

# U.S. Nuclear Regulatory Commission Site-Specific Written Examination

## Applicant Information

Name:	Region: I
Date: 5/5/2003	Facility: Salem 1 & 2
License Level: SRO	Reactor Type: W
Start Time:	Finish Time:

## Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected SIX hours after the examination starts.

## Applicant Certification

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

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

## Results

Examination Value	__100__ Points
Applicant's Score	_____ Points
Applicant's Grade	_____ Percent

## Senior Reactor Operator Examination

1. Given the following conditions:

- Salem Unit 2 is at BOL, and has been at 60% power for 3 days.
- Control Bank D is at 174 steps withdrawn.
- Rod Control is in automatic.
- RCS Auctioneered High Tave is 562 deg F and steady.

Control Bank D rods start withdrawing at 8 steps per minute. With Control Bank D at 177 steps, Rod Control is placed in Manual, and all rod motion stops.

Which of the following describes why control rods will be inserted in manual IAW S2.OP-AB.ROD-0003?

- a. To prevent reduced charging flow from lowering pressurizer level.
- b. To restore Tave to programmed band.
- c. To restore RCS pressure to normal.
- d. To prevent Tave/Tref console alarm from annunciating.

## Senior Reactor Operator Examination

2. Given the following conditions:

- Salem Unit 2 is at 80% power, performing a power reduction @ 1% / min due to degrading condenser backpressure.
- Rod control is in automatic.

As control rods are moving inward at 8 steps / minute, OHA E-24, "ROD DEV OR SEQ" alarms. Control rod 1D1 indicates 220 steps and stationary. All other control rods expected to be moving are inserting correctly.

The CRS directs entry into S2.OP-AB.ROD-0001, "IMMOVABLE / MISALIGNED CONTROL RODS", Rod Control is placed in Manual, and all rod motion stops with the remainder of control bank D at 200 steps.

Which of the following describes the actions required by Technical Specifications?

- IMMEDIATELY enter TSAS 3.1.3.1 "MOVABLE CONTROL ASSEMBLIES GROUP HEIGHT".
- IMMEDIATELY enter TSAS 3.1.3.2.1 "POSITION INDICATING SYSTEMS - OPERATING".
- After 1 hour, if rod 1D1 is still misaligned by > 12 steps from its group counter, enter TSAS 3.1.3.2.1 "POSITION INDICATING SYSTEMS - OPERATING".
- After 1 hour, if rod 1D1 is still misaligned by > 18 steps from its group counter, enter TSAS 3.1.3.1 "MOVABLE CONTROL ASSEMBLIES GROUP HEIGHT".

3. Given the following conditions:

- Salem Unit 2 is operating at 90% power.
- Pressurizer (PZR) is 2235 psig.
- PZR Power Operated Relief Valve (PORV) 2PR1 is leaking.
- Pressurizer Relief Tank (PRT) pressure is 5 psig.
- PORV discharge temperature has stabilized at 230 deg. F.

Which one of the following will DIRECTLY cause the indicated PORV discharge temperature to rise?

- PORV leakrate rises by 5 gpm.
- The PRT rupture disk develops a leak.
- PRT pressure is allowed to rise to 10 psig.
- Pressurizer Spray is removed from service.

## Senior Reactor Operator Examination

4. Which of the following is the basis for establishing / maintaining S/G Narrow Range level between 9%-33% (non-adverse containment) for small or intermediate LOCA's?
  - a. Maintains a static head of water to reduce any existing S/G tube leakage.
  - b. Maintain the water level above the top of the U-tubes to prevent depressurizing S/G.
  - c. Ensures adequate feed flow or S/G inventory to ensure a secondary heat sink.
  - d. A RCP may have to be started if FRCC-1 is entered later in the event.
  
5. Which of the following describes the condition that limits flow that is diverted from the ECCS injection path following ECCS actuation?
  - a. The CV55 valve, CENT CHG PMP FCV, closes to its minimum stop position to ensure NO greater than 40 gpm is diverted to the Reactor Coolant Pump (RCP) seals.
  - b. RCP Seal Injection flow is limited to less than 40 gpm with Charging Pump discharge pressure  $\geq 2430$  psig and the CV55 valve full open.
  - c. Automatic isolation of ALL non ECCS flow paths except the CV139 and CV140, CHG PUMP RECIRC STOP VALVES.
  - d. Automatic isolation of ALL non ECCS flow paths except the SJ68 and SJ69, SJ PUMP MIN FLOW VALVES.

## Senior Reactor Operator Examination

6. Given the following conditions:

- Salem Unit 2 is at 100% power.
- Total Seal Injection flow is 34 gpm.
- #1 Seal leakoff flows are:
  - 21 RCP 2.5 gpm.
  - 22 RCP 2.3 gpm.
  - 23 RCP 3.1 gpm.
  - 24 RCP 2.6 gpm.

2 weeks later, with unit remaining at 100% power, these indications are:

- Total Seal Injection Flow is 32 gpm.
- #1 Seal leakoff flows are:
  - 21 RCP 2.5 gpm.
  - 22 RCP 2.4 gpm.
  - 23 RCP 1.2 gpm.
  - 24 RCP 2.8 gpm.

Which of the following describes the condition that has developed?

- a. Reactor Coolant Drain Tank pressure has risen.
- b. 24 RCP #2 seal has failed.
- c. 23 RCP #1 seal clearance has deteriorated.
- d. VCT pressure has risen.

## Senior Reactor Operator Examination

7. Given the following conditions:

- Unit 2 is at 75% power.
- OHA's D20, 21, 22, 23, RCP 21-24 RCP BRG CLG WTR FLO LO alarms come in at 0810.
- Operator observes valve 2CC187, RCP CC OUTLET VLV has closed, he attempts to re-open the valve but it will NOT open.
- Valves 2CC117, 2CC118, RCP CC INLET VALVEs, and 2CC136 RCP CC OUTLET VLV are verified open.
- NO other alarms are in.
- S2.OP-AB.RCP-0001 "Reactor Coolant Pump Abnormality" is entered at 0816.

Which of the following actions is required by the procedure and why ?

- a. Trip the reactor then trip the RCP's to prevent damage to the pump seals.
- b. Pumps can remain in service since the seal water outlet temperatures have NOT exceeded their alarm setpoints.
- c. Trip the reactor then trip the RCP's to prevent damage to the pump motor bearings.
- d. Pumps can remain in service since the motor winding temperatures have NOT exceeded their alarm setpoints.

8. Given the following conditions:

- Unit 2 is in Mode 4.
- Reactor Coolant System (RCS) temperature is being maintained at 250 deg. F.

Which of the following is the Tech Spec requirement regarding the operability of Charging and Safety Injection (SI) pumps?

- a. At least one Centrifugal Charging Pump must be OPERABLE to provide Reactor Coolant Pump (RCP) seal injection and one SI Pump must be OPERABLE to provide a boron injection path from the Refueling Water Storage Tank (RWST).
- b. At least one Centrifugal Charging Pump must be OPERABLE to provide RCP seal injection and one SI Pump must be OPERABLE to provide a boron injection path from the RWST if RCS pressure is  $\geq 165$  psig.
- c. If 23 Charging Pump is operating to provide RCP seal injection then NO other Charging or SI Pump are allowed to be OPERABLE.
- d. 23 Charging Pump can be operating to provide RCP seal injection if 21 OR 22 Charging Pump is OPERABLE and NO SI Pumps are OPERABLE.

## Senior Reactor Operator Examination

9. Given the following conditions:

- Salem Unit 2 is in Mode 3.
- RWST level is 40.6'.
- RWST temp is 48 deg F.
- RWST boron concentration is 2344 ppm.
- 21 BAST is C/T.
- 22 BAST level is 95%.
- 22 BAST boron concentration is 6650 ppm.
- 22 BAST temp is 90.5 deg F.

Which of the following describes the status of the Borated Water Sources?

- a. INOPERABLE due to Boric Acid Storage System parameters.
- b. INOPERABLE due to RWST parameters.
- c. Fully OPERABLE.
- d. Available, but NOT required to be OPERABLE in Mode 3.

10. Given the following conditions:

- Unit 2 is in Mode 5 with 21 Residual Heat Removal (RHR) pump in service for cooling.
- The RO reports that Pressurizer (PZR) level is slowly lowering unexpectedly.
- NO Overhead Annunciator alarms have been received.
- Refueling Water Storage Tank (RWST) level is stable.
- 21 Waste Hold Up Tank level is rising slowly.

S2.OP-AB.RHR-0001, LOSS OF RHR, has been entered and steps are being performed to locate and isolate the leak.

Which of the following operator actions will isolate this leak?

- a. Close 2SJ69, RWST TO RHR, AND 2RH21, RHR TO RWST.
- b. Close 2CV8, RHR Letdown.
- c. Close 2CV132, Excess Letdown.
- d. Remove 21 RHR Loop from service and put 22 RHR loop in service.

## Senior Reactor Operator Examination

11. Given the following conditions:

- Unit 2 is at 88% power.
- The crew is attempting to isolate a Component Cooling (CC) Water leak using S2.OP-AB.CC-0001, COMPONENT COOLING ABNORMALITY.
- 22 Charging Pump is in service.
- 21 and 23 CC Pumps are in service.
- 22CC Pump and 22 CC Heat Exchanger are isolated.
- CC Surge Tank level indication LI-628C has been raised to 42% and it is now lowering.
- CC Surge Tank makeup is isolated.
- OHA C2 CNTMT SUMP PMP START has actuated and NO other alarms are in.

