

Final Submittal  
(Blue Paper)

FINAL RO  
WRITTEN EXAMINATION  
AND REFERENCES

BROWNS FERRY 2007-301

1.

Unit 3 has experienced an accident that results in fuel failure. A gaseous release is in progress with Site Assembly of personnel in progress. You are assigned to perform accountability for 44 personnel (including the Radcon Technician and yourself). The Radcon Technician assigned to your party reports that the dose rate in the Mods parking lot is 26 mr/hr. The dose rate in the Alternate Assembly area is 10 mr/hr.

If 30 minutes are required to perform assembly of these personnel, how much dose would be saved by moving to the Alternate Assembly area?

(Assume no dose received during travel time)

A. 220 mr

B. 352 mr

C. 440 mr

D. 572 mr

2.

Which ONE of the following describes the power supplies to the Unit 2 Division 1 ECCS ATUs?

Division 1 ATU is powered from 250v RMOV Board \_\_\_\_ with an alternate power supply from 250v RMOV Board \_\_\_\_.

A. 2A / 2B

B. 2B / 2B

C. 2B / 2A

D. 2A / 2A

3.

Which ONE of the following describes why control rods with drive temperatures above 350F must be declared "Slow" or "Inoperable"?

- A. Expansion of the drive graphitar seals may cause binding of the drive.
- B. Index tube thermal expansion may cause binding of the drive.
- C. Slower scram times from water flashing in the drive when scram valves open.
- D. Erratic notch control of the rods from water flashing in the drive causing the settle valve to be sluggish on an open signal.

4.

Unit 2 is operating at 35 percent power when one recirculation pump trips.

The Unit Operator reports that the jet pump flow on the operating loop is  $35 \times 10^6$  lbm/hr.

Which ONE of the following describes how core flow indications are affected and the required remedial action.

- A. Core flow indication is inaccurate, increase the speed of the operating pump.
- B. Core flow indication is accurate, restart the tripped pump within 24 hours.
- C. Core flow indication is inaccurate, have the RE implement SLO option to correct core flow indication.
- D. Core flow indication is accurate, close the discharge valve on the tripped recirculation pump.

5.

Which ONE of the following describes the response of the RFPT controls and the appropriate corrective actions per 1-AOI-3-1 for a failure of the Master Flow Controller output to zero?

A. RFP Flow Control System fails to single element,

Utilize the Master Flow Controller manual setpoint control to adjust RFP speed.

B. Individual RFP PDS fails to manual,

Utilize the Master Flow Controller manual setpoint control to adjust RFP speed.

C. Individual RFP PDS fails to manual,

Depress Individual RFP Manual Governor Enable Handswitch to enable manual speed control.

D. RFP Flow Control System fails to single element,

Depress Individual RFP Manual Governor Enable Handswitch to enable manual speed control.

6.

During the performance of Fuel Pool cleanout, a failure of the Refuel bridge monorail hoist results in a bucket containing irradiated stellite ball bearings being raised above the fuel pool water level. The radiation level on the refuel floor causes a ventilation isolation on all 3 units. The AUO on the bridge receives a dose of 12 rem while manually lowering the bucket below water level.

Does this constitute an emergency exposure per EPIP-15 and why or why not?

- A. This is an emergency exposure. Only 25 rem exposure is allowed for equipment problems.
- B. This is NOT an emergency exposure. Only planned exposures are covered under EPIP exposure limits.
- C. This is an emergency exposure. Spontaneous actions taken to mitigate a problem are covered by the EPIP-15 exposure limits.
- D. This is NOT an emergency exposure. However, this is a planned special exposure.

7.

Unit 1 is starting up after refueling outage. During performance of a High Drywell Pressure SR the Drywell Pressure input to the RPS/PCIS circuitry fails initiating a half isolation of PCIS and a half scram. The BOP operator notes the following:

- Reactor power 20%, RWM Group 11 at insert limit
- Drywell-Suppression Chamber Dp 0 psid
- Drywell Oxygen concentration ~ 20%
- IM's report no replacement for the slave unit available for 48 hours

Which ONE of the following is correct?

- A. Reactor power cannot be increased. Rod withdrawal will be blocked by the half scram.
- B. Reactor scram will be required to preclude an auto scram from MSIV closure due to loss of ventilation.
- C. Reactor power will be reduced below 15% to extend the time allowed to establish Drywell oxygen concentration and Dp.
- D. Reactor startup may continue when the fuse for the slave unit has been removed, Chemlab must sample Reactor coolant due to loss of the continuous conductivity monitor.

8.

SELECT the ONE set of conditions that completes the following statement.

During a reactor startup if the APRMs fail to come on scale when the IRMs are on ranges \_\_\_\_\_, the operator should \_\_\_\_\_.

- A. 7 to 8; continue the startup by single rod notch withdrawal and carefully monitor neutron instrumentation.
- B. 7 to 8; stop the startup until the disagreement in overlap can be resolved.
- C. 5 to 6; continue the startup by single rod notch withdrawal and carefully monitor neutron instrumentation.
- D. 5 to 6; stop the startup until the disagreement in overlap can be resolved.

9.

Which ONE of the following describes the operation of the RPS ATU cabinet power supplies?

- A. 2 **inverters** in each cabinet, one powered from each division of RPS. Both are required to power the cabinet.
- B. 2 **inverters** in each cabinet, powered from one division of RPS. Either inverter can supply all power to the cabinet.
- C. 2 **rectifiers** in each cabinet, one powered from each division of RPS. Both are required to power the cabinet.
- D. 2 **rectifiers** in each cabinet, powered from one division of RPS. Either rectifier can supply all power to the cabinet.

10.

Unit 2 is operating at 100% power when the BOP Operator notes the following:

- Generator Output lowering
- Condensate temperature 110 degrees and stable
- HOLDUP LINE INLET FLOW LOW, 2-FA-66-111B (2-XA-55-53, Window 4) at 7 scfm and lowering.
- 2-PCV-1-151(153) and 2-PCV-1-166(167) SJAE Steam Supply valves red lamps are extinguished

Which ONE of the following reports should the BOP Operator make to the US?

