

**U.S. Nuclear Regulatory Commission  
Site-Specific SRO Written Examination**

**Applicant Information**

Name:

Date:

Facility/Unit North Anna Power Station

Region: I ☐ II ☐ III ☐ IV ☐

Reactor Type: W ☐ CE ☐ BW ☐ GE ☐

Start Time:

Finish Time:

**Instructions**

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination, you must achieve a final grade of at least 80 percent overall, with 70 percent or better on the SRO-only items if given in conjunction with the RO exam; SRO-only exams given alone require a final grade of 80 percent to pass. You have 9 hours to complete the combined examination and 3 hours if you are only taking the SRO-only portion.

**Applicant Certification**

All work done on this examination is my own. I have neither given nor received aid.

\_\_\_\_\_  
Applicant's Signature

**Results**

RO/SRO-Only/Total Examination Values \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ Points

Applicant's Score \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ Points

Applicant's Grade \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ Percent

**Answer Sheet**  
**2018 NRC SRO Exam**

**Name:** \_\_\_\_\_  
**Date:** \_\_\_\_\_

- [A][B][C][D] 1. \_\_\_\_\_  
[A][B][C][D] 2. \_\_\_\_\_  
[A][B][C][D] 3. \_\_\_\_\_  
[A][B][C][D] 4. \_\_\_\_\_  
[A][B][C][D] 5. \_\_\_\_\_  
[A][B][C][D] 6. \_\_\_\_\_  
[A][B][C][D] 7. \_\_\_\_\_  
[A][B][C][D] 8. \_\_\_\_\_  
[A][B][C][D] 9. \_\_\_\_\_  
[A][B][C][D] 10. \_\_\_\_\_  
[A][B][C][D] 11. \_\_\_\_\_  
[A][B][C][D] 12. \_\_\_\_\_  
[A][B][C][D] 13. \_\_\_\_\_  
[A][B][C][D] 14. \_\_\_\_\_  
[A][B][C][D] 15. \_\_\_\_\_  
[A][B][C][D] 16. \_\_\_\_\_  
[A][B][C][D] 17. \_\_\_\_\_  
[A][B][C][D] 18. \_\_\_\_\_  
[A][B][C][D] 19. \_\_\_\_\_  
[A][B][C][D] 20. \_\_\_\_\_  
[A][B][C][D] 21. \_\_\_\_\_  
[A][B][C][D] 22. \_\_\_\_\_  
[A][B][C][D] 23. \_\_\_\_\_  
[A][B][C][D] 24. \_\_\_\_\_  
[A][B][C][D] 25. \_\_\_\_\_

- \_\_\_\_\_ 26. [A][B][C][D]  
\_\_\_\_\_ 27. [A][B][C][D]  
\_\_\_\_\_ 28. [A][B][C][D]  
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\_\_\_\_\_ 30. [A][B][C][D]  
\_\_\_\_\_ 31. [A][B][C][D]  
\_\_\_\_\_ 32. [A][B][C][D]  
\_\_\_\_\_ 33. [A][B][C][D]  
\_\_\_\_\_ 34. [A][B][C][D]  
\_\_\_\_\_ 35. [A][B][C][D]  
\_\_\_\_\_ 36. [A][B][C][D]  
\_\_\_\_\_ 37. [A][B][C][D]  
\_\_\_\_\_ 38. [A][B][C][D]  
\_\_\_\_\_ 39. [A][B][C][D]  
\_\_\_\_\_ 40. [A][B][C][D]  
\_\_\_\_\_ 41. [A][B][C][D]  
\_\_\_\_\_ 42. [A][B][C][D]  
\_\_\_\_\_ 43. [A][B][C][D]  
\_\_\_\_\_ 44. [A][B][C][D]  
\_\_\_\_\_ 45. [A][B][C][D]  
\_\_\_\_\_ 46. [A][B][C][D]  
\_\_\_\_\_ 47. [A][B][C][D]  
\_\_\_\_\_ 48. [A][B][C][D]  
\_\_\_\_\_ 49. [A][B][C][D]  
\_\_\_\_\_ 50. [A][B][C][D]



**Answer Sheet**  
**2018 NRC SRO Exam**

**Name:** \_\_\_\_\_  
**Date:** \_\_\_\_\_

- [A][B][C][D] 51. \_\_\_\_\_
- [A][B][C][D] 52. \_\_\_\_\_
- [A][B][C][D] 53. \_\_\_\_\_
- [A][B][C][D] 54. \_\_\_\_\_
- [A][B][C][D] 55. \_\_\_\_\_
- [A][B][C][D] 56. \_\_\_\_\_
- [A][B][C][D] 57. \_\_\_\_\_
- [A][B][C][D] 58. \_\_\_\_\_
- [A][B][C][D] 59. \_\_\_\_\_
- [A][B][C][D] 60. \_\_\_\_\_
- [A][B][C][D] 61. \_\_\_\_\_
- [A][B][C][D] 62. \_\_\_\_\_
- [A][B][C][D] 63. \_\_\_\_\_
- [A][B][C][D] 64. \_\_\_\_\_
- [A][B][C][D] 65. \_\_\_\_\_
- [A][B][C][D] 66. \_\_\_\_\_
- [A][B][C][D] 67. \_\_\_\_\_
- [A][B][C][D] 68. \_\_\_\_\_
- [A][B][C][D] 69. \_\_\_\_\_
- [A][B][C][D] 70. \_\_\_\_\_
- [A][B][C][D] 71. \_\_\_\_\_
- [A][B][C][D] 72. \_\_\_\_\_
- [A][B][C][D] 73. \_\_\_\_\_
- [A][B][C][D] 74. \_\_\_\_\_
- [A][B][C][D] 75. \_\_\_\_\_

- \_\_\_\_\_ 76. [A][B][C][D]
- \_\_\_\_\_ 77. [A][B][C][D]
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- \_\_\_\_\_ 85. [A][B][C][D]
- \_\_\_\_\_ 86. [A][B][C][D]
- \_\_\_\_\_ 87. [A][B][C][D]
- \_\_\_\_\_ 88. [A][B][C][D]
- \_\_\_\_\_ 89. [A][B][C][D]
- \_\_\_\_\_ 90. [A][B][C][D]
- \_\_\_\_\_ 91. [A][B][C][D]
- \_\_\_\_\_ 92. [A][B][C][D]
- \_\_\_\_\_ 93. [A][B][C][D]
- \_\_\_\_\_ 94. [A][B][C][D]
- \_\_\_\_\_ 95. [A][B][C][D]
- \_\_\_\_\_ 96. [A][B][C][D]
- \_\_\_\_\_ 97. [A][B][C][D]
- \_\_\_\_\_ 98. [A][B][C][D]
- \_\_\_\_\_ 99. [A][B][C][D]
- \_\_\_\_\_ 100. [A][B][C][D]

1. Given the following conditions:

- A large break LOCA occurred inside Unit 1 containment.
- Containment pressure peaked at 45 PSIA and has since lowered to 18 PSIA.
- Containment radiation peaked at  $2 \times 10^3$  R/HR and is stable.
- The OATC is monitoring conditions for 1-F-0, CRITICAL SAFETY FUNCTIONS STATUS TREES.

Based on the given conditions, which ONE of the choices below completes the following statement?

In accordance with 1-F-0, the OATC is required to use the \_\_\_\_\_ nuclear instruments to monitor for SUBCRITICALITY.

- A. Power Range (N-41, N-42, N-43, N-44)
- B. Intermediate Range (N-35, N-36)
- C. Source Range (N-31, N-32)
- D. Gamma-Metrics

2. Given the following conditions:

- Unit 1 Reactor Trip occurred 15 minutes ago
- Pressurizer Safety Valve, 1-RC-SV-1551A, is lifting
- Pressurizer Pressure is approximately 1915 psig
- RCS  $T_{Hot}$  is 545 °F
- Pressurizer Relief Tank pressure is 50 psig
- Containment Pressure is 15 psia

Which ONE of the following is the approximate temperature in the tailpipe **downstream** of the affected Pressurizer Safety Valve?

- A. 215 °F
- B. 300 °F
- C. 545 °F
- D. 628 °F

3. Given the following conditions:

- Automatic Reactor Trip and Safety Injection occurred on Unit 2
- Cold Leg Recirculation was established
- Operators are preparing to shift to Hot Leg Recirculation

Based on the given conditions, which ONE of the following is **NOT** a reason for shifting to Hot Leg Recirculation?

- A. Assists in terminating boiling in the Reactor Vessel.
- B. Assists in establishing conditions for Reflux Boiling.
- C. Assists in collapsing voids that may have formed in the Reactor Vessel Head.
- D. Assists in back-flushing boron that may have plated out on the Reactor Core.

4. Initial Conditions:

- Unit 1 is at 100% RTP.
- Annunciator 1C-C4, "RCP 1A-B-C THERM BARR CC HI/LO FLOW" has just alarmed.
- 1-CC-FI-116A, "A" RCP thermal barrier flow, is indicating 60 gpm, and stable.

Current Conditions:

- It has been two (2) minutes since the above annunciator alarmed

Which ONE of the choices below completes the following statements?

Based on the **current conditions**, valve 1-CC-TV-116A, 'A' RCP Thermal Barrier Outlet, \_\_\_\_ (1) \_\_\_\_ automatically closed.

Based on the **current conditions**, annunciator response procedure, 1C-C4, \_\_\_\_ (2) \_\_\_\_ require operators to Manually Trip the Reactor, STOP the 'A' RCP, and go to 1-E-0, REACTOR TRIP OR SAFETY INJECTION.

- A. (1) has  
(2) does NOT
- B. (1) has NOT  
(2) does NOT
- C. (1) has  
(2) does
- D. (1) has NOT  
(2) does

5. Given the following Conditions:

- Unit 1 at 100% RTP
- The PRESSURIZER LEVEL CHANNEL DEFEAT switch is selected to the 459/460 position.
- Normal Letdown is in service.
- 1-RC-LT-1459, Pressurizer Level Transmitter Ch. I, fails LOW.

Based on the given conditions, which ONE of the choices below completes the following statements?

Annunciator 1B-G7, PRZ LO LEV HTRS OFF - LETDWN ISOL, \_\_ (1) \_\_ in Alarm; AND

1-AP-3, LOSS OF VITAL INSTRUMENTATION, requires operators to **first** place \_\_\_\_ (2) \_\_\_\_ in MANUAL to control Pressurizer level on program.

- A. (1) is  
(2) 1-CH-FCV-1122, Charging Flow Control Valve
- B. (1) is  
(2) 1-RC-LCV-1459G, Pressurizer Level Control
- C. (1) is NOT  
(2) 1-CH-FCV-1122, Charging Flow Control Valve
- D. (1) is NOT  
(2) 1-RC-LCV-1459G, Pressurizer Level Control

6. Initial Conditions:

- Unit 1 is at 100% RTP.
- The Component Cooling (CC) System is split out.
- 1-CC-P-1B, 'B' Component Cooling Pump, is RUNNING
- 1-CC-P-1A, 'A' Component Cooling Pump, is in Pull-to-Lock

Current Conditions:

- I&C Technicians inadvertently cause the 1-CC-P-1B pump supply breaker (15J13) to receive a CDA actuation signal
- No other components receive a CDA signal

Which ONE of the choices below completes the following statements?

Based on the current conditions, alarm 1G-C3, COMPONENT COOLING HEAT EXCHANGER OUTLET LOW PRESSURE, \_\_\_\_ (1) \_\_\_\_ actuate.

When the CDA signal to 1-CC-P-1B breaker 15J13 is removed, 1-CC-P-1B \_\_\_\_ (2) \_\_\_\_ start automatically.

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

7. Initial Conditions:

- Unit 1 is at 100% RTP
- Pressurizer Master Pressure Controller, 1-RC-PCV-1444J, is in AUTO

Current Conditions:

- 1-RC-PT-1445, Pressurizer Pressure Control, fails LOW
- Annunciator 1B-F7, PRZ HI-LO PRESS, alarms
- No operator actions have occurred

Which ONE of the choices below completes the following statements?

Based on the current conditions, 1-RC-PCV-1456, PZR Power-Operated Relief Valve (PORV), \_\_\_\_ (1) \_\_\_\_ automatically OPEN if actual pressurizer pressure increases beyond its design setpoint.

This failure \_\_\_\_ (2) \_\_\_\_ require operators to place the Pressurizer Master Pressure Controller in MANUAL.

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



8. Initial Conditions:

- Unit 1 is operating at 100% rated thermal power
- All channels of 'B' Reactor Coolant Loop Flow are indicating 30% and stable
- 'B' RCP amps are low
- Reactor trip breakers are closed

Based on the **Initial** conditions, the operators are first required to enter \_\_\_\_ (1) \_\_\_\_ .

Current Conditions:

- Manual Turbine trip has failed
- Operators have placed both EHC Pumps in PTL
- The Turbine is still NOT tripped

Based on the **Current** Conditions, the next required action is to \_\_\_\_ (2) \_\_\_\_ .

Which ONE of the following completes the above statements?

- A. (1) 1-E-0, REACTOR TRIP OR SAFETY INJECTION  
(2) Manually run back turbine
- B. (1) 1-E-0, REACTOR TRIP OR SAFETY INJECTION  
(2) Close all MSTVs and MSTV Bypass Valves
- C. (1) 1-FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS  
(2) Manually run back turbine
- D. (1) 1-FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS  
(2) Close all MSTVs and MSTV Bypass Valves

9. Given the following sequence of events:

- Unit 1 was at 100% rated thermal power when an automatic Reactor Trip and Safety Injection occurred
- Operators transitioned to 1-E-3, STEAM GENERATOR TUBE RUPTURE, based on a 'B' Steam Generator (S/G) tube rupture
- Containment pressure is 10.75 psia and stable
- Containment radiation level is  $5 \times 10^{-3}$  R/hr and stable
- Operators are evaluating the following step in 1-E-3:  
( \* 4. MONITOR RUPTURED SG LEVEL)
- S/G NR Levels are as follows:
  - "A" S/G: 10% rising
  - "B" S/G: 14% rising
  - "C" S/G: 9% rising

Which ONE of the choices below completes the following statements in accordance with 1-E-3?

Based on the given conditions, 1-E-3 \_\_\_\_ (1) \_\_\_\_ require operators to stop feed flow to the 'B' S/G.

After isolation, if the 'B' S/G NR level shrinks below the appropriate setpoint (as given in step 4 of 1-E-3), operators are required to \_\_\_\_ (2) \_\_\_\_ to the 'B' S/G.

