

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

**Applicant Information**

Name:	Region: I / II / <b>III</b> / IV
Date:	Facility/Unit: <b>PBNP</b>
License Level: <b>RO</b> / SRO	Reactor Type: <b>W</b> CE / BW / GE
Start Time:	Finish Time:

**Instructions**

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected five 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	_____	Points
Applicant's Score	_____	Points
Applicant's Grade	_____	Percent

1. A load reduction is being performed with rods in AUTO. If rod control became inoperable and the load reduction continued, which of the following answers describes the operational implication on axial flux ?

**Axial Flux will move \_\_\_\_\_ due to \_\_\_\_\_.**

- A. positive, Tcold decreasing.
  - B. negative, Tcold increasing.
  - C. positive, core Delta T decreasing.
  - D. negative, core Delta T increasing.
2. Unit 1 is operating at Full Power when the Control Operator notes the following alarms and indications:

- 1P-1A RCP Vibration Alarm (1CO4 1C 1-5)
- Reactor Coolant Loop "A" Flow Low (1CO4 1B 2-7)
- RCS Flow on 1FI-411, 412, and 413 reads 80% and is rapidly lowering
- Reactor Trip Breaker Indicators are RED on 1CO4.

**Analyze these indications to determine which of the following choices is most correct.**

- A. Neither RCS Pressure or DNBR safety limits are challenged and the reactor should not have tripped.
- B. Both RCS Pressure and DNBR safety limits could be challenged and the reactor should have tripped.
- C. Neither RCS Pressure or Peak Centerline Temperature safety limits are challenged but the reactor should have tripped.
- D. Both RCS Pressure and Peak Centerline Temperature safety limits could be challenged but the reactor should not have tripped.

3. It is desired to place the plant in cold shutdown utilizing EOP-0.2, "Natural Circulation Cooldown". What is the maximum allowed cooldown rate and why is this limit imposed?

- A. Less than 50 degrees per hour to prevent exceeding Technical Specification cooldown limits.
- B. Less than 50 degrees per hour to minimize the probability of creating a void in the reactor vessel.
- C. Less than 25 degrees per hour to minimize the probability of creating a void in the reactor vessel.
- D. Less than 25 degrees per hour to prevent exceeding Technical Specification cooldown limits.

4. Given the following Unit 1 plant conditions:

- A reactor trip has just occurred.
- Two (2) control rods are stuck out of the core following the trip.
- An emergency boration has been initiated by the reactor operator in accordance with EOP-0.1, "Reactor Trip Response".

Which of the following states the **MINIMUM** injected volume of boric acid necessary to satisfy the required amount of boration?

- A. 600 gallons.
- B. 1,200 gallons.
- C. 2,400 gallons.
- D. 3,000 gallons.

5. If an operator is unable to restore power to the safeguards buses from the control room during the performance of ECA-0.0, "Loss of All AC Power", the procedure directs the operator to isolate the RCP seals by locally shutting RCP seal injection throttle valves CV-300A/B.

**Why are these valves shut ?**

- A. To prevent RCS inventory loss to the PRT via the seal injection relief line.
- B. To prevent a thermal shock to the RCP seals/shaft upon start of a charging pump.
- C. To prevent a thermal shock to the RCP thermal barrier upon start of a charging pump.
- D. To protect against a thermal expansion induced RCS leak at the seal injection filter housing.

6. Given the following situation:

- Unit 2 is at Full Power.
- PT-431 (PZR Pressure) Controlling Blue Channel fails high.
- The CO notes RCS pressure dropping rapidly.
- The CO also notes both PZR Spray Valves full open and shuts them. *(using chicken quikets)*

Given these conditions, which of the following statements best describes what will mitigate the RCS pressure drop on a short term basis once the spray valves are shut ?

- A. PZR insurge will occur causing a phase change from liquid to vapor.
- B. PZR outsurge will occur causing a phase change from liquid to vapor.
- C. PZR backup heaters need to be manually energized and hot PZR water flashes to steam.
- D. PZR backup heaters will automatically energize and hot PZR water flashes to steam.

7. During a faulted steam generator event, why is feed flow isolated to the faulted steam generator (S/G) ?
- A. To maximize feedwater inventory to the non-faulted S/G and to limit RCS cooldown.
  - B. To prevent run out from occurring on the operating feed pump(s) and to limit RCS cooldown.
  - C. To limit the temperature stress in the faulted steam S/G and to prevent runout from occurring on the operating auxiliary feedwater pump(s).
  - D. To minimize the unmonitored release of the contents of the S/G to the environment and to minimize feedwater inventory to the non-faulted S/G.
8. A small break LOCA has occurred one hour ago. The Safety Injection pumps are currently running. The current RCS temperature is 250 °F and pressure is 1000 psig. Which one of the following statements **BEST** describes the actions that must be taken, according to CSP-P.1, "Response to Imminent Pressurized Thermal Shock Condition", to mitigate this condition?
- A. Safety Injection Accumulators must be made available by opening isolation valves.
  - B. The cooldown must be stopped and the reactor coolant system fully depressurized.
  - C. A Reactor Coolant pump should be started to allow control of RCS pressure with spray flow.
  - D. The RCS temperature must be stabilized for at least one hour before further cooldown is allowed.
9. Unit 1 is coming out of its annual refueling outage and is holding power at 28% for chemistry concerns. The 'A' condensate pump, 'A' main feed pump, and the 'A' circulating water pump are operating. The "A" circulating water pump circuit breaker trips open due to a ground fault. Assuming no operator action, what will occur ?
- A. Neither the turbine or reactor will trip.
  - B. The reactor will trip but not cause a turbine trip.
  - C. The turbine will trip but not cause a reactor trip.
  - D. The turbine will trip on low vacuum and cause a reactor trip.

10. The following plant conditions exist:

- Unit 1 has experienced a Loss of All AC Power due to severe weather conditions and failure of emergency diesel generators to start and supply safeguard buses.
- The operating crew is carrying out actions of ECA 0.0, "Loss of All AC Power".
- Immediate actions have been completed and steps to restore power are in progress.
- The operators are at a point where they are to commence cooldown and depressurization of the steam generators.

**Based on these conditions, which of the following statements best describes the reason why a secondary depressurization is directed ?**

- A. To ensure the reactor remains subcritical and does not result in a restart accident.
- B. To minimize RCS inventory loss through the RCP seals, which maximizes time to core uncover.
- C. To remove all the stored energy in the steam generators to prevent a secondary safety valve from lifting.
- D. To prevent a challenge to the core cooling critical safety function status tree which is being monitored for implementation.

11. Both units are at full power.

The YELLOW 120V VITAL Instrument Bus (1Y-04) is to be removed from service for emergency inspection due to imminent failure.

Using your knowledge of Vital AC Instrument Buses and with regard towards Engineering Safeguards, analyze automatic actions that will immediately occur as a result of premature failure of the YELLOW instrument bus. The following assumptions can be made:

- This is the only failure or abnormal event that occurs.
- Operators take manual control of Feedwater Flow to maintain S/G water level at programmed level.

- A. "A" Steam Line Isolation will actuate.
- B. Low Pressurizer Pressure Safety Injection will actuate.
- C. No Engineered Safeguards Systems (ESFAS) will actuate.
- D. 1P-29 Turbine Driven Auxiliary Feedwater Pump will actuate.

12. What indications would you have in the control room that a fire has occurred in the G01 diesel generator room?

- A. C-900 alarm coincident with actuation of the AFFF system.
- B. C-900 alarm coincident with actuation of the Halon fire suppression system.
- C. C-900 alarm coincident with an indication of wet pipe sprinkler system actuation.
- D. Jockey and motor driven fire pumps indicate running along with an open deluge valve indication.

13. The following conditions exist:

Reactor Power:	Unit 1 and Unit 2 at Full Power
Control Room:	<b>FIRE in progress</b>
Offsite Power:	AVAILABLE

In accordance with AOP-10A, "Safe Shutdown-Local Control", which one of the following actions is **NOT** required to be completed prior to control room evacuation due to lack of control room habitability.

