

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

Applicant Information

Name:

Date: 03/27/2009

Facility/Unit: Fort Calhoun

Region: I II III IV

Reactor Type: W CE BW GE

Start Time:

Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination, you must achieve a final grade of at least 80.00 percent. Examination papers will be collected 6 hours after the examination begins.

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

2009 FORT CALHOUN RO EXAM

NAME: _____

KEY

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- | | | | | | | | | | |
|------|----------|----------|----------|----------|------|----------|----------|----------|----------|
| (1) | A | B | C | D | (39) | A | B | C | D |
| (2) | A | B | C | D | (40) | A | B | C | D |
| (3) | A | B | C | D | (41) | A | B | C | D |
| (4) | A | B | C | D | (42) | A | B | C | D |
| (5) | A | B | C | D | (43) | A | B | C | D |
| (6) | A | B | C | D | (44) | A | B | C | D |
| (7) | A | B | C | D | (45) | A | B | C | D |
| (8) | A | B | C | D | (46) | A | B | C | D |
| (9) | A | B | C | D | (47) | A | B | C | D |
| (10) | A | B | C | D | (48) | A | B | C | D |
| (11) | A | B | C | D | (49) | A | B | C | D |
| (12) | A | B | C | D | (50) | A | B | C | D |
| (13) | A | B | C | D | (51) | A | B | C | D |
| (14) | A | B | C | D | (52) | A | B | C | D |
| (15) | A | B | C | D | (53) | A | B | C | D |
| (16) | A | B | C | D | (54) | A | B | C | D |
| (17) | A | B | C | D | (55) | A | B | C | D |
| (18) | A | B | C | D | (56) | A | B | C | D |
| (19) | A | B | C | D | (57) | A | B | C | D |
| (20) | A | B | C | D | (58) | A | B | C | D |
| (21) | A | B | C | D | (59) | A | B | C | D |
| (22) | A | B | C | D | (60) | A | B | C | D |
| (23) | A | B | C | D | (61) | A | B | C | D |
| (24) | A | B | C | D | (62) | A | B | C | D |
| (25) | A | B | C | D | (63) | A | B | C | D |
| (26) | A | B | C | D | (64) | A | B | C | D |
| (27) | A | B | C | D | (65) | A | B | C | D |
| (28) | A | B | C | D | (66) | A | B | C | D |
| (29) | A | B | C | D | (67) | A | B | C | D |
| (30) | A | B | C | D | (68) | A | B | C | D |
| (31) | A | B | C | D | (69) | A | B | C | D |
| (32) | A | B | C | D | (70) | A | B | C | D |
| (33) | A | B | C | D | (71) | A | B | C | D |
| (34) | A | B | C | D | (72) | A | B | C | D |
| (35) | A | B | C | D | (73) | A | B | C | D |
| (36) | A | B | C | D | (74) | A | B | C | D |
| (37) | A | B | C | D | (75) | A | B | C | D |
| (38) | A | B | C | D | | | | | |

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(1)

A reactor trip has just occurred and the Standard Post Trip Actions are being performed in accordance with EOP-00, STANDARD POST TRIP ACTIONS.

Which of the following parameters requires you to take contingency actions?

- A. All trippable control element assemblies are fully inserted except for B-15. All non-trippable control element assemblies are fully withdrawn.
- B. Instrument air pressure is 85 psig and stable.
- C. Both steam generator wide range levels are 85% and stable.
- D. Pressurizer pressure is 2060 psia and increasing.

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(2)

Given the following plant conditions:

- A loss of load event resulted in a high pressure reactor trip
- Both of the Power-Operated Relief Valves (PORVs) opened
- One of the PORVs failed to close when pressurizer pressure lowered below its setpoint
- Power was not available to the open PORV's block valve during performance of Standard Post Trip Actions
- EOP-03, LOSS OF COOLANT ACCIDENT, was entered
- Power has now been restored to the open PORV's block valve

The PORV block valve associated with the open PORV should NOT be closed if:

- A. Pressurizer level is at 100%.
- B. Pressurizer pressure is 2010 psia.
- C. Reactor vessel level is 83%.
- D. RCS subcooling is 0°F.

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(3)

Given the following plant conditions:

- The plant is in hot shutdown
- Charging and letdown were isolated in response to RCS leakage
- Isolation of charging and letdown terminated the RCS leakage
- Pressurizer heaters have just lost power due to the low level cutout
- All Reactor Coolant Pumps are operating as designed

How much time do the operators have to reestablish charging flow to the RCS before the pressurizer empties assuming RCS cold leg temperature stays steady at 532°F?

- A. 3.5 - 4.5 hours
- B. 5.0 - 6.0 hours
- C. 6.5 - 7.5 hours
- D. 8.0 - 9.0 hours

(4)

The following plant conditions exist during a RCS heatup:

- T-cold is 410°F.
- T-hot is 411°F.
- Core Exit Thermocouples are reading between 410°F and 415°F.
- Pressurizer pressure indicates 955 psia.
- No operations are in effect that could cause a RCS dilution.

Which one of the following Reactor Coolant Pump operating conditions is NOT allowed by the requirements of T.S. 2.1.1?

- A. RC-3A and RC-3C are operable, but not operating. RC-3B and RC-3D are not operable. RC-3A has been shutdown for 35 minutes.
- B. RC-3A is operating. RC-3C is operable, but not operating. RC-3B and RC-3D are not operable. RC-3C has been shutdown for 75 minutes.
- C. RC-3B and RC-3D are operable, but not operating. RC-3A and RC-3C are not operable. RC-3D has been shutdown for 35 minutes.
- D. RC-3C is operating. RC-3D is operable, but not operating. RC-3A and RC-3B are not operable. RC-3D has been shutdown for 75 minutes.

(5)

Given the following plant conditions:

- RCS temperature is 105°F
- Pressurizer pressure is 15 psia
- Shutdown Cooling was in operation per OI-SC-1, SHUTDOWN COOLING INITIATION
- LPSI pump, SI-1A, was running
- The pressurizer manway is removed
- Offsite power has just been lost
- The Emergency Diesel Generators operate as designed

What action (if any) should you perform after the Emergency Diesel Generators start and their output breakers close?

- A. Manually restart the LPSI pumps.
- B. Un-isolate the LPSI system from the RCS and restart the LPSI pumps.
- C. No action is necessary; the Emergency Diesel Generators will pick up the LPSI pumps as dead bus loads.
- D. No action is necessary; the sequencers will restart LPSI pumps within one minute of the breaker closing.

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(6)

The following plant conditions exist:

- The plant was operating at 65% power with all systems are aligned for normal operation
- The "CC WATER SURGE TANK AC-2 HI OR LO LEVEL" alarm was received
- The Auxiliary Building Operator reported that he heard a loud rumbling noise from the operating CCW pump, AC-3A
- You observe fluctuating current and discharge pressure for AC-3A
- The CCW surge tank level is 8 inches and lowering
- The reactor was manually tripped two minutes after the AUXILIARY COOLANT FROM CRDM FLOW LO alarm was received

What action should be performed in addition to Standard Post Trip Actions in accordance with AOP-11?

- A. Trip one RCP in each loop within 3 minutes. Trip the remaining RCPs if high bearing temperature alarms are received.
- B. Trip one RCP in each loop within 5 minutes. Trip the remaining RCPs if high bearing temperature alarms are received.
- C. Shutdown all RCP's within 3 minutes.
- D. Shutdown all RCP's within 5 minutes.

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(7)

Given the following sequence of events:

- The plant was operating at full power
- Pressurizer level channel "Y" was selected as the controlling channel
- LT-101Y failed
- Letdown flow increased
- Pressurizer level lowered to 31%
- Pressurizer pressure lowered to 1920 psia
- All pressurizer heaters turned off.
- The Operator then took manual control of charging and letdown and restored level to 60%
- The operator then selected channel "X" as the controlling channel
- Pressurizer pressure control remained in automatic

Current plant conditions are:

- Pressurizer pressure and level are both stable with level at 60% and pressure at 1950 psia
- Pressurizer steam temperature indicates 632°F
- Pressurizer liquid temperature indicates 620°F

How will pressurizer pressure respond?

- A. Pressurizer pressure will steadily increase to 2100 psia.
- B. Pressurizer pressure will remain at approximately 1950 psia until the Level Control Bistables, LC-101-1 and LC-101-2, located behind CB-1/2/3 are reset.
- C. Pressurizer pressure will remain at approximately 1950 psia until Channel "X" is selected on PZR Heater Cutout Channel Select Switch, HC-101-1.
- D. Pressurizer pressure will remain at approximately 1950 psia until the water in the pressurizer reaches saturation temperature.

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(8)

The plant experiences an ATWS event where both the reactor and turbine failed to trip. What action does EOP-00 direct you to perform to limit reactor power?

- A. Trip all Reactor Coolant Pumps.
- B. Transfer charging pump suction to the SIRWT.
- C. Insert the non-trippable CEAs.
- D. Close the MSIVs.

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(9)

Given the following plant conditions:

- The plant is operating at 20% power
- A high radiation alarm has been received on RM-054B
- Counts are rising RM-057 but below the alarm setpoint
- Charging flow is 40 gpm
- Letdown flow is 30 gpm
- Pressurizer pressure is 2080 psia and steady
- Pressurizer level is 48% and steady
- There are no containment radiation alarms
- Containment pressure is steady
- Containment sump level is steady

Which one of the following actions will occur automatically with these plant conditions?

- A. Blowdown flow from Steam Generator, RC-2B will be isolated. Blowdown flow will continue from RC-2A.
- B. Blowdown flow from both Steam Generators will be isolated.
- C. RCV-978, 6th Stage Extraction Isolation Valve, will close.
- D. A Ventilation Isolation Actuation Signal (VIAS) will be generated

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(10)

Given the following plant conditions:

- A tube has ruptured in Steam Generator, RC-2A
- The steam line from Steam Generator, RC-2B, has ruptured in room 81
- EOP-00, STANDARD POST TRIP ACTIONS, has been completed
- EOP-20, FUNCTIONAL RECOVERY PROCEDURE, has been entered

In mitigating this event, which steam generator(s), if any, should be isolated?

- A. Neither Steam Generator should be isolated.
- B. Only RC-2A should be isolated.
- C. Only RC-2B should be isolated.
- D. Both steam generators should be isolated.

(11)

A break on the feedwater line to Steam Generator, RC-2B, inside containment has occurred.

The following plant conditions exist:

- SGIS has actuated
- Heat removal has been established using Steam Generator, RC-2A.
- AFW Pump, FW-6, is feeding Steam Generator RC-2A and is the only available AFW pump.
- Steam Generator, RC-2B, has dried out.
- No Reactor Coolant Pumps are running.

In accordance with EOP-05, UNCONTROLLED HEAT EXTRACTION, which one of the following actions should be taken and for what reason?

- A. AFW flow should be established to RC-2B to help promote natural circulation flow in both RCS loops.
- B. AFW flow should be established to RC-2B to increase decay heat removal.
- C. AFW flow should NOT be established to RC-2B because it would result in a positive reactivity addition.
- D. AFW flow should NOT be established to RC-2B because FW-6 does not have the capacity to feed both S/Gs simultaneously.

(12)

The following plant conditions exist:

- A loss of 161 KV to the plant resulted in fast transfer of vital buses 1A3 and 1A4 to 345 KV
- This was followed by a loss of load that resulted in a reactor trip
- Both D/Gs failed to start due to a common mode failure resulting in a station blackout
- Breakers 1A11, 1A13, 1A22 and 1A24 are open
- The generator field breaker is closed
- The Kirk key for disconnect, DS-T1, has been inserted and turned
- The isolated phase bus duct cooling units are off
- All Main Steam Stop Valves are closed
- Both DC buses are energized

Which one of the following actions must be taken to allow disconnect, DS-T1, to be opened from CB-20 prior to restoring 345 KV power to buses 1A3 and 1A4?

- A. Breakers 1A13 and 1A24 must be closed.
- B. The generator field breaker must be opened.
- C. The Kirk key Interlock must be disengaged.
- D. An isolated phase bus duct cooling unit must be started.

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(13)

The plant tripped from 100% power following a loss of all offsite power. The following conditions exist:

- RCS pressure is 2000 psia.
- Pressurizer level is 40%.
- Steam Generator Pressures are 900 psia.
- Steam Generator Wide Range levels are 40%.
- Hot leg temperatures are 575°F.
- Cold leg temperatures are 532°F.

Which of the following actions would be most effective in enhancing natural circulation?

- A. Raise RCS pressure.
- B. Raise Pressurizer level.
- C. Raise Steam Generator pressures.
- D. Raise Steam Generator levels.

(14)

Given the following plant conditions:

- The plant was operating at full power
- Power was lost to Instrument bus AI-40A
- AOP-16, LOSS OF INSTRUMENT BUS POWER, was entered

AOP-16, Section II, "Loss of Instrument Bus AI-40A", Step 14 states "Consider closing BOTH of the PORV (Power-Operated Relief Valves) Block Valves"

What is the purpose of this step?

- A. An additional vital instrument bus failure will result in opening ONE of the PORVs.
- B. An additional vital instrument bus failure will result in opening BOTH of the PORVs.
- C. An additional vital instrument bus failure will result in the inability to close ONE of the PORV Block Valves.
- D. An additional vital instrument bus failure will result in the inability to close BOTH of the PORV Block Valves.

(15)

The following plant indications were noted following a reactor trip.

- Bus Power Failure DC Distribution Panel 1 Light is off.
- Bus Power Failure DC Distribution Panel 2 Light is on.
- The DC BUS#1 LOW VOLT annunciator is in alarm
- The 43/FW Switch is in the OFF position.
- All NORMAL/OVERRIDE switches on AI-66A are in NORMAL.
- FW-6 can NOT be started from CB-10,11.

In accordance with AOP-16, LOSS OF INSTRUMENT BUS POWER, which one of the following actions is required to be able to start FW-6?

- A. Place the 43/FW Switch in the AUTO position.
- B. Start FW-6 from AI-66A after placing the NORMAL/OVERRIDE switches on AI-66A to OVERRIDE.
- C. Use the 1A1-1A3 Emergency MTS button, PB2-1A1-1A3 PBS, to switch to the emergency DC source.
- D. Start FW-6 from the Alternate Shutdown Panel, AI-179.

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(16)

One of the two 20 inch underground Raw Water headers from the intake structure to the auxiliary building completely ruptured.

How does isolating the ruptured header affect the ability to provide cooling to the RW/CCW heat exchangers?

- A. Raw Water can be supplied to all of the RW/CCW heat exchangers but only two of the Raw Water Pumps can be used.
- B. Raw Water can only be supplied to two of the RW/CCW heat exchangers and only two of the Raw Water Pumps can be used.
- C. Raw Water can be supplied to all of the RW/CCW heat exchangers but only three of the Raw Water Pumps can be used.
- D. Raw Water can only be supplied to three of the RW/CCW heat exchangers and only three of the Raw Water Pumps can be used.

(17)

The reactor has been manually tripped following a sudden loss of instrument air pressure.

According to AOP-17, Loss of Instrument Air, which of the following actions should be taken to prevent RCS cooldown?

- A. Close FCV-1101 and FCV-1102 using DCS.
- B. Maximize S/G blowdown flow.
- C. Initiate a Steam Generator Isolation Signal (SGIS).
- D. Manually trip all Main Feedwater Pumps.

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(18)

Given the following plant conditions:

- The plant is operating at 10% reactor power
- A loss of stator water cooling occurred
- Attempts to restore stator water cooling have been unsuccessful
- Stator cooling water outlet temperature has risen to 83°C

What action is required by AOP-27, GENERATOR MALFUNCTIONS?

- A. Manually trip the reactor.
- B. Manually trip the turbine.
- C. Manually trip the main generator output breakers.
- D. Manually open the main generator field breaker.

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(19)

Given the following plant conditions:

- A reactor startup is being performed using OP-2A, PLANT STARTUP
- The brake on one of regulating group 2 CEAs fails to release
- The CEAs are being withdrawn in the manual sequential mode.

When will a SCEAPIS (DCS) rod block signal be generated?

- A. When any CEA in group 2 is withdrawn 8 inches above the stuck CEA.
- B. When any CEA in group 2 is withdrawn 4 inches above the stuck CEA.
- C. When any CEA in group 1 reaches the upper rod stop.
- D. When any CEA in group 3 begins to withdraw.

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(20)

Given the following plant conditions:

- A power increase is in progress per OP-4, LOAD CHANGE AND NORMMAL POWER OPERATION
- The reactor is at 80% power
- Group 4 CEAs are at 52 inches
- All other CEAs are fully withdrawn.

Using the attached PDIL curve, determine what action must be taken as a result of these conditions?

- A. Immediately commence emergency boration.
- B. Withdraw group 4 CEAs to above the short term insertion limit.
- C. Withdraw group 4 CEAs until proper group overlap is achieved.
- D. Place the plant in hot shutdown within 6 hours.

(21)

Given the following:

- The AI-149 FIRE DETECTION ALARM OR TROUBLE alarm was received
- The Control Room Fire Detection Computer, PC-66, indicates that multiple detectors in the Cable Spread Room are in alarm
- The EONT was dispatched and reports that Halon is being discharged into the Cable Spread Room

In accordance with AOP-06, FIRE EMERGENCY, what action should be taken by the Control Room Operators?