- A. (1) does  
(2) maintain AFW isolated
- B. (1) does  
(2) restore AFW flow
- C. (1) does NOT  
(2) maintain AFW isolated
- D. (1) does NOT  
(2) restore AFW flow

10. Unit 1 is operating at 60% RTP with the following conditions:

- 'A' Main Feedwater Pump is tagged out to repair a seal leak
- 'B' Main Feedwater Pump is operating as designed
- 'C' Main Feedwater Pump just tripped on a low oil pressure signal
- 3 condensate pumps have been placed in service per 1-AP-31, LOSS OF MAIN FEEDWATER, actions

Which ONE of the following describes the overall strategy of 1-AP-31 to be taken by the operating crew and the reason for the actions?

- A. Take manual control of the main feedwater regulating valves and raise feedwater flow to match steam flow to stop the decrease in SG levels.
- B. Take manual control of the main feedwater regulating valves and raise feedwater flow to match steam flow to prevent the automatic controls from placing the 'B' MFP in a runout condition.
- C. Manually reduce turbine load to less than 50% to prevent the automatic tripping of the 'B' Main Feedwater Pump on a low delta P condition.
- D. Manually reduce turbine load to less than 50% to provide operating margin for the operating MFW pump.

11. Given the following conditions:

- Unit-1 has transitioned to 1-ECA-0.1, LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED.
- A Subsequent loss of Vital Bus 1-I occurred.
- The OATC is performing 1-ECA-0.1, attachment 1, NATURAL CIRCULATION VERIFICATION.

Which ONE of the choices below completes the following statements?

Based on the given conditions, the OATC has a maximum of \_\_\_\_ (1) \_\_\_\_ Train(s) of Core Exit Thermocouples available.

Attachment 1, Step 1, VERIFY NATURAL CIRCULATION FLOW, requires RCS subcooling based on Core Exit TCs to be > \_\_\_\_ (2) \_\_\_\_ °F

- A. (1) 1  
(2) 25
- B. (1) 1  
(2) 35
- C. (1) 2  
(2) 25
- D. (1) 2  
(2) 35

12. Given the following conditions:

- Unit 1 is at 100% power.
- A loss of power has caused a loss of the Unit 1 PCS.
- The crew is currently performing 1-AP-42.1, LOSS OF UNIT 1 PLANT COMPUTER SYSTEM (PCS).

Which ONE of the choices below completes the following statement?

In accordance with attachment 2, AUGMENTED SURVEILLANCE FOR LOSS OF UNIT 1 PCS, operators are required to monitor \_\_\_\_\_.

- A. Service Water Temperature
- B. Axial Flux Difference (AFD)
- C. Generator Megawatts
- D. RCP Vibrations

13. Initial Conditions:

- 125 VDC Bus 1-IV was being supplied by Swing Battery Charger (1C-II)
- The Swing Battery Charger (1C-II) tripped off-line
- 125 VDC Bus 1-IV is only being supplied by Battery 1-IV

Current Conditions:

- Operators are re-aligning to restore the normal power supply to Battery 1-IV in accordance with 1-OP-26.4.2, "MAIN STATION BATTERY CHARGERS 1-III AND 1-IV OPERATION."

Which ONE of the choices below completes the following statements?

Based on the current conditions, operators will first close the DC Output Circuit Breaker located at \_\_\_\_ (1) \_\_\_\_.

Operators will then close Breaker 9, Feed from Normal Charger, located at \_\_\_\_ (2) \_\_\_\_.

- A. (1) Normal Battery Charger Cabinet 1-IV  
(2) Normal Battery Charger Cabinet 1-IV
- B. (1) Normal Battery Charger Cabinet 1-IV  
(2) DC Distribution Panel 1-EP-CB-12D
- C. (1) DC Distribution Panel 1-EP-CB-12D  
(2) DC Distribution Panel 1-EP-CB-12D
- D. (1) DC Distribution Panel 1-EP-CB-12D  
(2) Normal Battery Charger Cabinet 1-IV

14. Given the following conditions:

- Unit 1 is operating at 100% RTP.
- Unit 1 and Unit 2 Component Cooling systems are split out.
- Unit 2 is supplying Component Cooling to the common loads.
- Unit 1, 'B' Component Cooling Heat Exchanger is isolated.
- The Component Cooling Surge Tank Level is 60%
- Maintenance activities have occurred that inadvertently closed 1-SW-MOV-108B, SW SUPPLY TO COMPONENT COOLING HXs.
- 1-SW-MOV-108A, SW SUPPLY TO COMPONENT COOLING HXs, remains unaffected.

Which ONE of the choices below completes the following statement?

The Unit 1 Component Cooling System Temperature will \_\_\_\_ (1) \_\_\_\_ AND the CC surge tank level control valve (1-CC-LCV-100) \_\_\_\_ (2) \_\_\_\_.

- A. (1) Remain Stable  
(2) Open
- B. (1) Increase  
(2) Open
- C. (1) Increase  
(2) Remain closed
- D. (1) Remain Stable  
(2) Remain closed

15. Initial Conditions:

- Unit 1 experienced an automatic Reactor Trip and SI from 100% power.
- Operators have transitioned to 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, and are performing step 8, DETERMINE CONTAINMENT SPRAY REQUIREMENTS.

Current Conditions:

The following conditions are noted on the '1K' Annunciator Panel:

- 1K E-2 RWST LEVEL BELOW NORM alarming
- 1K F-1 RWST LVL < 60% CH I - II - III alarming
- 1K H-1 CONTAINMENT HI PRESS CH II-III-IV alarming
- 1K H-2 CONTAINMENT INTER HIGH-HIGH CONT PRESS CH II-III-IV alarming
- 1K H-7 CONTAINMENT ISOLATION PHASE A alarming
- 1K H-8 CONTAINMENT ISOLATION PHASE B is **NOT** in alarm

The following conditions are noted on the '1J' Annunciator Panel:

- 1J C-5 RS PP 1A LOCKOUT OR AUTO TRIP OR TEST alarming
- 1J C-6 RS PP 2A LO OR OL TRIP alarming
- 1J G-5 RS PP 1B LOCKOUT OR AUTO TRIP OR TEST alarming
- 1J A-2 RWST LO LEVEL is **NOT** in alarm (>22.8%)
- 1J G-6 RS PP 2B LO OR OL TRIP **NOT** in alarm

Based on the current conditions, which ONE of the following describes the required actions?

**REFERENCE PROVIDED**

- A. Transition to 1-FR-Z.1, RESPONSE TO HIGH CONTAINMENT PRESSURE; No Quench Spray pumps are required.
- B. Remain in 1-ECA-1.1; Ensure Both Quench Spray pumps are operating.
- C. Transition to 1-FR-Z.1, RESPONSE TO HIGH CONTAINMENT PRESSURE; Ensure Both Quench Spray pumps are operating.
- D. Remain in 1-ECA-1.1; No Quench Spray pumps are required.



16. In accordance with 1-ECA-1.2, LOCA OUTSIDE CONTAINMENT, which ONE of the following is the correct sequence of operations?

- A. (1) Close LHSI Pump Discharge Valves, 1-SI-MOV-1864A & B then  
(2) Check RCS pressure - INCREASING  
(3) If RCS pressure continues to lower, then Close LHSI Cold Leg Injection Valves ,  
1-SI-MOV-1890C & D, and  
(4) Check RCS pressure – INCREASING again
- B. (1) Close LHSI Cold Leg Injection Valves, 1-SI-MOV-1890C & D and the LHSI Pump  
Discharge Valves, 1-SI-MOV-1864A & B then  
(2) Check RCS pressure – INCREASING only after both sets of valves are closed
- C. (1) Close LHSI Pump Discharge Valves, 1-SI-MOV-1864A &B, then  
(2) Check RVLIS indication - INCREASING  
(3) If RVLIS indication continues to lower, then Close LHSI Cold Leg Injection Valves,  
1-SI-MOV1890C &D, and  
(4) Check RVLIS indication – INCREASING again
- D. (1) Close both the LHSI Cold Leg Injection Valves, 1-SI-MOV-1890C &D, and the LHSI  
Pump Discharge Valves, 1-SI-MOV-1864A & B then  
(2) Check RVLIS indication – INCREASING only after both sets of valves are closed

17. Given the following conditions:

- Unit 1 experienced a loss of all main feedwater from 100% RTP.
- There are no main feedwater pumps available to feed steam generators.
- There are no auxiliary feedwater pumps available to feed steam generators.
- The crew has entered 1-FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK.
- The crew is depressurizing steam generators to establish feed flow from the condensate system.

Which ONE of the choices below completes the following statements?

In accordance with 1-FR-H.1, the crew is required to stop depressurizing all steam generators when any steam generator pressure has lowered to \_\_\_\_ (1) \_\_\_\_ psig.

The reason that steam generator depressurization is stopped at this pressure is to \_\_\_\_ (2) \_\_\_\_.

- A. (1) 100  
(2) minimize stress on the steam generator u-tubes
- B. (1) 100  
(2) prevent nitrogen injection into the reactor coolant system
- C. (1) 190  
(2) minimize stress on the steam generator u-tubes
- D. (1) 190  
(2) prevent nitrogen injection into the reactor coolant system

18. Upon entry into 1-ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, the crew determines that the RCS cooldown rate is 109°F/Hr.

Which ONE of the following identifies the requirement for controlling AFW flow in accordance with 1-ECA-2.1?

- A. Total flow is maintained >340 gpm until ALL SG narrow range levels are >11%.
- B. Total flow is maintained >340 gpm until ANY SG narrow range level is >11%.
- C. Flow is reduced to 100 gpm total flow for all SGs.
- D. Flow is reduced to 100 gpm to each SG.

19.

Given the following conditions:

- Unit 1 is at 20% RTP
- Rod Control Bank Selector Switch is in MANUAL
- Annunciator Panel 1A-G2, RPI ROD BOT ROD DROP, is LIT
- Operators observed NI and RCS Temperature deviations
- Loop Tavg are as follows:
  - A: 541 °F
  - B: 542 °F
  - C: 541 °F

Which ONE of the choices below completes the following statements? (Consider each statement separately)

Based on the given conditions, LCO 3.4.2, RCS Minimum Temperature for Criticality, is \_\_\_\_ (1) \_\_\_\_.

If the CONDITION is NOT met, then REQUIRED ACTION, A.1 of LCO 3.4.2, states: "Be in MODE 2 with  $k_{eff} < 1.0$ ," with a COMPLETION TIME of \_\_\_\_ (2) \_\_\_\_.

- A. (1) met  
(2) 30 minutes
- B. (1) met  
(2) 1 hour
- C. (1) NOT met  
(2) 30 minutes
- D. (1) NOT met  
(2) 1 hour

20. Initial conditions:

- Unit 1 was operating at 100% RTP
- 1-PT-17.1, Control Rod Operability, was in progress
- When Control Bank 'D' rods were stepping back out towards the fully withdrawn position, Rod H2 in Group 1 remained inserted
- Operators entered 1-AP-1.3, CONTROL ROD OUT OF ALIGNMENT

Current conditions:

- The cause of the misaligned rod has been repaired.

Which ONE of the choices below completes the following statements?

Based on the given conditions above, 1-AP-1.3, Attachment 3, Realigning Control Rod –Rod Low, directs the operators to:

Open the lift coil disconnect switches in D Bank for \_\_\_\_ (1) \_\_\_\_ except Rod H2,

AND

Correct the Control Rod System misalignment by placing the Rod Control switch in the \_\_\_\_ (2) \_\_\_\_ position.

- A. (1) Group 1 rods Only  
(2) IN
- B. (1) Group 1 rods Only  
(2) OUT
- C. (1) All rods  
(2) IN
- D. (1) All rods  
(2) OUT

21. Initial Conditions:

- Unit 1 was at 100% rated thermal power
- 1-FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, has been entered.

Current Conditions:

- Operators are performing FR-S.1, Step 5, INITIATE EMERGENCY BORATION OF RCS
- SI has NOT been initiated
- Charging flow is 80 gpm
- The BATP has been placed in FAST
- 1-CH-MOV-1350, Emergency Borate Valve, will NOT open from the Control Room
- Pressurizer pressure is 2350 psig and slowly rising

Based on the Current Conditions, which ONE of the following describes the 1-FR-S.1 required actions to establish emergency boration?

- A. Start a second charging pump and fully open 1-CH-FCV-1122, Charging Flow Control Valve. VERIFY OPEN/OPEN Pressurizer PORVs.
- B. Start a second charging pump and fully open 1CH--FCV-1122, Charging Flow Control Valve. Pressurizer PORVs are NOT required to be opened.
- C. Align the RWST to the charging pump suction and inject the BIT. VERIFY OPEN/OPEN Pressurizer PORVs.
- D. Align the RWST to the charging pump suction and inject the BIT. Pressurizer PORVs are NOT required to be opened.

22.

Unit 1 is operating at 100% power when a Reactor Trip occurs. Given the following conditions:

| Channel | Flux Level               | SUR      |
|---------|--------------------------|----------|
| SR N31  | 0 CPS                    | 0 DPM    |
| SR N32  | 0 CPS                    | 0 DPM    |
| IR N35  | $7 \times 10^{-11}$ amps | -1/3 DPM |
| IR N36  | $4 \times 10^{-11}$ amps | -1/3 DPM |
| PR N41  | 12%                      |          |
| PR N42  | 0%                       |          |
| PR N43  | 0%                       |          |
| PR N44  | 0%                       |          |

Which ONE of the following describes why the Source Range Nuclear Instruments are **NOT** indicating?

- A. 1P-D1, P-6 PERM IR  $>10^{-10}$  BLK SR TRIP, status light is NOT Lit
- B. 1P-D1, P-6 PERM IR  $>10^{-10}$  BLK SR TRIP, status light is LIT
- C. 1P-D2, P-10 PERM PR  $>10\%$  BLK NIS LP TRIPS, status light is NOT Lit
- D. 1P-D2, P-10 PERM PR  $>10\%$  BLK NIS LP TRIPS, status light is LIT

23. Initial Conditions:

- Maintenance was performed on N-35 which required de-energization of N-35
- All fuses have been removed

Current Conditions:

- I & C is performing re-energization of Intermediate Range N-35 by installing fuses IAW 1-ICP-NI-N-35, NIS Intermediate Range Ch. 1 N-35 Calibration.

Which ONE of the choices below completes the following statement?

Installation of the \_\_\_\_ (1) \_\_\_\_ fuses will reenergize the N-35 instrument drawer \_\_\_\_ (2) \_\_\_\_ the bistables.

