HL-16

NRC
RO
Exam

2011-301

1. 001G2.4.9 002/1/2/CONT ROD W/D/3.8/4.2 C/A/NEW/RO/SRO/NRC/TNT/GCW

Reactor power is stable at 2 X 10^{-3} % with critical data being taken when the following indications occur.

- Red RODS OUT light illuminates on QMCB vertical panel C.
- Control Bank D begins stepping at 72 steps per minute.
- SR and IR SUR meters indicate positive SURs.

Which ONE of the following:

(1) is/are the **FIRST** action(s) the OATC is required to take for these indications IAW AOP-18003-C, "Rod Control System Malfunction"

and

(2) **if no** operator action is taken, which automatic function will mitigate this event?

A. (1) Place rods in MANUAL and Rod Motion Switch in hold, verify rod motion stops.

(2) Source Range Hi Flux Trip

B. (1) Place rods in MANUAL and Rod Motion Switch in hold, verify rod motion stops.

(2) Intermediate Range Hi Flux Trip

C. (1) Manually trip the reactor, enter 19000-C, "E-0, Reactor Trip or Safety Injection".

(2) Source Range Hi Flux Trip

D. (1) Manually trip the reactor, enter 19000-C, "E-0, Reactor Trip or Safety Injection".

(2) Intermediate Range Hi Flux Trip

2. 001K2.05 002/2/2/CONTROL RODS-MG SETS/3.1/3.5 MEM/HL-15R NRC/RO/SRO/NRC/TNT/GCW

Which ONE of the following describes the power supplies to the Rod Drive Motor Generator (MG) sets and the breakers that are required to be locally tripped during an ATWT per 19211-C, "FR-S.1, Response to Nuclear Power Generation / ATWT", if the Reactor Trip breakers will NOT open locally?

	MG Set Power Supplies	**Breakers to Trip**
A.	1NB09 and 1NB10	M/G set **motor** breakers
B.	1NB09 and 1NB10	M/G set **output** breakers
C.	1NB08 and 1NB09	M/G set **motor** breakers
D. ✔	1NB08 and 1NB09	M/G set **output** breakers

3. 002K5.11 002/2/2/RCS-SECONDARY/4.0/4.2 C/A/BANK/RO/SRO/NRC/TNT/GCW

Which ONE of the following symptoms is unique to a Secondary Steam Leak as compared to a Primary Coolant Leak?

A. ✔ Reactor Power rising.

B. Pressurizer Level lowering.

C. Containment Pressure rising.

D. Pressurizer Pressure lowering.

4. 003K5.03 002/2/1/RCP-TAVE INDICATION/3.1/3.5 C/A/LOIT BANK/RO/SRO/NRC/TNT/GCW

Unit 1 reactor power is 6% Rated Thermal Power with all four RCPs running. The following Loop 2 and 3 RCP indications are noted by the Control Room Staff.

Loop 2 RCP: Motor Bearing Temperature = 195 °F
Motor Stator Winding Temperature = 312 °F
Seal Water Inlet Temperature = 224 °F
RCP Shaft Vibration = 14 mils
RCP Frame Vibration = 3 mils

Loop 3 RCP: Motor Bearing Temperature = 185 °F
Motor Stator Winding Temperature = 300 °F
Seal Water Inlet Temperature = 226 °F
RCP Shaft Vibration = 16 mils
RCP Frame Vibration = 4 mils

Based on the above indications, assuming the required operator actions are taken, which ONE of the following describes the response of the affected loop Tave and the reason for the affect on Tave?

A. Loop 2 Tave will initially decrease due to securing Loop 2 RCP.

B. Loop 2 Tave will initially increase due to securing Loop 2 RCP.

C. Loop 3 Tave will initially decrease due to securing Loop 3 RCP.

D. Loop 3 Tave will initially increase due to securing Loop 3 RCP.

5. 003K6.02 001/2/1/RCP SEALS/2.7/3.1 MEM/LOIT BANK/RO/SRO/NRC/GCW

Which ONE of the following is the CORRECT basis for closing the below listed valves while performing 19100-C, "Loss of all AC Power"?

1) HV-8103A, B, C, D the RCP Seal Injection Isolation valves.

2) HV-1979 ACCW Supply Header ORC Isolation valve.

A. 1) prevents seal leakage to the VCT which could relieve to the Auxiliary Building.

2) minimizes steam formation in ACCW system due to Thermal Barrier heating.

B✓ 1) prevents potential damage to the RCP seals and shaft on CCP restarts.

2) minimizes steam formation in ACCW system due to Thermal Barrier heating.

C. 1) prevents seal leakage to the VCT which could relieve to the Auxiliary Building.

2) prevents runout of the ACCW pump as voids collapse in Thermal Barrier piping.

D. 1) prevents potential damage to the RCP seals and shaft on CCP restarts.

2) prevents runout of the ACCW pump as voids collapse in Thermal Barrier piping.

6. 004A3.06 002/2/1/CVCS-TAVE/TREF/3.9/3.8 C/A/NEW/RO/SRO/NRC/GCW

Unit 1 is at 50% power with PRZR level control system in auto.

- RCS Loop 3 NR Tcold fails high.

Which ONE of the following describes the effect on Charging Flow and RCP Seal Injection flows, **with NO operator actions**.

	Charging Flow	Seal Injection Flows
A.	Go up	No Change
B✓	Go up	Go up
C.	Go down	No Change
D.	Go down	Go down

7. 005A1.02 001/2/1/RHR-FLOW/3.3/3.4/NEW/RO/SR0/NRC/TNT/GCW

Given the following conditions:

- Reactor Core is de-fueled.
- 13005-1, "Reactor Coolant System and Refueling Cavity Draining" is in progress.
- Upper Internals are removed.
- Drain down of the Reactor Cavity and RCS to RWST using RHR is in progress.

While draining down at an elevation of > 195 feet, RHR drain down flow rate is required to be limited to ___(1)___ maximum.

When draining down at an elevation of < 194 feet, RHR drain down flow rate is required to be limited to ___(2)___ maximum.

A. (1) 1500 gpm

   (2) 500 gpm

B. (1) 1500 gpm

   (2) 1000 gpm

C. (1) 3000 gpm

   (2) 500 gpm

D. (1) 3000 gpm

   (2) 1000 gpm

8. 005A4.03 002/2/1/RHR-TEMP-HTRS-FLOW/2.8/2.7 MEM/LOIT BANK/RO/SRO/NRC/GCW

Given the following Unit 1 conditions:

- Both Trains of RHR are in service.
- HV-0606 and HV-0607 (RHR Hx outlets) are 50% open.
- RHR flow is throttled to 3000 gpm per train (FV-0618 / FV-0619 RHR Hx Bypasses).
- RCS is stable at 180°F and 340 psig.

The Shift Supervisor has directed an RCS heatup to 330°F to begin.

Which ONE of the following:

1) describes the CORRECT actions to take to commence the heatup,

and

2) what is the MAXIMUM heatup rate allowed in accordance with UOP 12001-C "Unit Heatup to Hot Shutdown (Mode 5 to Mode 4)"?

A. 1) Adjust FV-0618 / FV-0619 to establish a heatup rate.

2) 50°F per hour.

B. 1) Adjust HV-0606 / HV-0607 to establish a heatup rate.

2) 100°F per hour.

C. 1) Adjust FV-0618 / FV-0619 to establish a heatup rate.

2) 100°F per hour.

D. 1) Adjust HV-0606 / HV-0607 to establish a heatup rate.

2) 50°F per hour.

9. 006A1.07 002/2/1/ECCS-PRESS HI-LOW/3.3/3.6 MEM/NEW/RO/SRO/NRC/GCW

Unit 1 is at 100% power.

The following is the status of each ECCS accumulator:

- Accumulator # 1 N_2 pressure - 631 psig Cb - 1911 ppm Level - 30%
- Accumulator # 2 N_2 pressure - 651 psig Cb - 2100 ppm Level - 69%
- Accumulator # 3 N_2 pressure - 615 psig Cb - 2000 ppm Level - 51%
- Accumulator # 4 N_2 pressure - 674 psig Cb - 2590 ppm Level - 59%

Per Tech Spec 3.5.1, Accumulators, the ECCS accumulator parameters above are ....

A. within Tech Spec limits.

B. not within Tech Spec limits due to level.

C. not within Tech Spec limits due to N_2 pressure.

D. not within Tech Spec limits due to boron concentration.

10. 006G2.1.30 002/2/1/ECCS CONTROLS/4.4/4.0 C/A/MOD BANK/RO/SRO/NRC/GCW

A Control Room evacuation has taken place.

- All Shutdown Panel 'B' (PSDB) handswitches are in LOCAL.
- All Shutdown Panel 'A' (PSDA) handswitches are in REMOTE.
- An automatic Safety Injection occurs on both trains.

Which ONE of the following is CORRECT regarding:

1) the status of the SI pumps, and

2) when SI Termination criteria is met, WHERE the SI pump(s) are required to be stopped per the procedure?

	SI Pump status	Location to shutdown the SI pumps
A.	Train A only running	Locally at 4160V Swgr 1AA02
B.	Train A only running	Locally at PSDA
C.	Both Train A and B running	Locally at 4160V Swgrs 1AA02 and 1BA03
D.	Both Train A and B running	Locally at PSDA and PSDB

11. 007A1.03 002/2/1/PRT TEMP MONITORING/2.6/2.7 MEM/NEW/RO/SRO/NRC/GCW

The following alarm has illuminated:

"PRZR REL TANK HI TEMP"

Which of the following would have caused the PRT Hi Temperature and what would be the **FASTEST** method to restore the tank temperature to normal?

A. ✓ CVCS Letdown Relief Valve (downstream of **orifice isolation valves**).

Cooldown using RMWST fill valve and Recirc valve to the RCDT.

B. CVCS Letdown Relief Valve (downstream of **Letdown Hx**).

Cooldown using RMWST fill valve and Recirc valve to the RCDT.

C. RHR Pump Suction Relief Valves.

Cooldown using recirculation method through the RCDT Hx.

D. RHR Pump Discharge Relief Valves.

Cooldown using recirculation method through the RCDT Hx.

12. 008AK1.01 001/1/1/PZR VAPOR SPACE ACC/3.2/3.7 C/A/LOIT BANK/RO/SRO/NRC/GCW

With the Unit operating at 100% power, the Reactor Trips on low Pressurizer pressure. Pressurizer Relief Tank (PRT) pressure indicates 35 psig. The crew suspects that a PORV opened inadvertently and is now stuck partially open.

Which ONE of the following confirming indications could be expected if a PORV is stuck partially open?

A. ✓ PORV relief line temperature stabilized at 281 °F. The opposite PORV and the Code Safety Valves tail pipe temperatures slowly rising.

B. PORV relief line temperature stabilized at 281 °F. The opposite PORV and the Code Safety Valves tail pipe temperatures indicate ambient temperature and stable.

C. PORV relief line temperature stabilized at 259 °F. The opposite PORV and the Code Safety Valves tail pipe temperatures slowly rising.

D. PORV relief line temperature stabilized at 259 °F. The opposite PORV and the Code Safety Valves tail pipe temperatures indicate ambient temperature and stable.

13. 009G2.4.8 002/1/1/SB LOCA/3.8/4.5 C/A/NEW/RO/SRO/NRC/GCW

A Reactor trip is performed from full power per AOP direction.

Which ONE of the following AOPs would NOT be performed concurrently while in 19000-C, "Reactor Trip or Safety Injection"?

A. ✓ 18004-C, Reactor Coolant System Leakage due to inability to maintain PRZR level.

B. 18028-C, Loss of Instrument Air with Instrument Air pressure less than 70 psig.

C. 18034-C, Loss of Class 1E 125V DC Power following a loss of DC bus 1AD1.

D. 18040-C, Partial Loss of Condenser Vacuum due to vacuum < 23 inches Hg.

14. 010K6.04 002/2/1/PRZR PRESS-PRT/2.9/3.2 C/A/LOIT BANK/RO/SRO/NRC/GCW

Given the following:

- HV-8000B is closed and de-energized.
- A total loss of 125V DC bus AD1 results in a Reactor trip.
- SI actuates due to inadequate throttling of AFW flow post trip.
- 15 minutes later, PRZR level is now rapidly rising.

Which ONE of the following would be available to mitigate RCS pressure rise?

A. Both PRZR sprays and one PRZR PORV.

B. ✓ Only PRZR Code Safeties.

C. Only one PRZR PORV.

D. Both PRZR sprays.

15. 011EA1.03 002/1/1/LB LOCA-RCP TRIP/4.0/4.0 MEM/MOD BANK/RO/SRO/NRC/GCW

Based on the following events:

- Safety Injection has been manually actuated.
- No CCP's are currently running or available.
- SIP A is running, SIP B is tripped.
- RCS pressure has lowered to 1350 psig.
- CETC's indicate 560°F and are slowly rising.
- 19010-C, "Loss of Reactor or Secondary Coolant" has just been entered.

Which of the following is the CORRECT action to take at this time and why?

A. RCP's should remain running, one SIP running is NOT adequate.

B. RCP's should remain running, at least one CCP running is required.

C. ✓ RCP's should be tripped, to prevent excessive depletion of RCS inventory.

D. RCP's should be tripped, the pump heat may lead to uncovering the core earlier.

16. 011K4.03 004/2/2/PZR LEVEL DENSITY CO/2.6/2.9 MEM/BANK CALLAWAY 07/RO/SR0/NRC/GCW

Which ONE of the following Pressurizer Level instruments is COLD calibrated, and how does its indication differ from the other pressurizer level instruments at normal operating temperature and pressure?

