

DUANE ARNOLD RO INITIAL LICENSE EXAMINATION

NOVEMBER 2002

**Docket No. 50-331
License No. DPR-49**

	WRITTEN EXAMINATION KEY COVERSHEET
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Training program: Reactor Operator		Course/lesson plan Number(s): 50007
Examination Number/Title: 2002 ILC RO Written Exam		
GRADE:		
Total Points Possible: 100	PASS CRITERIA: ≥ 80%	Exam Time:
EXAMINATION REVIEW AND APPROVAL:		
Submitted by:		Date:
Reviewed by:		Date:
Approved by:		Date:

Written Examination key


Attach answer key to this page.

Key should contain the following:

- Enabling Objective Number
- Test Item
 - Question or Statement
 - All possible answers
 - Correct Answer Indicated
 - Point Value
- References

Indicate in the following table if any changes are made to the exam after approval:

#	DESCRIPTION OF CHANGE	REASON FOR CHANGE	PREPARER	DATE
			REVIEWER	DATE

	WRITTEN EXAMINATION COVERSHEET
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TRAINEE INFORMATION:		
Name:	Job Title:	
Employee Number:	Site:	DAEC
Training program: Reactor Operator		Course/lesson plan Number(s): 50007
Examination Number/Title: 2002 ILC RO Written Exam		
GRADE:		
Total Points Possible: 100		Grade: ____/____ = ____%
Graded by:		Date:
Co-graded by (not required if Scantron graded):		Date:

EXAMINATION RULES

1. References may not be used during this examination, unless otherwise stated.
2. Read each question carefully before answering. If you have any questions or need clarification during the examination, contact the examination proctor.
3. Conversation with other trainees during the examination is prohibited.
4. Partial credit will not be considered.
5. Rest room trips are limited and only one examinee at a time may leave.
6. Ensure you have answered each item prior to turning in your exam.
7. For exams with time limits:
 - a. You have ____ minutes to complete the examination.
 - b. The proctor will collect all examinations after this time expires.

Dishonesty Policy: Cheating or compromising the exam will result in disciplinary actions up to and including termination.

“I have not given, received, or observed any aid or information regarding this examination prior to or during its administration that could compromise this examination’s integrity.”

Examinee’s Signature: _____ **Date:** _____

“I acknowledge that the correct answers to the exam questions were indicated to me following the completion of the exam. I have had the opportunity to review the examination questions with the instructor to ensure my understanding.

Examinee’s Signature: _____ **Date:** _____



WRITTEN EXAMINATION COVERSHEET

Training program: Reactor Operator

**Course/lesson plan Number(s):
50007**

Examination Number/Title: 2002 ILC RO Written Exam

1. Why are the ISVs (Intermediate Stop Valves) designed to close to isolate the MSRs during a Main Turbine trip?
 - a. To prevent MSR drain tank flashing caused by the rapid depressurization of the MSRs.
 - b. To protect the Main Turbine from debris caused by fast closure of the Turbine Stop Valves.
 - c. To protect the Main Turbine against an over speed caused by the stored steam in the MSR and cross around piping.
 - d. To prevent excessive thrust loading on the MSR internal components caused by fast closure of the Turbine Stop Valves.

2. A Reactor SCRAM has occurred and has **NOT** been reset.

The OSS directs you to perform IPOI 5 “Reactor Scram” and verify all control rods fully inserted. The Full Core Display shows 4 control rods with their green FULL IN lights OFF.

IAW IPOI 5 “Reactor Scram”, what other method is allowed to verify all control rods are fully inserted?

- a. Requesting a Rod Log
- b. Check SPDS for ALL RODS IN
- c. Use of Refuel One Rod Selected Permissive
- d. Check the rods are at position 00 on the Four Rod Display

3. A plant transient has occurred and ALC has been entered. The following conditions currently exist:

- All rods are in
- Reactor Pressure has been stabilized at 550 psig
- RPV level is +70 inches and lowering at 10 inches/min.
- All available high pressure injection sources are injecting at maximum flow
- RHR is being used to spray the Torus and Drywell
- Drywell pressure is 3 psig and holding steady

The OSS orders the panel operator to line up and maximize injection with RHR and Core Spray. The 1C03 operator verifies the “A” Core Spray pump is running and MO-2115 “Outboard Inject Valve” is OPEN.

The operator then attempts to OPEN MO-2117 “Inboard Inject Valve” to maximize flow but the valve will **NOT** OPEN.

Which of the following would explain these conditions?

- a. The Core Spray Automatic Initiation signal does **NOT** exist with these conditions. When RPV level drops to the Core Spray Initiation setpoint the operator will be able to OPEN the valve.
- b. Valve logic prevents simultaneously OPENING both Inboard and Outboard Inject Valve at this time to prevent over pressurizing the low pressure Core Spray piping.
- c. The differential pressure across the valve is too high. The Outboard Inject valve will need to be CLOSED and the Inboard Inject valve cracked off its closed seat. Then both valves can be OPENED.
- d. The “A” SBDG logic has failed to provide an OPEN permissive to the Core Spray Inject valve logic. The operator should verify the “A” SBDG is running.

4. The plant was operating at 92% power.
A plant transient occurred requiring a Manual SCRAM.
An electrical ATWS was entered due to failure to SCRAM conditions.
Defeat 15 "MSIV and MSL Drain LO-LO-LO Level Isolation Defeat" is installed.
Reactor power has stabilized at 4%.
RPV water level is 135 inches and steady.
The Main Turbine is still on line.
At 0910 a steam leak is detected in the Steam Tunnel reading 180°F and increasing at 10°F per minute.
- Which of the following will occur if no operator action is taken and the above conditions continue?
- a. At 0912 power will increase due to a rapid rise in RPV pressure.
 - b. At 0912 a Group 1 signal will occur. However, power will not be affected due to installation of Defeat 15.
 - c. At 0922 the MSIVs will close causing power to increase.
 - d. At 0922 the Main Turbine will trip. However, the Bypass Valves will maintain power stable at 4%.

5. A SCRAM occurs from full power.

The following actions occur:

- All RHR (LPCI) and Core Spray Pumps START
- Primary Containment Group 1 **and** Group 7 valves CLOSE
- The “A” and “B” SBDGs START
- The ADS Timers START

Which one of the following would account for this set of indications?

- a. Loss of 1A3 and 1A4 essential busses.
- b. Drywell Pressure has reached its Hi pressure trip setpoint 2 psig.
- c. RPV water level has reached its LO-LO level trip setpoint 119.5 inches.
- d. RPV water level has reached its LO-LO-LO level trip setpoint 64 inches.

6. Review the indication given in the Support Material Booklet

The plant was at power.

10 minutes ago annunciator 1C04C D-3 "Drywell Equip Drain Sump Hi Temp" alarmed followed shortly by 1C04C C-3 "Drywell Equip Drain Sump Hi Leakage.

The ARP automatic actions occurred properly with 1P37B "B DW Equipment Drain Pump" RUNNING recirculation through the 1E-34 "DW Equipment Drain Sump HX".

The STA reports Drywell pressure rising.

Drywell pressure has reached 3.5 psig and is slowly rising.

Annunciator 1C04C B-1 "Drywell Equipment Drain Sump HI-HI Level is in alarm.

At this point you observe the Drywell Drain system indications shown in the support material booklet.

Which action is correct for the current plant conditions?

(Assume indicated annunciators are still in alarm)

- a. Take HS for CV-3728 and CV-3729 "Drywell Equipment Drain Sump Isolation Valves" to CLOSED and check that both 1P37A and 1P37B AUTOMATICALLY STOP.
- b. Take HS for 1P37A and 1P37B to STOP and check CV-3728 and CV-3729 "Drywell Equipment Drain Sump Isolation Valves" AUTOMATICALLY CLOSE.
- c. Take HS for CV-3728 and CV-3729 "Drywell Equipment Drain Sump Isolation Valves" to CLOSED and check that 1P37A **and** 1P37B remain RUNNING.
- d. Take HS for CV-3728 and CV-3729 "Drywell Equipment Drain Sump Isolation Valves" to CLOSED and check that 1P37A **or** 1P37B remains RUNNING.

7. The plant is at full power.

You are the 1C05 operator and notice the following indications:

- Reactor power on the APRMs is noted to be slowly rising.
- Main Generator load is rising.
- Final Feedwater temperature is lowering.
- Condenser backpressure has risen.

Which of the following would account for this set of indications?

- a. CV-1139 “Feedwater Heater 1E-5A Dump to Condenser” is OPEN.
- b. CV-1158A “HP Turbine Extraction Steam Outlet to 1E-6A” is OPEN.
- c. MO-1546 “LP Feedwater Heater Bypass Isolation Valve” is CLOSED.
- d. CV-1237 “High Pressure Turbine Extraction Steam Bypass Valve “ is CLOSED.

8. An electrical ATWS has occurred with reactor power remaining at 7%.

The 1C05 operator is directed to manually drive control rods.