- A. Trip the reactor, open clutch power supply breakers, close the PORV block valves and evacuate the Control Room.
- B. Trip the reactor, close the PORV block valves, start both Fire pumps, FP-1A and FP-1B, and evacuate the Control Room.
- C. Trip the reactor, open clutch power supply breakers, close the PORV block valves and place the Control Room HVAC in Recirculation Mode.
- D. Close the PORV block valves, start both Fire pumps, FP-1A and FP-1B, and place the Control Room HVAC in Recirculation Mode.

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(22)

The following power indications are observed 10 minutes after a reactor trip:

- All four WR NI Channels are indicating $3 \times 10^{-3}\%$ Power and lowering.
- All four WR NI Channels are indicating a startup rate of -0.1 DPM and steady.
- All four Power Range NI Channels are indicating 0% power and steady.
- All four Delta-T Power Channels are indicating 2% power and lowering.

A miscalibration of which of the following could cause these indications?

Assume trip from full power.

- A. Wide Range NI power indication channels.
- B. Wide Range NI startup rate channels.
- C. Power Range NI channels.
- D. Delta-T Power Channels.

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(23)

Radioactive liquid that leaks inside containment will collect in the containment sump. The containment sump pumps will normally pump this radioactive water to the:

- A. Reactor Coolant Drain Tank.
- B. Waste Holdup Tanks.
- C. Waste Monitor Tanks.
- D. Spent Regenerant Tanks.

(24)

The radioactive gases released following a waste gas decay tank rupture will consist mostly of isotopes of:

- A. Xenon and Krypton.
- B. Iodine and Cesium.
- C. Tritium and Carbon.
- D. Argon and Neon.

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(25)

Given the following sequence of events:

- Condenser vacuum was lost
- The turbine and reactor tripped
- Immediately following the trip, a small LOCA occurred inside containment
- PPLS and CPHS have actuated
- All HPSI pumps failed to start
- RCS pressure is steady at 1000 psia
- Reactor Vessel Level is at 43%

Which of the following valves can be used by the Balance of Plant Operator to immediately begin a RCS cooldown in accordance with EOP-03?

- A. Steam Dump Valves, TCV-909-1,2,3,4.
- B. Steam Bypass Valve, PCV-910.
- C. Atmospheric Dump Valve, HCV-1040.
- D. Air Assisted Main Steam Safety Valves, MS-291, MS-292.

(26)

FC-214, REACTOR COOLANT DAILY SUMMARY REPORT, contains the following information:

- Fuel Reliability Indicator (FRI): 1.1×10^{-4} uCi/gm
- Dose Equivalent Iodine: 0.8 uCi/gm
- Xe-133 Activity: 2.8 uCi/gm
- RCS Total Activity: 5.5 uCi/gm
- E-bar: 0.68 Mev

Which one of the following actions is required?

- A. AOP-09, HIGH RADIOACTIVITY, must be entered due to the Fuel Reliability Indicator.
- B. AOP-09, HIGH RADIOACTIVITY, must be entered due to the Xe-133 Activity
- C. AOP-21, REACTOR COOLANT SYSTEM HIGH ACTIVITY, must be entered due to Dose Equivalent Iodine.
- D. AOP-21, REACTOR COOLANT SYSTEM HIGH ACTIVITY, must be entered due to the RCS Total Activity.

(27)

The "REACTOR VESSEL FLANGE LEAK" alarm was received due to leakage past the Reactor Vessel Flange inner O-Ring. Actions were taken to reset the alarm condition.

What one of the following parameters would cause an alarm if leakage occurs past the outer O-Ring?

- A. Increasing pressure.
- B. Increasing temperature.
- C. Decreasing pressure.
- D. Decreasing temperature.

(28)

Given the following:

- You have been directed to shutdown Reactor Coolant Pump, RC-3A in accordance with OI-RC-9
- You notice the Control Switch for Oil Lift Pump, RC-3A-1, is in the "AFTER START" position and that the Oil Lift Pump is not operating

Which one of the following actions, if any, is required to ensure proper lubrication of the RCP bearings?

- A. Do not trip RCP, RC-3A unless its' Oil Lift Pump is running.
- B. If the Oil Lift Pump does not start automatically after tripping RC-3A, then momentarily place the Oil Lift Pump Control Switch in the "STOP" position then back to the "START" position to reset it.
- C. If the Oil Lift Pump does not start automatically after tripping RC-3A, then hold the Oil Lift Pump Control switch in the "START" position until the "ZERO SPEED" light comes on.
- D. No action is required. The Oil Lift Pump is only needed when starting a Reactor Coolant Pump.

(29)

Given the following plant conditions:

- Leakage through Power Operated Relief Valve (PORV), PCV-102-1, has been discovered
- The leaking PORV has been isolated by closing its block valve, HCV-151
- HCV-151 also leaks through
- VCT makeup is in its normal alignment

Assuming no operator action is taken, how will the VCT level control system first respond?

- A. FCV-269, FCV-269X and FCV-269Y will open automatically to supply water to the VCT at the neutral blend boron concentration.
- B. FCV-269, FCV-269X and FCV-269Y will open automatically to supply water to the charging pump suction at the neutral blend boron concentration.
- C. LCV-218-3 will open and LCV-218-2 will close automatically to supply water to the VCT at the SIRWT boron concentration.
- D. LCV-218-3 will open and LCV-218-2 will close automatically to supply water to the charging pump suction at the SIRWT boron concentration.

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(30)

A plant shutdown and cooldown are being performed. One hour after placing shutdown cooling in service, the following plant indications are observed:

- Pressurizer pressure and level are lowering.
- Containment sump level is steady.
- CCW surge tank level and pressure are increasing.
- Steam Generator levels are steady.
- Steam Generator pressures are lowering slowly.
- RM-053 is in alarm.
- All other process radiation monitors are reading normal.

Which one of the following could cause these indications?

- A. A raw water/CCW heat exchanger tube leak
- B. A regenerative heat exchanger tube leak.
- C. A shutdown cooling heat exchanger tube leak.
- D. A steam generator tube leak.

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(31)

Given the following:

- EOP/AOP Attachment 7, "SDC WITH RAS" has been entered following a Loss of Coolant Accident
- A RCS cooldown is being conducted using shutdown cooling
- The RCS cold leg temperatures are currently 170°F.

What is the maximum allowable cooldown rate under these conditions?

- A. 25°F/hr.
- B. 50°F/hr.
- C. 100°F/hr.
- D. 200°F/hr.

(32)

The plant is operating at full power. HPSI pump, SI-2A, has been tagged out of service due to a breaker problem. **Normal actions have been taken.**

How does this affect the operability of the HPSI train associated with SI-2A per Technical Specifications?

- A. The HPSI train is considered operable if SI-2B is operable.
- B. The HPSI train is considered operable if SI-2C is operable.
- C. One train of HPSI is inoperable, SI-2A must be made operable within 24 hours.
- D. One train of HPSI is inoperable, SI-2A must be made operable within 7 days.

(33)

How is a steam bubble formed in the pressurizer following a refueling outage per OP-2A, PLANT STARTUP?

- A. With the pressurizer level at approximately 50%, pressurizer heaters are used to heat the water to saturation. Non-condensable gases are allowed to dissolve in the water.
- B. With the pressurizer level at approximately 90%, pressurizer heaters are used to heat the water to saturation. Non-condensable gases are allowed to dissolve in the water.
- C. With the pressurizer level at approximately 50%, pressurizer heaters are used to heat the water to saturation. Non-condensable gases are vented to the PQT or VCT using OI-CH-3, CHEMICAL AND VOLUME CONTROL SYSTEM NORMAL OPERATION OF VOLUME CONTROL TANK, Attachment 5 or 6.
- D. With the pressurizer level at approximately 90%, pressurizer heaters are used to heat the water to saturation. Non-condensable gases are vented to the PQT or VCT using OI-CH-3, CHEMICAL AND VOLUME CONTROL SYSTEM NORMAL OPERATION OF VOLUME CONTROL TANK, Attachment 5 or 6.

(34)

Given the following plant conditions:

- The plant is operating at 100% power.
- Pressurizer Safety Valve, RC-142, has seat leakage.
- Quench Tank temperature and level are rising.
- Quench Tank pressure is 8 psig and increasing slowly.

Which one of the following automatic actions will occur assuming no operator actions are taken?

- A. Quench Tank relief valve, RC-125, will open resulting in increasing containment pressure.
- B. Quench Tank relief valve, RC-125, will open and relieve to the waste gas system.
- C. Quench Tank vent valve, HCV-155, will open and vent to the containment vent header and the RCDT outlet containment isolation valve will close.
- D. Quench Tank vent valve, HCV-155, will open and the Quench Tank rupture disk will rupture resulting in increasing containment pressure.

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(35)

Given the following:

- The CCW system is being started up in accordance with OI-CC-1
- All pre-requisites have been met
- All CCW pumps are off.

What action will you direct the EONA to take before starting the first CCW pump, AC-3A?

- A. Ensure CCW Surge tank pressure is greater than 60 psig.
- B. Vent AC-3A using its casing vent valve.
- C. Fully open the discharge valve for AC-3A.
- D. Fully close the discharge valves for AC-3B and AC-3C.

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(36)

Given the following:

- A plant transient resulted in valid SIAS and CIAS actuations
- COMPONENT COOLING WATER SYSTEM LOW PRESSURE alarm came in 40 seconds ago
- CCW Header Pressure, PI-499, indicates 118 psig
- HCV-438A/B/C/D are closed in automatic
- CCW Surge Tank Pressure indicates 41 psig
- All CCW Pumps are running

Which one of the following conditions could cause these indications?

- A. PI-499, CCW header pressure, has failed low.
- B. CCW Pressure Switches, PCS-412 and PCS-413, have failed low.
- C. PIC-2802, CCW Surge Tank Pressure indication, has failed low.
- D. HCV-438A/B/C/D have inadvertently closed resulting in low CCW pressure to the RCPs.

(37)

Given the following plant conditions:

- A Reactor Coolant System cooldown is in progress for a refueling outage
- Shutdown cooling is in operation per OI-SC-1
- RCS temperature is 120°F
- RCS pressure is 235 psia
- Reactor Coolant Pumps, RC-3A and RC-3B, are operating.
- Pressure is being controlled manually using Main pressurizer spray and heaters.

What actions should be taken before shutting down Reactor Coolant Pumps, RC-3A and RC-3B, in accordance with OI-RC-9?

- A. RCS pressure should be lowered to less than 215 psia.
- B. RCS temperature should be lowered to less than 110°F.
- C. The RCS should be borated to the refueling boron concentration.
- D. RCS pressure control using Auxiliary spray should be established.

(38)

Given the following plant conditions:

- Bus Power Failure DC Distribution Panel 1 Light is off
- DC BUS#1 LOW VOLT annunciator is in alarm
- DC Bus #1 voltage indicates 0 volts
- Power has been lost to the "A" DSS 86-Relay

How will operation of the Diverse Scram System (DSS) be affected?

- A. The DSS will initiate a reactor trip.
- B. The DSS will go to a "1 of 3" trip logic.
- C. The "A" DSS 86-Relay will not be capable of generating a reactor trip.
- D. The DSS will not be capable of generating a reactor trip.

(39)

Given the following:

- The power supply to RPS Clutch Power Supply Breaker, CB-AB, will be transferred from Instrument Bus "B" to Instrument Bus "A".
- Inverter "A" is supplying power to Instrument Bus "A" and Swing Inverter, EE-8U, is supplying power to Instrument Bus "B".

Which one of the following actions will be taken before placing the Clutch Power Supply Transfer Switch, RPS/TS-AB, in the Instrument Bus A (#1) position in accordance with OI-EE-4?

- A. Cross-tie Instrument Bus "A" to Instrument Bus "C".
- B. Bypass Inverter "A".
- C. Transfer Instrument Bus "B" supply to Inverter "B".
- D. Bypass Swing Inverter 8-U.

(40)

Given the following:

- The plant was operating at 50% power when a LOCA occurred
- The reactor tripped automatically
- PPLS, CPHS, SIAS, CIAS, VIAS and SGIS all actuated
- The sequencers begin starting safeguards motors
- During the starting sequence bus 1A3 voltage and transformer T1A3 voltage decreased below the OPLS setpoint

How will the OPLS relays respond and what action, if any, should be taken by the Operators to ensure safeguards equipment actuates?

- A. OPLS will not actuate. Operators should trip both 86A/OPLS and 86B/OPLS.
- B. 86A/OPLS will actuate. Operators should trip 86B/OPLS.
- C. 86B/OPLS will actuate. Operators should trip 86A/OPLS.
- D. 86A/OPLS and 86B/OPLS will both actuate. No operator action is required.

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(41)

From where do the CEDM Cooling Fans, VA-2A and VA-2B, take suction?

- A. Directly from the containment coolers.
- B. From the seismic skirt area.
- C. Directly from the containment atmosphere.
- D. From the nuclear detector well cooling system.

(42)

Given the following:

- ECCS actuation has occurred due to a PPLS
- EOP-03, LOSS OF COOLANT ACCIDENT, has been entered
- Step 33 has been reached
- Step 33 says, "Verify that the Containment Sump level rises as the SIRWT level lowers."
- SIRWT level is 95 inches and lowering
- Containment sump level is low and not rising

What action should be taken per EOP-03?

- A. Minimize ECCS flow to the minimum required to remove decay heat.
- B. Initiate containment spray to ensure adequate containment sump level.
- C. Begin blended makeup to the SIRWT to increase SIRWT inventory.
- D. Trip the LPSI pumps to reduce SIRWT depletion rate.

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(43)

In order to maintain steam generator pressure below 1100 psia following a loss of load from 100% power, Technical Specifications require that _____ be operable in modes 1 and 2.

- A. All 10 Main Steam Safety Valves.
- B. 9 of 10 Main Steam Safety Valves.
- C. 4 of 5 Main Steam Safety Valves on each Steam Generator.
- D. 3 of 5 Main Steam Safety Valves on each Steam Generator.

(44)

Given the following plant conditions:

- The plant is operating at full power
- All Feedwater Reg valves and Bypass valves are in AUTO on DCS
- The Bypass valves are closed
- Both DCS level controllers are in AUTO on DCS
- Narrow range level in both Steam Generators is at 63%

How should the Feedwater Reg valves and Bypass valves respond to a reactor trip?

- A. The Feedwater Reg valves will ramp closed. The Feedwater Bypass valves will initially open to 40-45% and control narrow range water level at 63%
- B. The Feedwater Reg valves will ramp closed. The Feedwater Bypass valves will initially open to 40-45% and control narrow range water level at 35%
- C. The Feedwater Reg valves will initially ramp down to 8% and control narrow range water level at 63%. The Feedwater Bypass valves will remain closed.
- D. The Feedwater Reg valves will initially ramp down to 8% and control narrow range water level at 35%. The Feedwater Bypass valves will remain closed.

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(45)

To prevent a loss of RCS heat removal following a total loss of feedwater, either AFW flow must be initiated or once-through-cooling must be established when:

- A. Wide Range level in either S/G falls below 32%.
- B. Wide Range levels in both S/G's fall below 32%.
- C. An uncontrolled rise in RCS T-cold of 6°F.
- D. An uncontrolled rise in RCS pressure of 50 psi.

(46)

Given the following plant conditions:

- The plant was operating at full power
- An electrical grid disturbance results in degraded grid voltage
- AOP-31, 161 KV GRID MALFUNCTIONS, was entered
- The voltage on all 4160 V buses is less than the minimum required per AOP-31
- The voltage on all 480 volt buses is less than the minimum required per AOP-31
- The reactor was tripped and EOP-00, STANDARED POST TRIP ACTIONS, was entered

What actions are directed by AOP-31 after tripping the reactor and entering EOP-00?

- A. Trip all pumps fed by 4160 V buses and manually initiate a 480 volt load shed.
- B. Trip all pumps fed by 4160 V buses, parallel Diesel Generators to buses 1A4 and 1A3 and open their respective feeder breakers.
- C. Deenergize buses 1A4 and 1A3 by opening their respective feeder breakers and allowing the Diesel Generators to power the buses, manually initiate the sequencers to start required loads.
- D. Deenergize buses 1A4 and 1A3 by opening their respective feeder breakers and allowing the Diesel Generators to power the buses, manually start required loads.

(47)

Given the following:

- The plant was operating at full power
- The DC BUS #1 GROUND annunciator came into alarm
- The EONT has been dispatched to 125 VDC Bus 1 EE-8F
- You have been directed to check the DC Bus at AI-41A for indications of a ground in accordance with ARP-CB-20/A15.

Which one of the following is an indicator of a severe ground on 125V DC Bus #1 at AI-41A?

- A. Both white lights will be brightly lit and one Ground Fault Voltmeter will indicate low voltage.
- B. One white light will be brightly lit and one Ground Fault Voltmeter will indicate low voltage.
- C. Both white lights will be brightly lit and both Ground Fault Voltmeters will indicate low voltage.
- D. One white light will be brightly lit and both Ground Fault Voltmeters will indicate low voltage.

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(48)

The timer on battery charger #1, EE-8C, is being used to place an equalizing charge on battery #1.

What voltage would be expected to be indicated on DC bus #1 during this operation and when the timer times out?