Condenser vacuum is lowering due to \_\_\_\_

- A. reduced CCW flow.
- B. excessive condenser inleakage.
- C. loss of the SJAE loop seal.
- D. loss of the inservice SJAE.

11.

Unit 3 is operating at full power when the UO notes the following conditions:

- RHR Loop I logic power annunciator
- CS Loop I logic power annunciator
- 3-FCV-71-3 RCIC Steam Line Outboard Isolation Valve red and green lamps extinguished

Which ONE of the following is a failure that would result in these indications?

Loss of \_\_\_\_

- A. Unit 1 250v DC Battery Board (BB-1)
- B. Unit 2 250v DC Battery Board (BB-2)
- C. Unit 3 250v DC Battery Board (BB-3)
- D. Plant 250v DC Battery Board (BB-4)

12.

The Technical Specifications for SLC are applicable in several different Modes.

Which ONE of the following correctly describes the bases for this requirement?

- A. In Mode 5, SLC must be operable to ensure adequate Shutdown Margin.
- B. In Modes 1, 2 and 3; SLC must be operable to ensure offsite doses remain within limits.
- C. In Modes 1, 2 and 3; SLC must be operable to ensure shutdown capability.
- D. In Modes 3 and 4; SLC must be operable to provide adequate controls to ensure the Reactor remains subcritical.

13.

Unit 1 was operating at 100% power when an EHC leak occurred.

The UO notes the following conditions:

- RPV water level 30 inches and lowering
- RPV pressure 800 psig and rising
- RFPT High Level Trip Red lights are illuminated
- HPCI aligned for pressure control

Which ONE of the following describes the response of HPCI if a Drywell Pressure initiation signal is received with no additional operator actions?

- A. HPCI auto starts and injects.
- B. HPCI auto starts but does NOT inject.
- C. HPCI aligns for injection but does NOT start.
- D. HPCI remains in the current alignment.

14.

Unit 2 is aligned with RHR Loop I in shutdown cooling and Loop II in standby readiness. A leak occurs which results in the following conditions:

- RPV level at '0' and slowly lowering
- DWP at 3.0 psig and slowly rising
- RHR pumps 'A' and 'C' tripped

Which ONE of the following is/are the MINIMUM action(s) required per 2-OI-74 to align RHR Loop II for injection to the RPV after the SDC Suction Isolation valves (74-47 & 48) have closed.

- A. Reset PCIS and open both injection valves.
- B. Push the RHR SYS II SD CLG INBD INJECT ISOL RESET.
- C. Reset PCIS; push the RHR SYS II SD CLG INBD INJECT ISOL RESET and open the outboard injection valve.
- D. Start Loop II pumps; reset PCIS; and open the inboard injection valve.

15.

Unit 3 was operating at 100% power when the UO notes the following:

- 3A 250v RMOV board undervoltage alarm
- Main Steam Relief Valve open alarm
- 3-SRV-1-41 indicates full open

Actions taken per 3-AOI-1-1 are unsuccessful in closing the SRV.

The US directs all available Torus cooling in service.

Which ONE of the following describes the Torus Cooling subsystems available?

- A. A and C subsystems only due to loss of Division 2 logic
- B. B and D subsystems only due to loss of Division 1 logic
- C. All Torus Cooling subsystems available unless a LPCI initiation signal is received.
- D. No Torus Cooling subsystems available, Unit 3 Torus Cooling valves receive input from both divisions of logic.

16.

Unit 1 was operating at full power when a small line break in the Recirc system is experienced. The UO notes the following conditions:

- Loop II Core Spray tagged
- Reactor water level at -70 inches and lowering
- A 4kv Shutdown board deenergized by a bus fault
- Reactor pressure at 200 psig and lowering
- Drywell pressure at 3.8 psig and stable
- No Operator actions have been taken

The US directs injection with Loop I Core Spray.

Which ONE of the following is correct?

- A. Transfer 480v RMOV board 1C, start 1C Core Spray pump and verify injection.
- B. Start 1C Core Spray Pump and open 1-FCV-75-25, Inboard injection valve.
- C. Start 1C Core Spray Pump and open 1-FCV-75-23, Outboard injection valve.
- D. Transfer 480v Shutdown board 1A, start 1C Core Spray pump and verify injection.

17.

Unit 1 is operating at full power. The RBCCW TCV's for both Heat Exchangers are in automatic aligned as follows:

- 6 inch - full open
- 10 inch - 10% open

The Control Air line to the 1A RBCCW Heat Exchanger ruptures resulting in a loss of air to the 1A TCV's. The air supply to 1B Heat Exchanger is not affected.

Which ONE of the following describes the response of the TCV's to this failure?

- A. 1A Heat Exchanger - 6 inch open; 10 inch closed  
1B Heat Exchanger - 6 inch open; 10 inch >10% open
- B. 1A Heat Exchanger - 6 inch closed; 10 inch open  
1B Heat Exchanger - 6 inch < full open; 10 inch closed
- C. 1A Heat Exchanger - 6 inch open; 10 inch closed  
1B Heat Exchanger - 6 inch open; 10 inch closed
- D. 1A Heat Exchanger - 6 inch closed; 10 inch closed  
1B Heat Exchanger - 6 inch open; 10 inch open

18.

Browns Ferry has experienced a failure of the Control Air system that results in Control Air pressure falling to 15 psig. The Unit 1 Operator notes that 0-FCV-33-1 Service Air to Control Air Crosstie valve has closed with the hand switch in Automatic.

Which ONE of the following describes the reason for the closure of 0-FCV-33-1?

- A. 33-1 closes at 30 psig air pressure due to the design of the valve.
- B. 33-1 has inadvertently failed closed. The valve should have remained open until closed by the handswitch.
- C. 33-1 closes at 55 psig Control Air pressure to maintain air pressure for SRV operation.
- D. 33-1 closes at 15 psig Service Air pressure to maintain seal air available for E Service Air Compressor.

19.

A LOCA has occurred on Unit 3 which resulted in all SGT trains running for an extended period of time. Conditions were eventually established such that the SGT trains could be secured. The following alarm has just been received:

- SGT TRAIN C FILTER BANK TEMP HIGH

The alarm is believed to be due to iodine adsorption.

Which ONE of the following actions should be performed per the annunciator response procedure?

