

## **REFERENCES PROVIDED TO CANDIDATES 2012 NRC WRITTEN EXAM**

### RO Exam:

None

### SRO Exam:

LCO 3.1.4, "Control Rod Alignment," 2 pages

LCO 3.1.6, "Regulating Rod Group Position Limits," 2 pages

LCO 3.4.11, "Pressurizer Power Operated Relief Valves (PORVs)," 2 pages

LCO 3.7.3, "Main Feedwater Regulating Valves (MFRVs) and MFRV Bypass Valves," 1 page

LCO 3.7.5, "Auxiliary Feedwater (AFW) System," 2 pages

LCO 3.8.7, "Inverters - Operating," 1 page

LCO 3.8.9, "Distribution Systems - Operating," 2 pages

- 76. C
- 77. C
- 78. C
- 79. B
- 80. D
- 81. B
- 82. D
- 83. A
- 84. A
- 85. D
- 86. D
- 87. C
- 88. A
- 89. A
- 90. C
- 91. D
- 92. C
- 93. A
- 94. A
- 95. D
- 96. B
- 97. B
- 98. A
- 99. B
- 100. B

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X  
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M  
  
K  
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Y**

Given the following with the Plant at full power:

- P-52A, Component Cooling Water (CCW) Pump, is out of service for motor replacement
- P-52B, CCW Pump, is in service

Then, the following occurs:

- A manual Reactor trip is initiated due to a large break loss of coolant accident
- 2400V Bus 1D trips due to a fault and can not be energized
- EOP-1.0, "Standard Post Trip Actions," are complete
- EOP-4.0, "Loss of Coolant Accident Recovery," is implemented
- Then, P-52C, CCW Pump, trips and will not start

Which one of the following lists the additional procedure(s), if any, that the Control Room team is required to implement after the loss of P-52C?

- a. None. EOP-4.0 contains actions to mitigate the loss of P-52C.
- b. EOP Supplement 28, "Supplementary Actions for Loss of Power," only.
- c. EOP-9.0, "Functional Recovery Procedure," only.
- d. EOP-9.0 and EOP Supplement 28.

Given the following:

- The Plant is in MODE 4 with a cooldown to MODE 5 in progress
- P-50B and P-50D, Primary Coolant Pumps, are in service
- Shutdown Cooling is in service using P-67A, Low Pressure Safety Injection Pump
- Then, the following alarms annunciate simultaneously:
  - EK-0504, 2400V BUS 1D BKR 152-203 TRIP
  - EK-0532, BUS 1C OR 1D OVERCURRENT LOCKOUT

Which one of the following lists the procedure and section that will restore Shutdown Cooling flow for the above conditions?

- a. ONP-17, "Loss of Shutdown Cooling," section 4.15.7, "Loss of all AC Power."
- b. ONP-20, "Diesel Generator Manual Control," section 4.4.2, "Local Tending of D/G."
- c. ONP-17, section 4.15.2, "LPSI Pump Tripped."
- d. ONP-20, section 4.6.2, "Local Tending of D/G Output Breaker."

Given the following with the Plant at full power:

- On Tuesday at 0930, PRV-1042B, Power Operated Relief Valve (PORV), is declared INOPERABLE due to a design issue
- The other train PORV, PRV-1043B, is declared INOPERABLE on Wednesday at 1100
- PRV-1042B is then repaired and declared OPERABLE on Wednesday at 1230
- The parts required to repair PRV-1043B will not be on site for several days

Which one of the following is the latest allowable time on Saturday that the Plant must be in MODE 3 assuming PRV-1043B is not repaired?

- a. 1100.
- b. 1530.
- c. 1700.
- d. 1830.

Given the following:

- A Steam Line Break from 'B' Steam Generator occurs inside Containment coincident with a Tube Rupture in the 'A' Steam Generator
- The Shift Manager (acting as Emergency Plant Manager) has declared a Site Area Emergency (SAE)
- Van Buren County and the State of Michigan were notified of the SAE at 0155
- Then, due to degrading Plant conditions, the Shift Manager declares a General Emergency at 0200

Which one of the following is the latest allowable time that the State of Michigan must be notified due to the declaration of the General Emergency?

- a. 0210.
- b. 0215.
- c. 0225.
- d. 0230.