- A. 133-137 volts dropping to 123-127 volts.
- B. 138-142 volts dropping to 123-127 volts.
- C. 133-137 volts dropping to 128-132 volts.
- D. 138-142 volts dropping to 128-132 volts.

(49)

Given the following plant conditions:

- A large break LOCA occurred in containment
- Offsite power was lost at the same time
- Both Diesel Generators started
- DG-1's speed only increased to 700 rpm due to a problem with its governor

How would the ECCS pumps normally powered by DG-1 be affected?

- A. The output breaker from DG-1 would not close and there would be no power to the pumps.
- B. The output breaker from DG-1 would close, but the sequencers would not close the individual pump breakers.
- C. The output breaker from DG-1 would close and the sequencers would close the individual pump breakers, but the DG-1 output breaker would soon open due to an overcurrent condition.
- D. The output breaker from DG-1 would close and the sequencers would close the individual pump breakers, but the pumps would run at reduced speed and flow.

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(50)

Given the following plant conditions:

- The plant is operating at 90% power 10 months into the operating cycle
- Ion Exchanger, CH-8B, has just been placed into service
- Letdown temperature transmitter, TE-2897, has just been recalibrated
- Atmospheric dump valve, HCV-1040, was just unisolated
- New fluid has just been added to the EHC system
- Power range NI power is rising slowly on all channels
- Delta T power is rising slowly on all channels
- All hot and cold leg temperatures are rising slowly

What action should be taken based on these indications?

- A. Bypass the ion exchangers using OI-CH-2.
- B. Manually increase CCW flow through the letdown heat exchanger using OI-CH-2.
- C. Isolate the atmospheric dump valve using OI-MS-1A.
- D. Check the EHC fluid for air bubbles using OI-ST-12.

(51)

Given the following plant conditions:

- There is high activity in the RCS
- A steam generator tube leak exists in RC-2B
- RM-064 has been placed in service with the selector switch placed in the "auto" position

The indicated radiation level on RM-064 will:

- A. Read background radiation only.
- B. Peg high and stay that way.
- C. Alternate between high and low readings.
- D. Slowly continue to rise.

(52)

Given the following conditions:

- A steam line has ruptured inside containment
- The CCW surge tank has ruptured.
- All other Engineered Safeguards Features are operating as designed
- River level is 990 feet
- Containment pressure is 40 psia
- Containment temperature is 190°F

Should Raw Water backup cooling be supplied to the Containment Coolers in accordance with AOP-11, LOSS OF COMPONENT COOLING WATER and why?

- A. Yes, because both Containment temperature and pressure are high.
- B. No, because they are not needed with Containment Spray operating.
- C. No, because Containment temperature is too high.
- D. No, because river level is too low.

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(53)

Given the following plant conditions:

- The plant was operating at 100% power
- Raw Water pumps, AC-10A and AC-10B were running
- A Loss of Coolant Accident occurred coincident with a loss of offsite power
- Diesel Generator, DG-2, failed to start

Which Raw Water pumps will be running after sequencer operation?

- A. AC-10A and AC-10B.
- B. AC-10A and AC-10C.
- C. AC-10B and AC-10D.
- D. AC-10C and AC-10D.

(54)

Given the following plant conditions:

- The plant is operating at full power
- The PLANT AIR PRESS LO annunciator alarmed
- Soon after, the INSTRUMENT AIR PRESS LO annunciator alarmed
- On CB-10,11, PI-1750, Instrument Air Pressure, is cycling between 80 and 85 psig

Which one of the following failures could cause these indications?

- A. A leak in an instrument air line inside containment.
- B. A stuck open relief valve on an air receiver.
- C. A clogged or flooded air dryer.
- D. A leak in the turbine building service air header.

(55)

A mechanical interlock is provided on the Personnel Air Lock (PAL) doors to ensure that:

- A. The Inner PAL door cannot be opened with a high differential pressure across it.
- B. The Inner PAL door cannot be opened unless the outer PAL door is closed.
- C. The Outer PAL door cannot be opened from the outside with a Containment Isolation Actuation Signal (CIAS) present.
- D. The Outer PAL door cannot be opened from the outside with a Containment Radiation High Signal (CRHS) present.

(56)

Given the following plant conditions:

- A steam line break has occurred in Room 81
- PPLS and SGIS have actuated
- The affected steam generator has blown dry
- Pressurizer level is 60% and rising
- Pressurizer pressure is at 1650 psia and rising

In accordance with EOP-AOP Attachment 23, RESTORATION OF LETDOWN, what action should be taken to allow the letdown isolation valves, HCV-204 and TCV-202 to be opened?

- A. Reset Engineered Safeguards relays.
- B. Block PPLS, reset PPLS and CIAS lockout relays.
- C. Place CIAS override switches for HCV-204 and TCV-202 in override.
- D. Place Defeat switch for HCV-204 in the defeat position.

(57)

How could inoperability of the Containment Purge Exhaust Fans affect a refueling outage?

- A. Containment entry could be delayed due to higher airborne activity.
- B. Containment entry could be delayed due to higher temperatures in containment.
- C. Fuel movement could be delayed because Tech Specs require operability of the purge fans.
- D. Plant restart could be delayed because Tech Specs require operability of the purge fans.

(58)

Given the following plant conditions:

- The plant is in a refueling outage
- Shutdown Cooling is in service
- The Refueling Cavity is flooded
- The core has been offloaded to the Spent Fuel Pool
- Spent Fuel Pool Cooling pump, AC-5A, has just tripped and cannot be restarted
- Spent Fuel Pool Cooling pump, AC-5B, will not start

How will alternate spent fuel pool cooling be established per AOP-36, LOSS OF SPENT FUEL POOL COOLING?

- A. The Fuel Transfer Canal Drain pumps, AC-13A and AC-13B, will be aligned to circulate water through the Spent Fuel Pool.
- B. The Fuel Transfer Canal Drain pumps, AC-13A and AC-13B, will be aligned to circulate water between the Refueling Cavity and Spent Fuel Pool, back through the Fuel Transfer Tube.
- C. The Low Pressure Safety Injection Pumps, SI-1A and SI-1B, will be aligned to circulate water through the Spent Fuel Pool.
- D. The Low Pressure Safety Injection Pumps, SI-1A and SI-1B, will be aligned to circulate water between the Refueling Cavity and Spent Fuel Pool, back through the Fuel Transfer Tube.

(59)

How will the Steam Dump and Bypass valves respond to an uncomplicated reactor trip from full power if the output from pressure controller PIC-910 fails low?

(Assume all systems are in automatic.)

- A. The Steam Dump Valves, TCV-909s, will open fully and then reclose. The Bypass Valve, PCV-910, will open fully and remain open.
- B. The Steam Dump Valves, TCV-909s, will open fully and then modulate to control RCS average temperature between 530°F and 535°F. The Bypass Valve, PCV-910, will remain fully closed.
- C. The Steam Dump Valves, TCV-909s, and the Bypass Valve, PCV-910, will open fully and then modulate to control RCS average temperature between 530°F and 535°F.
- D. The Steam Dump Valves, TCV-909s, and the Bypass Valve, PCV-910, will open fully and then modulate to control RCS average temperature between 535°F and 540°F.

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(60)

Given the following:

- Condenser Evacuation pumps, FW-8A and FW-8C, are operating
- FW-8B is the standby pump
- The "43/FW" switch is in the "OFF" position.

What will happen if FW-8A trips due to high seal water temperature?

- A. FW-8B will start immediately. Condenser vacuum will be maintained steady.
- B. FW-8B will start automatically if condenser vacuum drops to 24.5 inches of mercury. FW-8B will continue to run after automatically starting.
- C. FW-8B will start automatically if condenser vacuum drops to 24.5 inches of mercury. FW-8B will then cycle on and off to maintain condenser vacuum between 24.5 and 25.5 inches of vacuum.
- D. FW-8B will not start automatically unless the "43/FW" switch is placed in the "AUTO" position.

(61)

Given the following plant conditions:

- The plant is operating at 40% power
- Condensate pump, FW-2A is out of service
- Condensate pump, FW-2B, is operating
- FW-2B is selected on SIAS/CSAS selector switch, 43-SIAS/FW2

What action, if any, should be taken in accordance with OI-FW-1 and for what reason?

- A. The selected pump should be changed to FW-2C to ensure that FW-2C will start automatically if FW-2B trips following a SIAS or CSAS actuation.
- B. The selected pump should be changed to FW-2C to ensure that FW-2B will continue to run following a SIAS or CSAS actuation.
- C. FW-2B should remain as the selected pump to ensure that FW-2B will trip following a SIAS or CSAS actuation.
- D. FW-2B should remain as the selected pump to ensure that FW-2B will continue to run following a SIAS or CSAS actuation.

(62)

Given the following:

- The plant is operating at full power
- REACTOR REGULATING SYSTEM LOOP 1 TREF/TAVG GROSS DEV annunciator is in alarm
- REACTOR REGULATING SYSTEM LOOP 2 TREF/TAVG GROSS DEV annunciator is in alarm
- The T-ref (black) pens on both of the TAVG/TREF Recorders (TR-111/TR-121) indicate 532°F

Which one of the following would produce these indications?

- A. One of the Power Range Control Channels output failed low.
- B. Both of the Power Range Control Channels output failed low.
- C. The Main Generator output transmitter failed low.
- D. The Turbine first stage pressure transmitter failed low.

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(63)

Given the following plant conditions:

- Waste Gas Compressor, WD-28A, is lined up and discharging to Gas Decay Tank, WD-29B
- The Control Switch for WD-28A is in the "HAND" Position.
- The Control Switch for Waste Gas Decay Tank, WD-29B's, Inlet Pressure Control valve, PCV-514B, is in the "HAND" position.

If vent header pressure is sufficient, which one of the following will act first to prevent overpressurizing WD-29B?

- A. WD-28A will trip on high discharge pressure.
- B. PCV-514B will close on high tank pressure.
- C. WD-29B's rupture disk will break relieving to the room.
- D. WD-29B's relief valve will open relieving to the Auxiliary Building Exhaust Duct.

(64)

The Distributed Control System (DCS) core mimic monitor provides color graphic displays for each CEDM. Green squares are used to indicate that the CEDM is fully inserted. The DCS input that results in the green square display comes from the:

- A. Synchro-transmitters.
- B. ERF computer.
- C. Magnet actuated reed switches.
- D. Cam actuated limit switches.

(65)

Which of the following describes the response of the Switchgear Room HVAC to Fire Protection System detector alarms in the East Switchgear Room?

- A. After a detector has actuated in either zone 7 or 8, the ventilation dampers for only the East Switchgear Room shut.
- B. After a detector has actuated in both zones 7 and 8, the ventilation dampers for only the East Switchgear Room shut.
- C. After a detector has actuated in either zone 7 or 8, the ventilation dampers for both Switchgear Rooms shut.
- D. After detectors have actuated in both zones 7 and 8, the ventilation dampers in both Switchgear Rooms shut.

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(66)

For what procedures are you allowed to use the Indexes on the Document Control Web page to verify that the most current revision of a procedure is being used per SO-G-7, OPERATING MANUAL?

- A. For all plant procedures.
- B. Only for procedures designated as "Information Use."
- C. Only for procedures designated as "Information Use" or "Reference Use."
- D. Cannot be used to verify current revision for any procedures.

(67)

Spent fuel is being moved in the Spent Fuel Pool using Spent Fuel Handling Machine, FH-12. Which one of the following plant HVAC configurations is required in accordance with OP-12, FUELING OPERATIONS?

- A. One Auxiliary Building Supply and two Auxiliary Exhaust Fans must be running.
- B. All Auxiliary Building Exhaust Fans must be running.
- C. Spent Fuel Pool Area Filter, VA-66, must be in the Filtered Mode position and Control Room Ventilation must be operating in the Filtered Air Makeup Mode.
- D. Spent Fuel Pool Area Filter, VA-66, must be in the Filtered Mode position and Control Room Ventilation must be operating in the Recirculation Mode.

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(68)

Given the following:

- A surveillance test is being performed that measures the closure time of a containment isolation valve.
- A suggestion is made that the test be conducted first for "just in time training" prior to the actual surveillance test being conducted.

Is this allowed in accordance with SO-G-23, SURVEILLANCE TEST PROGRAM and why?

- A. Yes, SO-G-23 requires pre-cycling of the valves to ensure operability prior to measuring stroke time.
- B. Yes, this is a good practice although it is not required by SO-G-23.
- C. No, this is not a good practice because it involves excessive valve cycling.
- D. No, this is not allowed because SO-G-23 requires the test be conducted from the "as found" condition.

(69)

During the conduct of a surveillance test, the control switch for a pump that is required to be operable by Technical Specifications is placed in the "PULL-TO-LOCK" position. No other changes have been made to the system.

How does this affect the Operability and Availability of the pump?

- A. The pump is "Operable" and "Available."
- B. The pump is NOT "Operable" but is "Available."
- C. The pump is "Operable" but is NOT "Available."
- D. The pump is NOT "Operable" and NOT "Available."

(70)

The plant is operating at full power. An instrument bus has been placed in an abnormal alignment to allow for maintenance activities.

Which one of the following alignments requires logging into a Limiting Condition for Operation?

- A. Instrument Bus "A" is being supplied by swing inverter, EE-8T.
- B. Instrument Bus "A" is being supplied by its bypass transformer.
- C. Instrument Bus "1" is being supplied by its bypass transformer.
- D. Instrument Bus "1" is being supplied by its testing transformer.

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(71)

When are Control Room Log entries required for containment entry and exit per Standing Order O-22, "CONTAINMENT ACCESS AND EGRESS?"

- A. When one PAL door is inoperable.
- B. When containment integrity is required.
- C. When entering without Radiation Protection coverage.
- D. When the containment security card readers are not operational.

(72)

How will placing the keyswitch on a Control Room process radiation monitor ratemeter in the "KEYPAD" position affect operation of the radiation monitor?

- A. Annunciation and equipment actuations will be blocked.
- B. Annunciation will still work but equipment actuations will be blocked.
- C. Annunciation and equipment actuations will still work but output to the radiation monitor recorder will be blocked.
- D. Annunciation and equipment actuations will still work but output to the ERF computer will be blocked.

(73)

EOP-04, STEAM GENERATOR TUBE RUPTURE, directs aligning blowdown sample flow to the Spent Regenerant Tank to:

- A. Limit the release of radioactive liquid to the river.
- B. Limit contamination of the water in the Condenser Hotwell.
- C. Minimize radiation levels in Room 81.
- D. Minimize radiation levels in the secondary sampling room.

(74)

In the Control Room, plant instruments that have been qualified to survive in an accident environment (EEQ) can be identified by:

- A. Orange tape.
- B. Orange dots.
- C. Yellow labels.
- D. Red and white striped label borders.

(75)

Given the following plant conditions:

- A reactor startup is in progress
- Wide Range NI power indicates $5 \times 10^{-5}\%$ power
- A sustained positive startup rate of 1.5 DPM is indicated on all channels.
- All Zero Power Mode Bypass Switches are in the "BYPASS" position
- All Reactor Coolant Pumps are operating

If Reactor Coolant Pump, RC-3D, were to trip from these conditions, when and why would an automatic reactor trip occur and EOP-00 be entered?

Assume no operator actions.

- A. The reactor would trip immediately due to low RCS flow.
- B. The reactor would trip on low RCS flow when power exceeds $1 \times 10^{-4}\%$ power.
- C. The reactor would trip immediately due to high startup rate.
- D. The reactor would trip on high startup rate when power exceeds $1 \times 10^{-4}\%$ power.

RO
EXAM
HANDOUTS

TECHNICAL SPECIFICATIONS

2.0 LIMITING CONDITIONS FOR OPERATION

2.1 Reactor Coolant System

2.1.1 Operable Components

Applicability

Applies to the operable status of the reactor coolant system components.

Objective

To specify certain conditions of the reactor coolant system components.

Specifications

Limiting conditions for operation are as follows:

(1) Reactor Critical

All four (4) reactor coolant pumps shall be in operation.

Exceptions

The limitations of this specification may be suspended during the performance of physics tests provided the power level is $\leq 10^{-1}\%$ of rated power and the flow requirements of Table 1.1 No. 2 are met.

(2) Hot Shutdown or $350^{\circ}\text{F} \leq T_{\text{cold}} \leq 515^{\circ}\text{F}$

(a) The reactor coolant loops listed below shall be operable:

- (i) Reactor coolant loop 1 and at least one associated reactor coolant pump.
- (ii) Reactor coolant loop 2 and at least one associated reactor coolant pump.

(b) At least one of the above reactor coolant loops shall be in operation.

Exceptions

All reactor coolant pumps may be de-energized for up to one hour provided (1) no operations are permitted that would cause dilution of the reactor coolant system boron concentration, and (2) core outlet temperature is maintained at least 10°F below saturation temperature.