- A. (1) Instrument power  
(2) and
- B. (1) Instrument power  
(2) but NOT
- C. (1) Control power  
(2) and
- D. (1) Control power  
(2) but NOT



24. Initial conditions:

- Unit 1 is in a Refueling Outage.
- Unit 1 Containment Purge and Exhaust is in operation.
- Containment Supply Fan, 1-HV-F-4A, and Exhaust Fan, 1-HV-F-5A, are running
- Unit 2 is at 100% RTP

Current conditions:

- A HI and HI-HI Radiation Alarms are received on 1-RM-RMS-162, Manipulator Crane Area Radiation Monitor.
- No other Radiation Monitors are in alarm
- No operator actions have occurred

Which ONE of the choices below completes the following statements?

Based on the current conditions, the Containment Purge Supply and Exhaust fans \_\_\_\_ (1) \_\_\_\_ automatically trip; and

the Main Control Room supply and exhaust ventilation dampers \_\_\_\_ (2) \_\_\_\_ automatically close.

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

25. Given the following conditions:

- Unit 1 has just been placed on line
- Annunciator A-G1, CNDSR LO VAC C-9 PERM NOT AVAIL, has just alarmed
- The reactor operator observes main condenser pressure at 4" Hg abs and degrading.
- Reactor power is 25% and increasing at 0.3%/minute

Which ONE of the following is the required team response in accordance with 1-AP-14, LOW CONDENSER VACUUM?

- A. Reduce turbine load until vacuum is stable.
- B. Trip the turbine and go to 1-AP-2.1, TURBINE TRIP WITHOUT REACTOR TRIP REQUIRED, while continuing with 1-AP-14.
- C. Initiate 1-AP-2.2, FAST LOAD REDUCTION.
- D. Trip the reactor and go to 1-E-0, REACTOR TRIP OR SAFETY INJECTION, while continuing with 1-AP-14.

26. Which ONE of the choices below completes the following statements about the area radiation monitor 1-RM-RMS-154, Auxiliary Building Control Area?

An advantage of this monitor's detector is that it \_\_\_\_ (1) \_\_\_\_.

A disadvantage of this monitor's detector is that it \_\_\_\_ (2) \_\_\_\_.

- A. (1) can discriminate radiation energies  
(2) has a long dead time
- B. (1) can discriminate radiation energies  
(2) has a short dead time
- C. (1) is sensitive  
(2) has a long dead time
- D. (1) is sensitive  
(2) has a short dead time

27. Initial Conditions:

- A loss of Offsite power has occurred
- The operating crew has transitioned to 1-ES-0.2A, NATURAL CIRCULATION COOLDOWN WITH CRDM FANS

Current Conditions:

- Offsite power has been restored
- Conditions to start the 'B' or 'C' RCPs per 1-OP-5.2, REACTOR COOLANT PUMP STARTUP AND SHUTDOWN, are **NOT** met
- All conditions to start the 'A' RCP per 1-OP-5.2 are met
- The crew has identified a loss of seal cooling to the 'A' RCP
- An engineering status evaluation has **NOT** yet been performed for the 'A' RCP

Which ONE of the choices below completes the following statements?

Based on the current conditions, in accordance with the CONTINUOUS ACTION PAGE for 1-ES-0.2A, operators \_\_\_\_ (1) \_\_\_\_ required to attempt to start the 'A' RCP.

If the appropriate subcooling or pressurizer level setpoints on the CONTINUOUS ACTION PAGE for 1-ES-0.2A are reached, THEN operators are directed to \_\_\_\_ (2) \_\_\_\_ AND GO TO 1-E-0, REACTOR TRIP OR SAFETY INJECTION, STEP 1.

- A. (1) are  
(2) manually start Charging pumps and align the BIT as necessary
- B. (1) are  
(2) manually initiate SI
- C. (1) are NOT  
(2) manually start Charging pumps and align the BIT as necessary
- D. (1) are NOT  
(2) manually initiate SI

28. 1-RC-P-1A seal parameters indicate as follows on PCS:

- SEAL #1 OUTLET PRESSURE = 2235 PSIG
- SEAL #2 OUTLET PRESSURE = 1700 PSIG
- SEAL LEAK-OFF HI-RNG FLOW = 3.6 GPM
- SEAL LEAK -OFF LO-RNG FLOW = 1.0 GPM
- SEAL #1 DELTA-P = 0 PSI
- SEAL #2 DELTA-P = 535 PSI
- SEAL #3 DELTA-P = 1670 PSI

In accordance with 1-AP-33.1, REACTOR COOLANT PUMP SEAL FAILURE, which ONE of the following describes the condition of the seal package?

- A. #1 and #2 seals degraded
- B. #1 degraded and #2 seal failed
- C. #1 and #2 seals failed
- D. #1 seal failed and #2 seal degraded

29. Given the following:

- The bearing lift pump for 1-RC-P-1C has been started
- Seal injection flow is 5 gpm
- Stator Cooler flow is 120 gpm
- Thermal Barrier flow is 50 gpm

Which ONE of the choices below completes the following statement?

In accordance with 1-OP-5.2 (REACTOR COOLANT PUMP STARTUP AND SHUTDOWN), RCP 1-RC-P-1C may be started \_\_\_\_\_.

- A. without any further adjustments
- B. after adjusting seal injection flow
- C. after adjusting stator cooler flow
- D. after adjusting thermal barrier flow

30. Given the following initial conditions:

- Unit 1 was operating at 100% RTP
- Volume Control Tank (VCT) level controls were aligned for automatic make-up
- VCT level was 40% and stable

Current conditions:

- One of the VCT Level Instruments begins to fail high slowly.

Which ONE of the choices below completes the following statement?

Based on the current conditions, when VCT level transmitter \_\_\_\_ (1) \_\_\_\_ reaches a VCT level of \_\_\_\_ (2) \_\_\_\_, THEN 1-CH-LCV-1115A, VCT Level Control, will automatically **begin** to modulate open.

- A. (1) LT-1112  
(2) 71%
- B. (1) LT-1112  
(2) 76%
- C. (1) LT-1115  
(2) 71%
- D. (1) LT-1115  
(2) 76%

31. Unit 1 is operating at 100% power with all equipment operable and the following charging pump configuration:

- 1-CH-P-1A is tagged out.
- 1-CH-P-1B is in AUTO-AFTER-STOP.
- 1-CH-P-1C (norm) is running.

The normal feeder breaker to the 'F' transfer bus (15F1) spuriously opens.

Which ONE of the choices below completes the following statements on the final charging pump configuration? (Assume no operator actions)

1-CH-P-1B is \_\_\_\_ (1) \_\_\_\_.

1-CH-P-1C is \_\_\_\_ (2) \_\_\_\_.

- A. (1) AUTO STANDBY  
(2) running
- B. (1) locked out  
(2) running
- C. (1) running  
(2) running
- D. (1) running  
(2) locked out



32. Operators are performing a cooldown to MODE 5 on Unit 1 to comply with Technical Specifications requirements.

Which ONE of the choices below completes the following statement?

In order to OPEN Residual Heat Removal (RHR) inlet isolation valves 1-RH-MOV-1700 and 1-RH-MOV-1701, RCS pressure must be below a MAXIMUM (setpoint value) of \_\_\_\_ (1) \_\_\_\_.

If wide-range pressure transmitter 1-RC-PT-1402 were to fail high, residual heat removal inlet isolation valves 1-RH-MOV-1700 and 1-RH-MOV-1701 \_\_\_\_ (2) \_\_\_\_ automatically close.

- A. (1) 418 psig  
(2) will
- B. (1) 418 psig  
(2) will NOT
- C. (1) 467 psig  
(2) will
- D. (1) 467 psig  
(2) will NOT

33. Given the following:

Initial Conditions:

- Unit 1 was shutdown 11 days ago for a refueling outage.
- BOTH RHR HXs are in-service.

Current Conditions:

- The Control room is performing 1-AP-11, LOSS OF RHR.
- Tave = 276 °F
- Total RHR flow is 3000 gpm
- 1-CC-MOV-100A, RHR heat exchanger return valve, Closed due to an electrical short.
- You have been assigned to evaluate the requirements of 1-AP-11, Step 5 (b) "Check RHR flow – LESS THAN OR EQUAL TO DESIGN FLOW ATTACHMENT 3."

Which ONE of the choices below completes the following statements?

Based on the current conditions, in accordance with 1-AP-11, the 'A' RHR HX \_\_\_\_ (1) \_\_\_\_ be considered for use and flow \_\_\_\_ (2) \_\_\_\_.

**REFERENCE PROVIDED**

- A. (1) can  
(2) can remain at current flow rate
- B. (1) can NOT  
(2) can remain at current flow rate
- C. (1) can  
(2) is required to be lowered
- D. (1) can NOT  
(2) is required to be lowered

34. Given the following:

Initial conditions:

- Unit 1 is at 75% power
- Charging Pump '1A' is in service supplying its associated loads.

Current conditions:

- 1-EI-CB-21C Annunciator B6, CH-P-1A-B-C LUBE OIL HI TEMP, is in ALARM.

Which ONE of the choices below completes the following statements?

The Charging Pump 1A Lube Oil Sump Cooler is normally cooled by Service Water from \_\_\_\_ (1) \_\_\_\_.

1-SW-TCV-102A, 1A Charging Pump Service Water Outlet Temp Control Valve, controls flow through the \_\_\_\_ (2) \_\_\_\_.

- A. (1) A SW Header Only  
(2) Lube Oil Cooler Only
- B. (1) Both "A" and "B" SW Headers  
(2) Gear Box and Lube OIL Cooler
- C. (1) A SW Header Only  
(2) Gear Box and Lube OIL Cooler
- D. (1) Both "A" and "B" SW Headers  
(2) Lube Oil Cooler Only

35. Given the following conditions:

- Unit 2 RCS Pressure is 1500 psig
- Tave is 396°F
- SI Accumulator Pressures are as follows:
  - "A" = 650 psig
  - "B" = 680 psig
  - "C" = 590 psig

Before any operator actions occur, and based on the given conditions...

Which ONE of the following is the applicable REQUIRED ACTION with the most restrictive COMPLETION TIME required by Technical Specifications LCO 3.5.1, Accumulators?

- A. Restore ECCS Accumulator "B" ONLY to OPERABLE status within 1 hour.
- B. Restore ECCS Accumulator "C" ONLY to OPERABLE status within 1 hour.
- C. Restore RCS pressure to less than 1000 psig within 1 hour.
- D. Enter LCO 3.0.3 Immediately.

### 36. Initial Conditions

- Unit 1 is at 100% power when annunciator 1B-H1, PRZ RELIEF TK HI TEMP, is received.
- The OATC confirms the alarm is valid, and notes that PRT level, pressure, and temperature have been slowly increasing since assuming the watch 3 hours ago.

Which ONE of the choices below completes the following statements?

The cause of these conditions in the PRT is \_\_ (1) \_\_.

To drain the heated water from the PRT, it will be drained to the PDTT, and then the PDTT will be pumped **directly** to the \_\_ (2) \_\_.

- A. (1) 1-CH-RV-1203, Regen HX Letdown Header Relief Valve, leaking by  
(2) in-service Boron Recovery Tank
- B. (1) 1-CH-RV-1203, Regen HX Letdown Header Relief Valve, leaking by  
(2) Gas Stripper
- C. (1) Reactor Vessel Flange O-ring leakage  
(2) in-service Boron Recovery Tank
- D. (1) Reactor Vessel Flange O-ring leakage  
(2) Gas Stripper

37. Given the following conditions:

- Unit 1 Component Cooling Water (CCW) System is cross-tied with the Unit 2 CCW System
- The "Controlling PCV" (1-CC-PCV-110 for Unit 1) is set between 90 and 95 psig

Which ONE of the choices below completes the following statement?

The "Backup PCV" (2-CC-PCV-210 for Unit 2) is required to be set 5 to 10 psig \_\_\_\_ (1) \_\_\_\_ than that maintained by the "Controlling PCV" in order to maintain steady CCW \_\_\_\_ (2) \_\_\_\_.

- A. (1) greater  
(2) supply header pressure
- B. (1) less  
(2) return header pressure
- C. (1) greater  
(2) return header pressure
- D. (1) less  
(2) supply header pressure

38. Initial condition:

- Unit 1 is at 100% reactor power.

Current conditions:

- Pressurizer PORV 1-RC-PCV-1455C starts leaking by.
- OATC observes pressurizer pressure indicating 2205 psig and slowly lowering.
- No operator action has been taken.

Which ONE of the choices below completes the following statements?

Based on the current conditions, the pressurizer backup heaters \_\_\_\_ (1) \_\_\_\_ be energized, and if pressure lowers to 2000 psig, the pressurizer PORV Block valves, 1-RC-MOV-1535 and 1-RC-MOV-1536 \_\_\_\_ (2) \_\_\_\_ receive a close signal.

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

39. Which ONE of the choices below completes the following statement?

The Over-Power Delta-Temperature (OPDT) Reactor trip setpoint at 100% power is \_\_\_\_ (1) \_\_\_\_ the OPDT Reactor trip setpoint at the Point of Adding Heat (POAH).

AND

The Over-Temperature Delta-Temperature (OTDT) Reactor trip setpoint at 100% power is \_\_\_\_ (2) \_\_\_\_ the OTDT Reactor trip setpoint at the POAH.

- A. (1) approximately the same as  
(2) different from
- B. (1) approximately the same as  
(2) approximately the same as
- C. (1) different from  
(2) approximately the same as
- D. (1) different from  
(2) different from



40. Initial Conditions:

- An automatic Reactor Trip and Safety Injection (SI) were initiated on "Lo-Lo Pressurizer Pressure" SI signal.
- The reactor did NOT automatically trip
- An operator in the field performed 1-FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, attachment 4, REMOTE REACTOR TRIP.
- All rods have fully inserted.

Current Conditions:

- 1-E-0, REACTOR TRIP OR SAFETY INJECTION, is now in progress
- The reactor trip breakers remain **closed**
- RCS pressure is 1700 psig
- You have been directed to RESET BOTH TRAINS OF SI.

Which ONE of the choices below completes the following statements?

The crew must wait a minimum of \_\_\_\_ (1) \_\_\_\_ seconds after SI is actuated before the SI actuation reset timing delay is satisfied.

AND

Based on current conditions, when the SI reset switches on the Main Control Board are taken to the RESET position, subsequent automatic SI signals \_\_\_\_ (2) \_\_\_\_ be blocked .