Given the following with the Plant at full power:

- The Reactor was manually tripped due to a loss of Main Feedwater
- EOP-1.0, "Standard Post Trip Actions," are completed and then subsequently exited and the Plant is stable in MODE 3
- CV-0701, 'A' Steam Generator Feed Regulating Valve, stuck open during the trip and was declared INOPERABLE
- CV-0701 was manually closed to satisfy the Required Actions of LCO 3.7.3 Condition 'A'
- The Plant was then cooled down to MODE 5 for repairs to a Control Rod Drive seal and a heatup to MODE 3 is planned

Which one of the following additional actions, if any, will allow the Plant to be heated up to MODE 3 assuming CV-0701 is not repaired?

- a. None; the Plant must remain in MODE 4 until CV-0701 is repaired and declared OPERABLE.
- b. An Auxiliary Feedwater Pump is placed in service and both Steam Generators are being fed at the programmed flow rate.
- c. A Safety Function Determination is performed and it is found that a loss of a safety function associated with the INOPERABILITY of CV-0701 does not exist.
- d. A Risk Assessment is performed and it is found that the risk associated with the INOPERABILITY of CV-0701 in MODE 3 is manageable.

Given the following with the Plant at full power:

- At 0800, alarm EK-0545, PREFERRED AC BUS NO 2 TROUBLE, annunciates
- The Control Room team determines that a loss of Y20, Preferred AC Bus #2, has occurred due to a malfunction with ED-07, Inverter #2
- Required Action A.1 of LCO 3.8.7, "Inverters - Operating," for one inverter INOPERABLE is entered
- At 0830, the Control Room team energizes Y20 from the Bypass Regulator

Which one of the following (1) identifies whether LCO 3.8.9, "Distribution Systems – Operating," is currently satisfied and (2) identifies the action(s) that will allow the LCO(s) to be met at the earliest time?

- a. (1) LCO 3.8.9 is not met.  
(2) Repair ED-07 and verify unloaded output voltage and frequency are within limits by 1200.
- b. (1) LCO 3.8.9 is met.  
(2) Repair ED-07 and align it to Y20 by 1400.
- c. (1) LCO 3.8.9 is met.  
(2) Repair ED-07 and verify unloaded output voltage and frequency are within limits by 1200.
- d. (1) LCO 3.8.9 is not met.  
(2) Repair ED-07 and align it to Y20 by 1400.



Given the following during a Reactor startup:

- All Part-Length and Shutdown Control Rods are fully withdrawn
- Regulating Group 1 Rods are being withdrawn and are currently indicating eight inches
- Then, power is lost to all Regulating Group 2 Control Rod Drive Motors

Which one of the following describes the Technical Specification actions required to be performed, if any?

- a. None.
- b. Enter LCO 3.1.4, "Control Rod Alignment," Condition D only.
- c. Enter LCO 3.1.4, "Control Rod Alignment," Condition E only.
- d. Enter LCO 3.1.4, "Control Rod Alignment," Condition D and E.

Given the following with the Plant in MODE 5:

- Alarm EK-0608C, NI CHANNEL TROUBLE, annunciates
- The Control Room team has determined that the cause of the alarm is Wide Range Nuclear Instrument 4A (NI-4A) channel failing low

Which one of the following is correct regarding the status of the Neutron Flux Monitoring Channels due to the above conditions?

- a. Both channels are OPERABLE as long as Source Range NI-2A is capable of detecting the existing neutron flux and is in agreement with Source Range NI-1A.
- b. One channel is INOPERABLE. LCO 3.3.9, "Neutron Flux Monitoring Channels," is not met.
- c. One channel is INOPERABLE. LCO 3.3.9 is met since only one channel of Neutron Flux Monitoring is required to be OPERABLE in the current MODE.
- d. Both channels are OPERABLE as long as Source Range/Wide Range NI-1/3A detector voltage remains above 45VDC.

Given the following:

- The Plant was tripped from full power due to a loss of coolant accident outside Containment
- EOP-4.0, "Loss of Coolant Accident Recovery," has been implemented
- Pressurizer pressure is 820 psia
- All Primary Coolant Pumps are secured
- Core  $\Delta T$  (CET -  $T_C$ ) is 55°F and slowly rising
- Corrected Pressurizer level is 15%
- The top 6 red sensor lights are LIT on the Reactor Vessel Level Monitoring System

Which one of the following (1) describes an additional indication that a steam bubble has formed in the Reactor Head region for these conditions and (2) the procedure, if any, that the Control Room team will implement to mitigate the bubble formation?