Which of the following identifies the location of the leak?

- a. Non-safeguards CC header.
  - b. 21 Component Cooling header.
  - c. 22 Component Cooling header.
  - d. Component Cooling Surge Tank.
12. Which of the following Pressurizer Level controlling channel leak locations will cause ACTUAL level to rise ABOVE the programmed setpoint ?
- a. Level detector reference leg.
  - b. Level detector variable leg.
  - c. Pressurizer Vapor Space.
  - d. Pressurizer Surge Line.

## Senior Reactor Operator Examination

13. Given the following conditions:

- Salem Unit 1 has experienced an Anticipated Transient Without Trip (ATWT), and has transitioned out of 1-EOP-TRIP-1 to 1-EOP-FRSM-1.
- SI has NOT been initiated.
- Rapid Boration flow CANNOT be established through 1CV175, Rapid Borate Stop Valve.

Which of the following choices identifies the next sequence of steps to be performed?

- a. Start both Boric Acid Transfer Pumps in High Speed, start a second Charging pump and fully open: 1CV55, CHARGING FLOW CONTROL VALVE; 1CV77, CHARGING TO LOOP 13 AND 1CV79, CHARGING TO LOOP 24.
  - b. Start both Boric Acid Transfer Pumps in High Speed, stop the Primary Water Make-up pump, start a second Charging pump and direct full make-up flow to the Charging Pump suction by closing 1CV181, MAKEUP FLOWPATH VALVE and fully opening 1CV185, MAKEUP FLOWPATH VALVE.
  - c. Send Operator to establish Rapid Boration by opening 1CV174, BA BLENDER BYPASS VALVE then start both Boric Acid Transfer Pumps in High Speed.
  - d. Open 1SJ1 and 1SJ2, RWST TO CHG PUMP; align charging flow through the BIT; shut 1CV40 and 1CV41 VCT DISCH STOP VALVE; and isolate normal charging flowpath.
14. In accordance with the Salem FSAR Accident Analysis, which of the following Fuel Handling Accidents could result in a HIGHER thyroid dose received at the Exclusion Area Boundary (EAB), and why?
- a. Fuel Handling Accident in the CONTAINMENT Building because all airborne activity that reaches the containment atmosphere is assumed to exhaust to the environment within 2 hours without filtration.
  - b. Fuel Handling Accident in the FUEL HANDLING Building because all airborne activity that reaches the FHB atmosphere is assumed to exhaust to the environment within 2 hours without filtration.
  - c. Fuel Handling Accident in the CONTAINMENT Building because the dilution rate of the unmonitored release is less.
  - d. Fuel Handling Accident in the FUEL HANDLING Building because of a lack of physical barriers to prevent egress of airborne activity to the outside environment.

## Senior Reactor Operator Examination

15. Given the following conditions:

- Unit 2 is at 100% power.
- 21 Steam Generator has a verified tube leak.
- The crew has entered S2.OP-AB.SG-0001, STEAM GENERATOR TUBE LEAK.

Trending of the leak shows:

- 1000 - 25 gpd
- 1030 - 30 gpd
- 1100 - 40 gpd
- 1130 - 40 gpd
- 1200 - 55 gpd
- 1230 - 75 gpd
- 1300 - 75 gpd
- 1330 - 80 gpd
- 1400 - 85 gpd

IAW the Continuous Action Summary of S2.OP-AB.SG-0001, STEAM GENERATOR TUBE LEAK, which of the following identifies the time a Unit shutdown is required, and why?

- a. 1230; to prevent leak propagation.
- b. 1230; because Tech Spec limits have been exceeded.
- c. 1330; to prevent leak propagation.
- d. 1330; because Tech Spec limits have been exceeded.

16. Which of the following describes why rising radiation levels on 2R19A, STM GEN BLOWDOWN RAD MONITOR, will automatically close the 21GB4, S/G B/D OUTLET ISOL VALVE?

- a. To prevent the spread of contamination from a Steam Generator Tube Rupture (SGTR) on 21 S/G to secondary systems.
- b. To minimize S/G mass loss during a SGTR with a Main Steamline Break.
- c. To prevent backfeeding contamination from 21 S/G to any other S/G through the unaffected S/G's blowdown lines.
- d. To prevent high alarm on 2R40, RAD MON CONDENSATE PRCS FILTER, from isolating the Condensate Polisher.

## Senior Reactor Operator Examination

17. Given the following conditions:

- 22 Steam Generator (S/G) has a ruptured tube and 2-EOP-SGTR-1, STEAM GENERATOR TUBE RUPTURE has been entered.
- 22 S/G has been isolated.
- Reactor Coolant System (RCS) cooldown is progress using Steam Dumps.
- 22 S/G level is 89% and rising.
- 22 S/G Pressure is 820 psia.
- RCS pressure is 1000 psia.
- Pressurizer level is 38%.

Under these conditions why must pressurizer pressure be reduced to less than 820 psia?

- a. To establish backflow to restore pressurizer level.
- b. To ensure 22 S/G code safety valves remain closed.
- c. To ensure maximum heat transfer to 21, 23 and 24 S/G's.
- d. To raise injection flow to raise RCS boron concentration.

18. For a given steam line rupture size and location, which of the following sets of initial conditions will result in the SMALLEST reactivity addition rate IMMEDIATELY following the rupture?

- a. Middle of core life with Reactor Coolant System temperature at 350 deg F.
- b. Middle of core life with RCS temperature at 547 deg F.
- c. End of core life with RCS temperature at 350 deg F.
- d. End of core life with RCS temperature at 547 deg F.

19. Given the following conditions:

- An electrical disturbance resulted in a loss of all Unit 2 Circulators.
- Unit 2 reactor has tripped from 50% power.

Which of the following will be the RCS temperature 10 minutes after the trip and why?

- a. 555 deg F due to the value of the lowest Main Steam Safety Valve setpoint.
- b. 552 deg F due to the Steam Dump Load Rejection Controller.
- c. 548 deg F due to the MS10, Main Steam Atmospheric Relief setpoint at 1015 psig.
- d. 547 deg F due to the Steam Dump Plant Trip controller.

## Senior Reactor Operator Examination

20. Given the following conditions:

- Salem Unit 1 has tripped from 100% power.
- 11 and 12 Steam Generator Feed Pumps have tripped.

While performing Auxiliary Feed (AF) flow verification at step 3 of 1-EOP-TRIP-2, REACTOR TRIP RESPONSE, the operator observes the following conditions:

- All Steam Generator (S/G) Narrow Range (NR) levels are off scale low.
- 11 through 14AF11's indicate closed.
- 11 through 14AF21's indicate 10% open.
- AF flow to each S/G is 4E4 lbm/hr.
- 11AF Pmp discharge pressure is 1380 psig.
- 12 AF Pmp discharge pressure is 1350 psig.
- 13 AF Pmp tripped on overspeed.

Which of the following choices identifies the action required by 1-EOP-TRIP-2 for these conditions?

- Depress the Pressure Override Defeat pushbutton for 11 AF Pmp to open 11 and 12AF21's and for 12 AF Pmp to open 13 and 14AF21's to establish feed flow >22E4 lbm/hr.
- Establish feed flow of NO less than 1E4 lbm/hr to each S/G to ensure tubes remain wet.
- Depress the 1MS52, TRIP VALVE OPEN, for 13 AF Pmp to restart 13 AF Pmp.
- Depress 11 through 14AF21 OPEN pushbuttons to establish feed flow >22E4 lbm/hr.

21. Which one of the following correctly completes the operator action concerning Safety Injection actuation in the event of an extended loss of all AC power?

The SI signal will be manually actuated...

- and reset after power is restored to at least ONE 4KV vital bus, to allow automatic loading of bus.
- and reset while the 4KV Vital busses are de-energized, to prevent automatic loading of bus.
- only if an automatic actuation signal is present, and is reset after power is restored to at least ONE 4KV Vital bus, to allow automatic loading of bus.
- only if automatic actuation signal is present, and is reset while the 4KV Vital busses are de-energized, to prevent automatic loading of bus.

## Senior Reactor Operator Examination

22. A loss of off-site power caused a Unit 2 reactor trip after a 300 day run at 100% power. NO emergency diesel generators energized their respective busses and the operating crew entered 2-EOP-LOPA-1 during the immediate actions of 2-EOP-TRIP-1.

The following conditions now exist:

- All S/G NR levels are between 15-25%
- S/G Pressure is 940 psig
- 23 AFW Pump is running
- The crew was depressurizing intact S/G's when 2C 4KV Vital Bus was energized from 2C EDG
- 25 SW Pump has been started
- 23 and 25 CFCU's are running in LOW
- All SEC's are de-energized
- RCP seals have been isolated
- PZR Level is 15%
- RCS Pressure lowered to 1750 psig during the cooldown
- Hottest In-core Thermocouple - 530°F

Which one of the following identifies the next procedure to be implemented?

- a. 2-EOP-LOPA-2, LOSS OF ALL AC POWER RECOVERY/SI NOT REQUIRED.
- b. 2-EOP-LOPA-3, LOSS OF ALL AC POWER RECOVERY/SI REQUIRED
- c. 2-EOP-TRIP-1, REACTOR TRIP OR SAFETY INJECTION.
- d. 2-EOP-TRIP-2, REACTOR TRIP RESPONSE.