- A. (1) 120  
(2) will NOT
- B. (1) 120  
(2) will
- C. (1) 60  
(2) will NOT
- D. (1) 60  
(2) will

#### 41. Initial Conditions

- Unit 1 is at 100% power.
- Containment Pressure Protection Instrument channel 1-LM-PT-100A (Ch. I) failed and was declared inoperable.
- The crew entered 1-AP-3, LOSS OF VITAL INSTRUMENTATION.

#### Current Conditions

- 1-LM-PT-100A (Ch.I) was placed in TEST IAW 1-MOP-55.75, CONTAINMENT PRESSURE PROTECTION INSTRUMENTATION.

*All applicable steps of 1-MOP-55.75 were completed*

Which ONE of the following best describes the current coincidence logic of the HIGH CONTAINMENT PRESSURE SAFETY INJECTION \_\_ (1) \_\_ and HIGH-HIGH CONTAINMENT PRESSURE CDA/PHASE B \_\_ (2) \_\_?

(1) HIGH CONTAINMENT  
PRESSURE SI

---

(2) HIGH-HIGH  
CONTAINMENT PRESSURE  
CDA/PHASE 'B'

---

- |    |     |     |
|----|-----|-----|
| A. | 2/3 | 2/4 |
| B. | 1/2 | 2/3 |
| C. | 2/3 | 2/3 |
| D. | 1/2 | 2/4 |

42. Which ONE of the choices below completes the following statement?

LCO 3.6.5, Containment Air Temperature, states the following: "Containment average air temperature shall be  $\geq$  \_\_\_\_ (1) \_\_\_\_ and  $\leq$  \_\_\_\_ (2) \_\_\_\_."

A. (1) 81°F  
(2) 105°F

B. (1) 81°F  
(2) 115°F

C. (1) 86°F  
(2) 105°F

D. (1) 86°F  
(2) 115°F

43. Initial plant conditions:

- Unit 1 was operating at 100% power when a Large Break LOCA in containment occurred
- 1-E-1, LOSS OF REACTOR OR SECONDARY COOLANT has been performed
- 1-ES-1.3, TRANSFER TO COLD LEG RECIRCULATION is in progress
- The crew is at step 7, "Verify RWST Level- Less than 15%," waiting for RWST level to reach 15% before continuing.

Current plant conditions:

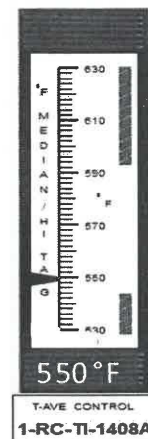
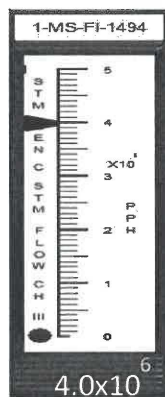
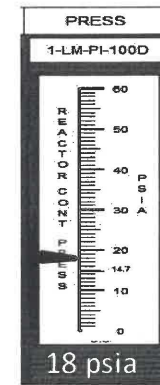
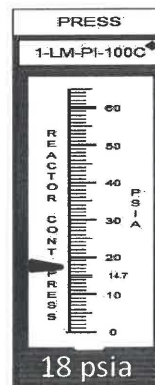
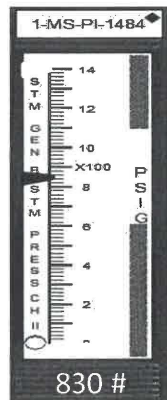
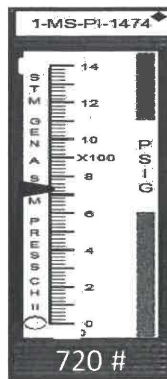
- RWST level is 21% and lowering
- Inside Recirc Spray Pumps and Outside recirc Spray Pumps amps are oscillating
- Inside Recirc Spray Pumps and Outside Recirc Spray Pump flows are oscillating
- Inside Recirc Spray Pump and Outside Recirc Spray Pump discharge pressures are oscillating
- Alarm Panel 1J B-5 RS PP 1A OR 1B VIBRATION is in alarm
- Alarm Panel 1J B-6 RS PP 2A OR 2B VIBRATION is in alarm

Which ONE of the choices below completes the following statement?

The cause of the current plant conditions is \_\_\_\_ (1) \_\_\_\_ and, based on the current conditions, operators are required to \_\_\_\_ (2) \_\_\_\_ .

- A. (1) sump blockage  
(2) continue in 1-ES-1.3 when RWST level reaches 15%
- B. (1) low Sump Level  
(2) continue in 1-ES-1.3 when RWST level reaches 15%
- C. (1) sump blockage  
(2) immediately implement 1-ES-1.3 Attachment 3, CONTAINMENT SUMP STRAINER BLOCKAGE OR LOSS OF SUCTION
- D. (1) low Sump Level  
(2) immediately implement 1-ES-1.3 Attachment 3, CONTAINMENT SUMP STRAINER BLOCKAGE OR LOSS OF SUCTION

44. Unit 1 was operating at 100% power when an event occurred that resulted in the indications below. (Assume Each Steam Generator's redundant transmitters are reading the same, and assume the 100% Steam Flow value is  $4.2 \times 10^6$  PPH)



Based on the above indications, which ONE of the following describes the reason the Main Steam Line Trip Valves will close automatically?

- A. Steam flow and Steam pressure
- B. Steam flow and Average coolant temperature
- C. Containment Pressure
- D. Steam Pressure only

45. Which ONE of the choices below completes the following statement?

Unit 1 is at 100% power when a lightning strike on the unit causes the Main feed Reg valves to fully open. When a high-high level setpoint of \_\_\_\_ (1) \_\_\_\_ on \_\_\_\_ (2) \_\_\_\_ channels is sensed on at least one steam generator, automatic feedwater isolation will occur.

- A. (1) 65%  
(2) 2 of 3
- B. (1) 65%  
(2) 1 of 2
- C. (1) 75%  
(2) 2 of 3
- D. (1) 75%  
(2) 1 of 2

46. The crew is performing a cooldown in accordance with ES-0.2A, NATURAL CIRCULATION COOLDOWN WITH CRDM FANS.

Which ONE of the following actions will cause both the cooldown rate and the Reactor Coolant System flow rate to rise?

- A. Starting more CRDM fans.
- B. Raising the setpoint on the steam dumps in automatic.
- C. Lowering the output of the steam dump controller in manual.
- D. Raising auxiliary feedwater flow to the steam generators.

47. Given the following conditions:

- The unit is in mode 1
- 1-PT-82H, 1H EMERGENCY DIESEL GENERATOR SLOW START TEST, is in progress.
- Annunciator 1H-A6, EMER DG #1H SWITCH NOT IN AUTO REMOTE, is in alarm.
- 1H EDG is paralleled to the grid and is at full load.

Which ONE of the choices below completes the following statements?

In this mode of operation, the Main Control Room "Normal Stop" pushbuttons\_\_\_\_(1)\_\_\_\_ stop the diesel.

Based on the current condition of the EDG, if the normal offsite feeder breaker to the 1H Bus were to trip open, then the load on the EDG would be expected to \_\_\_\_ (2) \_\_\_\_.

- A. (1) will  
(2) remain the same
- B. (1) will NOT  
(2) remain the same
- C. (1) will  
(2) decrease
- D. (1) will NOT  
(2) decrease



48. Which ONE of the choices below completes the following statements?

With both units at 100% power in a normal electrical alignment, a \_\_\_\_ (1) \_\_\_\_ signal WILL automatically trip the 1-EP-BKR-15F1, 'C' RSS Transformer Normal Feed, AND

subsequently remove the normal power supply from the \_\_\_\_ (2) \_\_\_\_ bus?

- A. (1) 'C' RSST undervoltage (upstream)  
(2) 1H
- B. (1) 'C' RSST undervoltage (upstream)  
(2) 2H
- C. (1) 'C' RSST feeder breakers (one of two) open  
(2) 1H
- D. (1) 'C' RSST feeder breakers (one of two) open  
(2) 2H

49. Given the following conditions:

- Unit 2 is operating at 75% rated thermal power
- The DC breaker for the 20-AST-2, Backup Master Trip Solenoid, solenoid has tripped

Which ONE of the following automatic turbine trip signals is impacted by the given conditions?

- A. EHC Controller Cabinet Power Failure
- B. Anti-Motoring
- C. Electrical Overspeed
- D. Switchyard Backup Lockout (86SWBU)

50. Given the following:

- The 1H Emergency Diesel Generator was started for a PT
- The Mode Selector switch is in MAN-LOCAL.
- The EDG speed is at 900 rpm and stable

Which ONE of the choices below completes the following statement?

The condition that would cause the 1H Emergency Diesel Generator to trip is \_\_\_\_\_.

- A. low lube oil temperature
- B. low crankcase pressure
- C. high fuel oil pressure
- D. high jacket cooling temperature

51. Given the following conditions:

- Unit 1 was at 100% RTP with a normal electrical alignment
- An electrical fault resulted in 1-EE-BKR-15J8, 1J 480V Emergency Busses Feeder Breaker, opening.
- The 1J Emergency Diesel Generator (EDG) did not start
- No operator actions have occurred and the 1J 480V bus remains de-energized

Which ONE of the choices below completes the following statements?

Based on the given conditions, the '1J' EDG Lead Fuel Oil Transfer Pump <sup>*1-EG-P-1JA*</sup> is \_\_\_\_ (1) \_\_\_\_;

AND

the '1J' EDG Standby Fuel Oil Transfer Pump <sup>*1-EG-P-1JB*</sup> is \_\_\_\_ (2) \_\_\_\_ .

- A. (1) energized  
(2) energized
- B. (1) energized  
(2) de-energized
- C. (1) de-energized  
(2) energized
- D. (1) de-energized  
(2) de-energized

52. Initial Conditions:

- Unit 1 is at 100% RTP.
- SGTR event occurs.
- Annunciator 1K-D4; RAD MONITOR SYST HI-HI RAD LEVEL, Alarms
- 1-SV-RM-121, Unit 1 condenser air ejector monitor, is reading high.

Current Conditions:

- Phase 'A' Containment Isolation has occurred.

Which ONE of the choices below completes the following statements?

AFTER 1K-D4 alarmed but BEFORE the Phase 'A' Containment Isolation, the Air Ejector Exhaust was aligned to \_\_(1)\_\_\_ .

AFTER the Phase 'A' Containment Isolation, the Air Ejector Exhaust status is \_\_(2)\_\_\_ .

- A. (1) Ventilation Vent Stack  
(2) discharging to Containment
- B. (1) Containment  
(2) discharging to Containment
- C. (1) Ventilation Vent Stack  
(2) secured
- D. (1) Containment  
(2) secured

53. Which ONE of the choices below completes the following statement?

With only one CCHX in-service on a service water header and with only one service water pump operable and in-service on the header (no other pump in automatic on that header), the maximum differential pressure on the service water side of the in-service CCHX is \_\_\_\_\_.

- A. 20 psid
- B. 25 psid
- C. 50 psid
- D. 150 psid

54. Given the following conditions:

- Unit 1 is in day 15 of a refueling outage.
- Unit 2 is operating at 100% power
- Annunciator 1F-F8, SAND FLTR IA SUPPLY LO PRESS, is received on Unit 1.
- Operators note instrument air pressure is 92 psig and rapidly lowering.
- The Unit 2 crew initiates 2-AP-28, LOSS OF INSTRUMENT AIR.

Which ONE of the choices below completes the following statements?

When instrument air pressure decreases to less than \_\_\_\_ (1) \_\_\_\_, the Unit 2 crew must go to 2-E-0, REACTOR TRIP OR SAFETY INJECTION, and close all main steam trip valves.

This action is required since low instrument air pressure may cause a \_\_\_\_ (2) \_\_\_\_ safety injection due to closure of a single trip valve.

- A. (1) 70 psig  
(2) high steam line differential pressure
- B. (1) 70 psig  
(2) high steam flow
- C. (1) 94 psig  
(2) high steam line differential pressure
- D. (1) 94 psig  
(2) high steam flow

55. Initial Conditions:

- Unit 1 is at 100% RTP
- 1-CV-P-3A, 'A' Containment Vacuum Pump, is running and lined up to lower Containment pressure.
- Phase 'A' Containment Isolation has occurred.

Which ONE of the choices below completes the following statement?

With no operator action, BOTH Containment vacuum pump suction valves (1-CV-TV-150A/B) \_\_\_\_ (1) \_\_\_\_ open and Containment Vacuum Pump 3A (1-CV-P-3A) \_\_\_\_ (2) \_\_\_\_ running.

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



56. Given the following:

- A manual Reactor Trip was attempted from the control room.
- The reactor did NOT trip.
- 1-FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, has been implemented.
- An Operator has been dispatched to perform Attachment 4, REMOTE REACTOR TRIP.

Where will the Operator go and what breakers will the Operator **first** attempt to open, in accordance with attachment 4 of 1-FR-S.1?

- A. 307 Switchgear to locally trip 1-EP-BKR-14B1-4, 1-ED-MG-1A Rod Drive M-G Set Motor Supply Breaker and 1-EP-BKR-14C2-12, 1-ED-MG-1B Rod Drive M-G Set Motor Supply Breaker.
- B. Rod Drive Room to locally trip 1-EP-BKR-14B1-4, 1-ED-MG-1A Rod Drive M-G Set Motor Supply Breaker and 1-EP-BKR-14C2-12, 1-ED-MG-1B Rod Drive M-G Set Motor Supply Breaker.
- C. Rod Drive Room to trip 1-EP-BKR-RTA/RTB reactor trip breakers and 1-EP-BKR-BYA/BYB reactor trip bypass breakers.
- D. 307 Switchgear to trip 1-EP-BKR-RTA/RTB reactor trip breakers and 1-EP-BKR-BYA/BYB reactor trip bypass breakers.

57. Given the following:

- Unit 1 – 100% RTP
- 1-RC-TE-1412E, Loop 1 Cold Leg Temperature, has failed HIGH.

Which ONE of the choices below completes the following statements?

Annunciator 1B-B8, LOOP 1A-B-C Delta T DEVIATION, \_\_ (1) \_\_ Alarming

The Unit 1 Rod Insertion Limits are \_\_ (2) \_\_.

- A. (1) is  
(2) unchanged
- B. (1) is NOT  
(2) unchanged
- C. (1) is  
(2) lower than BEFORE the failure
- D. (1) is NOT  
(2) lower than BEFORE the failure

58. Given the following conditions:

- Unit 1 – 100% RTP
- Pressurizer Level transmitter 1-RC-LT-1461 is selected to level channel LC-1459
- Pressurizer Level transmitter 1-RC-LT-1460 is selected to level channel LC-1460
- PZR Level drops to 14%

Which ONE of the choices below completes the following statements?

