

Final Submittal
(Blue Paper)

HARRIS EXAM
AUGUST 2007-301

Reactor Operator Written Examination

Name: _____

RO WRITTEN - FINAL

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1. Which ONE (1) of the following describes a condition that will prevent an RCP from starting when the control switch is placed to start?

- A. Seal Injection flow is below 8.2 GPM.
- B. The Oil Lift Pump has been running for 90 seconds.
- C. Oil Lift Pressure is below 600 psig.
- D. Oil Reservoir level is lower than (-) 1 inch.

2. Given the following:

- The unit is in Mode 4.
- Preparations are underway to start "A" RCP.

Which ONE (1) of the following conditions, if it existed at time of RCP start, may result in damage to "A" RCP in accordance with OP-100, Reactor Coolant System?

- A. RCS pressure is 330 psig
- B. VCT pressure is 11 psig
- C. RCP #1 seal leakoff flow is 0.85 gpm
- D. RCP #1 seal Delta P is 210 psid

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3.

The Unit is in Mode 2.

- Pressurizer Level Control is selected to position 459/460.
- All control systems are operating normally in AUTO.

Which ONE (1) of the following lists the Instrument Busses that, if lost, will require MANUAL control of charging flow in accordance with AOP-024, Loss of Uninterruptible Power Supply?

Loss of Instrument Busses...

- A✓ SI and SII
- B. SI and SIII
- C. SII and SIII
- D. SIII and SIV

4.

Given the following:

- The RCS is in solid plant operation.
- "A" CSIP is in service.
- "A" train RHR is in service providing both core cooling and low pressure letdown.
- Letdown Line Pressure Control valve PCV-145, (1CS-38) is in AUTO.
- Charging Flow Control valve FCV-122 is being operated with its controller in MANUAL with demand set at 20%.

Which ONE (1) of the following events or conditions will raise RCS pressure?

- A. FK-122.A1, Charging Flow Controller (1CS-231), is adjusted towards 0% demand.
- B. Loss of Instrument Air to Letdown Pressure Control Valve, (1CS-38).
- C✓ "A" RHR Pump trips.
- D. "A" CSIP trips.

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5.

Given the following:

- A reactor trip and safety injection have occurred.
- The crew is performing actions of EPP-009, Post LOCA Cooldown and Depressurization.
- RCS temperature is 500 degrees F with a cooldown rate of 25 degrees F per hour in progress.
- RCS pressure is 1600 psig.
- Containment pressure is 2 psig.
- One RCP is running.
- The crew is preparing to stop 1 CSIP and align the normal charging flowpath.

Which ONE (1) of the following describes (1) the reason RCS subcooling lowers when the crew stops 1 CSIP and aligns normal Charging, and (2) RCS subcooling value that requires action to realign the BIT?

RCS subcooling lowers due to....

- A. (1) RCS heatup when CSIP flow is reduced;
(2) 40 degrees F.
- B. (1) RCS heatup when CSIP flow is reduced;
(2) 10 degrees F.
- C. (1) RCS pressure reduction;
(2) 40 degrees F.
- D✓ (1) RCS pressure reduction;
(2) 10 degrees F.

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6.

Given the following:

- The unit is at 100% power.
- The following annunciator is received:
 - ALB-009-8-1, PRESSURIZER RELIEF TANK HI-LO- LEVEL PRESS OR TEMP
- PRT pressure is 8 psig and RISING SLOWLY.
- PRT level is 75% and STABLE.
- PRT temperature is 109 degrees F and STABLE.

Which ONE (1) of the following correctly describes (1) the pressure at which the rupture disc will rupture, and (2) the action required to restore PRT parameters in accordance with ALB-009-8-1 and OP-100, Reactor Coolant System?

- A✓ (1) 100 psig
(2) Vent the PRT.
- B. (1) 100 psig
(2) Drain the PRT.
- C. (1) 50 psig
(2) Vent the PRT.
- D. (1) 50 psig
(2) Drain the PRT.

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7.

Given the following:

- The unit is at 100% power.
- All control systems are operating normally in AUTO.
- Letdown Pressure transmitter PT-145 fails low.

Which ONE (1) of the following describes how Letdown Pressure Control Valve, 1CS-38, responds and which tank level will increase as a result of this failure?

A. 1CS-38 closes;

RCDT level will increase.

B. 1CS-38 closes;

PRT level will increase.

C. 1CS-38 opens;

RCDT level will increase.

D. 1CS-38 opens;

PRT level will increase.

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8.

Given the following:

- The unit is at 100% power.
- A loss of Component Cooling Water has occurred.
- The crew is attempting to restore CCW flow in accordance with AOP-014, Loss of Component Cooling Water.
- BOTH trains of CCW flow indicate 0 gpm.
- All RCP temperatures are currently below their alarm setpoints and slowly rising.
- RCP Seal Injection flow to each RCP is approximately 9 gpm.

Which ONE (1) of the following describes the MAXIMUM time allowed to trip RCPs per AOP-014 and the components that may be damaged if the RCPs are not tripped?

- A. Immediately;
RCP motor bearings.
- B. Immediately;
RCP pump bearings.
- C. ✓ 10 minutes;
RCP motor bearings.
- D. 10 minutes;
RCP pump bearings.

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9.

Given the following:

- The unit is at 100% power, steady state.
- All control systems are operating normally in AUTO.
- PZR pressure transmitter PT-445 indicates 2280 psig and rising.
- PZR pressure transmitter PT-444 indicates 2245 psig and stable.

Which ONE (1) of the following describes the response of the PZR PORVs and Spray valves if the above trend continues?

A. ONLY ONE (1) PZR PORV will open.

Spray valves remain closed.

B. TWO (2) PZR PORVs will open.

Spray valves remain closed.

C. ONLY ONE (1) PZR PORV will open.

Spray valves will open.

D. TWO (2) PZR PORVs will open.

Spray valves will open.

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10.

Initial Conditions:

- The unit is in Mode 1 conducting a normal startup
- Reactor Power is 20%.
- Pressurizer Pressure Control is operating normally in Automatic.
- Backup Heater Groups A, B, and D are in ON.
- Pressurizer Level dropped to 15% due to a controller malfunction in automatic.