- A. Verify Unit 1 and Unit 2 tripped.
- B. Shut Unit 1 and Unit 2 PORV block valves.
- C. Place Unit 1 and Unit 2 Main Feedwater Pumps in PULL-OUT.
- D. Place Unit 1 and Unit 2 Atmospheric Steam Dump Controllers in manual and shut.

14. The following plant conditions exist:

- A LOCA has occurred inside containment.
- Containment Pressure is currently STABLE at 10 psig.
- Subsequently, a Loss of Containment Integrity on one penetration occurs.
- Leakrate is estimated at 100 SCFM.

**Containment leakage will double if containment pressure reaches \_\_\_\_\_.**

- A. 14 psig
- B. 20 psig
- C. 40 psig
- D. 80 psig

15. Based on the following plant conditions:

- Unit 1 has a confirmed 200 gpm RCS leak into containment.
- The operating crew decides to transition from AOP-1A, "Reactor Coolant Leak" to EOP-0, "Reactor Trip or Safety Injection".
- The reactor is manually tripped and SI/CI manually actuated due to containment pressure at 3 psig and slowly rising.
- Reactor Coolant Pumps are tripped per foldout page criteria.
- It is later discovered that SI Flow is indicating 0 gpm.
- RCS Pressure is approximately 1000 psig and slowly rising.
- NR Reactor Vessel Water level is 25 ft and slowly trending downward.
- Core Exit Thermocouple Temperature is approximately 550 degrees F and slowly rising.
- All other equipment is functioning normally.

**If these plant conditions were to continue with no operator action, which of the following responses best describes the potential plant outcome ?**

- A. Loss of Subcriticality.
- B. Degraded Core Cooling.
- C. Brittle Fracture of the RCS.
- D. Containment Overpressurization.

16. According to AOP-8A, "High Reactor Coolant Activity", which of the following would be a symptom or entry condition into this procedure ? (Assume Unit 2 is the affected unit).

- A. Failed Fuel Monitor (2RE-109). *Alarm*
- B. Unit 2 Air Ejector Radiation Alarm (2RE-215).
- C. Waste Disposal System Liquid Monitor (RE-218). *Alarm*
- D. Steam Generator Blowdown Tank Radiation Alert (2RE-222).

17. With the Unit 1 Reactor operating at 60% power and turbine in IMP IN, the following indications are observed:

- Rising steam generator pressures.
- Rising pressurizer pressure.
- TAVG greater than TREF and rising.
- Turbine Impulse Pressure constant.
- Rising NI Power.

**Assuming no operator action, which of the following would initially explain the above indications ?**

- A. Turbine runback.
- B. Main steam line leak.
- C. Inadvertent AFW actuation.
- D. Uncontrolled rod withdrawal.

18. Unit 1 Reactor Power was initially at 100% steady state with normal operating conditions. The Control Operator then noted the following indications:

- One rod bottom light (G-7) lit.
- Tavg/Tref deviation alarm lit.
- RCS pressure lowering.
- Power Range Nuclear Instrument(s) lowering.
- Control bank "D" rods fully withdrawn.

**Based on these indications, which one of the following actions in accordance with the applicable procedure will the Control Operator be directed to perform first ?**

- A. Trip the reactor.
  - B. Disconnect the dropped RCCA.
  - C. Perform a shutdown margin calculation.
  - D. Place rod bank selector switch to manual.
19. A uncomplicated reactor trip has occurred. The immediate actions of EOP-0, "Reactor Trip or Safety Injection", have been completed and a transition to EOP 0.1, "Reactor Trip Response", has been made. Which of the following conditions would require a transition back to EOP-0, "Reactor Trip or Safety Injection".
- A. Pressurizer level lowered to 11% and is stable.
  - B. Containment pressure cannot be maintained less than 5 psig.
  - C. RCS cold leg temperature cannot be maintained greater than or equal to 540 degrees F.
  - D. Total feedwater flow cannot be maintained greater than 200 gpm with BOTH S/G levels less than 29%.

20. The following plant conditions exist:

- Unit 2 is operating at full power.
- I & C testing is in progress.
- 2 - RC-430 (PORV) inadvertently opens and sticks in this position.
- A Unit 2 reactor/turbine trip and safety injection subsequently occur.
- Two additional minutes have elapsed with no operator action.

**Based on these conditions, which of the following choices provides the most accurate indication of the following sensor/detector ?**

(Assume answers correspond to the same order of the detector given)

Pressurizer Level (LT-427) is going \_\_\_\_\_, Pressurizer Pressure (PT-430) is going \_\_\_\_\_, and Pressurizer Temperature (TE-424) is going \_\_\_\_\_.

- A. up, up, up.
- B. up, down, down.
- C. down, down, up.
- D. down, up, down.

21. Given the following plant conditions:

- Unit 1 has tripped due to failure of the main turbine lubricating oil system.
- During the trip, a PORV fails open and cannot be isolated.
- The operators are currently working their way through EOP 1.2, "Small Break LOCA Cooldown and Depressurization."
- Neither RCP can be restarted due to problems with their oil lift pumps.
- All equipment and systems are functioning normally (with exception of PORV isolation and RCP oil lift pumps).

**Which of the following statements accurately describes the operational implications of current plant conditions ?**

- A. Decay heat cannot be removed, the core will heat up and likely exceed temperature limits.
- B. The RCS will continue to void and eventually decay heat will be removed by reflux cooling.
- C. The combination of SI/break flow, auxiliary feedwater, and/or steaming paths should be sufficient to remove decay heat.
- D. Natural circulation cooling cannot be verified and is the only method of removing decay heat under these conditions.

22. Given the following plant conditions:

- Unit 1 Safety Injection (SI) has occurred.
- Containment pressure is .5 psig (1/2 psig) and steady.
- RCS pressure is 1300 psig and slowly dropping.
- Auxiliary Building Radiation Levels are in ALERT on RMS.
- Letdown fails to isolate.
- All other equipment functions as designed.

**Based on these conditions, with NO operator action, which one of the following statements is TRUE with regard to long-term plant response ?**

- A. Containment sump recirculation will be unavailable.
- B. RWST level will be depleted in less than 30 minutes.
- C. PORVs will cycle as necessary to control RCS pressure.
- D. Containment spray will occur at 15 psig containment pressure.

23. Given the following plant conditions:

- A steamline break occurred in Unit 2 Containment.
- The control room team has progressed through the EOP set to EOP 1.1, "SI Termination" and have secured BOTH RHR and SI Pumps.
- Containment pressure is 30 psig and slowly lowering.
- Core exit thermocouples are 325°F and slowly rising.
- PZR level is 20% and slowly lowering.

**Based on these conditions**, the control operator reports RCS subcooling is 30°F and slowly lowering. Which of the following responses best describes the required course of action?

**Manually start the Safety Injection pumps, as necessary, and \_\_\_\_\_**

- A. continue in EOP 1.1, "SI Termination".
- B. transition to EOP 0, "Reactor Trip or Safety Injection".
- C. transition to EOP-2, "Faulted Steam Generator Isolation".
- D. transition to EOP-1, "Loss of Reactor or Secondary Coolant".

24. Given the following Unit 1 plant conditions:

- RCS Temperature: 530 degrees F.
- RCS Subcooling: 50 degrees F.
- Pressurizer level: 5%
- Containment pressure: 7 psig
- 1A05/1A06 voltage: 4380 volts powered from off-site
- P-23A, "Reactor Make-up Water Pump" is lined up for blender services.

**Assuming all systems function as designed with no operator action, which one of the following statements is correct ?**

- A. Automatic charging pump speed will reduce to minimum.
- B. The containment spray system will automatically actuate.
- C. Automatic makeup to the Volume Control Tank will be lost.
- D. The emergency diesel generators (G02 and G04) will automatically load onto their respective buses.