23. Given the following conditions:

- OHA B-3, 2A VTL INSTR BUS INVRT FAIL, annunciates.
- An NEO sent to investigate reports that 2A Vital Instrument Bus (VIB) Inverter Static Rectifier has an INV AC OUTPUT LOW/FAIL Alarm illuminated.
- All other indications are normal.

In accordance with S2.OP-SO.115-0011, 2A VITAL INSTRUMENT BUS UPS SYSTEM OPERATION, which of the following is the correct action to be taken?

- a. Use the MANUAL BYPASS SWITCH to transfer the inverter to its DC POWER SUPPLY.
- b. Use the MANUAL BYPASS SWITCH to transfer the inverter loads to the AC LINE REGULATOR.
- c. Ensure the STATIC SWITCH TRANSFERRED indicator is illuminated.
- d. Ensure the INVERTER DC INPUT AVAILABLE indicator is illuminated.

## Senior Reactor Operator Examination

24. Which of the following describes how a loss of 125VDC affects a Reactor Trip Breaker (RTB)?
- The breaker is NOT capable of opening on a signal to the shunt trip coil.
  - The loss of voltage causes a shunt trip actuation and the breaker to open.
  - The breaker is NOT capable of opening on a signal to the UV trip coil.
  - The loss of voltage de-energizes the UV coil and the breaker opens.

25. One of the Radiation Monitoring System (RMS) 2R13, Containment Fan Coil Unit (CFCU) Service Water, channels goes into ALARM.

Which of the following actions are required by S2.OP-AB.RAD-000, ABNORMAL RADIATION, and why?

- Initiate Containment Ventilation Isolation to prevent an unmonitored release to the environment.
  - Stop the affected CFCU's and close the SW72's to prevent an unmonitored release to the environment.
  - Stop the affected CFCU's and close the SW72's to limit the spread of airborne contamination in the Containment.
  - Initiate a Containment Purge to filter and monitor a release of the Containment environment to the plant vent.
26. In response to an Alarm condition on Radiation Monitoring System (RMS) channel 2R16, Plant Vent Gross detector, S2.OP-AB.RAD-0001, ABNORMAL RADIATION, directs the Control Area Ventilation (CAV) systems for both units to be put into ACCIDENT PRESSURIZED MODE if there are NO R1B channels in service in the Unit 2 CAV Inlet duct.

Which of the following is the correct reason for taking this step?

- Insure Control Room personnel exposure is within 10CFR100 limits during the accident.
- Prevent Control Room Area pressure from becoming too high during the accident.
- Prevent ALL outside air from affecting Control Room habitability.
- Prevent CAV exhaust flow from diluting the sample flow past the 2R16 detector.

## Senior Reactor Operator Examination

27. Which of the following choices identifies ONLY events which can be identified using Area Radiation Monitors (ARM's)?
- a. LOCA inside Containment; Steam Generator Tube Rupture; fuel handling accident in the Fuel Handling Building (FHB); high radiation at the Condensate Polishers.
  - b. LOCA inside Containment; fuel handling accident in the Fuel Handling Building (FHB); high radiation at the Condensate Polishers; rupture of a Gas Decay Tank.
  - c. LOCA outside Containment; Main Steam Line Break; Reactor Coolant Pump Thermal Barrier leak; fuel handling accident in the Fuel Handling Building (FHB).
  - d. LOCA outside Containment; Steam Generator Tube Rupture; rupture of a Gas Decay Tank; Reactor Coolant Pump Thermal Barrier leak.

28. Given the following conditions:

- Unit 2 is at 100% power.
- The crew has entered S2.OP-AB.SW-0001, LOSS OF SERVICE WATER HEADER PRESSURE, due to a large leak just downstream of the 21SW22 and 21SW23 piping connection.
- The control room crew has closed 21SW22 and 21SW23 as directed by the procedure.

Which of the following describes the Service Water availability for the Emergency Diesel Generators (EDG) and Containment Fan Coil Units (CFCU) if a Reactor Trip/Safety Injection occurs?

- a. All 3 EDG's are supplied from 21 and 22 SW Headers; all 5 CFCU's are supplied from 22 SW Header.
- b. All 3 EDG's are supplied from 21 and 22 SW Header; 3 CFCU's are supplied from 22 SW Header.
- c. All 3 EDG's and 3 CFCU's are supplied ONLY from 22 SW Header.
- d. All 3 EDG's and all 5 CFCU's are supplied from either 21 or 22 SW Header.

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29. There is a break in the Control Air System header supplying the Mechanical Penetration area. Which of the following actions will S2.OP-AB.CA-0001 have operators verify?
- High flow caused the excess flow check valve to close, isolating the leaking portion of the system.
  - High flow has automatically swapped all redundant air supply panels in the Auxiliary Building, which completely isolates the leaking portion of the system.
  - Air Operated Containment Isolation valves 21 and 22CA330 use the downstream pressure to open. The decreasing pressure has isolated the leaking portion of the system.
  - High flow has caused the header isolation valves, 21 and 22CA50 to trip closed.

30. Given the following conditions:

- Alarm OHA A-7, FIRE PROT FIRE, is received in the Unit 1 Control Room.
- 1RP5 Fire Panel Zone 59 light, CONTAINMENT PANEL 335, and the TROUBLE ALARM for that row are illuminated.
- NO other fire alarms are present.

Using the A-7 window section of S1.OP-AR.ZZ-0001, OVERHEAD ANNUNCIATORS WINDOW A, the Operator will:

- OPEN valve 1FP147, Fire Protection Containment Isolation.
- initiate Containment Ventilation Isolation.
- announce on the station PA "Attention all personnel, fire at Containment Panel 335, stay clear".
- announce on the station PA "Attention all personnel, disregard Unit 1 fire alarm".

## Senior Reactor Operator Examination

31. Given the following conditions:

- Unit 2 Control Room is being evacuated in accordance with S2.OP-AB.CR-0001, CONTROL ROOM EVACUATION.
- The reactor has been tripped.
- Three control rods indicate fully withdrawn.

Which of the following describes the required actions to initiate a Rapid Boration?

- a. Align charging through 2CV175, Rapid Borate Stop Valve, in accordance with 2-EOP-TRIP-2, REACTOR TRIP RESPONSE.
- b. Open CV175 from the Hot Shutdown panel and isolate control air to CV55, Charging Flow Control Valve, to allow maximum charging flow in accordance with S2.OP-AB.CR-001.
- c. Ensure a safety injection is initiated in accordance with 2-EOP-FRSM-1, RESPONSE TO NUCLEAR POWER GENERATION.
- d. Manually open 2CV175, and control charging flow through CV55, using the Manual hand operator IAW S2.OP-AB.CR-0001.

32. Salem Unit 1 has experienced a Large Break LOCA.

The following plant conditions are present:

- Containment pressure peaked at 24 psig, and is currently 18 psig.
- Containment Sump level is 65%.
- All CETs are between 820-860 degrees F.
- Subcooling is -40 degrees F.
- RVLIS full range reading is 11%.

When permitted by procedure rules of usage, which of the following procedures will be entered first from 1-EOP-TRIP-1?

- a. 1-EOP-FRCE-2, Response to High Containment Sump Level, Purple Path.
- b. 1-EOP-FRCE-1, Response to Excessive Containment Pressure, Red Path.
- c. 1-EOP-FRCC-2, Response to Degraded Core Cooling, Purple Path.
- d. 1-EOP-FRCC-1, Response to Inadequate Core Cooling, Red Path.

## Senior Reactor Operator Examination

33. Unit 2 is at 80% power when RMS channel 2R31, Letdown Line-Failed Fuel Process Rad Monitor starts a rising trend.

Which of the following describes how S2.OP-AB.RC-0002, HIGH ACTIVITY IN REACTOR COOLANT SYSTEM (RCS), will have the operators distinguish between a crud burst and failed fuel as the cause of the rising 2R31 indication?

- a. By requesting a Shift Chemistry Technician perform a radiological analysis of the RCS. A crud burst will show different concentrations of certain radionuclides than will failed fuel.
  - b. By monitoring 2R31. Fuel damage will cause the indication to increase at a higher rate than a crud burst.
  - c. By requesting Radiation Protection to survey the letdown pipe area in the Auxiliary building. Radiation levels will be higher due to failed fuel than from a crud burst.
  - d. By increasing letdown flow rate to 120 gpm. The 2R31 readings will lower if crud burst caused the rising trend but will NOT lower if failed fuel caused the rising trend.
34. Given the following conditions:

- Unit 2 is performing the actions of 2-EOP-TRIP-3, SAFETY INJECTION TERMINATION.
- SI is reset.
- SEC's are reset.
- All safeguards equipment has been stopped with the exception of 21 Charging Pump.

Subsequently a Loss of Offsite power occurs and the following conditions are present:

- Reactor Coolant System (RCS) pressure is 1660 psig and lowering.
- Pressurizer level is 11% and lowering.

Which of the following actions is required IAW 2-EOP-TRIP-3, SAFETY INJECTION TERMINATION?