- A. Dispatch personnel to reset the temperature switch and restart SGT Train C.
- B. Start stack dilution fans to ensure air flow through SGT exhaust ducts.
- C. Run SGT Train C in the Decay Heat Removal mode.
- D. Start all available SGT building supply fans.

20.

Unit 2 experienced a turbine trip from 75% power. All rods fail to insert because of a hydraulic ATWS. The following conditions exist:

- Reactor level +33" controlled by RFPs
- Reactor power 12%
- Mode switch position Shutdown
- Reactor pressure 980 psig and steady
- Pressure Control 4 Bypass valves open
- Suppression pool temperature 95 deg F and slowly rising
- Drywell pressure 1.03 psig
- Drywell temperature 115 deg F

The Unit Supervisor orders a level band of -50 to -100 inches in order to lower reactor power and to minimize power oscillations.

Given these plant conditions, how will this level band lower power and minimize power oscillations?

- A. Lowers power by increasing core voiding.  
Minimizes oscillations by lowering NPSH to the recirc pumps.
- B. Lowers power by increasing core voiding.  
Minimizes oscillations by increasing feedwater heating.
- C. Lowers power by increasing feedwater heating.  
Minimizes oscillations by eliminating natural circulation flow.
- D. Lowers power by stabilizing reactor pressure.  
Minimizes oscillations by increasing feedwater heating.

21.

Given the following conditions:

- Drywell Temperature - 198 F and rising
- Suppression Chamber Pressure - 24 psig

Which ONE of the following describes the reason that EOI 2 directs entry into EOI 1 prior to reaching 200 F Drywell Temperature?

- A. Ensure a reactor scram is initiated prior to RPV flooding due to loss of level indication.
- B. Ensures a reactor scram is initiated to limit the damage to NON-EQ equipment located inside the drywell.
- C. Ensure actions required for Emergency Depressurization are complete prior to exceeding the allowable containment stresses.
- D. Ensure actions required for Emergency Depressurization are complete prior to exceeding the PSP pressure limit.

22.

The Unit 2 Control Room has been abandoned.  
2-AOI-100-2 Control Room Abandonment has been completed to the point that RCIC is injecting and controlling reactor water level.

Which ONE of the following conditions would result in RCIC turbine trip?

- A. Reactor water level at 57 inches.
- B. Steam line flow at 165% of rated.
- C. Reactor pressure at 50 psig.
- D. Pump suction pressure at 15 inches Hg vacuum.

23.

Unit 3 is performing testing of the EHC logic system. The UO depresses and holds the Overspeed Test pushbutton.

Given the above conditions, which ONE of the following depicts the Turbine speed at which an actual trip will occur?

A. 1926 rpm

B. 1944 rpm

C. 1962 rpm

D. 1980 rpm

24.

Unit 2 has experienced a fire on Control Bay elevation 3C. The Shift Manager has directed Control Room personnel to don SCBAs.

Which ONE of the following describes the percentage of air left in the SCBA when the audible alarm sounds and the approximate remaining usage time with this amount of air?

- A. 15 percent, 25 minutes
- B. 20 percent, 20 minutes
- C. 25 percent, 15 minutes
- D. 30 percent, 5 minutes

25.

Unit 2 is operating at 50% power with RPS A on alternate supply when the UO notes the following:

- 2-FIC-85-11 CRD flow control demand at 100% with flow lowering
- Scram discharge volume vent and drain valves red and green lamps illuminated

Which ONE of the following component failures would result in these symptoms?

- A. CRD Pump trip
- B. CRD Pump suction filter plugs
- C. Loss of 480v Shutdown board 2A
- D. Scram Air Header regulator closes

26.

Unit 2 is operating at 70% power.

- Reactor Recirc pump A at 1210 rpm
- Reactor Recirc pump B at 1270 rpm

Which ONE of the following is a possible adverse effect (if any) of operating the pumps at these speeds?

- A. No adverse affect.
- B. Exceeding loop flow mismatch limits.
- C. Excessive Recirc pump harmonic vibration.
- D. Exceeding 5% pump mismatch limit of Tech Specs.

27.

Unit 1 is performing a Reactor startup. The UO notes the following conditions:

- Reactor Power 21%
- RPV pressure 975 psig

An electrical fault in the EHC system results in all Bypass and Control valves slowly opening.

Which ONE of the following describes the response of Reactor Power to this transient?

Reactor Power will -

- A. Rise until terminated by MSIV closure.
- B. Rise until terminated by APRM flow biased scram.
- C. Lower until terminated by MSIV closure.
- D. Lower as moderator temperature decreases.

28.

Unit 1 is operating at 75% power. A 24v power supply for 1C RFP woodward governor fails.

Which ONE of the following is correct?

- A. RFPT GOVERNOR POWER FAILURE OR GOVERNOR ABNORMAL annunciator received. 1C RFP trips, verify 1A and 1B RFPs maintain water level.
- B. RFPT GOVERNOR POWER FAILURE OR GOVERNOR ABNORMAL annunciator received. Verify 1A, 1B and 1C RFPs maintain water level.
- C. RFPT GOVERNOR POWER FAILURE OR GOVERNOR ABNORMAL and RFPT TRIP CIRCUIT ABNORMAL annunciators received, verify 1A and 1B RFPs maintain water level.
- D. RFPT GOVERNOR POWER FAILURE OR GOVERNOR ABNORMAL and RFWCS FAILED TO MANUAL annunciators received, verify 1A,1B and 1C RFPs maintain water level.

29.

Unit 3 is operating at 100% power with a small coolant leak in the primary containment.

SGT C is operating for Drywell venting, and has stabilized drywell pressure at 1.6 psig with a vent flow rate of 100 scfm.

A relay failure results in the trip and lockout of Unit 1 and 2 D 4kv Shutdown board.

Determine which ONE of the following conditions would occur with no further operator actions?

Unit 3 Drywell pressure will:

- A. remain constant and the reactor will continue to operate.
- B. lower and the reactor will continue to operate.
- C. start to rise, and the reactor would eventually scram on high drywell pressure.
- D. remain constant and the reactor will eventually scram on MSIV isolation due to high steam tunnel temperature.

30.