Current Conditions:

- Pressurizer Level is 21% and rising under manual control.
- Pressurizer pressure indicates 2190 psig and lowering slowly.
- All Pressurizer Heater Groups are de-energized.
- NO additional action has been taken with regard to operation of pressurizer heaters.

Based on the indications above, which ONE (1) of the following describes the action(s) required to re-energize pressurizer heaters?

- A. Momentarily place Heater Groups A, B, C, and D to OFF, then place in AUTO or ON.
- B. Momentarily place Heater Group A, B, and D to OFF, then place in AUTO or ON. Locally close Heater Group C power supply breaker.
- C. Momentarily place Heater Group C to OFF, then place in AUTO or ON. Locally close Heater Group A, B, and D power supply breakers.
- D. Locally close Heater Groups A, B, C, and D power supply breakers.

11.

Which ONE (1) of the following reactor trip signals provides protection against DNB (Departure from Nucleate Boiling)?

- A. Power Range High Flux Low Setpoint
- B. RCP Underfrequency
- C. Power Range High Positive Flux Rate
- D. Steam Generator Low-Low Water Level

12.

Given the following:

- The unit is operating at 25% power.
- Emergency Diesel Generator (EDG) 1A-SA is loaded to 3800 KW while operating in parallel with the grid during the performance of OST-1013, 1A-SA Emergency Diesel Generator Operation.
- A loss of off-site power occurs.

Which ONE (1) of the following describes the response of the EDG output breaker and how bus loads will be restored?

EDG output breaker...

- A. remains closed;
verify automatic load sequencing occurs.
- B. remains closed;
loads must be manually started as required.
- C. opens and then recloses;
verify automatic load sequencing occurs.
- D. opens and then recloses;
loads must be manually started as required.

13.

Which ONE (1) of the following correctly describes the MINIMUM required logic for AUTOMATIC actuation of the Containment Spray System on HIGH-3 Containment Pressure?

- A. 1 of 2 channels on 1 of 2 trains must be in the trip condition.
- B. 2 of 2 channels on 2 of 2 trains must be in the trip condition.
- C. 2 of 4 channels on 1 of 2 trains must be in the trip condition.
- D. 2 of 4 channels on 2 of 2 trains must be in the trip condition.

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14.

Which ONE (1) of the following describes the power supply to the fan motors for Containment Fan Cooler AH-1?

- A. Aux Bus 1D1
- B. Aux Bus 1E1
- C. MCC 1A34-SA
- D✓ MCC 1B22-SB

15.

Initial Conditions:

- Surveillance testing is in progress on Containment Spray Train "A".
- "A" Containment Spray Pump is running.
- 1CT-24-SA & 1CT-25-SB, Containment Spray Eductor Test Valves, are open for testing.
- 1CT-50-SA, Containment Spray Pump 1A-SA Discharge Valve, is closed.

Current conditions:

- A LOCA is occurring.
- RCS pressure is 1600 psig.
- Containment Pressure is 7.5 psig.

Which ONE (1) of the following correctly lists the position of the Containment Spray Eductor Test Valves and the 1A-SA Discharge Valve for the current plant conditions?

	<u>1CT-24-SA & 1CT-25-SB</u>	1CT-50-SA
A.	OPEN	OPEN
B.	CLOSED	OPEN
C.	OPEN	CLOSED
D✓	CLOSED	CLOSED

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16.

Given the following:

- A Steam Generator Tube Leak has occurred in "C" SG.
- The leak has been stable at 70 gpd for the last 24 hours.
- The crew is performing actions of AOP-016, Excessive Primary Plant Leakage, per Attachment 10.
- REM-01TV-3534, Condenser Vacuum Pump Radiation Monitor, is out of service.
- The following trend in leak rate is identified:
 - 0800 70 GPD
 - 0900 70 GPD
 - 1000 76 GPD
 - 1100 82 GPD

Which ONE (1) of the following describes the MOST RESTRICTIVE actions that are required in accordance with AOP-016? (Reference provided)

- A. Reduce power to less than 50% within 1 hour.
- B. Be in Mode 3 within 2 hours.
- C. Be in Mode 3 within 6 hours.
- D. Be in Mode 3 within 24 hours.

17.

In accordance with the EOP-USER'S GUIDE, which ONE (1) of the following actions is allowed prior to the direction being provided in the EOPs?

- A. Closure of the MSIV for a ruptured SG.
- B. Isolation of AFW flow to a ruptured SG with narrow range level of 10%.
- C. Isolation of AFW flow to a faulted SG with at least one other intact SG available.
- D. Reduction of SI flow prior to steps that check for SI Termination, following a spurious SI actuation.

18.

Initial conditions:

- The unit was at 55% power.
- A reactor trip occurred.

Current conditions:

- Tave is 560 degrees F.
- All SG narrow range levels are approximately 20% and rising.

Which ONE (1) of the following describes the position of the listed Feedwater System valves?

Main Feed Reg Valves Main Feed Isolation Valves

- | | | |
|----|--------|--------|
| A. | OPEN | OPEN |
| B. | OPEN | CLOSED |
| C✓ | CLOSED | OPEN |
| D. | CLOSED | CLOSED |

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19.

Which ONE (1) of the following describes the Condensate Storage Tank level which requires aligning the ESW System to the AFW System and the source(s) of water for the TD AFW?

A✓ 10%

Either A-SA or B-SB ESW Train.

B. 25%

Either A-SA or B-SB ESW Train.

C. 10%

Only B-SB ESW Train.

D. 25%

Only B-SB ESW Train.

20.

Which ONE (1) of the following describes the effect on the Main Generator of exceeding the upper MVAR limit while operating at 100% power, and which ONE (1) of the following actions is required to mitigate the effect of exceeding MVAR limitations?

A✓ Generator Rotor Winding overheating;

reduce generator excitation

B. Isophase Bus Duct overheating;

reduce generator excitation

C. Generator Rotor Winding overheating;

reduce generator load

D. Isophase Bus Duct overheating;

reduce generator load

21.