- a. (1) Average Core Exit Thermocouple temperature is 515°F  
(2) EOP Supplement 26, "PCS Void Removal."
- b. (1) Average Core Exit Thermocouple temperature is 515°F  
(2) None. EOP-4.0 contains actions to vent the Reactor Head for these conditions.
- c. (1) Erratic Nuclear Instrumentation indications  
(2) EOP Supplement 26, "PCS Void Removal."
- d. (1) Erratic Nuclear Instrumentation indications  
(2) None. EOP-4.0 contains actions to vent the Reactor Head for these conditions.

Given the following:

- The Plant was manually tripped due to a tube rupture in the 'A' Steam Generator (S/G)
- A Safety Injection Actuation is then received
- The bottom six green lights are lit and the two top red lights are lit on the Reactor Vessel Level Monitoring System display
- Following immediate actions of EOP-1.0, "Standard Post Trip Actions," a Code Safety Valve associated with 'A' S/G opens and does not reseal
- The Control Room team implements EOP-9.0, "Functional Recovery Procedure"
- PCS Subcooling is 36°F and rising

Which one of the following correctly completes the statement below for the above conditions?

The Containment Barrier (1) lost and the Fuel Clad Barrier (2) lost.  
The Shift Manager will declare a (3).

- (1) is not  
(2) is  
(3) General Emergency
- (1) is not  
(2) is  
(3) Site Area Emergency
- (1) is  
(2) is not  
(3) General Emergency
- (1) is  
(2) is not  
(3) Site Area Emergency

Given the following with the Plant at full power:

- A failed relay causes CV-2099, PCP Controlled Bleedoff Containment Isolation Valve, to fail closed
- EK-0959, PRI COOLANT PUMPS CONT BLEEDOFF HDR HI PRESS, annunciates

Which one of the following correctly completes the below statement?

Primary Coolant Pump seal controlled bleed-off (CBO) flow is now being routed to \_\_\_\_ (1) \_\_\_\_ and an Action Statement from LCO 3.4.13, "PCS Operational Leakage," \_\_\_\_ (2) \_\_\_\_ required to be entered for the above conditions.

- (1) T-80, Equipment Drain Tank  
(2) is not
- (1) T-74, Primary System Drain Tank  
(2) is not
- (1) T-80  
(2) is
- (1) T-74  
(2) is

With the Plant in MODE 1, which one of the following conditions would cause a train of Containment Cooling to be declared INOPERABLE? (Assume there is no equipment initially out of service)

- a. P-7A, Service Water Pump, discharge basket strainer becomes clogged.
- b. V-4A, Containment Air Cooler Fan, will not start due to a breaker problem.
- c. One Containment Spray header is drained to the 596' elevation for maintenance.
- d. CV-3070, P-66B HPSI Pump Subcooling Valve, is failed closed for maintenance.

Given the following with the Plant at full power:

- P-8B, Auxiliary Feedwater (AFW) Pump, is out of service
- The Atmospheric Dump Valves are INOPERABLE due to ED-06, Inverter #1, failing and de-energizing Y-10, Preferred AC Bus
- Then, the Reactor is manually tripped following a loss of load event
- 2400V Bus 1C de-energizes
- The Reactor Operator reports that PIC-0511, Turbine Bypass Valve (TBV) Controller, output is zero and the TBV is closed
- Steam Generator pressures are 1000 psia and stable
- EOP-1.0, "Standard Post Trip Actions," are complete

For the above conditions, which one of the following describes (1) whether AFW flow rates meet those assumed in the safety analyses and if not, (2) the action that will allow AFW flow rates to meet the safety analyses?

- a. (1) AFW flow rates do not meet those assumed in the safety analyses.  
(2) Restore power to Y10 via the Bypass Regulator.
- b. (1) AFW flow rates do not meet those assumed in the safety analyses.  
(2) Place C-4, Hogging Air Ejector, in service.
- c. (1) AFW flow rates do not meet those assumed in the safety analyses.  
(2) Raise the setpoint of the in service AFW flow controllers.
- d. (1) AFW flow rates meet those assumed in the safety analyses.  
(2) No further actions are required.

Given the following with the Plant at full power:

- P-8B, Auxiliary Feedwater (AFW) Pump, is INOPERABLE for maintenance
- Then, a Reactor trip occurs due to a loss of all offsite power
- Diesel Generator 1-1 will not start automatically or manually
- P-8C, AFW Pump, trips immediately after starting
- EOP-7.0, "Loss of All Feedwater Recovery," has been implemented

Which one of the following procedures does EOP-7.0 direct performance of that will allow restoration of Auxiliary or Main Feedwater flow to at least one Steam Generator for the above conditions?