While operating at 100% power a turbine trip occurred on Unit 3 and the following conditions currently exist:

- Reactor Water level -10 inches and rising
- Scram Response not inhibited

Assuming a normal lineup prior to the turbine trip, which ONE of the following is correct?

'A' and 'B' RFPs are available for:

- A. Manual mode only and will be limited to < 600 rpm until the Scram Response logic is reset.
- B. Manual mode only and will be limited to 4100 rpm until the Scram Response logic is reset.
- C. AUTO or Manual mode of operation but are limited to 4100 rpm until the Scram Response logic is reset.
- D. AUTO or Manual mode of operation and may be taken to 5600 rpm in the Manual mode.

31.

Unit 1 is at full power. Unit 2 is performing a Reactor startup. 1B CRD pump is in service to Unit 1.

The UO notes the following conditions:

- RPV pressure 850 psig
- Reactor power Range 7 on IRMs
- CRD Charging Water pressure 900 psig and lowering
- 4kv Unit Board 2C deenergized

The UO notes the following alarms:

- CRD Unit Temp High alarm
- 7 CRD Accumulator Trouble lamps illuminated on Full Core Display

Which ONE of the following describes the required action?

- A. Swap CRD flow controllers 2-FCV-85-11.
- B. Place the Reactor Mode Switch in Shutdown.
- C. Verify CRDs with accumulator trouble lamps have adequate nitrogen charge.
- D. Lower CRD Drive Water pressure and cool hot CRDs with a continuous insertion signal.

32.

Unit 2 scram due to a loss of offsite power.

- All D/Gs start and tie to the 4kv Shutdown Bds.
- 480v Shutdown Bd 2B Normal feeder tripped when D D/G Output Breaker closed.
- RCIC is in operation for level control.
- A valid RCIC Rupture Disc High Pressure isolation signal is received.

Which ONE of the following is correct regarding the RCIC steam isolation valves.

- A. 71-2 and 71-3 will remain open.
- B. 71-2 will remain open and 71-3 will go closed.
- C. 71-2 will go closed and 71-3 will remain open.
- D. 71-2 and 71-3 will go closed.

33.

Unit 2 was operating at 80% power when a RPV level instrument failure causes an inadvertent start of the HPCI system.

Which ONE of the following describes an adverse result of HPCI operation?

- A. No sealing steam for the HPCI turbine.
- B. No cooling water for the Gland Condenser.
- C. Noncondensable leakage from the Gland Seal Exhauster.
- D. Water leakage from Gland Condenser.

34.

Unit 2 was operating at full power when a seismic event was experienced.

The Unit Operator notes the following:

- RPV level is -130 inches
- 4kv Unit Boards 1A and 2B deenergized
- A D/G tagged for maintenance
- D D/G failed to start

Which ONE of the following describes the RHR pump(s) that receive an initiation signal and the time after the initiation signal that the pump(s) start?

- A. 2A and 2C start immediately, 2B starts in 7 seconds, 2D does not start
- B. 2A does not start, 2B starts in 7 seconds, 2C starts immediately, 2D in 21 seconds
- C. 2A does not start, 2B and 2D start in 7 seconds, 2C starts in 14 seconds
- D. 2A, 2B, 2C, 2D all start immediately.

35.

Unit 1 and 2 are operating at full power.

- 480V Shutdown Board 2A is on Alternate Feeder to allow Breaker PMs on the Normal Feeder Breaker.
- 50G relay for 4KV Shutdown Board C Normal Feeder Breaker fails resulting in a trip of the breaker.

Which ONE of the following correctly describes the response of the Unit 1 and 2 RBCCW systems?

- A. Unit 1-A RBCCW pump stops, 1-FCV-70-48 closes  
Unit 2-B RBCCW pump stops, 2-FCV-70-48 closes
- B. Unit 1-B RBCCW pump stops, 1-FCV-70-48 closes  
Unit 2-A RBCCW pump stops, 2-FCV-70-48 remains open
- C. Unit 1-B RBCCW pump stops, 1-FCV-70-48 remains open  
Unit 2-A RBCCW pump stops, 2-FCV-70-48 closes
- D. Unit 1-A RBCCW pump stops, 1-FCV-70-48 remains open  
Unit 2-B RBCCW pump stops, 2-FCV-70-48 remains open

36.

Which one of the following represents the lower and upper **limit** of percent hydrogen in air where the mixture is explosive, detonable, or combustible?

- A. 5% to 80%
- B. 4% to 56%
- C. 5% to 66%
- D. 4% to 76%

37.

Initial valve alignments are complete in the Unit 2 Drywell following a major modification to the recirculation system. During system testing, the radiological conditions changed in the area near the drain valves. Current dose rates are 50 mr/hr in the work area. Independent verification per the checklist is required to complete the valve alignment checklist and should take approximately 15 minutes.

To maintain exposure ALARA, which ONE of the following should the Unit Supervisor direct the operators to do?

Independent verification may be waived \_\_\_\_\_

- A. due to exposure required to perform the independent verification..
- B. provided the Radiation Protection personnel survey the work area for leakage.
- C. as long as the Drywell Inleakage does not increase.
- D. since modification PMT must be completed before the system is returned to operable status.

38.

Unit 3 is operating at 100% power and a fault occurs on the 3A Reactor Feedpump (RFPT) such that its speed lowers to 600 rpm. The Unit Operator notices that both of the remaining RFPTs speeds are rising while both Recirc Pump speeds are lowering.

Which ONE of the following caused the Recirc Pump speeds to lower?

- A. The "3A" RFPT feedwater flow lowered to less than 27%  
Reactor water level lowered to less than 19"
- B. Total feedwater flow lowered to less than 27% and  
Reactor water level lowered to less than 19"
- C. The "3A" RFPT feedwater flow lowered to less than 19% and  
Reactor water level lowered to less than 27"
- D. Total feedwater flow lowered to less than 19%  
Reactor water level lowered to less than 27"

39.

Which ONE of the following describes the purpose of the Reactor Scram from High Drywell Pressure?