A. ✓ LT-462; indicates lower.

B. LT-462; indicates higher.

C. LT-461; indicates lower.

D. LT-461; indicates higher.

17. 012A4.07 001/2/1/RPS-MG SET BRKRS/3.9/3.9 C/A/LOIT BANK/RO/SRO/NRC/GCW

Given the following conditions at 100% power:

- All systems in normal alignment except for the following.

- Reactor Trip Breaker testing is in progress.

- RTB "A" QMCB light indication is "green".

- RTB Bypass Breaker "A" QMCB light indication is "red".

During testing, the following QMCB annunciator illuminates.

- **ROD DRIVE M-G SET TROUBLE**

- Motor Generator (MG) Set # 1 Output Breaker has tripped open.

Which ONE of the following is CORRECT regarding the MG Set Output Breakers and the Reactor Trip Breakers?

A. Reactor trip occurs.

Reactor Trip Breakers are in series, power is lost to the Rod Control Power Cabinets.

B. Reactor trip occurs.

MG Set Output breakers are in series, power is lost to the Rod Control Power Cabinets.

C. Reactor trip does **NOT** occur.

Reactor Trip Breakers are in parallel, power is maintained to the Rod Control Power Cabinets.

D. Reactor trip does **NOT** occur.

MG Set Output breakers are in parallel, power is maintained to Rod Control Power Cabinets.

18. 013K5.01 002/2/1/ESFAS-SAFETY TRAIN/2.8/3.2 MEM/LORQ BANK/RO/SRO/NRC/GCW

_____a_____ is divided into 2 distinct input, logic, and output bay ___b_____ with 3 or 4 _____c_____ of process control equipment used for the signal processing of unit parameters measured by the field instruments.

Which ONE of the following CORRECTLY describes the above mentioned instrumentation?

A. a- Reactor Protection System (RPS)
   b- Trains
   c- Channels

B. a- Solid State Protection System (SSPS)
   b- Trains
   c- Channels

C. a- Reactor Protection System (RPS)
   b- Channels
   c- Trains

D. a- Solid State Protection System (SSPS)
   b- Channels
   c- Trains

19. 014A1.02 002/2/2/DRPI INDICATION/3.2/3.6 C/A/LORQ BANK/RO/SRO/NRC/GCW

While performing 12003-C, "Reactor Startup (Mode 3 to Mode 2)", the following notes states:

"ALB10D04 ROD BANK LO-LO LIMIT and ALB10C04 ROD BANK LO LIMIT should normally reset when Control Bank C exceeds 48 ±2 steps and 58 ±2 respectively".

The OATC withdraws Control Bank 'C' rods and observes the following:

Prior to the rod withdrawal the following conditions existed:

DRPI: 42 Steps
Group 1 Step Counter: 42 Steps
Group 2 Step Counter: 41 Steps

After the rod withdrawal the following conditions exist:

DRPI: 42 Steps
Group 1 Step Counter: 56 Steps
Group 2 Step Counter: 55 Steps

With no other operator action, immediately after the rod withdrawal, the "Rod Bank LO-LO-Limit" annunciator ___(1)___ and the "Rod Dev" annunciator ___(2)___.

A. (1) resets

(2) illuminated

B. (1) remains illuminated

(2) illuminated

C. (1) remains illuminated

(2) does not alarm

D. (1) resets

(2) does not alarm

20. 017K6.01 001/2/2/IN-CORE DETECTORS/2.7/3.0 C/A/BANK/RO/SRO/NRC/GCW

Given the following:

- The crew is implementing 19001-C, "Reactor Trip Response".

- Natural circulation verification is in progress.

- 2 Core Exit Thermocouples are failed due to open circuits.

The input from these CETC's to the Subcooling Monitor are_____(1)_____ and the calculated subcooling margin will be_____(2)_____.

A. (1) failed low

(2) higher

B. (1) failed low

(2) unaffected

C. (1) failed high

(2) lower

D. (1) failed high

(2) unaffected

21. 022A4.05 002/2/1/CC-TEMP/PRESS/HUMID/3.8/3.8 MEM/BANK SUMMER2009/RO/SRO/NRC/GCW

Unit 2 is in Mode 1 with the following Containment Parameters:

Temperature	Pressure
T2501 = 115 °F	PI-0935 = 1.5 psig
T2502 = 123 °F	PI-0937 = 1.7 psig
T2503 = 117 °F	PI-0934 = 1.6 psig
UT2501(AVG) = 118.3 °F	PI-0936 = 1.4 psig

Based on Tech Spec limiting conditions for operation, which ONE of the following is correct?

A. (1) Temperature has exceeded limits.

(2) Pressure has exceeded limits.

B. (1) Temperature is within limits.

(2) Pressure has exceeded limits.

C. (1) Temperature has exceeded limits.

(2) Pressure is within limits.

D✔ (1) Temperature is within limits.

(2) Pressure is within limits.

22. 022AA2.03 004/1/1/LOSS RX M/U/3.1/3.6 C/A/LORQ BANK/RO/SRO/NRC/GCW

With the unit at 100% power and all control systems in automatic, the OATC observes the following:

- ALB07B06 "Charging Line Hi/Lo Flow" is alarming
- ALB07A05 "Regen HX LTDN Hi Temp" is alarming
- FI-132 letdown flow is oscillating between 0 & 100 gpm
- RCP seal injection flowmeters are off scale high

Using the above indications which ONE of the components failures below has occurred.

A. Controlling PRZR level channel LI-459 has failed high.

B. Charging Flow control valve FV-121 has failed closed.

C. Seal Flow Control control valve HV-182 has failed closed.

D. Letdown Pressure Control Valve PV-131 has failed closed.

23. 022K3.02 002/2/1/CCS-CNMT INST/3.0/3.3 MEM/MOD BANK SANOFRE/RO/SRO/NRC/GCW

Given the following conditions:

- A feedline break has occurred inside Containment.
- SI actuation has occurred.
- Only three Containment Coolers are available and running in low speed.
- Containment Pressure peaked at 7.8 psig.
- Containment Pressure is currently 2.6 psig.

The crew is currently evaluating ECCS termination criteria with the following values:

- Subcooling is 32 °F.
- Pressurizer level is 29% and slowly rising.
- All intact Steam Generator NR levels are 27% and rising.
- Both MDAFW Pumps running with flow throttled to 400 gpm total.

Which ONE of the following is true concerning SI termination criteria?

A. SI termination is met.

B. SI termination is not met due to subcooling.

C. SI termination is not met due to Pressurizer level.

D. SI termination is not met due to Steam Generator levels.

24. 025AK1.01 002/1/1/LOSS OF RHR/3.9/4.3 C/A/BANK/RO/SRO/NRC/GCW

The following conditions exist on Unit 1:

- The plant is 37 days and 12 hours into a refueling outage.
- The unit is in Mode 5 at mid-loop conditions.
- RHR 1A heat exchanger inlet temperature is stable at 100 °F.
- Core offload has NOT yet commenced.
- Subsequently the '1A' RHR Pump trips.
- 18019-C, "Loss of Residual Heat Removal" is entered.

Which ONE of the following is correct if the loss of RHR continues without mitigation?

REFERENCE PROVIDED

A. The time to boiling is less than 50 minutes. The FIRST action to take is evacuate Containment and establish containment closure, then align SI pumps for Hot Leg Injection.

B. The time to boiling is more than 60 minutes. The FIRST action to take is evacuate Containment and establish containment closure, then align SI pumps for Hot Leg Injection.

C. The time to boiling is less than 50 minutes. The FIRST action to take is to align SI pumps for Hot Leg Injection, then evacuate Containment and establish containment closure.

D. The time to boiling is more than 60 minutes. The FIRST action to take is to align SI pumps for Hot Leg Injection, then evacuate Containment and establish containment closure.

25. 026K3.02 002/2/1/CSS-RECIRC/4.2/4.3 C/A/NEW/RO/SRO/NRC/GCW

Containment Spray has actuated due to a LOCA.

Containment Spray pump 'A' shaft shears upon startup.

Containment Pressure is 15 psig.

Both Containment Emergency Sump Levels read 10 inches.

RWST level currently reading 5%.

19111-C, "Loss of Emergency Coolant Recirculation" has been entered from 19013-C, "Cold Leg Recirculation".

Which ONE of the following is CORRECT regarding:

1) the Containment Spray system status,

   and

2) the actions the crew should take regarding the Containment Spray pump?

A. 1) Only one Containment Spray ring is receiving flow.

   2) Stop Containment Spray pump B.

B. 1) Both Containment Spray rings are receiving flow.

   2) Leave Containment Spray pump B running.

C. 1) Only one Containment Spray ring is receiving flow.

   2) Leave Containment Spray pump B running.

D. 1) Both Containment Spray rings are receiving flow.

   2) Stop Containment Spray pump B.

26. 027AK2.03 002/1/1/PZR PRESS CNTRL/2.6/2.8 C/A/LORQ BANK/RO/SRO/NRC/GCW

Given the following:

- The unit is at 100% power.
- All control systems are in their normal alignments.
- The Pressurizer Master Pressure Controller output demand fails LOW.

Assuming no action has been taken by the crew, which ONE of the following describes the effect on the Pressurizer heaters, and the resulting effect on the plant?

A. PZR heaters energize.

PZR pressure rise is controlled by PZR PORV operation.

B. PZR heaters energize.

PZR pressure rise is controlled by PZR spray valve operation.

C. PZR heaters de-energize.

ONLY the PZR spray valves open.

D. PZR heaters de-energize.

PZR spray valves and one PZR PORV open.

27. 028AK1.01 002/1/2/PZR LEVEL REF LEG/2.8/3.1 C/A/LORQ BANK/RO/SRO/HL-16 NRC/GCW

The Unit is operating at 100% with all control systems in automatic.

Pressurizer level control is selected to the 459/460 position when the following occurs:

- A small Pressurizer level reference leg leak occurs on the controlling channel.

Which ONE of the following would be CORRECT regarding the response of the Pressurizer level control system?

A. LT-460 level would read lower than actual, charging flow would increase.

B. LT-459 level would read lower than actual, charging flow would increase.

C. LT-460 level would read higher than actual, charging flow would decrease.

D. LT-459 level would read higher than actual, charging flow would decrease.

28. 029EK3.02 002/1/1/ATWT/3.1/3.1 MEM/BANK/RO/SRO/NRC/GCW

Given the following:

- ATWT in progress.
- 19211-C, "Response to Nuclear Power Generation / ATWT" in effect.
- SI has NOT actuated at this time.
- Pressurizer level is 15%.
- The NCP is running.

Step 4.b states "verify a charging pump is running".

Which ONE of the following is CORRECT regarding the performance of this step?

A. The NCP can be left running, purpose is to provide emergency boration flow.

B. A CCP is required to be started, purpose is to provide emergency boration flow.

C. The NCP can be left running, purpose is to provide for RCS inventory control.

D. A CCP is required to be started, purpose is to provide for RCS inventory control.

29. 029K1.02 002/2/2/CNMT PURGE-RAD MONIT/3.3/3.6 C/A/NEW/RO/SRO/NRC/GCW

A containment pressure relief is in progress at full power.

- The following alarm illuminates:

  ALB05 window C05 for HIGH RADIATION ALARM

An investigation has revealed:

- RE-002, CNMT Low Range Area monitor indicates normal levels.
- RE-003, CNMT Low Range Area monitor indicates normal levels.
- RE-2562A/C CNMT Air Process monitor indicates normal levels.
- RE-2565A/B, CNMT Vent Rad monitor indicates normal levels.
- RE-2565C CNMT Vent Rad monitor has failed **High**.

The Containment Pressure relief path has _____.

A. remained in service and can remain in service.

B. remained in service but must be manually isolated per ARP.

C. automatically isolated due to the receipt of a CIA signal.

D. automatically isolated due to the receipt of a CVI signal.

30. 033AK3.01 002/1/2/LOSS OF IR/3.2/3.6 C/A/LOIT BANK/RO/SRO/NRC/GCW

Unit 1 is at 8% power when the following events occur:

- Annunciator ALB34, C02 INVERTERS 1BD1I2 1BD1I12 TROUBLE illuminates.
- Annunciator ALB34, C01 120V AC PANELS 1BY1B 1BY2B TROUBLE illuminates.
- All channel II trip status lights illuminate.
- Reactor power remains stable.

Which ONE of the following is the correct action(s) for the crew to take?

A. Control SG NR levels in MANUAL from 60 - 70% NR.

B. Reduce reactor power to < P-6 within the next 2 hours.

C. Manually trip the reactor and go to 19000-C, "E-0 Reactor Trip or Safety Injection".

D. Suspend all operations involving positive reactivity changes, maintain power stable.

31. 033G2.4.49 002/2/2/SFPC ACTIONS/4.6/4.4 MEM/NEW/RO/SRO/NRC/GCW

A refueling outage is in progress with movement of irradiated fuel assemblies occuring in the Spent Fuel Pools.

Which ONE of the following conditions would **ALLOW** movement of irradiated assemblies in the Spent Fuel Pool to continue?