Based on the given conditions, LC-460 \_\_ (1) \_\_ shut CVCS Letdown Isolation Valves 1-CH-LCV-1460B, 1-CH-HCV-1200A, 1-CH-HCV-1200B and 1-CH-HCV-1200C; **AND**

LC-460 \_\_ (2) \_\_ open 1-CH-FCV-1122, Charging Flow Control Valve, to increase the charging flow to the RCS.

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

59. Given the following condition:

- Unit 1 is at 40% RTP.

Which ONE of the choices below completes the following statement?

Annunciator 1A-F1, COMPUTER ALARM ROD DEV/SEQ, will **FIRST** alarm when \_\_\_\_ (1) \_\_\_\_ position indication differs from demand position by greater than \_\_\_\_ (2) \_\_\_\_?

- A. (1) individual rod  
(2) 10 steps
- B. (1) individual rod  
(2) 24 steps
- C. (1) control bank group  
(2) 10 steps
- D. (1) control bank group  
(2) 24 steps

60. Initial Conditions:

Core Exit Thermocouple (CET) readings are as follows:

B05 = 604°F  
D03 = 605°F  
D05 = 607°F  
E04 = 605°F  
G02 = 606°F  
H05 = 604°F  
H09 = 608°F

Current Conditions:

CET B05 fails to 2200°F

All other CETs remained unchanged

Based on the above information which ONE of the choices below completes the following statement?

The calculated "AVG 5 HIGH" CET indication \_\_\_\_ (1) \_\_\_\_ be affected and the "SUBCOOL (T/C)" calculation \_\_\_\_ (2) \_\_\_\_ be affected.

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

61. Which ONE of the choices below completes the following statement?

The containment minimum DESIGN pressure is \_\_\_\_\_ psia.

A. 10.3

B. 9.2

C. 8.6

D. 5.5

62. Given the following:

- A major rupture has occurred in the Spent Fuel Pit liner.
- The crew has entered 0-AP-27, MALFUNCTION OF SPENT FUEL PIT SYSTEM.
- All makeup sources are available for use.

Which ONE of the choices below completes the following statements?

In accordance with 0-AP-27, the preferred source of high volume makeup is \_\_\_\_ (1) \_\_\_\_.

In order to comply with T.S. 3.7.16, Fuel Storage Pool Water Level, a minimum of \_\_\_\_ (2) \_\_\_\_ ft. over the top of the irradiated fuel assemblies will be required.

- A. (1) Lake Anna  
(2) 23
- B. (1) Service Water  
(2) 23
- C. (1) Lake Anna  
(2) 25.1
- D. (1) Service Water  
(2) 25.1

63. Given the following:

Initial Conditions:

- Unit 1 is at 50% rated thermal power.
- 'B' and 'C' MFW pumps are tagged out.

Current Conditions:

- 'A' MFW pump has tripped.
- The OATC attempted to trip the Reactor, but the Reactor Trip Breakers did NOT open.

Which ONE of the choices below completes the following statement?

AMSAC is designed to automatically open the Control Rod Drive MG \_\_\_\_\_ after level in 2/3 SGs reaches 13% NR.

- A. supply breakers, 27 seconds
- B. output breakers, 27 seconds
- C. supply breakers, immediately
- D. output breakers, immediately



64. Initial conditions:

- 1-LW-PCV-115, Liquid Waste Discharge Valve, is in AUTO and OPEN.
- The Clarifier System is in-service with Holdup Tank Inlet Valve, 1-LW-FCV-100 OPEN

Current Conditions:

- 1-LW-RM-110, Clarifier Hold up Tank Inlet Header Rad Monitor, causes annunciator 1K-D2, RAD MONITOR SYSTEM HI RAD LEVEL, to alarm.

Which ONE of the choices below completes the following statement?

Liquid waste discharge valve, 1-LW-PCV-115 \_\_\_\_ (1) \_\_\_\_ close, and the inlet valve on the clarifier holdup tank, 1-LW-FCV-100 \_\_\_\_ (2) \_\_\_\_ close.

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

65. Given Conditions:

- Unit 1 AND Unit 2 – 100% RTP.
- Service Water system in reservoir-to-reservoir operation.
- 1-SW-P-1A and 1-SW-P-1B are in service
- At 0930, 4160V bus 1H experiences an undervoltage condition.
- At 0932, the undervoltage condition on 4160V bus 1H clears

Current conditions:

- Time is now 0934

Which ONE of the choices below completes the following statement?

Based on the above conditions, with no operator actions, the \_\_\_\_ (1) \_\_\_\_ pump tripped AND \_\_\_\_ (2) \_\_\_\_ automatically restarted.

- A. (1) 1-SW-P-1A  
(2) has
- B. (1) 1-SW-P-1A  
(2) has NOT
- C. (1) 1-SW-P-1B  
(2) has
- D. (1) 1-SW-P-1B  
(2) has NOT

66. Given the following:

- You are the oncoming Reactor Operator.
- You have been off shift for 14 days.

Which ONE of the choices below completes the following statement?

In accordance with OP-AA-100, Conduct of Operations, you would be expected to review logs and temporary orders for the duration of your absence or \_\_\_\_ (1) \_\_\_\_ whichever is \_\_\_\_ (2) \_\_\_\_.

- A. (1) 7 days  
(2) more
- B. (1) 7 days  
(2) less
- C. (1) 3 days  
(2) more
- D. (1) 3 days  
(2) less

67. Unit 1 tripped on January 1, 2017 @ 0100 for a scheduled refueling outage. Which one of the following is the earliest date and time that fuel offload can begin?

A. January 2, 2017 @ 0200

B. January 3, 2017 @ 0200

C. January 4, 2017 @ 0600

D. January 5, 2017 @ 0600

68. Given the following:

- Unit 1 and Unit 2 are both stable at 100% steady-state power.

In accordance with OP-AP-300, Reactivity Management, which ONE of the following requires Unit 1 to reduce power prior to performing the evolution?

- A. Raising Letdown temperature
- B. Swapping Aux Steam supply from Unit 1 to Unit 2
- C. Returning a Unit 1 1<sup>st</sup> point FW heater to service
- D. Performing Unit 1 Turbine Driven AFW pump PT

69. Which ONE of the choices below completes the following statements?

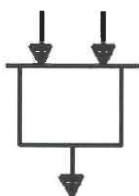
In accordance with Technical Specifications, during a refueling outage, the unit transitions from MODE 5, COLD SHUTDOWN, to MODE 6, REFUELING, when \_\_\_\_ (1) \_\_\_\_ .

In accordance with Technical Specifications, after all the fuel has been moved from the Reactor Vessel to the Spent Fuel Pool, the unit is \_\_\_\_ (2) \_\_\_\_ .

- A. (1) the FIRST reactor vessel head bolt is less than fully tensioned  
(2) in MODE 6
- B. (1) the FIRST reactor vessel head bolt is less than fully tensioned  
(2) not in any MODE
- C. (1) ALL reactor vessel head bolts are less than fully tensioned  
(2) in MODE 6
- D. (1) ALL reactor vessel head bolts are less than fully tensioned  
(2) not in any MODE

70. Given the following:

Symbol A



Symbol B



Symbol C



Symbol D



In accordance with North Anna Power Station Solid State Protection System Schematic NA-DW-1082H41, which ONE of the following symbols is a logic component whose output signal remains unchanged following a loss of the input signal(s)?

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

71. Given:

- Unit 1 – 100% RTP.
- High Capacity Steam Generator Blowdown System is in operation.
- 'A' Steam Generator has a tube leak in progress
- A Hi-Hi trip alarm is received on SS-RM-125, EFFLUENT DISCHARGE FROM 1-BD-E-2A/B.
- 1-BD-FCV-102A, B & C, SG To BD Recovery TK Flow Cont. Vlv, close to isolate input to the Blowdown Flash Tank.
- The valves downstream of the flash tank all remain open, dumping the contents to the circulating water tunnel.

Which ONE of the choices below completes the following statement?

This release is considered \_\_ (1) \_\_ AND \_\_ (2) \_\_ .

- A. (1) Planned  
(2) Unmonitored
- B. (1) Planned  
(2) Monitored
- C. (1) Unplanned  
(2) Unmonitored
- D. (1) Unplanned  
(2) Monitored



72. Which ONE of the choices below completes the following statements?

In accordance with 10-CFR-20, Standards for Protection Against Radiation, a radiation workers total effective dose equivalent (TEDE) is limited to \_\_\_\_ (1) \_\_\_\_ rem per year.

The annual 10-CFR-20 limit to the lens of the eye is \_\_\_\_ (2) \_\_\_\_ rem per year.

- A. (1) 3  
(2) 50
- B. (1) 5  
(2) 50
- C. (1) 3  
(2) 15
- D. (1) 5  
(2) 15

73. Given the following conditions:

Initial Conditions:

- The crew has just entered 1-E-0, REACTOR TRIP OR SAFETY INJECTION.

Current Conditions:

- The crew has completed the immediate actions when one of the Operators notices the 'B' SG is faulted
- Secondary heat sink requirements are satisfied.

Based on the current conditions, which ONE of the choices below completes the following statements?

OP-AP-104, Emergency and Abnormal Operating Procedures, \_\_\_\_ (1)\_\_\_\_ require verbalizing the performance of immediate operator actions.

AND

1-E-0 \_\_\_\_ (2)\_\_\_\_ allow isolating feedwater flow to the B steam generator prior to the transition to 1-E-2, FAULTED STEAM GENERATOR ISOLATION.

- A. (1) does  
(2) does
- B. (1) does  
(2) does NOT
- C. (1) does NOT  
(2) does
- D. (1) does NOT  
(2) does NOT

74. Given the following conditions:

- Unit 1 is currently at 8% as indicated by all power range nuclear instruments.
- Turbine impulse pressure is 7%.

Based on the given conditions, which ONE of the following would result in an automatic Reactor Trip?

- A. Pressurizer Pressure – 2380 psig
- B. Pressurizer Water Level – 94%
- C. Two Reactor Coolant Pumps – Tripped
- D. Main Turbine – Tripped (2/3 channels of (Auto Stop Oil) <45 psig)

75. Given the following conditions:

- Unit 1 tripped from 100% power
- CETCs indicate 709°F
- RCS pressure is 47 psig
- RVLIS full range indicates 50%
- No RCPs are running
- Containment pressure is 61 psia
- No Quench Spray Pumps are running

Based on the given conditions, which ONE of the following identifies the highest priority Critical Safety Function that is currently met, in accordance with 1-F-0, CRITICAL SAFETY FUNCTION STATUS TREES?

- A. ORANGE path on CORE COOLING
- B. ORANGE path on CONTAINMENT
- C. RED path on CORE COOLING
- D. RED path on CONTAINMENT

76. Which ONE of the choices below completes the following statements in accordance with the Technical Specifications and Bases?

In **MODE 5**, Core Cooling requirements are met by compliance with \_\_\_\_ (1) \_\_\_\_.

In **MODE 6**, use of a Steam Generator (with sufficient narrow range level) as a decay heat removal method (via natural circulation) \_\_\_\_ (2) \_\_\_\_ be credited for core cooling.

- A. (1) LCO 3.5.3, ECCS – Shutdown  
(2) can
- B. (1) LCO 3.4.7, RCS Loops – MODE 5, Loops Filled or LCO 3.4.8, RCS Loops – MODE 5, Loops Not Filled  
(2) can
- C. (1) LCO 3.5.3, ECCS – Shutdown  
(2) can NOT
- D. (1) LCO 3.4.7, RCS Loops – MODE 5, Loops Filled or LCO 3.4.8, RCS Loops – MODE 5, Loops Not Filled  
(2) can NOT

77. Given the following sequence of events:

- Unit 1 was at 100% rated thermal power when an automatic Reactor Trip and Safety Injection occurred.
- Operators secured all RCPs in 1-E-0, REACTOR TRIP OR SAFETY INJECTION.
- Operators transitioned to 1-E-3, STEAM GENERATOR TUBE RUPTURE, due to a rupture of the "C" Steam Generator (S/G).
- "C" S/G was fully isolated in accordance with 1-E-3.
- Operators then transitioned to 1-ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY REQUIRED.

Current Conditions:

- Operators are performing a less than 100° F/hr Cold Leg cooldown.
- Maximum observed Containment pressure is 10.75 PSIA and slowly rising.
- Operators are evaluating a step to "CHECK IF AN RCP SHOULD BE STARTED".
- RCS subcooling based on CETs is 36 F.
- PRZR level is 55%.

Based on the Current Conditions, which ONE of the following is the correct determination for RCP operations in accordance with 1-ECA-3.1?

#### **REFERENCE PROVIDED**

- A. Do NOT attempt to start any RCP. RCP trip criteria (from 1-E-0 and 1-E-3 CAP items) still applies.
- B. Do NOT attempt to start any RCP. Although RCP trip criteria (from 1-E-0 and 1-E-3 CAP items) no longer applies, either the RCS Subcooling and/or the PRZR level requirement(s) of 1-ECA-3.1 is/are currently NOT met.
- C. First attempt to start 1-RC-P-1C using 1-OP-5.2, REACTOR COOLANT PUMP STARTUP AND SHUTDOWN. If 1-RC-P-1C does NOT start, then attempt to start 1-RC-P-1A.
- D. First attempt to start 1-RC-P-1A using 1-OP-5.2, REACTOR COOLANT PUMP STARTUP AND SHUTDOWN. When 1-RC-P-1A is running, then start 1-RC-P-1B as necessary to provide enhanced spray.

78. Initial Conditions:

- The unit has entered 1-FR-H.5, RESPONSE TO STEAM GENERATOR LOW LEVEL, due to a loss of feedwater.
- No RCPs are running.

Current Conditions:

- Operators have just recovered the capability for AFW flow to the affected Steam Generator (S/G).

Based on the current conditions, in accordance with the Westinghouse background document for 1-FR-H.5, the reason AFW flow is NOT established to an affected S/G with wide range level less than 14%[24%] is to prevent \_\_\_\_\_ .

- A. reactionary stresses due to water hammer on S/G components until the TSC or Plant Staff have evaluated refilling the affected S/G as part of long-term plant recovery
- B. disruption of natural circulation flow in the Reactor Coolant System due to potential transient effects upon restoration of AFW flow
- C. significant thermal stress conditions on S/G components until the TSC or Plant Staff have evaluated refilling the affected S/G as part of long-term plant recovery
- D. establishing runout conditions on the AFW pump used to refill the affected S/G, which may have dried out

79. Initial Conditions:

- Unit 1 is at 100% RTP
- A channel calibration is being performed on the loss of voltage function for the H bus.

