| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 1 | Tier # | 1 | 1 |
| K/A Statement: Operational implications of decay | Group # | 1 | 1 |
| power as a function of time on a reactor trip | K/A # | EPE.007.EK1.5 | |
| Proposed Question: | Importance Rating | 3.3 | 3.8 |

The reactor has been at 100% power for several months when the following sequence of events occurs:

1. The reactor trips.
2. The crew enters ES-0.1, *Reactor Trip Response*.
3. One hour after the trip, the BOP operator reports 380 gpm Auxiliary Feedwater flow is required to maintain RCS Tave stable at 557°F.

How long after the trip will it take 150 gpm of AFW flow to maintain RCS Tave stable?

a) 2 to 4 hours.
b) 8 to 12 hours.
c) 1 to 3 days.
d) 6 to 8 days.

Proposed Answer: C

Explanation (Optional): Per GFS thumbrules, decay heat after a trip is 7.5% one second after a trip, 3.75% one minute after a trip, 1.875% one hour after a trip, 0.9375% one day after a trip, and 0.46875% one week after a trip. This is based on starting with 7.5% decay heat after one second, and then cutting the amount of remaining decay heat in half after each increment of time. Since required AFW flow is given as 380 gpm one hour after the trip, cutting 380 gpm in half gives 190 gpm one day after the trip ("A" and "B" wrong), and 95 gpm one week after the trip ("D" wrong). "C" is correct, since 190 gpm is just above the flow required one day after the trip. Per ECA-1.1, Attachment 1, which shows actual required ECCS flow during a LOCA to remove decay heat after a trip, it can be seen that about 380 gpm is required one hour after a trip. About 165 gpm is required after one day (1440 minutes), and about 130 gpm is required after two days. After one week, (10,080 hours) about 90 gpm is required. "A", "B", and "D" are plausible, since these times are all longer than the starting point of one hour after the trip given in the stem, and the required AFW flow of 150 gpm is less than the required 380 gpm one hour after the trip.

Technical Reference(s): ECA-1.1 (Rev 18-0), Attachment A
(Attach if not previously provided, General Physics Reactor Theory Chapter 8 Fig. 8-26 (Rev. 4)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04637 Describe the major administrative and procedural precautions and limitations place on the operation of the Auxiliary Feedwater System, and the basis for each (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.1, 41.5, 41.8, and 41.14

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 2 | Tier # | 1 | 1 |
| K/A Statement: Operate/monitor PRT level, pressure | Group # | 1 | 1 |
| and temperature on a Pzr vapor space break | K/A # | APE.008.AA1.8 | |
| Proposed Question: | Importance Rating | 3.8 | 3.8 |

The plant is in MODE 3 with PORV Testing in progress, and the following sequence of events occurs:

1. The RO opens the "A" PORV, and the PORV remains open.
2. PRT temperature and pressure start to increase.
3. The PZR REL TK PRESSURE HI annunciator comes in on MB4.
4. All automatic system response(s) occur, as designed.

How will the PRT temperature and pressure trends initially respond when the automatic response occurs?

a) PRT temperature will continue to increase, but pressure will start to decrease.
b) PRT temperature will continue to increase, and pressure will start to increase at a faster rate.
c) PRT temperature and pressure will both continue to increase at the same rate.
d) PRT temperature and pressure will both start to decrease.

Proposed Answer: B

Explanation (Optional): "B" is correct, since at the high-pressure alarm setpoint, the normally open PRT Vent Valve, 3RCS-PCV469, automatically closes, which allows PRT pressure to increase at a faster rate. "A" is wrong, but plausible, since this would occur if the vent valve automatically opened on high pressure. "C" is wrong, but plausible, since this would occur if no automatic actions occurred, or if automatic actions had no effect on these parameters. "D" is wrong, but plausible, since this would occur if the PRT rupture disk blew at the high pressure setpoint.

Technical Reference(s): OP 3353.MB4A (Rev. 05-0), 2-4
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05347 Describe the operation of the following Pressurizer Relief Tanks System controls and interlocks… Pressurizer Relief Tank Vent Valve RCS-PCV469… (As available)

Question Source: Bank #80880

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 3 | Tier # | 1 | 1 |
| K/A Statement: Reasons for actions in the | Group # | 1 | 1 |
| EOP on a small break LOCA | K/A # | EPE.009.EK3.21 | |
| Proposed Question: | Importance Rating | 4.2 | 4.5 |

Operators are cooling down the plant per ES-1.2, *Post-LOCA Cooldown and Depressurization.*

What RCP configuration does ES-1.2 direct the crew to align, and what is the basis for this configuration?

a) One RCP running for effective heat transfer and pressure control while minimizing heat input.
b) One RCP running for ECCS mixing considerations while minimizing inventory loss.
c) All RCPs stopped to minimize RCS inventory loss and maximize core cooling.
d) All RCPs stopped to prevent possible core uncovery should a loss of offsite power occur.

Proposed Answer: A

Explanation (Optional): ES-1.2 background states that forced flow is the preferred mode of operation ("C" and "D" wrong) to allow for normal RCS cooldown and provide pressurizer spray ("A" correct and "B" wrong). All but one RCP are stopped to minimize heat input to the RCS. Note that RCP Trip Criteria do not apply once a controlled cooldown is commenced. "B" is plausible, since this is related to the basis for starting a RCP in FR-P.1. "C" and "D" are plausible, since these are related to the bases for RCP trip criteria.

Technical Reference(s): ES-1.2 (Rev. 20-0), step 12
(Attach if not previously provided, ES-1.2 Background Doc (Rev. 3) for RCP major Action
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05350 Discuss the basis of major procedure steps and/or sequence of steps in EOP 35 ES-1.2. (As available)

Question Source: Bank #70250

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.10

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 4 | Tier # | 1 | 1 |
| K/A Statement: Determine/interpret conditions | Group # | 1 | 1 |
| for throttling/stopping HPI on a large break LOCA | K/A # | EPE.011.EA2.11 | |
| Proposed Question: | Importance Rating | 3.9 | 4.3 |

A large break LOCA occurs, resulting in the following sequence of events:

1. The crew completes aligning for Cold Leg Recirculation per ES-1.3, *Transfer to Cold Leg Recirculation*.
2. The crew returns to E-1, *Loss of Reactor or Secondary Coolant*.

The RO reports the "A" and "B" Containment Recirculation (RSS) Pumps amps and discharge pressure are oscillating.

Based on the foldout page of E-1, what sequence of actions are required to be taken by the crew?

a) Trip the "A" and "B" RSS Pumps, <u>then</u> trip both Charging Pumps and both SIH Pumps only.
b) Trip the "A" and "B" RSS Pumps, <u>then</u> trip both Charging Pumps, both SIH Pumps, and both RHR Pumps.
c) Trip both Charging Pumps and both SIH Pumps, <u>then</u> trip the "A" and "B" RSS Pumps only.
d) Trip both Charging Pumps, both SIH Pumps, and both RHR Pumps, <u>then</u> trip the "A" and "B" RSS Pumps.

Proposed Answer: C

Explanation (Optional): Recirculation Sump Screen Blockage Criteria, which includes RSS Pump amps and flow oscillations, requires prompt stopping of affected pumps receiving suction from the RSS Pump(s), before stopping the associated RSS Pump ("A" and "B" wrong). "C" is correct, and "D" wrong, since RHR Pumps are not required to be stopped, since they are removed from service when aligning for Cold Leg Recirculation. "A" and "B" are plausible, since all of these pumps are required to be tripped, just the sequence is wrong. "D" is plausible, since the RHR pumps initially supply low head injection, and are stopped as part of aligning for recirculation.

Technical Reference(s): (Attach if not previously provided, including version/revision number)
- E-1 (Rev 26-0), Foldout Page
- P&ID 112C (Rev. 38)
- P&ID 112A (Rev. 50)
- P&ID 104A (Rev. 54)
- P&ID 113B (Rev. 42)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-07422 Given a set of plant conditions, properly apply the notes, cautions, and foldout page items of E-1. (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 5 | Tier # | 1 | 1 |
| K/A Statement: Determine/interpret the cause of RCP failure | Group # | 1 | 1 |
| | K/A # | APE.015.AA2.1 | |
| Proposed Question: | Importance Rating | 3.0 | 3.5 |

With the plant operating at 100% power, the "B" Reactor Coolant Pump develops a tube leak in its Upper Oil Reservoir Cooler.

Correctly complete the following statement regarding Reactor Plant Component Cooling Water (RPCCW), Reactor Plant Chilled Water (CDS), and lubrication to the "B" RCP.

Lubrication will be lost due to___(1)___leaking into the___(2)___.

| | (1) | (2) |
|---|---|---|
| a) | Lube Oil | RPCCW System |
| b) | Lube Oil | CDS System |
| c) | RPCCW | Oil Reservoir |
| d) | CDS | Oil Reservoir |

Proposed Answer: C

Explanation (Optional): "C" is correct since RPCCW cools the RCP oil coolers and its pressure is above oil reservoir pressure, so on a cooler tube leak, RPCCW will enter the oil cooler, lowering the oil's lubrication capability. "A" is wrong since RPCCW pressure is greater than oil cooler pressure. "A" is plausible since this would occur if oil cooler pressure was higher than RPCCW pressure, and this is the case for several RPCCW loads. "B" and "D" are wrong since CDS does not supply the upper oil reservoir cooler. "B" and "D" are plausible since both RPCCW and CDS cool Containment loads, and CDS does cool the RCP motor coolers.

Technical Reference(s): OP3353.MB4B (Rev. 08-0), 4-2A
(Attach if not previously provided, P&ID 102A (Rev. 33)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05431 Describe the operation of the RCPs under the following abnormal conditions... Conditions requiring a Manual RCP Trip (As available)

Question Source: Bank #89256

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.3 and 41.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 6 | Tier # | 1 | 1 |
| K/A Statement: Operational implications of the reason for changing from manual to automatic control of charging flow during a loss of makeup | Group # | 1 | 1 |
| | K/A # | APE.022.AK1.4 | |
| | Importance Rating | 2.9 | 3.0 |

Proposed Question:

With the plant initially at 50% power, the following sequence of events occurs:

1. The "A" Charging Pump trips.
2. The RO isolates Charging and Letdown per AOP 3581, *Immediate Operator Actions.*
3. The crew enters AOP 3580, *Loss of Charging Pumps.*
4. The RO attempts to start the "B" Charging Pump, and it fails to start.
5. The crew successfully aligns and starts the "C" Charging Pump and restores letdown.
6. The RO begins restoring Pressurizer level to normal using MANUAL control of Charging Flow Control Valve 3CHS*FCV121.

Assuming no further adjustments are made with 3CHS*FCV121, and the controller is left in manual, how will the plant respond?

a) Actual Pressurizer level will decrease to the no load program level setpoint.
b) Actual Pressurizer level will increase to the 100% program level setpoint.
c) The Reactor will trip on low Pressurizer pressure.
d) The Reactor will trip on high Pressurizer level.

Proposed Answer: D

Explanation (Optional): With all Charging Pumps tripped, Pzr level will begin to decrease, even with Letdown isolated, due to RCP seal leakoff flow without charging flow or seal injection. While the "C" Charging Pump is being aligned (which takes time), Pzr level will drop below program level. The RO initially fully closed the Charging Flow Control Valve, and since level is low, the RO throttles FCV 121 open to restore level. This means there is a net gain in RCS inventory, causing Pzr level to increase ("A" wrong). Without operator action, eventually a high pressurizer level reactor trip will occur ("D" correct). "C" is wrong, since raising Pzr level squeezes the bubble in the Pzr, raising RCS pressure. The final plant conditions will have the pressurizer in a solid condition with plant pressure oscillating between the PORV set and reset points. "B" is wrong, since in manual, Pzr level does not respond to program level. "A" and "B" are plausible, since these could happen for certain controller malfunctions while in Auto. "C" is plausible, since if the controller was left in manual with net charging plus seal injection less than net letdown plus seal leakoff flow, Pzr level would decrease, expanding the bubble, lowering Pzr pressure.

Technical Reference(s): AOP 3580 (Rev 03-0), steps 7 d, g, h, and step 11
(Attach if not previously provided, Functional sheet 11 (Rev. H)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05342 Given a failure, partial or complete, of the Pressurizer Pressure and Level Control System, determine the effects on the system and on interrelated systems. (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 7 | Tier # | 1 | 1 |
| K/A Statement: Operate/monitor LPI pumps | Group # | 1 | 1 |
| On a loss of Residual Heat Removal | K/A # | APE.025.AA1.3 | |
| Proposed Question: | Importance Rating | 3.4 | 3.3 |

Initial conditions:

- The plant is in MODE 5.
- Both trains of RHR are operating in the "Cooldown" Mode.

The following sequence of events occurs:

1. Pzr level starts decreasing.
2. The crew enters EOP 3505, *Loss of Shutdown Cooling and/or RCS Inventory*.
3. Per EOP 3505, the US directs the RO to align RHR Train B for shutdown risk inventory control to restore Pzr level.
4. The RO places the "B" RHR Pump in Pull-To-Lock.

What actions are required to be taken by the RO with 3SIL*MV8812B, "RWST/PP B SUCT ISOL" and 3SIL*MV8809B, "PP B COLD LEG INJ" prior to restarting the "B" RHR Pump at MB2?

| | 3SIL*MV8812B | 3SIL*MV8809B |
|---|---|---|
| a) | Ensure open | Ensure open |
| b) | Ensure open | Open |
| c) | Open | Ensure open |
| d) | Open | Open |

Proposed Answer: C

Explanation (Optional): The crew will be realigning Train B RHR to inject water from the RWST into the RCS Cold Legs. The B RHR Cold Leg Injection Valve is already open in the Cooldown Mode, so opening the valve is not required. With an actual loss of inventory in progress, the crew will be directed to ensure the Cold Leg Injection Valve is open ("B" and "D" wrong). The suction path is initially aligned to take a suction on the RCS in the Cooldown Mode, so the RWST Suction Valve is required to be opened ("C" correct, "A" wrong). "A", "B", and "D" are plausible, since these valves may be open or closed, depending on the event in progress (Cooldown, Injection, Cold Leg Recirc).

Technical Reference(s): EOP 3505 (Rev 15-0), Entry Condition B.2.a, and step 5.RNO.e.2)
(Attach if not previously provided, OP 3310A (Rev 18-0), Steps 4.22.7.a and 4.22.8
including version/revision number) P&ID 112A (Rev. 50)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05451 Describe the function and location of the following Residual Heat Removal System components… RWST Suction Valves… RHR Pumps … RHR to RCS Cold Leg Injection Valves… (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.8 and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 8 | Tier # | 1 | 1 |
| K/A Statement: Knowledge of system purpose | Group # | 1 | 1 |
| or function during a loss of component cooling water | K/A # | APE.026.GEN.2.1.27 | |
| Proposed Question: | Importance Rating | 3.9 | 4.0 |

With the plant at 100% power and the "C" RPCCW Pump unavailable, the following sequence of events occurs:

1. The "B" RPCCW Pump trips.
2. The crew enters AOP 3561, *Loss of Reactor Plant Component Cooling Water.*
3. The crew progresses through AOP 3561 and cross-connects the RPCCW Containment Headers.

Which of the following groups of components is NOT currently being supplied by RPCCW?

a) Seal Return Heat Exchanger, Charging Pumps Cooling Surge Tank.
b) Excess Letdown Heat Exchanger, Charging Pumps Cooling Surge Tank.
c) Seal Return Heat Exchanger, Safety Injection Pumps Cooling Surge Tank.
d) Excess Letdown Heat Exchanger, Safety Injection Pumps Cooling Surge Tank.

Proposed Answer: A

Explanation (Optional): The Seal Return Heat Exchanger and the Charging Pumps Cooling Surge Tank are serviced by the "B" train of RPCCW Containment Header, but are outside of CTMT. Thus when the CTMT headers are cross-connected (which includes closing the "B" train CTMT Isolation Valves), these components will be affected ("A" correct). The Excess Letdown Heat Exchanger is a "B" train RPCCW load, but it is located inside CTMT and will have flow once CTMT headers are cross-connected ("B" and "D" wrong but plausible). The Safety Injection Pump Cooling Surge Tank is supplied by "A" Train RPCCW ("C" and "D" wrong, but plausible).

Technical Reference(s): AOP 3561 (Rev. 18-0), Attachment A, page 1
(Attach if not previously provided, P & ID 121A (Rev. 33)
including version/revision number) P & ID 121B (Rev. 21)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04155 (215500); Given the following failures, partial or complete, determine the effects on the RPCCW System, and on interrelated systems .... RPCCW leak .... High motor temperature (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.4 and 41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 9 | Tier # | 1 | 1 |
| K/A Statement: Interrelations between controllers/positioners | Group # | 1 | 1 |
| and a pressurizer pressure control malfunction | K/A # | APE.027.AK2.3 | |
| Proposed Question: | Importance Rating | 2.6 | 2.8 |

The plant is at 100% power, and the following initial conditions exist:

The Master Pressurizer Pressure Controller malfunctions and the **setpoint** step-changes from 2250 psia to 2175 psia, and components reposition.

After placing the Pressurizer Master Pressure Controller to MANUAL, what action will the RO take with the Master Pressurizer Pressure Controller in response to the failure?

a) Push on the INCREASE pushbutton, closing both spray valves and energizing backup heaters "A","B", "D", and "E".
b) Push on the DECREASE pushbutton, closing both spray valves and energizing backup heaters "A","B", "D", and "E".
c) Push on the INCREASE pushbutton, deenergizing backup heaters "A","B", "D", and "E", and opening both spray valves.
d) Push on the DECREASE pushbutton, deenergizing backup heaters "A","B", "D", and "E", and opening both spray valves.

Proposed Answer: A

Explanation (Optional): With the controller attempting to maintain 2175 psia, spray valves will have opened and heaters will have deenergized. Actual pressure will have started dropping, so the RO will need to close spray valves and energize heaters ("C" and "D" wrong). "C" and "D" are plausible since this would be the response if the controller had failed in the other direction. To raise pressure, the RO needs to go in the INCREASE direction ("A" correct, "B" and "D" wrong). "B" and "D" are plausible since this would be true of selecting INCREASE would OPEN on the spray valves.