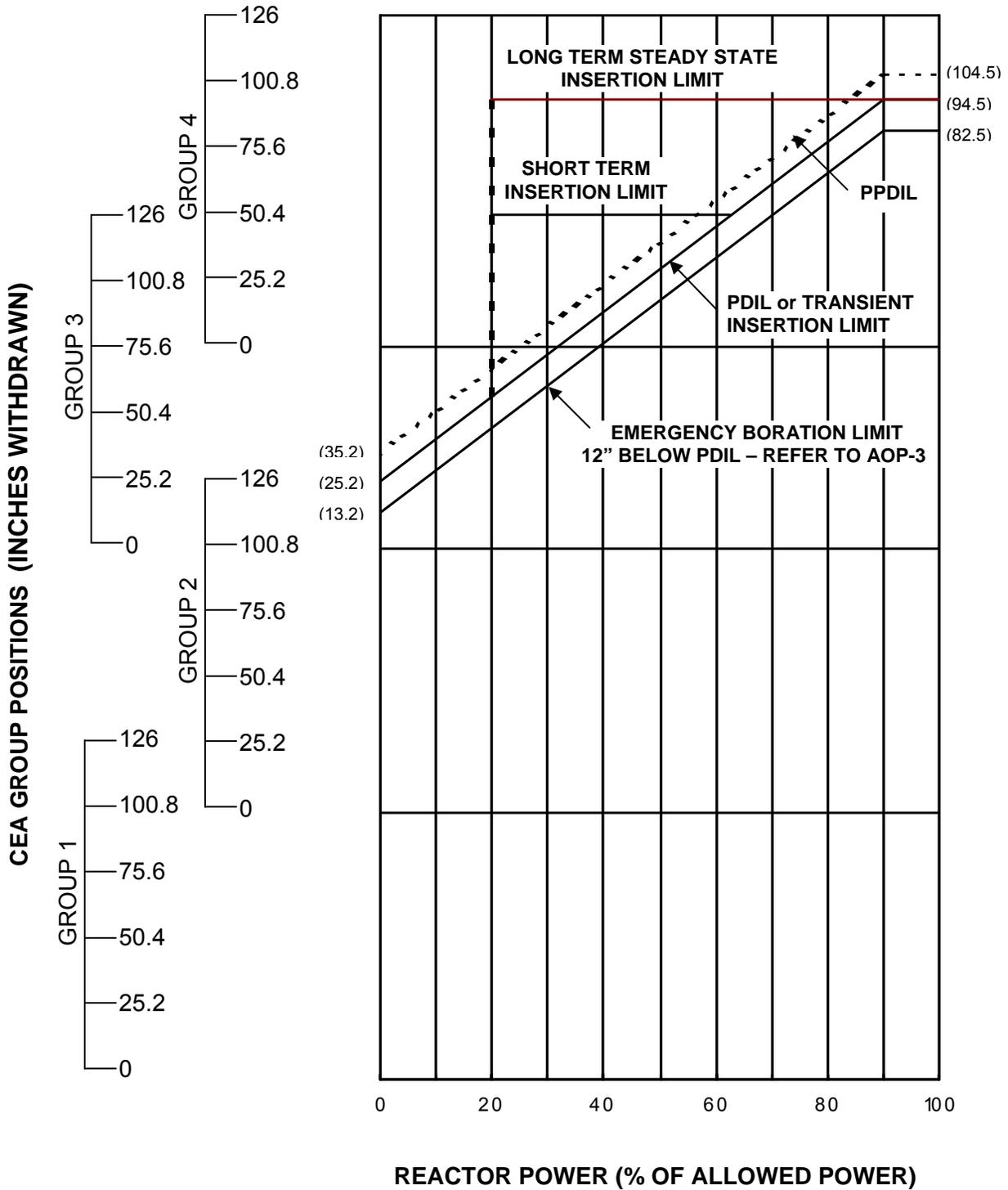
TECHNICAL SPECIFICATIONS

2.0 **LIMITING CONDITIONS FOR OPERATION**

2.1 Reactor Coolant System (Continued)

2.1.1 Operable Components (Continued)

- (c) If fewer than the above required reactor coolant loops are OPERABLE, the required loops shall be restored to OPERABLE status within 72 hours or the reactor shall be placed in COLD SHUTDOWN within the next 12 hours.
- (3) $210^{\circ}\text{F} \leq T_{\text{cold}} \leq 350^{\circ}\text{F}$ or $T_{\text{cold}} < 210^{\circ}\text{F}$ with fuel in the reactor and all reactor vessel head closure bolts fully tensioned.
- (a) At least two (2) of the decay heat removal loops listed below shall be OPERABLE:
 - (i) Reactor coolant loop 1 and its associated steam generator and at least one associated reactor coolant pump.
 - (ii) Reactor coolant loop 2 and its associated steam generator and at least one associated reactor coolant pump.
 - (iii) One shutdown cooling pump, one shutdown cooling heat exchanger, and associated shutdown cooling piping.
 - (iv) One shutdown cooling pump, in addition to that in (iii) above, one shutdown cooling heat exchanger, in addition to that in (iii) above, and associated shutdown cooling piping.
 - (b) At least one (1) of the decay heat removal loops listed above shall be IN OPERATION.
 - (c) With no coolant loop IN OPERATION, suspend all operations involving a reduction in boron concentration of the Reactor Coolant System and initiate corrective action to return the required coolant loop to operation in 8 hours.
 - (d) For the purposes of items a(iii) and a(iv) above, the containment spray pumps can be considered as available shutdown cooling pumps only if both of the following conditions are met:
 - (i) Reactor Coolant System temperature is less than 120°F .
 - (ii) The Reactor Coolant System is vented with a vent area greater than or equal to 47 in^2 .
- (4) DELETED



COLR

POWER DEPENDENT INSERTION LIMIT

FIGURE
 2

<p>U.S. Nuclear Regulatory Commission</p> <p>Site-Specific SRO Written Examination</p>	
<p>Applicant Information</p>	
<p>Name: _____</p>	
<p>Date: 03/27/2009</p>	<p>Facility/Unit: Fort Calhoun</p>
<p>Region: I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input checked="" type="checkbox"/></p>	<p>Reactor Type: W <input type="checkbox"/> CE <input checked="" type="checkbox"/> BW <input type="checkbox"/> GE <input type="checkbox"/></p>
<p>Start Time: _____</p>	<p>Finish Time: _____</p>
<p>Instructions</p> <p>Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination you must achieve a final grade of at least 80.00 percent overall, with 70.00 percent or better on the SRO-only items if given in conjunction with the RO exam; SRO-only exams given alone require a final grade of 80.00 percent to pass. You have 8 hours to complete the combined examination, and 3 hours if you are only taking the SRO portion.</p>	
<p>Applicant Certification</p> <p>All work done on this examination is my own. I have neither given nor received aid.</p> <p style="text-align: right;">_____</p> <p style="text-align: right;">Applicant's Signature</p>	
<p>Results</p>	
<p>RO/SRO-Only/Total Examination Values</p>	<p>_____ / _____ / _____ Points</p>
<p>Applicant's Scores</p>	<p>_____ / _____ / _____ Points</p>
<p>Applicant's Grade</p>	<p>_____ / _____ / _____ Percent</p>

2009 FORT CALHOUN SRO EXAM

NAME: KEY

-
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(2) A B C D
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(100) A B C D

2009 FORT CALHOUN SRO EXAM

(1)

A reactor trip has just occurred and the Standard Post Trip Actions are being performed in accordance with EOP-00, STANDARD POST TRIP ACTIONS.

Which of the following parameters requires you to take contingency actions?

- A. All trippable control element assemblies are fully inserted except for B-15. All non-trippable control element assemblies are fully withdrawn.
- B. Instrument air pressure is 85 psig and stable.
- C. Both steam generator wide range levels are 85% and stable.
- D. Pressurizer pressure is 2060 psia and increasing.

2009 FORT CALHOUN SRO EXAM

(2)

Given the following plant conditions:

- A loss of load event resulted in a high pressure reactor trip
- Both of the Power-Operated Relief Valves (PORVs) opened
- One of the PORVs failed to close when pressurizer pressure lowered below its setpoint
- Power was not available to the open PORV's block valve during performance of Standard Post Trip Actions
- EOP-03, LOSS OF COOLANT ACCIDENT, was entered
- Power has now been restored to the open PORV's block valve

The PORV block valve associated with the open PORV should NOT be closed if:

- A. Pressurizer level is at 100%.
- B. Pressurizer pressure is 2010 psia.
- C. Reactor vessel level is 83%.
- D. RCS subcooling is 0°F.

(3)

Given the following plant conditions:

- The plant is in hot shutdown
- Charging and letdown were isolated in response to RCS leakage
- Isolation of charging and letdown terminated the RCS leakage
- Pressurizer heaters have just lost power due to the low level cutout
- All Reactor Coolant Pumps are operating as designed

How much time do the operators have to reestablish charging flow to the RCS before the pressurizer empties assuming RCS cold leg temperature stays steady at 532°F?

- A. 3.5 - 4.5 hours
- B. 5.0 - 6.0 hours
- C. 6.5 - 7.5 hours
- D. 8.0 - 9.0 hours

(4)

The following plant conditions exist during a RCS heatup:

- T-cold is 410°F.
- T-hot is 411°F.
- Core Exit Thermocouples are reading between 410°F and 415°F.
- Pressurizer pressure indicates 955 psia.
- No operations are in effect that could cause a RCS dilution.

Which one of the following Reactor Coolant Pump operating conditions is NOT allowed by the requirements of T.S. 2.1.1?

- A. RC-3A and RC-3C are operable, but not operating. RC-3B and RC-3D are not operable. RC-3A has been shutdown for 35 minutes.
- B. RC-3A is operating. RC-3C is operable, but not operating. RC-3B and RC-3D are not operable. RC-3C has been shutdown for 75 minutes.
- C. RC-3B and RC-3D are operable, but not operating. RC-3A and RC-3C are not operable. RC-3D has been shutdown for 35 minutes.
- D. RC-3C is operating. RC-3D is operable, but not operating. RC-3A and RC-3B are not operable. RC-3D has been shutdown for 75 minutes.

(5)

Given the following plant conditions:

- RCS temperature is 105°F
- Pressurizer pressure is 15 psia
- Shutdown Cooling was in operation per OI-SC-1, SHUTDOWN COOLING INITIATION
- LPSI pump, SI-1A, was running
- The pressurizer manway is removed
- Offsite power has just been lost
- The Emergency Diesel Generators operate as designed

What action (if any) should you perform after the Emergency Diesel Generators start and their output breakers close?

- A. Manually restart the LPSI pumps.
- B. Un-isolate the LPSI system from the RCS and restart the LPSI pumps.
- C. No action is necessary; the Emergency Diesel Generators will pick up the LPSI pumps as dead bus loads.
- D. No action is necessary; the sequencers will restart LPSI pumps within one minute of the breaker closing.

(6)

The following plant conditions exist:

- The plant was operating at 65% power with all systems are aligned for normal operation
- The "CC WATER SURGE TANK AC-2 HI OR LO LEVEL" alarm was received
- The Auxiliary Building Operator reported that he heard a loud rumbling noise from the operating CCW pump, AC-3A
- You observe fluctuating current and discharge pressure for AC-3A
- The CCW surge tank level is 8 inches and lowering
- The reactor was manually tripped two minutes after the AUXILIARY COOLANT FROM CRDM FLOW LO alarm was received

What action should be performed in addition to Standard Post Trip Actions in accordance with AOP-11?

- A. Trip one RCP in each loop within 3 minutes. Trip the remaining RCPs if high bearing temperature alarms are received.
- B. Trip one RCP in each loop within 5 minutes. Trip the remaining RCPs if high bearing temperature alarms are received.
- C. Shutdown all RCP's within 3 minutes.
- D. Shutdown all RCP's within 5 minutes.

(7)

Given the following sequence of events:

- The plant was operating at full power
- Pressurizer level channel "Y" was selected as the controlling channel
- LT-101Y failed
- Letdown flow increased
- Pressurizer level lowered to 31%
- Pressurizer pressure lowered to 1920 psia
- All pressurizer heaters turned off.
- The Operator then took manual control of charging and letdown and restored level to 60%
- The operator then selected channel "X" as the controlling channel
- Pressurizer pressure control remained in automatic

Current plant conditions are:

- Pressurizer pressure and level are both stable with level at 60% and pressure at 1950 psia
- Pressurizer steam temperature indicates 632°F
- Pressurizer liquid temperature indicates 620°F

How will pressurizer pressure respond?

- A. Pressurizer pressure will steadily increase to 2100 psia.
- B. Pressurizer pressure will remain at approximately 1950 psia until the Level Control Bistables, LC-101-1 and LC-101-2, located behind CB-1/2/3 are reset.
- C. Pressurizer pressure will remain at approximately 1950 psia until Channel "X" is selected on PZR Heater Cutout Channel Select Switch, HC-101-1.
- D. Pressurizer pressure will remain at approximately 1950 psia until the water in the pressurizer reaches saturation temperature.

(8)

The plant experiences an ATWS event where both the reactor and turbine failed to trip. What action does EOP-00 direct you to perform to limit reactor power?

- A. Trip all Reactor Coolant Pumps.
- B. Transfer charging pump suction to the SIRWT.
- C. Insert the non-trippable CEAs.
- D. Close the MSIVs.

(9)

Given the following plant conditions:

- The plant is operating at 20% power
- A high radiation alarm has been received on RM-054B
- Counts are rising RM-057 but below the alarm setpoint
- Charging flow is 40 gpm
- Letdown flow is 30 gpm
- Pressurizer pressure is 2080 psia and steady
- Pressurizer level is 48% and steady
- There are no containment radiation alarms
- Containment pressure is steady
- Containment sump level is steady

Which one of the following actions will occur automatically with these plant conditions?

- A. Blowdown flow from Steam Generator, RC-2B will be isolated. Blowdown flow will continue from RC-2A.
- B. Blowdown flow from both Steam Generators will be isolated.
- C. RCV-978, 6th Stage Extraction Isolation Valve, will close.
- D. A Ventilation Isolation Actuation Signal (VIAS) will be generated

(10)

Given the following plant conditions:

- A tube has ruptured in Steam Generator, RC-2A
- The steam line from Steam Generator, RC-2B, has ruptured in room 81
- EOP-00, STANDARD POST TRIP ACTIONS, has been completed
- EOP-20, FUNCTIONAL RECOVERY PROCEDURE, has been entered

In mitigating this event, which steam generator(s), if any, should be isolated?

- A. Neither Steam Generator should be isolated.
- B. Only RC-2A should be isolated.
- C. Only RC-2B should be isolated.
- D. Both steam generators should be isolated.

(11)

A break on the feedwater line to Steam Generator, RC-2B, inside containment has occurred.

The following plant conditions exist:

- SGIS has actuated
- Heat removal has been established using Steam Generator, RC-2A.
- AFW Pump, FW-6, is feeding Steam Generator RC-2A and is the only available AFW pump.
- Steam Generator, RC-2B, has dried out.
- No Reactor Coolant Pumps are running.

In accordance with EOP-05, UNCONTROLLED HEAT EXTRACTION, which one of the following actions should be taken and for what reason?

- A. AFW flow should be established to RC-2B to help promote natural circulation flow in both RCS loops.
- B. AFW flow should be established to RC-2B to increase decay heat removal.
- C. AFW flow should NOT be established to RC-2B because it would result in a positive reactivity addition.
- D. AFW flow should NOT be established to RC-2B because FW-6 does not have the capacity to feed both S/Gs simultaneously.

(12)

The following plant conditions exist:

- A loss of 161 KV to the plant resulted in fast transfer of vital buses 1A3 and 1A4 to 345 KV
- This was followed by a loss of load that resulted in a reactor trip
- Both D/Gs failed to start due to a common mode failure resulting in a station blackout
- Breakers 1A11, 1A13, 1A22 and 1A24 are open
- The generator field breaker is closed
- The Kirk key for disconnect, DS-T1, has been inserted and turned
- The isolated phase bus duct cooling units are off
- All Main Steam Stop Valves are closed
- Both DC buses are energized

Which one of the following actions must be taken to allow disconnect, DS-T1, to be opened from CB-20 prior to restoring 345 KV power to buses 1A3 and 1A4?

- A. Breakers 1A13 and 1A24 must be closed.
- B. The generator field breaker must be opened.
- C. The Kirk key Interlock must be disengaged.
- D. An isolated phase bus duct cooling unit must be started.

(13)

The plant tripped from 100% power following a loss of all offsite power. The following conditions exist:

- RCS pressure is 2000 psia.
- Pressurizer level is 40%.
- Steam Generator Pressures are 900 psia.
- Steam Generator Wide Range levels are 40%.
- Hot leg temperatures are 575°F.
- Cold leg temperatures are 532°F.

Which of the following actions would be most effective in enhancing natural circulation?

- A. Raise RCS pressure.
- B. Raise Pressurizer level.
- C. Raise Steam Generator pressures.
- D. Raise Steam Generator levels.

(14)

Given the following plant conditions:

- The plant was operating at full power
- Power was lost to Instrument bus AI-40A
- AOP-16, LOSS OF INSTRUMENT BUS POWER, was entered

AOP-16, Section II, "Loss of Instrument Bus AI-40A", Step 14 states "Consider closing BOTH of the PORV (Power-Operated Relief Valves) Block Valves"

What is the purpose of this step?

- A. An additional vital instrument bus failure will result in opening ONE of the PORVs.
- B. An additional vital instrument bus failure will result in opening BOTH of the PORVs.
- C. An additional vital instrument bus failure will result in the inability to close ONE of the PORV Block Valves.
- D. An additional vital instrument bus failure will result in the inability to close BOTH of the PORV Block Valves.

(15)

The following plant indications were noted following a reactor trip.