- A. High pressure poses a direct threat of rupture to the nuclear system process barrier. A SCRAM counteracts a pressure rise by quickly reducing the core fission heat generation.
- B. High pressure indicates that the primary coolant boundary has breached and the reactor core is in danger of having inadequate cooling.
- C. The SCRAM limits the amount of energy transmitted to the drywell during a LOCA and prevents a return to criticality when the core is re-flooded.
- D. The SCRAM limits the amount of energy transmitted to the drywell during a LOCA and ensures that components and systems required to mitigate the high pressure are available.

40.

The plant is in a refueling outage and is partially defueled when a loss of shutdown cooling occurs.

Which one of the following cautions must be satisfied to operate a reactor recirculation pump to establish forced cooling flow in accordance with AOI-74-1, Loss of Shutdown Cooling?

- A. Ensure the in-core instrumentation tubes are protected on all sides by control rod blade guides or fuel bundles.
- B. Ensure core delta-P is greater than 4 psid to provide adequate cooling for the fuel bundles.
- C. Maintain recirculation pump at minimum speed to prevent jet pump or recirculation pump cavitation.
- D. Maintain recirculation pump at minimum speed to prevent the addition of excessive heat to the primary coolant.

41.

Unit 2 is operating at 80% power, when fouling of the RBCCW heat exchanger results in rising RBCCW temperatures. Efforts are underway to place the spare heat exchanger in service.

Which ONE of the following is the reason reactor power is reduced under these conditions?

- A. Prevents automatic isolation of RWCU system.
- B. Reduces Recirc pump VFD temperatures.
- C. Reduces heat load on RWCU NRHX.
- D. Reduces Recirc Pump Temperatures.

42.

Which ONE of the following describes the basis for the Minimum Critical Power Ratio (MCPR) Safety Limit?

- A. This limit ensures that more than 99.9% of the fuel rods in the core are expected to avoid transition boiling.
- B. This limit ensures that fuel damage will not result in the release of radioactive materials in excess of the guidelines of 10 CFR, Parts 20, 50, and 100.
- C. The MCPR safety limit ensures that the 1% limit on the fuel cladding plastic strain is not exceeded during all postulated operational transients.
- D. Maintaining the safety limit above the MCPR limit ensures that cladding temperatures stay below that which is required for a zirconium-water reaction for all fuel rods.

43.

A loss of coolant accident and loss of offsite power have occurred. The following plant conditions exist:

- RHR pump A maintaining RPV water level at -180 inches.
- No other RHR pumps available
- Drywell pressure at 20 psig and rising
- Reactor pressure at 400 psig

Which ONE of the following is correct given these conditions?

Drywell pressure will continue to rise, \_\_\_\_\_

- A. initiate Drywell sprays.
- B. rapidly depressurize the Reactor with the bypass valves.
- C. emergency depressurization will be required.
- D. emergency venting of containment is required.

44.

Unit 2 is in Mode 4 for a short mid-cycle outage, when a complete loss of Shutdown Cooling occurs. Plant conditions are as follows:

- Reactor Recirculation pumps are out of service
- Reactor Recirculation suction temperature is 140 degrees and slowly lowering
- Shutdown cooling flow **cannot** be re-established in a timely manner
- Reactor water level is 45 inches

Which ONE of the following describes how RPV level should be adjusted and the basis for this adjustment?

- A. Lower level to provide better mixing of CRD Cooling water.
- B. Raise level to 80 inches to promote natural circulation.
- C. Maintain current level to allow Recirc pump start.
- D. Raise level to the feedwater spargers to allow thermal stratification monitoring.

45.

Unit 2 is operating at 100% RTP. A fault in the supply breaker for the 2B Recirc Pump causes it to trip. The speed of the 2A Recirc Pump is such that the jet pump loop flow is reading  $38 \times 10^6$  lbm/hr.

Which ONE of the following describes the ICS indications for total core flow and any necessary actions?

- A. Total core flow indication remains accurate due to the out-of-service loop jet pump flow being **subtracted** instead of **added** to the in-service loop jet pump flow. Implement requirements of TS 3.4.1, Recirculation Loops Operating, within 24 hours.
- B. Total core flow indication remains accurate due to the out-of-service loop jet pump flow being **added** instead of **subtracted** from the in-service loop jet pump flow. Implement requirements of TS 3.4.1, Recirculation Loops Operating, within 36 hours.
- C. Total core flow indication is inaccurate due to the out-of-service loop jet pump flow being **added** instead of **subtracted** from the in-service loop jet pump flow. Increase the running Recirc Pump speed to raise jet pump flow to  $> 41 \times 10^6$  lbm/hr.
- D. Total core flow indication is inaccurate due to the out-of-service loop jet pump flow being **subtracted** instead of **added** to the in-service loop jet pump flow. Increase the running Recirc Pump speed to raise jet pump flow to  $> 41 \times 10^6$  lbm/hr.

46.

Unit 1 is in Mode 3 with the MSIVs closed.  
RCIC is currently aligned for pressure control mode,

DETERMINE how RCIC will respond to an increase in RPV level to +52" AND then a decrease in RPV level to -50".

- A. At +51" the steam supply valve (FCV-71-8) will go closed and the condensate return valve (FCV-71-38) will remain open. At -45" the steam supply valve will re-open, the condensate return valve will close, the injection valve (FCV-71-39) will open and RCIC will inject.
- B. At +51 " RCIC will trip and the stop valve (FCV-71-9) will close and the condensate return valve (FCV-71-38) will remain open. At -45" RCIC will NOT inject without operator action, the condensate return valve will close, and the injection valve (FCV-71-39) will open.
- C. At +51" the steam supply valve (FCV-71-8) will go closed and the condensate return valves (FCV-71-38) will close. At -45" the steam supply valve will re-open, the injection valve (FCV-71-39) will open, and RCIC will inject.
- D. At +51"the stop valve (FCV-71-9) will close and the condensate return valves (FCV-71-38) will remain open. At -45" the stop valve (FCV-71-9) will re-open, the condensate return valve will close and RCIC will inject.

47.

Fuel loading is in progress. As a fuel assembly is lowered into the core, the Rx. Engineer assigned ICS (RFF) duty notes rising SRM counts, the Unit Operator confirms SRM period lights illuminated over the radio.

Determine the correct action to be performed.