Technical Reference(s): Functional Sheet 11 (Rev. H)
(Attach if not previously provided, Functional Sheet 12 (Rev. F )
including version/revision number) Process Sheet 26 (Rev. J)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05341 Describe the operation of the Pressurizer Pressure and Level Control System under Normal, Abnormal, and Emergency Operating conditions. (As available)

Question Source: Bank #78908

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 10 | Tier # | 1 | 1 |
| K/A Statement: Interrelations between | Group # | 1 | 1 |
| breakers/relays/disconnects and an ATWS | K/A # | EPE.029.EK2.6 | |
| Proposed Question: | Importance Rating | 2.9 | 3.1 |

With the plant initially at 100% power, the following sequence of events occurs:

1. A steam pipe breaks in Containment.
2. SI and MSI automatically actuate.
3. The reactor fails to trip and the crew enters EOP 35 FR-S.1, *Response to Nuclear Power Generation / ATWS.*
4. After progressing through the EOP network, the crew transitions to ES-1.1, *SI Termination.*
5. When the Reactor Operator resets SI, it immediately re-actuates.

What error by the crew could be the cause of the SI reset failure?

a) The crew has not waited for the initiating condition causing the SIS to clear.
b) The crew has not successfully tripped the Reactor Trip Breakers.
c) The crew has not waited for the timer in the Safety Injection Block/Reset logic to time out.
d) The crew has not lowered RCS pressure to less than the P-11 setpoint.

Proposed Answer: B

Explanation (Optional): When SIS actuates, there is a 60 second time delay that must time out before SIS can be reset. "B" is correct since one function of P-4 is to prevent automatic SI actuation after SI is reset. "A" is wrong, since SI can be reset with the actuating signal still present if P-4 is also present, and greater than 60 seconds has elapsed. It is not desired to restore the faulted SG pressure >660 psig prior to resetting SI. "A" is plausible, since the actuating signal is still present. "C" is wrong, since the procedure flowpath to get to ES-1.1 would be significantly longer than 60 seconds. "C" is plausible, since a time delay exists before reset is possible. "D" is wrong, since P-11 does not have to be energized to allow SI reset. "D" is plausible, since P-11 provides the ability to block the Low Pressurizer Pressure SI at pressures below 1950 psig.

Technical Reference(s): Functional Sheet 8 (Rev. K)
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05497 Describe the operation of the RPS under the following normal, abnormal, and emergency conditions... Emergency Safeguards Actuation Signal Initiation... Instrumentation Failure... (As available)

Question Source: Bank #72376

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.10

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 11 | Tier # | 1 | 1 |
| K/A Statement: Operational implications of | Group # | 1 | 1 |
| leak rate versus pressure drop on a SGTR | K/A # | EPE.038.EK1.2 | |
| Proposed Question: | Importance Rating | 3.2 | 3.5 |

A SG Tube Rupture is in progress, and the following sequence of events occurs:

1. The crew enters E-3, *Steam Generator Tube Rupture*.
2. The crew reaches E-3, step 16 "Depressurize RCS To Minimize Break Flow And Refill PZR."
3. The crew commences depressurizing the RCS using maximum normal Pzr spray.
4. RCS depressurization termination criterion of RCS pressure dropping less than ruptured SG pressure is reached.
5. The crew closes the normal Pzr spray valves.
6. Immediately after the PZR Spray Valves are closed, the US directs the RO to monitor Pzr pressure and level.

Assuming no other pipe breaks or equipment malfunctions exist, complete the following statement.

Pzr pressure and level will_______________.

a) increase, since Safety Injection flow has not yet been terminated
b) increase, since the RCS is heating up
c) decrease, since primary to secondary leakage will reinitiate
d) decrease, since operators are cooling down the RCS at maximum rate

Proposed Answer: A

Explanation (Optional): "A" is correct, and "C" wrong, since the depressurization step lowers RCS pressure, decreasing break flow and increasing injection flow. The goal of the depressurization is to drop RCS pressure less than ruptured SG pressure. Unlike a LOCA, which will continue until the RCS is completely depressurized, RCS leak rate will decrease and then stop when RCS is less than ruptured SG pressure. Reverse flow from the ruptured SG into the RCS will commence. This is a temporary stop in primary to secondary leakage, since SI is still injecting, and with mass of the RCS increasing, the RCS will repressurize and break flow out the RCS into the SG will recommence. "C" is plausible, since primary to secondary leakage will reinitiate as RCS pressure increases. "B" is wrong, since, after previously completing the RCS cooldown, the operators were directed to maintain Core Exit TCs less than the required temperature. "B" is plausible, since if the operators were not directed to prevent a heatup, decay heat would cause RCS temperature to increase. "D" is wrong, since E-3 directs the operators to conduct the cooldown and depressurization steps sequentially, rather than concurrently. "D" is plausible, since a rapid RCS cooldown has just been conducted.

Technical Reference(s): E-3 (Rev. 25-0), steps 6.f, 13.c, 16, 18, and 19.
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination:

Learning Objective: MC-04919 Describe the major parameter changes associated with SGTRS. (As available)

Question Source: Bank #85230

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.3, 41.5, and 41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 12 | Tier # | 1 | 1 |
| K/A Statement: Reasons for actions in EOPs | Group # | 1 | 1 |
| for a loss of Main Feedwater | K/A # | APE.054.AK3.4 | |
| Proposed Question: | Importance Rating | 4.4 | 4.6 |

With the plant operating at 100% power, the Reactor trips due to a loss of both Turbine Driven Main Feedwater Pumps (TDMFPs), resulting in the following sequence of events:

1. Safety Injection actuates.
2. The crew transitions from E-0 to FR-H.1, *Response to Loss of Secondary Heat Sink.*
3. The crew commences efforts to establish Main Feed flow from the Motor Driven Main Feedwater Pump (MDMFP).
4. The crew resets Safety Injection.
5. The crew removes the Universal Logic (A213) Cards from 3RPS*RACLOGA and B.
6. The crew resets FWI at MB2 and MB5, and opens the FW Isolation Trip Valves.

Complete the following statement concerning why FR-H.1 directed the crew to remove the universal logic cards as part of the efforts to restore Main Feedwater flow.

Removing the Universal Logic Cards removes a FWI seal-in feature generated from a_______.

a) P-14 plus P-4 signal, which prevents resetting FWI, even after P-14 has cleared.
b) Safety Injection plus P-4 signal, which prevents resetting FWI, even after SIS has been reset.
c) P-4 plus Low Tave signal, which prevents opening the Feed Isolation Trip Valves, unless P-4 has been reset.
d) P-4 plus Low Tave signal, which prevents opening the Feed Regulating and Feed Bypass Valves, unless P-4 has been reset.

Proposed Answer: B

Explanation (Optional): SIS, P-14 ("A" plausible), or P-4 with Lo Tave ("C" and "D" plausible) generate a FWI signal. The SIS signal combines with the P-4 signal ("B" plausible) to lock in the FWI. SIS must be reset ("B" and "D" wrong) in order to reset the FWI, and either P-4 must be reset, or the universal logic cards must be pulled to clear the lock-in feature of the FWI ("B" correct). "A" is wrong, since on a loss of feed, P-14 will not actuate. "C" and "D" are wrong, since P-4 plus Lo Tave can be reset with the MB Pushbuttons, even with the P-4 plus Lo Tave condition still present. "C" and "D" are also plausible, since one train of FWI affects the FWIVs, and the other train affects the FRVs and Bypass Valves.

Technical Reference(s): FR-H.1 (Rev. 26-0), step 6.b.RNO
(Attach if not previously provided, Functional Sheet 13 (Rev. K)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04535 Discuss the basis of major procedure steps and/or sequence of steps in EOP 35 FR-H.1… (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7 and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 13 | Tier # | 1 | 1 |
| K/A Statement: Determine/interpret AFW | Group # | 1 | 1 |
| flow indicator on a loss of offsite power | K/A # | APE.056.AA2.20 | |
| Proposed Question: | Importance Rating | 3.9 | 4.1 |

With the plant initially at 100% power, the following sequence of events occurs:

1. The reactor trips due to a loss of offsite power.
2. The crew enters ES-0.1, *Reactor Trip Response*.
3. The US directs the BOP to maintain total feed flow between 530 and 600 gpm until narrow range level is greater than 8% in at least one SG.

Prior to the BOP taking action, what is the AFW flowrate to each SG the BOP expects to see, and what are the BOP's restrictions on throttling AFW flow?

a) 300 gpm to each of the 4 SGs. With the TD AFW Pump feeding the SGs, full travel stroking of any AFW Flow Control Valve should occur one at a time, at a rate greater than 15 seconds over full travel.
b) 400 gpm to each of the 4 SGs. With the TD AFW Pump feeding the SGs, full travel stroking of any AFW Flow Control Valve should occur one at a time, at a rate greater than 15 seconds over full travel.
c) 300 gpm to each of the 4 SGs. With the TD AFW Pump feeding the SGs, full travel stroking of any AFW Flow Control Valve should occur one at a time, at a rate greater than 5 seconds over full travel.
d) 400 gpm to each of the 4 SGs. With the TD AFW Pump feeding the SGs, full travel stroking of any AFW Flow Control Valve should occur one at a time, at a rate greater than 5 seconds over full travel.

Proposed Answer: A

Explanation (Optional): The Cavitating Venturis limit AFW flow to about 300 gpm per SG. OP 3272, *EOP/AOP User's Guide,* states that "With the TDAFW Pump feeding forward and when throttling TDAFW or MDAFW Flow Control Valves either OPEN or CLOSED, the valves should be throttled one at a time, at a rate that is greater than 15 seconds over the full travel." This is due to the low margin between the operating pressure of the TDAFW pump and the discharge relief valve setpoint. Therefore, "A" is correct. "B" and "D" are plausible, since 400 gpm per SG is the approximate design flow of the TDAFW pump plus one MDAFW pump.

Technical Reference(s): ES-0.1 (Rev. 029-0), step 1
(Attach if not previously provided, OP 3272 (Rev. 09-0) Attachment 3, page 39
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04454 (215730); State the conditions which would allow… throttling of or isolation of auxiliary feed water flow to a steam generator… prior to being directed to perform the action by a specific step within the EOP network. (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43.5 / 45.13

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 14 | Tier # | 1 | 1 |
| K/A Statement: Ability to determine operability/availability of safety related equipment on a loss of vital AC instrument bus | Group # | 1 | 1 |
| | K/A # | APE.057.GEN.2.2.37 | |
| | Importance Rating | 3.6 | 4.6 |

Proposed Question:

The plant is initially at 100% power.

Inverter 3 malfunctions, causing Inverter 3 output voltage to drop to zero volts.

Complete the following statement about the status of VIAC 3 prior to operator action.

VIAC-3 is energized from ___(1)___, and a Tech Spec LCO ACTION ___(2)___ required to be entered.

| | (1) | (2) |
|---|---|---|
| a) | DC Bus 3 | IS |
| b) | DC Bus 3 | IS NOT |
| c) | The Alternate AC Source | IS |
| d) | The Alternate AC Source | IS NOT |

Proposed Answer: C

Explanation (Optional): VIAC-3 is normally supplied by Inverter 3. If the normal 480 VAC input to Inverter 3 fails, DC Bus 3 maintains Inverter 3 output to VIAC 3 ("A" and "B" wrong, but plausible). If the output of inverter 3 fails, the static switch will automatically transfer VIAC 3 power to the alternate 480 VAC source. "C" is correct, and "D" wrong, since per LCO 3.8.3.1, VIAC 3 is required to be connected to its DC Source, and this isn't the case when on the alternate source. "D" is plausible, since VIAC 3 is still energized, and there is a separate LCO 3.8.2.1 for the DC Bus

Technical Reference(s): (Attach if not previously provided, including version/revision number)
OP 3345B (Rev. 12-0), Section 1.2
Tech Spec LCO 3.8.3.1.e (Amendment 220)
EE-1BA (Rev. 31)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03301 Given the following failures of the 120 VAC Distribution System or a portion of the system, determine the effects on the system and on interrelated systems… Inverter Failure Effect on VIAC… (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 41.7, 41.8, and 43.2

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 15 | Tier # | 1 | 1 |
| K/A Statement: Reasons for conditions that initiate automatic opening/closing of SWS isolation valves to coolers | Group # | 1 | 1 |
| | K/A # | APE.062.AK3.1 | |
| Proposed Question: | Importance Rating | 3.2 | 3.5 |

With the plant initially at 100% power, the following sequence of events occurs:

1. An inadvertent CDA occurs.
2. The crew enters E-0, *Reactor Trip or Safety Injection*.
3. While walking down the boards, the RO observes that Service Water has automatically isolated to the RPCCW Heat Exchangers, since the Service Water Supply Valves to RPCCW (3SWP*MOV50A and B) automatically closed.

Why are 3SWP*MOV50A and B designed to automatically close on the CDA Signal?

a) Allow adequate pressure to refill the Control Building Chiller Service Water Booster Pump suction piping.
b) Allows adequate pressure to refill the MCC/Rod Control Area Service Water Booster Pump suction piping.
c) Prevent robbing flow from the EDG Service Water Coolers in the event of an LOP.
d) Prevent excessive flow conditions in the Service Water System while supplying RSS.

Proposed Answer: D

Explanation (Optional): "D" is correct, and "A", "B", and "C" wrong, since the flow required to supply both the RSS System and the RPCCW system is beyond the capacity of a Service Water Pump. Service Water Pumps should not be operated above 15,000 gpm, and total flow to RPCCW Heat Exchangers is 14,776 gpm (7388 gpm per train), and flow to a train of RSS Heat Exchangers is 21,600 gpm (10,800 gpm per train. So with both the RPCCW Heat Exchangers and the RSS Heat Exchangers being supplied by a train on SWP, flow from that train would be 18,188 gpm, which exceeds the maximum flow for a SWP Pump. "A" and "B" are plausible, since both the Control Building Chiller Booster Pumps and the MCC/Rod Control Booster Pumps are at a high elevation, and Booster Pump priming is accomplished by the time delay associated with the automatic opening of Service Water to RSS Heat Exchangers C and D (3SWP*MOV 54C and D). "C" is plausible, since the EDG cooling water valves automatically open on a CDA, to provide cooling to the EDGs, which automatically started.

Technical Reference(s): (Attach if not previously provided, including version/revision number)
OP 3326 (Rev. 31-0), Precaution 3.7
FSAR Table 9.2-1 (Rev. 30)
P &ID 133A (Rev. 44-0)
P &ID 133B (Rev. 89-0)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05714 Describe the operation of the following Service Water System components controls and interlocks… RPCCW Heat Exchanger Isolation Valves (SWP*MOV50A/B)… (As available)

Question Source: Bank #85235

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7 and 41.8

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 16 | Tier # | 1 | 1 |
| K/A Statement: Operate/monitor the emergency | Group # | 1 | 1 |
| air compressor on a loss if instrument air | K/A # | APE.065.AA1.4 | |
| Proposed Question: | Importance Rating | 3.5 | 3.4 |

With the plant initially at 100% power, the following sequence of events occurs:

1. The RO reports that Instrument Air (IAS) header is at 90 psig and slowly decreasing.
2. The crew enters AOP 3562, *Loss of Instrument Air.*
3. A PEO is dispatched to place the Diesel Instrument Air Compressor in service.
4. 30 seconds after placing the Diesel Instrument Air Compressor control switch on 3IAS-PNL3 to MANUAL, the PEO notices that pressure in the Diesel Instrument Air Receiver (3IAS-TK1C) is not increasing.

What action is required to be taken by the PEO?

a) Place the control switch on 3IAS-PNL3 to AUTO. This will allow the compressor to start.
b) Perform an emergency shutdown of the Diesel Instrument Air Compressor.
c) Continue to monitor Diesel Instrument Air Compressor operation.
d) Check the valve lineup between the compressor and receiver and search for air leaks.

Proposed Answer: C

Explanation (Optional):
The PEO is dispatched with air pressure at 90 psig, which is well above the auto-start setpoint of 75 psig. The Diesel Instrument Air System manual start sequence from 3IAS-PNL3, has time delays which control and start the associated compressor and dryer. When the control switch is placed to "MANUAL," a three minute time delay will start and ensures that the Diesel Generator has time to start, power the compressor and dryer PLCs, and <u>then</u> initiate a start signal to the compressor ("C" correct, "A", "B", and "D" wrong). "A", "B", and "D" are plausible, since pressure is not increasing.

Technical Reference(s): AOP 3562 (Rev. 16-0), step 2. RNO.b.1
AOP 3562 (Rev. 16-0), Attachment B
AOP 3562 background doc (Rev. 16-0) for Attachment B, Note prior to step B.1

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05319 (216547): Describe the function and location of the following Plant Air System components… Diesel Instrument Air Compressor Subsystem. (As available)

Question Source: New
Question History:
Question Cognitive Level: Memory or Fundamental Knowledge
10 CFR Part 55 Content: 55.41.7
Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 17 | Tier # | 1 | 1 |
| K/A Statement: Interrelations between heat removal systems, proper operations of those systems, and a loss of secondary heat sink | Group # | 1 | 1 |
| | K/A # | WE05.EK2.2 | |
| | Importance Rating | 3.9 | 4.2 |

Proposed Question:

The crew has entered FR-H.1, *Response to Loss of Secondary Heat Sink*, and current conditions are as follows:

- The crew has NOT yet been required to initiate Bleed and Feed cooling of the RCS.
- The crew is preparing to depressurize Steam Generators to attempt to establish feed flow from the Condensate System.

In accordance with FR-H.1, what is the minimum number of Steam Generators the crew is required to depressurize, and to what minimum pressure are they required to be depressurized to?

| | Minimum number of SGs | Minimum SG pressure |
|---|---|---|
| a) | 1 or 2 | 400 psig |
| b) | 1 or 2 | 800 psig |
| c) | 3 or 4 | 400 psig |
| d) | 3 or 4 | 800 psig |

Proposed Answer: A

Explanation (Optional): To establish Condensate Pump flow to the Steam Generators, the crew is directed to depressurize SGs to a pressure that will allow condensate flow to the Steam Generators. The crew is allowed to depressurize one or two SGs, rather than all four, since this reduces the likelihood of reaching Bleed and Feed criteria (three of four SGs less than 21% WR level). This is allowed since steaming SGs to lower their pressure also lowers their WR level ("C" and "D" wrong). "C" and "D" are plausible, since depressurizing all four SGs would cool the RCS, and provide a greater chance of success if bleed and feed were not a concern. The minimum SG target pressure is 400 psig ("A" correct, "B" wrong), since this pressure ensures a Condensate Pump can provide adequate flow for RCS removal, and also have adequate recirculation flow for pump cooling. "B" is plausible, since this is well below normal SG pressure of 1092 psig after a trip.