- 1) Should the Rod Worth Minimizer be PLACED IN BYPASS or should it REMAIN IN OPERATE?
AND
- 2) What is the CORRECT reason for the answer to part 1 of this question?
 - a. 1) PLACED IN BYPASS
2) To disable possible Select Blocks.
 - b. 1) PLACED IN BYPASS
2) To disable possible Insert Blocks.
 - c. 1) REMAIN IN OPERATE
2) To enforce insertion of the highest worth rods FIRST.
 - d. 1) REMAIN IN OPERATE
2) To transmit rod positions to the Plant Process Computer.

9. As primary containment pressure exceeds 55 psig, which of the below correctly describes the operational implications of this pressure?
- a. The containment vent valves will not open due to high delta pressure.
 - b. The HPCI malfunctions due to high backpressure.
 - c. The SRVs will not remain open.
 - d. Containment failure.

10. The plant is at full power when annunciator 1C07A B-4 “EHC Fluid reservoir 1T-33 LO Level” is received.

The in-plant operator reports an unisolable EHC leak.

The OSS directs Reactor SCRAM and IPOI 5 actions to be carried out.

EOP 1 is entered on LO RPV water level after the SCRAM.

The OSS then directs securing both EHC pumps.

Which of the following is correct concerning Bypass valve operation for this event and subsequent Reactor pressure control?

- a. Bypass Valve operation will **NOT** be available for long term RPV pressure control under these conditions. ADS/SRVs, HPCI, or RCIC can be used for RPV pressure control.
- b. The Bypass Valves will **NOT** control with Pressure Set. However, the Bypass Valve Opening Jack will still function.
- c. The installed Bypass Valve accumulators provide 30 minutes of Bypass Valve operation. At this point decay heat will be within the capacity of the MSL Drain Valves.
- d. The Bypass Valves will **NOT** be available for RPV pressure control. Use Chest Warming to control RPV pressure until decay heat is within the capacity of the MSL Drains.

11. The Plant is at 90% power.
ATWS conditions have occurred.

Which of the following is correct with regard to automatic initiation of “ATWS ARI/RPT” and what does this accomplish?

Actions are automatically initiated ...

- a. at 119.5 inches RPV Water Level which rapidly reduces power due to a rapid increase in voids.
- b. at 1055 psig RPV Pressure which OPENS (vents to atmosphere) the ARI solenoid valves, depressurizing the Scram Air Header.
- c. at <90% OPEN on the Turbine Stop Valves which rapidly reduces power due to a rapid increase in voids.
- d. on a “Fast Closure Signal” to the Turbine Control Valves which OPENS (vents to atmosphere) the ARI solenoid valves, depressurizing the Scram Air Header.

12. The plant is at 40% power.
Control Rod 14-31 is at position 12.
Which of the following components is designed to prevent OUTWARD rod motion if the insert line were to rupture on the CRD Mechanism to Control Rod 14-31?
- a. Collet assembly.
 - b. Coupling spud.
 - c. Drive piston.
 - d. Stop piston.

13. The plant has suffered a major event and SAG entry was required.
Hydrogen concentrations in the Drywell have reached 5.1%.
You are directed to perform SEP 303.3 “CAD Purge for H2 Control In SAGs”

The following plant conditions currently exist:

- “B” RHR Loop is being used for Drywell and Torus Sprays.
- MO-2010 “RHR Loops A/B Cross-Tie Header Isolation Valve” is CLOSED.
- “A” RHR Loop is in Torus Cooling.
- Drywell Pressure is 25 psig and steady.
- MO-2000 “RHR Loop “A” Inboard Drywell Spray Valve” is bound CLOSED.
- Torus Level is 11.2 ft and stable.

Can N₂ from the CAD system be purged into the containment with the current plant condition?

If YES, where can it be injected?

If NO, why can it not be injected?

- a. YES. It can be injected into the “A” RHR Torus Spray Header.
- b. YES. It can be injected into the “A” RHR Drywell Spray Header.
- c. NO. MO-2000 must be OPENED.
- d. NO. Drywell pressure above the High Drywell pressure interlock.

14. Which of the following is designed to initiate AUTOMATIC actions to protect the Main Turbine from over heating of the last stage buckets?

(Assume NO operator actions)

- a. High Condenser Backpressure, 7.5" Hg absolute.
- b. MSR high level, 3 inches below the MSR Shell.
- c. HI-HI exhaust hood temperature, 225°F
- d. Main Turbine HI-HI Vibration, 10 mils.

15. The plant was at full power when a “Station Blackout” occurred.

Assume the OSS directed you to perform each of the following EOP actions.

Which one of the following actions can be accomplished AND will perform the system function directed by the OSS?

(Assume manual operation of MOTOR OPERATED valves is performed when required)

- a. Install Defeat 16 “Containment Atmosphere Monitoring Sample Line Isolation Defeat” to re-establish H₂ sampling of the Drywell.
- b. Lower Torus water level by draining the Torus to Radwaste per OI 149 “RHR System” section 12.0 “Draining to Radwaste”.
- c. Install Defeat 4 “Drywell Cooler Isolation Defeat” to reduce Drywell air temperature.
- d. Install AIP 404 “Injection with Fire Water” then initiate Torus and Drywell sprays to reduce Torus and Drywell pressure.

16. A plant transient occurred from full power.
A SCRAM was successfully inserted.
RPV injection is secured with the exception of CRD.
The MSIVs are open.
Reactor Water level is 280 inches on the Floodup Level indicator and slowly rising.
Reactor pressure is 145 psig and slowly raising.

Which of the following is required for the CURRENT plant conditions?

- a. Initiate Shutdown Cooling and drain to Radwaste.
- b. Manually open SRVs as needed to provide a drain path.
- c. Reduce Load Set until the Main Steam Bypass Valves open.
- d. Close the MSIVs until RPV level is restored and MSLs drained.

17. The plant is at full power.

Drywell temperature is 130°F and rising due to a Well Water problem.

The OSS directs you to, "Vent the Drywell IAW OI 573 "Containment Atmosphere Control System" section 6.1 "Normal Containment Venting".

"B" SBTG is started and Containment Rad levels are normal.

You have lined up and are venting the Drywell and maintaining Drywell pressure as directed.

Several annunciator alarm including 1C07A A-11 "HVAC Panel 1C-23 Trouble". The BOP operator determines that RIM-7606A "A RB Vent Shaft Rad Monitor " has failed.

Which one of the following is correct concerning the venting of the Drywell?

Drywell venting ...

- a. is **NOT** effected because RIM-7606A is not associated with "B" SBTG.
- b. can **NOT** be re-established with either a Group 3A or B Isolation signal present.
- c. can be re-established once RIM-7606A input to Group 3A logic is bypassed and the Containment Vent Path is selected to Drywell on 1C05.
- d. can continue but only (the small valve) CV-4310 "Inboard DW Vent CV-4302 Bypass Valve" is available with the Group 3A isolation signal present.

18. The plant is at full power.

One loop of RHR is in the Torus Cooling mode with full RHR and RHRSW flow.

At this point a Safety Relief Valve (SRV) fails FULL OPEN.

The other loop of RHR is quickly placed in Torus Cooling and flows maximized.

Which of the following CORRECTLY describes the expected response of Torus water temperature if the SRV **CAN NOT** be closed?

- a. Torus water temperature will still be LOWERING with only one loop of Torus Cooling on and LOWER EVEN FASTER when the second loop of Torus Cooling is placed in service.
- b. Torus water temperature will STABILIZE with only one loop of Torus Cooling on and BEGIN TO LOWER when the second loop of Torus Cooling is placed in service.
- c. Torus water temperature will RISE with only one loop of Torus Cooling on and BEGIN TO LOWER when the second loop of Torus Cooling is placed in service.
- d. Torus water temperature will RISE with only one loop of Torus Cooling on and CONTINUE TO RISE when the second loop of Torus Cooling is placed in service.

19. AOP 915 "Shutdown Outside Control Room" has been entered and the transfer has been completed.

Which of the following is correct?

- a. Div I RHR and Core Spray logics are disabled. LLS and ADS are disabled.
- b. Div I RHR and Core Spray logics are disabled. ADS and Group 1 are disabled.
- c. Div II RHR and Core Spray logics are disabled. LLS and ADS are disabled.
- d. Div II RHR and Core Spray logics are disabled. LLS and Group 1 are disabled.

20. Review the panel indications given in the Support Material Booklet

The plant was at power.

A transient has occurred requiring entry into EOP 4.

An unmonitored Off-site release is in progress.

Which one of the following systems has failed to isolate and what is the source of the steam leak?
(Assume in each case the indicated system is the only failure and all other systems have responded correctly)

- a. HPCI steam leak in Radwaste.
- b. RWCU steam leak in Steam Tunnel.
- c. MSL drain steam leak in Turbine Building.
- d. RCIC steam leak at Barometric Condenser.

21. The plant is at Full power.
A partial loss of GSW occurs.

Which of the following components has exceeded an AUTOMATIC trip point and is required to be tripped manually?

- a. "A" RFP with oil temperature at 245°F.
- b. The Main Generator with Isolation Bus Temperature at 185°F.
- c. The "A" Recirc MG Set with oil temperature at 220°F.
- d. Both "A" and "B" EHC pumps with EHC Tank temperature at 140°F.