- a. Allow Blackout Loading to complete, reset SEC's, and start ECCS pumps as necessary to maintain RCS inventory.
- b. Allow Blackout Loading to complete then align normal charging and letdown to maintain RCS inventory.
- c. Allow Blackout Loading to complete then manually reinitiate Safety Injection.
- d. Allow Blackout Loading with SI to complete then ensure that safeguards equipment is operating properly.

## Senior Reactor Operator Examination

35. Given the following conditions:

- The crew is performing 2-EOP-LOCA-2, POST LOCA COOLDOWN AND DEPRESSURIZATION.
- 21 Charging Pump has been stopped.
- Conditions are met for stopping one Safety Injection (SI) Pump.

Which of the following is the required pump to be stopped and why?

- a. 22 SI Pump to ensure ECCS injection flow if any single vital bus failure occurs.
  - b. 22 SI Pump to equalize Emergency Diesel Generator loading.
  - c. 21 SI Pump to ensure one full train of ECCS equipment remains in service for injection.
  - d. 21 SI Pump to ensure ECCS injection flow if any single vital bus failure occurs.
36. Which of the following Radiation Monitoring System channels in alarm identifies an indication that requires transition to 2-EOP-LOCA-6, LOCA OUTSIDE CONTAINMENT from 2-EOP-LOCA-1, LOSS OF COOLANT ACCIDENT?
- a. 2R1B-1, Unit 2 Control Room Intake Duct.
  - b. 2R15, Condenser Air Ejector.
  - c. 2R34, Mechanical Penetration Area 100 Ft. Elev.
  - d. 2R13A, 21-25 CFCU Service Water.

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37. Given the following conditions:

- Salem Unit 1 has experienced a large Main Steamline Break (MSLB) inside containment from 100% power.
- Safety Injection was manually initiated, with all components operating as expected.
- 11 AFP is C/T.
- 12 and 13 AFP's tripped after starting.
- RCS pressure is 1100 psig.
- All RCS Pps have been tripped.
- Containment pressure is 16 psig and rising.
- All Wide Range S/G levels are 35% and dropping.
- All S/G pressures are 425 psig and dropping.
- RCS Tc's have dropped from 540 deg to 440 degrees in 40 minutes.

Which of the following choices identifies the correct procedure to be entered and action to be taken upon transition out of 1-EOP-TRIP-1, REACTOR TRIP RESPONSE?

- a. 1-EOP-FRHS-1, RESPONSE TO LOSS OF SECONDARY HEAT SINK; initiate feed and bleed ONLY when S/G WR levels have dropped less than 32%.
- b. 1-EOP-FRHS-1, RESPONSE TO LOSS OF SECONDARY HEAT SINK; initiate feed and bleed immediately because S/G WR levels are less than 36%.
- c. 1-EOP-FRTS-1, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITIONS; shut all MS10's and steam dump valves to minimize cooldown.
- d. 1-EOP-FRTS-1, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITIONS; reset Safeguards Actuation and restore normal charging and letdown.

## Senior Reactor Operator Examination

38. Given the following conditions:

- Unit 2 tripped from 100% power due to a loss of all power.
- Operators entered 2-EOP-LOPA-1, LOSS OF ALL AC POWER.
- 23 AFP failed to start.
- After 30 minutes, operators have been successful in restoring power to 2B vital bus.
- 22 Auxiliary Feedwater Pump is in service supplying 21 and 22 Steam Generators.
- Due to a positioner failure on Power Operated Relief Valve 2PR1, the valve opened and will NOT close.
- Pressurizer level is at 89%.
- Reactor Coolant System Subcooling is <0 deg. F.
- There are 7 Core Exit Thermocouples (CET) between 710 and 720 deg. F.
- The remaining CET's are between 670 and 690 deg. F.
- RVLIS is indicating 65% and is stable.

Which of the following is the correct procedure transition to enter upon reaching the end of 2-EOP-LOPA-1?

- a. 2-EOP-LOCA-1, LOSS OF REACTOR COOLANT.
- b. 2-EOP-LOPA-2, LOSS OF ALL AC POWER RECOVERY/SI NOT REQUIRED.
- c. 2-EOP-FRCC-2, RESPONSE TO DEGRADED CORE COOLING.
- d. 2-EOP-FRCC-1, RESPONSE TO INADEQUATE CORE COOLING.

39. Given the following conditions:

- Salem Unit 2 is responding to a Saturated Core Cooling condition IAW 2-EOP-FRCC-3, due to a loss of subcooling following a Reactor Trip and Safety Injection.
- RCS pressure is 1200 psig and stable.

Under these conditions, which of the following choices identifies that ECCS flow is injecting to the RCS?

- a. 21 SI pump flow meter reads 60 gpm.
- b. RHR pump discharge flow reads 500 gpm on 21SJ49 flow meter.
- c. Charging flow reads 125 gpm on SI systems charging flow meter.
- d. All SI Accumulator pressures dropping slowly.

## Senior Reactor Operator Examination

40. Given the following conditions:

- Unit 2 was operating at 100% power.
- A loss of offsite power caused a reactor trip.

Ten minutes after the trip the following conditions exist:

- 21 S/G Pressure - 1010 psig and stable.
- 22 S/G Pressure - 1005 psig and stable.
- 23 S/G Pressure - 1015 psig and stable.
- 24 S/G Pressure - 1010 psig and stable.
- All Reactor Coolant Pumps are OFF.
- Reactor Coolant System pressure is 2230 psig and stable.
- That is approximately 575 deg F in all loops and lowering slowly.
- Core Exit thermocouples indicate approximately 580 deg F.
- Tcold is approximately 555 deg F in all loops and stable.

Based on the above conditions, what is the status of RCS cooling in accordance with 2-EOP-TRIP 2, REACTOR TRIP RESPONSE, and what action is required?

- Natural Circulation exists. The steam dumps are to be used to maintain heat removal.
- Natural Circulation does NOT exist. It can be established by opening the steam dumps.
- Natural Circulation exists. The MS10's are to be used to maintain heat removal.
- Natural Circulation does NOT exist. It can be established by opening the MS10's.

41. Which of the following actions are directed by 2-EOP-LOCA-5, LOSS OF EMERGENCY COOLANT RECIRCULATION?

- Provide guidance on aligning the Safety Injection Pump suction directly to the Containment Sump.
  - Terminate Cold Leg Recirculation and restore Charging and Letdown.
  - Cooldown and depressurize the Reactor Coolant System to allow Residual Heat Removal to be put into service.
  - Provide methods to make-up to the Refueling Water Storage Tank.
- 1, 2 and 3.
  - 2 and 4 ONLY.
  - 3 and 4 ONLY.
  - 2, 3 and 4.

## Senior Reactor Operator Examination

42. Salem Unit 2 has experienced a Main Steam Line Break inside containment. All attempts to initiate a Main Steam Line Isolation from the Control Room have failed. All MSIV's remain open.

The following conditions are present:

- Containment pressure is 22 psig and lowering.
- RCS pressure is 1400 psig and dropping.
- 21-24 S/G WR levels are 48% and dropping.
- Total Aux Feedwater flow is 24E4 lbm/hr.

Based on these conditions, what will be the earliest point to lower Aux Feedwater Flow to < 22E4 lbm/hr, and why will Aux Feed flow be lowered?

- a. When Narrow Range level in at least 1 S/G rises above 9%, aux feed flow can be reduced to prevent overfilling S/G's.
  - b. Aux feedwater flow will be directed to be reduced to NO less than 1.0E4 lbm/hr in 2-EOP-LOSC-2 to minimize cooldown and prevent Thermal Shock to S/G components.
  - c. 2-EOP-FRCE-1 directs Aux feedwater flow to be minimized, and maintained > 1.0E4 lbm/hr to keep S/G components wet, to minimize any Thermal Shock if feedwater flow is increased.
  - d. When Narrow Range level in at least 1 S/G rises above 9%, aux feed flow can be reduced to prevent excessive cooldown of the RCS.
43. While performing Emergency Operating Procedures, a step is encountered which states "Control PZR level between 25% (33% adverse) and 77% (74% adverse) by adjusting charging and letdown." Containment Pressure has risen to 5.5 psig and then lowered to 3.3 psig. Containment radiation levels have risen to 3.0E5 R/hr and lowered to 6.7E4 R/hr.

Which of the following PZR levels are required to be maintained?

- a. Minimum of 25%; maximum of 77%.
- b. Minimum of 33%; maximum of 74%.
- c. As directed by the Shift Technical Advisor (STA).
- d. As directed by the Operations Support Center (OSC).

## Senior Reactor Operator Examination

44. Given the following conditions:

- Salem Unit 1 is operating at 100% power.
- 1E 460 volt bus is deenergized following a trip of its feed breaker.
- Tagging is in progress to allow troubleshooting of 1E 460 volt bus.

The operator mistakenly opens the 1F 460 volt bus feed breaker, deenergizing the 1F 460 volt bus.

Which of the following describes a consequence, if any, of this action? Salem Unit 1 Reactor...

- a. will trip due to the loss of BOTH Rod Drive Motor Generators.
  - b. will trip due to the loss of a SINGLE Rod Drive Motor Generator.
  - c. will NOT trip because ONE Rod Drive Motor Generator is sufficient to maintain power to the Rod Control system.
  - d. will NOT trip because BOTH Rod Drive Motor Generators are still in service.
45. During a Design Basis Accident (DBA) LOCA, the post-accident leakage rate from containment is limited to a safe value by.....
- a. maintaining a negative pressure in containment prior to the accident.
  - b. maintaining the containment IAW 10CFR50 Appx. A, General Design Criteria for Nuclear Power Plants.
  - c. establishing the Exclusion Area Boundary (EAB) distance from the containment.
  - d. operation of the Iodine Removal Units (IRU's).