Given the following:

- The unit is at 100% power.
- All systems are in their normal alignments.
- The normal power supply to the 7.5 KVA inverter for Instrument Bus 1DP-1A-SI is lost.

Assuming no action has been taken by the crew, which ONE (1) of the following describes the current status of Instrument Bus SI?

- A. Energized from 1A21-SA
- B✓** Energized from DP-1A-SA.
- C. Energized from PP-1A211-SA.
- D. De-energized.

22.

Given the following:

- The plant is at 100% power.
- A loss of DC Bus 1B-SB occurs.

Which ONE (1) of the following describes the effect on the "B" EDG?

The Governor and Generator Excitation circuits will be _____ and the EDG Output breaker _____ closed from the MCB.

- A. de-energized;
can be
- B✓** de-energized;
can NOT be
- C. unaffected;
can be
- D. unaffected;
can NOT be

23.

Given the following:

- The 1B-SA Diesel Air Receiver and associated air compressors are under clearance, isolated, and depressurized.
- The 1A-SA Diesel Air Compressors have malfunctioned due to a common cause failure.
- The 1A-SA Diesel Air Receiver air pressure has dropped to 190 psig.

Which ONE (1) of the following describes the MINIMUM number of start attempts, if any, that are available in this condition?

- A✓ 5
- B. 2
- C. 1
- D. 0

24.

A Source Check is being performed on the Plant Vent Stack Wide Range Gas Monitor, (RM-3509-1-SA).

The activity measured by the channel is lower than required when the source is exposed.

Which ONE (1) of the following describes the indication observed?

- A. The Check Source (C/S) button on the RM-11 console flashes.
- B. The Check Source (C/S) button on the RM-23 module flashes.
- C✓ A symbol (**) is presented on the RM-11 screen.
- D. A symbol (**) is presented on the RM-23 module.

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25.

Given the following:

- The unit is at 100% power.
- "B" NSW pump is supplying the "A" ESW header.
- "A" Emergency Service Water (ESW) Pump automatically starts.
- All other systems respond normally in AUTO.

Which ONE (1) of the following correctly describes the position for 1SW-39, NSW Supply to "A" ESW Header, and 1SW-276, ESW to NSW Common Return?

	<u>1SW-39</u>	<u>1SW-276</u>
A. ✓	SHUT	OPEN
B.	OPEN	OPEN
C.	SHUT	SHUT
D.	OPEN	SHUT

26.

Which ONE (1) of the following lists the fail position for 1RH-30, RHR HX A Outlet Flow Control Valve, and 1RH-20, RHR HX A Bypass Flow Control Valve?

	<u>1RH-30</u>	<u>1RH-20</u>
A.	OPEN	OPEN
B. ✓	OPEN	CLOSED
C.	CLOSED	OPEN
D.	CLOSED	CLOSED

27.

Given the following:

- A LOCA has occurred.
- RCS pressure is 600 psig and stable.
- Containment pressure is 13 psig and lowering slowly.
- SI has NOT been reset.

- The RO has placed the RESET switches in RESET for Containment Isolation Phase A and Phase B.

Which ONE (1) of the following describes the status of Containment Isolation Phase A and B?

A ✓ Phase A will reset;

Phase B will reset

B. Phase A will reset;

Phase B will NOT reset

C. Phase A will NOT reset;

Phase B will reset

D. Phase A will NOT reset;

Phase B will NOT reset

28.

Given the following:

- A LOCA has occurred.
- Safety Injection is actuated.
- RCS pressure is 1500 psig and dropping.
- Containment pressure is 9.5 psig and rising.

Based on the conditions above, which ONE (1) of the following describes valves that have received signals to reposition?

- A✓ MSIVs and Containment Instrument Air Isolation Valve.
- B. MSIVs and CCW to RCP Isolation Valves.
- C. CCW to RCP Isolation Valves and Letdown Isolation Valves.
- D. Containment Spray Discharge Header Isolation Valves and Containment Purge Exhaust Isolation Valves.

29.

Given the following:

- The unit is at 100% power.
- Unit electrical alignment is normal.
- Aux Bus 1E de-energizes and is locked out.

Which ONE (1) of the following describes an effect on the unit?

- A. "C" RCP is deenergized
- B. "A" CSIP is momentarily deenergized
- C✓ "B" CSIP is momentarily deenergized
- D. Cooling Tower Makeup Pump 1X is deenergized

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30.

An electrical fire in the Main Control Room has resulted in the evacuation of the MCR to the ACP.

You have been directed to monitor in core thermocouple temperatures from outside the MCR per AOP-004.

Which ONE (1) of the following describes the location of the Inadequate Core Cooling Monitor local microprocessor panel, and the method of obtaining readings at the panel?

- A. PIC Room C-17 RAB 286' using CRT monitor and keyboard.
- B✓ PIC Room C-17 RAB 286' using thumbwheels set to specific points identified by a legend.
- C. PIC Room RAB 305' using CRT monitor and keyboard.
- D. PIC Room RAB 305' using thumbwheels set to specific points identified by a legend.

31.

Which ONE (1) of the following describes the effect on final Containment Hydrogen concentration if only ONE (1) Hydrogen Recombiner is in service following a small break LOCA?

Containment Hydrogen concentration will...

- A✓ be maintained less than 4% with Containment H2 Purge secured.
- B. be maintained less than 4% ONLY IF Containment H2 Purge is in service.
- C. increase to greater than 4% but can be maintained less than 8% with Containment H2 Purge secured.
- D. increase to greater than 4% but can be maintained less than 8% ONLY IF Containment H2 Purge is in service.

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32.

The unit is in Mode 3.

In accordance with Technical Specifications, which ONE (1) of the following describes the LCO requirements associated with the Containment Purge System?

- | | <u>42 inch makeup supply and exhaust valves</u> | <u>8 inch makeup supply and exhaust valves</u> |
|----|---|--|
| A. | must be sealed closed. | May be opened but must be capable of closure within 30 minutes |
| B. | may be opened for safety-related reasons only. | May be opened but must be capable of closure within 30 minutes |
| C✓ | must be sealed closed. | may be opened for safety-related reasons only. |
| D. | may be opened for safety-related reasons only. | may be opened for safety-related reasons only. |

33.