- A. Evacuate the Reactor Building and inject SLC
- B. Leave the fuel assembly in the current location and evacuate the Refuel Floor.
- C. Remove the fuel assembly from the core and if criticality is still confirmed, then move the assembly to the SFSP least populated rack location with grapple latched. Evacuate the Reactor Building.
- D. Remove the fuel assembly from the core and if criticality is still confirmed, then move fuel assembly away from core to the cattle chute; evacuate the Refuel Floor.

48.

Unit 2 plant conditions are as follows:

- A scram condition exists but the reactor did NOT shutdown.
- Reactor power is 15%
- SLC is injecting.
- The MSIVs are closed and 3 MSRVs are open for pressure control
- RPV Water Level is +15 inches and is being deliberately lowered.
- Suppression pool temperature is 112 degrees F.

The US directs you to insert Control Rods per Appendix 1D

Which ONE of the following is the primary reason for bypassing RWM per Appendix 1D?

- A. To prevent an RWM program abort .
- B. To force RWM to rescan so rod positions are accurately indicated.
- C. To inhibit the rod blocks enforced by the RWM group limits.
- D. To enable use of the Emergency In position of the CRD Notch Override switch.

49.

Unit 3 is in an outage with the following conditions:

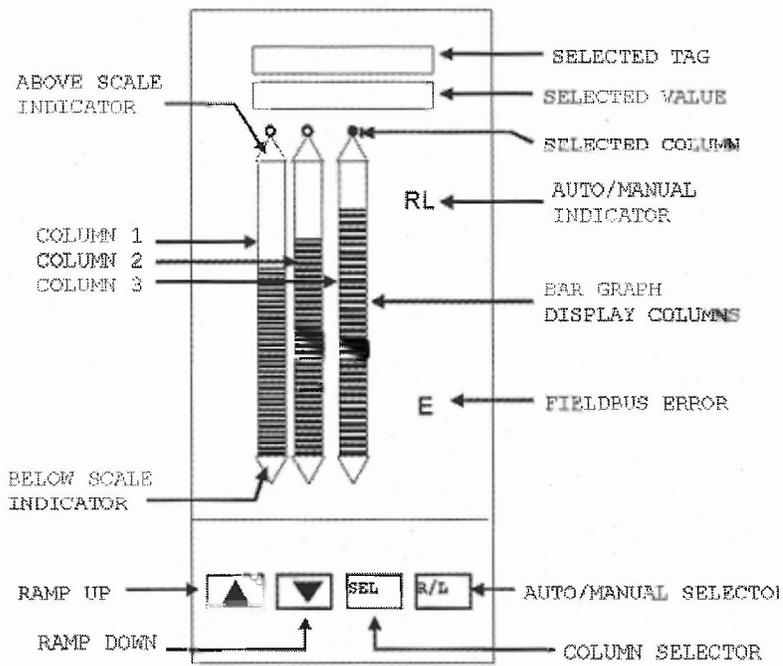
- 3B 4kv Unit Bd deenergized
- 3EC and 3ED D/G's tagged
- All Unit 3 480v RMOV Bds are energized

During a log review you note that the Unit 2 US made B D/G inoperable 5 hours earlier.

Which of the following is an RHR subsystem that meets the Tech Spec definition of an operable Shutdown Cooling subsystem?

- A. Loop I, A subsystem
- B. Loop I, C subsystem
- C. Loop II, B subsystem
- D. Loop II, D subsystem

50.



If the "2B" RFPT PDS Controller is selected to MANUAL, HOW will the system respond if the Column 3 is selected and the Ramp Up button is depressed?

- A. Bar graph and digital values rise. RFPT speed rises.
- B. Bar graph and digital values rise. RFPT speed remains the same.
- C. Bar graph rises, digital values remain the same. RFPT speed rises.
- D. Bar graph and digital values remain the same. RFPT speed remains the same.

51.

A reactor startup is in progress with the following plant conditions.

- Reactor Mode Switch in Startup
- IRMs on Range 7 reading 35

The following two alarms are received

- Control Rod Withdrawal Block alarm, Panel 9-5
- SRM High/INOP alarm, Panel 9-5

Which ONE of the following describes the **MINIMUM** conditions that will cause these two alarms?

Any one of the SRMs \_\_\_\_\_

- A. are withdrawn from the fully inserted position **or** the module is unplugged
- B. is indicating  $2.5E5$  cps **or** the Mode switch is out of operate
- C. are withdrawn from the fully inserted position **and** the module is unplugged
- D. is indicating  $2.5E5$  cps **and** the Mode switch is out of operate

52.

A small break LOCA has occurred on Unit 2 with a failure of all high pressure injection. ADS has auto-initiated.

With no operator action, when will the ADS valves close?

- A. When reactor water level rises above -122 inches.
- B. When reactor water level rises above +2 inches.
- C. When reactor pressure lowers to below 50 psig.
- D. When reactor pressure lowers to 20 psig above suppression chamber pressure.

53.

Unit 2 APRMs have the following indications:

- APRM1 - 106%
- APRM2 - 104%
- APRM3 - 104%
- APRM4 - 105%
- Recirc Loop A flow 60%
- Recirc Loop B flow 64%

Given these APRM indications, what is the appropriate plant response?

- A. Full Scram
- B. Half Scram
- C. Control Rod Withdrawal Block
- D. Flow Compare inverse video on ODA display

54.

An ATWS condition exists on Unit 2. Emergency Procedures direct initiation of Standby Liquid Control. 480v Shutdown Board 2A is deenergized due to an overcurrent lockout on the normal feeder breaker.

How will SLC respond if the SLC Control Switch is placed in the START PUMP B position?

- A. SLC Pump B starts, only one squib valve fires.
- B. SLC Pump B starts, both squib valves fire.
- C. SLC Pump B will not start, B squib valve fires.
- D. SLC Pump B will not start, both squib valves fire.

55.

RPS 3A is aligned to its alternate supply. 4kv Shutdown Board 3EC deenergizes due to relay operation.

Which ONE of the following correctly describes the PCIS group initiations that will be received and the action required to allow the reset of all PCIS logic?

PCIS groups \_\_\_\_\_. Transfer \_\_\_\_\_ 480v Shutdown board to alternate.