Technical Reference(s): FR-H.1 (Rev 26-0), step 9.b and f RNO
(Attach if not previously provided, FR-H.1 Millstone EOP Bkgd Document (Rev 26-0), step 9
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04534 Describe major action categories within EOP 35 FR-H.1 (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.4 and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 18 | Tier # | 1 | 1 |
| K/A Statement: Local Auxiliary Operator tasks during | Group # | 1 | 1 |
| a steam line rupture, and resultant operational effects | K/A # | WE12.GEN.2.4.3 | |
| Proposed Question: | Importance Rating | 3.8 | 4.0 |

With the plant initially at 100% power, the following sequence of events occurs:

1. Safety Injection actuates.
2. The BOP Operator reports that the Turbine Driven AFW Pump is the only AFW pump that is running.
3. The BOP Operator reports both Motor Driven AFW Pumps will NOT start.
4. The BOP Operator reports all four Steam Generators are faulted.
5. The crew enters ECA-2.1, *Uncontrolled Depressurization of All Steam Generators*.
6. The US provides a PEO with ECA-2.1, Attachment B, "Guidance for the Local Isolation of a Faulted SG", without specifying which valves on the Attachment to close.
7. The PEO is dispatched to attempt to locally isolate all four Steam Generators.

Assuming the PEO closes all of the valves on Attachment B, what effect, if any, will this have on the running TDAFW Pump?

a) There will be no effect on the TDAFW Pump, since Attachment B focuses on isolating the major paths from the SGs.
b) AFW flow to all four SGs will stop, since the TDAFW Pump Discharge paths will be isolated only.
c) The TDAFW Pump will stop, since the TDAFW turbine steam supply paths will be isolated only.
d) The TDAFW Pump discharge paths and the TDAFW Pump turbine steam supply paths will all be isolated.

Proposed Answer: D

Explanation (Optional): Attachment B isolates the major paths from the SGs, such as the main steamline and main feedline ("A" plausible), and also isolates smaller paths, down to the Chemical feed lines. It isolates the AFW Pump discharge paths ("A" and "C" wrong, "B" plausible), and the TDAFW Pump turbine steam supply valves ("D" correct, "B" wrong, "C" plausible). The crew is required to brief the PEO to ensure only the desired valves will be closed based on the event in progress.

Technical Reference(s): ECA-2.1 (Rev 19-0), Attachment B
(Attach if not previously provided, P&ID 130B (Rev. 49)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04367 Discuss the basis of major procedure steps and/or sequence of steps in EOP 35 E-2. (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 41.8 and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 19 | Tier # | 1 | 1 |
| K/A Statement: Operate/monitor facility behavior | Group # | 2 | 2 |
| characteristics during an instrument failure | K/A # (Site Priority) | AOP 3571.AA1.2 | |
| Proposed Question: | Importance Rating | 3.3 | 3.6 |

The plant is in MODE 4, and initial conditions are as follows:

- COPPS is armed.
- Both PORVs are in AUTO.

The following sequence of events occurs:

1. RCS Loop 1 Wide Range Thot fails low.
2. The crew enters AOP 3571, *Instrument Failure Response*.
3. The RO is directed to monitor the main boards, and is currently monitoring the Pzr PORVs.

How has this failure affected the PORVs?

a) The train "A" PORV will not open if an actual over pressure condition exists.
b) The train "B" PORV will not open if an actual over pressure condition exists.
c) The train "A" PORV AUTO-OPEN setpoint decreased to a lower pressure.
d) The train "B" PORV AUTO-OPEN setpoint decreased to a lower pressure.

Proposed Answer: C

Explanation (Optional): WR Thot inputs to PORV "A", and WR Tcold inputs to PORV"B" ("B" and "D" wrong, but plausible). The input is auctioneered LOW. If the temperature input fails low, the calculated pressure setpoint will be lower ("C" correct, "A" wrong), since at colder temperatures, the vessel is more susceptible to an overpressure event. "A" is plausible, since temperature failing high would raise the PORV open setpoint.

Technical Reference(s): OP 3208 (Rev. 27-0), Attachment 1
(Attach if not previously provided, Tech Spec Figures 3.4-4.A and B (Amendment 197)
including version/revision number) Functional Sheet 18 (Rev. D)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05447 Given a failure, partial or complete, of the Reactor Coolant System, DETERMINE the effects on the system and on interrelated systems. (As available)

Question Source: Bank #68333

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 20 | Tier # | 1 | 1 |
| K/A Statement: Reasons for guidance contained | Group # | 2 | 2 |
| in the EOP for a fuel handling incident | K/A # | APE.036.AK3.3 | |
| | Importance Rating | 3.7 | 4.1 |

A fuel handling accident occurs in the Fuel Building, resulting in the following sequence of events:

1. The crew enters EOP 3502, *Fuel Handling Accident*.
2. Per EOP 3502, step 11, the crew is verifying that a Fuel Building Filter Unit (3HVR*FN10A or B) is running.

Why does EOP 3502 direct the crew to make this check?

a) Remove at least 99% of the iodine gap activity released from the ruptured fuel assembly.
b) Limit the maximum gamma dose rate in the fuel building to 2.5 mrem per hour.
c) Prevent the high levels of radioactivity from entering the Control Room.
d) Minimize the potential radioactive release to the environment.

Proposed Answer: D

Explanation (Optional): "D" is correct, since the Fuel Building Filters contain charcoal which will remove iodine from the fuel building air prior to exhausting it to the environment. "A" is wrong, but plausible, since this is the reason 23 feet of water is maintained over the fuel in the spent fuel pool. "B" is wrong, but plausible, since this is the reason at least 10.5 feet of water is maintained over spent fuel that is being moved. "C" is wrong, but plausible, since this is the reason operators will actuate CBI per EOP 3502.

| | |
|---|---|
| Technical Reference(s): | EOP 3502 (Rev. 09-0), step 11 |
| (Attach if not previously provided, | EOP 3502 Basis Doc (Rev. 09-0), step 11 |
| including version/revision number) | FSAR Section 9.4.3 (Rev. 30) |

Proposed references to be provided to applicants during examination: None

| | | |
|---|---|---|
| Learning Objective: | MC-06415 Discuss the bases of major procedure steps and/or sequence of steps in EOP 3502, Fuel Handling Accident | (As available) |

Question Source: Bank #85241

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.5 and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 21 | Tier # | 1 | 1 |
| K/A Statement: Evaluate plant performance and make operational judgments during an accidental liquid radwaste release | Group # | 2 | 2 |
| | K/A # | APE.059.GEN.2.1.7 | |
| | Importance Rating | 4.4 | 4.7 |

Proposed Question:

A RADIATION HI annunciator is received on MB2.

A PEO reports the Turbine Plant Component Cooling Water (TPCCW) Sump level has started increasing.

Radiation detected from which location could be causing this abnormal level increase in the TPCCW sump?

a) Turbine Building Floor Drain Sump
b) SG Blowdown Tank
c) Waste Neutralization Sump
d) Liquid Waste (LWS) Discharge Piping

Proposed Answer: A

Explanation (Optional): "A" is correct, and "B", "C", and "D" wrong, since only the Turbine Building Floor Drains Sump Radiation Monitor RE50 diverts flow to the TPCCW sump upon detection of Hi Radiation levels. "B" is plausible, since the Blowdown Tank is a potential liquid release source in the event of a SG Tube Leak, and the blowdown line has an associated radiation monitor. "C" is plausible, since Radiation Monitor 3CND-07 diverts to the Condensate Demin Waste Neutralizing Sump on high radiation. “D” is plausible, since the TPCCW sump is normally aligned to the Liquid Waste System.

Technical Reference(s): AOP 3573 (Rev. 23-0), Att. A, pages 1, 3, 4, and 11 of 12
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05293Describe the operation of the following Radiation Monitors controls and interlocks.. DAS-RE50… (As available)

Question Source: Bank #67219

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5, 41.7, and 41.11

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 22 | Tier # | 1 | 1 |
| K/A Statement: Operate/monitor facility | Group # | 2 | 2 |
| behavior characteristics during a turbine trip | K/A # (Site Priority) | AOP 3550.AA1.2 | |
| Proposed Question: | Importance Rating | 3,3 | 3.6 |

With the plant initially at 40% power, the following sequence of events occurs:

1. The Main Turbine trips.
2. The crew enters AOP 3550, *Turbine/Generator Trip*.
3. At 30% power, the RO places Rod Control in Manual.

Assuming the reactor does not trip, complete the following statements.

When the turbine initially tripped, the Condenser Steam Dump Valves automatically___(1)____.
After rods were placed in manual, Condenser Steam Dump Valves___(2)____.

| | (1) | (2) |
|---|---|---|
| a) | open, and remain 100% open | start throttling down to 30% demand |
| b) | open, and remain 100% open | start throttling down to 75% demand |
| c) | open, then start throttling closed | stabilize at about 30% demand |
| d) | open, then start throttling closed | stabilize at about 75% demand |

Proposed Answer: D

Explanation (Optional): On a turbine trip, a C-7 signal (Load Reject) is generated after a 10% step decrease in turbine load (this has occurred). This arms and opens condenser steam dump valves. Maximum steam dump capacity is 40% reactor power, so they initially go fully open on the 40% load reject. Tave starts increasing on the turbine trip (heat in from the reactor greater than heat out). This causes rod control to start automatically start driving in. The steam dumps have a 2°F deadband, and rods have a 1.5°F deadband. If both systems are left in auto, rods will continue to step in to lower temperature to within 1.5°F of program, closing the steam dumps and reducing power to below the point where Main Feedwater Control Valves can control SG levels ("A" and "B" wrong). Rods are placed in manual to stabilize reactor power, then lower power in a controlled fashion. "A" and "B" are plausible, since with a constant steam demand (such as at 100% power) inserting rods affects Tave, with a minimal effect on reactor power. Since rods inserting lowers Tave, which throttles steam dump valves closed, AOP 3550 directs the crew to place rods in manual as soon as steam dump demand is less than 100%. In this case, steam dump demand at 30% reactor power would be about 75%, since its full capacity is 40% power ("D" correct, "C" wrong). "C" is plausible, since reactor power is 30%, and SG Safety Valves are able to respond to a 100% load reject.

| | |
|---|---|
| Technical Reference(s): | AOP 3550 (Rev 10-0), step 2.c and 2.d |
| (Attach if not previously provided, | AOP 3550 Basis Doc (Rev 10-0), step 2 |
| including version/revision number) | Functional Sheets 9 (Rev. H) and 10 (Rev. J) |
| | SDS041C (Rev. 5), Section 3 |

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03897 Discuss the basis of major procedure steps and/or sequence of steps in AOP 3550 (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.1, 41.5, 41.6, 41.7, and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 23 | Tier # | 1 | 1 |
| K/A Statement: Interrelations between components and | Group # | 2 | 2 |
| functions of control and safety systems, including instru- | K/A # | WE01 & 02.EK2.1 | |
| mentation, interlocks, failure modes during SI termination | Importance Rating | 3.4 | 3.9 |

Proposed Question:

With the plant initially at 100% power, the following sequence of events occurs:

1. An inadvertent SIS signal (Train A) is received.
2. Train "B" SIS, which is functioning normally, does NOT actuate.
3. The crew fails to recognize that only the "A" Train of SIS has actuated, and does NOT actuate train "B" SIS..
4. The crew transitions to ES-1.1, *SI Termination*.
5. The RO resets SIS.

At this point, a LOCA occurs, and Containment pressure increases to 19 psia.

Assuming both Trains of SSPS are functioning properly, how will SSPS respond?

a) Neither train of SIS will actuate.
b) The "A" Train of SIS will actuate, but "B" Train will NOT actuate.
c) The "A" Train of SIS will NOT actuate, but "B" Train will actuate.
d) Both trains of SIS will actuate.

Proposed Answer: C

Explanation (Optional): This question includes a lesson learned from the Salem eelgrass event."C" is correct, since "A" Train SIS will not actuate, since the P-4 will block AUTO-SIS after it has been reset ("D" wrong); and "B" Train will actuate, since it hasn't yet actuated, so it hasn't been reset ("A" and "B" wrong). "A" is plausible, since P-4 has actuated, and this would be true if both trains had originally actuated. "B" is plausible, since the two trains are not in the same alignment. "D" is plausible, since this is a misapplication of the effect of SIS Block (versus Reset) switches. HI-1 CTMT pressure SIS is the one input to SIS that is not blocked when operators block SIS when P-11 clears on a controlled RCS cooldown and depressurization.

Technical Reference(s): Functional Sheet 6 (Rev. J)
(Attach if not previously provided, Functional Sheet 7 (Rev. M)
including version/revision number) Functional Sheet 8 (Rev. K)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05493Describe the operation of the following RPS controls and interlocks… P-4… (As available)

Question Source: Bank #80925

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 24 | Tier # | 1 | 1 |
| K/A Statement: Determine/interpret adherence | Group # | 2 | 2 |
| to Post LOCA Cooldown procedures | K/A # | WE03.EA2.2 | |
| Proposed Question: | Importance Rating | 3.5 | 4.1 |

The crew is performing actions in ES-1.2, *Post LOCA Cooldown and Depressurization*, and initial conditions are as follows:

- Both RHR pumps have just been stopped.
- RCS pressure: 600 psia and stable.
- PZR Level: Empty.
- CTMT Pressure: 20 psia
- CTMT Temperature: 175°F
- CTMT Rad levels: $10^4$ R/hr

The LOCA increases in size, and the following sequence of events occurs:

| Time | Event |
|---|---|
| 0900: | RCS Pressure drops to less than 500 psia. |
| 0908: | CTMT Temperature increases above 180°F. |
| 0916: | CTMT Radiation increases above $10^5$ R/hr. |
| 0924: | RCS Pressure drops to less than 300 psia. |

When was the crew first required to restart the RHR Pumps?

a) When RCS pressure dropped below 500 psia
b) When CTMT temperature increased above 180°F.
c) When CTMT radiation increased above $10^5$ R/hr.
d) When RCS pressure dropped below 300 psia.

Proposed Answer: B

Explanation (Optional): To provide adequate ECCS flow, RCS pressure should be monitored to ensure that the RHR pumps are manually restarted if pressure decreases to LESS THAN 300 psia ("D" plausible). "D" is wrong, since Adverse Containment conditions came in prior to dropping below 300 psia). RHR Pumps are also required to be restarted if RCS pressure drops below 500 psia ("A" plausible) if ADVERSE CONTAINMENT conditions exist. "A" is wrong, since when pressure initially dropped below 500 psia Adverse Ctmt conditions did not exist. "B" is correct, and "C" wrong, but plausible, since both numbers indicate Adverse Ctmt conditions (>180°F, or $10^5$ R/hr), causing the pressure setpoint to increase to 500 psia, but the CTMT temperature condition came in first.

Technical Reference(s): E-0 (Rev. 32-0), Note prior to step 1
(Attach if not previously provided, ES-1.2 (Rev. 20-0), step 5, including Caution prior to step 5
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-07424 Given a set of plant conditions, properly apply the notes, cautions, and foldout page items of ES-1.2. (As available)

Question Source: Bank #63963

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 25 | Tier # | 1 | 1 |
| K/A Statement: Reasons for procedures | Group # | 2 | 2 |
| associated with Steam Generator Overpressure | K/A # | WE13.EK3.2 | |
| Proposed Question: | Importance Rating | 2.9 | 3.3 |

A turbine runback occurs, resulting in the following sequence of events:

1. The reactor automatically trips.
2. The crew enters FR-H.2, *Response to Steam Generator Overpressure*.
3. FR-H.2 directs the crew to check RCS hot leg WR temperature ≥ 530°F.
4. Based on RCS hot leg WR temperature being ≥ 530°F, FR-H.2 directs the crew to conduct a cooldown by dumping steam from the unaffected SGs.

Why does FR-H.2 direct the crew to cool down the RCS from the unaffected SGs?

a) To reduce affected SG pressure, since excessive heat transfer from the primary may be the cause of the overpressure condition.
b) To reduce thermal stresses on the U-tubes of the affected SG, since excessive pressure stress already exists on the tubes.
c) To prevent a rapid depressurization of the RCS, since the affected SG may not be at saturation conditions.
d) To prevent a radiation release, since the cause of the overpressure condition may be a SG Tube Rupture.

Proposed Answer: A

Explanation (Optional): "A" is correct, and "B", "C", and "D" wrong, since excessive heat transfer from the primary to the SG may be the cause of the affected SG overpressurization. Therefore, a check on RCS hot leg temperatures is made. If RCS hot leg temperatures are greater than or equal to 530°F (Which is the saturation temperature of the lowest SG Safety Valve setpoint, including allowances for channel accuracy), a cooldown is initiated by dumping steam from the unaffected SG(s) to aid in reducing the temperature and pressure in the affected SG(s). "B" is plausible, since an overpressure condition exists. "C" is plausible, since this is a basis related to high pressurizer level in FR-I.2, Response to High Pressurizer Level, and the SG may have a high pressure due to overfilling (but this would have led to an earlier transition to FR-H.3, Response to Steam Generator High Level). "D" is plausible, since this is a basis for cooling down the RCS if tube leakage is excessive.

Technical Reference(s): FR-H.2 (Rev. 09-0), step 7
(Attach if not previously provided, WOG Bkgd Doc (Rev. 3) for FR-H.2, step 7
including version/revision number)

Proposed references to be provided to applicants during examination: Steam Tables

Learning Objective: MC-05976 Discuss the basis of major procedure steps and/or sequence of steps in EOP FR-H.2. (As available)

Question Source: Bank #86740

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 26 | Tier # | 1 | 1 |
| K/A Statement: Operational implications of components, capacity, and function of emergency systems during a loss of Containment Integrity | Group # | 2 | 2 |
| | K/A # | WE14.EK1.1 | |
| | Importance Rating | 3.3 | 3.6 |

Proposed Question:

An earthquake occurs, resulting in the following sequence of events:

1. Safety Injection actuates due to four faulted SGs inside Containment.
2. The BOP operator throttles total AFW flow to 550 gpm.
3. All SG NR levels are offscale low.
4. All RCS hot leg temperatures have stabilized as the faulted SGs have depressurized.
5. The crew enters FR-Z.1, *Response to High Containment Pressure.*

The crew is currently checking if Auxiliary Feedwater Flow should continue to all SGs.

Per the Cautions in FR-Z.1, is the crew allowed to reduce AFW flow? If so, to what minimum value, and why?

a) Yes. The crew is allowed to stop AFW flow to all Steam Generators to minimize the mass/energy release to CTMT.
b) Yes. The crew is allowed to reduce AFW flow down to a minimum of 100 gpm to each SG to minimize the mass/energy release to CTMT.
c) Yes. The crew is allowed to reduce AFW flow down to a minimum total of 530 gpm to ensure minimum heat sink requirements are met.
d) No. The crew is required to increase current AFW flow rates to stabilize RCS temperature.