Given the following:

- The unit is in Mode 6.
- Fuel shuffle is progress in the Spent Fuel Pool. (SFP)
- The following alarm has been received:
 - ALB-23-4-17, SPENT FP HI/LO LEVEL
- The NLO reports that Spent Fuel Pool Level is 23 feet, 2 inches and has lowered approximately 1 inch in the last 2 hours.
- A search for the leak has been initiated.
- The USCO directs using Demineralized Water to make up to the Spent Fuel Pool in accordance with OP-116.01, Fuel Pool Purification System, to clear the alarm.

Which ONE (1) of the following describes whether Spent Fuel Pool level is above or below the Technical Specification limit, and whether sampling is required, in accordance with OP-116.01, after restoring SFP level?

SFP level is...

- A. BELOW the minimum required by Technical Specifications;
Spent Fuel Pool sampling is required upon completion.
- B. BELOW the minimum required by Technical Specifications;
Spent Fuel Pool sampling is NOT required upon completion.
- C✓ ABOVE the minimum required by Technical Specifications;
Spent Fuel Pool sampling is required upon completion.
- D. ABOVE the minimum required by Technical Specifications;
Spent Fuel Pool sampling is NOT required upon completion.

34.

Given the following:

- The unit is in Mode 6.
- Refueling activities are in progress.
- A fuel assembly has been slightly damaged during removal from the core.
- Radiation levels are rising steadily and are currently as follows:
 - REM-01LT-3502A-SA, Cnmt RCS Leak Detection Monitor, is in HIGH ALARM

Which ONE (1) of the following describes the system isolation signal(s), if any, that have been automatically initiated?

- A. NEITHER Normal Containment Purge NOR Containment Pre-Entry Purge.
- B. ONLY Normal Containment Purge.
- C. ONLY Containment Pre-Entry Purge.
- D. BOTH Normal Containment Purge AND Containment Pre-Entry Purge.

35.

Given the following:

- A safety injection has occurred due to a tube rupture in the "A" Steam Generator.
- The crew is performing actions of Path-2.
- Actions are in progress to isolate "A" Steam Generator

In accordance with Path-2, which one of the following describes the EARLIEST time when AFW flow to SG "A" may be secured, and the reason?

- A. When RCS cooldown to target temperature is complete, to minimize the magnitude of radiological release from the ruptured SG.
- B. When minimum required AFW flow to the intact SGs is verified, to ensure adequate heat sink for the planned RCS cooldown.
- C. When ruptured SG narrow range level is verified greater than minimum required, to minimize the magnitude of radiological release from the ruptured SG.
- D. When at least one intact SG narrow range level is verified greater than minimum required, to ensure adequate heat sink for the planned RCS cooldown.

36.

Given the following:

- A liquid waste discharge from a Treated Laundry and Hot Shower (TL&HS) Tank is in progress.
- The following alarm is received:
 - ALB-010-3-4, WPB EFFLUENT RAD MONITOR TROUBLE
- REM-1WL-3540, Treated Laundry and Hot Shower Tank Pump Discharge Monitor, has lost power.

Which ONE (1) of the following describes the effect on the waste discharge in progress?

- A. Automatic termination of the waste discharge is defeated.
- B. 3LHS-301, TL&HS Tks Discharge to Cooling Tower Blowdown, will automatically close.
- C. 3LHS-293, Flow Control Valve TL&HS Tk to Enviro, will automatically close.
- D✓ 3LHS-296, TL&HS Tank Discharge Isolation Valve, will automatically close.

37.

Which ONE (1) of the following describes the source of seal water for the Waste Gas Compressors, and the function of the sealing water?

- A. Reactor Makeup Water;
ONLY entrains waste gas.
- B✓ Reactor Makeup Water;
entrains waste gas AND lubricates the compressor mechanical seals.
- C. Waste Processing Building Component Cooling Water;
ONLY entrains waste gas.
- D. Waste Processing Building Component Cooling Water;
entrains waste gas AND lubricates the compressor mechanical seals.

38.

Which ONE (1) of the following describes the location of the connection between the Fire Protection System and the Service Water System, and the operability status of ESW in accordance with OP-139, Service Water System, when the connection is open?

	<u>Location</u>	<u>ESW Operability Status</u>
A.	ESW Pump Discharge	Operable
B.	ESW Pump Discharge	Inoperable
C.	ESW Booster Pump discharge	Operable
D✓	ESW Booster Pump discharge	Inoperable

39.

Initial conditions:

- A reactor trip has occurred due to a Loss of Offsite Power.

Current conditions:

- The crew is performing actions of EPP-004, Reactor Trip Response.
- Offsite Power has NOT been restored.
- RCS Thot is 575 degrees F and slowly rising.
- RCS Tcold is 555 degrees F and slowly lowering.
- SG PORVs are modulated open.
- Total AFW flow is 450 KPPH.
- All SG levels indicate 18% NR and rising slowly.

Which ONE (1) of the following describes the actions required in accordance with EPP-004 for this condition?

- A. Increase dumping steam and raise AFW flow until Thot is stabilized.
- B✓ Stop dumping steam and reduce AFW flow to just above 210 KPPH until at least 1 SG is greater than the minimum required level.
- C. Stop dumping steam and reduce AFW flow to 50 KPPH until Tcold is stabilized.
- D. Increase dumping steam and raise AFW flow until Tave is stable at or trending to 557 degrees F.

40.

Initial Conditions:

- A Pressurizer PORV has stuck open.
- RCS pressure is 1400 psig.
- Containment pressure is 2 psig and rising.
- CSIP flow is approximately 250 GPM.

Current Conditions:

- The stuck open PZR PORV cannot be isolated.
- RCS pressure continues to decrease and is currently 700 psig.
- Containment pressure is 4 psig and rising.

Assuming no action by the crew, which ONE (1) of the following correctly describes the current RCS leak rate and CSIP flow?