25. While in CSP-S.1, step 1, the Unit 1 Control Operator notes the following:

**Rod Bottom Lights:** OFF

**Reactor Trip Breakers:** CLOSED

**Rod Bank Positions:** SDA 225 Steps  
SDB 225 Steps  
CBA 225 Steps  
CBB 225 Steps  
CBC 225 Steps  
CBD 220 Steps

**Neutron Flux:** 97%

**Rod Control:** AUTO and rods not moving

**Which of the following choices provides the correct response for the operating crew to take in this situation?**

- A. Proceed immediately to step 2.
- B. Manually drive the control rods IN and continue with step 2.
- C. Initiate boration of the RCS at maximum rate and continue with step 2.
- D. Direct the auxiliary operator to open the Reactor Trip Breakers and Reactor trip bypass breakers locally and proceed to step 2.

26. Given the following plant conditions:

- Unit 1 is shutting down from full power.
- Reactor Power is currently at 6%.
- Intermediate Range Channel N35 fails high.

**Which of the following statements best describes how this failure affects the reactor shutdown and subsequent operation of the Nuclear Instrumentation System ?**

- A. The reactor will not trip, and the source range NIs will have to be manually reenergized.
- B. The reactor will not trip, and the source range NIs will reenergize when N36 reaches the proper setpoint.
- C. The reactor will trip on high IR flux, and the source range NIs will have to be manually reenergized.
- D. The reactor will trip on high IR flux, and the source range NIs will reenergize when N36 reaches the proper setpoint.

27. Given the following plant conditions:

- Unit 1 is at full operating power.
- A Loss of NI-35 (Intermediate Nuclear Range Channel) voltage occurs.
- The DSS/DOS directs that NI-35 be removed from service per ICP 10.2, "Routine Maintenance Procedure Removal of Safeguards or Protection Sensor from Service".

**Which of the following actions must be performed per ICP 10.2 on the affected channel drawer, to prevent an automatic reactor trip from occurring ?**

- A. Pull control power fuses.
- B. Pull instrument power fuses.
- C. Place level trip switch to "BYPASS".
- D. Place operation selector switch to " $10^{-9}$ ".

28. Given the following plant conditions:

- Unit 1 is operating at FULL Power.
- 1RE-231, "Steam Line "A" radiation" ALERT has just been received.

The Control Operator notes rising charging pump speed and a one (1) gpm rise in charging flow with no change in corresponding letdown flow.

**Based on these indications, determine which of the following statements is TRUE:**

- A. A steam generator tube leak in excess of TS limit is occurring which requires a plant shutdown.
- B. A steam generator tube leak less than the TS limit is occurring which requires a plant shutdown.
- C. A steam generator tube leak in excess of TS limit is occurring which does NOT require a plant shutdown.
- D. A steam generator tube leak less than the TS limit is occurring which does NOT require a plant shutdown.

29. Unit 1 has just been tripped based on the operators inability to maintain pressurizer level within the guidance provided by AOP-1A, "Reactor Coolant Leak". Additionally, the following indications are noted by the Control Room Team:

- SI/CI has actuated.
- Both MSIVs have automatically closed.
- "A" S/G Water Level is 40% and rising.
- "B" S/G Water Level is 25% and rising.
- Auxiliary Feedwater Flow is 200 gpm to each S/G.

**Based on your analysis of these parameters, which S/G(s), if any, has the highest potential of being ruptured and what additional parameter would confirm your analysis ?**

- A. "1B" S/G, Containment area high radiation alarm.
- B. "1A" S/G, Containment area high radiation alarm.
- C. "1B" S/G, S/G activity sample results indicating normal background.
- D. "1A" S/G, S/G sample results indicating boron higher than normal.

30. The following plant conditions exist on Unit 1:

- A Reactor trip occurred.
- A series of problems have occurred resulting in the lack of ability to provide feedwater addition to either S/G.
- S/G water levels are approximately 100 inches on wide range indication for each S/G.
- The control room team has just entered CSP-H.1, "Response to Loss of Secondary Heat Sink".
- RCS pressure has risen above the PORV setpoint due to the loss of a heat sink.

**Which action must the control room team take and what is the reason for this action ?**

- A. Raise charging pump flow to re-establish PZR level and maintain inventory.
- B. Establish Feed and Bleed to minimize core uncover and inadequate core cooling.
- C. Commence a primary system depressurization to prevent cycling of the PORV's and conserve inventory.
- D. Commence a secondary system depressurization to below the condensate pump shutoff head to allow condensate flow into the S/Gs.

31. The following plant conditions exist:

- Both units are operating at full power.
- No plant evolutions are in progress.
- The Unit 1 service water discharge monitor (1RE-229) is in alert on the control room RMS.
- The control room team verifies this is a valid alarm per RMSASRB guidelines and an unscheduled release is in progress.

**Which of the following choices best describes additional expected control room team actions and why ?**

- A. Refer to Technical Specifications which directs the effluent release path be isolated to minimize site boundary exposure.
  - B. Refer to AOP-4A, "High Effluent Activity" which allows discharge to continue due to the dilution effects of Lake Michigan.
  - C. Refer to AOP-4A, "High Effluent Activity" which directs the effluent release path be isolated to minimize exposure to the public.
  - D. Refer to "Radioactive Liquid Waste Permits" section of Release Accountability Manual (RAM 3.1) which provides release requirements after an accidental release has occurred.
32. What automatic function occurs in the Auxiliary Building Ventilation system when a high radiation alarm is received in the auxiliary building exhaust and why ?
- A. All PAB ventilation fans trip to isolate any potential release.
  - B. The PAB cleanup fans auto start to minimize radioactive release to the outside environment.
  - C. The charcoal filter inlet damper opens and the particulate filter damper closes to filter any potential release.
  - D. PAB supply fan stops to create a negative pressure in the PAB to minimize radioactive release to the outside environment.

33. The following plant conditions exist:

- Both units are operating at full power.
- 2RE-107 (Seal Table Area Monitor) has gone into alert and then cleared several times during your shift.
- No plant evolutions or abnormalities are noted.

**Based on these plant conditions, which of the following choices best represents the guidance that should be used and reason(s) for this guidance ?**

(RMSASRB, "Radiation Monitoring System Alarm Setpoint and Response Book")  
(RECM, "Radiation Effluent Control Manual")

- A. The RMSASRB guidance should be used to determine if random spiking or actual radiation is the cause.
- B. The RMSASRB guidance should be used to ensure 2RE-107's associated control functions have properly responded.
- C. The RECM guidance should be used to determine if random spiking or actual radiation is the cause.
- D. The RECM guidance should be used to ensure 2RE-107's associated control functions have properly responded.

34. With the Pressurizer Level Control Selector Switch in the **NORMAL** position, a pressurizer level instrument failure caused the following **SEQUENTIAL** plant events:

1. Charging flow reduced to minimum.
2. Pressurizer level lowered.
3. Letdown flow secured and heaters turned off.
4. Pressurizer level went up until a high level trip occurred.

**Which one of the following instrument failures occurred?**

(Assume NO operator action)

- A. Pressurizer level channel 428 (blue) failed low.
- B. Pressurizer level channel 428 (blue) failed high.
- C. Pressurizer level channel 427 (white) failed low.
- D. Pressurizer level channel 427 (white) failed high.

35. The reactor has tripped from 100% power due to a loss of offsite AC power. The EDGs are supplying the safeguards buses. Immediately after the transition to EOP-0.1, "Reactor Trip Response," the operator notes these indications:

<u>RCS</u>	<u>A</u>	<u>B</u>	<u>Units</u>	<u>Trend</u>
Th WR	584	585	°F	slowly rising
Tc WR	550	548	°F	stable
Core TC's	590	---	°F	slowly rising
RCPs	Off	Off	---	N/A
PZR Pressure	1737	---	psig	slowly lowering
PZR Level	10	---	%	slowly lowering
Subcooling	27	30	°F	slowly lowering

<u>Secondary</u>	<u>A</u>	<u>B</u>	<u>Units</u>	<u>Trend</u>
S/G Pressure	1010	1005	psig	stable
S/G Level	190	190	inches	slowly rising
AFW Flow	110	125	gpm	stable

**What action should be taken ?**

- A. Remain in EOP-0.1, "Reactor Trip Response," and maximize AFW flow.
- B. Manually initiate safety injection and go to EOP-0, "Reactor Trip or Safety Injection."
- C. Go to CSP-C.3, "Response to Saturated Core Cooling", and start a second charging pump.
- D. Go to CSP-H.2, "Response to Steam Generator Overpressure," and raise AFW flow.