Proposed Answer: B

Explanation (Optional): The caution prior to step 10 states "If all SGs are faulted, at least 100 gpm feed flow should be maintained to each SG ("B" correct, "A", "C", and "D" wrong)." "A" is plausible since, per step 10 operators are required to isolate AFW flow to a faulted SG (but not with all four SGs being faulted). Per the caution, and the basis document, AFW is required to be throttled to 100 gpm to minimize the energy input to CTMT. "C" is plausible, since in other places in the EOP network, AFW flow is controlled to maintain hot leg temperature, and the cooldown has stopped. "D" is plausible, since normally in the EOPS, AFW flow is maintained at greater than 530 gpm due to heat sink concerns.

Technical Reference(s): FR-Z.1 (Rev. 17-0), step 10, and Cautions prior to step 10
(Attach if not previously provided, WOG Bkgd Doc for FR-Z.1 (Rev. 3), step 6, and Caution
including version/revision number)

Proposed references to be provided to applicants during examination:

Learning Objective: MC-07464 Given a set of plant conditions, properly apply the notes and cautions of FR-Z.1. (As available)

Question Source: Bank #86739

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.10

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 27 | Tier # | 1 | 1 |
| K/A Statement: Determine/interpret adherence | Group # | 2 | 2 |
| to High Containment Radiation procedures | K/A # | WE16.EA2.2 | |
| Proposed Question: | Importance Rating | 3.0 | 3.3 |

The reactor has tripped, and the crew has just entered FR-Z.3, *Response to High Containment Radiation Level.*

Which system in addition to the Containment Air Filtration (CAF) System will FR-Z.3 direct the crew to consider using, with ADTS concurrence?

a) Containment Purge System.
b) Containment Vacuum System.
c) Containment Air Recirculation System.
d) Containment Spray System.

Proposed Answer: D

Explanation (Optional): FR Z.3 directs the crew to consider the use of CAF and CTMT spray pumps by discussing these options with the ADTS ("D" correct, "A", "B", and "C" wrong). "A", "B", and "C" are plausible, since each of these are CTMT ventilation systems, and two of these systems may be used to reduce Containment Hydrogen concentration during an accident, with one requiring an abnormal lineup to perform this function.

Technical Reference(s): FR-Z.3 (Rev. 05-0), step 1
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05972 Describe the major action categories within EOP 35 FR-Z.3. (As available)

Question Source: Bank #75470

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 41.8 and 41.10

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 28 | Tier # | 2 | 2 |
| K/A Statement: Predict/monitor changes in RCS temperature and pressure associated with operating controls | Group # | 1 | 1 |
| | K/A # | 003.A1.7 | |
| Proposed Question: | Importance Rating | 3.4 | 3.4 |

The plant is in MODE 5, with initial conditions as follows:

- The Pressurizer is solid
- COPPs is blocked
- RCS is at 140 $^{O}$F and 340 psia
- SG secondary side temperatures are 200 $^{O}$F
- No RCPs are running
- Both trains of RHR are aligned for cooldown
- The "B" RHR pump is running

What action/failure would cause an RCS overpressure transient?

a) The crew starts the "A" RHS pump.
b) The crew starts the "B" RCP.
c) RCS Wide Range pressure instrument fails high.
d) Letdown Pressure Control valve 3CHS*PCV131 fails open.

Proposed Answer: B

Explanation (Optional): "B" is correct since starting an RCP with the PZR solid and SGs greater than 50°F above RCS temperature will cause a pressure increase. This is due to increasing heat transfer from the SGs to the RCS. This heatup could damage the RHS suction line relief valve bellows. "A" is wrong, since starting the 2nd RHR pump would cause the RCS pressure to decrease slightly due to increased heat removal in the RHR heat exchanger, and PCV 131 will reposition in auto to maintain RCS pressure. "A" is plausible, since starting another RHR Pump affects heat removal from the RCS. "C" is wrong since COPPs is blocked. "C" is plausible, since RCS wide range pressure inputs to COPPS.
"D" is wrong since the letdown pressure control valve failing open will cause RCS pressure to decrease. "D" is plausible, since the repositioning of this valve has a significant effect on RCS pressure while the Pzr is solid.

Technical Reference(s): OP 3201 (Rev. 28-0), Precaution 3.3.4.b
(Attach if not previously provided, Tech Spec LCO 3.4.1.4.1***b (Amendment 230)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-07490 Given a set of plant conditions, properly apply the notes and cautions of OP 3201. (As available)

Question Source: Bank #73211

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 29 | Tier # | 2 | 2 |
| K/A Statement: Operational implications of the effects of RCP shutdown on T-ave, including reason for unreliability of T-ave in the shutdown loop | Group # | 1 | 1 |
| | K/A # | 003.K5.3 | |
| | Importance Rating | 3.1 | 3.5 |

Proposed Question:
With the plant initially at 30% power, the following sequence of events occurs:

1. The "C" RCP Hi-Hi vibration annunciator is received on MB4.
2. The crew enters AOP 3554, *RCP Trip or Stopping a RCP at Power*.
3. The RO stops the "C" RCP.
4. The plant does not trip during the transient.
5. The initial transient is stabilized, and SG levels have been restored to 50%.

Assuming the reactor does NOT trip, complete the following statement as to how "C" RCS Loop Tave is affected.

"C" Loop Tave will go to ____(1)____ of the other three loops, due to ____(2)____.

| | (1) | (2) |
|---|---|---|
| a) | Tcold | increased steam pressure in the "A", "B", and "D" SGs |
| b) | Thot | increased steam pressure in the "C" SG |
| c) | Tcold | water flow reversing in the "C" RCS loop |
| d) | Thot | natural circulation flow developing in the "C" RCS loop |

Proposed Answer: C

Explanation (Optional): When the "C" RCP stops, forced circulation stops in that loop. "C" loop driving head is now the DP across the vessel. The running RCPs keep cold leg (vessel inlet) pressure high, since it is located at their discharge. Flow reverses in the idle loop, since there is a pressure drop across the core. So Tcold water starts reverse-flowing into the "C" loop. The steaming rate in the "C" steam generator will decrease due to less energy being added to it [Q = UA (TAVE -- TSTM)]. So its DT is low, and the entire loop approaches Tcold of the other loops ("C" correct, "B" and "D" wrong). "A" is wrong, since steam pressure decreases in the unaffected loops, since their steaming rate increases to compensate for the loss of steaming from the affected loop. "A" is plausible, since Tave in the affected loop goes to Tcold, and steam pressure is affected in all SGs. "B" is plausible, since Tave is affected, and steam flow from the affected loop decreases significantly. "D" is plausible, since on a loss of all forced flow, Thot does increase significantly in all loops while natural circulation flow is being established.

Technical Reference(s): (Attach if not previously provided, including version/revision number)
AOP 3554 (Rev. 10-0), step 6
AOP 3554 Basis Doc (Rev. 10-0), steps 5 and 6
P&ID 102A (Rev. 33)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04893 Describe the major parameter changes associated with decreased RCS flow rate. (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.3, 41.5 and 41.14

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 30 | Tier # | 2 | 2 |
| K/A Statement: Operational implications of the purpose of the | Group # | 1 | 1 |
| CVCS System flowpath around the boric acid storage tank | K/A # | 004.K5.31 | |
| Proposed Question: | Importance Rating | 3.0 | 3.4 |

The crew has just entered AOP 3566, *Immediate Boration.*

Complete the following statements concerning the function performed by RWST to Charging Pump Suction Isolation Valves 3CHS*LCV112D and 112E while performing this procedure.

This path is aligned if__(1)___, and the minimum required flow when aligned through this path is__(2)___.

| | (1) | (2) |
|---|---|---|
| a) | a Reactor Trip is required | 33 gpm |
| b) | a Reactor Trip is required | 100 gpm |
| c) | adequate flow cannot be obtained from the BAT Tanks | 33 gpm |
| d) | adequate flow cannot be obtained from the BAT Tanks | 100 gpm |

Proposed Answer: D

Explanation (Optional): Step 1 of AOP 3566 attempts to align a boration path from the Boric Acid Tanks (BAT) through the Emergency Boration Valve. If unsuccessful, the crew will attempt to align a path from the BAT through the gravity feed boration path. If the crew is unsuccessful, they will align the path that bypasses the BAT Tanks from the RWST to the RCS. After aligning a boration path, the crew will check minimum boration flow of 33 gpm from the BAT Tanks ("A" and "C" plausible), and if adequate flow does not exist they will align the path from the RWST, with a minimum flow requirement of 100 gpm, since RWST boron concentration is less than that of the BAT Tanks ("D" correct, "C" wrong). "A" and "B" are wrong, but plausible, since if SIS actuates, the crew is not required to enter AOP 3566.

Technical Reference(s): AOP 3566 (Rev. 13-0), Step 3.d.RNO.d.1 and d.4
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03961Describe the major action categories contained within AOP 3566, Immediate Boration. (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.8 and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 31 | Tier # | 2 | 2 |
| K/A Statement: Design feature/interlocks for | Group # | 1 | 1 |
| RHR System Modes of operation | K/A # | 005.K4.2 | |
| Proposed Question: | Importance Rating | 3.2 | 3.5 |

Initial conditions:

- The plant is in MODE 4.
- The crew is establishing RHR Train A Boron Concentration in accordance with OP3310A, *Residual Heat Removal System*, and aligning train A of RHR for the "Cooldown" mode.

The RO selects “Cooldown” on the RHR Mode Switch on Main Board 2.

When "Cooldown" is selected, what physically has been done to RHR Heat Exchanger Outlet Flow Control Valve 3RHS*HCV606 and RHR Heat Exchanger Bypass Valve 3RHS*FCV618?

a) Instrument air is removed from both valves, failing them both OPEN.
b) Instrument air is restored to both valves, allowing them to modulate.
c) Instrument air is restored to 3RHS*HCV606, allowing it to modulate, and Instrument air is removed from 3RHS*FCV618, failing it OPEN.
d) Instrument air is restored to 3RHS*HCV618, allowing it to modulate, and Instrument air is removed from 3RHS*FCV606, failing it OPEN.

Proposed Answer: B

Explanation (Optional): When the Normal/Cooldown switch is taken to "Cooldown", air is restored to both valves to allow controlling the cooldown rate ("B" correct, "A", "B", and "C" wrong). Selecting "Normal" removes air from the valves, failing them to their OPEN position, which is an acceptable lineup for SIS or Safety Grade Cold Shutdown cooldown on loss of air. “A”. “C”, and “D” are plausible, since operating this switch restores or isolates Instrument Air to both of these valves.

Technical Reference(s): OP 3310A (Rev. 18-0), Section 4.5, especially steps 4.5.13, 14, and 15

(Attach if not previously provided, P&ID 112A (Rev. 50)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05455 Describe operation of the following residual heat removal (RHR) system equipment controls and interlocks... RHR heat exchanger bypass flow control valves...RHR heat exchanger flow control valves... (As available)

Question Source: Bank #72446

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 32 | Tier # | 2 | 2 |
| K/A Statement: Power supplies to the ECCS | Group # | 1 | 1 |
| valve operators for accumulators | K/A # | 006.K2.2 | |
| Proposed Question: | Importance Rating | 2.5 | 2.9 |

Reactor power is 100%.

An operator accidentally places the valve operator switch for SI Accumulator Outlet Valve 3SIL*MV8808A to the CLOSE position at MB2.

Will the valve stroke closed? If not, why not? If so, will an ESF Status Panel light illuminate?

a) No, the valve remains open, since its MCC breaker is maintained locked open with RCS pressure above 1000 psia.
b) No, the valve remains open, since the P-7 permissive prevents the valve from closing with the Reactor at power.
c) Yes, the valve strokes closed. The operators WILL be alerted via an ESF Status Panel light.
d) Yes, the valve strokes closed. The operators will NOT be alerted via an ESF Status Panel light.

Proposed Answer: A

Explanation (Optional): "A" is correct, and "C" and "D" wrong, since during a plant heatup, when RCS pressure is between 700 psia and 1,000 psia, the accumulator outlet valve MCC breakers will be closed, the valves will be opened from MB2, and then the MCC Breakers will be opened and locked. During normal operation, the Accumulator Outlet Valve MCC Breakers are kept locked open. "C" and "D" are plausible, since when the MCC breaker is closed per procedure, and the MB2 switch is placed in "Close", the valve strokes closed. "B" is wrong, but plausible, since above P-11 (not P-13), the accumulator outlet valves receive an auto-open signal. This signal will normally not have an effect on the valve, since it is deenergized.

Technical Reference(s): OP 3310B-4 (Rev 05-0), page 2 of 3
(Attach if not previously provided, OP 3201 (Rev. 28-0), step 4.5.7
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06289 Given a failure (partial or complete) of the Emergency Core Cooling System, determine the effects on the system and on interrelated systems (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7, 41.8, and 41.10

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 33 | Tier # | 2 | 2 |
| K/A Statement: Design feature/interlock | Group # | 1 | 1 |
| for PRT cooling | K/A # | 007.K4.1 | |
| Proposed Question: | Importance Rating | 2.6 | 2.9 |

Initial Conditions:

- The plant is at 100% power.
- The PGS CTMT Isolation Valves are closed.

The following sequence of events occurs:

1. A discharge to the PRT occurs.
2. PRT temperature becomes elevated.
3. The US directs the RO to cool the PRT by filling it from PGS using OP 3301A, *Pressurizer Relief Tank and Reactor Vessel Flange Leakoff Operations*.

In accordance with OP 3301A, what action(s), if any, is/are required by the RO to open the PRT "PRI WTR" Fill Valve (3PGS-AV8030) and the Primary Grade Water Containment Isolation Valves (3PGS*CV8028 and 8046) in order to commence cooling the PRT?

a) The RO must manually open the PRT Fill Valve at MB4, but the Primary Grade Water Containment Isolation Valves will have automatically opened.
b) The RO must manually open the Primary Grade Water Containment Isolation Valves at MB1 and manually open the PRT Fill Valve at MB4.
c) The RO must manually open the Primary Grade Water Containment Isolation Valves at MB1, but the PRT Fill Valve will have automatically opened.
d) No valve operation by the RO is required, since the Primary Grade Water Containment Isolation Valves and the PRT Fill Valve will have automatically opened.

Proposed Answer: B

Explanation (Optional): "B" is correct, and "A", "C", and "D" wrong, since these valves all are manually opened and closed. "A", "C", and "D" are plausible, since the CIVs have an auto-close feature, and the PRT Vent Valve has an auto-close feature. Also, the PRT drain valve is interlocked with PRT level.

Technical Reference(s): OP 3301A (Rev. 10-0), Step 4.2.1
(Attach if not previously provided, P&ID 119A (Rev. 34)
including version/revision number) LSK 35-1C (Rev. 10)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05349 Describe the Pressurizer Relief Tank System operation, or operations required, under the following normal, abnormal, or emergency operating conditions or procedures… Restoring from a high Pressurizer Relief Tank Temperature condition (As available)

Question Source: Bank #80878

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 34 | Tier # | 2 | 2 |
| K/A Statement: Ability to perform specific | Group # | 1 | 1 |
| system and integrated plant procedures during | K/A # | 008.GEN.2.1.23 | |
| all modes of operation for the CCW system | Importance Rating | 4.3 | 4.4 |

Proposed Question:

The crew is performing a plant cooldown per OP 3208, *Plant Cooldown*, with initial conditions as follows:

- The crew is preparing to place RHR Train "A" in service for plant cooldown.
- The crew desires to use the maximum allowed RPCCW flowrate to the "A" RHR Heat Exchanger to support the cooldown.
- The RO reports the following initial RPCCW flowrates exist:
  - "A" Train Non-Safety Header Flow 1000 gpm
  - "A" Train Safety Header Flow 1700 gpm
  - "A" Train Containment Header Flow 1100 gpm

The RO commences throttling open 3CCP-HK66A1, "RPCCW HX FLOW".

What will the RPCCW flow through "A" RHR heat exchanger indicate when the RPCCW heat exchanger flow limit is reached?

a) 7000 gpm
b) 4300 gpm
c) 4000 gpm
d) 3200 gpm

Proposed Answer: B

Explanation (Optional): The RPCCW Heat Exchanger flow limit is 8,100 gpm, to avoid RPCCW Heat Exchanger tube vibration. 3800 gpm of the maximum 8100 gpm initially exists. Operator can increase flow by 4300 gpm ("C" correct, "A", "B", and "D" wrong). "A" is plausible, since a 7,000 gpm flow limit exists for the RHR Heat Exchanger, but the 8,100 gpm flow limit will be reached prior to reaching this flow. "C" is plausible, since 4,000 gpm is the normal RHR flow rate through the RHR Heat Exchanger. "D" is plausible, since this would be the remaining flow available if the limit was 7,000 gpm, which is the RPCCW flow limit through the RHR Heat Exchanger.

| | |
|---|---|
| Technical Reference(s): | OP 3208 (Rev. 27-0), step 4.3.10 |
| (Attach if not previously provided, | OP 3330A (Rev. 23-0), Precaution 3.2 |
| including version/revision number) | P&ID 112A (Rev. 50) |

Proposed references to be provided to applicants during examination: None

| | | |
|---|---|---|
| Learning Objective: | MC-04152 Describe the major administrative or procedural precautions and limitations placed on the operation of the Reactor Plant Component Cooling System, and the basis for each. | (As available) |

Question Source: Bank #0069065

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.4 and 41.10

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 35 | Tier # | 2 | 2 |
| K/A Statement: Ability to locate CCW system | Group # | 1 | 1 |
| control room switches, controls and indications and to | K/A # | 008.GEN.2.1.31 | |
| determine they correctly reflect the desired plant lineup | Importance Rating | 4.6 | 4.3 |

Proposed Question:

With the plant at 100% power, the following sequence of events occurs:

1. The RPCCW SURGE TK LEVEL HI annunciator is received on MB1C.
2. The crew enters the appropriate Annunciator Response Procedure.
3. The US directs the RO to compare the two train-related Surge Tank level indications (3CCP-LI20A and B) on Main Board 1 (MB1).

Correctly complete the following statement regarding the crew's ability to diagnose and control the event.