## Senior Reactor Operator Examination

46. Given the following conditions:

- Salem Unit 2 is operating at 100% power when a reactor trip occurs coincident with a loss of off-site power.
- Main steam dump control is in Tave Control - AUTO.
- Core burnup is 10,000 MWD/MTU.

Which of the following identifies the method of circulation through the reactor core 20 minutes after the trip?

- Safety injection flow into the cold legs will circulate up through the core.
- Reflux cooling flow in the RCS hot leg to the steam generator.
- Charging flow to loop 23 cold leg combined with letdown flow.
- Natural circulation flow will replace RCP forced flow circulation through the core.

47. The plant is operating at 100% power with all control systems in AUTO. The following parameters are noted:

- Letdown Hx outlet flow (FI-132) 75 gpm.
- Charging Header flow (FI-121) 87 gpm.
- Total seal injection flow (FI-142 -FI -45) 33 gpm.

What is the initial effect on total seal injection flow if controlling Pzr level channel LT-459 fails LOW?

Total seal injection flow will...

- lower to 0 gpm.
- lower to approximately 20 gpm.
- remain approximately 33 gpm.
- rise to greater than 33 gpm.

## Senior Reactor Operator Examination

48. Given the following conditions:

- Salem Unit 1 is in Mode 3, HOT STANDBY, @ NOP, NOT.
- A cooldown caused by a Steam Dump malfunction caused pressurizer level to drop to 12%.
- Pressurizer pressure fell to 2185 psig before the Steam Dumps were isolated.
- Pressurizer level was quickly recovered to 22%, and pressurizer heaters were returned to AUTO.

Which of the following identifies the reason why the pressure recovery from 2185 psig takes a longer time for this event than it does if a PORV fails open and the PORV block valve was closed at 2185 psig?

- a. When the PORV opens, only the steam space needs to be reheated to raise pressure.
- b. The pressurizer heaters are less effective since they had tripped and cooled off on low PZR level.
- c. Pressure reduction will be faster for the open PORV.
- d. Subcooled water surge during refill reduced the Pressurizer liquid space temperature.

49. Given the following conditions:

- Salem Unit 2 is at 100% power.
- Core Burnup is 11,000 MWD/MTU.
- Rod Control is in MANUAL.
- All other plant controls are in their normal configuration.
- AUTO makeup initiated to the VCT.
- The boron addition rate is set 5 gpm higher than required for present RCS conditions.

Assuming NO operator action, what will be the effect on the following parameters 15 minutes after the auto makeup is complete?

- Reactor Power
  - RCS Tave
  - Main Generator Electrical Output
- a. Higher, higher, higher.
  - b. Lower, lower, higher
  - c. Higher, higher, lower.
  - d. Lower, lower, lower.

## Senior Reactor Operator Examination

50. Given the following conditions:

- Salem Unit 2 has experienced a Large Break LOCA.
- 2-EOP-LOCA-3, "TRANSFER TO COLD LEG RECIRCULATION" is complete with NO abnormalities encountered.
- Operators are currently at step 26, "Preparation for Hot Leg Recirc", of 2-EOP-LOCA-1, "LOSS OF REACTOR COOLANT".
- Off-site power is supplying all 4KV Vital busses.

If BOTH RHR pumps are operating, what would be the effect if 22 RHR Pp were to trip?

- a. 22 Containment Spray Pump would lose NPSH.
  - b. Containment Spray flow would drop to zero.
  - c. 21 RHR pump flow would increase to runout conditions.
  - d. 21 and 22 SI pumps would begin to cavitate.
51. During performance of S1.OP-DL.ZZ-0003, Control Room Logs Modes 1-4, the operator notices 12 SJ Accumulator level is at the log limit of 51%, with corresponding Accumulator pressure at 615 psig. How will the operator restore 12 Accumulator level and pressure to proper values?
- a. Raise Accumulator pressure first, then raise level.
  - b. Raise Accumulator level first, then raise pressure.
  - c. Raise Accumulator level ONLY.
  - d. Lower Accumulator pressure ONLY.

## Senior Reactor Operator Examination

52. Given the following conditions:

- Salem Unit 2 is in Mode 4.
- 22 and 23 CC pumps are in service.
- 21 CC pump is C/T for repair, and has been INOPERABLE for 24 hours.

22 CC pump is declared INOPERABLE due to the discovery of an unqualified bearing being installed during the last maintenance window. It is estimated that it will be at least 3 days before a new bearing will arrive on site for 22 CC pump.

Which of the following actions is required to be performed?

- a. Enter Tech Spec 3.0.3, within the next hour commence actions to ensure Mode 5 entry in the next 24 hours.
- b. IMMEDIATELY commence a RCS cooldown to ensure Mode 5 entry in the next 6 hours.
- c. Commence a cooldown to Mode 5 within 1 hour to ensure Mode 5 entry in the next 30 hours.
- d. If 21 CC pump is NOT returned to OPERABLE in the next 24 hours, commence a cooldown to ensure Mode 5 entry in the next 24 hours.

53. A series of problems resulted in a reactor trip with RCS pressure peaking at 2785 psig a few minutes after the trip.

Which of the following describes the required action (IAW Tech Specs), and the bases for the action for this situation?

- a. Reduce pressure to less than limit within 1 hour to prevent release of radionuclides in reactor coolant system from reaching containment environment.
- b. Reduce pressure to less than limit within 5 minutes to prevent overpressurization of Pressurizer Relief Tank (PRT).
- c. Reduce pressure to less than limit within 1 hour to prevent overpressurization of Pressurizer Relief Tank (PRT).
- d. Reduce pressure to less than limit within 5 minutes to prevent release of radionuclides in reactor coolant system from reaching containment environment.

## Senior Reactor Operator Examination

54. Given the following conditions:

- Salem Unit 1 is currently in MODE 5.
- RCS temperature is 140° F.
- RCS pressure is 150 psig.
- Pressurizer level is being monitored by 2LI459A, PZR LEVEL IND CH I on 2CC2, instead of 2LI462, 2 REACT COOL PZR LEVEL COLD CALIBRATION.

Which of the following identifies the correct choices to fill in the blanks of the statement below?

The pressurizer level instrument 2LI459A indicates \_\_\_\_\_ than actual pressurizer level because, compared to the calibration conditions, there has been a significant change in the density of the fluid in the \_\_\_\_\_. Charging flow must be \_\_\_\_\_ to restore proper level.

- lower; pressurizer; lowered.
- lower; reference leg; lowered.
- higher; pressurizer; raised.
- higher; reference leg; raised.

55. Given the following conditions:

- Unit 1 is at 100% power.
- Pressurizer Level Channel 1 is selected for control.
- Pressurizer Level Channel 2 is selected for alarm.
- Pressurizer Level Channel 2 fails LOW.

Which of the following completes the description of the immediate plant response assuming NO operator intervention?

Charging flow...

- does NOT change, letdown isolates, and ALL Pressurizer Heaters shut off.
- does NOT change, letdown isolation does NOT occur, and ONLY Backup Pressurizer Heaters shut off.
- will rise to maximum, letdown isolates, and ONLY Backup Pressurizer Heaters shut off.
- will rise to maximum, letdown isolation does NOT occur, and ALL Pressurizer Heaters shut off.

## Senior Reactor Operator Examination

56. Which of the following states how the SSPS 48VDC and 15VDC power supplies are provided from the Vital Instrument Busses (VIB's) to ensure that a common power supply failure does NOT result in a reactor trip?

Train A 48VDC and 15VDC supplies are powered from...

- 2A and 2B VIB's; Train B from 2C and 2D VIB's.
- 2B and 2C VIB's; Train B from 2B and 2D VIB's.
- 2A and 2D VIB's; Train B from 2B and 2C VIB's.
- 2A and 2B VIB's; Train B from 2A and 2C VIB's.

57. Given the following conditions:

- Salem Unit 2 has experienced a Large-Break Loss of Coolant Accident (LOCA).
- RCS pressure is 40 psig.
- All ECCS pumps are running in Injection mode.
- RWST Level is 14.9'.

IAW 2-EOP-LOCA-3, TRANSFER TO COLD LEG RECIRCULATION, which of the following conditions will prevent transferring to Cold Leg Recirc?

- RWST level less than 15.2'.
- Containment sump level of 50%.
- Two (2) Service Water pumps in service.
- One (1) Component Cooling Water pump in service.

58. An entry condition for S2.OP-AB.ROD-0004, ROD POSITION INDICATOR FAILURE, is "One or more Group Demand Counters (GDC) indicating +/-2 steps from Slave Cyclor output".

Which of the following describes how an operator will determine this condition exists?

- OHA E-24 ROD DEV OR SEQ alarm actuated.
- Plant Computer point Rod Position Deviation is displayed.
- Compare the P/A Converter indication to GDC indication.
- Deviations can only be determined by voltmeter readings from the Rod Position Indication cabinets.

