBRATION | 18 months |

4.1.6 Ensures that new fuel assemblies that are to be loaded into the reactor have been properly processed and inspected and are available for loading prior to the beginning of the refueling.

4.1.7 May perform as second person who verifies correct manipulation of fuel assemblies and inserts.

**4.2 FUEL HANDLING SUPERVISOR**

The qualifications, responsibilities, and authority of this individual are as follows:

4.2.1 The Fuel Handling Supervisor shall have a current Senior Reactor Operator's (SRO) license or an SRO license limited to fuel handling.

4.2.2 The Fuel Handling Supervisor should be trained in proper fuel handling techniques at VEGP.

4.2.3 The Fuel Handling Supervisor should be familiar with the procedures listed in Step 5.7.

4.2.4 Ensures that approved procedures are adhered to by all refueling crew personnel.

4.2.5 Ensures that all required check-off and prerequisites are completed prior to commencing a specific fuel handling evolution.

4.2.6 Ensures that appropriate entries and sign-offs are made on the Fuel Handling Data Sheets.

4.2.7 Ensures Fuel Handling Data Sheet compliance in containment.

4.2.8 Contacts the Reactor Engineer for approval of any deviations from the approved Fuel Handling Data Sheets per 93641-C.

4.2.9 Keeps himself informed of the systems that affect fuel handling and ensures that all evolutions in progress are compatible with the refueling program.

4.2.10 May perform as second person who verifies correct manipulation of fuel assemblies and inserts.

4.2.11 The Fuel Handling Supervisor ensures that the Reactor Engineer is notified of all assemblies that are difficult to seat and of the observations made from the binocular visual inspection.

4.2.12 In times of high noise levels in containment during CORE ALTERATIONS, the Fuel Handling Supervisor may assign a designee to monitor the Audible Count Rate.

# HL-15R SRO NRC EXAM

94. G2.2.19 002/3/N/A/MAINT WO REQUIRMENTS/C/A-3.4/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

Unit 2 is at 100% power
The regulating transformer associated with 2AY1A is danger tagged for maintenance
The transformer has been out of service for 2 hours

Current conditions:

2AY1A is de-energized due to inverter 2AD1I1 fault
The time to repair the inverter is estimated at 2-4 days
The expected return to service time for the transformer is 8 hours

The SS should enter LCO _____ due to this failure, and the SM should...

A. 3.8.9

upgrade the work order for the regulated transformer to an emergency work order.

B. 3.0.3

upgrade the work order for the regulated transformer to an emergency work order.

C. 3.8.9

inform the work planners that the regulated transformer needs to be restored in 6 hours.

D. 3.0.3

inform the work planners that the regulated transformer needs to be restored in 6 hours.

**K/A**

**G2.2.19 Equipment Control.**

**Knowledge of maintenance work order requirements.**

**K/A MATCH ANALYSIS**

The question presents a scenario where 2 train A 1E motor control centers become inoperable. The student must determine the correct LCO action to apply and also s/he

must determine the appropriate action related to these failures under the work order program 00350-C, "Work Request Program" which matches the K/A topic.

This question requires the knowledge of actions required by the Shift Manager, an SRO licensed shift position, under procedure 00350-C, and application of the correct LCO action meeting the requirements of an SRO only question.

**ANSWER / DISTRACTOR ANALYSIS**

A. Correct. LCO 3.8.9 condition B is entered, which requires vital bus 2AY1A to be re-energized in the next 2 hours. Once condition corrective action time is exceeded, condition D is entered, requiring the unit to bw placed in mode 3 in the next 6 hours. Since bus 2AY1A's associated regulation transformer is also danger tagged for maintenance, the SM will need to upgrade the work order to emergency work to respond to a shutdown LCO of $\leq$ 7 hours.

B. Incorrect. Plausible since two 1E electrical components that power vital busses are now out of service. Since these components both feed the same vital bus, LCO 3.0.3 enter is not required because a loss of safety function has not occurred making this choice incorrect.

C. Incorrect. 3.8.9 is the correct LCO to enter making this choice plausible. The student must realize the time left to re-energize the vital bus is less than 7 hours. Not upgrading the work order for the regulating transformer would not meet procedure 00350-C step 2.8 requirements making this choice incorrect.

D. Incorrect. Plausible since two 1E electrical components that power vital busses are now out of service. Since these components both feed the same vital bus, LCO 3.0.3 enter is not required because a loss of safety function has not occurred making this choice incorrect.

**REFERENCES**

00350-C, "Work Request Program" steps 2.8 and 3.11.1.1

LCO 3.8.9 "Distribution Systems - Operating"

**VEGP learning objectives:**

LO-LP-63350-04:

Describe the requirements for emergency maintenance and when emergency maintenance can be performed.

LO-LP-39212-02:

Given a set of Tech Specs and the bases, determine for a specific set of plant

conditions, equipment availability, and operational mode:

a. Whether any Tech Spec LCOs of section 3.8 are exceeded.

b. The required actions for all section 3.8 LCOs.

LO-LP-39202-03:

Demonstrate the application of logical connectors, completion times, and completion time extensions.

LO-LP-39217-10:

Given a set of plant conditions, equipment availability, and operational mode, determine if a loss of safety function exists.

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems – Operating

LCO 3.8.9 The required AC, DC, and AC vital bus electrical power distribution subsystems shall be OPERABLE.

----------NOTE----------
The redundant emergency buses of 4160 V switchgear 1/2AAO2 and 1/2BAO3 may be manually connected within the unit by tie breakers in order to allow transfer of preferred offsite power sources provided SR 3.8.1.1 is successfully performed within 12 hours prior to the interconnection. The interconnection shall be implemented without adversely impacting the ability to simultaneously sequence both trains of LOCA loads.
---

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| A. One or more AC electrical power distribution subsystems inoperable. | A.1 Restore AC electrical power distribution subsystems to OPERABLE status. | 8 hours<br><br>AND<br><br>16 hours from discovery of failure to meet LCO |
| B. One or more AC vital bus electrical power distribution subsystems inoperable. | B.1 Restore AC vital bus electrical power distribution subsystems to OPERABLE status. | 2 hours<br><br>AND<br><br>16 hours from discovery of failure to meet LCO |

(continued)

ACTIONS (continued)

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| C. One or more DC electrical power distribution subsystems inoperable. | C.1 Restore DC electrical power distribution subsystems to OPERABLE status. | 2 hours<br>AND<br>16 hours from discovery of failure to meet LCO |
| D. Required Action and associated Completion Time not met. | D.1 Be in MODE 3.<br>AND<br>D.2 Be in MODE 5. | 6 hours<br><br>36 hours |
| E. Two or more electrical power distribution subsystems inoperable that result in a loss of function. | E.1 Enter LCO 3.0.3. | Immediately |

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE | | FREQUENCY |
|---|---|---|
| SR 3.8.9.1 | Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution subsystems. | 7 days |

**2.5 CONTRACTOR MAINTENANCE**

Maintenance performed on the plant by personnel selected according to Procedure NMP-GM-010, "Supplemental Personnel Control."

**2.6 CORRECTIVE MAINTENANCE**

Work tasks performed on systems or components to resolve items identified through preventive or predictive maintenance, surveillance, inspections, and other methods.

**2.7 DEDICATION**

The point in time after which a Commercial Grade Item is accepted for a safety-related application and deficiency reporting becomes the responsibility of Plant Vogtle.

**2.8 EMERGENCY MAINTENANCE**

Any immediate mandatory maintenance or repair activity that is necessary to maintain safe operation or shutdown capabilities or to respond to a shutdown LCO of less than or equal to 7 hours. (1987214038)

**2.9 FIRE PROTECTION PROGRAM COMPONENT**

Those plant components required by VEGP FSAR 9.5.1 to be operational in order to maintain the viability of the Fire Protection Program.

**2.10 FUNCTIONAL TESTS**

A test , inspection or check which provides verification that a corrective or preventive maintenance activity corrected an original component deficiency, did not introduce a new deficiency, and provides a high degree of confidence that a subsequent return to service Operability Test, if required, can be performed satisfactorily. Performance of those steps necessary to determine that structures, systems, and components function in accordance with predetermined specifications. Functional tests may include: Surveillance tests, ISI tests, ASME Section XI requirements, and inspections in accordance with Procedure 29401-C, "Maintenance Work Order Functional Tests." (1985205452) (1985205455) (1985205456)

## 3.11 OPERATIONS DEPARTMENT SHIFT SUPERVISION

3.11.1 Shift Supervision ensures that the Maintenance Program is supported as follows:

3.11.1.1 Shift Manager (SM)

a. Make determinations of emergency maintenance.

b. Make notifications for reportable plant conditions.

c. Provides input regarding the need date for maintenance activities.

3.11.1.2 Shift Supervisor (SS)

a. When contacted by the Work Week Coordinator, offers him a preliminary assessment of the following:

(1) Effect on plant operations or identified plant problems.

(2) Whether or not a clearance is needed.

(3) Whether or not an LCO should be applied.

(4) Post maintenance testing requirements.

b. Provides authorization to start work.

c. Determine the scope of troubleshooting activities and appropriate controls.

3.11.1.3 Shift Support Supervisor (SSS)

The SSS may perform the actions identified for the SS in accordance with Procedure 10000-C, "Conduct of Operations."