- Bus Power Failure DC Distribution Panel 1 Light is off.
- Bus Power Failure DC Distribution Panel 2 Light is on.
- The DC BUS#1 LOW VOLT annunciator is in alarm
- The 43/FW Switch is in the OFF position.
- All NORMAL/OVERRIDE switches on AI-66A are in NORMAL.
- FW-6 can NOT be started from CB-10,11.

In accordance with AOP-16, LOSS OF INSTRUMENT BUS POWER, which one of the following actions is required to be able to start FW-6?

- A. Place the 43/FW Switch in the AUTO position.
- B. Start FW-6 from AI-66A after placing the NORMAL/OVERRIDE switches on AI-66A to OVERRIDE.
- C. Use the 1A1-1A3 Emergency MTS button, PB2-1A1-1A3 PBS, to switch to the emergency DC source.
- D. Start FW-6 from the Alternate Shutdown Panel, AI-179.

(16)

One of the two 20 inch underground Raw Water headers from the intake structure to the auxiliary building completely ruptured.

How does isolating the ruptured header affect the ability to provide cooling to the RW/CCW heat exchangers?

- A. Raw Water can be supplied to all of the RW/CCW heat exchangers but only two of the Raw Water Pumps can be used.
- B. Raw Water can only be supplied to two of the RW/CCW heat exchangers and only two of the Raw Water Pumps can be used.
- C. Raw Water can be supplied to all of the RW/CCW heat exchangers but only three of the Raw Water Pumps can be used.
- D. Raw Water can only be supplied to three of the RW/CCW heat exchangers and only three of the Raw Water Pumps can be used.

(17)

The reactor has been manually tripped following a sudden loss of instrument air pressure.

According to AOP-17, Loss of Instrument Air, which of the following actions should be taken to prevent RCS cooldown?

- A. Close FCV-1101 and FCV-1102 using DCS.
- B. Maximize S/G blowdown flow.
- C. Initiate a Steam Generator Isolation Signal (SGIS).
- D. Manually trip all Main Feedwater Pumps.

(18)

Given the following plant conditions:

- The plant is operating at 10% reactor power
- A loss of stator water cooling occurred
- Attempts to restore stator water cooling have been unsuccessful
- Stator cooling water outlet temperature has risen to 83°C

What action is required by AOP-27, GENERATOR MALFUNCTIONS?

- A. Manually trip the reactor.
- B. Manually trip the turbine.
- C. Manually trip the main generator output breakers.
- D. Manually open the main generator field breaker.

(19)

Given the following plant conditions:

- A reactor startup is being performed using OP-2A, PLANT STARTUP
- The brake on one of regulating group 2 CEAs fails to release
- The CEAs are being withdrawn in the manual sequential mode.

When will a SCEAPIS (DCS) rod block signal be generated?

- A. When any CEA in group 2 is withdrawn 8 inches above the stuck CEA.
- B. When any CEA in group 2 is withdrawn 4 inches above the stuck CEA.
- C. When any CEA in group 1 reaches the upper rod stop.
- D. When any CEA in group 3 begins to withdraw.

(20)

Given the following plant conditions:

- A power increase is in progress per OP-4, LOAD CHANGE AND NORMMAL POWER OPERATION
- The reactor is at 80% power
- Group 4 CEAs are at 52 inches
- All other CEAs are fully withdrawn.

Using the attached PDIL curve, determine what action must be taken as a result of these conditions?

- A. Immediately commence emergency boration.
- B. Withdraw group 4 CEAs to above the short term insertion limit.
- C. Withdraw group 4 CEAs until proper group overlap is achieved.
- D. Place the plant in hot shutdown within 6 hours.

(21)

Given the following:

- The AI-149 FIRE DETECTION ALARM OR TROUBLE alarm was received
- The Control Room Fire Detection Computer, PC-66, indicates that multiple detectors in the Cable Spread Room are in alarm
- The EONT was dispatched and reports that Halon is being discharged into the Cable Spread Room

In accordance with AOP-06, FIRE EMERGENCY, what action should be taken by the Control Room Operators?

- A. Trip the reactor, open clutch power supply breakers, close the PORV block valves and evacuate the Control Room.
- B. Trip the reactor, close the PORV block valves, start both Fire pumps, FP-1A and FP-1B, and evacuate the Control Room.
- C. Trip the reactor, open clutch power supply breakers, close the PORV block valves and place the Control Room HVAC in Recirculation Mode.
- D. Close the PORV block valves, start both Fire pumps, FP-1A and FP-1B, and place the Control Room HVAC in Recirculation Mode.

(22)

The following power indications are observed 10 minutes after a reactor trip:

- All four WR NI Channels are indicating $3 \times 10^{-3}\%$ Power and lowering.
- All four WR NI Channels are indicating a startup rate of -0.1 DPM and steady.
- All four Power Range NI Channels are indicating 0% power and steady.
- All four Delta-T Power Channels are indicating 2% power and lowering.

A miscalibration of which of the following could cause these indications?

- A. Wide Range NI power indication channels.
- B. Wide Range NI startup rate channels.
- C. Power Range NI channels.
- D. Delta-T Power Channels.

(23)

Radioactive liquid that leaks inside containment will collect in the containment sump. The containment sump pumps will normally pump this radioactive water to the:

- A. Reactor Coolant Drain Tank.
- B. Waste Holdup Tanks.
- C. Waste Monitor Tanks.
- D. Spent Regenerant Tanks.

(24)

The radioactive gases released following a waste gas decay tank rupture will consist mostly of isotopes of:

- A. Xenon and Krypton.
- B. Iodine and Cesium.
- C. Tritium and Carbon.
- D. Argon and Neon.

(25)

Given the following sequence of events:

- Condenser vacuum was lost
- The turbine and reactor tripped
- Immediately following the trip, a small LOCA occurred inside containment
- PPLS and CPHS have actuated
- All HPSI pumps failed to start
- RCS pressure is steady at 1000 psia
- Reactor Vessel Level is at 43%

Which of the following valves can be used by the Balance of Plant Operator to immediately begin a RCS cooldown in accordance with EOP-03?

- A. Steam Dump Valves, TCV-909-1,2,3,4.
- B. Steam Bypass Valve, PCV-910.
- C. Atmospheric Dump Valve, HCV-1040.
- D. Air Assisted Main Steam Safety Valves, MS-291, MS-292.

(26)

FC-214, REACTOR COOLANT DAILY SUMMARY REPORT, contains the following information:

- Fuel Reliability Indicator (FRI): 1.1×10^{-4} uCi/gm
- Dose Equivalent Iodine: 0.8 uCi/gm
- Xe-133 Activity: 2.8 uCi/gm
- RCS Total Activity: 5.5 uCi/gm
- E-bar: 0.68 Mev

Which one of the following actions is required?

- A. AOP-09, HIGH RADIOACTIVITY, must be entered due to the Fuel Reliability Indicator.
- B. AOP-09, HIGH RADIOACTIVITY, must be entered due to the Xe-133 Activity
- C. AOP-21, REACTOR COOLANT SYSTEM HIGH ACTIVITY, must be entered due to Dose Equivalent Iodine.
- D. AOP-21, REACTOR COOLANT SYSTEM HIGH ACTIVITY, must be entered due to the RCS Total Activity.

(27)

The "REACTOR VESSEL FLANGE LEAK" alarm was received due to leakage past the Reactor Vessel Flange inner O-Ring. Actions were taken to reset the alarm condition.

What one of the following parameters would cause an alarm if leakage occurs past the outer O-Ring?

- A. Increasing pressure.
- B. Increasing temperature.
- C. Decreasing pressure.
- D. Decreasing temperature.

(28)

Given the following:

- You have been directed to shutdown Reactor Coolant Pump, RC-3A in accordance with OI-RC-9
- You notice the Control Switch for Oil Lift Pump, RC-3A-1, is in the "AFTER START" position and that the Oil Lift Pump is not operating

Which one of the following actions, if any, is required to ensure proper lubrication of the RCP bearings?

- A. Do not trip RCP, RC-3A unless its' Oil Lift Pump is running.
- B. If the Oil Lift Pump does not start automatically after tripping RC-3A, then momentarily place the Oil Lift Pump Control Switch in the "STOP" position then back to the "START" position to reset it.
- C. If the Oil Lift Pump does not start automatically after tripping RC-3A, then hold the Oil Lift Pump Control switch in the "START" position until the "ZERO SPEED" light comes on.
- D. No action is required. The Oil Lift Pump is only needed when starting a Reactor Coolant Pump.

(29)

Given the following plant conditions:

- Leakage through Power Operated Relief Valve (PORV), PCV-102-1, has been discovered
- The leaking PORV has been isolated by closing its block valve, HCV-151
- HCV-151 also leaks through
- VCT makeup is in its normal alignment

Assuming no operator action is taken, how will the VCT level control system first respond?

- A. FCV-269, FCV-269X and FCV-269Y will open automatically to supply water to the VCT at the neutral blend boron concentration.
- B. FCV-269, FCV-269X and FCV-269Y will open automatically to supply water to the charging pump suction at the neutral blend boron concentration.
- C. LCV-218-3 will open and LCV-218-2 will close automatically to supply water to the VCT at the SIRWT boron concentration.
- D. LCV-218-3 will open and LCV-218-2 will close automatically to supply water to the charging pump suction at the SIRWT boron concentration.

(30)

A plant shutdown and cooldown are being performed. One hour after placing shutdown cooling in service, the following plant indications are observed:

- Pressurizer pressure and level are lowering.
- Containment sump level is steady.
- CCW surge tank level and pressure are increasing.
- Steam Generator levels are steady.
- Steam Generator pressures are lowering slowly.
- RM-053 is in alarm.
- All other process radiation monitors are reading normal.

Which one of the following could cause these indications?

- A. A raw water/CCW heat exchanger tube leak
- B. A regenerative heat exchanger tube leak.
- C. A shutdown cooling heat exchanger tube leak.
- D. A steam generator tube leak.

(31)

Given the following:

- EOP/AOP Attachment 7, "SDC WITH RAS" has been entered following a Loss of Coolant Accident
- A RCS cooldown is being conducted using shutdown cooling
- The RCS cold leg temperatures are currently 170°F.

What is the maximum allowable cooldown rate under these conditions?

- A. 25°F/hr.
- B. 50°F/hr.
- C. 100°F/hr.
- D. 200°F/hr.

(32)

The plant is operating at full power. HPSI pump, SI-2A, has been tagged out of service due to a breaker problem.

How does this affect the operability of the HPSI train associated with SI-2A per Technical Specifications?

- A. The HPSI train is considered operable if SI-2B is operable.
- B. The HPSI train is considered operable if SI-2C is operable.
- C. One train of HPSI is inoperable, SI-2A must be made operable within 24 hours.
- D. One train of HPSI is inoperable, SI-2A must be made operable within 7 days.

(33)

How is a steam bubble formed in the pressurizer following a refueling outage per OP-2A, PLANT STARTUP?

- A. With the pressurizer level at approximately 50%, pressurizer heaters are used to heat the water to saturation. Non-condensable gases are allowed to dissolve in the water.
- B. With the pressurizer level at approximately 90%, pressurizer heaters are used to heat the water to saturation. Non-condensable gases are allowed to dissolve in the water.
- C. With the pressurizer level at approximately 50%, pressurizer heaters are used to heat the water to saturation. Non-condensable gases are vented to the PQT or VCT using OI-CH-3, CHEMICAL AND VOLUME CONTROL SYSTEM NORMAL OPERATION OF VOLUME CONTROL TANK, Attachment 5 or 6.
- D. With the pressurizer level at approximately 90%, pressurizer heaters are used to heat the water to saturation. Non-condensable gases are vented to the PQT or VCT using OI-CH-3, CHEMICAL AND VOLUME CONTROL SYSTEM NORMAL OPERATION OF VOLUME CONTROL TANK, Attachment 5 or 6.

(34)

Given the following plant conditions:

- The plant is operating at 100% power.
- Pressurizer Safety Valve, RC-142, has seat leakage.
- Quench Tank temperature and level are rising.
- Quench Tank pressure is 8 psig and increasing slowly.

Which one of the following automatic actions will occur assuming no operator actions are taken?

- A. Quench Tank relief valve, RC-125, will open resulting in increasing containment pressure.
- B. Quench Tank relief valve, RC-125, will open and relieve to the waste gas system.
- C. Quench Tank vent valve, HCV-155, will open and vent to the containment vent header and the RCDT outlet containment isolation valve will close.
- D. Quench Tank vent valve, HCV-155, will open and the Quench Tank rupture disk will rupture resulting in increasing containment pressure.

(35)

Given the following:

- The CCW system is being started up in accordance with OI-CC-1
- All pre-requisites have been met
- All CCW pumps are off.

What action will you direct the EONA to take before starting the first CCW pump, AC-3A?

- A. Ensure CCW Surge tank pressure is greater than 60 psig.
- B. Vent AC-3A using its casing vent valve.
- C. Fully open the discharge valve for AC-3A.
- D. Fully close the discharge valves for AC-3B and AC-3C.

(36)

Given the following:

- A plant transient resulted in valid SIAS and CIAS actuations
- COMPONENT COOLING WATER SYSTEM LOW PRESSURE alarm came in 40 seconds ago
- CCW Header Pressure, PI-499, indicates 118 psig
- HCV-438A/B/C/D are closed in automatic
- CCW Surge Tank Pressure indicates 41 psig
- All CCW Pumps are running

Which one of the following conditions could cause these indications?

- A. PI-499, CCW header pressure, has failed low.
- B. CCW Pressure Switches, PCS-412 and PCS-413, have failed low.
- C. PIC-2802, CCW Surge Tank Pressure indication, has failed low.
- D. HCV-438A/B/C/D have inadvertently closed resulting in low CCW pressure to the RCPs.

(37)

Given the following plant conditions:

- A Reactor Coolant System cooldown is in progress for a refueling outage
- Shutdown cooling is in operation per OI-SC-1
- RCS temperature is 120°F
- RCS pressure is 235 psia
- Reactor Coolant Pumps, RC-3A and RC-3B, are operating.
- Pressure is being controlled manually using Main pressurizer spray and heaters.

What actions should be taken before shutting down Reactor Coolant Pumps, RC-3A and RC-3B, in accordance with OI-RC-9?

- A. RCS pressure should be lowered to less than 215 psia.
- B. RCS temperature should be lowered to less than 110°F.
- C. The RCS should be borated to the refueling boron concentration.
- D. RCS pressure control using Auxiliary spray should be established.

(38)

Given the following plant conditions:

- Bus Power Failure DC Distribution Panel 1 Light is off
- DC BUS#1 LOW VOLT annunciator is in alarm
- DC Bus #1 voltage indicates 0 volts
- Power has been lost to the "A" DSS 86-Relay

How will operation of the Diverse Scram System (DSS) be affected?

- A. The DSS will initiate a reactor trip.
- B. The DSS will go to a "1 of 3" trip logic.
- C. The "A" DSS 86-Relay will not be capable of generating a reactor trip.
- D. The DSS will not be capable of generating a reactor trip.

(39)

Given the following:

- The power supply to RPS Clutch Power Supply Breaker, CB-AB, will be transferred from Instrument Bus "B" to Instrument Bus "A".
- Inverter "A" is supplying power to Instrument Bus "A" and Swing Inverter, EE-8U, is supplying power to Instrument Bus "B".

Which one of the following actions will be taken before placing the Clutch Power Supply Transfer Switch, RPS/TS-AB, in the Instrument Bus A (#1) position in accordance with OI-EE-4?

- A. Cross-tie Instrument Bus "A" to Instrument Bus "C".
- B. Bypass Inverter "A".
- C. Transfer Instrument Bus "B" supply to Inverter "B".
- D. Bypass Swing Inverter 8-U.

(40)

Given the following:

- The plant was operating at 50% power when a LOCA occurred
- The reactor tripped automatically
- PPLS, CPHS, SIAS, CIAS, VIAS and SGIS all actuated
- The sequencers begin starting safeguards motors
- During the starting sequence bus 1A3 voltage and transformer T1A3 voltage decreased below the OPLS setpoint

How will the OPLS relays respond and what action, if any, should be taken by the Operators to ensure safeguards equipment actuates?

- A. OPLS will not actuate. Operators should trip both 86A/OPLS and 86B/OPLS.
- B. 86A/OPLS will actuate. Operators should trip 86B/OPLS.
- C. 86B/OPLS will actuate. Operators should trip 86A/OPLS.
- D. 86A/OPLS and 86B/OPLS will both actuate. No operator action is required.

(41)

From where do the CEDM Cooling Fans, VA-2A and VA-2B, take suction?

- A. Directly from the containment coolers.
- B. From the seismic skirt area.
- C. Directly from the containment atmosphere.
- D. From the nuclear detector well cooling system.

(42)

Given the following:

- ECCS actuation has occurred due to a PPLS
- EOP-03, LOSS OF COOLANT ACCIDENT, has been entered
- Step 33 has been reached
- Step 33 says, "Verify that the Containment Sump level rises as the SIRWT level lowers."
- SIRWT level is 95 inches and lowering
- Containment sump level is low and not rising

What action should be taken per EOP-03?

- A. Minimize ECCS flow to the minimum required to remove decay heat.
- B. Initiate containment spray to ensure adequate containment sump level.
- C. Begin blended makeup to the SIRWT to increase SIRWT inventory.
- D. Trip the LPSI pumps to reduce SIRWT depletion rate.