Current Surge Tank level is ___(1)___ the divider plate in the Surge Tank, and a control switch ___(2)___ available at MB1 to manually close the Surge Tank Fill Valve (3CCP-LV20), if it is open.

| | (1) | (2) |
|---|---|---|
| a) | BELOW | IS |
| b) | BELOW | IS NOT |
| c) | ABOVE | IS |
| d) | ABOVE | IS NOT |

Proposed Answer: C

Explanation (Optional): There is a divider plate separating the two trains of RPCCW in the surge tank ("A" and "B" plausible), but the divider plate only goes up to about 92%, which is below the high level alarm setpoint, so both trains will indicate the same ("A" and "B" wrong). "C" is correct, and "D" wrong, since the Surge Tank Fill Valve has both automatic and manual controls and indication available at MB1. "D" is plausible, since numerous indications exist on the Main Boards without corresponding controls.

Technical Reference(s): (Attach if not previously provided, including version/revision number)
OP 3353.MB1C, 2-7A (Rev. 12-0), steps 1 and 2
AOP 3561 (Rev. 18-0), Attachment C, step C.1, including Notes
OP 3250.30A (Rev. 03-0), Note before step 4.1.5
P&ID 121A (Rev. 33)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04150 Describe the operation of the following Reactor Plant Component Cooling System equipment controls and interlocks: A. Surge Tank Makeup Control Valve... (As available)

Question Source: Bank #89258

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.4, 41.7, and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 36 | Tier # | 2 | 2 |
| K/A Statement: Power supplies to | Group # | 1 | '1 |
| Pressurizer Heaters | K/A # | 010.K2.1 | |
| Proposed Question: | Importance Rating | 3.0 | 3.4 |

Which Load Center provides power for Pressurizer Backup Heater Group A?

a) 32A
b) 32P
c) 32S
d) 32V

Proposed Answer: C

Explanation (Optional): "C" is correct, and "A", "B", and "D" wrong, since Pzr Backup Heater Group A is powered from Load Center 32S. "A", "B", and "D" are plausible, since these are Load Centers at Millstone 3. Load Center 32A and P provide power to Turbine Building loads. 32V provides power to "B" Train Pzr Heaters.

Technical Reference(s): OP 3301G-001 (Rev. 05-3), page 5 of 5.
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03320 Describe the function and location of the following major 480 volt AC system components… 480 volt Load Centers… (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory of Fundamental Knowledge

10 CFR Part 55 Content: 55.41.8

Comments:

| | | | | |
|---|---|---|---|---|
| Examination Outline Cross-Reference: | | Level | RO | SRO |
| Question # 37 | | Tier # | 2 | 2 |
| K/A Statement: Predict/monitor changes associated with adjusting Reactor Protection System trip setpoints | | Group # | 1 | 1 |
| | | K/A # | 012.A1.1 | |
| Proposed Question: | | Importance Rating | 2.9 | 3.4 |

Initial conditions:

- A Plant Start-up is in progress per OP 3203, *Plant Startup*.
- Reactor power is 8%.

The following sequence of events occurs:

1. The crew commences raising power to 16-19% in preparation for starting the Main Turbine.
2. The RO reports the P-10 (REACTOR AT POWER) permissive light has illuminated on MB4.
3. The US directs the RO to depress the four "BLOCK" pushbuttons on MB4 per OP 3203.

What occurs as a direct result of the RO depressing these pushbuttons?

a) Removes the PR High Flux (Lo Setpoint) Reactor Trip.
b) Enables the PR High Flux (Hi Setpoint) Reactor Trip.
c) Removes the Two Loop Low Flow Reactor Trip.
d) Enables the High Pressurizer Level Reactor Trip

Proposed Answer: A

Explanation (Optional): P-10 provides a backup to ensure the SR remain de-energized, and inputs to the circuit to allow blocking the IR high flux trip and rod block. Above P-10, the IR High Flux and PR high flux (low setpoint) trips can be manually blocked by depressing the BLOCK pushbuttons on MB4 ("A" correct, "B" plausible). The PR High flux (high setpoint) trip is functional above and below P-10 ("B" wrong). The Two Loop Low Flow trip and the Pressurizer high level trip are enabled by P-7, which is fed by P-10 ("C" and "D" wrong, but plausible).

Technical Reference(s): OP 3203 (Rev. 23-0), step 4.3.9
(Attach if not previously provided, Functional Sheets 3 (Rev. G) and 4 (Rev. G)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05493 Describe the operation of the following RPS controls and interlocks…P-10… (As available)

Question Source: Modified Bank #69856 (Parent Question attached on following page)

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7 and 41.10

Comments:

This question is considered modified since the modified question has the new condition that the BLOCK pushbuttons have been depressed. Also, original distractor “D” has been changed.

Original Bank #69856

A Plant Start-up is in progress.

The crew is raising power to 16-19% in preparation for starting the main turbine.

Which of the following describes a function that is a <u>direct</u> result of the actuation of the P-10 (REACTOR AT POWER) permissive?

a) Allows blocking the C-1 control interlock
b) Enables the High Pressurizer level reactor trip
c) Enables the High Neutron Flux (high set point) reactor trip
d) Prevents a High Neutron Flux (low set point) Reactor Trip if the operator forgets to block the trip during a plant start up

Correct Answer: A

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 38 | Tier # | 2 | 2 |
| K/A Statement: Operational implications of | Group # | 1 | 1 |
| Reactor Protection for DNB | K/A # | 012.K5.1 | |
| Proposed Question: | Importance Rating | 3.3 | 3.8 |

Initial Conditions:

- Reactor power: 98%
- RCS Tave: 587°F
- RCS Pressure: 2250 psia

The following sequence of events occurs:

1. Pressurizer spray valve 3RCS*PCV456 starts to leak by.
2. RCS pressure decreases to 2230 psia.
3. RCS Tave remains stable at 587°F.

What effect, if any, has this transient had on the OTΔT and/or OPΔT setpoints?

a) OTΔT - decreases
   OPΔT - decreases
b) OTΔT - decreases
   OPΔT - unchanged
c) OTΔT - unchanged
   OPΔT - decreases
d) OTΔT - unchanged
   OPΔT - unchanged

Proposed Answer: B

Explanation (Optional): The OTDT Reactor Trip provides primary protection against DNB. If RCS pressure decreases, or Tave increases, Core DNBR is degrading.. The OTDT trip setpoint is designed to protect against DNB for these events. This is accomplished by making the OTDT trip setpoint = 120% ± Tave penalty ± Pzr pressure penalty – AFD penalty). Since pressure is decreasing, the OTDT trip setpoint automatically decreases ("C" and "D" wrong). The OPDT trip is a backup to the NIS overpower trip, and also protects against excessive KW/foot in the core. The OPDT setpoint = 110% - Tave increasing - Tave > 587 °F. So OPDT is not penalized by decreasing pressure ("B" correct, "A" wrong). "A", "C", and "D" are plausible, since one setpoint remains unchanged and one decreases.

Technical Reference(s): Tech Spec Section 2.0 Bases (LBDCR No. 07-MP3-017), page B 2-5
(Attach if not previously provided, Tech Spec Section 2.0 Bases (LBDCR No. 07-MP3-014), page B 2-6
including version/revision number) Tech Spec Table 2.2-1 (Amendment 218), pages 2-9 and 2-10
Tech Spec Table 2.2-1 (Amendment 242), page 2-11
TRM Section 2.0 Bases (LBDCR 16-MP3-011), Sections 2.2.1 and 2.2.2

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04593 Describe the operation of the following RPS controls and interlocks… OTDT… OPDT… (As available)

Question Source: Bank #69345

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 39 | Tier # | 2 | 2 |
| K/A Statement: Power supplies to | Group # | 1 | 1 |
| ESFAS System equipment control | K/A # | 013.K2.1 | |
| Proposed Question: | Importance Rating | 3.6 | 3.8 |

The plant is at 100% power.

Other than Protection Set 1 and Set 3 input relays and instrumentation, what inputs to Reactor Protection Train A is provided by VIAC 1 and/or VIAC 3?

a) VIAC 1 and 3 each provides a set of redundant and auctioneered 48 Volt and 15 Volt Power Supplies.
b) VIAC 1 supplies the 48 Volt Power Supply, and VIAC 3 provides the 15 Volt Power Supply.
c) VIAC 1 supplies the 15 Volt Power Supply, and VIAC 3 provides the 48 Volt Power Supply.
d) Only VIAC 1 supplies both the 48 Volt and 15 Volt Power Supplies.

Proposed Answer: A

Explanation (Optional): Each of the two Trains of RPS receives power from the two train-related VIACs. Train A receives power from VIAC 1 and VIAC 3. Each of the two trains of RPS contains four Protection Sets, with each Protection Set powered by its own VIAC. Each VIAC provides redundant power to a 48V power supply and to a 15 Volt power supply ("A" correct, "B", "C", and "D" wrong). "B" and "C" are plausible, since VIAC 1 and 3 provide inputs to Train A RPS that are not redundant. VIAC 1 also provides power to the Train "A" RPS Slave Relays for continuity testing ("D" plausible).

Technical Reference(s): AOP 3564 (Rev. 11-0), Entry Conditions
(Attach if not previously provided, SSPS Power Distribution RPS Training Figure 5 (Rev 05-0)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05245 Discuss the basic power supply arrangement for control and protection channels including the specific channel's color scheme. (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 40 | Tier # | 2 | 2 |
| K/A Statement: Effect of loss/malfunction of ESFAS | Group # | 1 | 1 |
| sensors and detectors on the ESFAS System | K/A # | 013.K6.1 | |
| Proposed Question: | Importance Rating | 2.7 | 3.1 |

Reactor power is stable in the Intermediate Range at $1 \times 10^{-8}$ amps when the following sequence of events occurs:

1. Controlling Pressurizer Pressure Channel 3RCS*PT455 fails high.
2. Actual Pressurizer pressure starts to decrease.

Assuming no operator action is taken, how will the plant respond to the decreasing Pressurizer pressure?

a) A reactor trip will occur at 1900 psia due to low pressurizer pressure.
b) SI actuation will occur at 1892 psia due to low pressurizer pressure.
c) Pressurizer backup heaters will energize at 2235 psia and stabilize pressurizer pressure.
d) The failed open PZR PORV will automatically close at 2000 psia and stabilize pressurizer pressure.

Proposed Answer: B

Explanation (Optional): "A" is wrong, since the low Pressurizer Pressure Reactor Trip is automatically blocked below P-7 (Reactor or Turbine <10% power). "A" is plausible, since this trip would actuate if power were above P-7. "B" is correct, since the low pressurizer pressure SI is active above P-11 (2000 psia). "C" is wrong, since backup heaters are driven by the failed controlling pressure channel. "C" is plausible, since there are three functioning detectors, and some signals require a 2 of 4 coincidence. "D" is wrong, since PZR PORVs cycle off of 2/4 coincidence pressurizer pressure, not the controlling channel, so the PORV did not open. Also, the spray valve remains open and the heaters are deenergized. "D" is plausible, since some controls operate off of the one detector selected for control.

Technical Reference(s): Functional Sheet 6 (Rev. J)
(Attach if not previously provided, Functional Sheet 11 (Rev. H)
including version/revision number) Functional Sheet 18 (Rev. D)
Functional Sheet 19 (Rev. D)

Proposed references to be provided to applicants during examination:

Learning Objective: MC-05493Describe the operation of the following RPS controls and interlocks… Safety Injection… P-7… P-10… (As available)

Question Source: Bank #78385

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 41 | Tier # | 2 | 2 |
| K/A Statement: Effect of loss of malfunction of the | Group # | 1 | 1 |
| Containment Cooling System on equipment susceptible | K/A # | 022.K3.1 | |
| to damage by temperature, humidity, and pressure | Importance Rating | 2.9 | 3.2 |

Proposed Question:

An earthquake occurs, resulting in the following:

- The "A" CAR Fan Trips, and the "B" CAR Fan cannot be started.
- An RCS leak initiates inside Containment.

These conditions result in the following parameters becoming significantly elevated inside Containment:

- CTMT humidity
- CTMT iodine levels
- CTMT particulate levels

The crew is considering the use of the Containment Air Filtration (CAF) System to lower radiation levels in CTMT.

What would be the greatest impact of the elevated CTMT humidity levels on the effectiveness of the CAF System?

a) The HEPA filters will be less effective at reducing atmospheric particulate levels.
b) The HEPA filters will be less effective at reducing atmospheric iodine levels.
c) The charcoal filters will be less effective at reducing atmospheric particulate levels.
d) The charcoal filters will be less effective at reducing atmospheric iodine levels.

Proposed Answer: D

Explanation (Optional): The CAF system is most effective at removing iodine in the charcoal filters ("C" wrong) and particulates in the HEPA filters ("B" wrong). "D" is correct, and "A" wrong, since high humidity conditions significantly reduce the effectiveness of the charcoal filters. "A", "B", and "C" are plausible, since the CAF System has both HEPA and charcoal filters, and removes both particulates and iodine.

Technical Reference(s): FR-Z.3 (Rev. 005), step 1
(Attach if not previously provided, FSAR 9.4.8.1 (Rev. 30)
including version/revision number) www.novent.homestead.com/files/carbon.htm

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04261 Describe the major administrative or procedural precautions and limitations placed on the operation of the Containment Ventilation System, and the basis for each. (As available)

Question Source: Bank #86759

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 41.10 and 41.12

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 42 | Tier # | 2 | 2 |
| K/A Statement: Manually operate/monitor | Group # | 1 | 1 |
| Containment Spray reset switches | K/A # | 026.A4.5 | |
| Proposed Question: | Importance Rating | 3.5 | 3.5 |

The crew is responding to a small break LOCA per E-1, *Loss of Reactor or Secondary Coolant*, and the current conditions are as follows:

- CDA actuated 14 minutes ago.
- CTMT pressure is 16.5 psia and decreasing.
- The crew is at E-1, step 7, "Check if CTMT Spray Should Be Stopped".
- The US directs the RO to stop Containment Spray using GA-8, *Stopping Containment Spray*.

Per GA-8, the RO is preparing to depress the CDA Reset pushbuttons on Main Board 2 to allow stopping any running Containment Spray Pumps from MB2.

What effect, if any, will depressing these pushbuttons have on the control of RPCCW Pumps from MB1, and will the Containment Depressurization Actuation annunciator clear when these pushbuttons are depressed?

a) The pushbuttons do not input to the RPCCW Pump control. The Containment Depressurization Actuation annunciator will remain lit on MB2.
b) The pushbuttons do not input to the RPCCW Pump control. The Containment Depressurization Actuation annunciator will clear on MB2.
c) The pushbuttons allow manually starting the RPCCW Pumps from MB1. The Containment Depressurization Actuation annunciator will remain lit on MB2.
d) The pushbuttons allow manually starting the RPCCW Pumps from MB1. The Containment Depressurization Actuation annunciator will clear on MB2.

Proposed Answer: D

Explanation (Optional): The CDA signal starts the QSS Pumps, and starts the RSS Pumps after a time delay. The CCP (RPCCW) pumps automatically trip on a CDA, so CDA needs to be reset to allow restarting these pumps ("A" and "B" wrong). "A" and "B" are plausible, since the pumps used to depressurize Containment on a CDA are the Spray Pumps. "D" is correct, and "C" wrong, since these pushbuttons clear this annunciator. This provides confirmation that the crew has successfully reset CDA. "C" is plausible, since Containment pressure has dropped below the CDA actuation setpoint of 23 psia, but the signal locks in, and needs to be reset from MB2.

| | |
|---|---|
| Technical Reference(s): | E-1 (Rev. 26-0), step 7 |
| (Attach if not previously provided, | GA-8 (Rev. 02-0), Step 2.b, 3, 4, and 6.RNO.3.b |
| including version/revision number) | Functional Sheet 6 (Rev. J) |
| | Functional Sheet 7 (Rev. M) |
| | Functional Sheet 8 (Rev. K) |

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05171 Describe operation of the following containment de-pressurization system components controls and interlocks… QSS pumps… (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7 and 41.10

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 43 | Tier # | 2 | 2 |
| K/A Statement: Predict impact/mitigate impact | Group # | 1 | 1 |
| of increasing Main Steam System steam demand, | K/A # | 039.A2.5 | |
| its relationship to increases in reactor power | Importance Rating | 3.3 | 3.6 |

Proposed Question:

Initial Conditions:

- Reactor power: 88%
- RCS boron concentration: 1000 PPM
- Rod Control: In MANUAL

The following sequence of events occurs:

1. One Main Turbine Control Valve spuriously strokes fully open.
2. The crew enters AOP 3582, *Excessive Steam Demand.*

Assuming the reactor does not trip, how does reactor power initially respond prior to operator action, and what action will AOP 3582 direct the crew to take to restore Tave to program while this transient is in progress?

a) Power will initially increase and remain elevated. The crew will withdraw Control Rods to restore Tave to program.
b) Power will initially increase and remain elevated. The crew will reduce Turbine load to restore Tave to program.
c) Power will initially increase, and then return to its original value. The crew will withdraw Control Rods to restore Tave to program.
d) Power will initially increase, and then return to its original value. The crew will reduce Turbine load to restore Tave to program.

Proposed Answer: B

Explanation (Optional): This question includes OE from a Millstone 2 reactivity management event. When steam demand increases (Heat out of the RCS becomes greater than heat in), RCS temperature decreases, adding positive reactivity. This causes reactor power to increase. Power will increase until heat input from the reactor matches heat out via the secondary, stopping the temperature decrease. The result is increased reactor power ("C" and "D" wrong) with decreased RCS temperature. "B" is correct, and "A" wrong, since it is never appropriate to withdraw control rods to restore RCS temperature during a secondary plant transient. "A" is plausible, since Tave is low, and withdrawing control rods will raise RCS temperature. Also, this has occurred on more than one occasion in the industry. "C" and "D" are plausible, since if the transient were initiated from a primary side reactivity addition, power would return to approximately its original value due to constant steam demand.

| | |
|---|---|
| Technical Reference(s): | AOP 3582 (Rev. 00-0), Entry Conditions |
| (Attach if not previously provided, | AOP 3582 (Rev. 00-0), step 2.RNO |
| including version/revision number) | OP-AP-300 (Rev 20-0), Attachment 2, page 4 of 4 |

Proposed references to be provided to applicants during examination: None

| | | |
|---|---|---|
| Learning Objective: | MC-04899 Describe the major parameter changes associated with Reactivity & Power Distribution Anomalies | (As available) |

| | |
|---|---|
| Question Source: | New |
| Question History: | |
| Question Cognitive Level: | Comprehension or Analysis |
| 10 CFR Part 55 Content: | 55.41.1 and 41.5 |
| Comments: | |

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 44 | Tier # | 2 | 2 |
| K/A Statement: Design feature/interlock for reactor | Group # | 1 | 1 |
| building isolation from the Main Steam System | K/A # | 039.K4.7 | |
| Proposed Question: | Importance Rating | 3.4 | 3.7 |

The crew is performing a plant cooldown in accordance with OP 3208, *Plant Cooldown*, and the following initial conditions exist:

- Tave is 540°F and slowly decreasing.
- PZR pressure is 2110 psia and slowly decreasing.
- S/G pressures are all approximately 950 psig and slowly decreasing.