A. Spent Fuel Pool boron concentration is 1969 ppm.

B. Spent Fuel Pool level is 216 feet, 4 inches on local reading.

C. Both SR NIS audio count rate channels have been lost.

D. Both FHB Post Accident Ventilation systems have been declared INOPERABLE.

32. 035A4.06 002/2/2/SG-ISOL SGTL/4.5/4.6 C/A/LOIT BANK/RO/SRO/NRC/GCW

Given the following:

- A Steam Generator Tube Rupture has occurred on Steam Generator # 4.
- The crew is performing actions of 19030-C, "Steam Generator Tube Rupture".
- Steam Generator # 4 NR level is 7%.
- Steam Generators # 1, 2, and 3 are reading 0% NR.
- AFW flow to each SG is 200 gpm.

The crew should isolate AFW flow to SG # 4 ___(1)___ and the reason is to ___(2)___.

A. (1) immediately

(2) prevent overfilling of the Steam Generator.

B. (1) immediately

(2) to minimize offsite dose due to lifting of the ARV.

C. (1) when SG #4 NR level > 10%

(2) to ensure a secondary side Heat Sink.

D. (1) when SG #4 NR level > 10%

(2) to promote thermal stratification for SG pressure control.

33. 038EK3.01 002/1/1/SGTR/4.1/4.3 FUNH/BANK HARRIS2007/RO/SR0/HL-16/EMT/GCW

Unit 2 was at 100% power

- A SGTR has occurred and 19030-C, E-3 Steam Generator Tube Rupture actions are in progress.

- The RCS cooldown to target temperature has just been completed.

Which ONE of the following describes the reason(s) for reducing RCS pressure to match ruptured SG pressure at this point?

A. To restore RCS inventory and reduce break flow prior to SI termination.

B. To prevent damage to secondary side steam piping due to overfill.

C. To minimize the probability of a Pressurized Thermal Shock event when RCS cooldown is recommenced.

D. To prevent any release of radioactivity through the SG Atmospheric Dump valves.

34. 039G2.2.39 002/2/1/MAIN/REHEAT STM -TS/3.9/4.5 MEM/NEW/RO/SRO/NRC/GCW

Given the following:

- The unit is at full power.
- A loss of external load without a direct reactor trip occurs.
- RCS pressure is currently 2800 psig.

In accordance with Technical Specifications and Bases, which one of the following are,

1) Main Steam components that should have prevented exceeding a Safety Limit, and

2) the maximum time limit required by Tech Specs for restoration of compliance.

Main Steam Component	**Restore Compliance Within**
A. Atmospheric Relief Valves	one hour
B. Atmospheric Relief Valves	5 minutes
C. Main Steam Safety Valves	one hour
D. Main Steam Safety Valves	5 minutes

35. 054G2.4.49 001/1/1/LOSS OF MFW/4.6/4.4 C/A/NEW/RO/SRO/NRC/GCW

Given the following:

- The Plant is at 67% when the following annunciators/indications occur.
- ALB15 D03, "MFPT A TRIPPED"
- ALB15 B05, "MFPT DISCH HDR LO PRESS"
- ALB13 "STM GEN FLOW MISMATCH" on all loops.
- MFPT "B" is at 5900 rpms with discharge pressure at 650 psig.
- S/G levels are 46% NR and rapidly lowering.

Which ONE of the following is the **first** CORRECT action(s) for the crew to perform per AOP 18016-C, "Condensate and Feed Water Malfunction"?

A. Trip the Reactor and go to E-0 due to S/G levels.

B. Trip the Reactor and go to E-0 due to power level.

C. Trip the Reactor and go to E-0 due to MFP indications.

D. Reduce Turbine load to lower MFP speed to $\leq$ 5300 rpm.

36. 055EA1.01 003/1/1/STATION B/O/3.7/3.9 MEM/BANK SUMMER2009/RO/SRO/HL-16/EMT/GCW

Which ONE of the following describes a condition that will require the crew to transition out of 19100-C,"Loss Of All AC Power" prior to restoring power to at least one AC ESF Bus?

A. CETC's indicate greater than 1200°F and rising.

B. The Tcolds for all RCS loops lower to less than 280°F.

C. Both Intermediate and Source Range startup rates are positive.

D. ALL S/Gs levels drop below 40% WR with no AFW flow available.

37. 055K3.01 002/2/2/COND AIR REMOVAL/2.5/2.7 MEM/NEW/RO/SRO/NRC/GCW

Given the following:

- Reactor power is 100%.

- The Instrument Air supply is lost to the Condenser Vacuum Breakers.

Which ONE of the following is CORRECT?

A. Condenser pressure is unaffected, Vacuum breakers can be opened from the Control Room.

B. Condenser pressure is unaffected, Vacuum breakers cannot be opened from the Control Room.

C. Condenser pressure rises and Main Turbine Mw output remains constant.

D. Condenser pressure rises and Main Turbine Mw output lowers.

38. 056AK3.01 003/1/1/LOSP/3.5/3.9 MEM/MOD BANK/RO/SRO/NRC/GCW

Which ONE of the following is correct regarding the response and the reason for the Containment Cooling fans loading sequence following a simultaneous UV on both trains of SSPS?

A. Eight Containment Cooling fans start in **low** speed at 30.5 seconds.

   Reason: High moisture and density air could damage motor windings.

B. Eight Containment Cooling fans start in **high** speed at 30.5 seconds.

   Reason: High moisture and density air could damage motor windings.

C. Four Containment Cooling fans start in **low** speed at 30.5 seconds, then four more start in **low** speed at 50.5 seconds.

   Reason: To prevent overloading the DG during loading.

D. Four Containment Cooling fans start in **high** speed at 30.5 seconds, then four more start in **high** speed at 50.5 seconds.

   Reason: To prevent overloading the DG during loading.

39. 057AA2.02 001/1/1/LOSS OF VITAL AC/3.7/3.8 MEM/NEW/RO/SRO/NRC/GCW

The following indications occur with the unit at full power:

- Accumulator # 1 level and pressure indications both fail due to a loss of power.

Which ONE of the following would be correct regarding:

1) power supply to accumulator level and pressure indicators, and

2) the direction the instruments would fail?

	power supply	**failure direction**
A.	125 VDC	fails low
B.	125 VDC	fails high
C.	120 VAC	fails low
D.	120 VAC	fails high

40. 058G2.4.49 002/1/1/LOSS OF DC/4.6/4.4 MEM/NEW/RO/SRO/NRC/GCW

Unit 1 core offload is in progress.

- A fault occurs on BD1, 125 VDC Vital Bus.

- The required DC sources for the present mode are NOT met.

Considering the following Technical Specification actions:

1) Suspend CORE ALTERATIONS.

2) Suspend movement of irradiated fuel assemblies.

3) Initiate actions to suspend operations involving positive reactivity additions.

Which ONE of the following contains ALL actions that are required to be IMMEDIATELY performed for the present Mode and DC source status?

A. # 1 only

B. # 1 and # 2 only

C. # 1 and # 3 only

D. # 1, # 2, and # 3

41. 059K4.18 002/2/1/MFW-FW REDUCTION/2.8/3.0 C/A/MOD BANK/RO/SRO/NRC/GCW

Reactor trip has occurred from 100% power with the following conditions:

- Reactor Trip Breaker "B" has remained closed.
- Loop 1 Tave = 563°F
- Loop 2 Tave = 563°F
- Loop 3 Tave = 566°F
- Loop 4 Tave = 564°F
- All SG levels are 35% NR.

The crew is performing 19001-C, "Reactor Trip Response" step for "Check FW Status".

With no operator action, which ONE of the following is CORRECT regarding the current status of FWI?

A. MFRVs - OPEN, BFRVs - OPEN

B. MFRVs - SHUT, BFRVs - OPEN

C. MFRVs - OPEN, BFRVs - SHUT

D. MFRVs - SHUT, BFRVs - SHUT

42. 059K4.19 003/2/1/MFW-FWI/3.2/3.4 MEM/NEW/RO/SRO/NRC/GCW

A plant feedwater transient at 100% power has resulted in ALB13-E04 annunciator illuminating:

FWI
SI or P-14
SG HI-HI LVL

Which ONE of the following is correct regarding:

1) Impact on MFW system, and

2) actions necessary to reset FWI, after SG levels are returned to normal?

A. 1) only closes all FWI valves.

2) cycle reactor trip breakers, then reset FWI.

B. 1) only closes all FWI valves.

2) reset FWI. Reactor trip breakers are NOT required to be cycled.

C✔ 1) closes all FWI valves and trips both MFPTs.

2) cycle reactor trip breakers, then reset FWI.

D. 1) closes all FWI valves and trips both MFPTs.

2) reset FWI. Reactor trip breakers are NOT required to be cycled.

43. 060AK2.01 002/1/2/GASEOUS RELEASE/2.6/2.9 MEM/NEW/RO/SRO/NRC/GCW

During core offload, a dropped assembly results in a gas bubble rising from the cavity into Containment atmosphere.

- RE-2562C, Containment Air - Radiogas goes into HIGH alarm.

- RE-002 & RE-003, Containment - Low Range monitor readings are **not** in alarm.

1) How can the operators check the High and Alert setpoints for the Containment - Low Range monitors, and

2) what indication would inform the operators if RE-002 and RE-003 have failed?

A. 1) can be checked on the SRDC in Control Room

2) the amber Equipment Trouble light would be illuminated.

B. 1) can be checked on the SRDC in Control Room

2) the blue Bypass light would be illuminated.

C. 1) can only be checked locally on the DPM

2) the amber Equipment Trouble light would be illuminated.

D. 1) can only be checked locally on the DPM

2) the blue Bypass light would be illuminated.

44. 061K2.01 002/2/1/AFW/3.2/3.3 MEM/LOIT BANK/RO/SRO/NRC/GCW

The UO notices the following indications for AFW valves:

- HV-5106, "TDAFW Steam Admission Valve", red and green lights are out.

- FV-5132 & 5134, "MDAFW SG 2 & 3 Discharge Throttle Valves", red, green, and white lights are out.

Which ONE of the following is the cause of these conditions?

A. Loss of C train 1E 480 VAC and B train 1E 125 VDC power.

B. Loss of C train 1E 125 VDC and B train 1E 125 VDC power.

C. Loss of C train 1E 480 VAC and B train 1E 480 VAC power.

D. Loss of C train 1E 125 VDC and B train 1E 480 VAC power.

45. 061K6.02 002/2/1/AFW PUMPS-LOSS/2.6/2.7 C/A/NEW/RO/SRO/NRC/TLH

While the TDAFW pump was tagged out for governor replacement, a spurious Reactor Trip from 100% occurred.

The Unit Operator monitoring AFW flow reports the following:

- Steam Generator #1 = 0 gpm.
- Steam Generator #2 = 300 gpm.
- Steam Generator #3 = 300 gpm.
- Steam Generator #4 = 0 gpm.

Which ONE of the following is CORRECT concerning the MDAFW pumps status and their associated mini-flow valve position?

	MDAFW Pump Status	**Mini-flow Valve Status**
A.	A RUNNING	OPEN
	B STOPPED	CLOSED
B.	A STOPPED	CLOSED
	B RUNNING	OPEN
C.	A RUNNING	CLOSED
	B STOPPED	OPEN
D✓	A STOPPED	OPEN
	B RUNNING	CLOSED

46. 062K4.02 002/2/1/AC-BREAKER TRIPS/2.5/2.7/MOD BANK/RO/SRO/NRC/GCW

The "Maintenance / Normal" switch located on the QEAB for a 4160V AC bus has been placed in the "Maintenance" position to support bus inspection.

When the switch is returned to the "Normal" position, this switch will...

A. enable the instantaneous overcurrent trips on the bus **load** breakers.

B. enable the instantaneous overcurrent trips on the bus **supply** breakers.

C. enable the time delay on the overcurrent trips on the bus **load** breakers.

D✔ enable the time delay on the overcurrent trips on the bus **supply** breakers.

47. 063A2.01 002/2/1/DC GROUNDS/2.5/3.2 C/A/BANK/RO/SRO/NRC/GCW

While at 100% power, the following annunciator illuminates:

- ALB34-B01, 125V DC SWGR BD1 TROUBLE

- The Control Building Operator (CBO) has been dispatched to investigate.

Which ONE of the following is CORRECT regarding indications / actions to take if a GROUND has occurred ?

A. There are no local bus ground detection targets associated with BD1, the CBO would have no indication of a ground, maintenance would determine the cause.

B. A bus ground detection target would be dropped on BD1, de-energize panels BD1M, BD11, and BD12 one at a time to locate the panel with the ground.

C. There are no bus ground detection targets associated with BD1, de-energize selected loads on BD1M, BD11, and BD12 one at a time until the alarm clears.

D✔ A bus ground detection target would be dropped on BD1, de-energize selected loads on BD1M, BD11, and BD12 one at a time to locate the source of the ground.

48. 064G2.2.12 002/2/1/DG SURVEILLANCES/3.7/4.1 C/A/BANK FARLEY 2010/RO/SRO/NRC/GCW

During the performance of the surveillance test, 14980A-2, "Diesel Generator 2A Operability Test":

The DG will be logged as INOPERABLE while performing a ___(1)___.

The DG will be OPERABLE when the ___(2)___.

A. (1) slow start

(2) EXCITER ENABLE pushbutton is depressed.

B. (1) slow start

(2) EXCITER PERMISSIVE switch is placed in NORMAL.

C. (1) fast start

(2) EXCITER ENABLE pushbutton is depressed.

D. (1) fast start

(2) EXCITER PERMISSIVE switch is placed in NORMAL.