Current Conditions:

- One channel was identified to actuate outside of its allowable values.

Based on the current conditions, which ONE of the choices below completes the following statements?

TS 3.3.5, LOSS OF POWER (LOP) EMERGENCY DIESEL GENERATOR (EDG) Start Instrumentation, \_\_\_\_ (1) \_\_\_\_ require placing this channel in TRIP within 72 hours.

In accordance with Surveillance Requirement 3.3.5.2, the **degraded voltage** time delay signal should actuate in approximately \_\_\_\_ (2) \_\_\_\_ seconds WHEN a Safety Injection signal is present.

- A. (1) does  
(2) 56.0
- B. (1) does  
(2) 7.5
- C. (1) does not  
(2) 56.0
- D. (1) does not  
(2) 7.5



80. Given the following:

- The plant is operating at 100% power.
- Annunciator window 1H-B3, BATTERY CHGR 1-III TROUBLE, alarms.
- Local inspection reveals that the DC Bus 1-III battery charger output breaker has tripped open and that the charger has failed.
- DC Bus 1-III voltage on Battery Voltage Recorder 01-BY-ER-101 has lowered to 125 volts.

Which ONE of the choices below completes the following statements?

Based on the conditions above, a REQUIRED ACTION of Tech Spec LCO 3.8.4, DC Sources - Operating, \_\_\_\_ (1) \_\_\_\_ required to be entered.

In accordance with T.S. 3.8.4 bases, each Station battery has adequate storage capacity to carry the required load continuously for at least \_\_\_\_ (2) \_\_\_\_ hours.

- A. (1) is  
(2) 8
- B. (1) is NOT  
(2) 8
- C. (1) is  
(2) 2
- D. (1) is NOT  
(2) 2

81. Given the following timeline:

0200: North Anna Units 1 and 2 are at 100% rated thermal power  
0200: Instrument Air Header Pressure 105 psig  
0205: 1J-D2, INST AIR COMPR./DRYER TROUBLE, illuminates  
0207: Instrument Air Pressure is 92 psig and lowering  
0208: 1J-E8, INSTRUMENT AIR LO PRESS, illuminates  
0210: IA pressure 69 psig and lowering

Based on the given timeline above, which ONE of the choices below identifies the correct sequence of procedural implementation?

Procedure names:

- 1-E-0, REACTOR TRIP OR SAFETY INJECTION
- 1-ES-0.1, REACTOR TRIP RESPONSE
- 1-AP-28, LOSS OF INSTRUMENT AIR

- A. (1) Perform 1-E-0 Immediate Actions, then  
(2) Perform 1-AP-28 Actions, then  
(3) Perform 1-E-0 and remaining steps of 1-AP-28 Concurrently.  
(4) Address annunciator response procedures for 1J-D2 and 1J-E8 as time and operator availability allows, after completing both 1-E-0 and 1-AP-28
- B. (1) Perform 1-AP-28 Actions, then  
(2) Perform 1-E-0 ONLY.  
(3) Remaining steps of 1-AP-28 are NOT required to be performed.  
(4) Address annunciator response procedure for 1J-D2 and 1J-E8 as time and operator availability allows, after completing 1-E-0
- C. (1) Address annunciator response procedure for 1J-D2, then  
(2) Perform 1-AP-28 and Trip the Reactor, then  
(3) Perform 1-E-0 Immediate Operator Actions, then  
(4) Perform 1-E-0 and remaining steps of 1-AP-28 Concurrently.
- D. (1) Address annunciator response procedure for 1J-D2, then  
(2) Perform 1-AP-28 and Trip the Reactor, then  
(3) Perform 1-E-0 ONLY.  
(4) Perform remaining steps of 1-AP-28 ONLY after completion of 1-E-0 and entry into 1-ES-0.1

82. Initial Conditions:

- Unit 1 is at 40% RTP
- Control Rod Bank Selector Switch is in Automatic
- 1-RC-TI-1408A, MEDIAN/HI TAVG, fails low
- Annunciator 1B-A7, MEDIAN/HI TAVG < > TREF DEVIATION, alarms
- Control Rods start withdrawing at maximum speed

Current Conditions:

- Operators perform immediate actions of 1-AP-1.1, CONTINUOUS UNCONTROLLED ROD MOTION
- The control rod motion stops.
- RCS Tave stabilizes 7°F above Tref

Which ONE of the choices below completes the following statements?

In accordance with 1-AP-1.1, based on current conditions, operators \_\_\_\_ (1) \_\_\_\_ required to initiate actions of Annunciator 1B-A7 while continuing with 1-AP-1.1.

A NOTE in 1-AP-1.1 Attachment 2, TREF PROGRAM .338 °F/% POWER (graph of RCS Temperature vs. Power), states that NIs \_\_\_\_ (2) \_\_\_\_ be used for Reactor Power indication.

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

83. Given the following conditions:

- Unit 1 entered MODE 3 on March 8 at 0100 for a refueling outage.
- On March 18 at 1300 core off load has commenced.

In accordance with T.S. 3.7.10, Main Control Room/Emergency Switchgear Room (MCR/ESGR) Ventilation System (EVS) bases, which ONE of the choices below completes the following statements?

The fuel being removed from the core \_\_\_\_ (1) \_\_\_\_ considered to be recently irradiated.

1-HV-F-41, Main Control Room and Relay Room Emergency Ventilation Fan, \_\_\_\_ (2) \_\_\_\_ be used to satisfy the requirements of LCO 3.7.10.

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

84. Which ONE of the choices below completes the following statements?

In accordance with the Westinghouse background document for 1-FR-Z.3, RESPONSE TO HIGH CONTAINMENT RADIATION, the YELLOW path entry condition radiation level setpoint \_\_\_\_ (1) \_\_\_\_.

In accordance with the Westinghouse background document for 1-FR-Z.3, it has been determined that it \_\_\_\_ (2) \_\_\_\_ be appropriate to use the containment spray system to reduce radioactivity at low containment pressure (<14 psia).

- A. (1) corresponds to a radiation level which is slightly above background radiation during normal plant operations  
(2) would
- B. (1) corresponds to a radiation level which is slightly above background radiation during normal plant operations  
(2) would NOT
- C. (1) would be reached due to any significant RCS leakage into containment or after a steamline break inside containment assuming technical specification leakage from the steam generators  
(2) would
- D. (1) would be reached due to any significant RCS leakage into containment or after a steamline break inside containment assuming technical specification leakage from the steam generators  
(2) would NOT

85. Initial Conditions:

- Unit 1 - 100% RTP
- Containment average air temperature is 92°F
- Service Water supply temperature is 70°F
- 1-LM-HIC-101A and -101B, Contmt Vac Set Point Partial Air, are both set at 11.5 psia
- Containment air partial pressure is 11.5 psia

Current Conditions:

- SW supply temperature is expected to increase to 80°F over the next month.

Which ONE of the choices below completes the following statements?

In accordance with TS-3.6.4, Containment Pressure, the basis for the current Containment air partial pressure upper limit \_\_\_\_ (1) \_\_\_\_ to prevent containment from exceeding the designed external pressure load of 9.2 psid upon inadvertent actuation of the QS System.

The crew \_\_\_\_ (2) \_\_\_\_ need to lower Containment air partial pressure to remain within the acceptable operation region of TS-3.6.4 over the next month.

**REFERENCE PROVIDED**

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

86. With Unit 1 at 100% power, inadvertent phase B containment isolation occurs. Approximately 15 minutes later, the following RCP temperatures exist.

'A' RCP

- Motor radial bearing 190°F
- Pump radial bearing 220°F
- Stator winding 265°F

'B' RCP

- Motor radial bearing 180°F
- Pump radial bearing 215°F
- Stator winding 255°F

'C' RCP

- Motor radial bearing 180°F
- Pump radial bearing 230°F
- Stator winding 260°F

Which ONE of the choices below completes the following statements?

In order to mitigate these plant conditions, The SRO tells the crew to perform 1-E-0, REACTOR TRIP AND SAFETY INJECTION, trip the Reactor, and stop \_\_\_\_ (1) \_\_\_\_.

When the unit is in MODE 3, T.S. 3.4.5, RCS Loops-MODE 3, requires Two Operable RCS loops and a minimum of \_\_\_\_ (2) \_\_\_\_ shall be in operation.

- A. (1) 'A' RCP due to motor radial bearing exceeding the limit of 185°F  
(2) One loop
- B. (1) 'C' RCP due to pump radial bearing exceeding the limit of 225°F  
(2) One loop
- C. (1) 'A' RCP due to motor radial bearing exceeding the limit of 185°F  
(2) Two loops
- D. (1) 'C' RCP due to pump radial bearing exceeding the limit of 225°F  
(2) Two loops

87. Initial Conditions:

- Unit 1 is in MODE 6
- Level in the RCS is at +74 inches
- The A RHR pump is running with the return flow aligned to the B RCS loop
- The B RHR pump is secured

Current conditions:

- The OATC notes that the position indicating lights for 1-RHR-MOV-1720B, RHR to C RCS Loop Isol Vlv, are not lit.
- Electricians determine that the breaker for 1-RH-MOV-1720B is damaged and it will take 12 hours to repair.

Which ONE of the choices below completes the following statement?

Based on the current conditions \_\_\_\_ (1) \_\_\_\_ train(s) of RHR is(are) required to be operable and \_\_\_\_ (2) \_\_\_\_ train(s) of RHR is(are) operable.

- A. (1) one  
(2) two
- B. (1) one  
(2) one
- C. (1) two  
(2) two
- D. (1) two  
(2) one



88. Initial Conditions:

- Unit 1 is at 100% RTP.
- 1-RC-PCV-1456, PZR Power Operated Relief Valve (PORV), inadvertently opens.
- The OATC is unable to close 1-RC-MOV-1535, PORV Block valve.
- Annunciator 1B-G1, PZR RELIEF TANK HI-LO LEVEL, is alarming.

Current Conditions:

- Unit 1 reactor was tripped.
- 1-E-0, REACTOR TRIP OR SAFETY INJECTION, was entered.

Based on the current conditions, which ONE of the choices below completes the following statements:

The PRT \_\_ (1) \_\_ designed to condense and cool a continuous discharge from one (1) PZR PORV while maintaining PRT temperature below 200°F and pressure below 50 psig.

Procedure 1-E-0 will FIRST require a transition to 1-E-1, LOSS OF REACTOR OR SECONDARY COOLANT, based upon the parameters of: \_\_ (2) \_\_.

- A. (1) is  
(2) the stuck open PORV and block valve
- B. (1) is  
(2) containment conditions (pressure, recirc spray sump level, or radiation) - ABNORMAL
- C. (1) is NOT  
(2) the stuck open PORV and block valve
- D. (1) is NOT  
(2) containment conditions (pressure, recirc spray sump level, or radiation) - ABNORMAL

89. Given the following:

| <u>Date:</u> | <u>Time:</u> | <u>Condition:</u>   |
|--------------|--------------|---|
| 6/1/2018     | 0100         | Unit 1 is operating at 100% RTP.                                      |
| 6/1/2018     | 0200         | Pressurizer heater Group 2 will not energize due to a failed breaker. |
| 6/1/2018     | 0300         | Pressurizer heater Group 1 will not energize due to a failed breaker. |
| 6/1/2018     | 0400         | Pressurizer heater Group 4 will not energize due to a failed breaker. |

Which ONE of the choices below completes the following statements?

In accordance with the applicable Technical Specification (T.S.) LCO, the crew is required to place Unit 1 in Mode 4 no later than \_\_\_\_(1)\_\_\_\_ if no repairs can be made prior to that time.

In accordance with the bases for T.S. 3.4.9, Pressurizer, the reason that an LCO is provided for pressurizer heaters is because \_\_\_\_(2)\_\_\_\_.

#### **REFERENCE PROVIDED**

- A. (1) 1400 on 6/4/2018  
(2) credit is always given in the UFSAR safety analysis for pressurizer heater operation
- B. (1) 1500 on 6/4/2018  
(2) of the need to maintain subcooling in the long term during a loss of offsite power
- C. (1) 1600 on 6/1/2018  
(2) credit is always given in the UFSAR safety analysis for pressurizer heater operation
- D. (1) 1700 on 6/1/2018  
(2) of the need to maintain subcooling in the long term during a loss of offsite power

90. Initial Conditions:

- Unit 1 is in MODE 3
- 1-RS-P-1A, Inside Recirculation spray pump, was declared inoperable on March 1<sup>st</sup> at 0600 for breaker relay maintenance.
- On March 2<sup>nd</sup> at 0900, Electricians informed the MCR that the relays were set incorrectly and could not be adjusted.

Current Conditions:

- Later on March 2<sup>nd</sup> at 1300, Maintenance calls to report that Outside RS Pump Discharge Isolation Valve (1-RS-MOV-156B) was found closed and unable to open.

Which ONE of the choices below completes the following statements?

Based on the **initial conditions**, the **latest** time LCO 3.6.7, "Recirculation Spray (RS) System," requires entry into MODE 5 is \_\_ (1) \_\_.

Based on the **current conditions**, the **latest** time LCO 3.6.7 requires entry into MODE 5 is \_\_ (2) \_\_.

**REFERENCE PROVIDED**

- A. (1) March 11<sup>th</sup> at 1800  
(2) March 4<sup>th</sup> at 0200
- B. (1) March 13<sup>th</sup> at 2100  
(2) March 4<sup>th</sup> at 0200
- C. (1) March 11<sup>th</sup> at 1800  
(2) March 6<sup>th</sup> at 0100
- D. (1) March 13<sup>th</sup> at 2100  
(2) March 6<sup>th</sup> at 0100

91. In accordance with Technical Specification Bases 3.3.1, Reactor Trip System Instrumentation, which ONE of the following correctly describes the protections provided by the Nuclear Instrumentation neutron flux trips?

The Intermediate Range Neutron Flux trip \_\_\_\_ (1) \_\_\_\_ provide protection against an uncontrolled RCCA bank withdrawal accident from a subcritical condition during startup.

The Power Range Neutron Flux-High Positive Rate trip \_\_\_\_ (2) \_\_\_\_ provide protection against an uncontrolled RCCA bank withdrawal accident from a subcritical condition during startup.