22. A complete loss of the service and instrument air systems occurs while at full power. Operators are trying to restart a compressor as air header pressure lowers, but they may be required to SCRAM the reactor.

Which one of the following is a potential effect on the Control Rod Drive (CRD) Hydraulic System?

- a. The scram discharge volume may fail to isolate when the scram occurs.
- b. Cooling flow could be lost to the control rod drive mechanisms before the scram occurs.
- c. The running CRD pump could trip due to operating at no flow conditions.
- d. The Backup scram valves could fail to vent the Scram Air Header when the scram occurs.

23. **Review the CIMS panel indications given in the Support Material Booklet**

The plant is currently at 90% power.

I&C Technicians are performing a TIF on a problem in 1C43 “Division 1 Core Spray Vertical Board”.

A CIMS alarm is received.

Which of the following is correct concerning the indications provided?

- a. The “B” Drywell Well Water isolation valves have isolated. The “A” Drywell Well Water isolation valves have **not** isolated. If no operator actions are taken the Reactor **will** scram.
- b. Both “A” and ”B” Drywell Well Water isolation valves have isolated. If no operator actions are taken the Reactor **will** scram.
- c. A signal is present for the Well Water Isolation but **not** all valves have isolated. If no operator actions are taken the reactor **may** scram depending on the current valve positions.
- d. A signal is present for the Well Water Isolation but the signal has an override in effect. A Reactor scram will **not** occur.

24. Given the following Conditions:

The plant is operating at full power.
The "A" CRD pump Tripped.
The "B" CRD pump has NOT been started.

Which one of the following statements describes the effect the loss of CRD pumps has on the plant?

- a. The Control Rods will NOT fully SCRAM with RPV pressure alone due to pressure equalization across the drive piston.
- b. The Control Rods can still be SCRAMMED, but the insertion time will be significantly longer.
- c. Multiple Control Rods will begin to drift if a pump is NOT returned to service within 15 minutes.
- d. Control Rod Drive mechanism temperatures will begin to rise.

25. **Review the indication given in the Support Material Booklet**

The plant is currently at 45% power.
An SRV is leaking by to the Torus.

Which of the following is correct concerning the Torus Temperature indicator on 1C03?
(Assume the **ONLY** parameter changing is Torus Temperature)

- a. The indicator is receiving a **SINGLE** input signal. Before the **RED** band is reached an **EOP 1** entry is required.
- b. The indicator is receiving a **SINGLE** input signal. Before the **YELLOW** band is reached an **EOP 1** entry is required.
- c. The indicator is receiving **MULTIPLE** input signals. Before the **RED** band is reached an **EOP 1** entry is required.
- d. The indicator is receiving **MULTIPLE** input signals. Before the **YELLOW** band is reached an **EOP 1** entry is required.

26. A loss of Drywell cooling occurred, causing the crew to SCRAM (successfully) from Full power.

When Average Drywell Air temperature could **NOT** be restored and maintained <280°F the crew Emergency Depressurized the RPV.

The OSS has performed a crew brief to inform the crew that the “Sat Curve” has been entered. (EOP-2, Graph 1)

The following applicable parameters are at these stable values:

- Both Recirc pumps are tripped.
- Indicated NR GEMAC RPV level 190"
- Indicated WR Yarway RPV level 200"
- Indicated WR GEMAC (Floodup) RPV level 200"
- Indicated Fuel Zone RPV level 190"

What value for RPV water level, if any, should be used for EOP decision-making purposes?

- a. 167"
- b. 190"
- c. 200"
- d. None, all RPV level indicators should be considered unreliable.

27. Review the indication given in the Support Material Booklet

EOP 2 directs entry into **EOP 1** if Torus Water Level CANNOT be maintained BELOW 13.5 ft.

Review the attached picture.

At what point does Torus water level reach the level that requires **EOP 1** entry from **EOP 2**?

- a. A
- b. B
- c. C
- d. D

28. Which of the following curves, if followed, will prevent system damage due to air entrainment?
- a. ECCS Vortex Limit
 - b. RHR NPSH Limit
 - c. Heat Capacity Limit
 - d. Core Spray NPSH Limit

29. The plant is at full power.

During transfer of RWCU resin, a pipe break released resin to the RB 2nd Floor North area outside the RWCU Phase Separator Room.

EOP 3 was entered on Radiation Levels in ONE area above MAX SAFE.

No other EOP 3 entry conditions exist.

The resin has been contained in this area.

The following High Radiation Areas have been posted due to this event:

- RB 1st Floor Northwest
- RB 2nd Floor North and SBTG Room
- RB 3rd Floor Northwest
- RB North Stairwell below RB 4th Floor
- ALL other area radiation levels are normal

Which alarm is consistent with this event?

- a. 1C03A D-9 "RBCCW RM-4820 HI RAD"
- b. 1C04C A-1 "RADWASTE EFFLUENT RIS-3972 HI RAD"
- c. 1C04B B-6 "NEW FUEL STORAGE AREA ARM HI RAD"
- d. 1C04B D-7 "RHRSW AND ESW EFFLUENT RM-1997 OR RM-4268 HI RAD"

30. Which of the following requires operator verification of Secondary Containment Isolation **and** entry into EOP 3?
- a. RB Vent Shaft Rad Monitor Rad levels reading 10 mR/hr.
 - b. Offgas Vent Pipe above the HI-HI Rad Trip setpoint.
 - c. Fuel Pool Exhaust Rad levels reading 10 mR/hr.
 - d. MSL HI-HI Rad at 500 mR/hr.

31. EOP 4 “ Radioactive Release Control” requires Emergency Depressurization before certain conditions are reached.

What purpose does Emergency Depressurization achieve AS IT RELATES TO EOP 4?

- a. This establishes or maintains adequate core cooling.
- b. This places the primary system in a low energy condition and reduces the driving head to the leak.
- c. Reduces the energy in the RPV before reaching conditions where the primary containment will not accommodate an SRV opening.
- d. This places the RPV in a low energy condition before reaching conditions where a loss of coolant accident could not be adequately contained in the primary containment.

32. A fire occurs in the Cable Spreading Room.
(Assume the Fire Protection System is lined up for AUTOMATIC ACTUATION and Cable Spreading Room access is restricted)

The installed fire protection system automatically actuates.
The room must be entered to determine if the fire has been extinguished.

- (1) What is the classification of the fire that is expected in this area?

AND

- (2) What safety hazard, from the automatic system actuation, should be considered prior to operators entering the Cable Spreading Room?

- | <u>(1)</u> | <u>(2)</u> |
|------------|---|
| a. Class B | Electrical Shock from water spray |
| b. Class C | Electrical Shock from water spray |
| c. Class B | Suffocation from oxygen depletion due to the discharge of CO ₂ in the area |
| d. Class C | Suffocation from oxygen depletion due to the discharge of CO ₂ in the area |

**33. Review the CIMS panel indications given in the Support Material Booklet
RO ONLY**

The plant is shutdown.

The “B” side of Shutdown Cooling is in service with “B” RHR and “B” RHRSW pumps running.

Annunciator 1C03B B-4 “RHR SHUTDOWN COOLING SUCTION HEADER HI PRESSURE” alarms followed shortly by a number of annunciators.

You observe the CIMS panel indications given.

(Assume all automatic actions have had time to go to completion)

(1) Which of the following would be consistent with the indicated plant conditions

AND

(2) what is/are the required operator action(s) for these conditions?

- a. (1) “B” RHR pump has tripped.
(2) Manually CLOSE/VERIFY CLOSED MO-2010 “RHR Crosstie Valve” and START an “A” side RHR and RHRSW pump to establish Shutdown Cooling on the “A” side.
- b. (1) Reactor Pressure is 145 psig and rising.
(2) Manually CLOSE/VERIFY CLOSED MO-1908 “Inboard Shutdown Cooling Isolation Valve” and MO-2003 “A Inboard Inject Isolation Valve”.
- c. (1) “B” RHR pump has tripped.
(2) REOPEN MO-1909 “Shutdown Cooling Isolation Valves” and START the “D” RHR pump.
- d. (1) Reactor Pressure is 145 psig and rising.
(2) THROTTLE OPEN MO-1939 “B Heat Exchanger Inlet Throttle Valve” to increase cooling flow.

34. Refueling operations are in progress with the Mode Switch in “REFUEL”. Which of the following allows the withdrawal of a control rod AND ensures the reactor will remain shutdown?
- a. The One-Rod permissive interlock and following the fuel moving plan during fuel moving.
 - b. The RSCS Group Selector switch selected to the correct sequence and adequate shutdown margin designed into the core
 - c. Refueling Rod Block Interlocks and the proper rod withdrawal sequence loaded into the RWM.
 - d. The RSCS Mode Selector Switch placed in “WITHDRAW” and following the fuel moving plan during fuel moving.

35. Review the indication given in the Support Material Booklet

The plant is at full power.

Annunciator 1C04B B-4 "Steam Leak Detection Ambient HI Temp" was received.

RCIC has failed to isolate and temperatures were noted to be rising slowly.