The following sequence of events occurs:

1. A significant steam leak occurs on the "B" steam line in the Main Steam Valve Building.
2. The SG B STEAMLINE PRESSURE LO annunciator coming in on MB5B.
3. The SG B PRESSURE RATE HI annunciator is **NOT** received.
4. No further operator action has been taken.

What is the current status of Containment Isolation Phase A (CIA) and Main Steam Isolation (MSI)?

a) Neither CIA nor MSI occur.
b) CIA actuates only.
c) MSI actuates only.
d) CIA and MSI both actuate.

Proposed Answer: D

Explanation (Optional): Low Steam Pressure SI and MSI are not procedurally blocked until less than 2000 psia. These signals cannot be blocked unless < P-11 (2000 psia). Above P-11, low steam pressure results in a SIS signal, which generates a CIA signal ("A" and "C" wrong), and a MSI signal ("D" correct, "B" wrong). "A" is plausible, since this would be correct if initial pressure was <1950 psia, since the crew would have blocked Low Steam Pressure SI and MSI per OP 3208, and "STEAM PRESSURE RATE HI" did not come in. "B" is plausible since SIS actuates. "C" is plausible, since, per MB5B, 2-4, high steam rate will actuate MSI with SIS blocked < P-11.

Technical Reference(s): (Attach if not previously provided, including version/revision number)
OP 3208 (Rev. 27-0), step 4.2.5
OP 3353.MB5B (Rev. 03-0), 3-4
Functional Sheet 7 (Rev. M)
Functional Sheet 8 (Rev. K)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05493 Describe the operation of the following RPS controls and interlocks… P-11… (As available)

Question Source: Bank # 76240

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7 and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 45 | Tier # | 2 | 2 |
| K/A Statement: Predict/monitor changes associated | Group # | 1 | 1 |
| with operating Main Feed Pump speed controls | K/A # | 059.A1.7 | |
| Proposed Question: | Importance Rating | 2.5 | 2.6 |

With the plant at 80% power, the following sequence of events occurs:

1 The controlling steam flow channel for the "A" Steam Generator starts to slowly fail low.
2. The BOP operator places the "A" Feed Regulating Valve controller to MANUAL and throttles the valve back to its original position.
3. The BOP reports that all 4 SGs are being slightly under-fed.
3. The RO reports that all 4 SGs Narrow Range levels are 48% and decreasing.

What is the most controlled way the BOP Operator can increase Feed Pump speed?

a) Allow the TDMFPs to respond in AUTO, since steam flow does not input to TDMFP speed control.
b) Take the Manual Speed Controllers (3TFC-M1A and B) for both TDMFPs to the RAISE direction as needed.
c) Take the TDMFP Master Speed Controller (3FWS-SK509A) to MANUAL and depress the RAISE pushbutton as needed.
d) Take both TDMFP NUS Controller (3FWS-SK46A and B) toggle switches to the RAISE direction as needed.

Proposed Answer: C

Explanation (Optional): "C" is correct, since the master speed controller will raise TDMFP speeds when both TDMFPs are in auto at a controlled rate, while the NUS controllers provide a rapid responding coarse adjust. Procedures direct the use of the Master Speed Controller in Manual, prior to use of the NUS controllers. "D" is wrong, since the toggle switches only work after manual is selected on the NUS controller. "D" is plausible, since the NUS controllers can be used to raise speed. "B" is wrong, since the manual speed controllers only control feed pump speed when their speed demand is less than the NUS output, and the Manual Speed Changer is already at the high-speed stop to allow full range of control by the NUS controller. "B" is plausible, since the Manual Speed Changer would control speed if it was the lowest set controller. "A" is wrong since Feed Pump Speed Control receives and input from total steam flow to determine program DP. "A" is plausible, since automatic control is the normally preferred method to control feed pump speed.

Technical Reference(s): OP 3321 (Rev. 24-0), steps 4.3.37 and 42
(Attach if not previously provided, AOP 3571 (Rev. 13-0), Attachment M, step M.3
AOP 3581 (Rev. 04-0), Attachment B, step B.1
Functional Sheet 13 (Rev. K)
Functional Sheet14 (Rev. K)
including version/revision number) LSK 6-1.2E (Rev. 10)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04660 DESCRIBE the operation of the following…Controls & Interlocks… Turbine Driven Main Feed Pump Manual Speed Controllers (TFC-M1A/B)… Turbine Driven Feed Pump Speed Controllers (FWS-SK46A/B)… Turbine Driven Main Feed Pump Master Speed Controller (FWS-SK509A)… (As available)

Question Source: Bank #65628

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 46 | Tier # | 2 | 2 |
| K/A Statement: Effect of loss/malfunction of | Group # | 1 | 1 |
| controllers and positioners on the AFW System | K/A # | 061.K6.1 | |
| Proposed Question: | Importance Rating | 2.5 | 2.8 |

The plant is at 2% power, and initial conditions are as follows:

- Both Motor Driven Auxiliary Feedwater (MDAFW) Pumps are running, feeding all four SGs.
- All AFW Pump suctions are aligned to the CST.

The following sequence of events occurs:

1. Offsite power is lost.
2. The BOP Operator reports the status of AFW as follows:
   - The "B" Motor Driven AFW Pump (3FWA*P1B) is NOT running, and will not start.
   - 3FWA*P1A is running.
   - The TDAFW Pump is running.
   - All three AFW Pump Suction Valves are still aligned to the CST.
   - Both discharge cross-tie valves (3FWA*AOV62A and B) have remained OPEN.

In accordance with the cautions of OP 3322, *Auxiliary Feedwater System*, what concern is there with the discharge cross-tie valves open, and which AFW Pump suction valves can the BOP Operator realign to the DWST from MB5?

a) The TDAFW Pump Trip Throttle Valve (3MSS*MSV5) may trip. The BOP Operator can realign only the MDAFW Pump Suction Valves to the DWST from MB5.
b) The TDAFW Pump Trip Throttle Valve (3MSS*MSV5) may trip. The BOP Operator can realign the MDAFW Pump and TDAFW Pump Suction Valves to the DWST from MB5.
c) The "A" MDAFW Pump may reach runout flow. The BOP Operator can realign only the MDAFW Pump Suction Valves to the DWST from MB5.
d) The "A" MDAFW Pump may reach runout flow. The BOP Operator can realign the MDAFW Pump and TDAFW Pump Suction Valves to the DWST from MB5.

Proposed Answer: C

Explanation (Optional): On a LOP, the positioners for the suction valves should have aligned the suction paths for the MDAFW Pumps to the DWST, and the positioners for the discharge cross tie valves should have realigned to the closed position. Operators are cautioned to prevent runout conditions for the MDAFW Pumps with the discharge cross-tie valves open. "A" and "B" are wrong, since the discharge cross ties valves affect the MDAFW Pumps, not the TDAFW Pump. "A" and "B" are plausible, since numerous industry OE exists involving inadvertent tripping of the TDAFW Pump Steam Supply Trip Valve. The MDAFW pump suction valves (3FWA*AOV23A/B and 3FWA*AOV61A/B) are normally operated from Main Board 5 ("D" plausible), but the TDAFW Pump suction valves (3FWA*HCV37and 3FWA*V30) require local operation ("C" correct, "D" wrong).

Technical Reference(s): OP 3322 (Rev. 28-0), Section 4.8, caution prior to step 4.8.4, and step 4.8.7
(Attach if not previously provided, OP 3322 (Rev. 28-0), Precaution 3.4
including version/revision number) P&ID 130B (Rev. 49)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04635 Describe the operation of the following Auxiliary Feedwater System component controls & interlocks… Motor & Turbine Driven Auxiliary Feedwater DWST Supply Header Isolation Valves… Motor & Turbine Driven Auxiliary Feedwater Pump Alternate Suction … Auxiliary Feedwater Pump Discharge Cross-connect Valves… (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7 and 41.10

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 47 | Tier # | 2 | 2 |
| K/A Statement: Manually operate/monitor: | Group # | 1 | 1 |
| local operation of AC Electrical System breakers | K/A # | 062.A4.4 | |
| Proposed Question: | Importance Rating | 2.6 | 2.7 |

A PEO has been dispatched to locally close a MCC breaker to return a load to service.

The PEO locally places the associated breaker to the "ON" position.

What additional action is required to be taken for the associated load?

a) At Main Board 8, place the associated load control switch to CLOSE.
b) Locally depress the electrical CLOSE pushbutton on the breaker face plate.
c) Locally place the loss of control power alarm relay switch to the BYPASS position.
d) Locally place the loss of control power alarm relay switch to the ON position.

Proposed Answer: D

Explanation (Optional): "D" is correct, since when the breaker is locally placed to ON, the control power alarm relay switch is required to be locally selected to ON ("C" wrong) to re-enable the loss of control power alarm for this load. "C" is plausible, since the switch is placed in bypass when opening the breaker, to prevent a loss of control power annunciator from being generated by the deenergized load that will mask other losses of control power from the loads that are still in service. "A" is wrong, since selecting ON locally is all that is required to close the breaker for the load. "A" is plausible, since Main Board 8 has numerous breaker control switches. "B" is wrong, since the electrical trip and close pushbuttons only function when the breaker is in the "test" position. "B" is plausible, since this pushbutton does close the breaker when in the "test" position, and mechanical trip and close pushbuttons on the breaker face plate do operate the breaker if locally depressed.

Technical Reference(s): OP 3344B (Rev. 10-0), Precaution 3.7
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04135 Describe all administrative or procedural precautions associated with the operation of breakers. (As available)

Question Source: Bank #63685

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7 and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 48 | Tier # | 2 | 2 |
| K/A Statement: Physical connections/cause- effect | Group # | 1 | 1 |
| between the AC Electrical System and the ED/G | K/A # | 062.K1.2 | |
| Proposed Question: | Importance Rating | 4.1 | 4.4 |

With the plant operating at 100%, the following conditions exist:

- A "brown-out" condition occurs on the grid.
- 6.9KV and 4160V Bus voltages drop to 80% of normal voltage.
- This condition lasts for 5 minutes.

Assuming no operator actions have been taken, complete the following statement about the status of the 4.16KV Buses after the five minutes have passed.

The Normal 4160V buses are ___(1)___, and the Emergency 4160V buses are powered from the ___(2)___.

| | (1) | (2) |
|---|---|---|
| a) | still energized at the low voltage | Emergency Diesels |
| b) | still energized at the low voltage | RSSTs |
| c) | de-energized | Emergency Diesels |
| d) | de-energized | RSSTs |

Proposed Answer: A

Explanation (Optional): "C" and "D" are wrong, but plausible, since sustained UV to lockout the NSST for the 4160V buses is 70%, and since voltages is 80%, the NSST supply breakers will not open. After a brownout exists for 4.5 minutes with no SIS signal present, the 4160V buses will attempt to transfer to the RSSTs. But this feature is interlocked with RSST voltage, and will not occur if RSST voltage is less than 97% ("A" wrong, but plausible). This causes the 34A-34C and 34B-34D tie breakers to open, causing the emergency diesels to automatically start and energize the emergency buses from the EDG ("A" correct).

Technical Reference(s): OP 3353.MB8A (Rev. 06-0), 3-12 and 2-2
(Attach if not previously provided, LSKs 24-3.A (Rev. 8), 3.B (Rev. 8), 3.C (Rev. 8), 3.D, (Rev. 12),
including version/revision number) LSKs 24-3.E (Rev. 8), 3.F (Rev. 8), 3.G (Rev. 8), 3.H (Rev. 8),
LSKs 24-3.J (Rev. 9),and 3.K (Rev. 11)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05023 Describe the 4 kV Distribution System operation under normal, abnormal, and emergency conditions: A. At power operations B. Main Generator trip C. Loss of NSSA D. Loss of RSSA (As available)

Question Source: Bank #68084

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7 and 41.8

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 49 | Tier # | 2 | 2 |
| K/A Statement: Physical connections/cause-effect between the DC Electrical System and the AC Electrical System | Group # | 1 | 1 |
| | K/A # | 063.K1.2 | |
| Proposed Question: | Importance Rating | 2.7 | 3.2 |

How is the 120 VAC System physically designed to ensure that the output of the Rectifier and not the DC Bus is normally supplying the Inverter?

a) Blocking diodes in the line from the DC bus prevent the DC bus from supplying the Inverter.
b) The Static Selector Switch is normally selected to the output of the Rectifier.
c) The Maintenance Bypass Switch is normally selected to the output of the Rectifier.
d) Rectifier output voltage is higher than DC bus output voltage.

Proposed Answer: D

Explanation (Optional): The DC Bus is physically connected in parallel with the rectifier output to the input to the inverter. The DC Bus does not normally supply power to the inverter because the rectifier output voltage is maintained at 140 VDC, while the DC Bus voltage is normally about 135 VDC, which is battery charger voltage ("D" correct). "A" is wrong, but plausible, since current flow from the rectifier output to the DC Bus is prevented by blocking diodes in the DC supply line to the inverter. "B" and "C" are wrong, but plausible, since the static switch and Maintenance Bypass Switch are at the output of the inverter, not the rectifier, and are used is used to transfer the load from the inverter to the bypass line, not the DC Bus.

Technical Reference(s): EE-1BA (Rev. 31)
(Attach if not previously provided, including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03296 Describe the function and location of the following major 120 volt AC system components: A. Uninterruptible power supply components: 1. Rectifier 2. Inverter 3. Static Switch 4. Bypass Line Regulator B. Manual Bypass Switch (As available)

Question Source: Bank #68190

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.8

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 50 | Tier # | 2 | 2 |
| K/A Statement: Manually operate/monitor local/remote | Group # | 1 | 1 |
| operation of the Emergency Diesel Generator | K/A # | 064.A4.1 | |
| Proposed Question: | Importance Rating | 4.0 | 4.3 |

With the plant at 100% power, the following sequence of events occurs:

1. A PEO starts the "A" Emergency Diesel (EDG) locally for a surveillance run.
2. The PEO places the local Diesel Mode Control Switch in "REMOTE".
3. The PEO reports abnormal noise coming from the "A" EDG.

Complete the following statement concerning emergency-stopping the "A" EDG in these conditions.

The minimum coincidence required when depressing the emergency stop pushbuttons is __(1)__, and the operating location(s) where these pushbuttons function is/are at __(2)__.

a) 1 of 2 — the local control panel or at MB8
b) 1 of 2 — MB8 only
c) 2 of 2 — the local control panel or at MB8
d) 2 of 2 — MB8 only

Proposed Answer: D

Explanation (Optional): The minimum coincidence needed to emergency-trip the EDG is 2 of 2 pushbuttons depressed simultaneously ("A" and "B" wrong). "A" and "B" are plausible, since some pairs of switches or pushbuttons, such as SIS actuation switches, have a 1 of 2 coincidence; and some are train-specific, such as SI Reset pushbuttons. "D" is correct, and "C" wrong, since when in REMOTE, the emergency stop pushbuttons at the local control panel will not trip the EDG, only the pushbuttons at MB8. "C" is plausible, since the EDG was started locally, and having emergency trip pushbuttons not function may appear non-conservative.

Technical Reference(s): OP 3346A (Rev. 35-0), section 4.10
(Attach if not previously provided, LSK 24-9.3J (Rev. 8)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05189 Describe the operation of the following emergency diesel generator system components controls and interlocks… emergency stop relay… (As available)

Question Source: Bank #64191

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7 and 41.8

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 51 | Tier # | 2 | 2 |
| K/A Statement: Predict impact/mitigate a | Group # | 1 | 1 |
| Process Radiation Monitor detector failure | K/A # | 073.A2.2 | |
| Proposed Question: | Importance Rating | 2.7 | 3.2 |

With the plant at 100% power, the following sequence of events occurs:

1. SG Blowdown Radiation Monitor (3SSR*RE08) fails high.
2. Blowdown flow isolates.
3. The SM directs Chemistry Department to obtain grab samples to comply with the REMODCM.
4. Chemistry Department requests that the crew restore blowdown flow as soon as possible since the Chemistry Performance Index (CPI) is 1.09.

Complete the following statement.

The Blowdown System valves that automatically closed as a direct result of the SSR08 failure are the (1)___, and the minimum action(s) physically required by the crew to allow the re-opening of the closed valves to re-establish blowdown flow is/are___(2)___.

a) (1) SG Blowdown Flow Control Valves (3BDG-HV20A-D)
   (2) remove SSR08 from service and depress the Blowdown Sample Isolation Reset pushbuttons on MB1.
b) (1) SG Blowdown Flow Control Valves (3BDG-HV20A-D)
   (2) depress the Blowdown Isolation Reset pushbuttons on MB1 only.
c) (1) SG Blowdown Containment Isolation Valves (3BDG*CTV22A-D)
   (2) remove SSR08 from service and depress the Blowdown Sample Isolation Reset pushbuttons on MB1.
d) (1) SG Blowdown Containment Isolation Valves (3BDG*CTV22A-D)
   (2) depress the Blowdown Isolation Reset pushbuttons on MB1 only.

Proposed Answer: D

Explanation (Optional): A Hi Rad signal from SSR08 auto-closes the SG Blowdown CIVs ("A" and "B" wrong). The Hi Rad signal can be overridden by resetting blowdown isolation on MB1, even with the initiating signal still present ("C" wrong, and "D" correct). "A" and "B" are plausible, since 3BDG-HV20A-D also receive AUTO-CLOSE signals, but not from Hi Rads, and 3BDG-HV20A-D will stop blowdown flow if closed. "A" and "C" are plausible, since the Blowdown Sample Isolation Reset pushbuttons are also on MB1, and for some reset circuits, such as SIS reset, the SIS will come right back in after a reset if the actuating signal is still present.

Technical Reference(s): AOP 3573 (Rev. 23-0), Att. A, page 12 of 12.
(Attach if not previously provided, LSK 32-13A (Rev. 9)
including version/revision number) LSK 32-13C (Rev. 4)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05472 Given a failure of the Radiation Monitoring System (partial or complete), determine the effects on the system and on inter-related systems. (As available)

Question Source: Bank #80885

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7 and 41.11

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 52 | Tier # | 2 | 2 |
| K/A Statement: Ability to determine operability | Group # | 1 | 1 |
| and/or availability of safety related equipment | K/A # | 076.GEN.2.2.37 | |
| related to the Service Water System | Importance Rating | 3.6 | 4.6 |

Proposed Question:

The "A" EDG is running, when a mat of debris in the Service Water System severely fouls the "A" EDG Engine Air Cooler Water (Intercoolant) Heat Exchanger.