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(43)

In order to maintain steam generator pressure below 1100 psia following a loss of load from 100% power, Technical Specifications require that _____ be operable in modes 1 and 2.

- A. All 10 Main Steam Safety Valves.
- B. 9 of 10 Main Steam Safety Valves.
- C. 4 of 5 Main Steam Safety Valves on each Steam Generator.
- D. 3 of 5 Main Steam Safety Valves on each Steam Generator.

(44)

Given the following plant conditions:

- The plant is operating at full power
- All Feedwater Reg valves and Bypass valves are in AUTO on DCS
- The Bypass valves are closed
- Both DCS level controllers are in AUTO on DCS
- Narrow range level in both Steam Generators is at 63%

How should the Feedwater Reg valves and Bypass valves respond to a reactor trip?

- A. The Feedwater Reg valves will ramp closed. The Feedwater Bypass valves will initially open to 40-45% and control narrow range water level at 63%
- B. The Feedwater Reg valves will ramp closed. The Feedwater Bypass valves will initially open to 40-45% and control narrow range water level at 35%
- C. The Feedwater Reg valves will initially ramp down to 8% and control narrow range water level at 63%. The Feedwater Bypass valves will remain closed.
- D. The Feedwater Reg valves will initially ramp down to 8% and control narrow range water level at 35%. The Feedwater Bypass valves will remain closed.

(45)

To prevent a loss of RCS heat removal following a total loss of feedwater, either AFW flow must be initiated or once-through-cooling must be established when:

- A. Wide Range level in either S/G falls below 32%.
- B. Wide Range levels in both S/G's fall below 32%.
- C. An uncontrolled rise in RCS T-cold of 6°F.
- D. An uncontrolled rise in RCS pressure of 50 psi.

(46)

Given the following plant conditions:

- The plant was operating at full power
- An electrical grid disturbance results in degraded grid voltage
- AOP-31, 161 KV GRID MALFUNCTIONS, was entered
- The voltage on all 4160 V buses is less than the minimum required per AOP-31
- The voltage on all 480 volt buses is less than the minimum required per AOP-31
- The reactor was tripped and EOP-00, STANDARED POST TRIP ACTIONS, was entered

What actions are directed by AOP-31 after tripping the reactor and entering EOP-00?

- A. Trip all pumps fed by 4160 V buses and manually initiate a 480 volt load shed.
- B. Trip all pumps fed by 4160 V buses, parallel Diesel Generators to buses 1A4 and 1A3 and open their respective feeder breakers.
- C. Deenergize buses 1A4 and 1A3 by opening their respective feeder breakers and allowing the Diesel Generators to power the buses, manually initiate the sequencers to start required loads.
- D. Deenergize buses 1A4 and 1A3 by opening their respective feeder breakers and allowing the Diesel Generators to power the buses, manually start required loads.

(47)

Given the following:

- The plant was operating at full power
- The DC BUS #1 GROUND annunciator came into alarm
- The EONT has been dispatched to 125 VDC Bus 1 EE-8F
- You have been directed to check the DC Bus at AI-41A for indications of a ground in accordance with ARP-CB-20/A15.

Which one of the following is an indicator of a severe ground on 125V DC Bus #1 at AI-41A?

- A. Both white lights will be brightly lit and one Ground Fault Voltmeter will indicate low voltage.
- B. One white light will be brightly lit and one Ground Fault Voltmeter will indicate low voltage.
- C. Both white lights will be brightly lit and both Ground Fault Voltmeters will indicate low voltage.
- D. One white light will be brightly lit and both Ground Fault Voltmeters will indicate low voltage.

(48)

The timer on battery charger #1, EE-8C, is being used to place an equalizing charge on battery #1.

What voltage would be expected to be indicated on DC bus #1 during this operation and when the timer times out?

- A. 133-137 volts dropping to 123-127 volts.
- B. 138-142 volts dropping to 123-127 volts.
- C. 133-137 volts dropping to 128-132 volts.
- D. 138-142 volts dropping to 128-132 volts.

(49)

Given the following plant conditions:

- A large break LOCA occurred in containment
- Offsite power was lost at the same time
- Both Diesel Generators started
- DG-1's speed only increased to 700 rpm due to a problem with its governor

How would the ECCS pumps normally powered by DG-1 be affected?

- A. The output breaker from DG-1 would not close and there would be no power to the pumps.
- B. The output breaker from DG-1 would close, but the sequencers would not close the individual pump breakers.
- C. The output breaker from DG-1 would close and the sequencers would close the individual pump breakers, but the DG-1 output breaker would soon open due to an overcurrent condition.
- D. The output breaker from DG-1 would close and the sequencers would close the individual pump breakers, but the pumps would run at reduced speed and flow.

(50)

Given the following plant conditions:

- The plant is operating at 90% power 10 months into the operating cycle
- Ion Exchanger, CH-8B, has just been placed into service
- Letdown temperature transmitter, TE-2897, has just been recalibrated
- Atmospheric dump valve, HCV-1040, was just unisolated
- New fluid has just been added to the EHC system
- Power range NI power is rising slowly on all channels
- Delta T power is rising slowly on all channels
- All hot and cold leg temperatures are rising slowly

What action should be taken based on these indications?

- A. Bypass the ion exchangers using OI-CH-2.
- B. Manually increase CCW flow through the letdown heat exchanger using OI-CH-2.
- C. Isolate the atmospheric dump valve using OI-MS-1A.
- D. Check the EHC fluid for air bubbles using OI-ST-12.

(51)

Given the following plant conditions:

- There is high activity in the RCS
- A steam generator tube leak exists in RC-2B
- RM-064 has been placed in service with the selector switch placed in the "auto" position

The indicated radiation level on RM-064 will:

- A. Read background radiation only.
- B. Peg high and stay that way.
- C. Alternate between high and low readings.
- D. Slowly continue to rise.

(52)

Given the following conditions:

- A steam line has ruptured inside containment
- The CCW surge tank has ruptured.
- All other Engineered Safeguards Features are operating as designed
- River level is 990 feet
- Containment pressure is 40 psia
- Containment temperature is 190°F

Should Raw Water backup cooling be supplied to the Containment Coolers in accordance with AOP-11, LOSS OF COMPONENT COOLING WATER and why?

- A. Yes, because both Containment temperature and pressure are high.
- B. No, because they are not needed with Containment Spray operating.
- C. No, because Containment temperature is too high.
- D. No, because river level is too low.

(53)

Given the following plant conditions:

- The plant was operating at 100% power
- Raw Water pumps, AC-10A and AC-10B were running
- A Loss of Coolant Accident occurred coincident with a loss of offsite power
- Diesel Generator, DG-2, failed to start

Which Raw Water pumps will be running after sequencer operation?

- A. AC-10A and AC-10B.
- B. AC-10A and AC-10C.
- C. AC-10B and AC-10D.
- D. AC-10C and AC-10D.

(54)

Given the following plant conditions:

- The plant is operating at full power
- The PLANT AIR PRESS LO annunciator alarmed
- Soon after, the INSTRUMENT AIR PRESS LO annunciator alarmed
- On CB-10,11, PI-1750, Instrument Air Pressure, is cycling between 80 and 85 psig

Which one of the following failures could cause these indications?

- A. A leak in an instrument air line inside containment.
- B. A stuck open relief valve on an air receiver.
- C. A clogged or flooded air dryer.
- D. A leak in the turbine building service air header.

(55)

A mechanical interlock is provided on the Personnel Air Lock (PAL) doors to ensure that:

- A. The Inner PAL door cannot be opened with a high differential pressure across it.
- B. The Inner PAL door cannot be opened unless the outer PAL door is closed.
- C. The Outer PAL door cannot be opened from the outside with a Containment Isolation Actuation Signal (CIAS) present.
- D. The Outer PAL door cannot be opened from the outside with a Containment Radiation High Signal (CRHS) present.

(56)

Given the following plant conditions:

- A steam line break has occurred in Room 81
- PPLS and SGIS have actuated
- The affected steam generator has blown dry
- Pressurizer level is 60% and rising
- Pressurizer pressure is at 1650 psia and rising

In accordance with EOP-AOP Attachment 23, RESTORATION OF LETDOWN, what action should be taken to allow the letdown isolation valves, HCV-204 and TCV-202 to be opened?

- A. Reset Engineered Safeguards relays.
- B. Block PPLS, reset PPLS and CIAS lockout relays.
- C. Place CIAS override switches for HCV-204 and TCV-202 in override.
- D. Place Defeat switch for HCV-204 in the defeat position.

(57)

How could inoperability of the Containment Purge Exhaust Fans affect a refueling outage?

- A. Containment entry could be delayed due to higher airborne activity.
- B. Containment entry could be delayed due to higher temperatures in containment.
- C. Fuel movement could be delayed because Tech Specs require operability of the purge fans.
- D. Plant restart could be delayed because Tech Specs require operability of the purge fans.

(58)

Given the following plant conditions:

- The plant is in a refueling outage
- Shutdown Cooling is in service
- The Refueling Cavity is flooded
- The core has been offloaded to the Spent Fuel Pool
- Spent Fuel Pool Cooling pump, AC-5A, has just tripped and cannot be restarted
- Spent Fuel Pool Cooling pump, AC-5B, will not start

How will alternate spent fuel pool cooling be established per AOP-36, LOSS OF SPENT FUEL POOL COOLING?

- A. The Fuel Transfer Canal Drain pumps, AC-13A and AC-13B, will be aligned to circulate water through the Spent Fuel Pool.
- B. The Fuel Transfer Canal Drain pumps, AC-13A and AC-13B, will be aligned to circulate water between the Refueling Cavity and Spent Fuel Pool, back through the Fuel Transfer Tube.
- C. The Low Pressure Safety Injection Pumps, SI-1A and SI-1B, will be aligned to circulate water through the Spent Fuel Pool.
- D. The Low Pressure Safety Injection Pumps, SI-1A and SI-1B, will be aligned to circulate water between the Refueling Cavity and Spent Fuel Pool, back through the Fuel Transfer Tube.

(59)

How will the Steam Dump and Bypass valves respond to an uncomplicated reactor trip from full power if the output from pressure controller PIC-910 fails low?

(Assume all systems are in automatic.)

- A. The Steam Dump Valves, TCV-909s, will open fully and then reclose. The Bypass Valve, PCV-910, will open fully and remain open.
- B. The Steam Dump Valves, TCV-909s, will open fully and then modulate to control RCS average temperature between 530°F and 535°F. The Bypass Valve, PCV-910, will remain fully closed.
- C. The Steam Dump Valves, TCV-909s, and the Bypass Valve, PCV-910, will open fully and then modulate to control RCS average temperature between 530°F and 535°F.
- D. The Steam Dump Valves, TCV-909s, and the Bypass Valve, PCV-910, will open fully and then modulate to control RCS average temperature between 535°F and 540°F.

(60)

Given the following:

- Condenser Evacuation pumps, FW-8A and FW-8C, are operating
- FW-8B is the standby pump
- The "43/FW" switch is in the "OFF" position.

What will happen if FW-8A trips due to high seal water temperature?

- A. FW-8B will start immediately. Condenser vacuum will be maintained steady.
- B. FW-8B will start automatically if condenser vacuum drops to 24.5 inches of mercury. FW-8B will continue to run after automatically starting.
- C. FW-8B will start automatically if condenser vacuum drops to 24.5 inches of mercury. FW-8B will then cycle on and off to maintain condenser vacuum between 24.5 and 25.5 inches of vacuum.
- D. FW-8B will not start automatically unless the "43/FW" switch is placed in the "AUTO" position.

(61)

Given the following plant conditions:

- The plant is operating at 40% power
- Condensate pump, FW-2A is out of service
- Condensate pump, FW-2B, is operating
- FW-2B is selected on SIAS/CSAS selector switch, 43-SIAS/FW2

What action, if any, should be taken in accordance with OI-FW-1 and for what reason?

- A. The selected pump should be changed to FW-2C to ensure that FW-2C will start automatically if FW-2B trips following a SIAS or CSAS actuation.
- B. The selected pump should be changed to FW-2C to ensure that FW-2B will continue to run following a SIAS or CSAS actuation.
- C. FW-2B should remain as the selected pump to ensure that FW-2B will trip following a SIAS or CSAS actuation.
- D. FW-2B should remain as the selected pump to ensure that FW-2B will continue to run following a SIAS or CSAS actuation.

(62)

Given the following:

- The plant is operating at full power
- REACTOR REGULATING SYSTEM LOOP 1 TREF/TAVG GROSS DEV annunciator is in alarm
- REACTOR REGULATING SYSTEM LOOP 2 TREF/TAVG GROSS DEV annunciator is in alarm
- The T-ref (black) pens on both of the TAVG/TREF Recorders (TR-111/TR-121) indicate 532°F

Which one of the following would produce these indications?

- A. One of the Power Range Control Channels output failed low.
- B. Both of the Power Range Control Channels output failed low.
- C. The Main Generator output transmitter failed low.
- D. The Turbine first stage pressure transmitter failed low.

(63)

Given the following plant conditions:

- Waste Gas Compressor, WD-28A, is lined up and discharging to Gas Decay Tank, WD-29B
- The Control Switch for WD-28A is in the "HAND" Position.
- The Control Switch for Waste Gas Decay Tank, WD-29B's, Inlet Pressure Control valve, PCV-514B, is in the "HAND" position.

If vent header pressure is sufficient, which one of the following will act first to prevent overpressurizing WD-29B?

- A. WD-28A will trip on high discharge pressure.
- B. PCV-514B will close on high tank pressure.
- C. WD-29B's rupture disk will break relieving to the room.
- D. WD-29B's relief valve will open relieving to the Auxiliary Building Exhaust Duct.

(64)

The Distributed Control System (DCS) core mimic monitor provides color graphic displays for each CEDM. Green squares are used to indicate that the CEDM is fully inserted. The DCS input that results in the green square display comes from the:

- A. Synchro-transmitters.
- B. ERF computer.
- C. Magnet actuated reed switches.
- D. Cam actuated limit switches.

(65)

Which of the following describes the response of the Switchgear Room HVAC to Fire Protection System detector alarms in the East Switchgear Room?

- A. After a detector has actuated in either zone 7 or 8, the ventilation dampers for only the East Switchgear Room shut.
- B. After a detector has actuated in both zones 7 and 8, the ventilation dampers for only the East Switchgear Room shut.
- C. After a detector has actuated in either zone 7 or 8, the ventilation dampers for both Switchgear Rooms shut.
- D. After detectors have actuated in both zones 7 and 8, the ventilation dampers in both Switchgear Rooms shut.

(66)

For what procedures are you allowed to use the Indexes on the Document Control Web page to verify that the most current revision of a procedure is being used per SO-G-7, OPERATING MANUAL?

- A. For all plant procedures.
- B. Only for procedures designated as "Information Use."
- C. Only for procedures designated as "Information Use" or "Reference Use."
- D. Cannot be used to verify current revision for any procedures.

(67)

Spent fuel is being moved in the Spent Fuel Pool using Spent Fuel Handling Machine, FH-12. Which one of the following plant HVAC configurations is required in accordance with OP-12, FUELING OPERATIONS?

- A. One Auxiliary Building Supply and two Auxiliary Exhaust Fans must be running.
- B. All Auxiliary Building Exhaust Fans must be running.
- C. Spent Fuel Pool Area Filter, VA-66, must be in the Filtered Mode position and Control Room Ventilation must be operating in the Filtered Air Makeup Mode.
- D. Spent Fuel Pool Area Filter, VA-66, must be in the Filtered Mode position and Control Room Ventilation must be operating in the Recirculation Mode.

(68)

Given the following:

- A surveillance test is being performed that measures the closure time of a containment isolation valve.
- A suggestion is made that the test be conducted first for "just in time training" prior to the actual surveillance test being conducted.

Is this allowed in accordance with SO-G-23, SURVEILLANCE TEST PROGRAM and why?

- A. Yes, SO-G-23 requires pre-cycling of the valves to ensure operability prior to measuring stroke time.
- B. Yes, this is a good practice although it is not required by SO-G-23.
- C. No, this is not a good practice because it involves excessive valve cycling.
- D. No, this is not allowed because SO-G-23 requires the test be conducted from the "as found" condition.

(69)

During the conduct of a surveillance test, the control switch for a pump that is required to be operable by Technical Specifications is placed in the "PULL-TO-LOCK" position. No other changes have been made to the system.

How does this affect the Operability and Availability of the pump?

- A. The pump is "Operable" and "Available."
- B. The pump is NOT "Operable" but is "Available."
- C. The pump is "Operable" but is NOT "Available."
- D. The pump is NOT "Operable" and NOT "Available."

(70)

The plant is operating at full power. An instrument bus has been placed in an abnormal alignment to allow for maintenance activities.

Which one of the following alignments requires logging into a Limiting Condition for Operation?

- A. Instrument Bus "A" is being supplied by swing inverter, EE-8T.
- B. Instrument Bus "A" is being supplied by its bypass transformer.
- C. Instrument Bus "1" is being supplied by its bypass transformer.
- D. Instrument Bus "1" is being supplied by its testing transformer.

(71)

When are Control Room Log entries required for containment entry and exit per Standing Order O-22, "CONTAINMENT ACCESS AND EGRESS?"