49. 064K3.03 002/2/1/DG-MANUAL LOADS/3.6/3.9 C/A/NEW/RO/SRO/NRC/TLH

Unit 1 has experienced a loss of power to 1AA02 while at 100% RTP.

D/G-1A automatically started but immediately tripped on "Overspeed" when the CCW pumps started.

While the investigation and repairs are in progress on the D/G-1A, the Control Room crew was able to re-energize 1AA02 from the SAT.

When 1AA02 was re-energized from the SAT, the Sequencer __(1)__. The reason the "Sequencer Reset" must be performed in this case is to __(2)__.

A. (1) will start its UV loads.

   (2) remove "Block Auto/Manual" signal.

B. (1) will NOT start its UV loads.

   (2) remove "Block Auto/Manual" signal.

C. (1) will start its UV loads.

   (2) reset the Loss of Offsite Power (LOP) Monitor.

D. (1) will NOT start its UV loads.

   (2) reset the Loss of Offsite Power (LOP) Monitor.

50. 067AA1.07 002/1/2/FIRE PANEL RESET/2.9/3.0 MEM/NEW/RO/SRO/NRC/GCW

The Fire Alarm Computer (FAC) has an alarm displayed on the alarm overview page.

(1) The computer for primary Fire Alarm response is located in ___(1)___,

and

(2) an unacknowledged alarm is a ___(2)___ icon.

A. (1) the Main Control Room

(2) FLASHING

B. (1) C & T (EBI workstation)

(2) FLASHING

C. (1) the Main Control Room

(2) SOLID

D. (1) C & T (EBI workstation)

(2) SOLID

51. 068A3.02 002/2/2/LIQUID RW-ISOLATION/3.6/3.6 C/A/LOIT BANK/RO/SRO/NRC/GCW

Waste Monitor Tank 009 release is in progress on Unit 1 when power to the DPM for RE-018 (Liquid Waste Monitor) is lost and subsequently restored.

Liquid Radwaste Isolation Valve RV-018 ___(1)___ and the release ___(2)___.

A. (1) closes

(2) can be restarted using the original release permit.

B. (1) closes

(2) cannot be restarted until a new release permit is obtained.

C. (1) remains open

(2) may continue using the original release permit.

D. (1) remains open

(2) may continue provided additional grab samples are obtained.

52. 068AK3.08 002/1/2/CONTROL RM EVACUATIO/3.4/3.9 MEM/NEW/RO/SRO/NRC/GCW

The control room has been evacuated due to a fire which posed a personnel hazard and the operators did not trip the MFPTs.

Later, the Shift Supervisor has opted to locally trip the MFPTs. Regarding the Condensate pumps, which of the following is correct regarding the required final Condensate pump status and the reason?

	Condensate Pump final status	**Reason for pump status**
A.	all pumps stopped	prevents overfilling the steam generators.
B.	all pumps stopped	prevents an excessive cooldown of the RCS.
C.	one pump running	maintains hotwell reject capability to the CSTs.
D.	one pump running	cools equipment needed to maintain vacuum.

53. 073K1.01 002/2/1/PRM SYSTEMS/3.6/3.9 MEM/LOIT BANK/RO/SRO/NRC/GCW

HIGH radiation has been detected in the Steam Generator Blowdown System (SGBD).

Regarding the following rad monitors:

RE-0019, "SG Sample Liquid"
RE-0021, "SG Blowdown Liquid"

Which ONE of the following would (1) initiate a SGBD isolation on High Radiation and (2) which valve listed below would automatically close to isolate the system on High Radiation?

A. (1) RE-0019

(2) FV-1150, Blowdown Inlet Isolation Valve

B. (1) RE-0019

(2) HV-7600, Blowdown Recycle Isolation Valve

C. (1) RE-0021

(2) FV-1150, Blowdown Inlet Isolation Valve

D. (1) RE-0021

(2) HV-7600, Blowdown Recycle Isolation Valve

54. 073K5.02 002/2/1/PRM-SOURCE DISTANCE/2.5/3.1 C/A/BANK SURRY 09/RO/SRO/NRC/GCW

Initial conditions:

- Radiography is in progress on a section of main steam piping.
- The radiographers want to verify the correct position of the camera by using a main steam line radiation monitor located on the same elevation and close to the area where the radiography needs to take place.
- To obtain a baseline reading, the camera source was placed 3.21 feet away from the radiation monitor detector.
- The radiation monitor reads 5.92 R/hr.

Current conditions:

- The camera has been moved into position to image the piping section.
- Engineering calculations show that the camera should be placed 17.46 feet away from the radiation monitor detector.

The distances listed above include the difference in height from the camera to the radiation monitor detector. Consider the radiography camera as a radiation **point source**. Carry all calculations to three (3) decimal places.

Based on current conditions, which ONE of the following correctly identifies the expected reading on the radiation monitor, if the camera was positioned correctly?

A. 0.037 R/hr

B. 0.200 R/hr

C. 1.088 R/hr

D. 2.538 R/hr

55. 076A3.02 001/2/1/NSCW HEAT LOADS/3.7/3.7 MEM/MOD BANK/RO/SRO/NRC/GCW

Given the following:

- A Reactor Trip and Safety Injection (SI) occur.

Which ONE of the following is CORRECT regarding NSCW cooling water status to the Containment Cooling system?

A. Auxiliary Coolers - open

   Containment Coolers - open

B. Auxiliary Coolers - closed

   Containment Coolers - closed

C. Auxiliary Coolers - closed

   Containment Coolers - open

D. Auxiliary Coolers - open

   Containment Coolers - closed

56. 076AA2.03 002/1/2/HIGH RCS ACTIVITY/2.5/3.0 MEM/LOIT BANK/RO/SRO/NRC/GCW

Initial conditions:

- Unit at full power with all systems in automatic.

Current conditions:

- CVCS letdown radiation monitor RE-48000 is off-scale high.
- Chemistry has validated the alarm with a sample.

Which ONE of the following choices correctly describes the cause for this indication and the appropriate actions to take per the ARP?

A. CVCS letdown mixed bed demineralizer over temperature.

   Bypass the CVCS mixed bed demineralizer and divert letdown to the RHT.

B. ✓ Fuel rod cladding leak.

   Dispatch HP personnel to measure dose rates in the penetration room area and determine RCS Activity levels.

C. CVCS letdown mixed bed demineralizer over temperature.

   Isolate CVCS normal letdown and then place excess letdown in service.

D. Fuel rod cladding leak.

   Maximize CVCS and excess letdown flows and limit any future power changes until RE-48000 reading lowers to normal background.

57. 076K1.05 002/2/1/NSCW-DG/3.8/4.0 C/A/NEW/RO/SRO/NRC/GCW

Given the following:

- DG 1A has been fully loaded per 14980A-1 "Diesel Generator 1A Operability Test".

- During the surveillance run, the following alarms illuminated:

  "NSCW TRAIN A DG CLR LO FLOW"
  "NSCW TRAIN A LO HDR PRESS"
  "NSCW PMP HOUSE TRN A DRN SUMP HI LVL"

Which ONE of the following has occurred and what will be the effect on the 1A DG if no operator actions are taken?

A. NSCW Pump trip.

   DG will trip on Hi Jacket Water Temperature.

B. ✓ NSCW leak.

   DG will trip on Hi Jacket Water Temperature.

C. NSCW Pump trip.

   DG will remain running.

D. NSCW leak.

   DG will remain running.

58. 077AA2.07 002/1/1/GRID DISTURBANCES/3.6/4.0 C/A/MOD BANK ROBINSON/RO/SRO/NRC/GCW

Given the following:

- Plant is in Mode 1 at 100% RTP.

- The Load Dispatcher reports several major generating stations have tripped and grid voltage is degrading.

- For the last 30 seconds 1E 4160V bus voltage has been reading 3740 volts.

Following the above conditions, the operator would expect the emergency busses to be energized from ...

A. offsite power, the Diesel Generators will not start until bus voltage reaches the "Loss of Voltage" setpoint.

B. offsite power, the Diesel Generators will not start until bus voltage reaches the "Degraded Voltage" setpoint.

C. the Diesel Generators, due to reaching the "Loss of Voltage" setpoint.

D. ✓ the Diesel Generators, due to reaching the "Degraded Voltage" setpoint.

59. 103K1.08 002/2/1/CNMT-SI-RESET/3.6/3.8 C/A/LOIT BANK/RO/SRO/NRC/GCW

Unit 1 has the following conditions:

- A LOCA has occurred and SI actuation.

- Containment Pressure is 5 psig and slowly lowering.

- SI has NOT been reset.

- Instrument Air to Containment has been isolated.

Which ONE of the following describes the minimum action(s) that must be performed to re-establish Instrument Air to Containment?

A. ✓ Reset CIA only.

B. Reset SI, then reset CIA.

C. Containment pressure < 3.8 psig, then reset CIA.

D. Containment pressure < 3.8 psig, then reset SI, then reset CIA.

60. WE04EK1.1 002/1/1/LOCA ORC/3.5/3.9 C/A/BANK/RO/SRO/NRC/GCW

Given the following:

- A LOCA outside Containment has occurred.

- The crew is performing 19112-C, "LOCA Outside Containment".

Which **ONE** of the following is:

1) the **FIRST** system to be isolated from the RCS to attempt leak isolation, and

2) the parameter monitored to determine if the leak has been isolated?

	1) First System Isolated	**2) Parameter Monitored**
A.	RHR	RVLIS level
B.✓	RHR	RCS pressure
C.	SI	RVLIS level
D.	SI	RCS pressure

61. WE05EA1.1 002/1/1/LOSS OF HEAT SINK/4.1/4.0 C/A/LOIT BANK/RO/SRO/NRC/GCW

Given the following:

- A transition from E-0 19000-C to 19231-C "Response To Loss of Secondary Heat Sink" has occurred.
- All Steam Generator Wide Range levels are approximately 5%.
- RCS temperature is approximately 580°F and stable.

Per 19231-C, which ONE of the following describes the preferred method of initiating Auxilary Feed flow for these conditions?

A.✓ Feed a selected SG at 30 - 100 gpm until WR level > 9%.

B. Feed a selected SG with no flow restrictions until NR level is > 10%.

C. Feed all SG's at 30 - 100 gpm until WR level > 9%.

D. Feed all SG's with no flow restrictions until NR level is > 10%.

62. WE08EA1.1 002/1/2/PTS-RCS OVERCOOLING/3.8/3.8 C/A/LOIT BANK/RO/SRO/NRC/GCW

Given the following:

- Unit 1 Reactor tripped and a natural circulation cooldown was required.
- The COPs system was placed in service in accordance with 19002-C, "Natural Circulation Cooldown".
- Subsequently, a faulted Steam Generator resulted into entry into 19241-C, "Pressurized Thermal Shock".
- All RCS temperatures have been stablized at approximately 290°F.
- RCS pressure is 650 psig.
- Loop 3 WR Cold Leg temperature fails to bottom of scale LOW.

Which ONE of the following describes the effect on the Unit?

A. PORV 455 will open until it is manually closed.

B. PORV 456 will open until it is manually closed.

C. PORV 455 will open until RCS pressure lowers below the minimum COPs setpoint.

D. PORV 456 will open until RCS pressure lowers below the minimum COPs setpoint.

63. WE09G2.4.9 001/1/2/NAT CIRC/3.8/4.2 C/A/LOIT BANK/RO/SRO/NRC/GCW

Given the following conditions:

- A small break LOCA has occurred.
- The RCPs have been secured.
- 19012, "Post LOCA Cooldown and Depressurization," is in progress.
- RCS pressure is 1490 psig.
- Wide Range T-Cold indications are 505°F and slowly lowering.
- Wide Range T-Hot indications are 515°F and slowly lowering.
- Core Exit Thermocouples (CETC's) are 581°F and stable.
- S/G pressures are 715 psig and stable.

According to 19012-C, which ONE of the following correctly states the status of Natural Circulation and the correct operator actions?

A. Natural Circulation is occurring. Continue attempts to start a RCP.

B. Natural Circulation is occurring. Maintain Steam Dump operation.

C. Natural Circulation is **NOT** occurring due to stable CETC's. Raise rate of Steam Dump Operation.

D. Natural Circulation is **NOT** occurring due to inadequate subcooling. Raise rate of Steam Dump Operation.

64. WE11EK2.2 002/1/1/LOSS OF COOLANT RECI/3.9/4.3 C/A/LOIT BANK/RO/SRO/NRC/GCW

The following Unit 1 conditions exist:

- A primary LOCA outside containment is in progress.
- Reactor Trip and SI have occurred.
- 19111-C, "Loss of Emergency Coolant Recirculation" is in effect.

Which ONE of the following choices describes the correct actions to take in 19111-C under these conditions?

A. Start makeup to the RWST from the Boric Acid System.

   Terminate ECCS flow with proper RVLIS indication ONLY.

B. ✓ Start makeup to the RWST from the Spent Fuel Pool.

   Establish one train of ECCS flow. The minimum required subcooling to terminate ECCS flow is 74°F.

C. Start makeup to the RWST from the Reactor Coolant Drain Tank.

   Terminate ECCS flow with proper RVLIS indication and subcooling > 74°F.

D. Start makeup to the RWST from the Spent Fuel Pool.

   Establish one train of ECCS flow. The minimum required subcooling to terminate ECCS flow is 24°F.

65. WE12EK2.1 002/1/1/MSL RUPTURE/3.4/3.7 MEM/MOD BANK WOLF CRK/RO/SRO/NRC/GCW

During the performance of 19121-C, "Uncontrolled Depressurization Of All Steam Generators", the following conditions exist:

- RCS cooldown rate is determined to be 125 °F/HR.
- All SG NR levels are off-scale low.