- A. (1) does  
(2) does
- B. (1) does NOT  
(2) does
- C. (1) does  
(2) does NOT
- D. (1) does NOT  
(2) does NOT

## 92. Initial Conditions

- Unit 1 startup in progress IAW 1-OP-2.1, UNIT STARTUP FROM MODE 2 TO MODE 1.
- The turbine was latched IAW 1-OP-15.1, OPERATION OF THE MAIN TURBINE.
- Reactor power 12% and stable.
- Steam Dumps are partially open.

## Current Conditions

- The unit has been placed online
- Turbine load has been increased, but the turbine is currently in Hold.
- Reactor power is 20% and slowly rising.
- The OATC notes that 1-MS-TCV-1408D, D Steam Dump, is full open.
- The crew has just entered 1-AP-38, EXCESSIVE LOAD INCREASE, at Step 1.

Which ONE of the choices below completes the following statements?

Based on the current conditions, per 1-AP-38, an attempt to close the Steam Dump should **first** be made by (1).

If the Steam Dump does NOT close, and if reactor power was 25% at this time, 1-AP-38 would **next** require (2).

- A. (1) placing both Steam Dump Interlock switches to OFF/RESET  
(2) tripping the turbine and entering 1-AP-2.1, TURBINE TRIP WITHOUT REACTOR TRIP REQUIRED
- B. (1) placing both Steam Dump Interlock switches to OFF/RESET  
(2) ramping the turbine down to less than previous power level
- C. (1) placing PC-1464B, Steam Header Pressure Controller, in Manual and raising its setpoint  
(2) ramping the turbine down to less than previous power level
- D. (1) placing PC-1464B, Steam Header Pressure Controller, in Manual and raising its setpoint  
(2) tripping the turbine and entering 1-AP-2.1, TURBINE TRIP WITHOUT REACTOR TRIP REQUIRED

93. Initial Conditions:

- Unit 1 and 2 are at 100% RTP.
- A leak has developed on the Main Fire Loop.
- 1-FP-P-6, Fire protection jockey pump, started and immediately siezed.

Current Conditions:

- Main Fire Loop Pressure continues to drop
- No Main Fire Pumps are running.

Based on the current conditions, which ONE of the choices below completes the following statements?

The operating crew \_\_\_\_ (1) \_\_\_\_ required to open 1-FP-246 <sup>(PIV X-CONN WITH WHSE 5 FIRE PUMPS)</sup> in accordance with TRM 7.1.1, Fire Suppression Water Systems.

On lowering Main Fire Loop Pressure, the Diesel-driven Main Fire Pump would be expected to start \_\_\_\_ (2) \_\_\_\_ the Motor Driven Main Fire Pump.

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

94.

New fuel is being moved from the New Fuel Storage Area (NFSA) to the Spent Fuel Pool (SFP).

Which ONE of the choices below completes the following statements:

In accordance with 0-OP-4.5, OPERATION OF THE NEW FUEL ELEVATOR, when a new fuel assembly is being moved from the NFSA to the SFP, the New Fuel Storage area radiation monitor (1-RMS-RM-152) \_\_\_\_ (1) \_\_\_\_ required to be OPERABLE.

T.S. 3.7.17, Fuel Storage Boron Concentration, requires a minimum boron concentration of \_\_\_\_ (2) \_\_\_\_ ppm.

- A. (1) is  
(2) 2500
- B. (1) is NOT  
(2) 2500
- C. (1) is  
(2) 2600
- D. (1) is NOT  
(2) 2600

95. Both units are at 100% power.

The following licensed control room staffing exists on June 1, 2018:

- The Tech Spec minimum required crew composition is present on-shift
- With four (4) hours remaining to the end of the shift, the Unit 2 Operator-At-The-Controls (OATC) passes out and requires evacuation.

Which ONE of the choices below completes the following statements?  
(Consider each statement separately)

In accordance with T.S. 5.2.2, Unit Staff, the Shift Manager \_\_\_\_ (1) \_\_\_\_ required to call in a replacement RO before shift turnover.

An RO that stood only 3 watches during the months of January, February and March of 2018 \_\_\_\_ (2) \_\_\_\_ assume the duties of the Unit 2 OATC.

- A. (1) is not  
(2) can
- B. (1) is  
(2) can
- C. (1) is not  
(2) can not
- D. (1) is  
(2) can not



96. Given the following:

- A report was received from the Auxiliary Building that a Liquid Waste valve was bumped partially open and water was flowing onto the Auxilliary basement floor.
- An operator was dispatched and the valve was closed.
- HP reports that an area of 28 feet by 38 feet was contaminated and dose rates in the area increased from 2 mrem/hr to 7 mrem/hr.
- Clean up required 3 hours for a 3 person decon crew to complete.
- No other station personnel received measurable dose from this event.

In accordance with OP-AA-1500, Operational Configuration Control, attachment 3, Mispositioning Consequences Matrix, which ONE of the following will be the highest level of classification for this event?

**REFERENCE PROVIDED**

- A. Level 1 (Severe) Event
- B. Level 2 (Major) Event
- C. Level 3 (Minor) Event
- D. Level 4 (Immediately Identified) Event

97. Initial Conditions:

- Unit 1 is in MODE 5.
- Maintenance informs the control room that while performing rigging activities in the turbine driven AFW pump room the governor for 1-FW-P-2, Turbine Driven AFW pump, was damaged.
- An Urgent Work Order was written to repair the governor.

Current Conditions:

- The Turbine Driven AFW pump governor maintenance is complete.
- Post Maintenance Testing requires 1-FW-P-2 to be run and flowed to the SG.
- Plant conditions are such that a test requirement listed on the Test Data Sheet cannot be performed.

In accordance with VPAP-2003, POST MAINTENANCE TESTING PROGRAM, which ONE of the choices below completes the following statements?

Based on the **initial conditions**, when an Urgent Work Order is written, the Shift Manager \_\_\_\_ (1) \_\_\_\_ approve the initiation of maintenance work without a Test Data Sheet.

Based on the **current conditions**, VPAP-2003 \_\_\_\_ (2) \_\_\_\_ allow the performance of a post maintenance test requirement to be deferred until plant conditions are appropriate following Operations Department review and approval.

- A. (1) can  
(2) does NOT
- B. (1) can  
(2) does
- C. (1) can NOT  
(2) does NOT
- D. (1) can NOT  
(2) does

98. Which ONE of the choices below completes the following statements?

In accordance with Technical Specifications LCO 3.4.16, RCS Specific Activity, the DOSE EQUIVALENT IODINE-131 limit is  $\leq$  \_\_\_\_ (1) \_\_\_\_.

In accordance with Technical Specification Bases for LCO 3.4.20, SG Tube Integrity, the UFSAR safety analysis for the Steam Generator Tube Rupture (SGTR) accident assumes that the affected S/G discharges steam to the environment for \_\_\_\_ (2) \_\_\_\_ until the S/G is manually isolated.

- A. (1) 197  $\mu\text{Ci} / \text{gm}$   
(2) 60 minutes
- B. (1) 197  $\mu\text{Ci} / \text{gm}$   
(2) 30 minutes
- C. (1) 1.0  $\mu\text{Ci} / \text{gm}$   
(2) 60 minutes
- D. (1) 1.0  $\mu\text{Ci} / \text{gm}$   
(2) 30 minutes

99. Given the following:

Initial Conditions:

- Unit 1 is at 100% RTP
- Unit 1 crew is preparing to ramp the unit down to remove the 'A' HP Heater Drain Pump from service to repair minor packing leakage.
- The Unit 2 OATC reports that Annunciator 2F-H6, UNIT #1 ANN SYS POWER SUPPLY FAILURE is LIT
- The Unit 1 OATC reports a loss of annunciators

Current Conditions:

- 1-AP-6, LOSS OF MAIN CONTROL ROOM ANNUNCIATORS, is entered.
- 1-EP-CB-04A, BKR 34, Main Annunciator System Primary Plant 1-EI-CB-21, is found to be OPEN and cannot be CLOSED.

Based on the current conditions, which ONE of the choices below completes the following statements?

If Annunciator functionality cannot be restored, 1-AP-6 directs establishment of \_\_\_\_ (1) \_\_\_\_ monitoring of indications affected by lost annunciators,

AND

1-AP-6 \_\_\_\_ (2) \_\_\_\_ allow the crew to ramp down for the pump repair.

- A. (1) hourly  
(2) does
- B. (1) continuous  
(2) does
- C. (1) hourly  
(2) does NOT
- D. (1) continuous  
(2) does NOT

100. Given the following:

- The Shift Manager is performing EPIP-1.06, PROTECTIVE ACTION RECOMMENDATIONS

Which ONE of the choices below completes the following statements in accordance with EPIP-1.06?

In accordance with EPIP-1.06, a "Severe Accident Condition" exists when any Containment Loss Fission Product Barrier threshold is met AND Critical Safety Function Status Tree (CSFST) \_\_\_\_ (1) \_\_\_\_ is RED.

Notification of a revised Protective Action Recommendation must be made to the State within \_\_\_\_ (2) \_\_\_\_ minutes .

- A. (1) Heat Sink  
(2) 15
- B. (1) Heat Sink  
(2) 60
- C. (1) Core Cooling  
(2) 15
- D. (1) Core Cooling  
(2) 60

# **SRO REFERENCES**

|           |   |                  |
|-----------|---|------------------|
| NUMBER    | PROCEDURE TITLE   | REVISION         |
| 1-ECA-3.1 | SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED<br>RECOVERY DESIRED | 27               |
|           |   | PAGE<br>19 of 36 |

| STEP   | ACTION/EXPECTED RESPONSE  | RESPONSE NOT OBTAINED   |
|--|---|---|
| <p><b>NOTE:</b> The Upper Head region may void during RCS depressurization if RCPs are not running. This will result in a rapidly rising PRZR level.</p>   |   |   |
| <p>24. ____ DEPRESSURIZE RCS TO REFILL PRZR:</p>   |   |   |
|  | <input type="checkbox"/> a) Use normal PRZR spray                     | <input type="checkbox"/> a) Use one PRZR PORV.  |
|  | <input type="checkbox"/> b) Check PRZR level - GREATER THAN 36% [50%] | <input type="checkbox"/> b) <u>WHEN</u> level is greater than 36% [50%], <u>THEN</u> stop RCS depressurization.   |
|  | <input type="checkbox"/> c) Stop RCS depressurization                 | <input type="checkbox"/> Continue with Step 25.   |
| <p>*****</p> <p><b>CAUTION:</b> • Following a loss of all seal cooling, affected RCPs should not be started without prior status evaluation.</p> <p>• To prevent local boron dilution conditions in the core, the RCP in the loop with the ruptured SG should not be started while performing this procedure.</p> <p>*****</p> |   |   |
| <p>25. ____ CHECK IF AN RCP SHOULD BE STARTED:</p>   |   |   |
|  | <input type="checkbox"/> a) All RCPs - STOPPED                        | <p>a) Do the following:</p> <p>1) <u>IF</u> 1-RC-P-1C is running, <u>THEN</u>:</p> <p><input type="checkbox"/> • Stop 1-RC-P-1A.</p> <p><input type="checkbox"/> • Stop 1-RC-P-1B.</p> <p><input type="checkbox"/> 2) <u>IF</u> 1-RC-P-1B is only running RCP, <u>THEN</u> GO TO Step 26.</p> |
| <p>(STEP 25 CONTINUED ON NEXT PAGE)</p>  |   |   |

|           |   |                  |
|-----------|---|------------------|
| NUMBER    | PROCEDURE TITLE   | REVISION         |
| 1-ECA-3.1 | SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED<br>RECOVERY DESIRED | 27               |
|           |   | PAGE<br>20 of 36 |

| STEP | ACTION/EXPECTED RESPONSE  | RESPONSE NOT OBTAINED   |
|------|---|---|
| 25.  | CHECK IF AN RCP SHOULD BE STARTED:<br>(Continued)   |   |
|      |   | <input type="checkbox"/> 3) <u>IF</u> 1-RC-P-1C is <u>NOT</u> running, <u>THEN</u> stop 1-RC-P-1B unless required for enhanced spray. |
|      |   | <input type="checkbox"/> GO TO Step 26.   |
|      | <input type="checkbox"/> b) RCS subcooling based on Core Exit TCs - GREATER THAN 25°F [75°F]                                  | <input type="checkbox"/> b) GO TO Step 34.  |
|      | <input type="checkbox"/> c) PRZR level - GREATER THAN 36% [50%]   | <input type="checkbox"/> c) RETURN TO Step 24.  |
|      | d) Try to start 1-RC-P-1C:  | d) <u>IF</u> C RCP cannot be started, <u>THEN</u> do the following using 1-OP-5.2:  |
|      | <input type="checkbox"/> 1) Establish conditions for starting C RCP using 1-OP-5.2, REACTOR COOLANT PUMP STARTUP AND SHUTDOWN | <input type="checkbox"/> 1) Try to start 1-RC-P-1A.   |
|      | <input type="checkbox"/> 2) Start 1-RC-P-1C   | <input type="checkbox"/> 2) <u>WHEN</u> 1-RC-P-1A is running, <u>THEN</u> start 1-RC-P-1B as necessary to provide enhanced spray.     |
|      |   | <input type="checkbox"/> 3) <u>IF</u> 1-RC-P-1A cannot be started, <u>THEN</u> start 1-RC-P-1B.                                       |



### 3.4 REACTOR COOLANT SYSTEM (RCS)

#### 3.4.9 Pressurizer

LC0 3.4.9 The pressurizer shall be OPERABLE with:

- a. Pressurizer water level  $\leq 93\%$ ; and
- b. Two groups of pressurizer heaters OPERABLE with the capacity of each group  $\geq 125$  kW and capable of being powered from an emergency bus.

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.<br><u>AND</u>  | 6 hours         |
|   | A.2 Fully insert all rods.<br><u>AND</u>   | 6 hours         |
|   | A.3 Place Rod Control System in a condition incapable of rod withdrawal.<br><u>AND</u> | 6 hours         |
|   | A.4 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.<br><u>AND</u>  | 6 hours         |
|   | C.2 Be in MODE 4.  | 12 hours        |

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE   | FREQUENCY   |
|--|---|
| SR 3.4.9.1     Verify pressurizer water level is $\leq 93\%$ .                                 | In accordance with the Surveillance Frequency Control Program |
| SR 3.4.9.2     Verify capacity of each required group of pressurizer heaters is $\geq 125$ kW. | In accordance with the Surveillance Frequency Control Program |

### 3.6 CONTAINMENT SYSTEMS

#### 3.6.7 Recirculation Spray (RS) System

LC0 3.6.7 Four RS subsystems and a casing cooling tank shall be OPERABLE.