36. CSP-Z.2, "Response to Containment Flooding," is entered when containment sump "B" level is greater than 74 inches. Which one of the following correctly states the major concern to the operator if containment sump "B" level were to exceed 74 inches?

- A. Plant components required for long-term cooling of the core and/or containment could be damaged and rendered inoperable.
- B. The sodium hydroxide tank does not contain enough volume to "neutralize" a larger volume of sump "B" contents to the correct pH.
- C. Containment design does not include the additional pressure from a larger depth of water in the event containment pressure exceeds 60 psig.
- D. The containment sump "B" valves (SI-850 A/B) design does not include the additional pressure from a larger depth of water in the event containment pressure exceeds 60 psig.

37. - Unit 1 is at Full Power.
- Annunciator 1C04 1C 2-9, "Containment or Aux Building Ventilation System Air Flow Low" actuates.
  - Upon investigation, the CO reports an amber light above 1W-3A/3B, "CRDM Cooling Fans" on the rear of 1C04.

**Given these plant conditions, which of the following most accurately describes the course of action the CO should recommend to the DOS ?**

- A. Immediately trip Unit 1 off line and cool down the RCS to < 500 degrees F per EOP-0.
- B. Continued operations is permissible because the amber light means the standby fan has automatically started.
- C. Continued operations is permissible as long as cooling is restored in 7 days per technical specifications.
- D. Attempt to start standby cooling fan and if unsuccessful ramp Unit 1 off line at 1%/min and cooldown RCS to < 350 degrees F per ARB.

38. Given the following conditions:

- Unit 2 Reactor is at 60% power.
- Nuclear Instrument Channel N42 begins to fail.
- Over the course of an eight hour shift N42 drifts up to a pegged high condition.
- All systems are in automatic.
- No operator action is taken.
- Main Turbine load remains constant.

**How will the Rod Control System respond to this instrument failure ?**

- A. Rods will not move because Tavg and Turbine Power remain constant.
- B. Rods will move inward to lower power because N42 drives Auctioneered Nuclear Power signal high.
- C. Rods move outward to adjust Tavg to agree with programmed Tavg consistent with the failed instrument reading.
- D. Rods will move inward in response to Turbine Runback when mismatch between N42 and the other power range channels is 2.5%.

39. The following conditions exist:

- Unit 2 is in a Hot Shutdown condition.
- Both Reactor Coolant Pumps are running.
- All Pressurizer Heaters are energized.
- One Reactor Coolant Pump is subsequently stopped.

**To maintain stable RCS pressure, the spray valve in the operating loop will**

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- A. close slightly because core Delta P is higher.
  - B. open slightly because core Delta P is lower.
  - C. close slightly because spray temperature is higher.
  - D. open slightly because spray temperature is lower.
40. A Unit 1 heat up is in progress and both RCPs are operating. All RCP seal parameters are normal with RCS pressure indicating 855 psig. 1P-2A (Charging Pump) is in manual. Which of the following responses best describes what effect raising charging pump speed will have on RCP parameters ?
- A. RCP labyrinth seal D/P will go up.
  - B. RCP labyrinth seal D/P will go down.
  - C. RCP number 1 seal leak off flow will go down.
  - D. RCP number 1 seal outlet temperature will go up.
41. Over temperature protection for CVCS Demineralizer resin is provided by:
- A. Letdown isolation valve (RC-427) closes on high temperature.
  - B. Letdown temperature control valve (TCV-145) directs flow to the VCT.
  - C. Letdown divert valve (LCV-112A) directs letdown to the Holdup Tanks.
  - D. Letdown orifice (CV-200A, B, or C) restricts flow to prevent temperature exceeding 150 degrees F.

42. Following a reactor trip on Unit 1, the following plant conditions were observed:

- RCS pressure is 1985 psig and stable.
- Emergency boration valve, 1CV350, is out of service CLOSED.
- Boric acid flow control valve, 1CV110A, has just stuck in the CLOSED position.
- Two control rods are stuck in the core at 180 steps.

**Which one of the following boration flow paths is immediately available to reestablish shutdown margin using approved procedures ?**

- A. Borate using a charging pump and the RWST.
- B. Borate using the charging pumps and the blender.
- C. Borate using the safety injection pumps and normal pressurizer spray.
- D. Borate using the boric acid tanks, boric acid transfer pumps, and charging pumps.

43. The following occurs from 100% power:

- Unit 2 Reactor Trip.
- An uncontrolled cooldown.
- Safety Injection actuates on low pressurizer pressure.
- Pressurizer level is >15%.

**Which of the following valves should remain OPEN ?**

- A. Charging isolation valve MOV 1298.
- B. Seal return isolation valve MOV 313A.
- C. Letdown isolation valves AOV 371 and AOV 371A.
- D. Letdown isolation valves AOV 200A, 200B, and 200C.

44. You are performing a surveillance on Emergency Diesel Generator G-01. Prior to closing the output breaker for G01, your service water pump combination is A and D.

**What pumps would you expect to have running after closing the output breaker ?**

- A. P-32A, B, C, D
- B. P-32A, B, D, E
- C. P-32A, B, D, F
- D. P-32A, C, D, F

45. The following Unit 1 conditions exist:

- OP-3B, "Reactor Shutdown" is the procedure in effect.
- N-35 indicates 2E-11 amps.
- N-36 indicates 3E-9 amps.
- The RO depresses the Intermediate Range Permissive defeat buttons, which resulted in a SR HIGH FLUX reactor trip.

**Which one of the following conditions for N-35 and N-36 would have caused this event ?**

- A. N-35 is Over compensated, N-36 is Properly compensated.
- B. N-35 is Properly compensated, N-36 is Over compensated.
- C. N-35 is Properly compensated, N-36 is Under compensated.
- D. N-35 is Under compensated, N-36 is Properly compensated.

46. The following plant conditions exist on Unit 2:

- A Reactor Trip occurred 3 days ago.
- OP-1B, "Reactor Startup" is in progress.

**With regard to Nuclear Instrumentation, which of the following indications will the Control Room Team use to determine the reactor is critical ?**

- A. The third neutron doubling has just occurred.
- B. A sustained positive SUR without rod motion is achieved.
- C. The reactor is at the point of adding heat as evidenced by decreasing SUR.
- D. Proper overlap on at least one decade between source range and intermediate range detectors.

47. Given the following plant conditions:

- Unit 2 was operating at 100% power.
- The RTD inputs to subcooling monitors are OOS for I & C maintenance.
- A Reactor Trip occurs due to turbine trip.
- Fast Bus transfer did not occur.
- The control room team entered EOP-0, "Reactor Trip Safety Injection", and transitioned to EOP 0.1, "Reactor Trip Response".

**Based on these conditions, which of the following most accurately reflects how a loss of all in-core temperature detectors would impact the crew's ability to verify natural circulation per EOP-0.1?**

- A. Only RCS subcooling would not be available.
- B. There is no impact on verifying natural circulation.
- C. Only Core exit thermocouples would not be available.
- D. Core exit thermocouples and RCS subcooling would not be available.