Which ONE of the following describes how the crew is directed to control AFW flow and the basis for the action?

A. Flow is reduced to 30 gpm to each SG.

   WR Hot Leg temperatures are monitored to ensure secondary heat sink is maintained.

B. Total flow is reduced to 30 gpm to only one SG.

   WR Cold Leg temperatures are monitored for conditions that may result in PTS.

C. Total flow is maintained > 570 gpm until ANY SG NR level is > 10%.

   WR Hot Leg temperatures are monitored to ensure secondary heat sink is maintained.

D. Total flow is maintained > 570 gpm until ANY SG NR level is > 10%.

   WR Cold Leg temperatures are monitored for conditions that may result in PTS.

66. G2.1.1 002/3/N/A/COND OF OPS/3.8/4.2 MEM/NEW/RO/SRO/NRC/GCW

The On-Duty Shift Manager is required to notify the Operations Manager On-Call (OMOC) promptly of significant plant events.

Per NMP-OS-007-001, "Conduct of Operations Standards and Expectations", which ONE of the following would (1) require the notification to the OMOC and (2) the minimum requirements of the individuals fulfilling the OMOC function?

A. (1) Apprentice Mechanic has sustained a First Aid injury.

   (2) Must be knowledgeable at the SRO level.

B. (1) Chemistry reports Secondary Chemistry Action Level 2.

   (2) Must have a current or formerly held an SRO license.

C. (1) A missed Tech Spec surveillance or test.

   (2) Must be knowledgeable at the SRO level.

D. (1) A reportable event per 10CFR.

   (2) Must have a current or formerly held an SRO license.

67. G2.1.23 002/3/N/A/COND OF OPS/SYSTEMS/4.3/4.4 MEM/LOIT BANK/RO/SRO/NRC/GCW

UOP 12004-C, "POWER OPERATION" is in effect.

The transfer from Auxiliary Feed Water to Main Feed Water step is in progress.

The Bypass Feed Isolation Valve (BFIV) is opened while the Main Feed Isolation Valve (MFIV) is verified closed. The flowpath of main feedwater to the selected steam generator as the Bypass Feed Reg Valve (BFRV) is opened is:

A. established, because the MFIV leak-by is great enough to supply SG flow needs at low power through the BFRV.

B. established, because the BFRV and BFIV are in series and not isolated by the MFIV.

C. NOT established, because the MFIV isolates flow to both the BFRV and the MFRV.

D. NOT established, because both the MFIV and BFIV must be opened before flow can be established.

68. G2.2.13 002/3/N/A/C & T/4.1/4.3 MEM/BANK-HL-15R/RO/SRO/NRC/GCW

A **fail open** air operated valve (AOV) with a handwheel must be Danger Tagged as a boundary point for a clearance.

To meet the minimum requirements of NMP-AD-003-002, "Tagout Standards":

1) The handwheel is _____.

2) The air supply valve is _____.

	_____1_____	_____2_____
A.	Danger tagged	Danger tagged
B.	Danger tagged	NOT required to be Danger tagged
C.	NOT required to be Danger tagged	Danger tagged
D.	NOT required to be Danger tagged	NOT required to be Danger tagged

69. G2.2.14 002/3/N/A/EQUIP CONFIQ/3.9/4.3 MEM/NEW/RO/SRO/NRC/GCW

Procedure 10000-C, "Operations Administrative Controls" has requirements for Tracking Configuration of Repositioned Components.

A component that is procedurally manipulated from the Control Room to an Off Normal configuration is expected to remain in that position past shift turnover time.

Which ONE of the following is CORRECT concerning how this component is tracked in order to return it to its normal alignment?

A. The **only** requirement is the component is Caution Tagged stating the reason for its repositioning.

B. The **only** requirement is the controlling procedure is placed into the "Procedures in Progress" book in the Control Room.

C. The component is flagged with a Pink "Off Normal Component" flag and logged in the Unit Control Log.

D. The component is flagged with a Pink "Off Normal Component" flag and controlling procedure placed into the "Procedures in Progress" book in Control Room.

70. G2.3.15 001/3/N/A/RMS-KNOWLEDGE OF/2.9/3.1/NEW/RO/SRO/NRC/GCW

Per 00930-C, "Radiation and Contamination Control", when exiting Contaminated Areas, hand carried tools and materials (e.g., clipboards, notebooks, pencils, etc.) shall be frisked for _____**1**_____ contamination.

Personnel decontamination should be performed when the results of personnel monitoring exceed a minimum of _____**2**_____ above background.

A. (1) Beta-Gamma

(2) 200 cpm

B. (1) Alpha

(2) 200 cpm

C. (1) Beta-Gamma

(2) 100 cpm

D. (1) Alpha

(2) 100 cpm

71. G2.3.5 002/3/N/A/RMS-USE OF/2.9/2.9 MEM/NEW/RO/SRO/NRC/GCW

An operator has exited Containment during a Refueling Outage.

Which ONE of the following is CORRECT concerning the Personnel Monitoring requirements for the operator prior to leaving the RCA?

A. Hands and Feet should be frisked at the nearest frisker location.

   Proceed to the nearest personnel contamination monitor for a Whole Body survey.

B. Hands and Feet should be frisked at the nearest frisker location.

   Proceed to the HP Control Point personnel contamination monitor for a Whole Body survey.

C. Hands and Feet are NOT required to be frisked at the nearest frisker location.

   Proceed to the nearest personnel contamination monitor for a Whole Body survey.

D. Hands and Feet are NOT required to be frisked at the nearest frisker location.

   Proceed to the HP Control Point personnel contamination monitor for a Whole Body survey.

72. G2.3.7 002/3/N/A/RWP/3.5/3.6 MEM/LOIT BANK/RO/SRO/NRC/GCW

An individual is reviewing the RWP before beginning work.

If the dose rate in the area is 900 mrem/hr, he would expect to find a _____(a)_____ colored RWP requiring an ALARA briefing prior to_____(b)_____entry.

A. (a) RED

   (b) each

B. (a) YELLOW

   (b) each

C. (a) RED

   (b) only the first

D. (a) YELLOW

   (b) only the first

73. G2.4.14 002/3/N/A/GENERAL EOP USAGE/3.8/4.5 C/A/LOIT BANK/RO/SRO/NRC/GCW

Following a Reactor Trip, the IOAs of 19000-C, E-0 "Reactor Trip or Safety Injection" have been completed.

The following conditions exist:

- SG # 1 has a Main Steam Safety Valve stuck open.
- SG # 2 has been identified as having a tube leak by Chemistry sample.
- Both SG levels are currently 12% in the Narrow Range.
- Containment pressure is 4.4 psig.
- The UO desires to isolate AFW flow to both SGs prior to reaching procedural direction to do so.

The UO would be allowed to isolate AFW flow to ___(a)___, SS permission ___(b)___ required prior to taking the action.

A. (a) SG # 1 only (b) is

B. (a) SG # 1 only (b) is not

C. (a) both SGs # 1 and # 2 (b) is

D. (a) both SGs # 1 and # 2 (b) is not

74. G2.4.2 002/3/N/A/EOPS STPTS-ENTRY/4.5/4.6 C/A/BANK/RO/SRO/NRC/GCW

The following conditions exist:

- Unit is at 5% reactor power following a start up.
- A Pressurizer Spray valve fails open.

Which ONE of the following would be the first to trip the reactor? (Assume no operator action).

A. OT Delta T Reactor Trip

B. Pressurizer High Level Reactor Trip

C. Low Pressurizer Pressure Reactor Trip

D. Pressurizer Pressure Safety Injection Reactor Trip

75. G2.4.34 002/3/N/A/EOP TASK OUT CR/4.2/4.1 MEM/MOD BANK-FARLEY/RO/SRO/NRC/GCW

Given the following:

- A fire required evacuation of the Control Room.
- Charging was aligned to the VCT before exiting the Control Room.
- Procedure 18038-1,"Operation From Remote Shutdown Panels" is in progress.
- All equipment control has been transferred to the Shutdown Panels.

Upon receipt of a VCT Lo-Lo Level, the RWST to CCP suction valves and VCT outlet isolation valves _____(1)_____ automatically re-position and 1FV-121 will be controlled locally _____(2)_____.

A. (1) will

(2) from the "B" Train Shutdown Panel.

B. (1) will

(2) from the control box located on "C" level of the Aux Building.

C. (1) will **not**

(2) from the "B" Train Shutdown Panel.

D. (1) will **not**

(2) from the control box located on "C" level of the Aux Building.

HL-16 RO Exam Short Key

#	ID	Answers 0
1	001G2.4.9 2	B
2	001K2.05 2	D
3	002K5.11 2	A
4	003K5.03 2	A
5	003K6.02 1	B
6	004A3.06 2	B
7	005A1.02 1	C
8	005A4.03 2	B
9	006A1.07 2	C
10	006G2.1.30 2	B
11	007A1.03 2	A
12	008AK1.01 1	A
13	009G2.4.8 2	A
14	010K6.04 2	B
15	011EA1.03 2	C
16	011K4.03 4	A
17	012A4.07 1	D
18	013K5.01 2	B
19	014A1.02 2	A
20	017K6.01 1	B
21	022A4.05 2	D
22	022AA2.03 4	C
23	022K3.02 2	A
24	025AK1.01 2	A
25	026K3.02 2	A
26	027AK2.03 2	A
27	028AK1.01 2	D
28	029EK3.02 2	A
29	029K1.02 2	D
30	033AK3.01 2	C
31	033G2.4.49 2	C
32	035A4.06 2	D
33	038EK3.01 2	A
34	039G2.2.39 2	C
35	054G2.4.49 1	C
36	055EA1.01 3	A
37	055K3.01 2	A
38	056AK3.01 3	D
39	057AA2.02 1	C
40	058G2.4.49 2	D
41	059K4.18 2	C
42	059K4.19 3	C
43	060AK2.01 2	A
44	061K2.01 2	D
45	061K6.02 2	D
46	062K4.02 2	D
47	063A2.01 2	D
48	064G2.2.12 2	A

		Answers
#	ID	0
49	064K3.03 2	B
50	067AA1.07 2	A
51	068A3.02 2	B
52	068AK3.08 2	D
53	073K1.01 2	C
54	073K5.02 2	B
55	076A3.02 1	C
56	076AA2.03 2	B
57	076K1.05 2	B
58	077AA2.07 2	D
59	103K1.08 2	A
60	WE04EK1.1 2	B
61	WE05EA1.1 2	A
62	WE08EA1.1 2	D
63	WE09G2.4.9 1	D
64	WE11EK2.2 2	B
65	WE12EK2.1 2	A
66	G2.1.1 2	C
67	G2.1.23 2	B
68	G2.2.13 2	B
69	G2.2.14 2	D
70	G2.3.15 1	C
71	G2.3.5 2	A
72	G2.3.7 2	D
73	G2.4.14 2	A
74	G2.4.2 2	D
75	G2.4.34 2	D

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NOTE: **The 'Comment' box should be checked if the question is not worded clearly or contains errors and/or misleading information. The 'Challenge' box should be checked if the question to be reviewed for credit on your exam. Include your name.**

Exam Title: Vogtle 2011 NRC SRO Examination 4/1/11
Date Exam Administered

Submitted By: A. Curtis Jenkins 4/5/11
Date

☐ Comment ☒ Challenge

Question Identifier (Complete number example: AFW-40201D08004) LOCT Cycle 3, Question #2)	#78 (SRO Exam)

State the reason for comment or challenge on the question: Contrary to the Answer/Distracter Analysis, the correct answer is "C". This is based on T.S. B 3.4.11, Pressurizer Power Operated Relief Valves (PORVs), which states, *"An OPERABLE PORV is required to be capable of manually opening and closing, and not experiencing excessive seat leakage. Excessive seat leakage, although not associated with a specific criteria, exists when conditions dictate closure of the block valve to limit leakage.*
Therefore, based on the Technical Specifications Bases, C is the only correct answer.

Operation Management supports this challenge for the reasons stated above.

Challenge Review:

Credit given to the submitter	☐	YES	☐	NO		
Key changed	☐	YES	☐	NO	☐	N/A
Submitted for exam bank update	☐	YES	☐	NO	☐	N/A

Exam Bank Review:

Comment/Challenge incorporated	☐	YES	☐	NO	☐	N/A

Reason for not incorporating: _____

*Challenge Approved: _____
Training Supervisor Date

* N/A if challenge does not result in an exam key change

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 Pressurizer Power Operated Relief Valves (PORVs)

LCO 3.4.11 Each PORV and associated block valve shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more PORVs inoperable and capable of being manually cycled.	A.1	Close and maintain power to associated block valve.	1 hour
B. One PORV inoperable and not capable of being manually cycled.	B.1	Close associated block valve.	1 hour
	AND		
	B.2	Remove power from associated block valve.	1 hour
	AND		
	B.3	Restore PORV to OPERABLE status.	72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. One block valve inoperable.	C.1	Place associated PORV in manual control.	1 hour
	AND		
	C.2	Restore block valve to OPERABLE status.	72 hours
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1	Be in MODE 3.	6 hours
	AND		
	D.2	Be in MODE 4.	12 hours
E. Two PORVs inoperable and not capable of being manually cycled.	E.1	Close associated block valves.	1 hour
	AND		
	E.2	Remove power from associated block valves.	1 hour
	AND		
	E.3	Be in MODE 3.	6 hours
	AND		
	E.4	Be in MODE 4.	12 hours
F. More than one block valve inoperable.	F.1	Place associated PORVs in manual control.	1 hour
	AND		

(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
F. (continued)	F.2	Restore one block valve to OPERABLE status.	2 hours
	AND		
	F.3	Restore remaining block valve to OPERABLE status.	72 hours
G. Required Action and associated Completion Time of Condition F not met.	G.1	Be in MODE 3.	6 hours
	AND		
	G.2	Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.11.1	----------NOTE---------- Not required to be performed with block valve closed in accordance with the Required Action of Conditions A, B, or E. ---------- Perform a complete cycle of each block valve.	92 days
SR 3.4.11.2	Perform a complete cycle of each PORV.	18 months

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.11 Pressurizer Power Operated Relief Valves (PORVs)

BASES

BACKGROUND

The pressurizer is equipped with two types of devices for pressure relief pressurizer safety valves and PORVs. The PORVs are safety-related DC solenoid operated valves that are controlled to open at a specific set pressure when the pressurizer pressure increases and close when the pressurizer pressure decreases. The PORVs may also be manually operated from the control room.