3.11.2 Off Shift Supervision ensure that the Maintenance Program is supported as follows:

3.11.2.1 Operations Superintendents should supply WO evaluation data to Work Week Coordinator on request.

3.11.2.2 Operations Department Representatives, while performing Ops reviews on work activities, may designate which activities will require a pre-job brief, especially an interdepartmental one. The work activities will then be flagged, and the information will then be made available to the shift crews via the Work Activity schedule.

# HL-15R SRO NRC EXAM

95. G2.2.35 001/3/N/A/TECH SPEC MODES/C/A-4.5/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

RCS Tave is 554 F
TAVG/TREF DEVIATION alarm is lit
The UO is recording RCS loop Tave's every 15 minutes per 12003-C "Reactor Startup"
The OATC has pulled control bank A rods to 50 steps

Current conditions:

The OATC has pulled rods to 100 steps on control bank C
The OATC is waiting for the count rate to stabilize while SUR decreases to 0

TAVG/TREF DEVIATION alarm is still lit
The UO realizes his last set of RCS loop Tave readings were taken 45 minutes ago

In accordance with Technical Specifications the SS should direct the...

A. OATC to insert the control bank rods within the next 15 minutes due to the requirement to declare LCO 3.4.2, "RCS Minimum Temperature for Criticality" not met.

B. OATC to insert the control bank rods within the next 30 minutes due to the requirement to declare LCO 3.4.2, "RCS Minimum Temperature for Criticality" not met.

C. UO to immediately record all four RCS loop Tave's and have the OATC continue to wait for count rate stabilization.

D. UO to immediately record all four RCS loop Tave's and if any RCS loop Tave is less than 551 F have the OATC to pull rods to restore Tave in the next 30 minutes.

**K/A**

**G2.2.35 Equipment Control.**

**Ability to determine Technical Specification Mode of Operation.**

**K/A MATCH ANALYSIS**

The question presents a scenario for a reactor start up with the UO recording RCS loop Tave's per SR 3.4.2.1 requirements. To answer this question correctly, the student must determine the correct mode and status of the reactor which matches the K/A for this question. The question requires detailed knowledge of the techncial specification for minimum temperature for criticality.

This question also involves the application of required actions and suveillance requirements IAW rules of application requirements of techncial specifications making this an SRO question per the SRO only question guidance document.

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. This listed action is correct if the reactor were critical and RCS loop Tave's have not been recorded in the next 30 minutes per SR 3.0.3. SR 3.4.2.1 is required to be perfromed every 30 minutes. The controlling procedure requires recording the temperatures every 15 minutes.

B. Incorrect. This action would be correct if Tave was in fact less than 551 F. The crew has 30 minutes to perform SR 3.4.2.1 prior to declaring LCO 3.4.2 not met.

C. Correct. Per SR 3.0.3: If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Frequency, whichever is greater. This delay period is permitted to allow performance of the Surveillance. A risk evaluation shall be performed for any Surveillance delayed greater than 24 hours and the risk impact shall be managed.

D. Incorrect. The first part of this choice is the correct action to take. However, pulling rods and possibly taking the reactor critical to restore Tave greater than 551 F is incorrect. If the reactor is critical then LCO 3.4.2 would meet the mode applicability requirements and the listed action to shutdown the reactor within 30 minutes would apply.

**REFERENCES**

Technical Specifications Generic SR - SR 3.0.3
LCO 3.4.2 "RCS Minimum Temperature for Criticality"
UOP 12003-C, "Reactor Startup (Mode 3 to Mode 2)" step 4.2.5

**VEGP learning objectives:**

LO-LP-61201-15:

State the parameter and frequency recorded to meet the minimum temperature for criticality technical specification

LO-LP-39208-02:

Given a set of Tech Specs and the bases, determine for a specific set of plant conditions, equipment availability, and operational mode:

a. Whether any Tech Spec LCOs of section 3.4 are exceeded.

b. The required actions for all section 3.4 LCOs.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.2 RCS Minimum Temperature for Criticality

LCO 3.4.2 Each RCS loop average temperature ($T_{avg}$) shall be ≥ 551°F.

APPLICABILITY: MODE 1,
MODE 2 with $k_{eff}$ ≥ 1.0.

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| A. $T_{avg}$ in one or more RCS loops not within limit. | A.1 Be in MODE 3. | 30 minutes |

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE | FREQUENCY |
|---|---|
| SR 3.4.2.1 Verify RCS $T_{avg}$ in each loop ≥ 551°F. | Once within 30 minutes and every 30 minutes thereafter when the $T_{avg}$ - $T_{ref}$ deviation alarm is not reset and any RCS loop $T_{avg}$ < 561°F |

## 3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.1

SRs shall be met during the MODES or other specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO except as provided in SR 3.0.3. Surveillances do not have to be performed on inoperable equipment or variables outside specified limits.

SR 3.0.2

The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met.

For Frequencies specified as "once," the above interval extension does not apply.

If a Completion Time requires periodic performance on a "once per . . ." basis, the above Frequency extension applies to each performance after the initial performance.

Exceptions to this Specification are stated in the individual Specifications.

SR 3.0.3

If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Frequency, whichever is greater. This delay period is permitted to allow performance of the Surveillance. A risk evaluation shall be performed for any Surveillance delayed greater than 24 hours and the risk impact shall be managed.

If the Surveillance is not performed within the delay period, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.

(continued)

## 3.0 SR APPLICABILITY

SR 3.0.3 (continued)

When the Surveillance is performed within the delay period and the Surveillance is not met, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.

SR 3.0.4

Entry into a MODE or other specified condition in the Applicability of an LCO shall only be made when the LCO's Surveillances have been met within their specified Frequency, except as provided by SR 3.0.3. When an LCO is not met due to Surveillances not having been met, entry into a MODE or other specified condition in the Applicability shall only be made in accordance with LCO 3.0.4.

This provision shall not prevent entry into MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

INITIALS

NOTE

Step 4.2.5 is not applicable if Tavg and Power recording is being performed IAW Step 4.2.4

4.2.5 Using Data Sheet 2, **commence** recording Tavg at 15-minute intervals and verify Tavg remains greater than or equal to 551°F. (TS 3.4.2) (1984300206, 1996232496) _____*

4.2.6 **Verify** the CONTROL ROOM HI FLUX LEVEL AT SHUTDOWN alarm (HFASA) for both SR NI Channels are blocked. (TS 3.3.8 Note) (1996233053)

a. SR Channel N31 blocked _____

_____ IV

SR Channel N32 blocked _____

_____ IV

b. **Verify** HFASA alarm status:

(1) SOURCE RNG HI FLUX LEVEL AT SHUTDOWN (ALB10C01) reset. _____

(2) SOURCE RNG HI SHUTDOWN FLUX ALARM BLOCKED (ALB10B01) illuminated. _____

4.2.7 **Verify** Rod Bank Selector Switch in MANUAL. _____

_____ IV

96. G2.3.05 001/3/N/A/USE OF RAD MON SYS/C/A-2.9/NEW/HL-15R NRC/SRO/TNT/DS

Given the following:

Reactor trip and SI on low PRZR pressure
RCS pressure is now 23 psig
CNMT pressure is now 23 psig
CNMT radiation monitors RE-005/006 read 5.3 E+5 mR/hr
Plant Vent Radiogas Effluent monitor RE-12444C has read 1.2 E+3 µCi/cc since the event initiation 10 minutes ago.

Determine the appropriate emergency classification based on the conditions listed above.

**REFERENCES PROVIDED**

A. General, PAR's required on declaration message.

B. Site Area, PARs required on declaration message.

C. General, PARs NOT required on declaration message.

D. Site Area, PARs NOT required on declaration message.

**K/A**

**G2.3.05 Radiation Control.**

**Ability to use radiation monitoring systems.**

**K/A MATCH ANALYSIS**

The question requires the student to properly interpret radiation monitor readings to determine the appropriate emergency classification per procedure 91001-C.

The question matches the use of the radaition monitoring systems to properly interpret data for an emergency classification.

This question is also written for an SRO since it requires knowledge of which radiation monitors are used for emergency classification and if protective action recommendations are required for an emergency declaration.

**ANSWER / DISTRACTOR ANALYSIS**

A. Correct. With the plant vent radiation monitor RE-12444 reading > 7.0 E+2 µCi/cc the general emergency threshold has been reached for both cold and hot conditions listed in the radiological effluents columns of figures 4 & 5 of 91001-C. The protective

91002-C, "Emegency Notifications".

B. Incorrect. Site Area emergency is plausible since the 15 minute duration specified for 12444 readings has not been exceeded while the RCS and CNMT barriers have both been lost per evaluations on figures 2, and 3 of 91001-C. Protective action recommendations are also plausible since a radiaactive release is occurring.

C. Incorrect. The emergency classification is correct based on the RE-12444 radiation monitor readings. Waiting for PARs based on dose assessment results is incorrect based on 91002-C, Checklist 2 notes.

D. Incorrect. Site Area emergency is plausible since the 15 minute duration specified for 12444 readings has not been exceeded while the RCS and CNMT barriers have both been lost per evaluations on figures 2, and 3 of 91001-C. Not issuing PARs for a Site Area emergency classification while waiting for does asessment is very plausible action. Procedures do not require any PARs on the initial declaration for a Site Area emergency.