48. Given the following plant conditions:

- Unit 2 has tripped due to a Small Break LOCA.
- Indicated RCS subcooling is 10 F.
- In-Core Thermocouples are reading 500 F and stable.
- SI Pumps are running with RCS pressure above shutoff head.
- Operators are currently entering EOP-1.2, "Small Break LOCA Cooldown and Depressurization"

**Based on these conditions, which of the following choices best describes the RCS cooling conditions ?**

- A. Reflux Cooling.
- B. Natural Circulation Cooling.
- C. Normal Forced RCS Cooling.
- D. Inadequate Natural Circulation Cooling.

49. Assuming the Containment Spray System is in its normal AUTO standby mode:

**Upon actuation of a containment spray signal, the containment spray system will respond by \_\_\_\_\_**

- A. immediately having both containment spray pumps start, followed 10 seconds later by the spray pump discharge MOVs opening (SI-860 A, B, C & D) and two minutes later the sodium hydroxide addition AOVs opening (SI-836 A & B).
- B. immediately having the spray pump discharge MOVs open (SI-860 A, B, C & D), followed 10 seconds later by both containment spray pumps starting and two minutes later the sodium hydroxide addition AOVs opening (SI-836 A & B).
- C. immediately having the sodium hydroxide addition valves opening (SI-836A & B), followed 10 seconds later by both containment spray pumps starting and two minutes later by the spray pump discharge MOVs opening (SI-860 A, B, C & D).
- D. immediately having both containment spray pumps start, followed 10 seconds later by the sodium hydroxide addition valves opening (S-836 A & B) and two minutes later by the spray pump discharge MOVs opening (SI-860 A, B, C & D).

50. Which one of the following statements correctly describes the normal automatic operation of the Low Pressure Heater Bypass Valve (CV-2273) ?
- A. Auto-opens fully when condensate reject valve (CV-2130) opens to prevent flooding condensers.
  - B. Modulates to maintain gland steam and air ejector condensers differential pressure < 14.85 psid.
  - C. Modulates to maintain steam generator feed pump suction pressure at a variable set point (set on controller on C-03).
  - D. Auto-closes fully at 500 gpm steam generator feed pump discharge flow to ensure sufficient low pressure feedwater heater cooling flow.

51. Given the following plant conditions:

- OP-1C, "Low Power to Normal Power Operation", is in progress on Unit 2.
- Reactor power is currently at 28%.
- All Heater Drain Tank Pumps (P-27A, B, C) are secured.
- P-25A, ("A" Condensate Pump) is running.
- P-25B ("B" Condensate Pump) is secured with its control switch in the green flagged position.

**If P-25A tripped due to motor overload, which of the following best describes the impact on the condensate system ?**

- A. A pressure switch downstream of the 4A & 4B low pressure feedwater heaters will sense low pressure and send a start signal to P-25B.
- B. A differential pressure switch downstream of the air ejector condenser will sense a low differential pressure and sends a signal to shut the mini-recirculation valve (CV-2252).
- C. A temperature detector located in the exhaust trunk of each low pressure turbine senses high temperature and shuts the exhaust hood spray valves (CV-2109/CV-2114).
- D. A level detector located in each condenser hotwell senses a high level and opens the condensate reject valve (CV-2130) dumping excess condensate to the condensate storage tank.

52. Which of the following conditions/signals will result directly in an automatic start of the Unit 1 Turbine Driven Auxiliary Feedwater Pump (1P-29) ?

- A. Unit 1 Safety Injection signal.
- B. Trip of both Motor Driven AFW pumps.
- C. Loss of 4.16 KV buses 1A01 and 1A02.
- D. Low-Low steam generator (SG) level (25%) in Unit 1 "A" SG.

53. The following plant conditions exist:

- Both Units are operating at Full Power.
- The Control Room Team notes alarms and a green and white light above 2P-28A (Main Feedwater Pump) control switch in the control room.
- S/G water levels are 35% and lowering.

**Based on these indications, knowledge of plant impact, and Operation Managers expectations, which of the following course of actions would be acceptable ?**

- A. Trip Unit 2 and enter EOP-0, "Reactor Trip or Safety Injection".
- B. Restart the tripped Main Feedwater Pump per Alarm Response Book.
- C. Commence a load reduction at 10%/minute to 70 % per AOP-17A, Rapid Power Reduction.
- D. Commence a load reduction at 5 %/minute to 80 % power and start Auxiliary Feedwater per AOP-2B, "Feedwater System Malfunction".

54. Given the following plant conditions:

- P-38A, "Electric Driven AFW Pump" is aligned to fill Unit 1 "A" Steam Generator (S/G) during a refueling outage at 200 gpm from the CST.
- T24A, CST level is indicating 10 ft. on C01.
- T24B, (CST) is drained and isolated for maintenance.
- Unit 2 is operating at 100% power.

**Using the Tank Level Book data provided, determine the maximum amount of time the auxiliary feedwater pump could continue filling the S/G before reaching a technical specification limit.**

- A. 0 minutes.
- B. 30 minutes.
- C. 60 minutes.
- D. 90 minutes.

55. Which one of the following events will occur on a high alarm on RE-223, "Waste Distillate Discharge Liquid Process Monitor" ?

- A. Indication only - no automatic actions, manual action is required.
- B. RCV-018, "Waste Liquid Overboard Valve" receives a CLOSE signal.
- C. FCV-LW-15, "Waste Distillate Overboard Valve" receives a CLOSE signal.
- D. FCV-LW-15, "Waste Distillate Overboard Valve" AND RCV-018, "Waste Liquid Overboard Valve" receive a CLOSE signal.

56. The PAB AO is preparing the "A" Waste Gas Decay Tank (GDT) for maintenance in accordance with OI-54A, "Gas Decay Tank(s) Preparation for and Return from Maintenance". Prior to opening this GDT to atmosphere, what is the maximum allowable hydrogen concentration to prevent flammability ?
- A. 0 %.
  - B. 3 %.
  - C. 10%.
  - D. 70 %.
57. Which of the following Radioactive Gaseous Waste Effluent Monitors has an automatic control function associated with its design to isolate a waste gas release when high noble gas activity is sensed ?
- A. RE-221, "Drumming Area Ventilation".
  - B. RE-224, "Gas Stripper Building Exhaust".
  - C. RE-225, "Combined Air Ejector Low Range".
  - D. RE-214, "Auxiliary Building Exhaust Ventilation"
58. Fuel handling in the Spent Fuel Pool (SFP) is ongoing:
- A spent fuel element became detached from the Spent Fuel Pool (SFP) Bridge Hoist.
  - Radiation levels, as read on spent fuel pool low range monitor, RE-105, are going up.

**Which one of the following is required by AOP-8C, "Fuel Handling Accident in Primary Auxiliary Building?"**

- A. Secure PAB ventilation.
- B. Secure both SFP cooling pumps.
- C. Place both SFP heat exchangers in service.
- D. Initiate a limited plant evacuation of the primary auxiliary building.

59. The following Plant Conditions exist:

- Unit 2 is at rated power 100 days after a refueling shutdown.
- The 3rd RO on watch is performing trip testing with RP on RMS.
- 2RE-222, "S/G B/D Tank Area Monitor" is currently being tested.
- Unit 2 CO is not being informed of the testing status.

**Based on these conditions, which of the following answers accurately reflects how trip testing will effect Unit 2 CO control board indications ?**

- A. Only S/G Blowdown Tank Outlet Valve (2MS-2040) will have a green light indication.
- B. Only S/G Blowdown Valves (2MS-5958 and 5959) will have a green light indication .
- C. S/G Blowdown Valves (2MS-5958 and 5959) will have a red light indication .
- D. Both A & B above.

60. The Unit 1 Reactor is currently operating at 50% Power with all control systems in AUTO and on setpoint.

**What are the expected conditions for Reactor Coolant System parameters?**

- A. Average Temperature 570 degrees F, Pressure 2200 psig, Pressurizer Level 46%.
- B. Average Temperature 558 degrees F, Pressure 1985 psig, Pressurizer Level 46%.
- C. Average Temperature 558 degrees F, Pressure 1985 psig, Pressurizer Level 33%.
- D. Average Temperature 570 degrees F, Pressure 1985 psig, Pressurizer Level 33%.