Block valves, which are normally open, are located between the pressurizer and the PORVs. The block valves are used to isolate the PORVs in case of excessive leakage or a stuck open PORV. Block valve closure is accomplished manually using controls in the control room. A stuck open PORV is, in effect, a small break loss of coolant accident (LOCA). As such, block valve closure terminates the RCS depressurization and coolant inventory loss.

The PORVs and their associated block valves may be used by plant operators to depressurize the RCS to recover from certain transients if normal pressurizer spray is not available. Additionally, the series arrangement of the PORVs and their block valves permit performance of surveillances on the block valves during power operation.

The PORVs may also be used for feed and bleed core cooling in the case of multiple equipment failure events that are not within the design basis, such as a total loss of feedwater.

The power supplies to the PORVs, their block valves, and their controls are Class 1E. Two PORVs and their associated block valves are powered from two separate safety trains (Ref. 1).

The plant has two PORVs, each having a relief capacity of 210,000 lb/hr at 2385 psig. The functional design of the PORVs is based on maintaining pressure below the Pressurizer Pressure — High reactor trip setpoint up to and including the design step-load decreases with steam dump. In addition, the PORVs minimize challenges to the pressurizer

(continued)

BASES

BACKGROUND (continued)

safety valves and also may be used for cold overpressure protection. See LCO 3.4.12, "Cold Overpressure Protection System (COPS)."

APPLICABLE SAFETY ANALYSES

Plant operators may employ the PORVs to depressurize the RCS in response to certain plant transients if normal pressurizer spray is not available. For the Steam Generator Tube Rupture (SGTR) event, the safety analysis assumes that manual operator actions are required to mitigate the event. A loss of offsite power is assumed to accompany the event, and thus, normal pressurizer spray is unavailable to reduce RCS pressure. The PORVs or auxiliary pressurizer spray may be used for RCS depressurization, which is one of the steps performed to equalize the primary and secondary pressures in order to terminate the primary to secondary break flow and the radioactive releases from the affected steam generator.

In addition, in the event of an inadvertent safety injection actuation at power, the potential for pressurizer filling and subsequent water relief via the pressurizer safeties (PSVs) is evaluated (FSAR section 15.5.1). Operator action to make one PORV available is credited in the analysis to mitigate this event. If the PORV is available for automatic actuation, the event consequences would be mitigated directly by preventing water relief through the PSVs. However, automatic actuation is not required to mitigate this event. The analysis includes an acceptable delay for the operator to open a block valve and to manually control the PORV if necessary.

The PORVs also provide the safety-related means for reactor coolant system depressurization to achieve safety-grade cold shutdown and to mitigate the effects of a loss of heat sink or an SGTR. They are modeled in safety analyses for events that result in increasing RCS pressure for which departure from nucleate boiling ratio (DNBR) criteria, pressurizer filling, or reactor coolant saturation are critical (Ref. 2). By assuming PORV actuation, the primary pressure remains below the high pressurizer pressure trip setpoint, thus the DNBR calculation is more conservative. As such, automatic actuation is not required to mitigate these events, and PORV automatic operation is, therefore, not an assumed safety function. Events that assume this condition include a turbine trip, loss of normal feedwater, and feedwater line break (Ref. 2).

Pressurizer PORVs satisfy Criterion 3 of 10 CFR 50.36 (c)(2)(ii).

(continued)

BASES

LCO

The LCO requires the PORVs and their associated block valves to be OPERABLE for manual operation to mitigate the effects associated with an SGTR, or loss of heat sink, and to achieve safety grade cold shutdown. The PORVs are considered OPERABLE in either the manual or automatic mode. The PORVs (PV-455A and PV-456A) are powered from 125 V MCCs 1/2AD1M and 1/2BD1M, respectively. If either or both of these MCCs become inoperable, the affected PORV(s) are to be considered inoperable.

By maintaining two PORVs and their associated block valves OPERABLE, the single failure criterion is satisfied.

An OPERABLE PORV is required to be capable of manually opening and closing, and not experiencing excessive seat leakage. Excessive seat leakage, although not associated with a specific criteria, exists when conditions dictate closure of the block valve to limit leakage.

An OPERABLE block valve may be either open and energized, or closed and energized with the capability to be opened, since the required safety function is accomplished by manual operation. Although typically open to allow PORV operation, the block valves may be OPERABLE when closed to isolate the flow path of an inoperable PORV that is capable of being manually cycled (e.g., as in the case of excessive PORV leakage). Similarly, isolation of an OPERABLE PORV does not render that PORV or block valve inoperable provided the relief function remains available with manual action. Satisfying the LCO helps minimize challenges to fission product barriers.

APPLICABILITY

The PORVs are required to be OPERABLE in MODES 1, 2, and 3 for manual actuation to mitigate a steam generator tube rupture event, an inadvertent safety injection, and to achieve safety grade cold shutdown. In addition, the block valves are required to be OPERABLE to limit the potential for a small break LOCA through the flow path. The most likely cause for a PORV small break LOCA is a result of a pressure increase transient that causes the PORV to open. Imbalances in the energy output of the core and heat removal by the secondary system can cause the RCS pressure to increase to the PORV opening setpoint. The most rapid increases will occur at the higher operating power and pressure conditions of MODES 1 and 2. Pressure increases are less prominent in MODE 3 because the core input energy is reduced, but the RCS pressure is high. Therefore, the LCO is applicable in MODES 1, 2, and 3. The LCO is not applicable in MODES 4, 5, and 6 with the reactor vessel head in place when both pressure and core energy are decreased and the pressure surges become much less significant. LCO 3.4.12 addresses the PORV

(continued)

BASES

APPLICABILITY (continued) requirements in MODES 4, 5, and 6 with the reactor vessel head in place.

ACTIONS A Note has been added to clarify that all pressurizer PORVs are treated as separate entities, each with separate Completion Times (i.e., the Completion Time is on a component basis).

A.1

PORVs may be inoperable and capable of being manually cycled (e.g., excessive seat leakage, instrumentation problems, or other causes that do not create a possibility for a small break LOCA). In this condition, either the PORVs must be restored or the flow path isolated within 1 hour. The associated block valve is required to be closed, but power must be maintained to the associated block valve, since removal of power would render the block valve inoperable. The PORVs may be considered OPERABLE in either the manual or automatic mode. This permits operation of the plant until the next refueling outage (MODE 6) so that maintenance can be performed on the PORVs to eliminate the problem condition.

Quick access to the PORV for pressure control can be made when power remains on the closed block valve. The Completion Time of 1 hour is based on plant operating experience that has shown that minor problems can be corrected or closure accomplished in this time period.

B.1, B.2, and B.3

If one PORV is inoperable and not capable of being manually cycled, it must be either restored or isolated by closing the associated block valve and removing the power to the associated block valve. The Completion Times of 1 hour are reasonable, based on challenges to the PORVs during this time period, and provide the operator adequate time to correct the situation. If the inoperable valve cannot be restored to OPERABLE status, it must be isolated within the specified time. Because there is at least one PORV that remains OPERABLE, an additional 72 hours is provided to restore the inoperable PORV to

(continued)

BASES

ACTIONS

B.1, B.2, and B.3 (continued)

OPERABLE status. If the PORV cannot be restored within this additional time, the plant must be brought to a MODE in which the LCO does not apply, as required by Condition D.

C.1 and C.2

If one block valve is inoperable, then it is necessary to either restore the block valve to OPERABLE status within the Completion Time of 1 hour or place the associated PORV in manual control. The prime importance for the capability to close the block valve is to isolate a stuck open PORV. Therefore, if the block valve cannot be restored to OPERABLE status within 1 hour, the Required Action is to place the PORV in manual control to preclude its automatic opening for an overpressure event and to avoid the potential for a stuck open PORV at a time that the block valve is inoperable. The Completion Time of 1 hour is reasonable, based on the small potential for challenges to the system during this time period, and provides the operator time to correct the situation. The time allowed to restore the block valve is based upon the Completion Time for restoring an inoperable PORV in Condition B since the PORV may not be capable of mitigating an event if the inoperable block valve is not fully open. If the block valve is restored within the Completion Time of 72 hours, the PORV may be restored to automatic operation. If it cannot be restored within this additional time, the plant must be brought to a MODE in which the LCO does not apply, as required by Condition D.

D.1 and D.2

If the Required Action of Condition A, B, or C is not met, then the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. In MODES 4, 5, and 6, maintaining PORV OPERABILITY may be required. See LCO 3.4.12.

(continued)

BASES

ACTIONS (continued)

E.1, E.2, E.3, and E.4

If more than one PORV is inoperable and not capable of being manually cycled, it is necessary to either restore at least one valve within the Completion Time of 1 hour or isolate the flow path by closing and removing the power to the associated block valves. The Completion Time of 1 hour is reasonable, based on the small potential for challenges to the system during this time and provides the operator time to correct the situation. If one PORV is restored and one PORV remains inoperable, then the plant will be in Condition B with the time clock started at the original declaration of having two PORVs inoperable. If no PORVs are restored within the Completion Time, then the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. In MODES 4, 5, and 6, maintaining PORV OPERABILITY may be required. See LCO 3.4.12.

F.1, F.2, and F.3

If more than one block valve is inoperable, it is necessary to either restore the block valves within the Completion Time of 1 hour, or place the associated PORVs in manual control and restore at least one block valve within 2 hours and restore the remaining block valve within 72 hours. The Completion Times are reasonable, based on the small potential for challenges to the system during this time and provide the operator time to correct the situation.

G.1 and G.2

If the Required Actions of Condition F are not met, then the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant

(continued)

BASES

ACTIONS

G.1 and G.2 (continued)

conditions from full power conditions in an orderly manner and without challenging plant systems. In MODES 4, 5, and 6, maintaining PORV OPERABILITY may be required. See LCO 3.4.12.

SURVEILLANCE REQUIREMENTS

SR 3.4.11.1

Block valve cycling verifies that the valve(s) can be closed if needed. The basis for the Frequency of 92 days is the ASME Code, Section XI (Ref. 2). The Note modifies this SR by stating that it is not required to be performed with the block valve closed, in accordance with the Required Actions of Conditions A, B, or E.

SR 3.4.11.2

SR 3.4.11.2 requires a complete cycle of each PORV. Operating a PORV through one complete cycle ensures that the PORV can be manually actuated for mitigation of an SGTR. The Frequency of 18 months is based on a typical refueling cycle and industry accepted practice.

REFERENCES

1. Regulatory Guide 1.32, February 1977.

2. ASME, Boiler and Pressure Vessel Code, Section XI.

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NOTE: **The 'Comment' box should be checked if the question is not worded clearly or contains errors and/or misleading information. The 'Challenge' box should be checked if the question to be reviewed for credit on your exam. Include your name.**

Exam Title: Vogtle 2011 NRC SRO Examination 4/1/11
Date Exam Administered

Submitted By: Carla Smith 4/5/11
Date

☐ Comment ☒ Challenge

Question Identifier (Complete number example: AFW-40201D08004) LOCT Cycle 3, Question #2)	#90 (SRO Exam)

State the reason for comment or challenge on the question: This question stem states, "The Main Control Board indicators for various Steam Generator (SG) pressure channels display a RED Bezel on the bottom of the indicator. The SG pressures are also displayed on the Remote Shutdown Panels. Which ONE of the following is correct concerning both (1) the Control Room indicators and (2) the Remote Shutdown Panel indicators for SG Pressure?"

Based on instructor interviews with the candidates, the question stem was confusing in that it biased the students to assume that the question was asking what was the difference between the RED Bezels in the control room versus the "B" Remote Shutdown panel, in that case "A" would be the correct answer. Five out of six SROs picked A. (See VEPG-FSAR-18.1.2.11 and FSAR-7 Alternate Shutdown Indication System page 7.4-14)

This question confusion may be contributed to psychometric deficiencies, namely this question is a list of true false statements (refer to NUREG-1021 Supplement 1, Appendix B for basic psychometric principles of exam writing. The stem of the question should have directly asked the question if the SG Pressure is fire qualified.