The operator manipulates the Steam Leak Detection panel as Shown.

Which of the following is correct concerning the RCIC Room?

- a. Room Differential Temperature is 50°F.
- b. Room Differential Temperature is >50°F.
- c. Room Ambient Temperature is 155°F.
- d. Room Ambient Temperature is >175°F.

36. Main Plant Exhaust Plenum pressure is rising.

Which of the following will AUTOMATICALLY initiate to provide the indicated protective function?

- a. The Main Plant Exhaust Fans sequentially SHIFT to High Speed to prevent collapsing the Main Plant Exhaust Plenum.
- b. The Reactor Building Exhaust Fans START to prevent Refuel Floor blow out panels from lifting.
- c. The Reactor Building Supply fans TRIP to prevent over pressurizing Secondary Containment.
- d. SBTG STARTS to draw at least a -.25 inch WG in the Reactor building.

37. From which of the following source(s) can power for SV-1856 “RPS “A” Scram Pilot Solenoid Valves” originate?
- a. Bus 1B32 only
 - b. Bus 1D13 only
 - c. Buses 1B32 or 1B42
 - d. Buses 1D13 or 1D23

38. **RO ONLY**

The 1C05 operator is on step 20 of the “Control Rod Withdrawal Sequence Sheet”.

Control Rod 22-39 has just been withdrawn to position 12.

Control Rod 38-23 is selected.

Backlights on Rods 22-39 and 38-23 are bright.

RWM reads “RPIS INDICATES THAT RODS 22-39 AND 38-23 ARE SELECTED”

RWM is in “OPERATE”.

Which of the following is the combined effect from the RWM and RBM as it pertains to Inward and Outward rod motion?

- a. Bypassing the RWM allows Outward rod motion. Inward rod motion is NOT effected.
- b. NO Outward rod motion is allowed. Inward rod motion is NOT effected.
- c. NO Outward rod motion is allowed. Inward rod motion is allowed with “Emergency In” or SCRAM signal only.
- d. NO Outward rod motion is allowed. Inward rod motion can NOT occur unless the RWM is bypassed or by SCRAM signal.

39. **RO ONLY**

A plant transient has occurred resulting in an ATWS.

While attempting to verify all rods inserted the 1C05 operator places the “Rod Select Power” switch in the OFF position and LEAVES IT THERE.

Which of the following RIPs **CANNOT** be accomplished with these conditions?

- a. RIP 102.1 “Repeated Manual Scram”
- b. RIP 103.2 “Increase CRD Cooling Flow and Pressure”.
- c. RIP 103.3 “Manually Drive Control Rods”.
- d. RIP 103.4 “Vent Individual CRD Exhaust Lines”.

40. Both Reactor Recirculation pumps were running at 70% speed when an internal component failure in the “B” MG SET SPEED CONTROL caused the controller speed demand output signal to instantaneously fail to the MAXIMUM value.

Which of the following CORRECTLY describes the expected affect of this failure on core flow?

Core flow will rise until...

- a. the “B” Recirc Scoop Tube Positioner reaches its ELECTRICAL STOP.
- b. the “B” Recirc Scoop Tube Positioner reaches its MECHANICAL STOP.
- c. a “B” Recirc Scoop Tube Positioner LOCK-UP occurs due to high Milliamp output signal from the Controller.
- d. a “B” Recirc Scoop Tube Positioner LOCK-UP occurs due to high deviation between the Controller speed demand and the Positioner position.

41. The plant is being shut down.
All Control Rods have been inserted.
RPV pressure is 220 psig.
RHR is in Standby/Readiness Condition per OI 149 "RHR System" with NO pumps running.
The "B" Recirculation pump is RUNNING.
The "A" Recirculation pump has been SECURED.
The "A" Recirculation pump Suction, Discharge, and Discharge Bypass Valves are OPEN.

Which of the following will occur if RPV water level were to drop to 119.5"?
(The DEFAULT loop is selected for injection and Drywell pressure is **NOT** rising)

- a. The "A" Recirc Loop Discharge and Discharge Bypass valves will receive a CLOSE signal.
- b. The "A" RHR Loop LPCI Inboard and Outboard Injection valves will receive a CLOSE signal that is sealed in for 10 minutes from the time that a loop is selected.
- c. The "B" Recirc pump will trip after the Discharge and Discharge Bypass valves CLOSE.
- d. The "B" RHR Loop Inboard LPCI Inject valve will OPEN and RHR will immediately inject into the RPV.

42. **RO ONLY**

Given the following conditions:

- The plant is at 75% power
- MO-1913 “B RHR Pump Torus Suction Valve” is being cycled for post maintenance testing and is currently CLOSED.
- All other RHR system components are in their normal standby lineup
- A steam break causes drywell pressure to reach 3 psig
- RPV water level is 190”

Which of the following CORRECTLY describes the response of the “B” RHR Pump Torus Suction valve, MO-1913, and the “B” RHR pump?

- a. MO-1913 automatically OPENS and the “B” RHR Pump automatically STARTS after MO-1913 is fully OPEN.
- b. MO-1913 must be manually OPENED and the “B” RHR Pump automatically STARTS after MO-1913 is fully OPEN.
- c. MO-1913 automatically OPENS and the B” RHR Pump must be STARTED after MO-1913 is fully OPEN.
- d. MO-1913 must be manually OPENED and the “B” RHR Pump must be STARTED after MO-1913 is fully OPEN.

1 Point

43. Following a full Group I Isolation at full power, HPCI received an auto initiation signal on RPV low level.
During the Group I Isolation, the HPCI pump flow signal was lost to the flow controller, sensing a constant ZERO gpm flow signal.

Which of the following describes the HPCI system response if NO operator action is taken?

The HPCI turbine will...

- a. remain at minimum speed.
- b. trip on high RPV water level.
- c. trip as soon as the signal is lost.
- d. trip on overspeed and remain shutdown.

44. The plant is at full power.

Which of the following Core Spray pressure annunciators/indications describe the operator's indication that a leak has occurred in the Core Spray piping BETWEEN the Reactor Vessel and Core Shroud?

- a. Core Spray Sparger HI Δ P (3.6 psig increasing)
- b. Core Spray Sparger LO Δ P (2.46 psid decreasing)
- c. Core Spray Discharge line low pressure (47.5 psig decreasing)
- d. Core Spray Discharge line high pressure (100 psig increasing)

1 Point

45. A transient has occurred while at power, which has resulted in a Bus 1A3 lockout followed by a hydraulic ATWS.

The 1C05 operator initiates Standby Liquid Control (SBLC) as directed.

Which of the following CORRECTLY describes the expected condition of the SBLC Squib valves based on their respective power supplies?

- a. Both will have actuated; they are powered from respective divisions of 125 VDC.
- b. Both will have actuated; they are powered from Uninterruptible AC.
- c. Only one will have actuated; it is powered from B RPS.
- d. Only one will have actuated; it is powered from its associated pump breaker on 1B44.

46. A turbine trip from full power has caused a reactor scram. RPV level lowered to 110" during the initial transient but has been restored to the normal operating band for two minutes. The scram has **NOT** been reset?

Select the answer that correctly describes the status of the RPS Backup Scram valves under these plant conditions.

Both Backup Scram valves should be...

- a. energized and OPEN (venting)
- b. energized and CLOSED (not venting)
- c. deenergized and OPEN (venting)
- d. deenergized and CLOSED (not venting)

47. You are directed by OI 878.2 “Intermediate Range Neutron Monitoring System” to closely monitor IRMs when switching between Range 6 and Range 7.

What is the reason for this direction?

- a. The affects of Power Range Gamma’s are starting to overcome the affects of Decay Gamma’s and will cause power to show a faster rate of rise.
- b. The SRM Rod Blocks are bypassed at this point and IRM spiking has occurred due to noise when the SRM circuitry bypasses the SRMs.
- c. The Mean Square Analog Unit is switched into the circuit at this point and starts applying the Campbelling calculations to the IRM output.
- d. The IRMs shift between Low and High Frequency Amplifiers at this point and could affect the IRM output signal.

48. **Review the indication given in the Support Material Booklet
RO ONLY**

The plant was at full power when a transient occurred that required insertion of a SCRAM.
The plant experienced an electrical ATWS.

Control Rods WERE SUCCESSFULLY INSERTED with the individual test switches per the
RIPs.

Plant conditions were stabilized.

Alarm 1C05A D-5 "SRM Downscale" is received.

Which one of the following is correct for these plant conditions and given indications?

- a. The 1C05 Operator has not completed the IPOI 5 Immediate actions to Drive IN the SRMs.
- b. The "C" SRM DNSC has deselected the SRM Drive Motors to prevent SRMs from going below T.S. required counts.
- c. "C" SRM has alarmed one decade above the alarm setpoint. Inform the OSS and write a WRC to repaired/recalibrate "C" SRM.
- d. IRMs are DRIVING into the core and when the IRMs are full in the Retract Permit light will come ON and then SRMs can be Driven IN.

49. The plant is at 85% power.
1C05A D-2 "APRM DOWNSCALE" annunciator alarms.
The "A" APRM indicates a downscale condition.