A. 1, 3, 6 / 3A

B. 2, 3, 4 / 3B

C. 1, 2, 6, 8 / 3A

D. 1, 2, 3, 6, 8 / 3B

56.

Unit 1 is starting up after an outage. Control Rod withdrawal is in progress. The IM's have requested the UO bypass and withdraw G IRM as PMT for an open WO. All IRM's are on range 1.

Which ONE of the following describes an adverse event that withdrawal of the detector may cause?

- A. Control Rod Block from the Detector Wrong Position interlock.
- B. Tech Spec LCO from inadequate number of Division 1 IRM's operable during Reactor startup.
- C. Control Rod Block from IRM downscale setpoint as detector is withdrawn.
- D. Reactor half scram or scram from unbypassed IRM spiking when detector motion is started/stopped.

57.

Which ONE of the following correctly describes the normal steady state RFPT speed limits for Unit 1 and Unit 3?

- A. Unit 1 - 5675 rpm; Unit 3 - 5050 rpm
- B. Unit 1 - 5050 rpm; Unit 3 - 5675 rpm
- C. Unit 1 - 6050 rpm; Unit 3 - 5900 rpm
- D. Unit 1 - 5900 rpm; Unit 3 - 6050 rpm

58.

Unit 2 is operating at 100% reactor power with no equipment out of service.

The Unit Operator grasps the Mode Switch and begins to rotate it counterclockwise, through each position, until the Mode Switch reaches the last position. All rods insert and EOI-1 is subsequently entered on low reactor water level. Level is recovered and EOI-1 is exited.

Which ONE of the following describes the First Out annunciators that would be received in the correct order?

- A. Reactor Low Water Level  
Neutron Monitoring System  
East Scram Discharge Volume High Water Level
- B. Neutron Monitoring System  
East Scram Discharge Volume High Water Level  
Reactor Low Water Level
- C. East Scram Discharge Volume High Water Level  
Neutron Monitoring System  
Reactor Low Water Level
- D. Reactor Low Water Level  
East Scram Discharge Volume High Water Level  
Neutron Monitoring System

59.

Which ONE of the following describes the **effect** of a loss of RPS bus on the 90-256 CAM and the actions required to return the CAM to service per OI-99?

A. RPS bus A isolates only inboard CAM valves

Valves open when PCIS is reset.

B. RPS bus B isolates only outboard CAM valves

PCIS reset and individual valve resets required to return CAM to service.

C. Both RPS busses must be lost to isolate CAM

Valves open when PCIS is reset.

D. Either RPS bus loss fully isolates CAM

PCIS reset and individual valve resets required to return CAM to service.

60.

The 2B 250v Battery charger has .....

- A. The capability to supply 2 unit batteries at the same time.
- B. The capability to supply only one unit battery at a time.
- C. Only one power supply and the output can be routed to any unit battery.
- D. Two power supplies (one AC and one DC), and the output can be routed to any unit battery.

61.

Which ONE of the following describes the operating setpoints and the operational design criteria of the Main Steam Safety Relief valves?

- A. 4 valves - 1135 psig, 4 valves - 1145 psig, 5 valves - 1155 psig  
12 valves limit peak pressure below 1375 psig for the design isolation transient.
- B. 5 valves - 1135 psig, 4 valves - 1145 psig, 4 valves - 1155 psig  
12 valves limit peak pressure below 1325 psig for the design isolation transient.
- C. 4 valves - 1135 psig, 4 valves - 1145 psig, 5 valves - 1155 psig  
13 valves limit peak pressure below 1325 psig for the design isolation transient.
- D. 5 valves - 1135 psig, 4 valves - 1145 psig, 4 valves - 1155 psig  
13 valves limit peak pressure below 1375 psig for the design isolation transient.

62.

Unit 2 has experienced a loss of offsite power. The 'A' D/G frequency began oscillating after 2A RHR pump was placed in service for torus cooling. The Unit Supervisor has directed you to take control of 'A' D/G at the 4kv Shutdown board.

Which ONE of the following describes the required actions to take control of the D/G at the Shutdown board?

- A. Pull and place D/G A Operational Mode Selector switch in Parallel with System  
Verify D/G A output breaker local control switch in normal after close  
Place D/G A control transfer switch in emergency
- B. Pull Operational Mode Selector switch in Single Unit  
Verify D/G A output breaker local control switch in normal after close  
Place D/G A control transfer switch in emergency
- C. Pull Operational Mode Selector switch in Single Unit  
Place D/G A control transfer switch in emergency  
Verify D/G A output breaker local control switch in close
- D. Pull and place D/G A Operational Mode Selector switch in Parallel with System  
Place D/G A control transfer switch in emergency  
Verify D/G A output breaker local control switch in close

63.

Which ONE of the following correctly describes air compressor trip setpoints for compressors A, F and G?

	A Compressor	F Compressor	G Compressor
A.	35 F <b>oil</b> temperature	4 psig seal pressure	65 F <b>air</b> temperature
B.	180 F <b>air</b> temperature	5 psig seal pressure	90 F <b>oil</b> temperature
C.	310 F <b>air</b> temperature	6 psig seal pressure	125 F <b>oil</b> temperature
D.	180 F <b>oil</b> temperature	7 psig seal pressure	130 F <b>air</b> temperature

64.

Unit 1 has experienced an accident that results in the following conditions:

- Only HPCI available for high pressure injection, HPCI in standby readiness alignment
- Torus level 15 feet lowering 1 inch per minute
- Torus temperature 130 degrees

What is the MAXIMUM time HPCI will be available for injection and why?

- A. 15 minutes, Torus temperature will reach HPCI operating limit.
- B. 27 minutes, Torus level will reach HPCI operating limit
- C. 30 minutes, Torus temperature will reach HPCI operating limit
- D. 42 minutes, Torus level will reach HPCI operating limit

65.

Unit 2 was at 80% power when a turbine trip occurs and RPS did NOT de-energize.

- Subsequent attempts to use ARI were not successful,
- RPV water level has been lowered to -80" for power control.
- Reactor pressure is 962 psig.

The crew has placed both RHR Loops in Torus Cooling in accordance with OI-74.

How will RHR Loop I and II respond if Drywell pressure reaches 2.45 psig?