This question therefore has an unclear stem that confused the applicants and did not ask the question in a more direct manner. Interviewing a sample of the candidates, one indicated that a group of SROs studying for the exam discussed the RED Bezels. The question was asked of the candidates, which instruments went through Eagle 21 (fire qualified instruments), the sampling could answer the question. (Refer to NUREG-1021 Supplement 1, ES-403, D.b., unclear and confusing stems.). Based on aforementioned, tis question is recommended to be deleted from the SRO exam.

The utility supports this challenged based on the reasons above.

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Challenge Review:

Credit given to the submitter	☐	YES	☐	NO		
Key changed	☐	YES	☐	NO	☐	N/A
Submitted for exam bank update	☐	YES	☐	NO	☐	N/A

Exam Bank Review:

Comment/Challenge incorporated	☐	YES	☐	NO	☐	N/A

Reason for not incorporating: _____

_____

_____

_____

_____

*Challenge Approved: _____

Training Supervisor Date

* N/A if challenge does not result in an exam key change

_____

18.1.2.11 Labeling (Grouping, Marking)

This is defined as alphanumeric, color, and other visual methods used for controls and displays to improve the performance of control room personnel.

A color coding scheme for the switchplates on the QMCB, QEAB, QHVC, QPCP, PSDA, and PSDB is implemented in a plant procedure.

Additionally:

A. Controls located on the bench board section of the QMCB are grouped by subsystems divided by the demarcation lines (paragraph 18.1.1.2.A) and enveloped, where room permits, with hierarchical labels for subsystems at the top center of the envelopes to improve recognition of functional grouping.

B. Labels are located to minimize interference with operator view and to avoid interference with other control functions.

C. Labels are designed for legibility and visibility based on the contrast between the lettering and its background.

D. Labels are designed to have white letters on black tags. Black on white is sometimes used to highlight a display.

E. Labels are designed with 3/16-in. capital letters. Annunciator window engravings are designed with 1/4-in. or 3/16-in. letters. The 1/4-in. letters are used to improve readability when message length permits.

F. Controls and displays are labeled with service description and tag number engravings. In addition, the control switch modules shall contain engravings for switching development functions, equipment-actuated functions, and train, if applicable.

G. Labels are placed above the instruments and on the escutcheon plates for control switches to allow adequate viewing from a distance of about 3 ft.

H. Labels for similar devices throughout a board are designed to be uniform in style, size, lettering, and use of abbreviations, with the exception of integral panels supplied by the vendor and inserted into the boards or panels as a unit.

I. Labels are designed and mounted so that they cannot easily be damaged or removed.

J. Labels and tag numbers are designed for accessibility and visibility during maintenance.

K. Labels are concise with minimum repetitive information and are directly usable with minimum decoding and interpretation of the service descriptions and abbreviations. A hierarchical label is used to highlight functional grouping.

L. Labels are not designed to describe engineering characteristics, name of manufacturer, trademarks, or nonfunction-related nomenclatures of the equipment.

M. Shades of colors used for mimics on the QEABs are designed to have maximum contrast between the mimic bus and the boards.

N. Safety-related post-accident monitoring instrumentation is identified by a dark red line on the black bezel base of each instrument.

Southern Nuclear Operating Company			
SOUTHERN COMPANY	Nuclear Management Form	Exam Question Feedback	NMP-TR-215-F02 Version 1.0 Page 1 of 2

NOTE: **The 'Comment' box should be checked if the question is not worded clearly or contains errors and/or misleading information. The 'Challenge' box should be checked if the question to be reviewed for credit on your exam. Include your name.**

Exam Title: Vogtle 2011 NRC SRO Examination 4/1/11
Date Exam Administered

Submitted By: Mackie Sinkler 4/6/11
Date

☐ Comment ☒ Challenge

Question Identifier (Complete number example: AFW-40201D08004) LOCT Cycle 3, Question #2)	#97 (SRO Exam)

State the reason for comment or challenge on the question: This question also has "C" as a correct answer based on the following discussion. The question states, "The Unit 2 CSTs are (inoperable / operable (question answer / distractor) and the basis for the Tech Spec minimum level requirements are for (holding the unit in MODE 3 for 7 / 4 (question answer / distractor)hours followed by a 5 hour cooldown to RHR entry conditions. Based on T.S. 3.7.6 and the associated Bases T.S. B 3.7.6 (attached), Unit Two is Inoperable (CST #2 is 11% level). Bases 3.7.6, Actions B.1 and B.2 states, "If the AFW pumps cannot be aligned to an OPERABLE CST within the required Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours, and in MODE 4 within 12 hours." Answer C is also correct based on 4 hours in MODE 3 with 8 hours for MODE 4, RHR entry, as the Bases states, MODE 4 within 12 hours. Therefore "C" would be a correct answer. Option "C" for this question is also a correct subset of the bounding time of 12 hours. Based on outage performance in 1R16, from the time the unit was offline until RHR was 5 hours (per the detailed outage schedule). This supports the five hours given in the question stem. Therefore there are two correct answers for this question.

Operation Management supports this challenge for the reasons stated above.

Challenge Review:

Credit given to the submitter	☐	YES	☐	NO		
Key changed	☐	YES	☐	NO	☐	N/A
Submitted for exam bank update	☐	YES	☐	NO	☐	N/A

Exam Bank Review:

Comment/Challenge incorporated	☐	YES	☐	NO	☐	N/A

Reason for not incorporating: _____

_____

_____

_____

*Challenge Approved: _____

Training Supervisor Date

* N/A if challenge does not result in an exam key change

3. Ultimate heat sink maximum temperature case (one-train operation post-LOCA until basin depletion) Units 1 and 2;
4. Ultimate heat sink design, MSLB accident case (two-train operation post-MSLB accident inside containment for 1 day followed by one-train operation for 29 days) Unit 1 [HISTORICAL];
5. Ultimate heat sink performance, post MSLB accident (during one-train operation post-MSLB accident inside containment) Unit 1 [HISTORICAL].

Based on this data, the governing case for the maximum inventory loss is two-train operation post-LOCA for 1 day followed by one-train operation for the remainder of the accident duration. The governing case for the maximum basin temperature and NSCW outlet temperature from the fan coolers is one-train continuous operation post-LOCA. On this basis, only these two cases were evaluated for Unit 2 to account for the difference in the heat removal requirement.

For the Unit 1 3626 MWt plant uprate, cases 1 and 3 were reanalyzed to determine the impact to the plant.

Unit 1 system performance data, including containment conditions, total heat loads, evaporation rates, and basin water depth and temperature for cases 2, 4, and 5 are presented in tables 9.2.5-4, 9.2.5-6, and 9.2.5-7 for historical purposes. These values do not represent the Unit 1 power uprate or SFP reracking.

Unit 1 system performance data for cases 1 and 3 are presented in tables 9.2.5-3 and 9.2.5-5.

Table 9.2.5-10 provides shutdown heat loads with loss of offsite power for two-train and one-train operation. The two-train analyses (tables 9.2.5-3, 9.2.5-4, and 9.2.5-6) used meteorological conditions (paragraph 9.2.5.2.5.B) which maximize total water usage (drift and evaporation) over the postulated 30-day period. Since blowdown is terminated during accident conditions, blowdown need not be considered in basin sizing. The one-train analyses, for which system temperatures are a maximum, used meteorological conditions (paragraph 9.2.5.2.5.A) which maximize the cold water outlet temperature from the cooling tower.

For the 1-day, two-train analyses (tables 9.2.5-3 and 9.2.5-6), water from the basin of the inactive train is transferred to the basin of the active train until the inactive train basin is depleted. For the one-train analyses (tables 9.2.5-5 and 9.2.5-7), no interbasin water transfer is assumed.

During and following a tornado, offsite power is presumed lost, with a subsequent reactor trip. Immediately following the reactor trip, the auxiliary feedwater system (subsection 10.4.9) is used to maintain the plant at hot standby, using the inventory of the safety-grade condensate storage tanks (CSTs) to effect reactor heat removal. Each CST has sufficient auxiliary feedwater supply to hold the plant at hot standby for 4 h followed by a 5-h cooldown to the temperature (350°F) at which the residual heat removal (RHR) system may be placed into service. If both CSTs are available, the allowable time at hot standby is increased to 31 h before cooldown must be initiated. Once the RHR system is placed in service, the RHR heat load is rejected to the component cooling water (CCW) system which in turn rejects the heat load to the ultimate heat sink (the cooling tower) via the nuclear service cooling water (NSCW) system.

During hot standby assuming the most limiting single active failure (loss of one complete NSCW train) plus loss of one fan in the operable tower as a result of a missile strike, the remaining three fans in the operating train will maintain the temperature in the tower basin below 90°F. Thus the ability to maintain hot standby under such conditions is provided. During the subsequent cooldown using the RHR and CCW systems, three fans in one NSCW tower are adequate to bring the plant to a cold shutdown condition. However, because the tower is only 75% effective, cold shutdown will not be achieved in 32 h (36-4) stated in paragraph 9.2.2.1.1.F.

THIS PAGE APPLICABLE TO UNIT 1 ONLY

3.7 PLANT SYSTEMS

3.7.6 Condensate Storage Tank (CST)

LCO 3.7.6 One CST shall be OPERABLE with a safety-related volume ≥ 340,000 gallons.

APPLICABILITY: MODES 1, 2, and 3,

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CST volume not within limit.	A.1 Align Auxiliary Feedwater pumps to OPERABLE CST.	2 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4	6 hours 12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.6.1	Verify the CST volume is within limit.	12 hours

THIS PAGE APPLICABLE TO UNIT 2 ONLY

3.7 PLANT SYSTEMS

3.7.6 Condensate Storage Tank (CST)

LCO 3.7.6 Two CSTs shall be OPERABLE with:

a. A combined safety-related volume of ≥ 378,000 gallons; and

b. The CST aligned to supply the auxiliary feedwater pumps shall have a safety-related volume ≥ 340,000 gallons.

APPLICABILITY: MODES 1, 2, and 3,

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. CST volume(s) not within limit(s).	A.1	Restore volume(s) to within limit(s).	2 hours
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 4	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.6.1	Verify CST volumes within limits.	12 hours

B 3.7 PLANT SYSTEMS

B 3.7.6 Condensate Storage Tank (CST)

BASES

BACKGROUND

The two CSTs (V4001 and V4002) provide redundant safety grade sources of water to the steam generators for removing decay and sensible heat from the Reactor Coolant System (RCS). The CSTs provide a passive flow of water, by gravity, to the Auxiliary Feedwater (AFW) System (LCO 3.7.5). The steam produced is released to the atmosphere by the main steam safety valves or the atmospheric dump valves.

When the main steam isolation valves are open, the preferred means of heat removal is to discharge steam to the condenser by the nonsafety grade path of the steam dump valves. The condensed steam is returned to the CST. This has the advantage of conserving condensate while minimizing releases to the environment.

Because the CST is a principal component in removing residual heat from the RCS, it is designed to withstand earthquakes and other natural phenomena, including missiles that might be generated by natural phenomena. The CST is designed to Seismic Category I to ensure availability of the feedwater supply.

A description of the CST is found in the FSAR, Subsection 9.2.6 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The CST provides cooling water to remove decay heat and to cool down the unit following all events in the accident analysis as discussed in the FSAR, Chapters 6 and 15 (Refs. 2 and 3, respectively). For anticipated operational occurrences and accidents that do not affect the OPERABILITY of the steam generators, the analysis assumption is generally 60 minutes at MODE 3, steaming through the MSSVs, followed by a cooldown to residual heat removal (RHR) entry conditions.

The limiting event for the condensate volume is the large feedwater line break coincident with a loss of offsite

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

power. Single failures that also affect this event include the following:

a. Failure of the diesel generator powering the motor driven AFW pump to the unaffected steam generator (requiring additional steam to drive the remaining AFW pump turbine); and

b. Failure of the steam driven AFW pump (requiring a longer time for cooldown using only one motor driven AFW pump).

These are not usually the limiting failures in terms of consequences for these events.

A nonlimiting event considered in CST inventory determinations is a break in either the main feedwater or AFW line near where the two join. This break has the potential for dumping condensate until terminated by operator action, since the Auxiliary Feedwater Actuation System would not detect a difference in pressure between the steam generators for this break location. This loss of condensate inventory is partially compensated for by the retention of steam generator inventory.

The CST satisfies Criterion 3 of 10 CFR 50.36 (c)(2)(ii).

LCO

To satisfy accident analysis assumptions, the CST must contain sufficient cooling water to remove decay heat for 60 minutes following a reactor trip from 102% RTP, and then to cool down the RCS to RHR entry conditions, assuming a coincident loss of offsite power and the most adverse single failure. In doing this, it must retain sufficient water to ensure adequate net positive suction head for the AFW pumps during cooldown, as well as account for any losses from the steam driven AFW pump turbine, or before isolating AFW to a broken line.

The CST level required is equivalent to a usable volume of ≥ 340,000 gallons (66% instrument span) which is based on holding the unit in MODE 3 for 4 hours, followed by a 5 hour cooldown to RHR entry conditions at 50°F/hour with one Reactor Coolant Pump in operation. This basis is

(continued)

THIS PAGE APPLICABLE TO UNIT 1 ONLY

BASES

LCO (continued)

established in Reference 4 and exceeds the volume required by the accident analysis.

The OPERABILITY of the CST is determined by maintaining the tank level at or above the minimum required level. Either CST V4001 or CST V4002 may be used to satisfy the LCO requirement.

APPLICABILITY

In MODES 1, 2, and 3, the CST is required to be OPERABLE.

Due to the reduced heat removal requirements and short period of time in MODE 4 and the availability of RHR in MODE 4, the LCO does not require a CST to be OPERABLE in this MODE.