**REFERENCES**

91001-C, "Emergency Classification and Implementing Instructions"
Figures 1 through 4. **(PROVIDED TO THE STUDENTS)**

91002-C. " Emergency Notifications" Checklist 2 page 1.

**VEGP learning objectives:**

LO-LP-40101-13:

Given an emergency scenario, and the procedure, classify the emergency (SRO only).

LO-LP-40101-36:

Summarize the evaluation and implementation of Protective Action Recommendations as specified in the EPIP's (NMP-EP-109). (SRO only)

REFERENCE USE

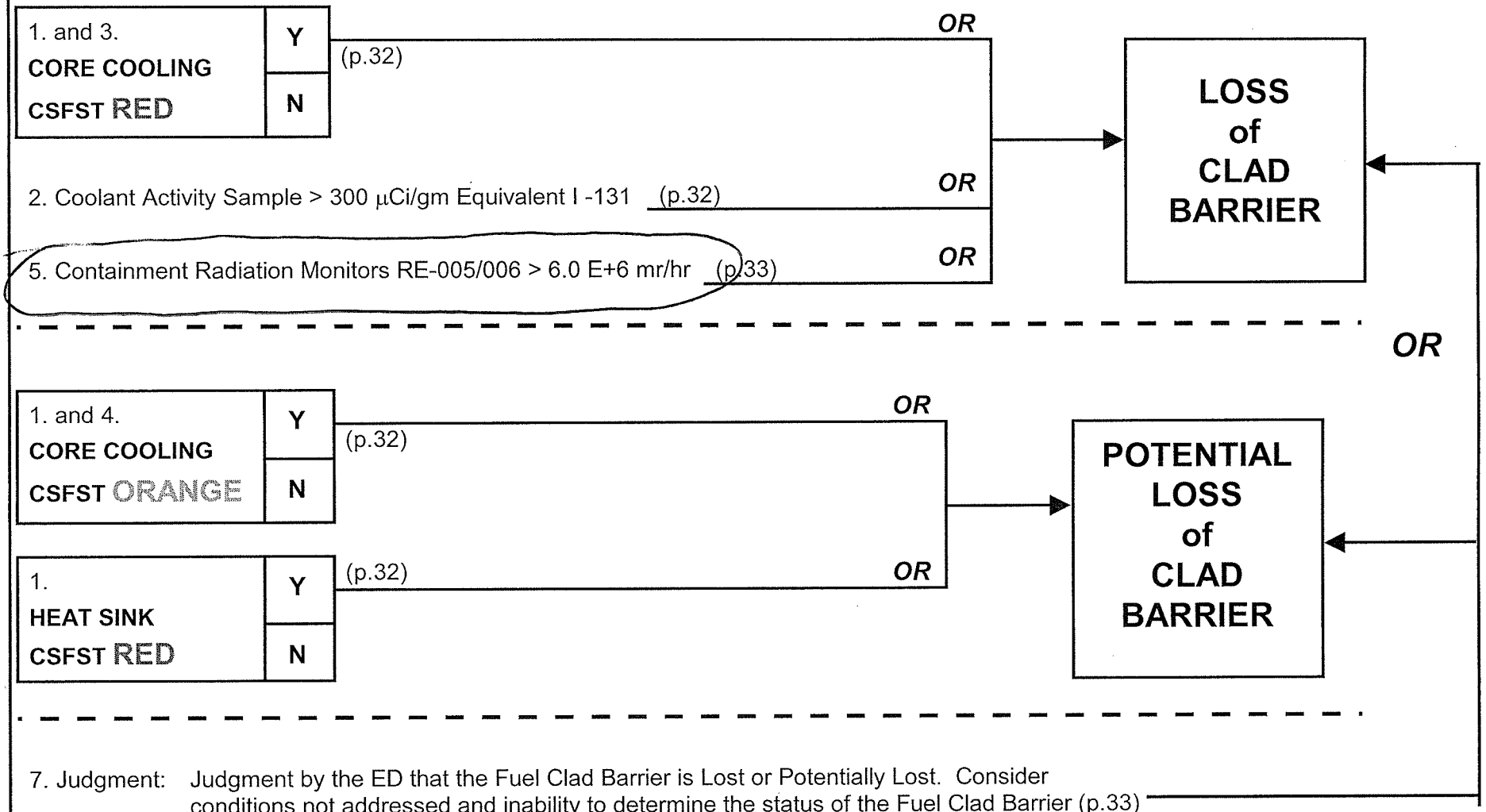



**FIGURE 1 – FUEL CLADDING INTEGRITY** ***(Modes 1, 2, 3 and 4 only)***

REFERENCE USE

2. RCS Leak in progress ***AND*** RCS Subcooling is Less Than 24 °F [38 ° F ADVERSE] (p.33) ***OR***

3. SGTR Resulting in an SI Actuation (p.34) ***OR***

4. Containment Radiation Monitors RE-005/006 > 2.0 E+4 mr/hr (p.34) ***OR***

→ **LOSS of RCS BARRIER**

***OR***

| | | |
|---|---|---|
| 1. **HEAT SINK** **CSFST RED** | Y | ***OR*** (p. 33) |
| | N | |

| | | |
|---|---|---|
| 1. **RCS INTEGRITY** **CSFST RED** | Y | ***OR*** (p. 33) |
| | N | |

→ **POTENTIAL LOSS of RCS BARRIER**

2. NON-Isolable RCS leak (including SG tube leakage) GREATER THAN the Capacity of One Charging Pump in the normal charging mode (p.34) ***OR***

5. Unexplained level rise in any of the following: containment sump, Reactor Coolant Drain Tank (RCDT), Waste Holdup Tank (WHT) (p.34)

6. Judgment: Judgment by the ED that the RCS Barrier is Lost or Potentially Lost. Consider conditions not addressed and the inability to determine the status of the RCS Barrier (p. 34)

## FIGURE 2 – REACTOR COOLANT SYSTEM (RCS) INTEGRITY *(Modes 1, 2, 3 and 4 only)*

REFERENCE USE

2. Rapid Unexplained Containment Pressure Decrease Following Initial Pressure Increase (p.35) ***OR***

2. Intersystem LOCA indicated by Containment Pressure or Sump Level Response Not Consistent With a Loss of Primary or Secondary Coolant (p. 35) ***OR***

4. Ruptured SG is also Faulted Outside of Containment (p. 36) ***OR***

4. Primary-to-Secondary Leakage > 10 gpm ***AND*** a Non-Isolable Steam Release of Contaminated Secondary Coolant is Occurring to the Environment (p. 36) ***OR***

5. Containment Isolation Valve(s) or Damper(s) are NOT Closed Resulting in a Direct Pathway to the Environment After Containment Isolation is Required (p. 37) ***OR***

7. Pathway to the environment exists based on VALID RE-2562C, RE-12444C, ***OR*** RE-12442C Alarms. (p.37)

→ **LOSS of CNTMT BARRIER**

***OR***

| | |
|---|---|
| 1. **CONTAINMENT CSFST RED** | Y / N (p. 35) |

***OR***

2. CTMT CSFST ORANGE ***AND*** less than the following minimum operable equipment: four CTMT fan coolers ***AND*** one train of CTMT spray (p.35) ***OR***

3. CORE COOLING CSFST RED ***OR*** ORANGE > 15 minutes ***AND*** RVLS FULL RANGE LEVEL <62% (p.37) ***OR***

2. Containment Hydrogen Concentration > 6% (p.35) ***OR***

2. Containment Pressure > 43 psig (p.35) ***OR***

6. Containment Radiation Monitors RE-005/006 > 2.4 E+8 mr/hr (p.37) ***OR***

→ **POTENTIAL LOSS of CNTMT BARRIER**

8. Judgment: Judgment by the ED that the CNTMT Barrier is Lost or Potentially Lost. Consider conditions not addressed and inability to determine the status of the CTMT Barrier (p. 37)

## FIGURE 3 – CONTAINMENT INTEGRITY *(Modes 1, 2, 3 and 4 only)*

| | EFFLUENTS | RAD LEVELS |
|---|---|---|
| GENERAL EMERGENCY | **RG1- Offsite Dose Resulting from an Actual or Imminent Release of Gaseous Radioactivity Exceeds 1000 mR TEDE OR 5000 mR Thyroid CDE for the Actual or Projected Duration of the Release Using Actual Meteorology (pg. 28)** | |
| | See Notes 1 and 2 → | *Note 1: If dose assessment results are available at the time of declaration, the classification should be based on Threshold Value #2 instead of Threshold Value #1.While necessary declarations should not be delayed awaiting results, the dose assessment should be initiated / completed in order to determine if the classification should be subsequently escalated.* |
| | 1. ~~VALID~~ reading on any of the following radiation monitors that exceeds OR expected to exceed the reading shown for 15 minutes OR longer:<br>• RE-12839 $1.5 \times 10^{5}$ µCi/cc<br>• RE-12444 $7.0 \times 10^{2}$ µCi/cc<br>• RE-13119 thru 13122 $3.1 \times 10^{5}$ µCi/cc | *Note 2: The Emergency Director should not wait until 15 minutes has elapsed, but should declare the event as soon as it is determined that the release duration has or will likely exceed 15 minutes.* |
| | **OR** | |
| | 2. Dose assessment using actual meteorology indicates doses greater than 1000 mR TEDE OR 5000 mR thyroid CDE at OR beyond the site boundary. | |
| | **OR** | |
| | 3. Field survey results indicate closed window dose rates exceeding 1000 mR/hr expected to continue for more than one hour; OR analyses of field survey samples indicate thyroid CDE of 5000 mR for one hour of inhalation, at OR beyond the site boundary. | |

91001-C
FIGURE 4

Reference Use

## CHECKLIST 2

## EMERGENCY DIRECTOR INSTRUCTIONS FOR ENN FORM IMPLEMENTATION

(1985304606) (1985304832)

### INITIAL ACTIONS

NOTES

- The ENN Communicator should establish communications with offsite authorities before the ED completes the message form.
- Emergency Recall activation will be performed by Control Room ENN Communicators only.
- A follow-up message containing pertinent radiological release information (including lines 14 through 16) should be started promptly after an initial notification that indicates a release is occurring or has been completed.