When does the APRM alarm occur AND with NO other plant changes what other annunciator will alarm?

- a. Alarm at 12% and 1C05B B-6 "RBM UPSCALE OR INOP"
- b. Alarm at 5% and 1C05B B-6 "RBM UPSCALE OR INOP"
- c. Alarm at 12% and 1C05B A-6 "ROD OUT BLOCK"
- d. Alarm at 5% and 1C05B A-6 "ROD OUT BLOCK"

**50. Review the indication given in the Support Material Booklet
RO ONLY**

The plant is at 64% Reactor power.
All other plant and system conditions are normal.
The “E” APRM is bypassed.

Based on the indications shown, how many LPRM inputs does “E” APRM have

and

if the “E” APRM is unbypassed what will occur?

- a. 12 LPRM inputs, ½ Scram
- b. 12 LPRM inputs, Full scram
- c. 6 LPRM inputs, ½ Scram
- d. 6 LPRM inputs, Full scram

51. **RO ONLY**

The plant is cooling down from full power operations.

The GEMAC Reference Leg Backfill System has been out of service for 3 weeks.

RPV level is 190 inches and stable.

Which of the following would be an EXPECTED plant response as the RPV cooldown and pressure reduction continues and what should be done if this occurs?

- a. LI-4560 "B GEMAC Level" instrument on 1C05 shows a 2 inch step change in level. Level is expected to slowly return to normal.
- b. LI-4560 "B GEMAC Level" instrument on 1C05 shows a 2 inch step change in level. The level instrument is inoperable and I&C must refill the reference leg to recover the instrument to service.
- c. LI-4540 "B Yarway Level" Wide-Range instrument on 1C05 shows a 2 inch step change in level. Level is expected to slowly return to normal.
- d. LI-4540 "B Yarway Level" Wide-Range instrument on 1C05 shows a 2 inch step change in level. The level instrument is inoperable and I&C must refill the reference leg to recover the instrument to service.

52. The plant is at 75% power.

The RCIC turbine has been started CST to CST using the flow-indicating controller.

RCIC is at 3000 RPM and stable.

Other plant conditions are normal with the exception of those systems lined up to support the RCIC testing.

Annunciator 1C04C C-9 “ RCIC INVERTER POWER FAILURE” Alarms and RCIC Inverter failure is confirmed.

Which of the following is correct concerning the RCIC turbine?

RCIC will ...

- a. remain running at 3000 rpm.
- b. tripped on electrical overspeed.
- c. tripped on mechanical overspeed.
- d. be running at idle speed (approx. 1000 rpm).

53. Review the indication given in the Support Material Booklet

The Plant was at full power.

A loss-of-coolant accident has occurred resulting in a successful reactor scram.

RPV water level lowered to 110 inches before the trend was reversed.

A transient has occurred involving the RCIC system.

The only operator action taken with RCIC was to cycle the handswitch for MO-2405, RCIC Turbine Stop Valve, to the fully CLOSED position and then to hold it in the OPEN position for three seconds.

What is the status of RCIC based on these indications?

- a. A RCIC Auto Isolation trip has occurred.
The RCIC Turbine trip is RESET.
- b. A RCIC High RPV Level trip has occurred.
The RCIC Turbine trip is RESET.
- c. A RCIC Electrical Overspeed trip has occurred.
The RCIC Turbine trip is NOT RESET.
- d. A RCIC Mechanical Overspeed trip has occurred.
The RCIC Turbine trip is NOT RESET.

54. The plant was operating at power.

A transient occurred, a SCRAM was successfully inserted, and the MSIVs were closed.

RPV level is 190 inches and being controlled in Auto by the Feedwater Level Control (FWLC) System.

SRVs are being used to manually control pressure between 800 and 1000 psig.

The 1C03 operator reports he is opening an SRV to reduce RPV pressure.

Which of the following would be the **FIRST** expected plant response in regards to cycling open the SRV?

- a. An RPV High Level alarm due to void increase.
- b. An RPV High Level alarm due to FWLC System response to increased steam flow.
- c. An RPV Low Level alarm due to void increase.
- d. An RPV Low Level alarm due to increased mass flowrate **NOT** sensed by the FWLC System.

55. **Review the indication given in the Support Material Booklet**

The plant is at full power.

A Group 3B isolation has occurred and verified to be complete.

You are ordered to override CV-4371A and the system responds as indicated in the picture on the following page.

What are the long-term implications of this system response?

- a. All of the SRVs will eventually lose the ability to lift on their safety setpoint.
- b. $\frac{1}{2}$ of the SRVs will eventually lose the ability to lift on their safety setpoint.
The other $\frac{1}{2}$ are **NOT** effected.
- c. All of the SRVs have lost N₂ from outside the Drywell.
- d. $\frac{1}{2}$ of the SRVs have lost N₂ from outside the Drywell.
The other $\frac{1}{2}$ are **NOT** effected.

56. Review the indication given in the Support Material Booklet

A plant transient has occurred from full power.

Defeat 4 was inserted and verified correct.

Other EOP actions have been taken and some time later, the BOP observes the panel indications shown in the Support Material Booklet.

Which of the following BY ITSELF would account for the indications observed?

- a. Drywell pressure is below 2 psig.
- b. Drywell sprays have been initiated.
- c. Drywell H₂ or O₂ concentration is >4%.
- d. Drywell temperature is below the over temperature alarm setpoint.

57. The plant is at full power and the “A” RPS bus becomes de-energized.

Which of the following correctly describes the plant response to this event?

- a. Inboard MSIV control power and position indication will be lost.
- b. PCIS Div 1 Groups 1 through 5 (excluding MSIVs) will isolate.
- c. A Scoop Tube Lockup will occur on the “A” Recirc MG set.
- d. The “A” SBDG 1G31 will automatically start.

58. Review the panel indications given in the Support Material Booklet.

The plant was at full power when a spurious Group 1 inboard isolation occurred. The following annunciators are currently ALARMING:

- 1C03A C-5 “SRV/SV Tailpipe HI Pressure or HI Temp”
- 1C03A D-5 “LLS “A” or “B” Armed”
- 1C05A C-4 “Reactor Vessel HI Pressure Trip”

Based on these conditions and the panel indications shown, which of the following is correct?

- a. PSV 4407 has failed to open.
- b. The operator has reset the ”B” LLS logic on 1C03.
- c. The initial LLS pressure reduction is complete and LLS is cycling normally.
- d. The initial pressure reduction by LLS has just started and LLS is functioning normally.

59. The plant is currently at 540 MWe.
LOAD SET was inadvertently placed at 550 MWe.
All other Turbine controls are normal.

As Reactor power is raised to full power, which of the following is the correct plant response?

- a. The Turbine Supervisory Panel will sense a load imbalance at 575 MWe and a Turbine trip will occur.
- b. The 100% Load Limit is in effect at this power level which will allow the Turbine to be loaded to full power.
- c. When Turbine load reaches 550 MWE number 1 Bypass Valve will start opening to control turbine inlet pressure.
- d. When Turbine load reaches 550 MWE reactor pressure will continue to increase and an RPS Scram will occur.

60. **RO ONLY**

OI 644 "Condensate and Feedwater Systems" directs the verification of Condensate/Feed system being filled and vented prior to the FIRST Condensate Pump start.

Which of the following is the reason for this action?

- a. Reduce the risk of water hammer and the system damage that could result.
- b. To prevent pump damage due to exceeding pump vibration limits during pump startup.
- c. To prevent Condensate Pump vortex limits from being exceeded and vapor binding of the pump.
- d. To prevent pump run out conditions in the Condensate Pump which would cause winding degradation.

61. The Narrow Range GEMAC level transmitters (LT-4559, 4560, and 4561) are used in the Reactor Water Level Control system.

1) Are these transmitters calibrated HOT or COLD?

And

2) What type of compensation, if any, do they use?

- a. 1) COLD
2) Electronic pressure compensation
- b. 1) COLD
2) None
- c. 1) HOT
2) Temperature compensation
- d. 1) HOT
2) None

62. **RO ONLY**

The OSS directs you to **START** the “B” SBG T train **WITHOUT** a Group 3 isolation.

Which method below will achieve this direction?

(Assume these are the only operator actions taken)

- a. With SBG T in **AUTOMATIC**, depress PB-5831B “B SBG T Test Pushbutton”
- b. With SBG T in **AUTOMATIC**, place the RIS 4131B “Fuel Pool Exhaust Radiation Monitor” to **TRIP TEST**.
- c. Take HS 5814B “B SBG T Mode Select Switch” to **MANUAL** then depress PB-5831B “B SBG T Test Pushbutton”
- d. Take HS 5814B “B SBG T Mode Select Switch” to **MANUAL** then place the RIS 4131B “Fuel Pool Exhaust Radiation Monitor” to **TRIP TEST**.

63. Which one of the following conditions would PREVENT the 1G31, “A Diesel Generator”, from being shutdown using the Engine Mode Selector Switch on Panel 1C93 “SBDG 1G31 Control Panel”?
- a. The DG automatically started due to bus undervoltage on 1A3.
 - b. The DG automatically started due to a 2 psig in the Drywell.
 - c. The DG was started by “Fast Manual Start” from the DG Room.
 - d. The DG was manually started from the Control Room.