In MODE 5 or 6, the CST is not required because the AFW System is not required.

(continued)

THIS PAGE APPLICABLE TO UNIT 2 ONLY

BASES

LCO (continued)

established in Reference 4 and exceeds the volume required by the accident analysis.

The OPERABILITY of the CST is determined by maintaining the tank level at or above the minimum required level. Either CST V4001 or CST V4002 may be used to satisfy the LCO requirement.

For Unit 2 only, two CSTs are required to be OPERABLE with a combined safety-related volume of ≥ 378,000 gallons, and the CST aligned to supply the auxiliary feedwater pumps shall have a safety-related volume ≥ 340,000 gallons. The basis for requiring an additional 38,000 gallons of safety-related usable CST inventory is to support the elimination of the bypass line and associated valve bonnet depressurization line for the 2HV-8701B RHR suction isolation valve. The elimination of the bypass line and valve bonnet depressurization line requires an additional 3 hours for a total of 12 hours prior to placing RHR Train A in service. The additional time ensures that the 2HV-8701B valve bonnet and the space between the 2HV-8701B and 2HV-8701A RHR suction isolation valves have depressurized sufficiently to allow the suction isolation valves to be opened.

APPLICABILITY

In MODES 1, 2, and 3, the CST is required to be OPERABLE.

Due to the reduced heat removal requirements and short period of time in MODE 4 and the availability of RHR in MODE 4, the LCO does not require a CST to be OPERABLE in this MODE.

In MODE 5 or 6, the CST is not required because the AFW System is not required.

(continued)

THIS PAGE APPLICABLE TO UNIT 1 ONLY

BASES (continued)

ACTIONS

A.1 and A.2

If the required CST volume is not within limit, the Completion Time of 2 hours provides sufficient time for the three AFW pumps to be aligned to the OPERABLE CST. This Completion Time is acceptable based on: 1) Operating experience to perform the required valve operations; 2) The ACTIONS being entered as soon as the CST level decreased below the limit, which would most probably leave sufficient capacity in the inoperable CST to support AFW pump operation for at least the 2 hour Completion Time; and 3) The low probability of an event occurring during this interval that would require the CST to be fully OPERABLE.

B.1 and B.2

If the AFW pumps cannot be aligned to an OPERABLE CST within the required Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours, and in MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.6.1

CST V4001 (LI-5101 and LI-5111A)
CST V4002 (LI-5104 and LI-5116A)

This SR verifies that the CST contains the required volume of cooling water. The 12 hour Frequency is based on operating experience and the need for operator awareness of unit evolutions that may affect the CST inventory between checks. Also, the 12 hour Frequency is considered adequate in view of other indications in the control room, including alarms, to alert the operator to abnormal deviations in the CST level.

(continued)

THIS PAGE APPLICABLE TO UNIT 2 ONLY

BASES (continued)

ACTIONS

A.1 and A.2

If one or both of the CST volumes are not within limits, the volume(s) must be restored to within limits within 2 hours. This Completion Time is acceptable based on : 1) The ACTIONS being entered as soon as the CST level(s) decreased below limit(s), which would provide reasonable assurance of at least sufficient capacity to support AFW operation for at least the 2 hour Completion Time; and 2) The low probability of an event occurring during this interval that would require the CSTs to be fully OPERABLE.

B.1 and B.2

If the AFW pumps cannot be aligned to an OPERABLE CST within the required Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours, and in MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.6.1

CST V4001 (LI-5101 and LI-5111A)
CST V4002 (LI-5104 and LI-5116A)

This SR verifies that the CSTs contain the required volumes of cooling water. The 12 hour Frequency is based on operating experience and the need for operator awareness of unit evolutions that may affect the CST inventory between checks. Also, the 12 hour Frequency is considered adequate in view of other indications in the control room, including alarms, to alert the operator to abnormal deviations in the CST level.

(continued)

BASES (continued)

REFERENCES

1. FSAR, Subsection 9.2.6.

2. FSAR, Chapter 6.

3. FSAR, Chapter 15.

4. Branch Technical Position RSB 5-1, Rev. 2, July 1981, "Design Requirements of the Residual Heat Removal System."

9.2.6 CONDENSATE STORAGE FACILITY

The condensate storage facility consists of two condensate storage tanks (CSTs), a vacuum degasifier, degasifier feed and transfer pumps, degasifier vacuum pumps, and associated valves, piping, and instrumentation. The condensate storage facility provides the following:

- Degasified and demineralized makeup and surge capacity to compensate for changes in the turbine plant water inventory.
- Reserve supply for emergency shutdown decay heat removal in the event of failure of the normal feedwater system.
- Secondary system fill water for plant startups.

9.2.6.1 Design Bases

Protection of the condensate storage from wind and tornado effects is discussed in section 3.3. Flood protection is discussed in section 3.4. Missile protection is discussed in section 3.5. Protection against the dynamic effects associated with postulated rupture in piping is addressed in section 3.6. Environmental design is discussed in section 3.11.

9.2.6.1.1 Safety Design Bases

A. The condensate storage facility provides water to the suctions of the auxiliary feedwater pumps during emergency conditions, including loss of offsite power, with a coincident single failure.

B. Each CST capacity is based on satisfying the safety-grade cold shutdown capability which is sufficient to allow plant operation in the hot standby mode for 4 h, followed by a 5-h orderly plant cooldown, at an average rate of 50°F/h but not to exceed a rate of 100°F/h, to a temperature of 350°F when the residual heat removal (RHR) system may be placed in operation.

C. The CSTs are designed to remain functional during and after a safe shutdown earthquake (SSE). Provision is made so that failure of any non-Seismic Category 1 lines attached to the CSTs cannot cause a loss of the reserve capacity required for safe plant shutdown.

D. The piping layout from the CSTs to the auxiliary feedwater pumps ensures adequate net positive suction head (NPSH) at the maximum CST water temperature.

9.2.6.1.2 Power Generation Design Bases

A. The CSTs provide:

1. Sufficient water storage for simultaneous filling of all three condenser shells upon completion of condenser field erection for the purpose of hydrostatic testing of the condenser.

2. Sufficient water volume for filling of the condensate feedwater system condenser hotwells and steam generators to their normal water levels just prior to initial plant operation.

3. Sufficient water capacity to simultaneously fill all three condensers for leak testing of condensers during scheduled shutdown periods.

B. The CSTs serve as a reservoir to supply or receive condensate as required by the condenser hotwell level control system.

C. The condensate storage facility permits periodic testing of the auxiliary feedwater pumps and valves.

9.2.6.1.3 Codes and Standards

Codes and standards applicable to the condensate storage facility are listed in table 3.2.2-1. The storage tanks and safety-related piping are designed and constructed as Seismic Category 1. The vacuum degasifier and appurtenances are designed and constructed as Seismic Category 2.

9.2.6.2 System Description

9.2.6.2.1 General System Description

The condensate storage facility is shown in drawing 1X4DB161-1. The layout of the condensate storage facility is shown in section 1.2. The system consists of two CSTs, a vacuum degasifier, degasifier feed pump, degasifier transfer pump, a degasifier feed/transfer pump, two degasifier vacuum pumps, and associated piping and instrumentation. There is one condensate storage facility for each plant unit.

9.2.6.2.2 Component Description

A. Condensate Storage Tanks

Each CST has a capacity of 480,000 gal. The tanks are vertical right cylindrical tanks, constructed of reinforced concrete with stainless steel liners. The tanks are provided with vent and overflow standpipes. The tanks are provided with level and temperature instrumentation. Each pair of tanks is surrounded by a dike with a capacity to retain leakage or overflow equal to 5% of one tank volume.

B. Vacuum Degasifier Subsystem

This subsystem consists of the vacuum degasifier designed to withstand pressure range from 30 in. mercury vacuum to 125 psig. The capacity rate of the degasifier is 350 gal/min. Two vacuum pumps are provided to maintain the required vacuum in the degasifier. Three fluid pumps are provided:

1. One to feed condensate to the degasifier.

2. One to transfer condensate from the degasifier back to the CSTs.

3. One that can be used as either a feed or a transfer pump. Each of these three pumps is rated at 350 gal/min at 32 psig.

To control corrosion within the system, the CSTs are provided with floating diaphragms which minimize the absorption of oxygen by the condensate. The degasifier system further reduces the concentration of dissolved oxygen.

9.2.6.3 System Operation

9.2.6.3.1 Normal Operation

The condensate level in each storage tank is automatically maintained by a level control valve in the line from the demineralized water system. The valve opens when the volume of liquid in the tank drops to 457,000 gal and closes when the volume increases to 503,000 gal, thus maintaining the volume at 480,000 gal plus or minus 23,000 gal.

If changes in the condensate system inventory cannot be accommodated by the condenser hotwell, the hotwell level control automatically obtains makeup from, or diverts excess to, the condensate storage facility.

Operation of the degasifier subsystem is intermittent as required to maintain the dissolved oxygen in the condensate at less than 0.1 ppm.

The condensate storage facility normally contains no radioactivity. However, in the event of a primary-to-secondary leak resulting from a steam generator tube leak, it is possible for the CSTs to become contaminated. A further discussion of the radiological aspects of primary-to-secondary leakage is included in chapter 11.

9.2.6.3.2 Emergency Operation

The condensate storage facility is normally aligned such that CST No. 1 provides water to all three auxiliary feedwater pumps. A separate line connects the tank to each pump. In each line are two locked open valves; thus, no automatic or manual action is required to supply water to the suction of the auxiliary feedwater pumps.

As the level in CST No. 1 decreases to the minimum allowable level, the operator manually realigns the system so that CST No. 2 serves all three pumps. A separate line connects each pump to CST No. 2. Each line contains a locked open valve and a normally shut, remote-manual valve. The remote-manual valves have two points of control:

- The main control room.
- The appropriate shutdown panel (train A or B) or the auxiliary feedwater turbine-driven pump local control panel.

9.2.6.4 Safety Evaluation

A. Two CSTs are provided for each plant unit. The system's active components are designed to satisfy the single failure criteria. A failure modes and effects analysis

(FMEA) is included in the FMEA provided for the auxiliary feedwater system in subsection 10.4.9.

B. The total design capacity of each storage tank is 480,000 gal. A total of 340,000 gal is required to operate the plant in hot standby mode for 4 h, followed by a 5-h cooldown to 350°F, the temperature at which the RHR system may be used to remove the remaining residual heat as required for plants with safety-grade cold shutdown capability. (See paragraph 10.4.9.2.2.5.)

C. The CSTs and associated safety-related piping and valves are designed and constructed as Seismic Category 1, ensuring that they will remain functional through the SSE.

The components and supporting structures of any system or equipment which are not Seismic Category 1 are evaluated to ensure that their failure does not cause a loss of function of safety-related portions of the condensate storage facility.

All nozzles used in normal power generation and nozzles to and from the vacuum degasifier are located on the storage tank at an elevation such that a reserve volume of 340,000 gal is always maintained below the level of these nozzles. This ensures an adequate reserve for emergency safety use.

D. For a maximum CST water temperature of 120°F, the NPSH margin at the motor- and turbine-driven auxiliary feedwater pumps suctions is greater than 11 ft.

9.2.6.5 Tests and Inspections

Hydrostatic testing will be done prior to initial startup. Analytical qualifications are performed as required by seismic category and quality classification of each item.

Proper system performance and integrity during normal plant operation will be verified by system operation and visual inspections.

Correct positioning of valves is ensured by written procedure, as applicable.

Inservice testing of pumps and valves is in accordance with American Society of Mechanical Engineers Section XI as discussed in subsection 3.9.6.

Samples are taken to ensure oxygen levels are maintained within acceptable limits.

9.2.6.6 Instrumentation Applications

A level detection system is installed on the CST. Level signals are transmitted to the automatic tank level control devices. Level indication is provided in the control room and on the shutdown panels. A level recorder is located on the main control panel in the control room. Low- and high-level alarms are provided in the control room. A low-level alarm is provided on the turbine driven auxiliary feedwater panel.

A temperature sensor is provided for each CST with the temperature data transmitted to the plant computer. The plant computer provides an alarm function on low water temperature by a flashing readout on the CRT display screen.

2011-301 Vogtle Written Exam Answer Key

Questions 52 & 66 to be deleted therefore there are only 73 RO and 98 RO/SRO Questions

1	B	26	A	51	B	76	A
2	D	27	D	~~52~~	~~D~~	77	B
3	A	28	A	53	C	78	~~D~~ C
4	A	29	D	54	B	79	B
5	B	30	C	55	C	80	B
6	B	31	C	56	B	81	B
7	C	32	D	57	B	82	C
8	B	33	A	58	D	83	D
9	C	34	C	59	A	84	A
10	B	35	C	60	B	85	C
11	A	36	A	61	A	86	D
12	A	37	A	62	D	87	A
13	A	38	D	63	D	88	D
14	B	39	C	64	B	89	D
15	C	40	D	65	A	90	C
16	A	41	C	~~66~~	~~C~~	91	A
17	D	42	C	67	B	92	D
18	B	43	A	68	B	93	D
19	A	44	D	69	D	94	B
20	B	45	D	70	C	95	B
21	D	46	D	71	A	96	A
22	C	47	D	72	D	97	D
23	A	48	A	73	A	98	C
24	A	49	B	74	D	99	C
25	A	50	A	75	D	100	C

Questions 52 & 66 deleted

Question 78 Correct answer changed from D to C