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

#### ACTIONS

| CONDITION  | REQUIRED ACTION                                     | COMPLETION TIME |
|--|---|-----------------|
| A. One RS subsystem inoperable.                            | A.1 Restore RS subsystem to OPERABLE status.        | 7 days          |
| B. Two RS subsystems inoperable in one train.              | B.1 Restore one RS subsystem to OPERABLE status.    | 72 hours        |
| C. Two inside RS subsystems inoperable.                    | C.1 Restore one RS subsystem to OPERABLE status.    | 72 hours        |
| D. Casing cooling tank inoperable.                         | D.1 Restore casing cooling tank to OPERABLE status. | 72 hours        |
| E. Required Action and associated Completion Time not met. | E.1 Be in MODE 3.<br><u>AND</u>                     | 6 hours         |
|  | E.2 Be in MODE 5.                                   | 84 hours        |

ACTIONS

| CONDITION  | REQUIRED ACTION      | COMPLETION TIME |
|--|----------------------|-----------------|
| <p>F. One outside RS subsystem and one inside RS subsystem inoperable and not in the same train.</p> <p><u>OR</u></p> <p>Three or more RS subsystems inoperable.</p> <p><u>OR</u></p> <p>Two outside RS subsystems inoperable.</p> | F.1 Enter LCO 3.0.3. | Immediately     |

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE   | FREQUENCY   |
|--|---|
| SR 3.6.7.1 Verify casing cooling tank temperature is $\geq 35^{\circ}\text{F}$ and $\leq 50^{\circ}\text{F}$ . | In accordance with the Surveillance Frequency Control Program |
| SR 3.6.7.2 Verify casing cooling tank contained borated water volume is $\geq 116,500$ gal.                    | In accordance with the Surveillance Frequency Control Program |
| SR 3.6.7.3 Verify casing cooling tank boron concentration is $\geq 2600$ ppm and $\leq 2800$ ppm.              | In accordance with the Surveillance Frequency Control Program |

## SURVEILLANCE REQUIREMENTS

| SURVEILLANCE |  | FREQUENCY   |
|--------------|--|---|
| SR 3.6.7.4   | Verify each RS and casing cooling manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position is in the correct position.  | In accordance with the Surveillance Frequency Control Program |
| SR 3.6.7.5   | Verify each RS and casing cooling pump's developed head at the flow test point is greater than or equal to the required developed head.  | In accordance with the Inservice Testing Program              |
| SR 3.6.7.6   | <p>Verify on an actual or simulated actuation signal(s):</p> <ul style="list-style-type: none"> <li>a. Each RS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position;</li> <li>b. Each RS pump starts automatically; and</li> <li>c. Each casing cooling pump starts automatically.</li> </ul> | In accordance with the Surveillance Frequency Control Program |
| SR 3.6.7.7   | Verify, by visual inspection, each RS train containment sump component is not restricted by debris and shows no evidence of structural distress or abnormal corrosion.   | In accordance with the Surveillance Frequency Control Program |
| SR 3.6.7.8   | Verify each spray nozzle is unobstructed.  | Following maintenance which could cause nozzle blockage       |

Containment Pressure  
3.6.4

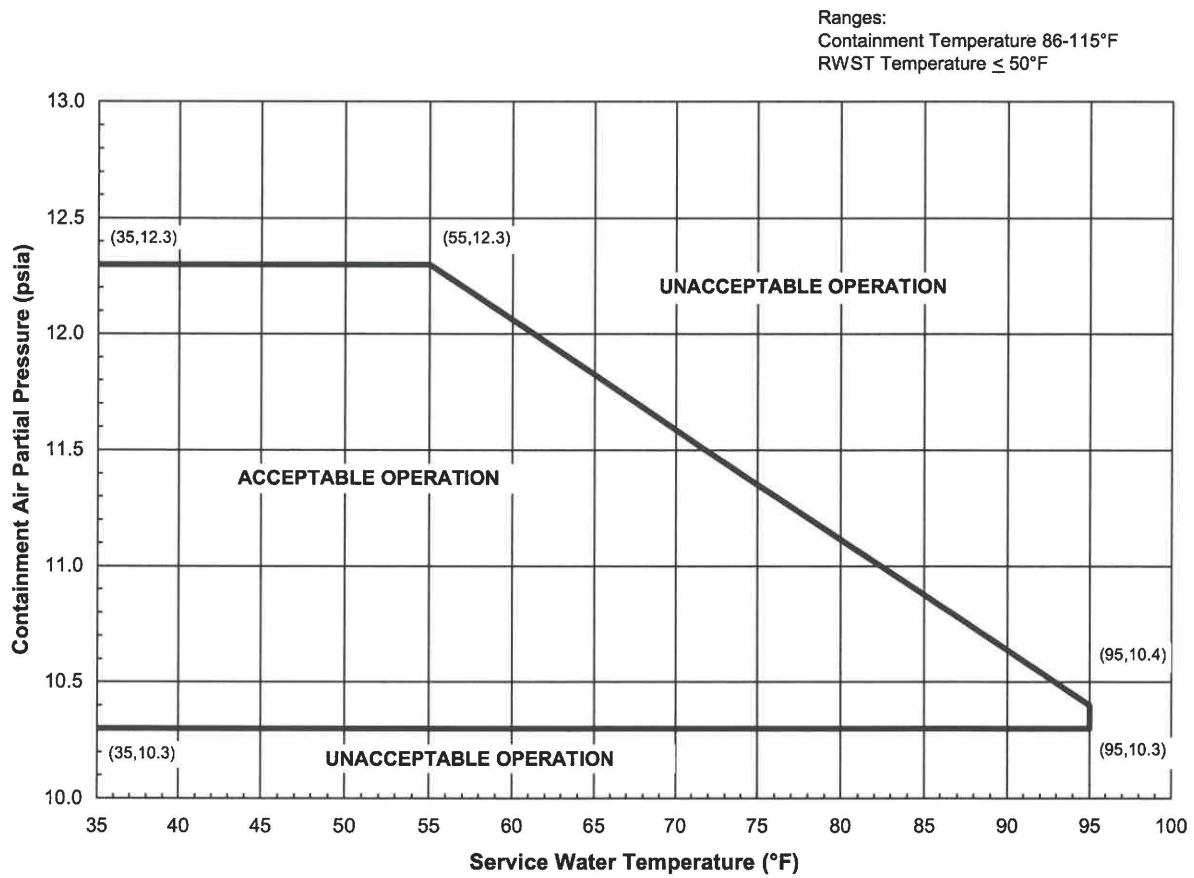


Figure 3.6.4-1 (page 1 of 1)  
Containment Air Partial Pressure Versus  
Service Water Temperature

**ATTACHMENT 3**

(Page 1 of 5)

**Mispositioning Consequences Matrix****Level 1 Mispositioning Events**

**Level 1 (Severe) Event:** An unintentional or unexpected component manipulation that results in a significant transient or challenge to personnel, nuclear, radiological or environmental safety.

**Examples of Level 1 (Severe) Events:**

- Event results in reactor Scram or actual unplanned shutdown
- Unplanned transient or load drop greater than 20%
- Event causes entry into an EOP procedure
- Unplanned radioactive release reportable to the NRC
- Unmonitored radioactive release reportable to the NRC
- Unplanned environmental release reportable to the state
- Unplanned radiation exposure >100 mR
- Actual damage to safety related or risk significant equipment resulting in inoperability
- OSHA Recordable Injury
- Event results in an on-line/outage risk condition of red (Ref. 5.4.9)

## ATTACHMENT 3

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## Mispositioning Consequences Matrix

## Level 2 Mispositioning Events

**Level 2 (Major) Event:** An unintentional or unexpected component manipulation that results in impact to operation of the plant or reportability to regulatory agencies below the threshold of a Level 1 Event.

**Examples of Level 2 (Major) Event:**

- Radioactive spill or contamination event of greater than 1000 square feet (Ref. 5.4.9)
- Unexpected fluid or energy movement resulting from an unintended flow path that results in any identified reactor inventory loss
- Actual Engineered Safeguards Feature (ESF) actuations reportable to the NRC
- Would have acted to complicate response to an ESF actuation as stated above
- Unplanned transient  $\leq 20\%$  power (Ref. 5.4.9)
- Would have acted to complicate response to a transient of  $\leq 20\%$  (Ref. 5.4.9)
- Inadvertent or unplanned actuations of plant systems that create production risk (e.g., actuation of a Main Transformer deluge system that actually sprays water on the Main Transformer)
- Unplanned system trip or isolation resulting in emergent PRA or reportable to the NRC
- Event resulting in lost critical path time during an outage
- Event results in an on-line/outage risk condition of orange (Ref. 5.4.9)
- Actual damage to plant equipment or components or suspected damage resulting in unplanned maintenance for inspection
- Bumping open breakers that de-energize major plant equipment or logic including ECCS, RPS, safeguard buses (e.g., trip of an ESF breaker, and RPS logic channel)
- Event causes entry into a general abnormal procedure or operational transient procedure
- Introduction of energy into clearance tag boundary
- Results in any unplanned radiation exposure
- Unplanned shutdown technical specification  $\leq 72$  Hr. limiting condition for operation (LCO) entry  
**AND** does **NOT** meet the conditions for a "Level 1 Event"



## ATTACHMENT 3

(Page 3 of 5)

## Mispositioning Consequences Matrix

## Level 3 Mispositioning Events

**Level 3 (Minor) Event:** An unintentional or unexpected operation that results in minimal impact to plant operations, safety or station personnel.

**Examples of Level 3 (Minor) Event:**

- Unexpected fluid or energy movement resulting from an unintended flow path that:
  - Causes contaminated water spill that creates >50 square feet of contaminated floor space (Ref. 5.4.9)
  - Introduces airborne activity
  - Causes a large volume (non contaminated) water spill > 25 gallons in the power block (e.g., Reactor or turbine buildings or Aux buildings or other similar building in power block)
  - Causes a challenge to a clearance boundary

These are examples and not intended to be all-inclusive:

- Inadvertent bumping of a component that causes a system trip or actuation (including inadvertent removal of a jumper) below the threshold of Level 2 Events.
- Finding a manual valve partially out of its expected or required position with no Tech Spec operability or reportability concerns. This typically applies to valves partially open.
- Clearance error that:
  - Failed to correctly position a tagged component on application or tagged and repositioned the wrong component and was identified after the clearance has been turned over to performing workgroup.
  - Failed to correctly position a component on clearance removal
  - Includes any non-boundary components being controlled by the clearance
- Any unplanned step change in online/outage risk
- Unplanned system trip or isolation not resulting in reportability and does not create a production risk
- Unplanned actuations or initiations not resulting in reportability and does not create a production risk
- Unplanned shutdown technical specification > 72 Hr. Limiting Condition for Operation (LCO) entry
- Event causes entry into an off-normal procedure **AND** does **NOT** meet conditions for a "Level 1 or 2 Event"

## ATTACHMENT 3

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## Mispositioning Consequences Matrix

## Level 4 Mispositioning Events

**Level 4 (Immediately Identified) Event:** An unintentional or unexpected operation of a component that results in minimal or no impact to plant operations, safety or station personnel and was minor in nature and immediately identified.

**Examples of Level 4 (Immediately Identified) Events:**

- Inadvertent bumping of a component to a position other than the expected position that does not cause a system trip or actuation
  - Changing the position of a switch or breaker
  - Inadvertent removal of a jumper
  - Inappropriately pushing a start/stop button and starts/stops the equipment
- Missed procedural step where a component(s) were manipulated out of procedural order or not at all.
- A sliding link left in an incorrect position after completion of a post-maintenance calibration activity and found by the first individual performing line-up and tag removal (restoring status control is not a mispositioned component. (The component was not yet “being controlled”)

(The following is a Level 4 Event and the definition “IMMEDIATELY” does not apply)

- Any clearance independent verification that discovers an incorrectly positioned component from initial application or initial removal assuming incorrect actions does not cause entry to higher level criteria). The error **MUST** be discovered during the in-field IV to apply, **AND** does **NOT** meet the conditions for a “Level 1, 2 or 3 Event”.

**ANSWER KEY REPORT**  
for RO & SRO TEST Test Form: 0  
Answers

| #  | 0 |
|----|---|
| 1  | D |
| 2  | B |
| 3  | B |
| 4  | A |
| 5  | A |
| 6  | B |
| 7  | D |
| 8  | A |
| 9  | B |
| 10 | D |
| 11 | A |
| 12 | B |
| 13 | B |
| 14 | C |
| 15 | B |
| 16 | B |
| 17 | D |
| 18 | D |
| 19 | A |
| 20 | D |
| 21 | C |
| 22 | B |
| 23 | B |
| 24 | B |
| 25 | D |
| 26 | C |
| 27 | D |
| 28 | D |
| 29 | B |
| 30 | A |
| 31 | C |
| 32 | B |
| 33 | D |
| 34 | D |
| 35 | D |
| 36 | B |
| 37 | A |
| 38 | B |
| 39 | A |
| 40 | C |
| 41 | C |
| 42 | D |
| 43 | A |
| 44 | C |
| 45 | C |
| 46 | D |

**ANSWER KEY REPORT**  
for RO & SRO TEST Test Form: 0  
Answers

| #  | 0 |
|----|---|
| 47 | C |
| 48 | A |
| 49 | D |
| 50 | D |
| 51 | D |
| 52 | D |
| 53 | B |
| 54 | B |
| 55 | B |
| 56 | C |
| 57 | A |
| 58 | B |
| 59 | A |
| 60 | A |
| 61 | D |
| 62 | A |
| 63 | A |
| 64 | C |
| 65 | A |
| 66 | D |
| 67 | D |
| 68 | D |
| 69 | B |
| 70 | D |
| 71 | D |
| 72 | D |
| 73 | A |
| 74 | A |
| 75 | D |
| 76 | D |
| 77 | D |
| 78 | C |
| 79 | B |
| 80 | C |
| 81 | C |
| 82 | B |
| 83 | D |
| 84 | D |
| 85 | C |
| 86 | B |
| 87 | C |
| 88 | C |
| 89 | D |
| 90 | A |
| 91 | C |
| 92 | B |

**ANSWER KEY REPORT**  
for RO & SRO TEST Test Form: 0  
Answers

| #   | 0 |
|-----|---|
| 93  | C |
| 94  | C |
| 95  | D |
| 96  | B |
| 97  | B |
| 98  | D |
| 99  | D |
| 100 | C |