## Senior Reactor Operator Examination

59. Which of the following identifies the parameters that must be satisfied in order to transition from 2-EOP-FRSM-1, RESPONSE TO NUCLEAR POWER GENERATION?
- NO more than two control rods failed to insert.
  - The Cold Shutdown Shutdown Margin value is achieved.
  - Either Reactor Trip Breaker and its associated Bypass Trip Breaker is open.
  - Three Power Range Nuclear Instrumentation channels less than 5% and Intermediate Range Start Up Rate negative.
60. Intermediate Range (IR) compensating voltage fails LOW on one of the IR detectors. The Reactor subsequently trips due to other causes, but the IR current on the failed detector does NOT go below 5.0E-5 amps.

Which of the following describes how the source range instruments will be energized as reactor power DECREASES below 7.0E-11 amps?

- P-6 will be unblocked and the source range detectors will automatically unblock.
  - The failed IR detector will be bypassed allowing the source range detectors to energize.
  - The source range manual reset pushbuttons will be used to manually reenergize the source range detectors.
  - One source range detector will automatically reenergize and the other will be manually reenergized using the reset pushbutton.
61. Which of the following identifies the parameter that sets the High Steam Flow Safety Injection setpoint, and the logic for the SI actuation?
- Main Turbine first stage pressure instruments PT-505 and PT-506; 1/2 channels high steam flow on 1/4 main steam lines coincident with low steam line pressure or LO-LO Tave.
  - Main Turbine first stage pressure instruments PT-505 and PT-506; 1/2 channels high steam flow on 2/4 main steam lines coincident with low steam line pressure or LO-LO Tave.
  - Main steam header pressure instrument PT-507; 1/2 channels high steam flow on 2/4 main steam lines coincident with low steam line pressure or LO-LO Tave.
  - Main steam header pressure instrument PT-507; 1/2 channels high steam flow on 1/4 main steam lines coincident with low steam line pressure or LO-LO Tave.

## Senior Reactor Operator Examination

62. Given the following conditions:

- Salem Unit 2 is operating at 100% power.
- 21 Containment Spray pump has been declared INOPERABLE due to an oil leak.
- 24 and 25 CFCU's are INOPERABLE and isolated due to 22 SW Accumulator being INOPERABLE.
- All other ECCS equipment is OPERABLE.

With the plant in this configuration, which of the following describes if the plant being operated within the Design Basis for containment cooling, and the BASES for your answer?

- a. No, two (2) Containment Spray pumps and five (5) CFCU's are required to be OPERABLE to meet the design basis for containment cooling.
- b. No, one containment Spray pump and four (4) CFCU's are required to be OPERABLE to meet the design basis for containment cooling.
- c. Yes, a single OPERABLE Containment Spray pump meets the design basis for containment cooling.
- d. Yes, one (1) OPERABLE Containment Spray pump combined with three (3) OPERABLE CFCU's meets the design basis for containment cooling.

63. Which of the following choices identifies a condition that will prevent starting of 21 Hydrogen Recombiner?

- a. OHA C-23, CNTMT H2 LVL HI annunciator in alarm.
- b. Hot Shutdown Panel 213, 21 H2 Recombiner Control Switch in OFF.
- c. POWER OUT SWITCH red light illuminated.
- d. 21 Recombiner Control Switch on 2RP5 in OFF.

## Senior Reactor Operator Examination

64. Given the following conditions:

- Salem Unit 2 is in Mode 5.
- Containment purge is in service.

2R12A CONTAINMENT SMPLG PRCS MONITOR NOBLE GAS Monitor goes into alarm. Concurrently, Radiation Protection personnel call the control room to inform them of elevated and rising radiation levels in containment, and recommends evacuating ALL personnel from containment.

Which of the following choices describes how the Containment Evacuation Alarm is activated?

- The Containment Evacuation Alarm automatically alarmed upon the Containment Ventilation Isolation (CVI) signal.
- Manually sound the Containment Evacuation Alarm at Containment Air Particulate Detector skid.
- Manually sound the Containment Evacuation Alarm at 2RP2.
- The Containment Evacuation Alarm automatically alarmed upon the 2R12A high radiation signal.

65. Given the following condition:

- 22 Spent Fuel Pool (SFP) Pump is running providing SFP cooling.

Which of the following describes when 22 SFP Pump will lose suction if a leak develops in the pump suction line?

- When the spent fuel pool lowers to four feet below normal.
- Any running pump trips when SFP LVL LO alarm (OHA C-35) actuates.
- When the anti-siphon hole in the return pipe uncovers.
- The fuel will uncover before 22 SFP loses suction on a suction line break.

## Senior Reactor Operator Examination

66. Given the following conditions:

- Salem Unit 2 is in Mode 6.
- A fuel assembly has dropped onto the spent fuel racks as it was being transported from the upender to its destination in the spent fuel pit.
- The dropped fuel assembly has visible damage, and bubbles are rising from the assembly.
- Radiation levels in the Fuel Handling Building have risen to 1.2 R/hr.

Which of the following identifies an action which must be performed?

- Enter S2.OP-AB.FUEL-0002, LOSS OF REFUELING CAVITY OR SPENT FUEL LEVEL, start 21 and 22 Iodine Removal Units.
- Enter S2.OP-AB.FUEL-0001, FUEL HANDLING INCIDENT, press HEPA 22 PLUS CHAR pushbutton on Fuel Handling Building Ventilation.
- Enter S2.OP-AB.FUEL-0002, LOSS OF REFUELING CAVITY OR SPENT FUEL LEVEL, sound the High Radiation Alert alarm.
- Enter S2.OP-AB.FUEL-0001, FUEL HANDLING INCIDENT, initiate makeup to the Spent Fuel Pit from the RWST.

67. Given the following conditions:

- Salem Unit 2 Reactor power - 25%, rising.
- RCS Tave - 549 °F, lowering.
- Pressurizer pressure - 2150 psig, lowering.
- Pressurizer level - 22%, lowering.
- Turbine load is stable.
- S/G pressures are - 950 psig (21S/G); 890 psig (22S/G); 950 psig (23S/G); 950 psig (24S/G), all lowering.
- MS10s, atmospheric relief valves, indicate closed.
- Steam Dumps indicate closed.
- Containment temperature and pressure are normal.
- Sound heard in the control room indicates that a Main Steam Safety Valve may be open.

Which of the following describes the action to be taken IAW S2.OP-AB.STM-0001 for the above conditions?

- Immediately close 22MS167 and initiate a rapid unit shutdown.
- Immediately initiate Main Steamline Isolation (22 loop only); initiate a reactor trip; initiate MANUAL SI.
- Trip the reactor; close 22MS167; initiate MANUAL SI (if necessary).
- Trip the reactor; initiate Main Steamline Isolation (all loops); initiate MANUAL SI.

## Senior Reactor Operator Examination

68. Given the following conditions:

- Salem Unit 2 is operating at 12% power.
- Control Bank D rods are at 152 steps withdrawn.
- Main turbine is rolling up to normal speed.
- Main steam dumps are set for 950 psig, in MS PRESS CONTROL-AUTO.

If Main steam dump AUTO setpoint is adjusted down to 940 psig, what effect will this have on Tave and Reactor power assuming NO other operator action?

- Tave will lower, Rx power will lower.
- Tave will lower, Rx power will rise.
- Tave will rise, Rx power will lower.
- Tave will rise, Rx power will rise.

69. Given the following conditions:

- Salem Unit 2 is at 30% power.
- Main Turbine SETTER & REFERENCE are indicating 36.
- IMP IN is selected.
- Main Turbine Valve Position Limiter is set at 100% power value.

The turbine impulse pressure channel input the EHC instantaneously fails to zero.

In accordance with S2.OP-AR.ZZ-0013, CONTROL CONSOLE 2CC3 ALARM RESPONSE, which of the following describes how turbine load is affected and how the EHC controls will respond?

- Increases until the difference between REFERENCE and the input signal exceeds the setpoint, then operator ensures EHC transfers to MANUAL control.
- Remains constant. When the difference between REFERENCE and the input signal exceeds the setpoint, then operator ensures EHC transfers to IMP OUT.
- Increases until the difference between REFERENCE and the input signal exceeds the setpoint. An alarm then alerts the operator to select EHC IMP OUT.
- Remains constant. When the difference between REFERENCE and the input signal exceeds the setpoint, an alarm then alerts the operator to select EHC MANUAL control.

## Senior Reactor Operator Examination

70. Given the following conditions:

- Unit 2 is at 100% power with all major control systems in AUTO.
- 22 Heater Drain Pump is OOS for breaker replacement.

Using the attached documents, which of the following specifies the required action if 21 Condensate Pump trips? Assume SGFP suction pressure remains above the trip setpoint.

- Reduce reactor power to less than or equal to 75% at less than or equal to 5% / minute.
- Reduce reactor power to less than or equal to 80% at less than or equal to 5% / minute.
- Immediately reduce reactor power to 75% at 15% / minute.
- Immediately reduce reactor power to 80% at 15% / minute.

71. Given the following conditions:

- Salem Unit 2 is operating at 85 % power.
- 21 Condensate pump C/T.
- PT-506, Turbine Impulse Pressure Channel II is O/S.
- Main condenser backpressure is 2.1"Hg.

22 SGFP speed starts acting erratically, and quickly degrades to the point where the crew manually trips 22 SGFP.

What other action is IMMEDIATELY required of the crew?