64. **RO ONLY**

The plant was operating at 90% power.

Both SBDGs started and loaded onto their respective buses due to a total loss of off site power.

The 1C03 operator informs you he will be starting the “A” RHRSW pump.

You observe 1G-31 “A” SBDG voltage and frequency are slightly lower after the “A” RHRSW pump is started and running.

Is this an expected system response

and

what should be done based on these indications?

- a. This is expected. Adjust SBDG speed and voltage to the desired values.
- b. This is expected. However, take HS-3234A “Governor Mode (DROOP) Switch” to “PARALLEL” as soon as possible to provide more stable voltage and frequency control.
- c. This is **NOT** expected. These conditions indicate that the “A” RHRSW motor and pump are uncoupled and the pump should be secured immediately.
- d. This is **NOT** expected. A governor failure is indicated and the SBDG output breaker should be OPENED immediately to prevent a 1A3 bus lockout from occurring.

65. A Group 1 isolation and ATWS have occurred from full power.

- Reactor power was 15% after the Recirc pumps were tripped.
- LLS is controlling RPV pressure.
- RPV injection was terminated and prevented for Level/Power Control.

As the 1C05 operator, you CLOSED the Feed Reg Valves and are monitoring critical parameters. You report the following parameters to the OSS:

- RPV level is at 150".
- Reactor power is at 2%.

At this point the OSS directs you to reestablish injection with feedwater.

Is this direction correct? (YES or NO)

If YES, identify the reason it is correct.

If NO, identify the additional considerations necessary to reestablish injection.

- a. YES
Injection may be reestablished when power lowers to <5%. There is no restriction on RPV level.
- b. YES
Injection may be reestablished when power lowers to <5% and RPV level is <158".
- c. NO
Injection must remain terminated until RPV level lowers to less than +119.5".
- d. NO
Injection must remain terminated until RPV level lowers to less than +87".

66. A startup is in progress.
Control Rod 18-15 is being notched out.

Position indication for position 18 has been lost.
The RWM-OD (Operator Display) was taken to BYPASS.
Rod 18-15 was driven IN to position 16, IAW the pull sheet, and position 16 was verified operable.
The RWM-OD was taken to OPERATE.
Rod 18-15 is again withdrawn to position 18.

Which of the following is correct AND will allow rod withdrawal of Control Rod 18-15 to position 48 to continue?

- a. A RWM WITHDRAW ERROR will occur. After position 18 is SUBSTITUTED on the RWM-OD the withdraw error will clear.
- b. A RWM WITHDRAW ERROR will occur. After Control Rod 18-15 is BYPASSED on the RWM- CC (Computer Chassis) the withdraw error will clear.
- c. Both RWM INSERT and WITHDRAW BLOCKS will occur. After position 18 is SUBSTITUTED on the RWM-OD both rod blocks will clear.
- d. Both RWM INSERT and WITHDRAW BLOCKS will occur. After Control Rod 18-15 is BYPASSED on the RWM-CC (Computer Chassis) both blocks will clear.

67. Review the indication given in the Support Material Booklet

The plant was at Full power.

“A” RWCU Pump running with both “A and B” RWCU Beds in Service.

The “A” SBLC pump is tagged out to replace the motor.

A transient occurred resulting in an Electrical ATWS.

You have been directed to inject with SBLC.

You have placed the Handswitch (HS-2613) for SBLC in the position shown in the Support Material Booklet and observe the indications shown.

The following plant conditions currently exist:

- LLS is controlling RPV pressure.
- RPV level control is set at 158 inches in auto and controlling level.
- SBLC system flow indicator is indicating 0 GPM
- SBLC pump discharge pressure is indicating 1375 psig
- SBLC tank level is reading 88% and stable

What is the status of the following?

MO-2701 “RWCU Suction Outboard Isolation Valve”

MO-2740 “RWCU Return Header Outboard Isolation Valve”

“A” RWCU pump

- a. MO-2701 - CLOSED
MO-2740 - OPEN
“A” RWCU pump - OFF
- b. MO-2701 - OPEN
MO-2740 - CLOSED
“A” RWCU pump - ON
- c. MO-2701 - OPEN
MO-2740- OPEN
“A” RWCU pump - ON
- d. MO-2701 - CLOSED
MO-2740 - CLOSED
“A” RWCU pump - OFF

68. Assuming a normal SDC alignment with the "B" RHR loop in SDC.
The "B" RHR pump is running at 4300 gpm.
The "B" RHRSW pump is running at 2000 gpm.
MO 1909 "RHR Shutdown Cooling Outboard Isolation Valve" indicates OPEN.
MO 1939 "RHR HX 1E-201B Inlet Throttle Valve" indicates DUAL.
MO 1940 "RHR HX 1E-201B Bypass Valve" indicates DUAL.
MO 1947 "RHR HX 1E-201B Service Water Outlet Isolation Valve" indicates DUAL.
The STA reports a cooldown rate of 70°F/hr.

The OSS directs you to achieve a cooldown rate between 40 and 60°F/hr.

Which of the following panel manipulation would be appropriate in achieving this order?

(Assume you place the handswitch for the indicated MO in the given direction for one second and then recalculate the cooldown rate.)

- a. CLOSE on MO 1909.
- b. OPEN on MO 1939.
- c. OPEN on MO 1940.
- d. OPEN on MO 1947.

69. A non-selected control rod at position 36 is uncoupled and the control blade is stuck. The RO will be selecting and WITHDRAWING this control rod fully.

Which of the following CORRECTLY describes when the uncoupled control rod can be identified using RPIS indications only?

- a. As soon as the control rod is selected.
- b. When the selected control rod is withdrawn from position 36 to position 38.
- c. After the RMCS Timer times out with the selected control rod at position 48.
- d. When the selected control rod has withdrawn past position 48 independent of the RMCS Timer.

70. Which of the following is utilized to automatically select the appropriate RBM upscale trip setpoint when the RBM is required to be in operation?
- a. Steam Flow
 - b. Reference APRM
 - c. Averaging Circuit
 - d. Turbine 1st Stage pressure

71. The plant is at full power.

HPCI was running for a surveillance test with RHR, RHRSW, and ESW running as required for support.

Torus temperature reached the EOP 2 entry condition during the surveillance.

The OSS entered EOP 2 on Torus water temperature and Torus Cooling was MAXIMIZED with all RHR and RHRSW pumps running at rated flows.

Currently:

HPCI is secured and Torus Water temperature is 2°F above the EOP 2 entry temperature and slowly lowering.

Torus Cooling is still MAXIMIZED.

Bus 1A3 receives a bus Lockout.

Which of the following would be the expected status of Torus Cooling with no operator action?

- a. "B" RHR Loop would be operating within limits.
- b. The "A" RHR Loop header would be below the allowed pressure.
- c. Torus Cooling would no longer be MAXIMIZED as directed by EOP 2.
- d. "B" and "D" RHR pumps would be above their maximum allowed flow rates.

72. **RO ONLY**

A plant transient has occurred resulting in High Drywell temperatures and pressures.

You are the 1C03 operator and the OSS directed you to spray the Torus and Drywell.

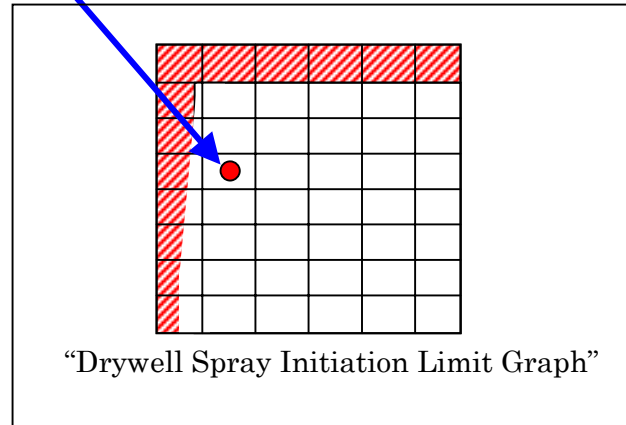
You initiated full Torus and Drywell sprays.

Drywell temperature and pressure lowered as expected.

Drywell pressure and temperature dropped to the point where Drywell and Torus sprays are automatically secured.

Drywell temperature and pressure again begin to rise.

Drywell pressure is currently 15 psig and Drywell temperature is 220°F.



All other plant conditions are the same.

Which of the following is correct?

- a. With OSS permission reestablish Drywell and Torus Sprays
- b. Reestablish Drywell and Torus Sprays. OSS permission is **NOT** required again.
- c. Containment failure will occur if Drywell sprays are initiated at this Drywell Temperature and Pressure.
- d. Drywell and Torus sprays at this temperature and pressure would result in a large amount of oxygen entering the containment through the vacuum breakers.

73. **RO ONLY**

A small break LOCA has occurred from full power.
Drywell Pressure is 2.4 psig and stable.
Torus water level is 12.5 ft.
RPV level is 214 inches and stable.