61. Given the following plant conditions:

- Both units are operating at full power.
- 1T-34A (SI Accumulator) level has been slowly rising over the past three weeks.
- SI Accumulator Boron Concentration prior to the level rise was 2800 ppm.
- The DSS directs the CO, to lower 1T-34A tank level by 10% in accordance with OI-100, "Adjusting SI Accumulator level and pressure".

**Based on these conditions, predict what effects the above sequence of events will have on 1T-34A boron concentration.**

- A. Boron concentration has not and will not change.
  - B. Boron concentration currently is and will remain lower than 2800 ppm.
  - C. Boron concentration currently is 2800 ppm and will remain so until the CO lowers accumulator level.
  - D. Boron concentration currently is higher than 2800 ppm and will remain so until the CO lowers accumulator level.
62. What is the purpose of maintaining continuous trickle bypass spray flow (1 gpm nominal) when the Spray Valve(s) is(are) closed ?
- A. Reduce Pressurizer Spray Nozzle thermal stresses.
  - B. Provide adequate loop seal for PORV discharge line.
  - C. Reduce Spray Valve differential pressure for proper valve operation.
  - D. Allow operation of the Proportional Pressurizer Heaters at about 50%.

63. A transient in the Secondary System has resulted in a rise in Reactor Coolant System Temperature sufficient to produce an associated Pressurizer Level change in excess of 5%.

**What is the expected response of the Pressurizer System ?**

- A. Pressurizer insurge energizes all back-up Heaters.
- B. Pressurizer outsurge energizes all back-up Heaters.
- C. Pressurizer insurge de-energizes all back-up Heaters.
- D. Pressurizer outsurge de-energizes all back-up Heaters.

64. Assume the reactor is being started up from a source range count of 10 cps.

**Choose the answer, which matches the order in which the tasks listed below are performed.**

1. Verify "Power Above P6" light energized.
2. Manually block power range low setpoint high flux trip.
3. Manually block source range level trip.
4. Verify "Power Above P10" light energized.

- A. 1, 3, 2, 4.
- B. 1, 3, 4, 2.
- C. 3, 1, 2, 4.
- D. 3, 1, 4, 2.

65. Which one of the following situations would be in violation of Technical Specifications ?

- A. Rod position by IRPI and PPCS indication shows a misalignment of 10 steps with the bank demand position at 220 steps.
- B. Rod position by IRPI and PPCS indication shows a misalignment of 10 steps with the bank demand position at 180 steps.
- C. Rod position by IRPI and PPCS indication shows a misalignment of 15 steps with the bank demand position at 25 steps.
- D. Rod position by IRPI and PPCS indication shows a misalignment of 15 steps with the bank demand position at 190 steps.

66. The following conditions exist on Unit 1:

- Reactor trip and safety injection occurred.
- S/G levels prior to the Rx Trip were 85%.
- Tavg has returned to no-load condition.
- S/G levels are currently at 40%.

The reactor operator desires to restore feed to the S/Gs using the FW Regulating bypass valves.

**Which one of the following conditions have to be met to OPEN the FW Regulating Bypass valves ?**

- A. FW isolation would have to be reset.
- B. Reactor Trip breakers would have to be re-closed and FW isolation would have to be reset.
- C. Reactor Trip breakers would have to be re-closed and MFP discharge MOV re-opened.
- D. The Safety Injection signal would have to be reset followed by the resetting of the FW isolation.

67. Maintenance of the containment critical safety function during a design basis loss of coolant accident requires what two safety systems to be operable to ensure containment integrity ?

- A. Cavity cooling fans and hydrogen recombiner.
- B. Containment accident recirculation fans and hydrogen recombiner.
- C. Control rod shroud fans and the containment spray system.
- D. Containment accident recirculation fans and the containment spray system.

68. While in cold shutdown, the DSS directs the Containment Purge and Exhaust System be placed in service in accordance with Attachment "C" of OP-9C, "Containment Venting and Purging".

**What interlock must be met for the purge SUPPLY and EXHAUST system to become operational ?**

- A. In order to start the purge SUPPLY fan, the purge EXHAUST fan must be running and EXHAUST valves must be open.
- B. In order to start the purge EXHAUST fan, the purge SUPPLY fan must be running and SUPPLY valves must be open.
- C. In order to start the purge EXHAUST fan, the purge SUPPLY fan must be running and the EXHAUST and SUPPLY valves must be open.
- D. In order to start the purge SUPPLY fan, the purge EXHAUST fan must be running and the EXHAUST and SUPPLY valves must be open.

69. The following plant conditions exist on Unit 1:

- RHR has just been placed in service.
- The Control Operator (CO) reports unstable RHR flow and discharge pressure.
- The Duty Operating Supervisor (DOS) enters SEP-1, "Degraded RHR System Capability" and directs RHR pumps secured.
- The DOS also directs the CO to have the PAB Operator reflood the RHR suction line.

**Using the provided Figure 1 of SEP-1, analyze and choose which of the following valves and water sources will be used to perform RHR suction line reflood ?**

- A. The RWST outlet valve (1SI-856A) from the RWST.
- B. The SI Accumulator valve (1SI-841A) from a SI accumulator.
- C. The SFP to RHR valve (1SF-819) from the spent fuel pool cooling system.
- D. The Reactor Vessel Injection valve (1SI-852A) from the safety injection system.

70. The following plant conditions exist on Unit 1 which is at End of Life after a 400 day run:

- The control room team has entered CSP-S.1, "Response to Nuclear Power Generation/ATWS" due to the inability to trip the reactor from the control room.
- Reactor trip breakers have just been reported opened locally by the AO.
- The Control Operator notes "A" S/G pressure and level is trending rapidly downward.
- He also reports RCS temperature is trending downward.

**Given these plant conditions which of the following statements is TRUE ?**

- A. Positive reactivity is being added due partially to a positive moderator temperature coefficient.
- B. Negative reactivity is being added due partially to a positive moderator temperature coefficient.
- C. Positive reactivity is being added due partially to a negative moderator temperature coefficient.
- D. Negative reactivity is being added due partially to a negative moderator temperature coefficient.

71. Given the following plant conditions:

- Unit 1 is operating at full power.
- A normal plant shutdown in accordance with OP-3A, "Normal Power Operation to Low Power Operation" is directed by the DSS.
- The Control Operator inadvertently closes HC-2085 (MSR Control Valve Controller).

**Which of the following choices best describes the expected initial steam generator (S/G) response ?**

- A. S/G pressure goes up, S/G water level goes up.
- B. S/G pressure goes up, S/G water level goes down.
- C. S/G pressure goes down, S/G water level goes up.
- D. S/G pressure goes down, S/G water level goes down.

72. Given the following plant conditions:

- Unit 2 has been operating at full power for 200 days. Unit 1 is shutdown.
- The Auxiliary Operator (AO) is directed to tag out Unit 1 air ejectors, but inadvertently removes Unit 2 air ejectors from service.

**Which of the following choices describes a potential alarm that will INITIALLY be received in the control room as a result of this action ?**

- A. "Condenser Vacuum Low " annunciator (2CO3 F1-8).
- B. "Condenser DELTA T High" annunciator (2CO3 F1-7).
- C. "Service Air Header Pressure Low" annunciator (C01 D1-1).
- D. "Vacuum Control Tank Vacuum Low " annunciator (2CO3 F1-6).

73. Given the following plant conditions:

- Both units initially at full power with a normal electric plant line-up.
- A subsequent Bus Lockout occurs on 1A05
- All equipment operates as designed.

**Based on these plant conditions and your knowledge of AC Electrical Distribution, which of the following statements best explains the status of 480 VAC bus 1B03 ?**

- A. 1B03 is automatically re-energized after a 10 second time delay from alternate source 1B01.
- B. 1B03 is automatically re-energized after a 10 second time delay from alternate source 1B04.
- C. 1B03 is de-energized but can be manually re-energized from alternate source 1B02.
- D. 1B03 is de-energized but can be manually re-energized from alternate source 1B01.