Which other systems (in addition to the loads of the Intercoolant Water System), if any, will be impacted by the decreased Service Water flow?

a. No other "A" EDG systems will be affected.
b. The "A" EDG Jacket Water Cooling System only, will heat up.
c. The "A" EDG Lube Oil System only, will heat up.
d. Both the "A" EDG Jacket Water Cooling System and Lube Oil Systems will heat up.

Proposed Answer: D

Explanation (Optional): Service Water flows in series from the Air Cooler Water (Intercoolant) Heat Exchanger to the Jacket Water Heat Exchanger, so Jacket Water temperature would be impacted with increased temperatures ("A and "C" wrong). Since Jacket Water cools the Lube Oil Heat Exchanger, the Lube Oil system will be similarly affected ("D" correct, "B" wrong).

Technical Reference(s): P & ID 116A (Rev. 47)
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04395; Describe the function and location of the following EDG (and Support) system components... Jacket Water Cooling system... Intercoolant system... Lube Oil system... (As available)

Question Source: Bank #316065

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.8

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 53 | Tier # | 2 | 2 |
| K/A Statement: Monitor automatic operation of | Group # | 1 | 1 |
| the Instrument Air System due to air pressure | K/A # | 078.A3.1 | |
| Proposed Question: | Importance Rating | 3.1 | 3.2 |

With the plant at 100% power, the following sequence of events occurs:

1. A PEO reports an air leak on the instrument air ring header in the turbine building.
2. The RO reports that instrument air header pressure is at 88 psig and decreasing slowly.
3. The RO is observing instrument air pressure for indications of service air to instrument air cross tie valve 3IAS-AOV14 opening and service air supply valve 3SAS-AOV33 closing.

Assuming the added capacity of the Service Air Compressor is capable of compensating for the leak, complete the following statement as to how instrument air header pressure will respond prior to any local actions by PEO's.

After IAS header pressure lowers to __(1)___, pressure will start to recover when 3IAS-AOV14 and 3SAS-AOV33 realign. Pressure will start to drop again when IAS header pressure increases to __(2)___, since the __(3)___.

| | (1) | (2) | (3) |
|---|---|---|---|
| a) | 80 psig | 103 psig | valves will realign to their original positions |
| b) | 80 psig | 110 psig | running instrument air compressors will unload |
| c) | 85 psig | 103 psig | valves will realign to their original positions |
| d) | 85 psig | 110 psig | running instrument air compressors will unload |

Proposed Answer: C

Explanation (Optional): Pressure switch 3IAS-PS14, which senses IAS common header pressure downstream of the IAS receivers, will cause AOV14 to open, and AOV33 to close when pressure lowers to 85 psig ("A" and "B" wrong). Additionally, when IAS header pressure increases to 103 psig, PS14 will automatically realign the AOV's to their normal positions, and pressure will again start to decrease since the leak has not been isolated ("C" is correct and "D" is wrong). "A" and "B" are plausible, since numerous setpoints exist based on IAS pressure. "D" is plausible, since if the cross tie valve did not realign at 103 psig, the running IAS compressors would unload at 110 psig.

Technical Reference(s): (Attach if not previously provided, including version/revision number)
OP 3353.IS (Rev. 03-0), 1-1
LSK-12-1C (Rev. 6)
LSK-12-2C (Rev. 8)
PAS Training Lesson Plan (Rev. 7), slide number 59

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05321 Describe the operation of the following plant air systems components controls and interlocks… Service air to instrument air cross-connect valve (IAS-AOV14)… (As available)

Question Source: Bank #67323

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.4 and 41.77

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 54 | Tier # | 2 | 2 |
| K/A Statement: Predict impact/mitigate | Group # | 1 | 1 |
| emergency containment entry | K/A # | 103.A2.5 | |
| Proposed Question: | Importance Rating | 2.9 | 3.9 |

With the plant at 100% power, the crew enters AOP 3568, *Emergency Breaking of Containment Vacuum*, in preparation for making an emergency containment entry.

The BOP Operator is reviewing a caution in AOP 3568 that warns the crew NOT to open 3HVU*CTV32A or 3HVU*CTV32B (containment purge isolation valves) during the containment repressurization.

The reason for this caution is that opening either 3HVU*CTV32A or 3HVU*CTV32B risks_____________.

a) radioactive contamination of Auxiliary Building ductwork

b) damage to ventilation ductwork in the Auxiliary Building

c) an unplanned radioactive release to the environment

d) damage to ventilation ductwork in containment

Proposed Answer: B

Explanation (Optional): The reason for the caution concerning keeping the CTVs closed is that pressure gradients between the Aux Building and Containment experienced during depressurization and repressurization of the containment structure require closure of containment purge air valves, 3HVU*CTV32A and 3HVU*CTV32B, to prevent damage to sheet metal ductwork in the Auxiliary Building ("B" correct). "A" is wrong but plausible since the CTMT atmosphere has yet to be tested and could contain small amounts of airborne activity. Opening either valve would provide an opening from CTMT to the Aux Building ventilation ductwork. 'C' is wrong but plausible since opening 3HVU*CTV32A provides a path to the Aux Building roof, and opening 3HVU*CTV32B provides a path to the turbine building stack. 'D' is wrong but plausible since opening 3HVU*CTV33A will expose CTMT ductwork to high pressure and flow during repressurization.

Technical Reference(s): AOP 3568 (Rev 03-2), Caution prior to step 2
(Attach if not previously provided, OP 3313F (Rev 13-0), Precaution 3.8
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04250 (215567); Describe operation of the Containment System under the following emergency conditions: Containment entry, loss of CTMT integrity and emergency breaking of CTMT vacuum. (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.5 and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 55 | Tier # | 2 | 2 |
| K/A Statement: Effect of loss of malfunction of | Group # | 1 | 1 |
| Containment integrity under normal operations | K/A # | 103.K3.2 | |
| Proposed Question: | Importance Rating | 3.8 | 4.2 |

With the plant at 100% power, the following sequence of events occurs:

1. The RO reports the following:
   - Containment pressure has started trending upward.
   - Current Containment pressure is 13.9 psia, and slowly increasing.
2. The crew enters AOP 3565, *Loss of Containment Vacuum/Integrity*.
3. The crew verifies normal radiation conditions exist in Containment.
4. The US directs the RO to operate the Containment Vacuum (CVS) System to lower Containment pressure using OP 3313E, *Containment Vacuum*.

Per OP 3313E, what CVS air removal path(s) is/are allowed to be aligned under these conditions to attempt to maintain Containment pressure?

a) The Containment Air Ejector only
b) One Containment Vacuum Pump only
c) One or both Containment Vacuum Pumps only
d) The Containment Air Ejector and both Containment Vacuum Pumps

Proposed Answer: C

Explanation (Optional): Explanation (Optional): The Containment Vacuum Air Ejector is used to initially drawdown Containment pressure to its normal operating range, and is much quicker at removing air than the vacuum pumps ("A" and "D" plausible). "A" and "D" are wrong, since the Air Ejector is not allowed to be aligned unless the plant is in MODES 5 or 6, since Technical Specification 3.6.5.1 requires the inside and outside Containment isolation valves for the steam jet air ejector suction line to be closed in MODEs 1, 2, 3, and 4. "C" is correct, and "B" wrong, since using both Containment Vacuum Pumps at once is allowed. "B" is plausible, since normally, one Containment Vacuum Pump is operated intermittently to compensate for air in-leakage after normal operating containment pressure has been reached.

Technical Reference(s): OP 3313E (Rev. 09-0), Section 1.2 and Precautions 3.1 and 3.3
(Attach if not previously provided, OP 3313E (Rev. 09-0), Note prior to step 4.2.1
including version/revision number) Tech Spec LCO 3.6.5.1 (Amendment No. 258)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04270 Describe the major administrative or procedural precautions and limitations placed on the operation of the Containment Vacuum System, and the basis for each. (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.9 and 41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 56 | Tier # | 2 | 2 |
| K/A Statement: Effect of loss/malfunction | Group # | 2 | 2 |
| of pumps on the Reactor Coolant System | K/A # | 002.K6.7 | |
| Proposed Question: | Importance Rating | 2.5 | 2.8 |

With the plant initially at 100% power, an earthquake occurs, and the following sequence of events occurs:

1. Offsite power is lost.
2. A four-square inch small break LOCA occurs on the "D" RCS Cold Leg.
3. Safety injection actuates.
4. No Charging Pumps are running, and none can be started.
5. No SIH Pumps are running, and none can be started.
6. Both RHR Pumps are running.

What will be the effect on the RCS of the loss of all high-head safety injection pumps?

a) RCS pressure will steadily decrease to accumulator injection pressure. Since break flow is adequate to remove all decay heat, SGs will no longer be removing heat, and accumulator injection will keep the core covered throughout the transient.
b) RCS pressure will steadily decrease to a pressure where mass into the RCS from the accumulators equals mass out of the break. Since break flow is not adequate to remove all decay heat, SGs will continue to remove excess decay heat via reflux boiling while slight core uncovery occurs.
c) RCS pressure will quickly decrease to, and stabilize at, approximately 1250 psia. The upper portions of the core will start to uncover, but the loop seal will clear in the RCS crossover leg, and shortly thereafter level in the fuel will recover, remaining covered until accumulators inject.
d) RCS pressure will quickly decrease to, and stabilize at, approximately 1250 psia. The loop seal will clear in the RCS crossover leg, but deep core uncovery will exist for several minutes before pressure drops low enough for accumulators to start recovering core level.

Proposed Answer: D

Explanation (Optional): "D" is correct, since on a small cold leg break, the vessel will draw a bubble and act as a pressurizer due to decay heat addition. The cold leg will remain full of water, limiting heat removal out the break, so decay heat input exceeds heat removal out the break. Excess heat will be removed through the steam generator reliefs, resulting in RCS pressure stabilizing at a pressure slightly above the steam generator pressure ("A" and "B" wrong). Even with equilibrium RCS pressure, break flow continues depleting RCS inventory. When the loop seal clears, steam will flow through the break, resulting in increased heat removal, so RCS depressurization occurs, but the fuel will remain uncovered until RCS pressure reaches accumulator pressure ("C" wrong). "A" is plausible, since this is the basic response to a hot leg break where break size is large enough to remove all decay heat. "B" is plausible, since this is the basic pressure response expected for a small break LOCA that is small enough that makeup can replace all the water lost out the break, except pressure would stabilize above SG pressure. "C" is plausible, since this is basic trend for a small cold leg break with high head ECCS available.

Technical Reference(s): Westinghouse MITCORE Core Cooling Text (1991), Figures 2.2.4 and 2.2.5
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination:

Learning Objective: MC-04933 Assuming no operator action, analyze the loss of core cooling event leading to core damage (As available)

Question Source: Bank #80924

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5, 41.8, and 41.14

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 57 | Tier # | 2 | 2 |
| K/A Statement: Power supplies to NIS | Group # | 2 | 2 |
| channels, components and interconnections | K/A # | 015.K2.1 | |
| Proposed Question: | Importance Rating | 3.3 | 3.7 |

Complete the following statement concerning the functions being supplied by Control Power to Power Range (PR) NIS Channel N41.

Control Power is provided from__(1)___, and provides power to the__(2)___on the NIS Power Range Drawer.

| | (1) | (2) |
|---|---|---|
| a) | VIAC 1 | PR meters |
| b) | VIAC 1 | Bistable lamps |
| c) | Battery 1 | PR meters |
| d) | Battery 1 | Bistable lamps |

Proposed Answer: B

Explanation (Optional): Control Power is provided from VIAC 1 ("C" and "D" wrong), and provides power to the Bistable lamps on the NIS Power Range Drawers ("B" correct, "A" wrong). "A" is wrong, but plausible, since instrument power from VIAC 1 supplies the meters. "C" and "D" are plausible, since Battery 1 supplies control power to numerous safety related circuits.

Technical Reference(s): Training Drawing NIS-15 (Rev. 5/0) Control Power Drawing
(Attach if not previously provided, (Based on NIS Tech Manual Drawing)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05229 For the following conditions, determine the effects on the Nuclear Instrumentation System and on interrelated systems… Blown Power Range control power fuse… (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 58 | Tier # | 2 | 2 |
| K/A Statement: Operational implications of | Group # | 2 | 2 |
| separation of control and protection circuits | K/A # | 016.K5.1 | |
| Proposed Question: | Importance Rating | 2.7 | 2.8 |

The Master Pressurizer Pressure controller develops a ground in its control circuitry.

What is the immediate electrical effect, if any, on the Reactor Protection System?

a) No effect, since protection and control circuits use separate detectors, power supplies, and circuitry.
b) No effect, since the control circuit is electrically isolated from the protection circuit.
c) The associated protection system bistable trips.
d) The associated protection system alarms actuate, but the bistable does NOT trip.

Proposed Answer: B

Explanation (Optional): "B" is correct, and "A", "C", and "D" wrong, since control signals going to the controller are electrically isolated from the protection circuits, to prevent electrical faults in control circuits from affecting safety circuits. "A" is plausible, since this relates to circuits used to shutdown the plant when the crew is required to evacuate the control room due to a fire. "C" is plausible, since the circuits use the same input signals. "D" is plausible, since alarm circuits upstream of the trip bistables are not electrically isolated from control circuits.

Technical Reference(s): Process Sheet 12 (Rev. N)
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05243 Discuss the difference between "Process Control" and "Process Protection". (As available)

Question Source: Bank #68324

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 59 | Tier # | 2 | 2 |
| K/A Statement: Predict/monitor changes in Spent Fuel | Group # | 2 | 2 |
| Pool water level associated with operating Spent Fuel | K/A # | 033.A1.1 | |
| Pool Cooling System controls | Importance Rating | 2.7 | 3.3 |

Proposed Question:

What would cause PGS Makeup Valve to the Spent Fuel Pool (3SFC-LV44) to open and cause Fuel Pool level to start increasing?

a) 3SFC-LV44 will automatically open with the control switch on the Fuel Pool Cooling Panel for LV-44 in the auto position when Spent Fuel Pool level drops below 44%.
b) 3SFC-LV44 will automatically open with the control switch on the Fuel Pool Cooling Panel for LV-44 in the auto position when Spent Fuel Pool level drops below 35%.
c) 3SFC-LV44 will open manually when the open pushbutton on either the Fuel Pool Cooling Panel OR Main Board 1 is depressed, <u>only</u> if Spent Fuel Pool level is below 44%.
d) 3SFC-LV44 will open manually when the open pushbutton on either the Fuel Pool Cooling Panel OR Main Board 1 is depressed, <u>only</u> if Spent Fuel Pool level is below 35%.

Proposed Answer: C

Explanation (Optional): The normal SFP makeup valve, 3SFC-LV44, is controlled from MB1 or the Fuel Pool Cooling Panel by Open/Auto - Close pushbutton controllers. Makeup valve LV-44 is normally opened manually when SFP level reaches 40% level (Low Level Alarm is at 35%). The makeup valve is normally opened at MB1 but can be opened at the FP. When SFP level reaches 44%, level transmitter LT-26 provides a Close signal for LV-44. Either of the controllers in the Close position will also cause LV-44 to close. "C" is correct, since LV44 will open if the open pushbutton at either the Fuel Pool Cooling Panel or MB1 is depressed, and SF Pool level is less than the auto-close setpoint of 44% ("D" wrong). "D" is plausible, since 35% is the low level alarm setpoint. "A" and B" are wrong, since there is no auto-open feature. "A" and "B" are plausible, since there is an auto-close feature for the valve.

Technical Reference(s): OP 3305 (Rev 25-0), Section 4.13.2.a
OP 3353.MB1A (Rev. 08-0), 3-4
LSK 34-1B (Rev. 9)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05641 Describe the operation of the following Spent Fuel Pool Cooling System controls and interlocks... Spent Fuel Pool Makeup Valve (SFC-LV44) (As available)

Question Source: Bank #65338
Question History:
Question Cognitive Level: Comprehension or Analysis
10 CFR Part 55 Content: 55.41.5
Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 60 | Tier # | 2 | 2 |
| K/A Statement: Manually operate/monitor neutron levels in the Control Room associated with Fuel Handling Equipment | Group # | 2 | 2 |
| | K/A # | 034.A4.2 | |
| Proposed Question: | Importance Rating | 3.5 | 3.9 |

The plant is in MODE 6, with current conditions as follows:

- Fuel handling operations are in progress, with new fuel being loaded into the core from the Spent Fuel Pool.
- Both Westinghouse Source Range NIS channels are operating normally.
- Gammametrics Channel 2 is not available
- Gammametrics Channel 1 is operating normally
- The following NIS switch positions are selected at the NIS Cabinets:
  - The "Channel Selector Switch" on the Audio Count Rate drawer is in the "N-31" position.
  - The "Amplifier Selector" switch on the rear of the Audio Count Rate drawer is in the "Normal" position.
  - The "Audio Multiplier Switch" on the Audio Count Rate drawer is in the "10" position.

What visual indications of neutron counts are available at the NIS cabinets, and what audible indication of counts is heard in the Control Room?

| | Visual indication of neutron counts | Audible indication of neutron counts |
|---|---|---|
| a) | Westinghouse and Gammametrics | Westinghouse |
| b) | Westinghouse and Gammametrics | Gammametrics |
| c) | Westinghouse only | Westinghouse |
| d) | Westinghouse only | Gammametrics |

Proposed Answer: A

Explanation (Optional): Westinghouse and Gammametrics Source Range indications exist in the Control Room at the NIS Cabinets ("C" and "D" wrong), since all of the switches in the question stem only affect audible counts. "C" and "D" are plausible, since only Westinghouse NIS is available at MB4, and another Gammametrics indication exists at the Aux Shutdown Panel area. Audible counts is aligned to Westinghouse when in the "Normal" position ("A" correct). "B" is wrong, since Gammametrics Channel "1" is not capable of emitting sound. "B" is plausible, since Gammametrics channel "2" is capable of providing audible indication in the Control Room, but it is deenergized.

| | |
|---|---|
| Technical Reference(s): (Attach if not previously provided, including version/revision number) | OP 3360 (Rev. 07-9), Section 4.7<br>Training Drawing NIS-22 (Rev. 5/0)<br>(Based on Tech Manual) |

Proposed references to be provided to applicants during examination: None

| | | |
|---|---|---|
| Learning Objective: | MC-05221 Describe the function and location (Control Room and Auxiliary Shutdown Panel) of the following major Ex-core and Incore Nuclear Instrumentation System components… Audio Count Rate/Timer – Scaler… | (As available) |

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 61 | Tier # | 2 | 2 |
| K/A Statement: Monitor automatic operation | Group # | 2 | 2 |
| of Steam Generator Water Level Control | K/A # | 035.A3.1 | |
| Proposed Question: | Importance Rating | 4.0 | 3.9 |

With the plant initially at 80% power, the following sequence of events occurs:

1. The extra operator is monitoring the Steam Generators at MB5 to verify proper operation of SGWLC.
2. The crew commences a rapid downpower at 5% per minute per AOP 3575, *Rapid Downpower*.