1. Direct the ENN Communicator to activate the Emergency Recall System and then establish communications and complete roll call in accordance with Checklist 4. (1985304621) ____
2. Complete or direct the completion of the Emergency Notification Form Checklist 2, except portions of items 1 (message #), items 2 (Notification time, date and authentication #), items 3 (Confirmation Phone #) and items 17 (notified by) which will be completed by the communicator. ____

a. Complete items 1, 2 and 3 as appropriate. ____

b. Item #4, select appropriate Emergency Classification, part A, B, C, or D, complete including the EAL# and provide a bases of event description of the emergency that supports the classification, that is, how the associated EAL threshold is exceeded per Figures 1, 2, 3, 4 or 5 of procedure 91001-C. ____

NOTES

- "PROTECTIVE ACTIONS RECOMMENDATIONS", are required for ALL General Emergency declarations.
- Refer to procedure NMP-EP-109 for PROTECTIVE ACTIONS RECOMMENDATIONS.

c. Item #5, parts B, C, D, and E should be completed as delineated in NMP-EP-109. If the recommended protective actions change after the initial general declaration is transmitted, a follow-up transmission is required to be initiated with in 15 minutes. (1985304591) (1985304593) (1985304619) (1985304692) (1985304693) ____

97. G2.4.27 001/3/N/A/FIRE IN PLANT PROCS/C/A-3.9/NEW/HL-15R NRC/SRO/TNT/DS

A fire alarm is annunciated on the Fire Alarm Computer in the control room. After the UO acknowledges the alarm and announces the location of the detector, the SS/SM should...

A. dispatch a Responder with a portable radio to investigate, sound the Fire Alarm (Siren) and make an announcement over the PA system to assemble the fire brigade.

   Immediately contact the Burke County Emergency Management Agency.

B. dispatch a Responder to investigate, sound the Fire Alarm (Warble) and make an announcement over the PA system to assemble the fire brigade.

   Immediately contact the Burke County Emergency Management Agency only if the fire is within a vital area.

C. dispatch a Responder with a portable radio to investigate. If a fire is confirmed, sound the Fire Alarm (Siren) and make an announcement over the PA system to assemble the fire brigade.

   Immediately contact the Burke County Emergency Management Agency.

D. dispatch a Responder to investigate. If a fire is confirmed, sound the Fire Alarm (Warble) and make an announcement over the PA system to assemble the fire brigade.

   Immediately contact the Burke County Emergency Management Agency only if the fire is within a vital area.

# HL-15R SRO NRC EXAM

**K/A**

**G2.4.27 Emergency Procedures / Plans.**

**Knowledge of "fire in the plant" procedures.**

**K/A MATCH ANALYSIS**

The question presents a scenario where the student must correcctly identify the actions the SM/SS must take or direct upon receipt of a fire alarm matching the K/A topic.

This question is written for SRO's since it focuses soley on the actions the SM/SS must either take or direct control room staff to perform in response to a fire alarm per procedure 92005-C, "Fire Response Procedure".

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. Dispatching a responder with a portable radio is the correct action to take in response to a FAC fire alarm per 93005-C step 3.5.1. Sounding the fire alarm and making the PA announcement occur only **after** the fire is confirmed by the responder. By procedure step 3.8.1 the Burke County EMA is immediately contacted.

B. Incorrect. The responder should be dispatched with a portable radio. Sounding the fire alarm and making the PA announcement occur only **after** the fire is confirmed by the responder. By procedure step 3.8.1 the Burke County EMA is immediately contacted for any fire.

C. Correct. Step 3.5.1 states that the applicable SM/SS should dispatch a responder to investigate. The note preceeding this step states that personnel dispatched should carry a portable radio for communication with the Control Room. Step 3.7.1 states that when the presence of a fire is confirmed the SM/SS shall direct Control Room personnel to sound the fire alarm (siren) on the plant PA system and make an announcement to assemble the fire brigade. Step 3.8.1 states immediate notification of Burke County Emergency Management Agency shall be performed by the Shift Supervisor or Shift Manager.

D. Incorrect. All actions of this choice are correct except for the fire alarm. The correct alarm to sound is the siren.

**REFERENCES**

92005-C, "Fire Response Procedure" steps 3.5.1, 3.7.1, and 3.8.1

**VEGP learning objectives:**

LO-TA-40008:

Assemble and Dispatch the Fire Brigade using 92005-C (SRO ONLY)

## 3.5 OPERATIONS PERSONNEL

NOTES

- Personnel dispatched should carry a portable radio for communication with the Control Room.
- The SM/SS may elect not to dispatch a Responder if there is reliable information available confirming the presence of a fire.

3.5.1 Upon notification via phone report or receipt of an alarm in the Control Room or C&T, the applicable SM/SS should dispatch a Responder to investigate.

### 3.5.2 Notification VIA C&T or Control Room Alarm

If notification was via C&T or Control Room alarm at the Fire Alarm Computer, the SS will dispatch a responder to:

a. Proceed to the remote alarm panel or the affected zone to determine the location of the alarm and notify the Control Room to confirm the fire.

b. If the alarm is in the protected area, the Responder will then proceed to the location of the activating device and inspect for and verify the presence of a fire and notify the Control Room to confirm the fire.

### 3.5.3 Notification VIA Phone

a. If notification was via phone report, verification is not necessary.

b. If verification is performed, the results of the inspection for the presence of fire shall immediately be communicated to the Control Room.

**Reference Use**

## 3.7 ANNOUNCEMENTS

### 3.7.1 Fire Alarm Announcement After Confirmation

When the presence of a fire, or the initiation of a drill, is confirmed, the SM/SS shall direct the Control Room personnel to:

a. Sound the fire alarm (siren) over the Plant PA system ☐

b. Make the following announcement: ☐

ATTENTION, ATTENTION. THIS IS A (DRILL / ACTUAL FIRE EMERGENCY). THERE IS A FIRE IN...(Specify exact location, such as unit number, building name, floor level and equipment affected.) FIRE TEAM RESPOND TO THE PRIMARY (or ALTERNATE) FIRE BRIGADE EQUIPMENT LOCKER (Alternate locker upon SM/SS direction, normally chosen only if conditions at the primary locker could be hazardous). NON-ESSENTIAL PERSONNEL SHOULD LIMIT UNNECESSARY CALLS OR TRIPS TO THE CONTROL ROOM AND FIRE SCENE. THIS IS A (DRILL / ACTUAL FIRE EMERGENCY).

c. Sound the siren each time and repeat the announcement two (2) more times. ☐

### 3.7.2 Fire Alarm Announcement After Loss Stop

a. When the "loss stop" benchmark has been received from the Fire Team Captain in the event of an actual fire, the SM/SS shall direct the Control Room personnel to make the following announcement: ☐

ATTENTION IN THE PLANT, ATTENTION IN THE PLANT. THE FIRE IN...(Specify exact location, such as unit number, building name, floor level and equipment affected.) IS OUT.

b. When the "loss stop" benchmark has been received from the Fire Team Captain in the event of a fire drill, the SM/SS shall direct the Control Room personnel to make the following announcement: ☐

ATTENTION IN THE PLANT, ATTENTION IN THE PLANT. THE FIRE DRILL HAS BEEN TERMINATED.

## 3.8 CONTROL ROOM ACTIONS AFTER FIRE CONFIRMATION AND ANNOUNCEMENT

NOTE

Having the Fire Team respond to a fire outside the protected area is a decision the SM/SS shall make. The condition of the plant, the location of the fire, and the availability of fixed suppression are a few items he should consider before sending the Fire Team outside the protected area.