A. Leak rate is approximately 50% of the initial leak rate.

CSIP flow is less than 500 GPM.

B. Leak rate is approximately 50% of the initial leak rate.

CSIP flow is greater than 500 GPM.

C. Leak rate is approximately 70% of the initial leak rate.

CSIP flow is less than 500 GPM.

D. Leak rate is approximately 70% of the initial leak rate.

CSIP flow is greater than 500 GPM.

41.

Given the following:

- The unit is at 100% power.
- An RCS leak has developed.
- RCS pressure is degrading to a reactor trip setpoint.

Which ONE (1) of the following describes reactor trip instrumentation designed to protect against a small break LOCA (SBLOCA) and the core power distribution limit it protects?

A. OT Delta T;

DNBR protection

B. OT Delta T;

Enthalpy Rise Hot Channel Factor protection

C. OP Delta T;

DNBR protection

D. OP Delta T;

Enthalpy Rise Hot Channel Factor protection

42.

Initial Conditions:

- The plant is at 100% power.
- "B" Train equipment is in service.
- "A" EDG is running for testing.

Current Conditions:

- A rupture occurs in the Normal Service Water System.
- The location of the rupture has NOT been identified.
- The crew is performing actions of AOP-022, Loss of Service Water.
- BOTH ESW Trains have been started.
- 1A-SA ESW Pump trips upon starting and cannot be restarted.
- "A" ESW Header pressure has been 0 psig for 1 minute.

Which ONE (1) of the following describes a required action and the reason for the action, in accordance with AOP-022?

- A✓ Emergency Stop "A" EDG due to loss of Service Water flow to "A" EDG Jacket Water Cooler.
- B. Emergency Stop "A" EDG due to loss of Service Water flow to "A" EDG Lube Oil Cooler.
- C. Isolate Letdown due to loss of "B" CSIP.
- D. Isolate Letdown due to loss of cooling to Letdown Heat Exchanger.

43.

Given the following:

- The unit is at 35% power.
- RCP "B" Oil Reservoir level HIGH alarm is received.
- RCP "B" Motor Bearing temperatures are 145 degrees F and rising.
- RCP "A" and "C" Motor Bearing temperatures are approximately 140 degrees F and stable.
- CCW Surge Tank level is lowering.
- The crew enters AOP-014, Loss of Component Cooling Water.

Which ONE (1) of the following describes the location of the CCW leak and the actions required in accordance with AOP-014?

A. RCP "B" Oil Reservoir cooler;

Isolate CCW to "B" RCP; trip RCP "B".

B✓ RCP "B" Oil Reservoir cooler;

Isolate CCW to all RCPs; trip the reactor, stop all running RCPs.

C. Thermal Barrier Heat Exchanger;

Trip the reactor; stop all running RCPs.

D. Thermal Barrier Heat Exchanger;

Start the RCP Bearing Lift Pumps and attempt to restore CCW.

44.

Initial Conditions:

- A SGTR has occurred and Path-2 actions are in progress.
- The RCS cooldown to target temperature has just been completed.

Which ONE (1) of the following describes the reason(s) for reducing RCS pressure to match ruptured SG pressure at this point?

A✓ To restore RCS inventory and reduce break flow prior to SI termination.

B. To prevent damage to secondary side steam piping due to overflow.

C. To minimize the probability of a Pressurized Thermal Shock event when RCS cooldown is recommenced.

D. To prevent any release of radioactivity through the SG Atmospheric Dump valves.

45.

Initial conditions:

- The plant is in Mode 5.
- RCS temperature is stable at 180 degrees F.
- "A" Train RHR is in service.
- "B" Train RHR is aligned for Standby operation.

Current conditions:

- "A" RHR Pump has tripped on overcurrent.
- RCS temperature is 183 degrees F and rising at 1 degree F per minute.
- All other systems are operating as required.

Which ONE (1) of the following describes the mechanism that will be used for RCS heat removal in accordance with AOP-020, Loss of RCS Inventory or Heat Removal While Shutdown, and the MAXIMUM allowable cooldown rate?

A. Dump steam to atmosphere;

50 degrees F per hour

B. Dump steam to atmosphere;

100 degrees F per hour

C. Start "B" RHR Pump;

50 degrees F per hour

D. Start "B" RHR Pump;

100 degrees F per hour

46.

Given the following:

- The unit is at 95% power.
- "A" RHR Pump is being run for quarterly surveillance test on recirculation to the RWST.
- CCW Surge Tank level is slowly decreasing with the CCW Surge Tank makeup valve open.

Assuming that a CCW System leak exists, which ONE (1) of the following describes the location of the leak?

- A. RCP Thermal Barrier Heat Exchanger
- B✓ Seal Return Heat Exchanger
- C. "A" RHR Heat Exchanger
- D. Letdown Heat Exchanger

47.

Given the following:

- The unit is at 100% power.
- All control systems are in their normal alignments, with the exception of the Pressurizer Master Pressure Controller, which is in MANUAL.
- The Pressurizer Master Pressure Controller output fails LOW.

Assuming no action has been taken by the crew, which ONE (1) of the following describes the effect on the pressurizer heaters, and the resulting effect on the plant?

- A. Pressurizer heaters energize;
Pressure rise controlled by PZR spray valve operation.
- B✓ Pressurizer heaters energize;
Pressure rise controlled by PZR PORV operation.
- C. Pressurizer heaters deenergize;
ONLY PZR spray valves open, reactor trip on low PZR pressure.
- D. Pressurizer heaters deenergize;
PZR spray valves AND ONE (1) PZR PORV opens, reactor trip on low PZR pressure.

48.

Per the EOP Basis Document, which ONE (1) of the following statements describes the reason for immediately tripping the turbine in FRP-S.1, Response to Nuclear Power Generation/ATWS?

- A✓ Prevents adding positive reactivity due to an uncontrolled RCS cooldown.
- B. Prevents Pressurized Thermal Shock due to an uncontrolled RCS cooldown.
- C. Generates a redundant automatic reactor trip signal.
- D. Minimizes the peak pressure transient for the event.