- a. ONP-2.1, "Loss of AC Power."
- b. EOP Supplement 28, "Supplemental Actions for Loss of Power."
- c. EOP Supplement 31, "Supply AFW Pumps from Alternate Sources."
- d. EOP Supplement 32, "Main Feedwater Pump Hot Restart."



Given the following with the Plant at full power:

- A Nuclear Plant Operator in the Diesel Generator (D/G) 1-1 Room reports that C-3A, D/G 1-1 Air Compressor, has a strong burning smell and there is smoke emanating from the motor
- 52-116C, Supply Breaker for C-3A, is found in the “trip-free” condition
- T-31A and T-31B, D/G 1-1 Air Starting Tanks, pressure indication is 239 psig and slowly lowering

Which one of the following describes the impact on LCO 3.8.3, “Diesel Fuel, Lube Oil, and Starting Air,” and the correct action due to the above conditions?

- a. LCO 3.8.3 is not met.  
Place K-1A, C-3A Backup Gasoline Engine, in service or repair and restore C-3A motor to service and ensure Starting Air Tank pressure is adequate. This will allow all LCO 3.8.3 action statements to be exited.
- b. LCO 3.8.3 is not met.  
Repair and restore C-3A motor to service and ensure Starting Air Tank pressure is adequate. This will allow all LCO 3.8.3 action statements to be exited.
- c. LCO 3.8.3 is met.  
Action must be taken to prevent Starting Air Tank pressure from lowering below **215** psig to avoid LCO 3.8.3 action statement entry.
- d. LCO 3.8.3 is met.  
Action must be taken to prevent Starting Air Tank pressure from lowering below **225** psig to avoid LCO 3.8.3 action statement entry.

With the Plant at full power, the Reactor Operator notes the following:

- Primary Rod position indications on Panel C-02 are blank
- The PPC is providing valid primary and secondary Rod position indications
- The red matrix lights for all Rods are ON

Which one of the following describes the impact of these conditions on LCO 3.1.4, "Control Rod Alignment," and the Conditions, if any, required to be entered?

- LCO 3.1.4 is not met.  
LCO 3.1.4.B only.
- LCO 3.1.4 is not met.  
LCO 3.1.4.A only.
- LCO 3.1.4 is not met.  
LCO 3.1.4.A and LCO 3.1.4.B.
- LCO 3.1.4 is met.  
No Conditions are required to be entered.

Given the following:

- The Plant has just started a Technical Specification required cooldown from 532°F and 2060 psia in MODE 3 due to a prolonged loss of Preferred AC Bus Y10
- Then, Pressurizer (PZR) Pressure Controller, PIC-0101B, loses power

Which one of the following describes (1) the immediate effect on PZR pressure control components and (2) the procedure the Control Room team will implement to recover PZR pressure for these conditions?

- (1) PZR Spray valves close only.  
(2) ONP-18, "Pressurizer Pressure Control Malfunctions."
- (1) PZR Proportional heaters receive full amps and PZR Spray valves close.  
(2) SOP-1A, "Primary Coolant System."
- (1) PZR Proportional heaters receive full amps and PZR Spray valves close.  
(2) ONP-18, "Pressurizer Pressure Control Malfunctions."
- (1) PZR Spray valves close only.  
(2) SOP-1A, "Primary Coolant System."

Given the following with the Plant in MODE 6:

- Refueling Operations are in progress in the Containment and Spent Fuel Pool (SFP)
- EK-1309, SPENT FUEL POOL HI/LO LEVEL, annunciates on Panel C-13
- Door-950, Spent Fuel Pool South Tilt Pit Gate, is removed
- The Control Room team observes SFP level lowering slowly on the remote monitor

Which one of the following describes the procedural action that the Control Room team will implement to mitigate this event?

- a. Install Door-950 per ONP-23.3, "Loss of Refueling Water Accident."
- b. Install Door-950 per ONP-23.4, "Loss of Spent Fuel Pool Cooling."
- c. Add water to the SFP per SOP-27, "Fuel Pool System," Attachment 2, "Addition of Water to the SFP."
- d. Add water to the SFP per SOP-27, section 7.2.1 "Fill the SFP from Safety Injection Refueling Water Tank."

Given the following:

- The Plant is in MODE 2 during a critical approach per GOP-3, "MODE 3  $\geq$  525°F to MODE 2"
- The Reactivity Manager is stationed in the Control Room
- Data collection by Reactor Engineering is in progress

Which one of the following individuals has the authority to authorize a shift turnover for the above conditions?