3.8.1 Immediate notification of Burke County Emergency Management Agency shall be performed by the Shift Supervisor or Shift Manager as follows:

a. Contact Burke County Emergency Management Agency (BCEMA) by dialing 911 on the Waynesboro line. ☐

b. If there is a problem with this means of communication, contact BCEMA using SouthernLinc. The following numbers may be used on a SouthernLinc phone with the ability to call numbers outside of the Southern Company network: ☐

(1) Dispatch: Linc ID: 1 11 9103

(2) Director / Chief: Linc ID: 1 11 7493

(3) Assistant Chief: Linc ID: 1 11 9105

(4) Battalion Chief: Linc ID: 1 11 9101

(5) Spare: Linc ID 1 11 7554

c. As a minimum, the following information should be given: ☐

(1) Vogtle Electric Generating Plant

(2) Location of the fire

(3) Description of the fire (be specific as possible)

(4) Name of the Fire Team Captain or person in charge at the fire scene

(5) Inform them VEGP Security personnel will meet them at the Main Gate to escort them to the fire location.

d. Notify Security of BCEMA estimated time of arrival and request issuance of dosimetry to the offsite responders at the PESB if the fire is in an RCA or has the potential to involve radiological material. ☐

# HL-15R SRO NRC EXAM

91. 079A2.01 001/2/2/SA-X-CONN W/ IAS/C/A-3.2/NEW/HL-15R NRC/SRO/TNT/DS

AOP 18028-C "Loss of Instrument Air" is being implemented
Instrument air pressure is 95 psig and lowering
RCS Tave is 314 F

The SS should direct the Turbine Building Operator to...

A. manually isolate the service air system when air pressure drops below 80 psig.

   Service air should be restored locally in the turbine building by implementing SOP 13710-1, "Service Air System" when service air pressure at the PMEC is above 97 psig to prevent excessive lowering of the instrument air system pressure.

B. manually isolate the service air system when air pressure drops below 80 psig.

   Service air should be restored by isolating control air to the Service Air Dryer and then resetting PV-9375 per Attachment B of AOP 18028-C, "Loss of Instrument Air in Modes 4, 5, and 6" to prevent excessive service air flow.

C✓ verify automatic isolation of the service air system from the instrument air system at 80 psig.

   Service air should be restored locally in the turbine building by implementing SOP 13710-1, "Service Air System" when service air pressure at the PMEC is above 97 psig to prevent excessive lowering of the instrument air system pressure.

D. verify automatic isolation of the service air system from the instrument air system at 80 psig.

   Service air should be restored by isolating control air to the Service Air Dryer and then resetting PV-9375 per Attachment B of AOP 18028-C, "Loss of Instrument Air in Modes 4, 5, and 6" to prevent excessive service air flow.

**K/A**

**079 Station Air System (SAS)**

**A2.01 Ability to (a) predict the impacts of the following malfunctions or operatons on the SAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations.**

**Cross-connection with IAS.**

# HL-15R SRO NRC EXAM

## K/A MATCH ANALYSIS

The question presents a scenario that requires the isolation and the subsequent restoration of the service air cross-tie with the instrument air system following a loss of air meeting the required K/A.

This question is also written at the SRO level because it requires detailed knowledge of when to implement attachments including how to coodinate these items with prcedure steps. It also requires knowledge of coordination of normal and abnormal procedures.

## ANSWER / DISTRACTOR ANALYSIS

A. Incorrect. The service air header will automatically isolate at 80 psig. The resoration steps and the procedure to use are all correct actions to take.

B. Incorrect. The service air header will automatically isolate at 80 psig. Attachment B of AOP 18028-C is applicable for this event. However the action to restore service air are contained in SOP 13710-1 which is called out in the AOP.

C. Correct. 18028-C continuous action step 6 requires dispatching an operator to locally verify isolation of the service air header. The use of SOP 13710-1 and the conditions of use are all correct.

D. Incorrect. 18028-C continuous action step 6 requires dispatching an operator to locally verify isolation of the service air header. Attachment B of AOP 18028-C is applicable for this event. However the action to restore service air are contained in SOP 13710-1 which is called out in the AOP.

## REFERENCES

AOP 18028-C pages 4, 5, and 25

SOP 13710-1, page 19

## VEGP learning objectives:

LO-LP-02110-08:

Show the flow path of air through the in-service and regenerating chambers of an "on service" air dryer.

LO-LP-02110-15:

List the sequence of major events on a decreasing instrument air pressure condition. Describe the method of recovering from low instrument air pressure.

LO-LP-60321-06:

# HL-15R SRO NRC EXAM

Describe the operator actions required during normal full power operation when instrument air header pressure fails below 80 psig and/or below 70 psig.

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|

**CAUTION**

Do NOT isolate control air to instrument or service air dryers as this will cause dryers to blow down continuously.

| | | | |
|---|---|---|---|
| __2. | Verify proper operation of Instrument Air dryers. | __2. | IF an Instrument Air Dryer is malfunctioning,<br>THEN place in two chamber full flow mode by pushing in local pushbutton switch:<br>Dryer A HS-0746<br>Dryer B HS-0747 |
| __3. | Verify proper operation of Service Air dryers. | 3. | IF a Service Air Dryer is malfunctioning,<br>THEN perform one of the following:<br>Bypass Service Air dryer:<br>__a) Open 2401-U4-551 Service Air Dryer Bypass.<br>__b) Slowly close 2401-U4-554 Service Air Dryer Outlet.<br>__c) Close 2401-U4-548 Service Air Dryer Inlet.<br>-OR-<br>__Place service air dryer in two chamber full flow mode by depressing local pushbutton switch HS-0745. |
| __4. | Initiate the Continuous Actions Page. | | |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|

**CAUTION**

Loss of Turbine Building instrument air will cause all extraction steam stop valves to close. MFP miniflow valves and feedwater heater and drain tank hi-level dump valves will fail open.

| | | | |
|---|---|---|---|
| __5. | Check Instrument Air header pressure – LOWERING. | __5. | Go to Step 17. |
| __*6. | **Check Instrument Air header pressure - REMAINS GREATER THAN 80 PSIG.** | __*6. | Dispatch an operator to verify PV-9375 Service Air Header Isolation Valve is closed:<br><br>UNIT 1 (TB-A-TD11)<br><br>UNIT 2 (TB-A-TD10) |
| __7. | Check UNIT 1 Service Air – AVAILABLE. | 7. | Verify seals supplied with bottled nitrogen at greater than or equal to 50 psig:<br><br>__• Cask loading pit gates.<br><br>__• Fuel transfer canal gates. |

ATTACHMENT B
LOSS OF INSTRUMENT AIR IN MODES 4, 5, OR 6



| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __*B9. **Check Instrument Air header pressure - REMAINS GREATER THAN 70 PSIG.** | __*B9. Dispatch an operator to close Turbine Building Instrument Air isolation valve:<br><br>UNIT 1: 1-2420-U4-512 (TB-1-TE12)<br><br>UNIT 2: 2-2420-U4-512 (TB-1-TE10) |
| __B10. Check main turbine turning gear – ENGAGED. | __B10. Engage turning gear if necessary by initiating 13800, MAIN TURBINE OPERATION. |
| __B11. Check cause for loss of Instrument Air – CORRECTED. | B11. Perform the following:<br><br>__a. Maintain stable RCS conditions until a source of instrument air is established.<br><br>__b. Return to Step B1. |
| B12. Restore air systems to normal by initiating the following:<br><br>__• 13710, SERVICE AIR SYSTEM.<br><br>-AND-<br><br>__• 13711, INSTRUMENT AIR SYSTEM. | __B12. Return to Step B1. |

INITIALS

**4.4.3 Restoring Service Air System Pressure Following Low Pressure Isolation**

4.4.3.1 **Verify** the following valves are closed:

- SERVICE AIR AIR DRYER 1 BYPASS VLV 1-2401-U4-551. _____
- SERVICE AIR AIR DRYER 1 OUTLET ISO VLV 1-2401-U4-554. _____
- SERVICE AIR AIR DRYER 1 PREFILTER 503 ISO VLV 1-2401-U4-548. _____

NOTE

Pressure Switch 1-PSL-9375 is located on Instrument Rack 15 (1-1624-P5-R15) Turbine Building Level 1 near the Powdex Vessels.

4.4.3.2 At PMEC, When Service Air header pressure is greater than 97 psig on 1-PI-19380, **reset** Pressure Switch 1-PSL-9375 by simultaneously depressing both RESET switches. _____

4.4.3.3 **Verify** 1-PV-9375 opens. _____

**CAUTION**

When repressurizing the Service Air header, the valve should be opened slowly to prevent reducing pressure to less than 100 psig.

4.4.3.4 **Re-pressurize** the Service Air header as follows:

a. Slowly **open** SERVICE AIR AIR DRYER 1 BYPASS VLV 1-2401-U4-551. _____

b. If desired, **start up** Service Air Dryer per Section 4.1.5. _____

98. G2.4.39 001/3/N/A/RO E-PLAN DUTIES/C/A-3.8/NEW/HL-15R NRC/SRO/TNT/DS

Initial conditions:

A large RCS LOCA has occurred
An Alert emergency has been declared by the Shift Manager

The Shift Manager should direct the unaffected unit's...

A. UO to complete a roll call and **then** a recall. Confirmation that the primary recall system functioned properly is confirmed by a page on the SM's pager that starts with "666".

   Faxing of the notification form **is required** to be performed in parallel with the ENN notification to meet the initial notification time requirements.

B. UO to complete a recall and **then** a roll call. Confirmation that the primary recall system functioned properly is confirmed by a page on the SM's pager that starts with "999".

   Faxing of the notification form is performed in parallel with the ENN notification **only if** time permits to prevent exceeding the initial notification requirements.

C. SS to complete a roll call and **then** a recall. Confirmation that the primary recall system functioned properly is confirmed by a page on the SM's pager that starts with "666".