49.

Initial Conditions:

- The plant is at 100% power.
- All automatic systems are operating normally.

Current Conditions:

- A Steam Line Rupture has occurred on the "C" Main Steam Line.
- A Reactor Trip and Safety Injection have initiated automatically.
- The following SG pressures are observed:
 - "A" SG Pressure - 710 psig
 - "B" SG Pressure - 685 psig

Assuming NO operator actions have occurred, which ONE (1) of the following describes "C" SG pressure when an AFW Isolation signal would be expected and the LCO that would NOT be met if this signal fails to occur?

A. 585 psig;

T.S. 3.3.1, Reactor Trip Instrumentation

B✓ 585 psig;

T.S. 3.3.2, Engineered Safety Features Actuation System

C. 610 psig;

T.S. 3.3.1, Reactor Trip Instrumentation

D. 610 psig;

T.S. 3.3.2, Engineered Safety Features Actuation System

50.

Initial Conditions:

- The plant was at 100% power.
- All automatic systems are operating normally.

Then the following alarms and indications were observed:

- ALB 16-1-4 FW PUMP A/B O/C TRIP-GND OR BKR FAIL TO CLOSE illuminated.
- ALB 16-2-2 LOSS OF BOTH MAIN FW PUMPS illuminated.
- The reactor trip breakers open.
- Neutron flux decreasing.
- All SG NR levels 24% and lowering slowly.
- PZR pressure 2370 psig and rising slowly.

Current Conditions:

- All SG NR levels indicate 41% and increasing.
- PZR pressure indicates 2260 psig and stable.

Which ONE (1) of the following describes the MCB ALB First Out indication available, and the indication available when the alarm panel is reset by the RO?

A. SG LO-LO Level is flashing RED;

the First Out alarm will clear after the ALB is acknowledged and reset.

B. SG LO-LO Level is flashing RED;

the First Out alarm will stop flashing and remain solid after the ALB is acknowledged and reset.

C. PZR PRESSURE is flashing RED;

the First Out alarm will clear after the ALB is acknowledged and reset.

D. PZR PRESSURE is flashing RED;

the First Out alarm will stop flashing and remain solid after the ALB is acknowledged and reset.

RO WRITTEN - FINAL

51.

Given the following:

- The unit is in Mode 1.
- Due to problems with its inverter, Instrument Bus SI must be placed on its alternate supply.

Which ONE (1) of the following requirements must be met prior to placing Instrument Bus SI on its alternate supply in accordance with OP-156.02, AC Electrical Distribution?

- A. All Feedwater Regulating Valves must be placed in MANUAL.
- B. Instrument Bus SI must be deenergized.
- C. Both trains of SSPS must be in TEST.
- D. MCB BLOCK switches for Low PZR Pressure SI and Low Main Steam Line Pressure SI must be taken to BLOCK.

52. Initial Conditions:

- A station blackout has occurred.
- Both 125 VDC vital batteries are discharging at design capacity.

Which ONE (1) of the following describes the expected time until the 125 VDC vital batteries reach their minimum voltage and an expected plant response once 125 VDC power is lost?

- A. 3 hours;
Loss of indication for TDAFW pump steam supply valves
- B. 3 hours;
Loss of indication for PZR PORV Block valves
- C. 4 hours;
Loss of indication for TDAFW pump steam supply valves
- D. 4 hours;
Loss of indication for PZR PORV Block valves

53.

Given the following:

- A loss of instrument air is in progress.
- Instrument Air header pressure is 70 psig and lowering slowly.

Which ONE (1) of the following describes the status of 1SA-506, Instrument Air from Service Air Isolation Valve, and the status of the Instrument Air Header Low Pressure alarm?

A. Closed to ensure all stored air is available to the Instrument Air System.

Alarm is NOT lit.

B. Open to supply the Instrument Air Header from Service Air.

Alarm is NOT lit.

C. Closed to ensure all stored air is available to the Instrument Air System.

Alarm is lit.

D. Open to supply the Instrument Air Header from Service Air.

Alarm is lit.

54.

Given the following:

- A LOCA outside containment has occurred.
- The crew is performing the actions in EPP-013, LOCA Outside Containment.
- RAB radiation levels are stable.
- Safety Injection flow is stable.
- PZR level is offscale low.
- RAB sump levels are rising.
- RCS pressure is 1450 psig and lowering.

Which ONE (1) of the following describes whether the leak is isolated and the parameter used in accordance with EPP-013 to make that determination?

- A. Leak is isolated based on RAB radiation levels.
- B. Leak is isolated based on Safety Injection flow.
- C. Leak is NOT isolated based on RCS pressure.
- D. Leak is NOT isolated based on RAB Sump levels.

55.

Given the following:

- A Loss of Feedwater has occurred.
- The crew is performing actions of FRP-H.1, Response to Loss of Secondary Heat Sink.

Which ONE (1) of the following indicates that a loss of secondary heat sink has occurred, and Bleed and Feed cooling of the RCS is required?

- A. A low core Delta T because Tcold is rising
- B. A high core Delta T because Tcold is lowering
- C. A low core Delta T because Thot is lowering
- D. A high core Delta T because Thot is rising

RO WRITTEN - FINAL

56.

Which one of the following describes two of the objectives of EPP-012, Loss of Emergency Coolant Recirculation?

A. Maximize SI flow to ensure core cooling;

Initiate makeup to the RWST to ensure RCS inventory can be maintained.

B. Reduce SI flow to delay depletion of the RWST;

Stabilize RCS temperature to minimize RCS inventory requirements.

C. Restore emergency coolant recirculation capability;

Stabilize RCS temperature to minimize RCS inventory requirements.

D. Reduce SI flow to delay depletion of the RWST;

Restore emergency coolant recirculation capability

57.

Given the following:

- An Emergency Boration is being performed in accordance with AOP-002, Emergency Boration using 1CS-278, Emergency Boric Acid Addition.

Which ONE (1) of the following describes the minimum boron concentration and minimum temperature for solubility of the borated water being delivered to the RCS?