Which condition below, **BY ITSELF**, will cause Torus Water level to continue to rise if no operator action is taken?

(Consider each condition independently and assume all automatic actions occur as required)

- a. The "A" loop RHR pumps are injecting into the RPV for Level control and the "B" loop RHR pumps are lined up for Torus Spray.
- b. All RHRSW pumps are running and spraying the Torus per AIP 401"Injection with RHRSW".
- c. Both Core Spray pumps **AUTOMATICALLY** started on Drywell pressure and are injecting.
- d. HPCI Started automatically on the High Drywell pressure signal.

74. **RO ONLY**

The plant is at full power.

You are cycling MO-1904 "Outboard Inject Isolation Valve" for the "B" RHR loop for post maintenance testing.

When you take the handswitch to OPEN annunciator 1C08A D-5 "MCC 1B34A/1B44A Tie Breaker 1B3402 or 1B4402 Trip" is received.

You notice the valve indicating lights for MO-1904 and MO-1905 "Inboard Inject Isolation Valve" are OFF.

Which of the following would be the expected condition of the Recirc system Valves?
(Assume no operator actions)

- a. The "A" and "B" Recirc Pump Suction, Discharge, and Discharge Bypass Valves have lost power.
- b. The "A" and "B" Recirc Pump Discharge and Discharge Bypass Valves have lost power. The Suction Valves are still powered.
- c. The "B" Recirc Pump Suction, Discharge, and Discharge Bypass Valves have lost power. The "A" Recirc Pump Valves are still powered.
- d. The "B" Recirc Pump Discharge and Discharge Bypass Valves have lost power; the Suction Valve is still powered. The "A" Recirc Pump Valves are also still powered.

**75. Review the indication given in the Support Material Booklet
RO ONLY**

Preparations for placing the Main Generator on the grid are in progress.

Currently generator voltage is 20,000 volts.

You are to adjust generator voltage to the proper voltage for placing the generator on the grid.

(Proper voltage regulator response has already been verified)

Which is the proper switch and manipulation that would adjust Generator voltage to the correct voltage for placing the Generator on the grid?

Adjust the (GENERATOR AUTOMATIC VOLTAGE ADJUST SWITCH / GENERATOR MANUAL VOLTAGE ADJUST SWITCH) in the (RAISE/LOWER) direction until voltage is at the desired voltage.

- a. GENERATOR MANUAL VOLTAGE ADJUST SWITCH ; RAISE
- b. GENERATOR MANUAL VOLTAGE ADJUST SWITCH ; LOWER
- c. GENERATOR AUTOMATIC VOLTAGE ADJUST SWITCH ; RAISE
- d. GENERATOR AUTOMATIC VOLTAGE ADJUST SWITCH ; LOWER

76. **RO ONLY**

The plant is currently at full power.

1C06A D-12 "Condensate Pumps 1P-8A/B LO Discharge Pressure" annunciator alarms.

1P-8B "B Condensate Pump" amperage is reading 20% of 1P-8A "A Condensate Pump" amps.

Which of the following would explain these indications and actions to be taken?

- a. The "B" Feed Reg Valve is failing closed. Insert a manual SCRAM.
- b. The "A" Feed Reg Valve is failing open. Monitor RPV water level, a SCRAM would **not** be expected.
- c. 1P-8B motor has become uncoupled from the pump. Insert a manual SCRAM.
- d. 1P-8B motor has become uncoupled from the pump. Monitor RPV water level, a SCRAM would **not** be expected.

77. A trainee is synchronizing 1G 31 “A SBDG” to the 1A3 bus.

The following conditions are present during synchronizing the SBDG:

- The incoming voltage is slightly HIGHER than running voltage.
- The synchroscope is rotating slowly in the clockwise direction.

The trainee places the “A” SBDG output breaker to the close position when the synchroscope is at the 3 o'clock position.

Which of the following describes the expected breaker response?

The “A” SBDG output breaker will ...

- a. close and then trip open due to “A” SBDG overspeed trip.
- b. close and then trip open due to an instantaneous overcurrent trip.
- c. remain open due to the sync-check relay sensing excessive current differential.
- d. remain open due to the sync-check relay sensing excessive incoming to running phase angle differential.

78. Of the systems listed below which one meets the requirements needed for the following situation?

The plant is installing a new component.

The component is **NOT** safety related or essential to plant safety.

However, power interruptions to this component should be avoided.

The plant power supply to the component must have 3 power sources, one normal source and two alternate sources.

Upon loss of power to the normal power supply the system must be able to **AUTOMATICALLY** align to either of the two alternate sources **WITHOUT** prolonged loss of power (less than 2 seconds).

- a. The 125 VDC Power Supply System
- b. The Instrument A.C. Control System.
- c. The Uninterruptible A.C. Control Power System.
- d. Reactor Protection System Distribution Panel 1Y30

79. The plant is at power.
Annunciator 1C35A “Offgas Stack KAMAN 9 & 10 HI RAD or Monitor Trouble” alarms.
Offgas Stack flow has not changed.
The Chemist reports the Normal Range sample pump is not working.
All other Offgas Stack KAMAN equipment is functional.

Which of the following is correct?

- a. The KAMAN Normal Range is INOPERABLE. The Accident Range is OPERABLE.
- b. The KAMAN Normal Range is OPERABLE. The Accident Range is INOPERABLE.
- c. Both KAMAN Normal and Accident Ranges are INOPERABLE.
- d. Both KAMAN Normal and Accident Ranges are OPERABLE.

80. During shiftly annunciator checks the annunciators do not alarm on panel 1C40 “Fire Protection”.
AOP 302.2 “ Loss of Alarm Power” is entered.
There are NO other annunciators in alarm.

Which of the following panels has the breaker that supplies power to 1C40 and would give these indications if the breaker had tripped open?

- a. 1D13
- b. 1D50
- c. 1Y11
- d. 1Y23

81. **RO ONLY**

The plant is at 85% power.

During movement of a large component on the Refuel floor the component contacted the outside wall and opened a large hole in the wall to atmosphere.

The Reactor Building Supply fans are all OFF.

The Reactor Building to Atmosphere DP has stabilized at 0.1 inches of water with the Reactor Building Exhaust Fans EF 1, 2, and 3 running.

HPs report there are NO abnormal radiation level readings.

Which ONE of the following states the adverse consequences that has/will occur in this situation and what procedure directs the actions for this event?

- a. Refuel Floor integrity has been lost to atmosphere with spent fuel in the Fuel Pool. EOP 4 is entered to prevent Radioactive release to the environment.
- b. In the event of a design basis Loss of Coolant Accident (LOCA) an unmonitored release could occur. T.S. directs actions (Shutdown using IPOI 4 "Shutdown" or IPOI 5 "Reactor Scram") if secondary containment operability can not be restored.
- c. The Drywell pressure instrumentation is inoperable. ARP 1C23C A-6 "Main Plant Exhaust Plenum HI Pressure" directs re-calibration of the Drywell pressure instruments.
- d. The differential pressure across the Reactor Building doors will prevent access to the Secondary Containment. EOP 3 is entered on loss of Secondary Containment access.

82. **RO ONLY**

The Plant was at full power.

A complete Loss of Off Site Power (LOOP) has occurred.

Torus cooling has been maximized.

The Control Building Chillers were off for an extended time.

Control Room temperature reached 95°F.

1V-CH-1A "A Control Building Chiller" was started and is currently running.

Control Room temperature is lowering.

Which of the following is correct concerning the Temperature Load Control (TLC) units of the "A" Control Building Chiller under the current plant conditions?

- a. The 75 Hp TLC is controlling until the "A" or "B" RHR pump is secured.
- b. The 75 Hp TLC is controlling until the Essential Bus is powered from either the Startup or Standby Transformers.
- c. The 200 Hp TLC is controlling until Control Room temperature reaches 90°F.
- d. The 200 Hp TLC is controlling until the local keylock switch, HS-6924X "Reduced Loading Control", is placed in the 75 Hp position.

83. **RO ONLY**

AOP 518 "Failure of Instrument and Service Air" was entered due to a large air line break at the Instrument Air Dryers.

Which of the following indications would **NOT** be expected under these conditions?

- a. 1C05A E-3 "SBLC Tank HI/LO Level" with level reading 95%.
- b. 1C07B B-9 "Air Compressor Facility Trouble" with all compressors running.
- c. 1C05B F-1 "SCRAM Air Header HI/LO Pressure" with pressure reading 60 psig.
- d. 1C06A D-1 and 2 "A and B RHRSW/ESW Pit Low" with CV-4914 and 4915 "River Water Supply" makeup valves full open.

84. The Traversing In-core Probe System was in service when a Group 2 Containment Isolation signal is received.

One probe does **NOT** automatically retract.

The key lock switch on the TIP Valve Control Monitor has been placed to the FIRE position.

Which of the below correctly describes the control room indication(s) of this condition?

- a. The SHEAR VLV MONITOR light is OFF.
- b. The GROUP 2 ISOLATION light is OFF.
- c. The BALL VALVE CLOSED light is ON.
- d. The SQUIB MONITOR light is ON.