   Faxing of the notification form **is required** to be performed in parallel with the ENN notification to meet the initial notification time requirements.

D. SS to complete a recall and **then** a roll call. Confirmation that the primary recall system functioned properly is confirmed by a page on the SM's pager that starts with "999".

   Faxing of the notification form is performed in parallel with the ENN notification **only if** time permits to prevent exceeding the initial notification requirements.

**K/A**

**G2.4.39 Emergency Procedures / Plans.**

**Knowledge of RO's responsibilities in emergency plan implementation.**

**K/A MATCH ANALYSIS**

The question presents an emergency scenario where an Alert emergency has been declared due to a large RCS LOCA. The question requires the student to properly answer the duties of the RO's for emergency notification in procedure 91002-C, "Emergency Notifications", checklist 4, "Directions for ENN Communicators" matching the K/A topic.

This question is written for an SRO due to the expected pager indications, who must perfrom the ENN notification, and what effect the FAXing of the ENN form has on initial notification time requirements.

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. The unaffected unit's UO is the correct person to select, the correct order is to perfrom the recall first followed by the roll call. For a radiological emergency the SM's pager should display 999. 666 is displayed for a security emergency. Faxing of the ENN form is done in parallel. This is done as long as it does not jepordize the time limits via the voice notification circuit (ENN).

B. Correct. The unaffected unit UO is the person designated at the start of shift by the SM as ENN communicator. This person performs the duties listed in checklist 4 of 91002-C. They include completing a recall followed by a roll call. Verifiyng the SM receives 999 on his pager and faxing the ENN form if time permits.

C. Incorrect. The unaffected unit's SS is the individual designated at the start of shift to be the ENS communicator. The ENN communicator will complete recall followed by the roll call. 666 is displayed for a security emergency. Faxing the ENN form is done in parallel with notification via the voice circuits if time permits.

D. Incorrect. The unaffected unit's SS is the individual designated at the start of shift to be the ENS communicator. 999 is the correct display on the SM's pager and faxing the ENN form is done if time permits.

**REFERENCES**

00012-C, "Shift Manning Requirements", step 4.2 and Data Sheet 1

91002-C, "Emergency Notifications" Checklist 4 "Directions for ENN Communicators" sheets 1 and 4

**VEGP learning objectives:**

LO-LP-63500-04:

(SRO only) Given a list of duties and responsibilities, identify those that belong to the Shift Manager (SM).

LO-LP-40101-15:

State the individual responsible for making emergency notifications.

LO-TA-40003:

Emergency Notifications using 91002-C

## 1.0 PURPOSE

This procedure consolidates and establishes the minimum shift manning as required by Technical Specifications, the Technical Requirements Manual, the Emergency Plan, and the FSAR. This procedure also prescribes the manner in which each department will provide records for shift manning.

## 2.0 DEFINITIONS

None

## 3.0 RESPONSIBILITIES

### 3.1 DEPARTMENT MANAGERS/SUPERINTENDENTS

Department Managers/Superintendents whose personnel are required to work shifts are responsible to ensure that their department provides at least the minimum required qualified personnel on each shift as outlined in Data Sheet 1.

### 3.2 TRAINING AND EMERGENCY PREPAREDNESS MANAGER

The Training and Emergency Preparedness Manager will supply each department head a list of all current Emergency Response Organization qualified personnel at least quarterly, listing the date when each qualification lapses. Additionally, Training will maintain a database with this information. This data is available to personnel throughout the plant.

## 4.0 INSTRUCTIONS

4.1 The Operations, Health Physics/Chemistry, Security, and Maintenance Departments shall ensure that for each shift the minimum staffing is maintained for positions required by Data Sheet 1.

4.2 At the beginning of each shift, the Shift Manager shall ensure Data Sheet 1 is completed. Any deviation from the manning requirements of Data Sheet 1 shall be noted in the Comments section with the reason for the deviation(s). Typical or normal personnel filling the positions are listed below that position slot. Data Sheet 1 shall be filled out using the lists of qualified personnel. An Operations Superintendent, the Operations Manager, or the Duty Manager shall approve any deviation from Data Sheet 1 manning.

## DATA SHEET 1

Sheet 1 of 2

### Minimum Shift Manning (Either Unit in Mode 1-4)

**Date:** _____ **Shift (Day/Night):** _____

| POSITION | UNIT #1 | COMMON | UNIT #2 |
|---|---|---|---|
| **Shift Manager**<br>V-OPS-SS, V-ERO-CR01, and V-ERO-CR10 | | Also assigned as Emergency Director | |
| **SS**<br>V-OPS-USS, V-ERO-CR02, AND V-ERO-CR10 | Also assigned as ENS Communicator | | Also assigned as ENS Communicator |
| **OATC**<br>V-OPS-RO/BOP | | | |
| **UO**<br>V-OPS-RO/BOP and V-ERO-CR04 | Also assigned as ENN Communicator | | Also assigned as ENN Communicator |
| **SO**<br>V-OPS-SO | SO/NPO | | SO/NPO |
| **STA**<br>(May be assigned other duties)<br>V-OPS-STA | | (SM, or SSS or SS not assigned to FB or ENN Communicator) | |
| **Fire Team Captain**<br>V-FP-FIRE BRIGADE LEADER | | SSS, or SS C&T | |
| **FB Member**<br>V-FP-FIRE BRIGADE | | 1.<br>SO(Also fulfills Common SO FSAR req) | |
| **FB Member**<br>V-FP-FIRE BRIGADE | | 2.<br>SO | |
| **FB Member**<br>V-FP-FIRE BRIGADE | | 3.<br>SO | |
| **FB Member**<br>V-FP-FIRE BRIGADE | | 4.<br>SO | |
| **Security**<br>V-ERO-SEC or V-ERO-SEC02 | | Per Security Procedure 90101-C | |
| **SAT Operator**<br>V-OPS-SO-OAO | Assigned per procedure 13419-C | 5.<br>SO/NPO/SRO | |
| **Wilson Operator**<br>V-OPS-WILSON BLKSTRT | Assigned per procedure 13419-C | 6.<br>SO/NPO | |

### Emergency Plan

| POSITION | UNIT #1 | COMMON | UNIT #2 |
|---|---|---|---|
| **Emergency Director**<br>V-OPS-SS | | Shift Manager | |
| **ENN Communicator**<br>V-ERO-CR04 or V-ERO-CR10 | UO Unaffected Unit | | UO Unaffected Unit |
| **ENS Communicator**<br>V-OPS-USS or V-OPS-STA | SS Unaffected Unit | | SS Unaffected Unit |

Reference Use

## CHECKLIST 4

## DIRECTIONS FOR ENN COMMUNICATORS

NOTES

- Emergency Recall activation (Section I.) will be performed by Control Room ENN Communicators only.
- ERO personnel should be recalled only if an Alert, Site Area Emergency or General Emergency has been declared or when directed by the Emergency Director.
- If the Alert, Site Area Emergency or General Emergency involves an actual or credible imminent threat of attack on the plant by a hostile force, then activate the Security Emergency Scenario.
- Only VEGP Management is notified when the NOUE scenario is activated.
- There is a three to four minute delay between initiating the emergency recall and the callback to the control room from the recall system.

## I. EMERGENCY RESPONSE ORGANIZATION RECALL (1985304614)

1. Operations personnel shall activate the "Primary" emergency recall system in accordance with posted system instructions. (Either NOUE or Alert/Site Area/General or Security Scenario as appropriate) _____
2. Operations personnel should verify the "Primary" emergency recall system is operable via a callback to the control room by the emergency recall system. In addition, the Shift Manager's beeper should activate and display a predetermined emergency pager message. The number displayed on the pager for an actual emergency will be **three 9's** (999) and a call-in number. The number displayed on the pager for a security emergency will be **three 6's** (666) and a call-in number. _____
3. If it has been determined that the "Primary" emergency recall system located at VEGP is not operable then Operations personnel shall activate the "Back-up" emergency recall system (Either NOUE or Alert/Site Area/General or Security Scenario as appropriate) in accordance with "Back-up" emergency recall posted system instructions. ____☐NA
4. Operations personnel should verify the "Back-up" emergency recall system is operable via a callback to the control room by the emergency recall system. In addition, the Shift Manager's beeper should activate and display a predetermined emergency pager message. The number displayed on the pager for all emergencies will be (**800-475-9704**). ____☐ NA
5. Record date, time and name below after completing the 'Steps For Remote Activation' as delineated within the posted system instructions _____

_____/_____/_____
Date Time Name

## CHECKLIST 4

## DIRECTIONS FOR ENN COMMUNICATORS (CONTINUED)

NOTES

- Ensure items #1 (message #), items 2 (Notification time, date and authentication#), items 3 (Confirmation Phone #) and items 17 (notified by) are completed by the communicator. The ENN Communicator should not wait for the ED to complete the notification form prior to completing the roll call.
- When reading item #5, Protective Action Recommendations, ensure parts B, C, D, and E are marked as applicable and read for all General emergency declarations.
- Ensure the ED has signed the Emergency Notification form prior to transmission.
- It's expected that the emergency facility which performs an initial notification will also complete the first follow-up notification for that initial notification. (e. g. the control room would complete message 1 and message 2 at minimum prior to transfer to the TSC.)
- Faxing of the Emergency Notification form should never cause the time requirements for voice notification to be missed.