- A. When one PAL door is inoperable.
- B. When containment integrity is required.
- C. When entering without Radiation Protection coverage.
- D. When the containment security card readers are not operational.

(72)

How will placing the keyswitch on a Control Room process radiation monitor ratemeter in the "KEYPAD" position affect operation of the radiation monitor?

- A. Annunciation and equipment actuations will be blocked.
- B. Annunciation will still work but equipment actuations will be blocked.
- C. Annunciation and equipment actuations will still work but output to the radiation monitor recorder will be blocked.
- D. Annunciation and equipment actuations will still work but output to the ERF computer will be blocked.

(73)

EOP-04, STEAM GENERATOR TUBE RUPTURE, directs aligning blowdown sample flow to the Spent Regenerant Tank to:

- A. Limit the release of radioactive liquid to the river.
- B. Limit contamination of the water in the Condenser Hotwell.
- C. Minimize radiation levels in Room 81.
- D. Minimize radiation levels in the secondary sampling room.

(74)

In the Control Room, plant instruments that have been qualified to survive in an accident environment (EEQ) can be identified by:

- A. Orange tape.
- B. Orange dots.
- C. Yellow labels.
- D. Red and white striped label borders.

(75)

Given the following plant conditions:

- A reactor startup is in progress
- Wide Range NI power indicates $5 \times 10^{-5}\%$ power
- A sustained positive startup rate of 1.5 DPM is indicated on all channels.
- All Zero Power Mode Bypass Switches are in the "BYPASS" position
- All Reactor Coolant Pumps are operating

If Reactor Coolant Pump, RC-3D, were to trip from these conditions, when and why would an automatic reactor trip occur and EOP-00 be entered?

Assume no operator actions.

- A. The reactor would trip immediately due to low RCS flow.
- B. The reactor would trip on low RCS flow when power exceeds $1 \times 10^{-4}\%$ power.
- C. The reactor would trip immediately due to high startup rate.
- D. The reactor would trip on high startup rate when power exceeds $1 \times 10^{-4}\%$ power.

(76)

The Power Dependent (transient) Insertion Limits (PDILs) specified in the Core Operating Limits Report (COLR) are based on ensuring that:

- A. Adequate shutdown margin is available following a reactor trip.
- B. The rate of reactivity addition during a CEA withdrawal event does not exceed the value used in the Chapter 14 analysis.
- C. A diverging xenon oscillation will not be initiated.
- D. Excessive swelling of the B_4C in the CEAs is prevented.

(77)

Given the following plant conditions::

- The Crew has entered EOP-03, LOSS OF COOLANT ACCIDENT
- A small break LOCA has been isolated in accordance with EOP-03
- The RCS Pressure and Temperature limits of EOP-AOP Attachment 2, "RCS Pressure-Temperature Limits for 40 EFPY" have been violated

What action is required to be taken after pressure and temperature have been stabilized?

- A. Implement EOP-AOP Attachment 2, RCS Pressure-Temperature Limits for 40 EFPY, and soak the RCS at the current pressure and temperature for 3 hours.
- B. Implement EOP-AOP Attachment 2, RCS Pressure-Temperature Limits for 40 EFPY, and contact the PRC for an Appendix E limit evaluation.
- C. Implement EOP-AOP Attachment 27, P-T Limit Restoration, and soak the RCS at the current pressure and temperature for 3 hours.
- D. Implement EOP-AOP Attachment 27, P-T Limit Restoration, and contact the PRC for an Appendix E limit evaluation.

(78)

Given the following plant conditions:

- The plant is operating at full power
- Annunciator CB-1/2/3 A6 A-4, "REACTOR COOLANT PUMP RC-3A VIBRATION HI" is in alarm.
- A plant operator was dispatched to AI-270 and reports that the alarm is valid and that the vibration on the upper guide bearing is above the action level but below the shutdown limit.

What action should you direct be taken as a result of this alarm?

- A. Enter AOP-35, REACTOR COOLANT PUMP MALFUNCTION, and continue to monitor the vibration level.
- B. Enter AOP-05, EMERGENCY PLANT SHUTDOWN. Trip RC-3A after the reactor has been shut down.
- C. Reference OI-RC-13, OPERATION OF RCP VIBRATION MONITORING SYSTEM, and contact the system engineer.
- D. Trip the reactor and enter EOP-00, STANDARD POST-TRIP ACTIONS. Trip RC-3A after the reactor has been shut down.

(79)

Given the following plant conditions:

- The plant is operating at 100% power
- The FEEDWATER CONTROL STEAM GENERATOR RC-2A(B) LEVEL LO-LO annunciators are in alarm for both Steam Generators
- The levels on both Steam Generators are continuing to lower slowly
- Two main feedwater pumps operating
- FW level control valves LCV-1101 and LCV-1102 are 100% open in automatic control.

What actions should you direct the Operators to take?

- A. Trip the reactor and enter EOP-00, STANDARD POST TRIP ACTIONS. Establish auxiliary feedwater flow to the steam generators using the contingency actions of EOP-00.
- B. Trip the reactor and enter EOP-00, STANDARD POST TRIP ACTIONS. After Reactivity Control is verified, transition to EOP-06, LOSS OF ALL FEEDWATER, and establish auxiliary feedwater flow to both steam generators.
- C. Refer to the ARP and attempt to restore main feedwater flow by taking manual control of feedwater using DCS.
- D. Refer to the ARP and attempt to restore main feedwater flow by starting a third main feedwater pump.

(80)

Given the following plant conditions:

- The reactor was in hot shutdown with RCS cold leg temperatures being maintained at 532°F
- a steam generator tube ruptured resulting in PPLS actuation
- Instrument air pressure is below 40 psig due to a ruptured header in the auxiliary building.

What actions should you direct to be taken?

- A. Enter AOP-22, REACTOR COOLANT LEAK, and perform Attachment B, Primary to Secondary Leak Rate Actions. After completing these actions, enter AOP-17, LOSS OF INSTRUMENT AIR, which will direct you to isolate the ruptured header.
- B. Enter AOP-22, REACTOR COOLANT LEAK, and perform the initial actions. Then enter AOP-17, LOSS OF INSTRUMENT AIR, which will direct you to isolate the ruptured header. After performing these actions, return to AOP-22 and perform Attachment B, Primary to Secondary Leak Rate Actions.
- C. Enter EOP-00, STANDARD POST TRIP ACTIONS. After performing the required actions, go to EOP-20, FUNCTIONAL RECOVERY PROCEDURE. EOP-20 Success Path MVA-IA will direct you to isolate the ruptured header.
- D. Enter EOP-00, STANDARD POST TRIP ACTIONS. After performing the required actions, go to EOP-20, FUNCTIONAL RECOVERY PROCEDURE. EOP-20 Success Path MVA-IA will direct you to implement AOP-17, LOSS OF INSTRUMENT AIR, which will direct you to isolate the ruptured header.

(81)

Given the following plant conditions:

- The plant was operating at full power
- The copy of the capability curve normally located on CB-20 has been removed for some control board mimic changes
- a "GENERATOR FIELD OVERVOLTAGE" alarm was received on CB-20/A14.

What procedures would be used to adjust Main Generator Field Voltage and verify that the generator is operating within its capability curve?

- A. AOP-27, MAIN GENERATOR MALFUNCTIONS, and OI-ST-1, TURBINE GENERATOR NORMAL OPERATION.
- B. AOP-27, MAIN GENERATOR MALFUNCTIONS, and the TECHNICAL DATA BOOK.
- C. ARP, CB-20/A14, and OI-ST-1, TURBINE GENERATOR NORMAL OPERATION.
- D. ARP, CB-20/A14, and the TECHNICAL DATA BOOK.

(82)

The plant was operating with the following initial conditions:

- The reactor is operating at 55% power during a power ascension
- The DCS SCEAPIS function is inoperable

The plant conditions suddenly changed such that:

- The ROD DROP NUCLEAR INSTRUMENTATION CHANNEL annunciator is in alarm
- Nuclear Instrumentation channel "C" indication initially lowered to 46% power and is now reading 50% and steady
- The other three Nuclear Instrumentation channels indication initially lowered to 49% power and are now reading 52% and steady
- RCS cold leg temperatures have all lowered by 5°F and are steady.

Which one of the following procedures should be entered as a result of these conditions?

- A. AOP-40, OVERCOOLING / EXCESSIVE STEAM DEMAND.
- B. AOP-15, LOSS OF FLUX INDICATION OR FLOW STREAMING
- C. AOP-03, EMERGENCY BORATION.
- D. AOP-02, CEA AND CONTROL SYSTEM MALFUNCTIONS.

(83)

Given the following plant conditions:

- 24 hours prior to startup, Wide range channel "A" was removed from service due to a failed fission chamber
- A plant startup is in progress
- Criticality has just been achieved and power has been stabilized at 1×10^{-3} % Power
- Wide range channels "B" and "D" have just failed low following a voltage transient

What action is required by Technical Specifications and AOP-15, "Loss of Flux Indication or Flow Streaming" and why?

- A. The reactor must be shutdown by manually inserting CEAs because wide range channel "D" failed and reactor power indication will not be available on AI-212.
- B. The reactor must be shutdown by manually inserting CEAs because SCEAPIS (DCS) requires at least 2 wide range channels greater than 10^{-4} % power to enable the rod block function.
- C. The reactor must be tripped because there are an inadequate number of operable channels for the RPS high startup rate trip.
- D. The reactor must be tripped because there are an inadequate number of operable channels for the RPS axial power distribution trip.

(84)

Given the following plant initial conditions:

- A refueling outage is in progress.
- 106 fuel assemblies have been loaded into the core
- The 107th fuel assembly (a new fuel assembly) is being moved over the core
- The Equipment Hatch, Room 66 roll-up doors, Room 66 construction access opening and both PAL doors are all open

Plant conditions then change:

- The moving fuel assembly drops from FH-1.
- No radiation monitor alarms are received.

Which one of the following actions meets the requirements of AOP-08, FUEL HANDLING INCIDENT, if performed within one hour?"

- A. Initiate CIAS using the EMERGENCY OPERATE switches. Close the equipment hatch and one of the PAL doors.
- B. Initiate CIAS using the EMERGENCY OPERATE switches. Close the room 66 rollup doors and both of the PAL doors.
- C. Initiate VIAS using the CRHS test switches. Close the equipment hatch and one of the PAL doors.
- D. Initiate VIAS using the CRHS test switches. Close the room 66 rollup doors and both of the PAL doors.

(85)

Given the following plant conditions:

- The plant is operating at full power
- The RM-057 CONDENSER OFF GAS HIGH RADIATION annunciator is in alarm
- The radiation level on RM-057 is just above the Alert setpoint and rising slowly
- Pressurizer level is steady at 60%
- Charging flow at 40 gpm
- Letdown flow is 36 gpm
- The Shift Chemist reports that the primary to secondary leak rate is 8 gallons per day.

What action should you direct be taken based on these conditions?

- A. Enter AOP-22, REACTOR COOLANT LEAK, and perform Attachment B, Primary to Secondary Leak Rate Actions. Use SO-G-105, STEAM GENERATOR TUBE LEAKAGE, to determine action level and other required actions.
- B. Enter AOP-22, REACTOR COOLANT LEAK, and perform Attachment B, Primary to Secondary Leak Rate Actions. SO-G-105, STEAM GENERATOR TUBE LEAKAGE, is not used unless primary to secondary leakage exceeds 10% of the Technical Specification Limit.
- C. Enter AOP-22, REACTOR COOLANT LEAK, perform Attachment B, Primary to Secondary Leak Rate Actions, when the primary to secondary leakage increases to greater than 10 gpd. Use SO-G-105, STEAM GENERATOR TUBE LEAKAGE, to determine action level and other required actions.
- D. Use SO-G-105, STEAM GENERATOR TUBE LEAKAGE, to determine action level and required actions. AOP-22, REACTOR COOLANT LEAK, will not be entered with normal indications of pressurizer level, charging and letdown.

(86)

Given the following initial plant conditions:

- The plant is shutdown with the RCS at mid-loop for replacement of a reactor coolant pump seal
- Boric Acid Pump Header to Charging Pumps Isolation Valve, HCV-268, is closed and tagged out of service
- All other CVCS components are operable
- All CEAs are fully inserted

Plant conditions change such that:

- The count rates indicated by two of the four operable Wide Range Nuclear Instrumentation Channels are rising steadily and have doubled in the past 15 minutes
- All four Power Range channels are indicating 0% and are steady

What action should you direct be taken?

- A. Enter AOP-03, EMERGENCY BORATION. Perform emergency boration from the Boric Acid Storage Tanks per the procedure.
- B. Enter EOP-20, FUNCTIONAL RECOVERY PROCEDURE, Success Path RC-2, and perform alternate emergency boration from the SIRWT.
- C. Enter SO-O-21, SHUTDOWN OPERATIONS PROTECTION PLAN, Attachment 7.6, Reduced Inventory, and ensure reactivity management resources are available.
- D. Enter AOP-15, LOSS OF FLUX INDICATION OR FLOW STREAMING. Direct I&C to recalibrate the Wide Range NI Channels.

(87)

Given the following initial plant conditions:

- Shutdown Cooling is in operation using Low Pressure Safety Injection Pump, SI-1A
- RCS temperature is 250°F
- Pressurizer pressure is 250 psia
- Pressurizer level at 50%

Plant conditions change such that:

- SI-1A trips
- The LPSI PUMP SI-1A O/L OR TRIP annunciator is in alarm
- The SHUTDOWN COOLING FLOW HI-LO annunciator is in alarm
- Voltage on bus 1A3 is 3950 Volts
- Voltage on bus 1A4 is 4160 Volts.

What action should be taken as a result of these conditions?

- A. Enter AOP-19, LOSS OF SHUTDOWN COOLING, and place LPSI pump SI-1B in service.
- B. Enter AOP-19, LOSS OF SHUTDOWN COOLING, and place Containment Spray Pump, SI-3A, in service.
- C. Enter AOP-31, 161 KV GRID MALFUNCTIONS, and place LPSI pump SI-1B in service.
- D. Enter AOP-31, 161 KV GRID MALFUNCTIONS, and place Containment Spray Pump, SI-3A, in service.

(88)

Given the following plant conditions:

- A large LOCA has occurred inside containment.
- PPLS, CPHS and CSAS have all actuated
- EOP-03, LOSS OF COOLANT ACCIDENT, has been entered
- Containment Cooling and Filtering Units, VA-3A tripped and VA-3B failed to start
- Containment pressure is 62 psig

What action should be taken as a result of these plant conditions?

- A. Ensure maximum CCW flow to Containment Cooling Units, VA-7A and VA-7B. Do NOT start any containment spray pumps.
- B. Manually initiate SGLS to enable containment spray operation.
- C. Transition to EOP-20, FUNCTIONAL RECOVERY PROCEDURE, Success Path CI and establish containment spray flow using one containment spray pump.
- D. Transition to EOP-20, FUNCTIONAL RECOVERY PROCEDURE, Success Path CI and establish containment spray flow using all available containment spray pumps.

(89)

Given the following plant conditions:

- The plant is operating at 60% power
- The FEEDWATER CONTROL STEAM GENERATOR RC-2B LEVEL HI-HI annunciator is in alarm
- Steam Generator, RC-2B, narrow range level is 84%
- DCS controller, FC1102, has transferred to manual
- Feed Reg Valve, FCV-1102, went closed but is now reopening

What actions should be taken after entering ARP CB-4/A8?

- A. Direct the BOPO to monitor FC1102 and verify that control transfers back to automatic.
- B. Direct the BOPO to return level to 63% using manual control of FCV-1102.
- C. Transition to OI-FW-3, STEAM GENERATOR LEVEL CONTROL. Direct the BOPO to transfer FC1102 to single element control.
- D. Transition to OI-FW-3, STEAM GENERATOR LEVEL CONTROL. Direct the BOPO to open FCV-1102 to 50% in manual and then place DCS Controller FC1102 in automatic control.

(90)

Given the following plant conditions:

- A severe thunderstorm occurred 6 hours ago
- Debris has been observed floating in the river
- The river level is 985'
- The plant is operating at full power
- Raw Water Pumps, AC-10A and AC-10B are operating with their pressure indicating lights lit
- The RAW WATER SUPPLY HEADER FLOW LO annunciator is in alarm
- The AC-12A STRAINER DP HIGH annunciator is in alarm.
- The AC-12B STRAINER DP HIGH annunciator is in alarm.

Which one of the following actions should be taken as a result?

- A. Enter AOP-01, ACTS OF NATURE, and place the Raw Water Strainers in MANUAL BACKWASH.
- B. Enter AOP-01, ACTS OF NATURE, and ensure that Raw Water pump AC-10A is not running.
- C. Enter AOP-18, LOSS OF RAW WATER, and ensure that the traveling screens are operating in MANUAL-SLOW.
- D. Enter AOP-18, LOSS OF RAW WATER, and shutdown the Circulating Water Pumps that share cells with the running Raw Water pumps.

(91)

Given the following plant conditions:

- The plant is operating at full power.
- During surveillance testing, it was determined that one of the group 4 Control Element Assemblies was immovable due to excessive friction
- The immovable CEA is aligned with the other CEAs in its group
- Adequate shutdown margin was verified assuming the inoperable CEA and the highest worth CEA do not insert following a reactor trip.