74. Battery pilot cell temperatures are checked by the AO on rounds. If temperatures are high or low, how would this affect the station battery ?

- A. High temp: Battery life would lengthen.  
Low temp: Battery capacity would lengthen.
- B. High temp: Battery capacity would be reduced.  
Low temp: Battery life would shorten.
- C. High temp: Battery life would shorten.  
Low temp: Battery capacity would be reduced.
- D. High temp: Battery capacity would lengthen.  
Low temp: Battery life would lengthen.

75. Emergency Diesel Generator (G-03) control power normally comes from which of the following bus supplies ?

- A. D-11
- B. D-13
- C. D-28
- D. D-40

76. Given the following plant conditions:

- Unit 2 was at 100% power.
- 2P-15B, "B" Safety Injection Pump was OOS service for an oil change prior to event.
- A Large Break LOCA occurred forcing the unit off-line.
- Upon fast bus transfer 2X-04 transformer was lost due to lockout.
- G-02 failed to start and load onto it's associated bus.
- 2SI-852A & B, "Low Head Core Deluge Isolation Valves" remained in their normal at power position.
- All other equipment operates as designed.

**Based on these conditions, if NO operator actions were to occur, which of the following statements is true ?**

- A. Several 10CFR 50.46 acceptance criteria will be exceeded.
- B. The charging pumps will ensure peak centerline temperature doesn't exceed 2200 degrees F.
- C. The SI Accumulator injection will ensure the core remains amenable to core cooling during and after the break.
- D. The RHR Pumps will ensure core temperature is reduced and decay heat is removed for extended periods of time.

77. Which system listed below is physically connected between the liquid radwaste discharge and the circulating water system ?

- A. Condensate System.
- B. Service Water System.
- C. Component Cooling System.
- D. Condenser Air Removal System.

78. Given the following plant conditions:

- Unit 2 is at 100 % power following a 20 day refueling outage.
- The control room team has received several annunciators related to Instrument Air on C01.
- AOP-5B, "Loss of Instrument Air" has been entered.
- All service air and instrument air compressors are running.
- Instrument air header pressure is stable at 78 psig.
- All systems operate automatically as designed.

**What is the expected alignment of the service air and instrument air systems ?**

- A. Only the Instrument air back-up valves (IA-3079/3014) opened.
- B. Only the Instrument air dryer bypass valve(s) (IA-3094-S/3000-S) opened.
- C. Instrument air back-up valves (IA-3079/3014) and dryer bypass valve(s) (IA-3094-S/3000-S) have opened.
- D. Instrument air back-up valves (IA-3079/3014) and dryer bypass valve(s) (IA-3094-S/3000-S) have NOT opened.

79. Given the following:

- A Halon smoke detector in Group "B" in Zone 2 is de-energized for maintenance.
- The detector group is removed from service and appropriate compensatory actions taken.

**Using the diagram provided, determine what the Halon Fire Protection System response would be if a fire occurred in the area of the de-energized smoke detector.**

- A. The Halon system will not actuate automatically and no fire alarm will actuate.
- B. The Halon system will actuate on a Zone 2 thermal detector (HAD) and the control room fire alarm will NOT actuate.
- C. The Halon system will NOT actuate and the control room fire alarm will actuate on a Zone 2 thermal detector (HAD).
- D. The Halon system will actuate on a Zone 2 thermal detector (HAD) and the control room fire alarm will actuate on another smoke detector.

80. Given the following conditions on Unit 1:

- An RCS cooldown is in progress.
- RHR has been placed in service for shutdown cooling.
- RCS wide range temperature (hot leg) is 340 degrees F and slowly lowering.
- Flow controller RHR-626 is in automatic at 10% open.

**If the RHR return header flow transmitter (FT626) failed LOW, which one of the following would correctly describe the plant's response ?**

- A. RHR Heat Exchanger flow control valves (1RH-624/625) will automatically close to attempt to prevent exceeding RCS cooldown rate of 100 F/Hr.
- B. RHR Heat Exchanger bypass valve (1RH-626) will position full open to attempt to maintain RHR desired system flow rate and RCS cooldown will change.
- C. RHR Heat Exchanger bypass valve (1RH-626) will position full close to attempt to maintain RHR desired system flow rate and RCS cooldown will change.
- D. RHR Heat Exchanger flow control valves (1RH-624/625) will automatically open to attempt to maintain desired system flow rate, and cooldown will be faster.

81. With Unit 2 at normal operating pressure, a PORV opens and cannot be isolated. The PRT pressure will initially peak at \_\_\_\_\_, then stabilize eventually at \_\_\_\_\_.

- A. 5 psig, 0 psig.
- B. 100 psig, 100 psig.
- C. 5 psig, containment pressure.
- D. 100 psig, containment pressure.

82. The Hydrogen Recombiner is being installed in accordance with EPIP 10.3, "Post-Accident Containment Hydrogen Reduction".

**What power supply must be available in order to make it operational ?**

- A. 2A-03.
- B. 2B-02.
- C. MCC-1B-11.
- D. MCC-1B-31.

83. During Refueling operations, a Fuel Assembly being removed from the Spent Fuel Rack becomes stuck.

**What will prevent the Fuel Assembly from being damaged by the Hoist?**

- A. Bridge load cell automatically stops hoist movement.
- B. Pool rack releases the stuck assembly when associated shear pin breaks.
- C. Fuel handling tool automatically releases fuel assembly due to excessive load.
- D. The operator must stop the hoist movement based on load cell indication because there are no automatic actions.

84. Given the following:

- Unit 1 is at 100 % Power.
- 1PT-486, "HP first stage turbine pressure transmitter", has stuck at its 100% power value (~550 psig).
- An inadvertent turbine trip occurs due to personal error during the performance of TS-3A, "Turbine Trip Test (Monthly)."

**What is the effect of the failure of 1PT-486 on the response of the condenser steam dump system ?**

Assume that no operator action is taken and Steam Dump Selector is in AUTO.

- A. All of the condenser steam dumps will fully open and remain open.
- B. The condenser steam dump valves remain closed but have a demand signal.
- C. The condenser steam dump valves will maintain RCS average temperature at 554.5 degrees F.
- D. The condenser steam dumps will operate as designed to lower RCS average temperature to 547 degrees F.

85. Given the following plant conditions:

- A steam leak is reported to the control room near the # 4 Feedwater Heater in Unit 1 Turbine Hall.
- The DOS directs a reactor trip and EOP-0, "Reactor Trip or Safety Injection" Immediate actions to be performed.
- Reactor Trip has been verified.

**Based on these plant conditions, interpret which of the following is an acceptable means to verify a turbine trip in accordance with Step 2 of EOP-0.**

- A. "Governor Valves Two Closed" as indicated by annunciator on 1C03.
- B. Generator Output of ZERO MW as indicated on MW meter on 1C01.
- C. One of Two Turbine Stop Valves SHUT as indicated by green lights on 1C03.
- D. "Turbine Valves Closed" bistable lights LIT as indicated by orange lights on 1C04.

86. Given the following plant conditions:

- Both Units are operating at Full Power.
- Ice Melt is being established IAW OI-38, "Circulating Water System Operation".
- Forebay Level has been trending lower.
- Condenser Vacuum has been slowly decaying away on both units.
- "North or South Service Water Header Pressure Low" alarm has annunciated on C-01

**Based on these conditions only, diagnose which of the following is the most likely cause. (Assume the control room team is not responding to alarms and other control room alarms may be occurring)**

- A. Intake Crib Freezing.
- B. Service Water leakage on Unit 2.
- C. Traveling Water Screen Freezing.
- D. Service Water Zurn Strainers are clogging.