- a. Reactivity Manager.
- b. Shift Manager.
- c. Control Room Supervisor.
- d. Reactor Engineer.

Given the following with the Plant in MODE 6 for refueling:

- Fuel moves are in progress in the Spent Fuel Pool (SFP)
- EK-1371, RADIATION MONITOR SYSTEM CKT FAILURE, annunciates due to RIA-2313, SFP Criticality Monitor, failing low
- Fuel moves are immediately stopped in the SFP

Which one of the following describes an action, if any, that will allow unrestricted fuel movements to resume in the SFP area?

- a. None, fuel moves cannot resume until RIA-2313 is restored to FUNCTIONAL status.
- b. Station a Radiation Protection Technician in the area of RIA-2313 with a survey meter.
- c. Lower the alarm setpoint for RIA-5709, SFP Criticality Monitor, to 5 mR/hour.
- d. Place a portable Area Monitor near RIA-2313 with an audible alarm capability.

Given the following:

- The Plant is in MODE 5 for a refueling outage
- A Temporary Modification (TM) is ready to be installed in the Plant
- The TM affects the Plant Final Safety Analysis Report (FSAR)

Which one of the following describes (1) the person that has the authority to approve installation of the TM and (2) the department that is notified due to the affect on the FSAR after installation of the TM in accordance with EN-DC-136, "Temporary Modifications?"

- a. (1) Shift Manager.  
(2) Engineering.
- b. (1) Shift Manager.  
(2) Licensing.
- c. (1) Work Control Center Supervisor.  
(2) Engineering.
- d. (1) Work Control Center Supervisor.  
(2) Licensing.

Given the following with the Plant at full power:

- P-8A, Auxiliary Feedwater (AFW) Pump, is discovered to be INOPERABLE
- Condition 'A' of LCO 3.7.5, "Auxiliary Feedwater System," is entered
- Then, 12 hours later, FIC-0736A, Controller for P-8C AFW to E-50B S/G, is discovered to be INOPERABLE

Which one of the following correctly completes the statement below?

Separate entry into Condition 'A' of LCO 3.7.5 \_\_\_\_ (1) \_\_\_\_ be performed when FIC-0736A becomes INOPERABLE.

In order to meet the requirements for a completion time extension, \_\_\_\_ (2) \_\_\_\_ must be restored to OPERABLE status first.

- (1) will  
(2) P-8A
- (1) will not  
(2) P-8A
- (1) will  
(2) FIC-0736A
- (1) will not  
(2) FIC-0736A



Given the following:

- The Plant is in MODE 1
- Two maintenance technicians contact the Control Room and request permission to enter the Containment to perform a calibration of an instrument located in the 590' Air Room
- RIA-1817, Containment Air Monitor, is out of service
- RIA-1805/1806/1807, Containment Area Monitors, indicate 1.2 R/hr
- RIA-1808, Containment Area Monitor, is out of service
- Neutron dose rate is expected to be as high as 350 mrem/hour

Which one of the following describes if the Control Room Supervisor may authorize these technicians to enter the 590' level of Containment without restriction and if not, the reason?

- a. No, Radiation Protection Manager permission is required since Containment Area Monitors indicate 1.2 R/hr.
- b. Yes, all conditions are met.
- c. No, Radiation Protection Manager permission is required since neutron dose rate is expected to be 350 mrem/hour.
- d. No, Radiation Protection Manager permission is required since RIA-1808 is out of service.

Given the following with the Plant initially in MODE 5:

- A loss of Shutdown Cooling event occurs
- Neither Low Pressure Safety Injection Pump can be started
- Primary Coolant System temperature has reached 204°F
- The Pressurizer Manway is removed
- All Containment Air Coolers are available

Which one of the following sections of ONP-17, "Loss of Shutdown Cooling," will the Control Room Supervisor implement to restore Primary Coolant heat removal?

- a. Attachment 6, "S/G Heat Removal."
- b. Attachment 5, "Option 3: PCS Boil Off and Makeup."
- c. Attachment 5, "Option 2: Spent Fuel Pool Cooling."
- d. Attachment 5, "Option 1: Containment Spray."

Which one of the following is the lowest projected Total Effective Dose Equivalent (TEDE) offsite dose which requires a Protective Action Recommendation based upon Dose Status per EI-6.13, "Protective Action Recommendations for Offsite Populations?"

- a. 0.6 Rem.
- b. 1.1 Rem.
- c. 2.1 Rem.
- d. 5.1 Rem.