- Trip the Reactor, and GO TO 2-EOP-TRIP-1.
- Verify Automatic Turbine Runback has or is occurring.
- Ensure Rod Bank Selector Switch is in AUTO.
- Initiate Main Turbine runback at less than or equal to 15%/ minute to less than 352 psig turbine first stage pressure.

## Senior Reactor Operator Examination

72. Given the following conditions:

- Salem Unit 1 is operating at 85.0 % power.
- During a manual bus swap prior to clearing and tagging a Station Power Transformer, the 1A 4KV vital bus is inadvertently deenergized, and the SEC loads 1A bus in Mode 2\*.
- All other electrical bus transfers expected to occur from the loss of 1A 4KV vital bus are successful.

With NO operator action, which of the following identifies the plant condition 5 minutes after the initial loss of 1A 4KV vital bus?

- a. Reactor power is > 85.0%.
- b. The Reactor is tripped.
- c. The Main Turbine will have run back to 60%.
- d. Reactor power has remained at 85.0%.

73. The Auxiliary Feed System is designed so that a minimum of \_\_\_\_\_ AFW pump(s) can sufficiently remove decay heat and cooldown the RCS at \_\_\_\_\_ deg/hr following a Reactor trip from 100% power.

- a. 1; 50.
- b. 2; 50.
- c. 1; 100.
- d. 2; 100.

74. 125 VDC breaker 2BDC1AX12, 2G 4KV Bus Control Power Supply (Reg) tripped due to a breaker malfunction.

Which of the following describes the impact this malfunction will have?

- a. Only motor amperage indication will be lost for 24 RCP.
- b. 24 RCP will trip immediately.
- c. 24 RCP will remain running but will NOT automatically trip if required.
- d. Emergency control power from the 2A 125 VDC bus will automatically be provided.

## Senior Reactor Operator Examination

75. Given the following conditions:

- Unit 1 is operating at 100% power.
- 1A EDG starting air receiver 11A is C/T.
- 11A EDG starting air compressor is C/T.
- A Loss of Off-Site Power occurs.
- 1A EDG starts and trips for an unknown reason.
- 11B starting air compressor will NOT run.

There is sufficient air remaining for how many more engine starts?

- a. 2
- b. 3
- c. 4
- d. 5

76. Given the following conditions:

- Salem Unit 2 is operating at 100% power.
- 2C EDG is declared INOPERABLE at 0700 on May 1st.

Which of the following describes the actions required to be taken IAW Tech Specs, assuming 2C EDG remains INOPERABLE, and NO other equipment is INOPERABLE?

- a. Restore 2C EDG to OPERABLE status by 0700 on May 4th, or be in HOT STANDBY by 1300 on May 4th.
- b. Perform S2.OP-ST.500-0001, ELECTRICAL POWER SYSTEM AC SOURCE ALIGNMENT within 1 hour and once per 24 hours after that.
- c. Within 4 hours, declare 22 CS pp, 22 CVCS pp, and 22 SI pp INOPERABLE, then enter TSAS 3.5.2 for 1 INOPERABLE ECCS subsystem.
- d. Be in HOT STANDBY by 1700 May 1st, and in COLD SHUTDOWN by 2300 on May 1st.

## Senior Reactor Operator Examination

77. Given the following conditions:

- 1 WMHUT is in recirc, a sample has been drawn and is in the process of being analyzed.
- The RWO mistakenly places 1 WMHUT in service.
- One hour later, the RWO realizes his/her error, and returns 1 WMHUT to recirc.

What effect, if any, will this have on the release preparations for 1 WMHUT?

- a. A new sample must be drawn, with NO minimum required recirculation.
- b. The release preparations may continue as long as volume added to tank does NOT exceed 1% of total tank volume ONLY.
- c. The release preparations may continue as long as volume added to tank does NOT exceed 1% of total tank volume AND double verification of sample analysis is performed.
- d. The tank will require further recirculation and resampling prior to release.

78. Given the following conditions:

- A Unit 2 Pressurizer Safety Valve has been leaking.
- Procedural actions being taken to prevent overpressurizing the PRT are generating liquid waste.

Assuming the containment isolation valves are open, which of the following describes the flow path of the water after the operator opens 2PR14, PRT Drain valve?

- a. The PRT gravity drains to the in-service CVC HUT.
- b. The PRT gravity drains to the RCDT. The RCDT pumps automatically cycle on RCDT level to the in-service CVC HUT.
- c. The RCDT Pump in AUTO cycles to control PRT level whenever 2PR14 is open.
- d. The RCDT pumps start on interlock with 2PR14, directing flow to the in-service CVC HUT.

## Senior Reactor Operator Examination

79. While performing a review of 21 GDT release paperwork, S2.OP-SO.WG-0008 the CRS notices that the calculated maximum release rate is 28 scfm.

Which of the following statements is correct regarding the GDT release?

- a. The GDT release CANNOT be initiated because release flow rates < 32 scfm will result in off-site dose exceeding 500 mrem/yr total body.
  - b. The GDT release CANNOT be initiated because a minimum calculated flow rate of 32 scfm is required.
  - c. The GDT release can be initiated if a double, independent verification of the release rate has been performed.
  - d. The GDT release can be initiated with NO abnormal restrictions.
80. Which of the following identifies the Radioactive Gaseous Waste Gas Decay Tank (GDT) release path?
- a. To the Fuel Handling Building exhaust ventilation header, then to the Plant Vent release point at the top of containment.
  - b. To the Fuel Handling Building exhaust ventilation header, then to the Plant Vent release point at the top of the Auxiliary Building.
  - c. To the Auxiliary Building exhaust ventilation header to the Plant Vent release point at the top of containment.
  - d. To the Auxiliary Building exhaust ventilation header to the Plant Vent release point at the top of the Auxiliary Building.
81. Which of the following lists the automatic functions performed by the New Fuel Storage FHB 1(2)R9 Area Monitors?
- a. 1(2)R9 diverts the ventilation for the FHB through charcoal filters, is interlocked to start FHB Exhaust Fans, activates radiation warning lights outside the building and emergency warning evacuation alarm inside the building.
  - b. 2R9 and 1R9 have Unit differences. An interlock with the Unit 1 FHB Exhaust Fans exists on the 1R9 monitors. Unit 2 2R9 monitors have NO automatic function.
  - c. 1(2)R9 activates radiation warning lights and emergency evacuation alarms inside the FHB AND Containment when limits are reached.
  - d. 2R9 is interlocked with the FHB Exhaust Fans to prevent starting the fans if a high radiation condition exists. Unit 1 1R9 monitors have NO automatic functions.

## Senior Reactor Operator Examination

82. Given the following conditions:

- A defective fire protection wet head fusible leak in the Fire Pump House has caused both Diesel driven fire pumps and their associated Jockey pump to become INOPERABLE.
- Fire protection water header pressure has dropped to ~ 0 psig.
- The fire protection cross-tie valve to Hope Creek has NOT been opened.

Which of the following choices identifies a consequence of these events on other fire suppression system capabilities?

- Fire detection capabilities outside the Fire Pump House will become degraded, but OPERABLE.
  - ALL fire suppression capability to the DFOST Room is unavailable.
  - ONLY dry head fire suppression sprinkler systems will remain available and OPERABLE.
  - Salem Unit 3 Foam suppression capability is unavailable.
83. Which of the following Containment Personnel Airlock conditions must be met to ensure containment integrity is maintained in Modes 1-4?
- Inner Door is stuck open; Outer door OPERABLE.
  - Inner Door has broken seal, closed and locked; Outer Door OPERABLE.
  - Inner Door OPERABLE, closed, and locked; Outer Door has a broken seal.
  - Inner Door OPERABLE; Outer Door has a broken seal.

84. Given the following conditions:

- Unit 2 is in MODE 3.
- Both Reactor Trip Breakers (RTB) are closed for I&C testing.
- All Rod Drive MG (RDMG) Set breakers are open.
- 21 and 23 Reactor Coolant Pumps (RCP) are operating.
- Electrical Maintenance is scheduled to test 21 RDMG.

Which of the following describes the required conditions prior to starting 21 RDMG?

- 22 AND 24 RCP must be started before closing 21 RDMG set breakers.
- 21 AND 23 RCP's must remain in operation while 21 RDMG set breakers are closed.
- 21 OR 23 RCP must remain in operation while 21 RDMG set breakers are closed.
- Either 22 OR 24 RCP must be started prior to closing 21 RDMG set breakers.

## Senior Reactor Operator Examination

85. A determination has been made that a compensatory reading must be taken on a normally logged parameter due to a safety related piece of equipment being out of service in Mode 1.

Which of the following is the requirement for the normal log reading while the compensatory reading requirement is in effect?

- a. Normal logging requirements are suspended.
  - b. Normal logging requirements remain in effect.
  - c. Normal logging requirements are suspended provided the compensatory readings are verified by the STA.
  - d. Normal logging requirements are suspended provided the compensatory readings are verified by a second RO.
86. During steady state 100% power operation, you are performing a "Plant Computer Online Calorimetric Validation" in accordance with Attachment 5 of S2.OP-IO.ZZ-0004, POWER OPERATION.

The computer points for Steam Generator (S/G) Blowdown are all entered at 40K lbm/hr. Actual blowdown for 22 S/G is 42K lbm/hr, all other S/G's are at 40K lbm/hr. All other parameters are SAT.