87. Following a reactor trip on Unit 1, the following indications are noted:

- |   |          |
|---|----------|
| • SW flow to air cooling units:                   | 980 gpm  |
| • Containment area radiation elevation 66' RE102: | 28 mR/hr |
| • Containment pressure:                           | 25 psig  |
| • Containment "A" sump level:                     | 100 %    |

**Based on the indications given and assuming all systems are in AUTO and function as designed \_\_\_\_\_.**

- A. CI should have occurred, MSIVs should have shut.
- B. CI should NOT have occurred, MSIVs should have shut.
- C. CI should have occurred and MSIVs should remain open.
- D. CI should NOT have occurred, MSIVs should remain open.

88. It has been confirmed that RE-225, combined air ejector in DAM 7 has an instrument malfunction in accordance with RMSASRB 1.0, "Generic RMS Alarm Response Guideline". The DAM count rate exceeds  $5.10E + 05$  cpm and a fail high alarm status is shown at the CT/SS.

**Given the above information, determine what color will be shown on PPCS ?**

- A. Red
- B. White
- C. Yellow
- D. Purple

89. The following plant conditions exist:

- Unit 1 has tripped.
- 1 "A" S/G pressure is 0 psig.
- 1 "B" S/G pressure is 350 psig and slowly lowering.
- Containment Pressure is 30 psig and slowly lowering.
- No Containment Radiation Alarms exist.
- No other abnormal conditions exist and all equipment is functioning as designed.
- The control room team has just entered EOP-0, "Reactor Trip or Safety Injection".

**Which of the following choices is the next procedure that the crew will transition to ?**

- A. EOP-0.1, "Reactor Trip Response".
- B. EOP-3, "Steam generator tube Rupture".
- C. EOP-2, "Faulted Steam Generator Isolation".
- D. EOP-1, "Loss of Reactor or Secondary Coolant".

90. The OS directs an AO to perform pitot tube installation in accordance with OI-70, "Service Water System Operation". According to NP 1.1.4, "Use and Adherence of Procedures and Work Plans", which of the following **BEST** describes the proper method that the OS and AO will use to ensure the current procedure is being utilized for the evolution ?

- A. Obtain procedure from any controlled manual.
- B. Verify the revision number in the controlled index and on EDMS.
- C. Check EDMS for revision number and check for any temporary changes in effect.
- D. Verify revision number in the controlled index and check for any temporary changes in effect.

91. You are performing a monthly surveillance on the AFW system for the "A" steam generator.

**Under which of the following conditions should you initiate a temporary change ?**

- A. Steps two and three must be repeated.
- B. The AFW surveillance procedure incorrectly spells the word auxiliary.
- C. The component description for P-38A is not present in one step of the procedure.
- D. Steps two and three have been confirmed to be in the incorrect order by the DSS.

92. The following plant conditions exist:

- Unit 1 and 2 have each been operating at full power for greater than 100 days.
- P-38A (Electric Motor Driven Auxiliary Feedwater Pump) has just been removed from service for repairs.
- As the oncoming Unit 1 Control Operator attending turnover, upcoming maintenance to be performed during your shift is discussed.

**Which of the following components, if removed from service on your shift, would result in an immediate plant shutdown due to Technical Specification LCO concerns ?** (Assume no other equipment is to be manipulated or maintenance is occurring other than what is mentioned above)

- A. 1P-2A (Charging Pump).
- B. 1P-14A (Containment Spray Pump).
- C. G-04 (Emergency Diesel Generator).
- D. 1W-1A1 (Containment Accident Recirc Fan).

93. Given the following information for an operator:

- Age - 25
- Total lifetime exposure - 15,000 mrem TEDE
- Current year exposure- 1,200 mrem TEDE

A Site Emergency has been declared due to a LOCA outside containment, with limited make-up to the RWST available. The above operator volunteers to make an emergency entry into the penetration area to attempt leak isolation. This action would result in saving a maintenance workers life. The action has all required approvals.

**Of the following choices, what is the MAXIMUM exposure the operator may receive while performing this action ?**

- A. 4,000 mrem TEDE
- B. 10,000 mrem TEDE
- C. 15,000 mrem TEDE
- D. 25,000 mrem TEDE

94. NP.4.2.1, "Plant ALARA Program", provides the requirements and responsibilities for the Alara Program at PBNP.

**Which of the following examples would NOT be an ALARA consideration used for job planning for an upcoming refueling at PBNP ?**

- A. Conduct a dry run at the job site.
- B. Conducting a pre-job brief prior to commencing core off-load.
- C. Temporary shielding used on the refueling bridge machine.
- D. Limiting the amount of time spent over the core during RCCA unlatching.

95. A newly qualified AO has just been assigned to your crew and her first task is to assist in a filter (F-1) changeout. During the pre-job brief, she informed the job lead that prior to working at PBNP, she had been a contractor with Framatone and had already received 2750 mrem during this calendar year. Based on surveys at the job site, you expect her to receive 25 mrem during this job.

**Assuming the new AO has received 0 mrem at PBNP to date, can she be allowed to perform this assignment according to NP 4.2.14, "Administrative Dose Levels/Dose Level Extension Procedure and why or why not ?**

- A. Yes, assign her the job because 2750 mrem is the average dose for AOs.
- B. No, we should reassign her to a low dose job because she exceeded her Federal Limit at her previous job.
- C. No, we should remove her access from the RCA because she has exceeded her admin limit of 2000 mrem.
- D. Yes, assign her the job because the admin dose limit and work group leveling is only applicable for doses received at PBNP as long as total dose is < 4000 mrem/yr.

96. According to HP 2.6, "High Radiation Area Access Control", what is the **DIFFERENCE** between a high radiation area with levels of 900 mrem/hr and one with levels of 1300 mrem/hr ?
- A. The 1300 mrem/hr area requires posting as an "Extremely High Radiation Area"; the 900 mrem/hr area does not.
  - B. The 1300 mrem/hr area requires key-locked doors to prevent unauthorized entry; the 900 mrem/hr area does not.
  - C. The 1300 mrem/hr area requires that an individual entering take an audible dosimeter; the 900 mrem/hr area does not.
  - D. The 1300 mrem/hr area requires that an individual entering have an accompanying RP representative; the 900 mrem/hr area does not.
97. EOP-0, "Reactor Trip or Safety Injection", foldout page lists criteria for tripping reactor coolant pumps (RCP's).

**What is the basis for this action ?**

- A. To allow the steam generator tubes to drain and provide RCS inventory to the core.
  - B. To prevent reactor coolant pump damage from cavitation due to operation with two phase flow.
  - C. To prevent damage to the reactor coolant pump seal stack which could result in additional mass loss from the RCS.
  - D. To avoid the excessive RCS inventory loss that would occur if the reactor coolant pumps were left running and then tripped later in a small break LOCA event.
98. According to OM 3.7, "AOP and EOP Procedure Sets Use and Adherence, which one of the following choices is the **primary responsibility** of the affected Unit Control Operator ?
- A. Reactivity management and primary system operations.
  - B. Ensuring status trees are monitored until the STA arrives.
  - C. Ensuring affected personnel are aware of significant events.
  - D. Implementing AOP/EOP procedure set steps for the affected unit.

99. When used in the EOP's, the term "Maximum Cooldown Rate" implies:

- A. the absolute maximum cooldown rate attainable.
- B. the maximum cooldown rate attainable not to exceed 50 °F/hr.
- C. the maximum cooldown rate attainable using one atmospheric steam dump.
- D. the maximum cooldown rate attainable using no more than two condenser steam dumps full open ensuring operator control.

100. Assume a complete two train actuation of Unit 1 Safety Injection (SI) has occurred. Determine the status of the Service Water Pumps one minute after SI actuation occurred and any necessary operator actions.

- A. P-32 A, B, and F running; operators would need to start a fourth pump to ensure sufficient cooling.
- B. P-32 A, B, C, D, E, and F pumps running; operators would NOT need to take any further action.
- C. P-32 A, B, C, D, E and F pumps running; operators would need to secure a pump to minimize electrical loading.
- D. Only previously operating pumps running; operators would NOT need to start additional pumps to ensure sufficient cooling.