- A. Torus Cooling valves remain open, pumps trip and restart.
- B. Torus Cooling valves close, pumps trip and restart.
- C. Torus Cooling valves remain open, pumps continue to run.
- D. Torus Cooling valves close, LPCI injection valve opens.

66.

SBGT trains A, B, and C are in a normal standby lineup when the UO places the handswitch for 0-DMP-065-0025, SGT TRAIN B INLET DAMPER, from AUTO to CLOSE.

The inlet damper will remain closed and the "SGT TRAIN UNAVAILABLE" annunciator will alarm in \_\_\_ control room(s).

- A. Units 1, 2 and 3
- B. Units 2 and 3 only
- C. Unit 2 only
- D. Unit 3 only

67.

During loading of a Dry Cask from the Unit 2 Fuel Pool an irradiated fuel bundle is damaged. Unit 2 Reactor and Refuel Zone Rad Monitors are upscale and the ventilation systems have initiated as designed.

Which ONE of the following describes the status of the Control Bay ventilation system Dp and the reason for this status?

- A. Maintained positive to ensure adequate supply flow to sensitive equipment.
- B. Maintained negative due to exhaust flow from CREV system.
- C. Maintained positive to minimize inflow of contamination.
- D. Maintained negative to ensure exhaust flow from vital electric board rooms provides adequate cooling.

68.

During the initial phases of an Alert (emergency centers not yet staffed) the Onsite emergency response organization is normally notified by:

- A. the Site Director's staff, using a phone list.
- B. the U1 UO, using the Automated Paging System.
- C. the REP Manager, using the Automated Paging System.
- D. the Operations Duty Specialist, using a phone list.

69.

Unit 1 is at 60% power when an electrical fault results in closure of the D outboard MSIV and no scram occurs..

Which ONE of the following describes the response of the Main Steam Line drain valves to the MSIV closure?

MSL A/B/C/D Drain Valves FCV's 1-168, -169, -170 and -171 \_\_\_\_  
and  
Upstream MSL Drain to Condenser FCV 1-58 \_\_\_\_

- A. Close  
Opens
- B. Open  
Closes
- C. Close  
Closes
- D. Open  
Opens

70.

Unit 2 experienced a complete loss of offsite power. All Diesel Generators started and tied to their respective shutdown boards.

Shortly thereafter, Unit 2 experiences a leak inside containment causing the following plant conditions:

- DW pressure: 8 psig slowly rising
- RPV level: -100 inches stable
- RPV pressure: 425 psig stable

Assuming a normal systems lineup, what is the status of the 250v Battery Charger 2A?

- A. The battery charger is de-energized and can only be energized when the accident signal clears.
- B. The battery charger is de-energized but can be re-energized by utilizing an emergency bypass switch.
- C. The battery charger reenergizes forty seconds following an accident signal.
- D. The battery charger is energized, it has not received a trip signal yet.

71.

U-2 is in Mode 1, a malfunction causes a fuse to clear in the the Division 1 ECCS ATU Inverter input from 250VDC supply.

Which ONE of the following accurately describes the effects of this loss on the HPCI, RCIC system and ECCS/RCIC initiation logic.

- A. HPCI Inoperable, RCIC Operable, all ECCS/RCIC auto initiation logic Operable
- B. HPCI Operable, RCIC Inoperable, all ECCS/RCIC auto initiation logic Operable.
- C. HPCI Inoperable, RCIC Inoperable, half of all ECCS/RCIC auto initiation logic Inoperable.
- D. HPCI Operable, RCIC Operable, half of all ECCS/RCIC auto initiation logic Inoperable.

72.

Which ONE of the following will meet the definition of adequate core cooling.

- A. Reactor water level is verified to be at or above 2/3 core height.
- B. During execution of C-1 with all rods in, two Condensate pumps injecting at 4000 gpm (each pump) with RPV water level -200 inches.
- C. During execution of C-5 after ED, 6 SRVs open with reactor pressure at 230 psig and steady.
- D. During execution of C-4 with all rods in, reactor pressure is 60 psig above torus pressure with 5 SRVs open.

73.

A failure of the EHC pressure controller causes reactor pressure to reach 1080 psig. The reactor automatically scrams and the following conditions are noted:

- Reactor water level drops to -60 inches.
- IRMs are inserted, on Range 3 and lowering.
- Several minutes after the scram, level is normal and reactor pressure is being maintained by the turbine bypass valves.
- Two control rods are at position 04.

Which of the following should the crew be executing to stabilize RPV water level, RPV pressure, and Rx. power?

- A. C5, RC/P, RC/Q
- B. C1, RC/P, AOI-100-1
- C. C1, RC/P, GOI-100-12A
- D. C5, RC/P, AOI-100-1

74.

Which ONE of the following correctly describes the possible adverse consequences of initiating an Emergency Depressurization if the plant is operating in the ACTION REQUIRED region of the Heat Capacity Temperature Limit curve?

- A. Direct pressurization of the suppression chamber airspace  
Loss of the pressure suppression function of primary containment  
Exceeding NPSH limits for RHR pumps
- B. Failure of primary containment due to static and/or dynamic loadings  
Loss of the pressure suppression function of primary containment  
Exceeding suppression chamber design temperature limits
- C. Loss of the pressure suppression function of primary containment  
Exceeding suppression chamber design temperature limits  
Exceeding NPSH limits for RHR pumps
- D. Failure of equipment necessary for safe shutdown of the plant  
Direct pressurization of the suppression chamber airspace  
Failure of primary containment due to static and/or dynamic loadings

75.

Unit 2 is at full power when an actuation of the Power Load Unbalance Circuit occurs.

Which ONE of the following describes a condition to cause this actuation and the expected plant response?

- A. Loss of Stator Cooling Water  
Turbine will NOT receive a trip signal  
Reactor will scram based on Turbine Control Valve Limit Switch Position
- B. Generator High Side (500KV) Breakers Trip  
Turbine will trip  
Reactor will scram based on Turbine Control Valve Pressure Switch Actuation
- C. Generator Output Breaker (22KV) Trip  
Turbine will trip  
Reactor will scram based on Stop Valve Pressure Switch Actuation
- D. Moisture Separator Drain Tank High Level  
Turbine does NOT receive a trip signal  
Reactor will NOT scram