Which of the following is the correct response to these conditions?

- a. Enter a value of 42K lbm/hr for 22 S/G Blowdown and insure the online calorimetric remains below 100%.
- b. Declare the online calorimetric SAT since the entered value for 22 S/G is less than the actual blowdown.
- c. Declare the online calorimetric UNSAT AND perform a confirmatory calorimetric in accordance with SC.RE-ST.ZZ-0001.
- d. Declare the online calorimetric UNSAT AND lower 22 S/G Blowdown Flow to  $\leq$  40K lbm/hr.

## Senior Reactor Operator Examination

87. Unit 2 is at 100% power when a low pressure feedwater heater string is automatically bypassed.

In response to these conditions, which of the following is correct concerning any Operator actions taken?

- a. CRS approval is required prior to reducing load.
  - b. CRS approval is NOT required prior to reducing load.
  - c. The CRS must be present at the controls for a power change greater than 5%.
  - d. The CRS must verify all boration and dilution calculations prior to any power changes.
88. During a plant heatup from Cold Shutdown in accordance with S2.OP-IO.ZZ-0002, COLD SHUTDOWN TO HOT STANDBY, the 21thru 24SJ54 Accumulator outlet valves are opened. Once the valves are fully opened how will the control power be aligned and why?
- a. Left in the ON position and C/T to prevent a single failure from rendering the accumulator INOPERABLE.
  - b. Placed in the OFF position and C/T to prevent the valve from closing on a spurious actuation signal.
  - c. Placed in the OFF position with the 2RP4 Lockout Switch in Valve Operable to allow safeguards actuation of the valve.
  - d. Left in the ON position with the 2RP4 Lockout Switch in Lockout to prevent the valve from closing on a spurious actuation signal.
89. Which of the following On-The-Spot-Change (OTSC) requests could the OS/CRS sign for approval in accordance with NC.NA-AP.ZZ-0001, NUCLEAR PROCEDURE SYSTEM?
- a. Change of a test gauge to a different type of gauge which has the identical range and accuracy.
  - b. Change a QA Inspection Hold Point to a QA Inspection Notification Point.
  - c. Change a drain path for a section of piping which could cause an increase in general radiation levels.
  - d. Change to the acceptance criteria for 23 Auxiliary Feedwater Pump overspeed test.

## Senior Reactor Operator Examination

90. Given the following conditions:

- A normally scheduled surveillance test run of 1B EDG is in progress IAW S1.OP-ST.DG-0002.
- SC.OP-PT.DG-0001, Diesel Generator Manual Barring has been completed SAT.

During the test, at what point has/will 1B EDG be declared OPERABLE?

- a. When the 1B EDG barring procedure was complete with second verification.
  - b. When the 1B EDG Lockout Switch (LOSW) is placed in the In-Service position.
  - c. When 1B EDG acceleration, voltage, and frequency meet Acceptance Criteria of S1.OP-ST.DG-0002, and output breaker is shut.
  - d. When S1.OP-ST.DG-0002 is complete, and ALL Acceptance Criteria are met.
91. Which of the following describes the primary reason for maintaining Refueling Cavity water level greater than 23 feet (127'1 1/2" elevation) over the top of the reactor pressure vessel flange with the reactor head removed?
- a. Sufficient water volume is available to provide time for the operator to recognize the indications of a dilution accident before Keff can exceed 95% deltak/k
  - b. Sufficient water depth is available to provide adequate time to implement procedures for cooling the core, in the event that RHR flow is lost
  - c. Sufficient water depth is available to remove 99% of the assumed 10% iodine gap activity released from the rupture of an irradiated fuel assembly
  - d. Sufficient water volume is maintained above the top of the fuel assembly during movement to ensure that the radiation levels at the operating elevation for fuel handling equipment remain less than 5 mR/hr
92. Which of the following parameter limits is established to ensure that radiation releases will remain within the limits of 10CFR20?
- a. Liquid Waste discharge activity.
  - b. Primary system activity.
  - c. Secondary system activity.
  - d. Primary to secondary leakage.

## Senior Reactor Operator Examination

93. During a Unit 2 shutdown a decision has been made to enter the containment to inspect an INOPERABLE component.  
The Unit is being shutdown at 10% per hour.

Whose specific approval is required to enter containment under these conditions?

- a. Nuclear Technical Supervisor (ALARA).
  - b. Radiation Protection Manager.
  - c. Vice President-Nuclear.
  - d. Operations Manager - Salem.
94. Sluicing operations are in progress for transferring spent resins from the Spent Resin Storage Tank to a High Integrity Container using procedure S2.OP-SO.WL-0007, SLUICING RESINS TO A HIGH INTEGRITY CONTAINER.

The Nuclear Equipment Operator reports that the remote dose rate monitor is reading 22R/hr.

Which of the following is the correct response to these conditions?

- a. Stop the sluicing operations and get Radiation Protection approval before continuing.
  - b. Continue sluicing, radiation levels are within the capacity of the High Integrity Container.
  - c. Stop the sluicing operations and get Operations Shift Manager approval before continuing.
  - d. Continue sluicing while the Duratek Technician raises the Dewatering Pump flow rate.
95. When performing a 13 Waste Gas Decay Tank Release with the 1R41A INOPERABLE, which of the following is NOT required IAW S1.OP-SO.WG-0010?
- a. Obtain grab samples of release at least every 8 hours, and analyze with 24 hours for gaseous principal gamma emitters.
  - b. Estimate the Plant Vent Flow Rate at least every 4 hours.
  - c. Two independent samples of 13 Waste Gas Decay Tank have been analyzed.
  - d. Release rate calculations have been independently verified by at least two technically qualified members of Facility Staff.

## Senior Reactor Operator Examination

96. Given the following conditions:

- 1-EOP-FRCC-2, RESPONSE TO DEGRADED CORE COOLING, was entered due a PURPLE path condition for Core Cooling Safety Function.
- While performing this procedure the STA informs you that concurrent RED path conditions exist for both the Heat Sink Critical Safety Function and the Containment Environment Critical Safety Function.
- NO other abnormal conditions are noted.

As CRS, which of the following correctly describes the required actions?

- a. Complete the actions of 1-EOP-FRCC-2 and then transition to 1-EOP-FRHS-1, RESPONSE TO A LOSS OF SECONDARY HEAT SINK.
- b. Complete the actions of 1-EOP-FRCC-2 and then transition 1-EOP-FRCE-1, RESPONSE TO EXCESSIVE CONTAINMENT PRESSURE.
- c. Stop performing 1-EOP-FRCC-2 and immediately transition to 1-EOP-FRHS-1.
- d. Stop performing 1-EOP-FRCC-2 and immediately transition to 1-EOP-FRCE-1.

97. Given the following conditions:

- The crew is performing EOP-TRIP-1, REACTOR TRIP OR SAFETY INJECTION.
- The PO has been directed to perform EOP-APPX-1, COMPONENT COOLING RESTORATION.
- While performing APPX-1, the CRS determines that a transition to EOP-LOCA-1, LOSS OF REACTOR COOLANT, is necessary.

Which of the following actions are required?

- a. Discontinue action in APPX-1 until directed by EOP-LOCA-1.
- b. Transition to LOCA-1 and continue action as necessary in APPX-1.
- c. Continue action in APPX-1 but do NOT block or reset SECs until directed by EOP-LOCA-1.
- d. Complete the action required by APPX-1 prior to transition to LOCA-1.

## Senior Reactor Operator Examination

98. Given the following conditions:

- Salem Units 1 and 2 are operating at 100% power.
- The Duty Security Supervisor reports that an employees car is on fire in the parking lot in front of the Security Building.

IAW the Salem Event Classification Guide, which of the following identifies the action that is required?

- a. Immediately declare an UNUSUAL EVENT due to fire on the OWNER CONTROLLED AREA.
  - b. If the fire is NOT out in 15 minutes, declare an UNUSUAL EVENT due to fire on the OWNER CONTROLLED AREA.
  - c. NO ECG classification is required unless the car fire causes the gas tank to explode.
  - d. NO ECG classification is required because the fire is outside the double security fence.
99. An explosion and fire at the RAP tank area has resulted in a possible large spill of radioactive water in the area. The Fire Department has determined that off-site assistance from the local fire department is needed.

Which of the following choices identifies who must authorize requesting off-site fire department assistance?

- a. Security Duty Supervisor.
- b. Emergency Duty Officer (EDO).
- c. Radiological Assessment Coordinator (RAC).
- d. Nuclear Fire Protection Supervisor.

## Senior Reactor Operator Examination

100. Given the following conditions:

- Salem Unit 2 is operating at 100% power.
- A Salem NEO has discovered 21SJ35 and 22SJ35, 21 and 22 SI PUMP DISCH VLVS, shut with their handwheels removed, and apparent valve stem damage.

As the OS, which of the following actions must you perform IAW SH.OP-AP.ZZ-0007, SUSPECTED TAMPERING?

- a. Notify Shift Security Supervisor, NRC Resident, and NJ State Police.
- b. Perform valve position verification on ALL systems required for safe shutdown, starting with high head injection system.
- c. Immediately quarantine area with ANY available personnel.
- d. Notify Shift Security Supervisor, Hope Creek OS, and NRC resident.