85. **RO ONLY**

The Fuel Pool water temperature in the FUEL POOL should not exceed what temperature when there is irradiated fuel in the pool?

If the Fuel Pool water temperature needs to be lowered the operator can throttle OPEN which flow from the Fuel Pool Heat Exchanger?

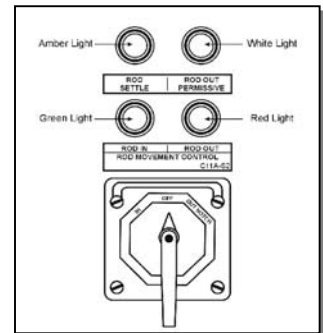
- a. 130°F, GSW
- b. 130°F, RBCCW
- c. 150°F, GSW
- d. 150°F, RBCCW

86. **RO ONLY**

At which point in the following Core Alteration scenario would the “Rod Out Permissive” white light above the RMCS “Rod Movement Control” switch FIRST go OUT?

Scenario:

- The Mode Switch is in REFUEL.
- All control rods are fully inserted.
- One control Rod is selected.
- The “Rod Out Permissive” white light is ON.
- The only hoist in use is the Main Grapple Hoist.
- A fuel assembly is grappled and raised to Full-Up in the Fuel Pool.
- The Refuel Platform is driven over the core.
- The fuel assembly is lowered into its assigned location.
- The 1C05 operator attempts to withdraw the selected control rod.



The “Rod Out Permissive” white light will FIRST go OUT when ...

- a. the loaded Main Grapple Hoist reaches Full-Up in the Fuel Pool.
- b. the Refuel Platform is driven over the core.
- c. the Main Grapple Hoist starts to lower the fuel assembly.
- d. the 1C05 operator attempts to withdraw the selected control rod.

87. During vessel re-assembly the Head Bolts for the Steam Separator and Shroud Head Assembly were **NOT** tightened.

Which of the following indications would operators see?

- a. The Reactor will go critical several rods early.
- b. Recirc Pump flow mismatch will be greater at high power.
- c. At higher Recirc flow rates as flow is increased power will **NOT** increase as expected.
- d. The GEMAC Level instrument reference legs will experience flashing at Recirc flow rates greater than 40 Mlb/hr.

88. Review the indication given in the Support Material Booklet

The plant is at power.

The "B" Recirc MG Set Scoop tube is locked.

You are directed to take Local control of the "B" Recirc MG Set Scoop tube.

Review the picture in the Support Material Booklet.

From the labeled components choose which one performs each of the following functions?

1) Deenergizes the brake.

2) Mechanically releases brake tension to allow manual turning of the hand crank.

3) Proper Hand Crank location when adjusting scoop tube position.

a. 1) B
2) A
3) D

b. 1) B
2) F
3) D

c. 1) C
2) A
3) E

d. 1) C
2) F
3) E

89. **RO ONLY**

The plant is at 93% power.

You are reviewing the periodic log and find load line is reading 104%.

(1) Is this above or below the MELLLA line (Maximum Extended Load Line Limit Analysis)?

AND

(2) A power change of 4% by _____?_____.

- a. (1) above
(2) inserting Control Rods will place the plant below the MELLLA line.
- b. (1) above
(2) reducing Recirc Flow will place the plant below the MELLLA line.
- c. (1) below
(2) withdrawing Control Rods will place the plant above the MELLLA line.
- d. (1) below
(2) raising Recirc Flow will place the plant above the MELLLA line.

90. **RO ONLY**

Which of the following plant conditions would require entry into the LCO for Recirc pump speed mismatch?

	Rated Thermal Power	“A” Recirc speed	“B” Recirc speed
a.	55%	60%	75%
b.	65%	75%	90%
c.	75%	60%	75%
d.	85%	75%	90%

91. **RO ONLY**

The plant is 50% power.

The "A" Recirc pump is secured.

Which of the following is the lowest MCPR can reach and NOT violate the T.S. MCPR safety limit when operating in this condition?

- a. MCPR at 1.07
- b. MCPR at 1.10
- c. MCPR at 1.12
- d. MCPR at 1.14

92. A new A1 control rod sequence is to be loaded into the RWM.

1) From what RWM panel is the new sequence loaded into RWM memory

AND

2) from what panel is the A1 sequence selected for RWM to enforce?

- a. 1) RWM-OD (1C05 Operator Display)
2) RWM-OD (1C05 Operator Display)
- b. 1) RWM-OD (1C05 Operator Display)
2) RWM-CC (1C28 Computer Chassis)
- c. 1) RWM-CC (1C28 Computer Chassis)
2) RWM-OD (1C05 Operator Display)
- d. 1) RWM-CC (1C28 Computer Chassis)
2) RWM-CC (1C28 Computer Chassis)

93. A reactor startup is in progress.

Conditions just prior to the startup and currently are listed below:

Beginning of Startup	Currently
• SRM A at 9 cps	SRM A at 85 cps
• SRM B at 11 cps	SRM B at 100 cps
• SRM C at 8 cps	SRM C at 90 cps
• SRM D at 10 cps	SRM D at 95 cps
• Moderator temperature at 148°F	Moderator temperature at 149°F

The reactor is NOT critical and you still have one rod left to pull to complete the A12 sequence. In order to pull this control rod to continue the startup, what must you do per IPOI-2 concerning the method of control rod withdrawal?

- a. Change from continuous withdrawal to group notch withdrawal.
- b. Change from continuous withdrawal to single rod notch withdrawal.
- c. Change from single rod notch withdrawal to group notch withdrawal.
- d. Change from single rod notch withdrawal to continuous rod withdrawal.

94. **RO ONLY**

An individual radiation worker has exposure history as follows:

Date of Birth: 8/29/63
Lifetime Exposure: 23 R
Exposure this year: 0.8 R
Exposure this quarter: 0.2 R

Today is May 18th.

The individual is assigned a job that will take several days.

During this job the worker will be in a dose rate of 200 mr/hr.

Which one of the following is the **LONGEST TIME** the worker can participate in the job before reaching a DAEC administrative exposure limit that requires supervisory or other special permission to continue?

- a. 6 hours
- b. 9 hours
- c. 10 hours
- d. 18.5 hours

95. The 1C03 operator is performing an Air Purge (De-inerting) the Primary Containment.

Which of the following radiation-monitoring systems monitor the atmosphere that is exhausted through the Drywell/Torus vent valves?

- a. Reactor Building Vent KAMAN monitors (KAMAN 3 through 8)
- b. Offgas Vent Pipe Rad Monitors (RM-4116A & B) ONLY
- c. Offgas Stack KAMAN monitors (KAMAN 9 & 10) ONLY
- d. Offgas Vent Pipe Rad Monitors (RM-4116A & B)
AND
Offgas Stack KAMAN monitors (KAMAN 9 & 10)

96. The plant is being started up following a refueling outage. Inspectors are in the Drywell performing the 400-psig inspection. Plant conditions are as follows:

- RPV pressure is 350 psig
- Reactor Power is 6%

Which of the following evolutions would **NOT** be allowed while the inspectors are still in the Drywell?

- a. Perform a heavy lift with the Reactor Building Crane.
- b. Close the inboard Drywell Personnel Hatch.
- c. Movement of fuel within the Fuel Pool.
- d. Raise Pressure set to 390 psig.

97. Which of the procedures listed below would require a DCF to change if you determine that performing one of the steps would lead to serious personnel injury?
- a. ODI 19 "Tagging Practices".
 - b. AOP 301 "Loss of Essential Electrical Power".
 - c. EOP 2 "Primary Containment Control" Flow Chart.
 - d. SAG 1 "Primary Containment Flooding" Flow Chart.

98. **RO ONLY**

A Continuous Recheck Statement exists at the entry into Emergency Depressurization that states:

IF it is anticipated that primary containment water level will rise above 39 feet **THEN** open MSL Inboard Drain Valve MO-4423. If necessary, bypass Group 1 Isolations, Defeat 5.

What is the purpose of this continuous recheck statement?

- a. Vent excess H₂ from the RPV.
- b. Establish a coolant flowpath for RPV Flooding.
- c. Ensure that main steam line drains remain available as an alternate depressurization path.
- d. Keep the RPV depressurized so low pressure systems can inject for Alternate Level Control.

99. The EOPs have been entered and plant conditions have degraded such that SAG entry is required.
The TSC is **NOT** ready to assume control.

Which of the following is correct?

The operating crew should ...

- a. continue implementing the current EOP actions until the TSC is ready to transition to the SAGs.
- b. exit the EOP which directs the entry into the SAGs and continue to implement all other EOPs which are entered.
- c. exit the EOP leg that is directing the SAG entry and continue to implement all other EOPs legs in effect.
- d. enter the SAG that is directed and when the TSC is ready, turnover all actions which were directed from the SAGs entered.

100. To place the Reactor Core in a low energy state, reduce RPV temperature, and maintain RPV water level above the top of active fuel to prevent Fuel Cladding temperature from exceeding 1500°F, is the bases for which EOP?

- a. EOP 1
- b. EOP 2
- c. EOP 3
- d. EOP 4