What action is required by Technical Specifications?

- A. Enter Tech Spec 2.0.1 and place the plant in hot shutdown within 6 hours.
- B. Enter Tech Spec 2.10.2(4) and place the plant in hot shutdown within 7 hours.
- C. Enter Tech Spec 2.10.2(4) and lower reactor power to less than 70% within one hour. Operation below 70% power may continue up to 8 hours.
- D. Enter Tech Spec 2.10.2(1) and verify adequate shutdown margin every 24 hours using TDB-V.9, SHUTDOWN MARGIN WORKSHEET.

(92)

Given the following plant conditions:

- A Loss of Coolant Accident with delayed ECCS operation has occurred
- The core was uncovered for more than one hour but is now covered
- Core Exit Thermocouple temperatures exceeded 2000°F but now indicate 240°F
- Radiation level inside containment is 94,000 R/hr
- Containment pressure reached 55 psig but is now 10 psig
- Containment relative humidity is 100%
- The ERF computer shows that containment temperature is 240°F
- A Control Room Operator has placed the hydrogen analyzers in service
- Indicated containment hydrogen concentration is 3.2%

What action is required to correct the indicated hydrogen concentration for high containment temperature?

- A. Use the correction curve in OI-VA-6, CONTAINMENT HYDROGEN ANALYZER OPERATION, which will result in a higher than indicated hydrogen concentration.
- B. Use the correction curve in OI-VA-6, CONTAINMENT HYDROGEN ANALYZER OPERATION, which will result in a lower than indicated hydrogen concentration.
- C. Use the correction curve in EOP-AOP Attachment 16, CONTAINMENT HYDROGEN ANALYZER STARTUP, which will result in a higher than indicated hydrogen concentration.
- D. Use the correction curve in EOP-AOP Attachment 16, CONTAINMENT HYDROGEN ANALYZER STARTUP, which will result in a lower than indicated hydrogen concentration.

(93)

Given the following plant conditions:

- The plant was operating at 100% power
- An event occurred that resulted in a loss of the intake structure and all of the equipment inside
- The turbine and reactor tripped automatically due to a loss condenser vacuum
- EOP-00, STANDARD POST TRIP ACTIONS, have been completed

Which one of the following actions should be taken to cool components that are normally cooled by Component Cooling Water?

- A. Use AOP-10, LOSS OF CIRCULATING WATER, to provide cooling to required components using Potable Water.
- B. Use AOP-11, LOSS OF COMPONENT COOLING WATER, to provide cooling to required components using the RW/CCW interface valves.
- C. Use AOP-18, LOSS OF RAW WATER, to line up alternate cooling to a RW/CCW Heat Exchanger using hoses from the plant Fire Protection System.
- D. Use OCAG-1, OPERATIONAL CONTINGENCY ACTION GUIDELINE, to line up alternate cooling to a RW/CCW Heat Exchanger using hoses from the FCS Fire Engine.

(94)

The plant is operating at full power. You have just received a FC-214 report from chemistry that reports the following plant chemistry parameters:

- Oxygen concentration is 0.12 ppm.
- Chloride concentration is 0.12 ppm.
- Fluoride concentration is 0.12 ppm.

What action, if any, is required by Technical Specifications?

- A. Begin action to restore oxygen concentration within 8 hours.
- B. Begin action to restore chloride concentration immediately.
- C. Begin action to restore oxygen and fluoride concentrations within 8 hours.
- D. Begin action to restore oxygen and fluoride concentrations immediately.

(95)

Given the following plant conditions:

- Fuel movement is in progress using Fuel Handling Machine, FH-1, and Spent Fuel Handling Machine, FH-12.
- A vendor is being used to operate the fuel handling equipment.

What are the requirements for OPPD supervision of the vendor activities?

- A. A Fuel Handling Coordinator with an SRO license to supervise Fuel Movement at FH-1.
- B. A Fuel Handling Coordinator with an RO or SRO license to supervise Fuel Movement at FH-1.
- C. Fuel Handling Coordinators with SRO licenses to supervise Fuel Movement at both FH-1 and FH-12.
- D. Fuel Handling Coordinators with RO or SRO licenses to supervise Fuel Movement at both FH-1 and FH-12.

(96)

Given the following:

- The boron concentration in the Safety Injection and Refueling Water Storage Tank (SIRWT) and Safety Injection Tanks equals the refueling boron concentration.
- The water level in the SIRWT is 188 inches.
- SIRWT water temperature is 74°F
- The pressure and level of each Safety Injection Tank is listed below:

	<u>LEVEL</u>	<u>PRESSURE</u>
SI-6A	67.2%	245 psig
SI-6B	69.5%	241 psig
SI-6C	72.2%	265 psig
SI-6D	74.6%	258 psig

What action is required prior to taking the plant from mode 3 to mode 2 in accordance with Technical Specifications?

- A. No action is required.
- B. Raise the level in the SIRWT using OI-CH-4, CHEMICAL AND VOLUME CONTROL SYSTEM MAKEUP OPERATIONS, Attachment 7.
- C. Raise the pressure in SI-6B using OI-SI-1, SAFETY INJECTION - NORMAL OPERATION, Attachment 7.
- D. Lower the level in SI-6D using OI-SI-1, SAFETY INJECTION - NORMAL OPERATION, Attachment 27.

(97)

Given the following plant conditions:

- Steam Generator "A" Blowdown Radiation Monitor, RM-054A, has just been declared inoperable by the Shift Manager
- Analysis of secondary chemistry samples indicates background activity only

What action is required to be taken within 2 hours by CH-ODCM-0001, OFF-SITE DOSE CALCULATION MANUAL?

- A. Isolate blowdown flow from Steam Generator, RC-2A.
- B. Reduce blowdown flow from Steam Generator, RC-2A, to less than 20,000 lbm/hr.
- C. Align blowdown sample flow to the Spent Regenerant Tank.
- D. Align blowdown sample flow such that blowdown from both Steam Generators is sampled by RM-054B.

(98)

Given the following conditions:

- Spent Fuel is being moved from the Spent Fuel Pool to the Independent Spent Fuel Storage Installation (ISFSI)
- A Transfer Cask/Dry Shielded Canister (TC/DSC) is being removed from the Spent Fuel Pool and transferred to the work platform.

How will the Spent Fuel Pool Area be posted and access controlled during this operation?

- A. The area will be posted as a Radiation Area; gates and doors to the area will be locked.
- B. The area will be posted as a Radiation Area; gates and doors to the area will not be locked.
- C. The area will be posted as a Restricted High Radiation Area; gates and doors to the area will be locked.
- D. The area will be posted as a Restricted High Radiation Area; gates and doors to the area will not be locked.

2009 FORT CALHOUN SRO EXAM

(99) How are the FCS Severe Accident Management Guideline's (SAMGs) used?

- A. EOF personnel use the SAMGs to support the Control Room Operators in mitigating core damage events.
- B. TSC personnel use the SAMGs to support the Control Room Operators in mitigating core damage events.
- C. The Control Room Operators use the SAMGs along with the EOPs to mitigate core damage events.
- D. The Control Room Operators transition from the EOPs to the SAMGs to mitigate core damage events.

(100)

The following plant conditions exist:

- A Steam Generator Tube Rupture occurred from full power
- After Standard Post Trip Actions were performed, EOP-04, STEAM GENERATOR TUBE RUPTURE, was entered
- RC-2A was identified as the affected Steam Generator and isolated per EOP-04
- A plant cooldown is being performed using RC-2B
- RCS cooldown rate = 30°F/hour
- RCS pressure = 700 psia and lowering
- Core exit thermocouples indicate 400°F
- Pressurizer level = 48% and steady
- RVLMS level = 100%
- RC-2A pressure = 740 psia and steady.
- RC-2B pressure = 240 psia and lowering.

What action should be taken as a result of these plant conditions?

- A. Implement EOP/AOP floating step CC, "SAMPLING THE RCS FOLLOWING SGTR" to ensure RCS activity remains below limits that would require a change in Emergency Action Levels.
- B. Implement EOP/AOP floating step CC, "SAMPLING THE RCS FOLLOWING SGTR" to ensure RCS boron concentration is high enough to ensure adequate shutdown margin.
- C. Implement EOP/AOP Attachment 14, "RCS VOID ELIMINATION" to prevent void formation in Steam Generator RC-2A's tubes.
- D. Implement EOP/AOP Attachment 14, "RCS VOID ELIMINATION" to prevent void formation in Steam Generator RC-2B's tubes.

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TECHNICAL SPECIFICATIONS

2.0 LIMITING CONDITIONS FOR OPERATION

2.1 Reactor Coolant System

2.1.1 Operable Components

Applicability

Applies to the operable status of the reactor coolant system components.

Objective

To specify certain conditions of the reactor coolant system components.

Specifications

Limiting conditions for operation are as follows:

(1) Reactor Critical

All four (4) reactor coolant pumps shall be in operation.

Exceptions

The limitations of this specification may be suspended during the performance of physics tests provided the power level is $\leq 10^{-1}\%$ of rated power and the flow requirements of Table 1.1 No. 2 are met.

(2) Hot Shutdown or $350^{\circ}\text{F} \leq T_{\text{cold}} \leq 515^{\circ}\text{F}$

(a) The reactor coolant loops listed below shall be operable:

- (i) Reactor coolant loop 1 and at least one associated reactor coolant pump.
- (ii) Reactor coolant loop 2 and at least one associated reactor coolant pump.

(b) At least one of the above reactor coolant loops shall be in operation.

Exceptions

All reactor coolant pumps may be de-energized for up to one hour provided (1) no operations are permitted that would cause dilution of the reactor coolant system boron concentration, and (2) core outlet temperature is maintained at least 10°F below saturation temperature.

TECHNICAL SPECIFICATIONS

2.0 **LIMITING CONDITIONS FOR OPERATION**

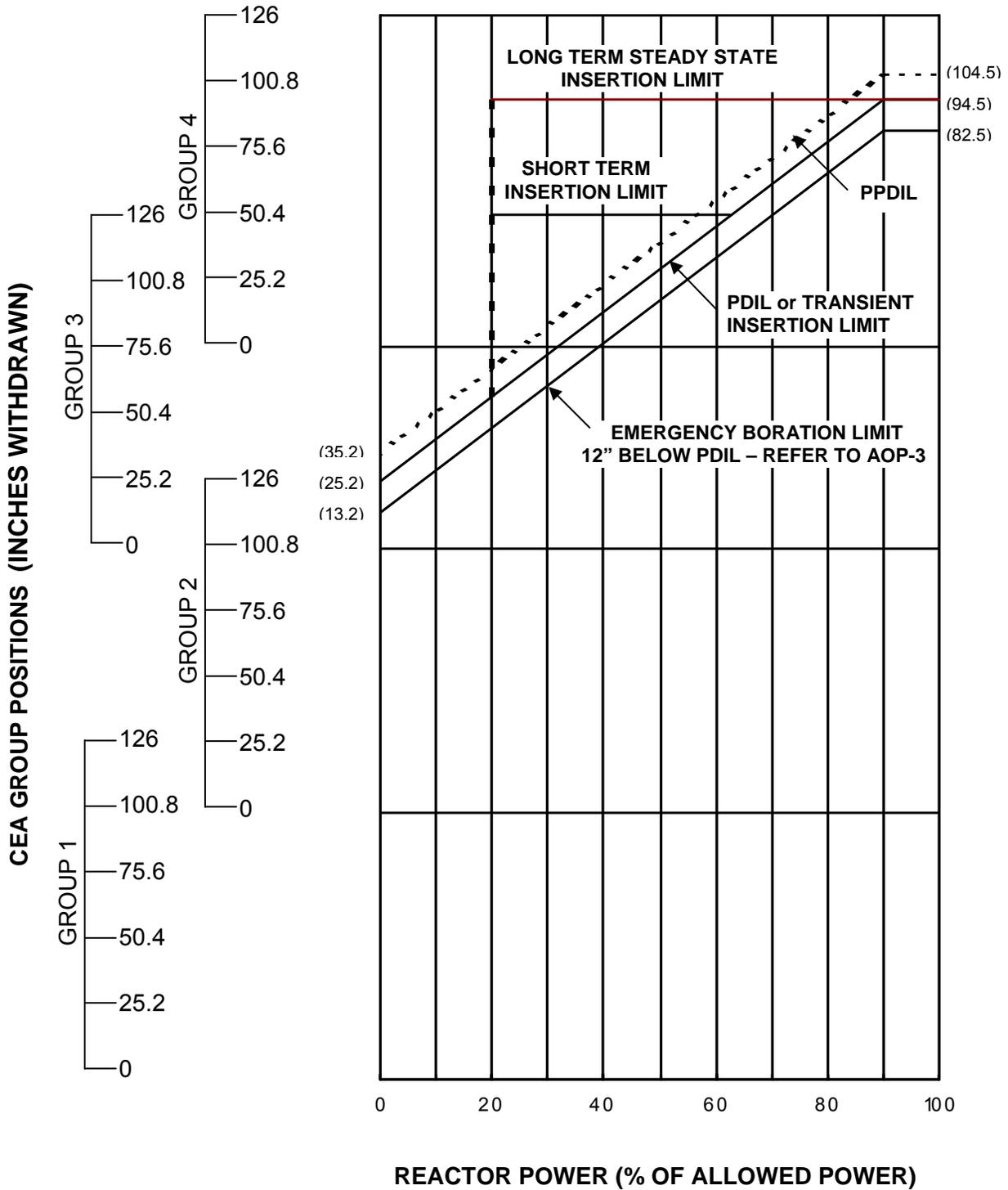
2.1 Reactor Coolant System (Continued)

2.1.1 Operable Components (Continued)

- (c) If fewer than the above required reactor coolant loops are OPERABLE, the required loops shall be restored to OPERABLE status within 72 hours or the reactor shall be placed in COLD SHUTDOWN within the next 12 hours.

- (3) $210^{\circ}\text{F} \leq T_{\text{cold}} \leq 350^{\circ}\text{F}$ or $T_{\text{cold}} < 210^{\circ}\text{F}$ with fuel in the reactor and all reactor vessel head closure bolts fully tensioned.
 - (a) At least two (2) of the decay heat removal loops listed below shall be OPERABLE:
 - (i) Reactor coolant loop 1 and its associated steam generator and at least one associated reactor coolant pump.
 - (ii) Reactor coolant loop 2 and its associated steam generator and at least one associated reactor coolant pump.
 - (iii) One shutdown cooling pump, one shutdown cooling heat exchanger, and associated shutdown cooling piping.
 - (iv) One shutdown cooling pump, in addition to that in (iii) above, one shutdown cooling heat exchanger, in addition to that in (iii) above, and associated shutdown cooling piping.
 - (b) At least one (1) of the decay heat removal loops listed above shall be IN OPERATION.
 - (c) With no coolant loop IN OPERATION, suspend all operations involving a reduction in boron concentration of the Reactor Coolant System and initiate corrective action to return the required coolant loop to operation in 8 hours.
 - (d) For the purposes of items a(iii) and a(iv) above, the containment spray pumps can be considered as available shutdown cooling pumps only if both of the following conditions are met:
 - (i) Reactor Coolant System temperature is less than 120°F .
 - (ii) The Reactor Coolant System is vented with a vent area greater than or equal to 47 in^2 .

- (4) DELETED



COLR

POWER DEPENDENT INSERTION LIMIT

FIGURE
 2

TECHNICAL SPECIFICATIONS

2.0 **LIMITING CONDITIONS FOR OPERATION**

2.1 Reactor Coolant System (Continued)

2.1.5 Maximum Reactor Coolant Oxygen and Halogens Concentrations

Applicability

Applied to the reactor coolant oxygen and halogens concentrations.

Objective

To specify the maximum oxygen and halogens concentrations of the reactor coolant system for safe reactor operation.

Specifications

Maximum limits of oxygen and halogens concentrations are as follows:

- (1) If the concentration of oxygen in the reactor coolant exceeds 0.1 ppm during power operation, corrective action shall be initiated within 8 hours to return oxygen levels to ≤ 0.1 ppm.
- (2) If the concentration of chloride in the reactor coolant exceeds 0.15 ppm during power operation, corrective action shall be initiated within 8 hours to return chloride levels to ≤ 0.15 ppm.
- (3) If the concentration of fluorides in the reactor coolant exceeds 0.10 ppm following modifications or repair to the reactor coolant system involving welding, corrective action shall be initiated within 8 hours to return fluoride levels to ≤ 0.10 ppm.
- (4) If the oxygen concentration and the chloride or fluoride concentration of the reactor coolant simultaneously exceed the limits given in (1), (2) and (3), respectively, corrective action is to be taken immediately to return the system to within normal operation specifications.
- (5) If the concentration limits of oxygen and chloride or fluoride given in (1), (2) and (3) above are not restored within 24 hours, the reactor shall be placed in a hot shutdown condition within 12 hours thereafter. If the normal operational limits are not restored within an additional 24-hour period, the reactor shall be placed in a cold shutdown condition within 24 hours thereafter.

Basis

By maintaining the oxygen, chloride and fluoride concentrations in the reactor coolant within the limits specified, the integrity of the reactor coolant system materials in contact with the coolant ⁽¹⁾ are protected against potential stress corrosion attack. ⁽²⁾