## III TRANSMISSION OF NOTIFICATION MESSAGE

1. Transmit the notification form via voice and facsimile in the following manner:

   a. If time permits, fax the notification form.

      (1) Place a copy or one sheet of the triplicate form facedown in the transmit tray of the fax machine. _____

      (2) Depress the appropriate one-touch speed dial button (Control Room use NOTIFY) _____

NOTE

For notifications time purposes (either 15 or 60 minute notifications, once line 2 of the notification form (checklist 2) has been read the time requirement is considered to be met.

   b. Read the notification form (Checklist 2) starting at line 1, through line 13 then line 17. _____

   c. If performing a follow-up notification, read lines 1-17 _____

# HL-15R SRO NRC EXAM

99. WE04EA2.1 001/1/1/LOCA OUTSIDE- PROCS/MEM-4.3/M-FARLEY 04/HL-15R NRC/SRO/TNT/DS

The crew is implementing EOP 19112-C, "ECA-1.2 LOCA Outside Containment".
The COLD LEG INJECTION FROM SIS HV-8835 has been closed.
The SS determines the leak is now isolated.

The correct procedure transition is...

A. 19011-C, "ES-1.1 SI Termination".

B. 19010-C, "E-1 Loss of Reactor or Secondary Coolant".

C. 19111-C, "ECA-1.1 Loss of Emergency Coolant Recirculation".

D. 19012-C, "ES-1.2 Post-LOCA Cooldown and Depressurization".

# HL-15R SRO NRC EXAM

**K/A**

**WE04 LOCA Outside Containment**

**EA2.1 Ability to determine and interpret the following as they apply to the (LOCA Outside Containment).**

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

**K/A MATCH ANALYSIS**

The question presents a plausible scenario where an RCS LOCA ouside CNMT has been isolated. The examinee must select the apprpriate recovey procedure. This question requires the use of a diagnostic step and decision point in an EOP that involves a transition to an event specific sub-procedure, making this an SRO question.

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. Plausible since the LOCA is now isolated. The crew will eventually transition out of 19010-C to this procedure, but this choice is incorrect because it is not entered directly from 19112-C.

B. Correct. 19112-C specifies going to 19010-C for this condition.

C. Incorrect. Plausible since this is the expected transition from 19112-C if recirculation capability has been lost.

D. Incorrect. This is plausible since the RCS may be in saturated conditons with pressure above 300 psig. Those pararmaters would result in a transition to 19012-C from 19010-C, but NOT from 19112-C.

**REFERENCES**

EOP 19112-C steps 3 and 4
Farley 2004 NRC exam question W/E04EA2.1 001

**VEGP learning objectives:**

N/A

1. W/E04EA2.1 001

Unit 1 was operating at 100% power when a Small Break Loss Of Coolant Accident (SBLOCA) caused a plant trip and SI actuation.

- SI and Phase A Containment Isolation have actuated per design.
- The crew has implemented EEP-0, Reactor Trip or Safety Injection and EEP-1, Loss of Reactor or Secondary Coolant.
- A LOCA outside containment is indicated so the crew has transitioned to and is performing steps in ECP-1.2, LOCA Outside Containment.
- The crew has just completed the step to isolate RCP seal injection.

The crew observes RCS Pressure is no longer dropping, and is now rising.

Which one of the following describes the required actions in accordance with ECP-1.2 that must be taken at this point?

A. Go to EEP-1, Loss Of Reactor Coolant Or Secondary Coolant.

B. Direct HP to perform radiation surveys in the auxiliary buildings.

C. Go to ESP-1.2, Post LOCA Cooldown and Depressurization.

D. Immediately transition to ECP-1.1, Loss Of Emergency Coolant Recirculation.

Farley 04

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| 3. Try to identify and isolate SI Cold Leg injection break: | |
| ☐ a. Close SI PMP-A TO COLD LEG ISO VLV HV-8821A. | |
| ☐ b. Check RCS pressure - RISING | ☐ b. Open SI PMP-A TO COLD LEG ISO VLV HV-8821A.<br>☐ Go to Step 3d. |
| ☐ c. Go to Step 3k. | |
| ☐ d. Close SI PMP-B TO COLD LEG ISO VLV HV-8821B. | |
| ☐ e. Check RCS pressure - RISING | ☐ e. Open SI PMP-B TO COLD LEG ISO VLV HV-8821B.<br>☐ Go to Step 3g. |
| ☐ f. Go to Step 3k. | |
| ☐ g. Close COLD LEG INJECTION FROM SIS HV-8835. | |
| ☐ h. Check RCS pressure - RISING | ☐ h. Open COLD LEG INJECTION FROM SIS HV-8835.<br>☐ Go to Step 4. |
| ☐ i. Stop both SI Pumps. | |
| ☐ j. Go to Step 4. | |
| ☐ k. Stop SI Pump in train with leak isolated. | |
| 4. Check if break is isolated: | |
| ☐ a. Check RCS pressure - RISING | ☐ a. Go to 19111-C, ECA-1.1 LOSS OF EMERGENCY COOLANT RECIRCULATION. |
| ☐ b. Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT. | |

END OF PROCEDURE TEXT

# HL-15R SRO NRC EXAM

100. WE10EA2.1 001/1/2/NAT CIRC W/ VOIDS/C/A-3.9/M-HARRIS 08/HL-15R NRC/SRO/TNT/DS

Initial conditons:

An RCS cooldown at 50 F/hr per 19002-C, "ES-0.2 Natural Circulation Cooldown" is in progress

Current conditions:

PSMS train A DPU is inoperable
RCS pressure is 1200 psig and lowering
RCS cold leg temperatures are 450 F and lowering
SG pressures are 435 psig and lowering
PRZR level is 35% and rising

The RCS temperature must be < 350 F in the next 1 hour and 30 minutes to comply with a technical specification action requirement.

The correct action to take for these condtions is to...

A. continue the cooldown at the present rate. Declare an Alert emergency due to the inability to cool down the RCS to < 350 F within the technical specification LCO action time limit.

B. repressurize the RCS within the limits of LCO 3.4.3 to collapse potential voids while increasing the cooldown rate to 70 F/hr to meet the technical specification time limit.

C. transition to 19003-C, "ES-0.3 Natural Circulation Cooldown with Void in Vessel (With RVLIS)" and increase the cooldown rate to 70 F/hr to meet the technical specification time limit.

D. transition to 19004-C, "ES-0.4 Natural Circulation Cooldown with Void in Vessel (Without RVLIS)" and increase the cooldown rate to 70 F/hr to meet the technical specification time limit.

**K/A**

**WE10 Natural Circulation with Steam Void in Vessel with/without RVLIS.**

**EA2.1 Ability to determine and interpret the following as they apply to the (Natural Circulation with Steam Void in Vessel with/without RVLIS).**

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

**K/A MATCH ANALYSIS**

appropriate actions to comply with techncial specifications and the appropriate EOP transition.

This question is appropriate for an SRO since it involves detailed knowledge of a decision point in EOP 19002-C that involves a transition to 19003-C, an event specific sub-procedure

**ANSWER / DISTRACTOR ANALYSIS**

A. Incorrect. This course of action is a procedurally plausible path and there is an option for declaring an **NOUE** for not completing technical specification action requirements within the time limit.

B. Incorrect. Repressurizing the RCS within the LCO 3.4.3 limits to collapse potential voids is a procedural option in 19002-C. 19002-C requires a transition to 19003-C with a cool down rate in excess of 50 F/hr.

C. Correct. Since RCS cooldown rate must exceed 50 F/hr to comply with technical specifications a transition to 19003-C is required.

D. Incorrect. Since RCS cooldown rate must exceed 50 F/hr to comply with technical specifications a transition to 19003-C is required. A transition to 19004-C would be appropriate if RVLIS was not functional. However, RVLIS is still fucntional even with one DPU out of service.

**REFERENCES**

19002-C, "ES-0.2 Natural Circulation Cooldown" steps 10, 18, 20, and 23

19003-C, "ES-0.3 Natural Circulation Cooldown with Void in Vessel (With RVLIS)" step 4

V-LO-PP-05101 "Plant Safety Monitoring System" slide 34

91001-C, "Emergency Classification and Implementation Procedure" Figure 4 EAL# SU2

**VEGP learning objectives:**

LO-LP-37012-15:

State the limitations on subcooling and cooldown rate associated with natural circulation cooldown. Include the bases for any variations.

1. E10 EA2.1 002

Given the following:

- A reactor trip has occurred due to a loss of offsite power.
- The operating crew is performing actions of EPP-005, Natural Circulation Cooldown.
- "A" Train RVLIS is out of service.
- The crew has commenced RCS cooldown and depressurization.
- RCS pressure is 1780 psig and trending DOWN.
- RCS Tave is 448 °F and trending DOWN.
- All SG pressures are at 960 psig and trending DOWN slowly.
- Pressurizer level is 35% and trending UP slowly.
- Plant management determines that RCS cooldown rate MUST be performed at approximately 60 °F/hr due to secondary inventory concerns.

Which ONE of the following actions will be required in accordance with EPP-005?