A. 2400 ppm;

40 degrees F

B. 2400 ppm;

65 degrees F

C. 7000 ppm;

40 degrees F

D. 7000 ppm;

65 degrees F

RO WRITTEN - FINAL

58.

Given the following:

- An irradiated Fuel Assembly was being withdrawn from the core when it was determined that the assembly was damaged.
- Containment Area Radiation is rising but monitors are NOT in alarm status.
- AOP-013, Fuel Handling Accident, has been entered.

Which ONE (1) of the following describes the FIRST action required in accordance with AOP-013?

- A. Evacuate Containment
- B. Place the affected fuel assembly in a 2 X 2 element hole
- C. Place the affected fuel assembly on the floor of the Lower Refueling Cavity
- D. Initiate Containment Closure

59.

Which ONE (1) of the following describes a limitation associated with Fuel Handling Building (FHB) Area Radiation Monitors and why it is a concern?

FHB Area Radiation monitors may not detect _____ which is primarily a _____ hazard.

- A. Krypton-85;
beta
- B. Krypton-85;
gamma
- C. Iodine-131;
beta
- D. Iodine-131;
gamma

60.

Given the following:

- Following a LOCA with subsequent equipment failures, the crew is operating Containment Spray Pumps in accordance with EPP-012, Loss of Emergency Coolant Recirculation.
- Due to current plant conditions, the crew transitions to FRP-J.1, Response to High Containment Pressure.

Which ONE (1) of the following describes the action that will be taken, and why?

A. Operate Containment Spray Pumps in accordance with EPP-012;

Actions performed in EOP network may not be undone.

B✓ Operate Containment Spray Pumps in accordance with EPP-012;

Preserving inventory for RCS makeup has priority over Containment heat removal.

C. Start available Containment Spray Pumps in accordance with FRP-J.1;

In the EOP network, FRPs take priority over EPPs.

D. Start available Containment Spray Pumps in accordance with FRP-J.1;

Failure to start a Containment Spray Pump may lead to exceeding 10CFR100 dose limits.

RO WRITTEN - FINAL

61.

Initial Conditions:

- An SI was initiated due to uncontrolled lowering of PRZ level.
- The crew entered EPP-013, LOCA OUTSIDE CONTAINMENT.
- The leak was located and isolated.
- Following leak isolation, RCS pressure was rising.

Current Conditions:

- RCS pressure has started to lower.
- After reducing AFW flow, the BOP reports that SG "A" level is rising in an uncontrolled manner.
- To address the changing conditions, the USCO enters EOP-REDIAGNOSIS.

Which ONE (1) of the following describes the correct transition out of EOP-REDIAGNOSIS?

- A. Return to EPP-013.
- B. Enter AOP-016, Excessive Primary Plant Leakage.
- C. Re-enter PATH-1 at Entry Point A.
- D. Enter PATH-2 at Entry Point J.

62.

Initial Conditions:

- A Loss of Coolant Accident has occurred inside containment.
- Reactor Trip Breakers are **OPEN**.
- The crew is carrying out actions of EPP-009, POST-LOCA COOLDOWN AND DEPRESSURIZATION.
- SI has been reset.
- Pressurizer pressure is 1950 psig and slowly lowering.
- Low Steam Line Pressure SI has just been blocked.
- Steam Generator pressures are all 750 psig and slowly lowering.
- All equipment has operated as designed.

Current Conditions:

- "A" Main Steam Line ruptures inside Containment.

Which ONE (1) of the following could occur automatically?

- A. Safety Injection ONLY
- B. Main Steam Line Isolation ONLY
- C. BOTH Safety Injection and Main Steam Line Isolation
- D. NEITHER Safety Injection or Main Steam Line Isolation

63.

Initial Conditions:

- A loss of off-site power has resulted in a reactor trip and a loss of Reactor Coolant Pumps (RCPs).
- A cooldown to Mode 5 has begun in accordance with EOP-005, NATURAL CIRCULATION COOLDOWN.

Current Conditions:

- Offsite Power has been restored.
- All prerequisites have been met for starting an RCP.

Which ONE (1) of the following describes the order in which the RCPs should be started in accordance with EOP-005?

- A. C, B, A
- B. C, A, B
- C✓ B, A, C
- D. B, C, A

64.

Given the following:

- The crew has entered FRP-H.2, RESPONSE TO STEAM GENERATOR OVERPRESSURE, on a YELLOW CSF.
- "B" SG pressure is 1240 PSIG.
- "B" SG level is 94%.
- "A" and "C" SG pressure are at 1040 PSIG.
- "A" and "C" SG levels are at 23%.
- Motor Driven AFW Pump 1A is running.
- All MSIV's are SHUT.
- Secondary radiation levels are all normal.

Which ONE (1) of the following actions will clear the YELLOW Path?

- A. Feed the affected SG to increase level by 3% using MDAFW Pump 1A.
- B. Feed the unaffected SGs to increase level by 3% using MDAFW Pump 1A.
- C. Feed the affected SG to increase level by 3% using the Turbine-Driven AFW Pump.
- D✓ Feed the unaffected SGs to increase level by 3% using the Turbine-Driven AFW Pump.

65.

Given the following:

- A reactor trip and safety injection occurred due to a break inside containment.
- RCS Pressure has stabilized at 1600 PSIG.
- The Containment CSFST is YELLOW, all others are GREEN.
- Containment Pressure is 3 PSIG.
- Containment Wide Range Sump Level is 90 inches, rising slowly.
- Containment HI Range Radiation Accident Monitor RM-1CR-3589 HIGH alarm has actuated.
- Containment HI Range Radiation Accident Monitor RM-1CR-3590 ALERT alarm has actuated.
- The USCO has elected to implement the YELLOW Path procedure.

Which ONE (1) of the following describes the event in progress and the applicable YELLOW path procedure?

A. Loss of Coolant Accident;

FRP-J.2, Response to Containment Flooding.

B. Loss of Coolant Accident;

FRP-J.3, Response to High Containment Radiation.

C. Steam or Feed Line Break;

FRP-J.2, Response to Containment Flooding.