A. Remain in EPP-005 and continue cooldown and depressurization.

B. Actuate safety injection and go to Path-1, entry point A.

C. Transition to EPP-006, Natural Circulation Cooldown With Steam Void In Vessel (With RVLIS).

D. Remain in EPP-005, stop depressurization and re-establish required subcooling .

Harris 08

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __b. As RCS cooldown is initiated, hold HS-0500A and HS-0500B in the BYPASS INTERLOCK position until RCS temperature is less than 550°F. | |
| *10. **Initiate RCS cooldown to cold shutdown:** | |
| __a. Check RCS boron concentration greater than required boron concentration for xenon free cold shutdown. | __a. Return to Step 6. |
| __b. Maintain cooldown rate in RCS Cold Legs - LESS THAN 50°F/Hr. | |
| __c. Dump steam to Condenser using Steam Dumps. | __c. Use SG ARVs. |
| __d. Maintain SG NR levels - AT APPROXIMATELY 65%. | |
| __e. Check RCS cooldown at 15 minute intervals. | |
| f. Maintain RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION LCO 3.4.3 (PTLR):<br>__ Use 60°F/HR curve and RCS Cold Leg temperature. | |
| __g. Perform other appropriate actions required to take the unit to cold shutdown by initiating 12006-C, RCS COOLDOWN TO COLD SHUTDOWN. | |

ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

**CAUTION**

SI actuation circuits will automatically unblock if PRZR pressure rises to greater than 2000 psig.

17. Block SI actuation:

- Low steamline pressure SI
- Low PRZR pressure SI

*18. **Maintain following RCS conditions:**

__ • RCS pressure - AT 1950 psig.

__ • PRZR level - AT 25%.

__ • Cooldown rate in RCS Cold Legs - LESS THAN 50°F/Hr.

- RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION LCO 3.4.3 (PTLR):

  __ Use 60°F/HR curve and RCS Cold Leg temperature.

*19. **Monitor RCS cooldown:**

__ • Core Exit TCs - LOWERING.

__ • RCS WR Hot Leg temperatures - LOWERING.

__ • RCS subcooling - RISING.

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| __*20. **IF at any time it is determined that the desired cooldown rate may form a steam void in the reactor vessel, THEN go to 19003-C, ES-0.3 NATURAL CIRCULATION COOL DOWN WITH VOID IN VESSEL (WITH RVLIS).** | |
| *21. **Initiate RCS depressurization:** | |
| __a. Verify CRDM Fans - AT LEAST TWO RUNNING. | __a. Maintain RCS subcooling - GREATER THAN 124°F.<br>__ Go to Step 21.c |
| __b. Maintain RCS subcooling - GREATER THAN 74°F. | |
| __c. Verify letdown - IN SERVICE. | __c. Depressurize RCS using one PRZR PORV.<br>__ Go to Step 22. |
| __d. Depressurize RCS using Auxiliary Spray. | |
| *22. **Continue RCS cooldown and depressurization:** | |
| __a. Maintain cooldown rate in RCS Cold Legs - LESS THAN 50°F/Hr. | |
| __b. Maintain RCS subcooling - GREATER THAN 74°F (124°F with less than two CRDM Fans running). | __b. Stop depressurization.<br>__ Re-establish subcooling. |

° Step 22 continued on next page

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| c. Maintain RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION LCO 3.4.3 (PTLR):<br><br>__ Use 60°F/HR curve and RCS Cold Leg temperature. | |
| 23. Check that steam void in Reactor Vessel does NOT exist:<br><br>__• PRZR level - NO UNEXPECTED LARGE VARIATIONS.<br><br>__• RVLIS Upper Range - GREATER THAN 98%. | __23. Repressurize RCS within limits of Technical Specification LCO 3.4.3 (PTLR) to collapse potential voids in system and continue cooldown.<br><br>__IF RCS depressurization must continue,<br>THEN go to 19003-C, ES-0.3 NATURAL CIRCULATION COOL DOWN WITH VOID IN VESSEL (WITH RVLIS). |
| *24. **Check if ECCS should be locked out:**<br><br>__a. Check RCS WR pressure - LESS THAN 950 PSIG. | __a. WHEN RCS WR pressure is less than 950 psig,<br>THEN go to Step 25.<br><br>__ Go to Step 29. |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|

**CAUTION**

While in this procedure, do NOT exit to 19263-C, FR-I.3 RESPONSE TO VOIDS IN REACTOR VESSEL, to perform a head venting operation.

| | |
|---|---|
| __1. Verify Steps 1 through 19 of 19002-C, ES-0.2 NATURAL CIRCULATION COOL DOWN - COMPLETE. | __1. Return to applicable step of 19002-C, ES-0.2 NATURAL CIRCULATION COOL DOWN. |
| __2. Initiate the Continuous Actions and Foldout Page. | |
| __*3. **IF SI actuation occurs during this procedure, THEN go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION.** | |
| __*4. **Check RVLIS- AVAILABLE.** | __*4. Go to 19004-C, ES-0.4 NATURAL CIRCULATION COOL DOWN WITH VOID IN VESSEL (WITHOUT RVLIS). |
| *5. **Try to restart an RCP:** | |
| a. Close PRZR Spray Valve(s) for stopped RCP(s):<br>__ RCP 1: PIC-0455C<br>__ RCP 4: PIC-0455B | |
| __b. Establish conditions for starting an RCP using ATTACHMENT A. | __b. Go to Step 6. |

* Step 5 continued on next page

# PSMS Abnormalities

- If a RPU/DPU is out of service or not functioning, the indicators and algorithms associated with that RPU/DPU will not function.
- Each DPU calculates the RVLIS algorithm for both trains of RVLIS.

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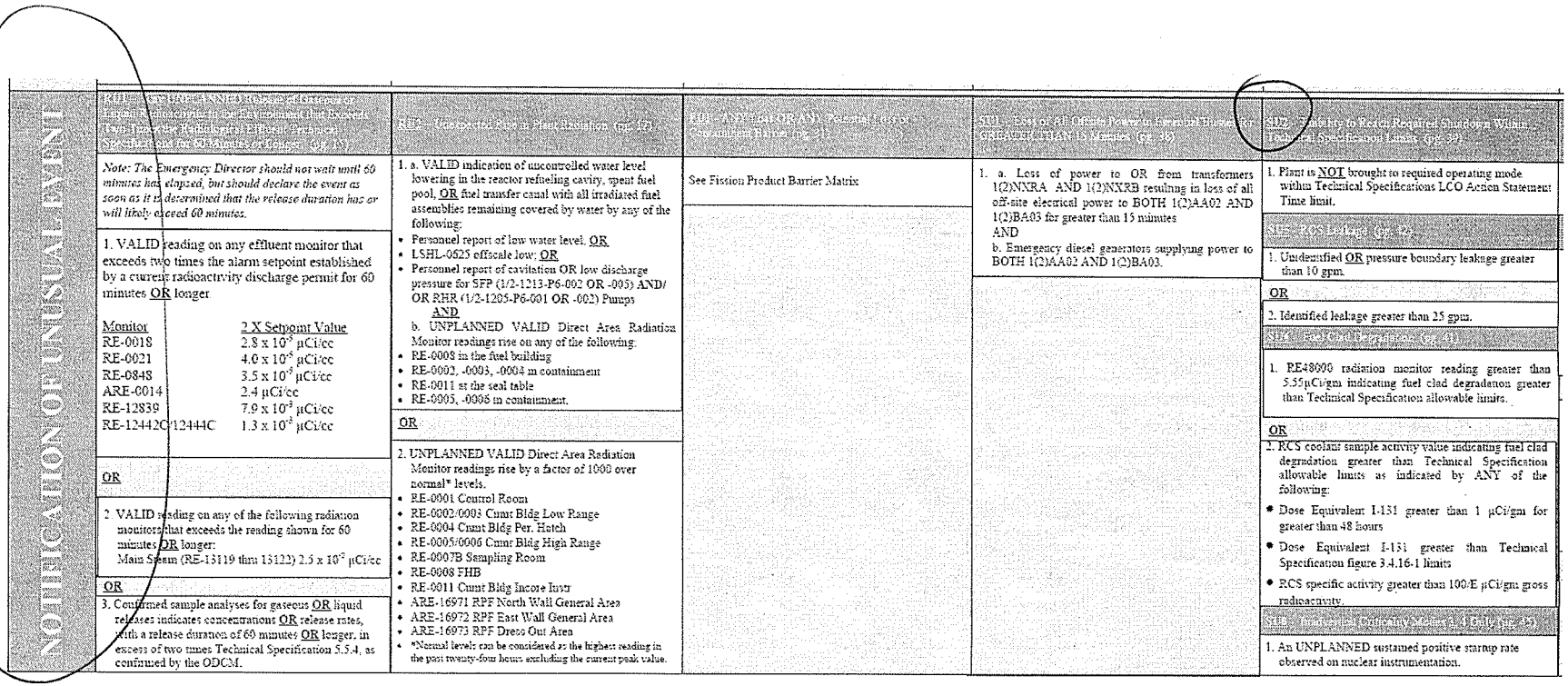
| | |
|---|---|
| or | SU2 - Inability to Reach Required Shutdown Within Technical Specification Limits (pg. 39) |
| ers<br>all<br>ID | 1. Plant is **NOT** brought to required operating mode within Technical Specifications LCO Action Statement Time limit. |

9/001-E
FIGURE 4




9100l-c

FIGURE 4