D. Steam or Feed Line Break;

FRP-J.3, Response to High Containment Radiation.

66.

Given the following:

- A plant cooldown is in progress IAW GP-007, Normal Plant Cooldown Mode 3 to Mode 5.
- RCS temperature is 323 degrees F.
- RCS Pressure is 370 psig
- The following annunciator is received:
 - APP-ALB-009, 1-4, PORV 445A LTOP BLOCK TROUBLE

Which ONE (1) of the following is the cause of this alarm, and what action is required?

A. 1RC-117, PORV 445A Isolation Valve, is open.

Close 1RC-117.

B. 1RC-117, PORV 445A Isolation Valve, is closed.

Open 1RC-117.

C. LTOP is in service when it is NOT permitted.

Place the PORV 445A LTOP Block control switch in BLOCK.

D. LTOP is not in service when it is required.

Place the PORV 445A LTOP Block control switch in NORMAL.

67.

Given the following:

- The plant was at 40% power and increasing IAW GP-005, Power Operation.
- At time = 0 seconds, a load rejection caused Generator load to drop to 300 MWe.
- At time = 25 seconds, the running Main FW pump tripped.
- At time = 63 seconds, all SG NR levels dropped below 25%.
- At time = 66 seconds, all SG NR levels dropped below 20%.

The Reactor did NOT trip automatically and SG NR levels continue to lower.

Assuming NO action by the crew, the ATWS Mitigation System Actuation Circuitry (AMSAC) will...

- A. NOT actuate because it was not armed.
- B. actuate at T = 66 seconds.
- C. actuate at T = 88 seconds.
- D✓ actuate at T = 91 seconds.

68.

Which ONE (1) of the following describes the TWO (2) inputs to the Rod Insertion Limit Computer/Comparator?

- A. RCS Median Loop Delta T and Master Cyclor output
- B✓ RCS Median Loop Delta T and Pulse to Analog Converter output
- C. RCS Median Tave and Master Cyclor output
- D. RCS Median Tave and Pulse to Analog Converter output

RO WRITTEN - FINAL

69.

Which ONE (1) of the following locations requires Plant Manager Authorization for movement of fuel, in accordance with FHP-014, Fuel and Insert Shuffle Sequence?

Spent Fuel Pool...

- A. A
- B. B
- C. C
- D. D

70.

Given the following:

- The unit is in Mode 6, operating per GP-009, REFUELING CAVITY FILL, REFUELING AND DRAIN OF THE REFUELING CAVITY MODES 5-6-5
- Core off-load was in progress.
- Source Range N-31 indication failed to ZERO and the channel has been declared inoperable.
- Core off-load has been halted.

Which ONE (1) of the following describes the MINIMUM actions required by GP-009 before fuel movement in containment can resume?

Verify the Audio Count Rate channel is selected to Source Range N-32 and verify that...

- A. both Wide Range Neutron Flux Monitors are operable.
- B. either Wide Range Neutron Flux Monitor is operable.
- C. the Wide Range Neutron Flux Monitor on the opposite side of the core from N-32 is operable.
- D. the Wide Range Neutron Flux Monitor on the same side of the core as N-32 is operable.

RO WRITTEN - FINAL

71.

Which of the following subsystems, if any, requires manual sampling to prevent undetected inadvertent radioactive release to the environment, per OP-139, "Service Water System"?

- A. Normal Service Water AND Emergency Service Water.
- B. Normal Service Water ONLY.
- C. ✓ Emergency Service Water ONLY.
- D. NEITHER Normal Service Water OR Emergency Service Water.

72.

Given the following:

- Some valves must be operated in a high radiation area in order to tag out a section of pipe that will be replaced during an outage.
- Planners estimate that one operator could do the valve alignment in 20 minutes while two operators could perform it in 12 minutes.
- Due to "radioactive hot spots" the general radiation level in the work area is 300 mr/hour.
- The radiation level could be reduced to 120 mr/hr by the installation of temporary shielding over the hot spots.
- Planners estimate it would take two Radiation Protection Technicians 10 minutes to install the temporary shielding.

Which ONE (1) of the following methods of doing the job would be in accordance with the principles of the HNP ALARA Program?

- A. ✓ One operator without shielding.
- B. Two operators without shielding.
- C. One operator with shielding.
- D. Two operators with shielding.

73.

Given the following:

- A Site Area Emergency (SAE) has been declared.
- All Emergency Response facilities are activated.
- A non-licensed operator must be dispatched from the Operations Support Center to an area with an identified radiation field of 27 Rem/hour in order to isolate the pathway for a large release to the environment.
- The operator will only be in the area for ten seconds.

Which ONE (1) of the following is the HIGHEST level of authority that must authorize the entry?

- A. Emergency Repair Director.
- B. Plant Operations Director.
- C. Radiological Control Director.
- D. ✓ Site Emergency Coordinator.

74.

Given the following:

- A LOCA has occurred.
- Both CSIP's are tripped.
- A RED Path CSF is confirmed on Core Cooling.
- A RED Path CSF is confirmed on Heat Sink.
- The operating crew is performing FRP-C.1, RESPONSE TO INADEQUATE CORE COOLING.
- The RWST LO-LO LEVEL alarm just actuated.

Which one of the following describes when the crew must transition to EPP-010, TRANSFER TO COLD LEG RECIRCULATION?

- A. ✓ Prior to completing any other actions in FRP-C.1.
- B. After addressing all Red Path FRPs.
- C. When directed by FRP-C.1 to return to the procedure and step in effect.
- D. As soon as cold leg recirculation capability is confirmed.

75.

Given the following conditions:

- A steam break has occurred inside containment.
- SPDS is displaying a RED on the INTEGRITY Critical Safety Function (CSF)
- All instrumentation is operating properly.

Which ONE (1) of the following describes the parameters used by SPDS to determine the INTEGRITY CSF?

- A. Lowest Tcold and average RCS Pressure.
- B. Average Tcold and average RCS Pressure.
- C✓ Lowest Tcold and highest RCS Pressure.
- D. Average Tcold and highest RCS Pressure.

You have completed the test!