Complete the following statement about how the Main Feed Regulating Valves will respond to the downpower.

The Main Feed Regulating Valves initially throttle in the __(1)__ signal. This will be followed by the valve throttling as needed to __(2)__.

| | (1) | (2) |
|---|---|---|
| a) | closed direction due to the level error | match feed flow and steam flow |
| b) | open direction due to the level error | match feed flow and steam flow |
| c) | closed direction due to the flow error | restore SG levels to 50% |
| d) | open direction due to the flow error | restore SG levels to 50% |

Proposed Answer: C

Explanation (Optional): SGWLC receives a "flow error" signal from feed flow versus steam flow, and a "level error" signal, which compares actual Narrow Range level to the level setpoint of 50% ("A", "B", and "D" plausible). As steam flow decreases when the downpower commences, steam flow becomes less than feed flow, and SG inventory increases due to a decrease in steam flow. However, SG level is measured in the downcomer region of the SGs, which experiences "shrink" as the downpower is commenced, creating an artificially low level indication. SGWLC is designed to respond initially to the flow error signal, which anticipates the change in SG inventory, while the level error signal is lagged due to shrink or swell. So initially, the feed control valve throttles in the close direction ("D" wrong) due to flow error ("A" and "B" wrong), and then adjusts as needed to restore level to 50%, since SGWLC is also designed to be level dominant ("C" correct).

Technical Reference(s): Functional Sheet 13 (Rev. K)
(Attach if not previously provided, Functional Sheet 14 (Rev. K)
including version/revision number) Process Block Sheet 33 (Rev. J)

Proposed references to be provided to applicants during examination:

Learning Objective: MC-04660 Describe the operation of the following Main Feedwater & Steam Generator Water Level Control Systems Controls & Interlocks… Main Feed Regulating Valves (FWS*FCV510/520/530/540)… (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 62 | Tier # | 2 | 2 |
| K/A Statement: Ability to verify that Waste Gas Disposal | Group # | 2 | 2 |
| System alarms are consistent with plant conditions | K/A # | 071.GEN.2.4.46 | |
| Proposed Question: | Importance Rating | 4.2 | 4.2 |

With the plant at 100% power the following valves automatically reposition in the plant:

- Degasifier Feed Preheater Steam Supply Valve 3ASS-TV31 closes.
- Degasifier Preheater Condensate Divert Valve 3CNA-AOV46 diverts to the Aux Building Sump.

A PEO is dispatched to the Gaseous Waste Panel to investigate.

Which alarm at the Gaseous Waste Panel would have caused the automatic valve responses that occurred?

a) DEGASIFIER FEED PRESSURE LO
b) GAS WASTE FEED PREHTR OUT COND HI
c) PROCESS GAS CHARCOAL BED RADIATION HI
d) PROCESS GAS RECEIVER PRESSURE HI

Proposed Answer: B

Explanation (Optional): Upon receipt of high conductivity, 3CNA-AOV 46 diverts to the Aux Building Sump AND 3ASS-TV31 closes ("B" correct). "A" and "D" are wrong, since these annunciators do not have automatic actions associated with them. "C" is wrong, since this annunciator causes the Process Gas Receiver Pressure Control Valve (3GWS-PV49 to automatically close. "A, "C", and "D" are plausible, since all of these are actual alarms on the GWS panel, and numerous alarms at the GWS Panel (such as degasifier high level) result in automatic actions.

Technical Reference(s): OP 3353.GW (Rev. 01-0) 1-1, 2-2, 2-5, and 2-6
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04733 (315650) Given a failure, partial or complete, of the GWS system, determine the effects on the system and on interrelated systems. (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 63 | Tier # | 2 | 2 |
| K/A Statement: Area Radiation System design feature/inter- | Group # | 2 | 2 |
| lock which provides for containment ventilation isolation | K/A # | 072.K4.1 | |
| Proposed Question: | Importance Rating | 3.3 | 3.6 |

The plant is in MODE 5, with the CTMT Purge System (HVU) in operation.

Fuel Drop monitor 3RMS*RE42 goes into HIGH alarm.

What immediate automatic actions, if any, occur on the running CTMT Purge Exhaust Fan (3HVR-FN4A or 4B), and/or on the purge supply valves (3HVU*CTV32A and 33A) and exhaust valves (3HVU*CTV32B and 33B)?

a) The Fan continues to run. One supply valve and one exhaust valve close.
b) The Fan trips. One supply valve and one exhaust valve close.
c) The Fan continues to run. All four supply and exhaust valves close.
d) The Fan trips. All four supply and exhaust valves close.

Proposed Answer: A

Explanation (Optional): High Radiation isolates the CTMT Purge Supply and Exhaust paths if either fuel drop monitor goes into alarm. One monitor isolates the supply and return inside containment valves, and the other monitor isolates the outside containment valves ("C" and "D" wrong). The fans do not receive an auto-trip signal ("A" correct, "B" wrong). "C" and "D" are plausible, since each of these isolates CTMT. "B" is plausible, since the fan is running without a suction path.

Technical Reference(s): (Attach if not previously provided, including version/revision number)
AOP 3573 (Rev. 23-0), Attachment B, page 5 of 5
P&ID 148A (Rev. 42)
P&ID 153A (Rev. 29)
LSK 22-1D (Rev. 7)
LSK 22-27E (Rev. 6)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05467 Describe the operation of the following Radiation Monitoring System Radiation Monitors Controls and interlocks: A. RMS-RE-41/42… (As available)

Question Source: Bank #73071

Question History:

Question Cognitive Level: Memory of Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7 and 41.11

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 64 | Tier # | 2 | 2 |
| K/A Statement: Physical connections/cause-effect between Rod Control and NIS/RPS | Group # | 2 | 2 |
| | K/A # | 001.K1.05 | |
| Proposed Question: | Importance Rating | 4.5 | 4.4 |

With power initially at 100% power, the following sequence of events occurs:

1. Power Range NI Channel N44 rapidly fails high.
2. Control Bank "D" rods start to drive in.

Assuming no operator action is taken, complete the following statements about how the Rod Control System responds to this event.

Automatic inward rod motion will__(1)___. Prior to switch operation at the NIS cabinet, rods__(2)___be withdrawn manually at MB4.

a) stop as the power mismatch signal decays — CANNOT
b) stop as the power mismatch signal decays — CAN
c) continue until rods are fully inserted — CANNOT
d) continue until rods are fully inserted — CAN

Proposed Answer: A

Explanation (Optional): The power mismatch signal (difference in the rate of change between reactor and turbine load) will initially cause rods to drive in due to a rapid increase in auctioneered high NIS power. As rods drive in, Tave decreases. Temperature error will start offset the inward rod motion signal, and the and the power mismatch signal will decay, since it is not a primary to secondary power mismatch signal ("C" and "D" wrong), but a rate of change signal. This would result in inward rod motion stopping. The overpower rod stop coincidence is 1 of 4 channels, so outward rod motion is blocked until the failed channel is defeated at the NIS cabinets ("A" correct and "B" wrong). "C" and "D" are plausible, since this would be true if a temperature instrument failed high, since temperature error is based on difference between Tave and Tref, not a rate of change between the two. "B" is plausible, since most of the RPS coincidences are 2 of 4 channels, not 1 of 4.

Technical Reference(s): (Attach if not previously provided, including version/revision number) Functional Sheet 9 (Rev. H)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05477 Describe the operation of the following Rod Control System controls and interlocks: A. Manual Rod Control Switch B. Bank Selector Switch C. Control Interlocks 1. C-1 2. C-2... (As available)

Question Source: Bank #64983

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 10 CFR 55.41.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 65 | Tier # | 2 | 2 |
| K/A Statement: Predict impact/mitigate | Group # | 2 | 2 |
| low Fire Protection header pressure | K/A # | 086.A2..2 | |
| Proposed Question: | Importance Rating | 3.0 | 3.3 |

While performing construction work on the west side of the Unit 3 Turbine Building, the following sequence of events occurs:

1. A backhoe inadvertently causes a moderate size rupture in the Fire Protection Water (FPW) header.
2. The FPW System header pressure drops to and stabilizes at 50 psig.

Prior to operator action, what is the status of the FPW pumps?

a) The Diesel Driven Fire Pump will be running only.
b) The Unit 3 Electric Driven Fire Pump will be running only.
c) Both Electric Driven Fire Pumps will be running only.
d) All three of the Main Fire Pumps will be running.

Proposed Answer: D

Explanation (Optional): The first electric pump auto-starts at 95 psig decreasing ("B" plausible), and the second starts at 85 psig decreasing ("C" plausible). Continued decrease in pressure will cause the diesel pump to start at 75 psig decreasing. "D" is correct, and "A", "B", and "C" wrong, since header pressure has dropped to 50 psig, all three pumps are running. "A" is plausible, since on several systems, such as AFW, Lube Oil, and Seal Oil, the non-electric pumps receive different start signals than the electric pumps.

Technical Reference(s): MP3 FPER (Rev. 30-0), Section 4.1.1
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04610 Describe the function and location of the following Water Fire Protection (FPW) system components… Electric Fire Pumps (2 total)… Diesel Fire Pump… (As available)

Question Source: Bank #67312

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.4 and 41.7

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 66 | Tier # | 3 | 3 |
| K/A Statement: Knowledge of administrative | Group # | 1 | 1 |
| requirements of temporary management directives such | K/A # | GEN.2.1,15 | |
| standing orders, night orders, operations as memos, etc. | Importance Rating | 2.7 | 3.4 |

Proposed Question:

A Temporary Standing Order has just been issued per OP-AA-100, *Conduct of Operations*.

Per OP-AA-100, what is normally allowed/required for Temporary Orders?

a) They are normally issued to support equipment operability.
b) They normally do NOT require Operations Management approval.
c) They are issued to change procedures.
d) They are reviewed by shift Operators as part of the shift turnover process.

Proposed Answer: D

Explanation (Optional): This question is based on Millstone 3 OE (CR1042287) when oncoming watchstanders did not review standing orders prior to taking the shift. Temporary orders are used to amplify or clarify operational information of a temporary nature; they are not used to change procedures ("C" wrong) or support operability ("A" wrong), with the exception of where the Tech Spec or TRM is determined to be improper or inadequate. They are
Written in a clear and concise manner
Approved by Operations management ("B" wrong)
Consistent with approved procedures
Reviewed by shift Operators as part of the shift turnover process ("D" correct)
Available in hard-copy or electronically
Reviewed by Security for Target Set impact
"A" is plausible, since compensatory actions (such as dedicated operators) may be taken in certain situations to support equipment operability. "B" is plausible, since these orders are temporary in nature. "C" is plausible, since there is a process for making temporary procedure changes.

Technical Reference(s): OP-AA-100 (Rev. 33-0), Att. 7, page 1 of 2.
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05072 Discuss on-coming shift responsibilities (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 67 | Tier # | 3 | 3 |
| K/A Statement: Knowledge of how to conduct | Group # | 1 | 1 |
| system lineups, such as valves, breakers, switches, etc. | K/A # | GEN.2.1.29 | |
| Proposed Question: | Importance Rating | 4.1 | 4.0 |

An operator has completed the initial positioning (valve lineup) on Train A High Pressure Safety Injection System valves.

A second operator has just been dispatched to perform a Valve Position Verification on the system.

Two of the valves the operator is verifying are:

- 3SIH*V89 (3SIH*P1A DIS PRES INST PI919 ISOL)
- 3SIH*V107 (3SIH*P1A TO HOT LEG 32 BALANCING)

**Using the attached copy of OP 3308-003 "Train A High Pressure Safety Injection System,"** how is the operator required to verify the positions of these two valves?

a) Turn the hand wheel for 3SIH*V89 in the CLOSED direction until stem movement is verified, then turn the hand wheel until the valve is fully open, and then CLOSE the valve ¼ turn. Check the locking device secured for 3SIH*V107 and hinders valve operation.
b) Verify the sealing device is intact for 3SIH*V89. Remove the locking device for 3SIH*V107, CLOSE the valve, OPEN the valve the required number of turns and reinstall the locking device.
c) Verify the sealing device is intact for 3SIH*V89. Check the locking device secured for 3SIH*V107 and that the locking device hinders valve operation.
d) Turn the hand wheel for 3SIH*V89 in the CLOSED direction until stem movement is verified, and then turn the hand wheel until the valve is fully open. Remove the locking device for 3SIH*V107, CLOSE the valve, OPEN the valve the required number of turns and reinstall the locking device.

Proposed Answer: C

Explanation (Optional): "BOP" indicates 3SIH*V89 is to be sealed Back-seated Open. This is verifying the sealing device is intact and has NOT been damaged ("A" and "B" wrong). "LT" indicates 3SIH*V107 is to be Locked Throttled. This is accomplished by checking the locking device secured. This valve should not be adjusted, since it was set based on flow per the surveillance procedure ("C" correct, "D" wrong). "A" and "B" are plausible; since the normal method for checking valves open is to close the valve ¼ turn off the open seat. "D" is plausible, since this method is normally used to initially position throttled valves.

Technical Reference(s): PI-AA-500 (Rev. 3), Attachment 2, step 1.d and e (Sealed/Locked valves)
(Attach if not previously provided, OP 3308-003 (Rev. 005-03)
including version/revision number)

Proposed references to be provided to applicants during examination: **OP 3308-003**

Learning Objective: MC-05095 Describe the process for verifying the position of the following types of equipment: A) manual valves, B) throttle valves, C) locked valves, D) in-service breakers, E) disabled breakers, and F) removed from service breakers (As available)

Question Source: Bank #85268

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 68 | Tier # | 3 | 3 |
| K/A Statement: Ability to interpret | Group # | 1 | 1 |
| and execute procedure steps | K/A # | GEN.2.1.20 | |
| Proposed Question: | Importance Rating | 4.6 | 4.6 |

In accordance with AD-AA-102, *Procedure Use and Adherence*, what specific requirements exist while executing steps from a "Reference Use" procedure?

a) The operator will have a copy of the procedure or applicable pages available at the work site or be in direct communication with someone who has a copy and refer to the procedure as often as required to complete the task in accordance with the procedure requirements.
b) The operator will keep the procedure in hand for steps marked as "critical steps," and keep the procedure readily available, though not necessarily at the work location, for the remaining steps.
c) The operator will either have the applicable pages of the procedure in hand or be in direct communication with someone who has the procedure and placekeep as each step is performed.
d) The operator will review the procedure, as needed, before using it to perform the task. However, performing the activity from memory does **NOT** relieve the user of the responsibility of performing it in accordance with the procedure.

Proposed Answer: A

Explanation (Optional): "A" is correct, since a Reference Use procedure shall be used as follows:
1. HAVE a copy of the procedure or applicable pages available at the work site OR BE in direct communication with someone who has a copy.
2. REFER to the procedure as often as required to complete the task in accordance with the procedure requirements.
"B" is wrong, but plausible, since this describes the requirements of a "Multiple Use" procedure.
"C" is wrong, but plausible, since this describes the requirements of a "Continuous Use" procedure.
"D" is wrong, but plausible, since this describes the requirements of an "Information Use" procedure.

Technical Reference(s): AD-AA-102 (Rev. 12-0), Section 3.2.1.b
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06763 State the criteria that would assign a procedure as a Reference Level of Use (As available)

Question Source: Bank #85268

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 69 | Tier # | 3 | 3 |
| K/A Statement: Ability to recognize system parameters | Group # | 2 | 2 |
| that are entry level conditions for Tech Specs | K/A # | GEN.2.2.42 | |
| Proposed Question: | Importance Rating | 3.9 | 4.6 |

With the plant at 100% power, the following conditions exist:

- SIL Accumulator "D" borated water volume is 6650 gallons.
- RWST Recirculation Pumps (3QSS-P1A and P1B) are NOT running.
- RWST borated water volume is 1,100,000 gallons.
- RWST temperature is 46° F.

Which of these conditions requires entry into a Technical Specification ACTION STATEMENT?

a) Accumulator Volume.
b) RWST Recirc Pumps.
c) RWST Volume.
d) RWST Temperature.

Proposed Answer: C

Explanation (Optional): "A" is wrong, but plausible, since accumulator volume is within the required volume of 6618 and 7030 gallons. "B" is wrong, since RWST Recirc Pumps cycle to maintain RWST temperature, but are not required by Technical Specifications. "C" is correct, since RWST volume is below the required volume of 1,166,000 and 1,207,000 gallons. "D" is wrong, since RWST temperature is between within the required temperature band of 42 and 73°F. “A” and “D” are plausible, since these are Tech Spec requirements. “B” is plausible, since RWST Recirc Pumps maintain RWST Temperature, which is required by Tech Specs.

Technical Reference(s): Tech Spec LCO 3.5.1 (Amendment 258)
(Attach if not previously provided, Tech Spec LCO 3.5.4. (Amendment 262)
including version/revision number)

Proposed references to be provided to applicants during examination:

Learning Objective: MC-06288 Describe the major administrative or procedural precautions and limitations placed on the operation of the Emergency Core Cooling System, and the basis for each. (As available)

Question Source: Modified Bank #74365 Parent Question attached

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.2 and 43.5

Comments:
Question is considered “modified” since RWST Level and Accumulator Volume have been changed in the stem, and RWST Recirc Pump status has been added to the stem. There is a new correct answer, and a new distractor about RWST Recirc Pumps.

Original Bank #74365

With the plant at 100% power, the RO is taking rounds and observes the following parameters:

- SIL Accumulator "D" borated water volume is 6200 gallons.
- SIL Accumulator "D" pressure is 640 psia.
- RWST borated water volume is 1,200,000 gallons.
- RWST temperature is 45° F.

Which of these conditions requires entry into a Technical Specification ACTION STATEMENT?

e) Accumulator volume.
f) Accumulator pressure.
g) RWST volume.
h) RWST temperature.

Correct Answer: A

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 70 | Tier # | 3 | 3 |
| K/A Statement: Ability to interpret Control Room indications to | Group # | 2 | 2 |
| verify the status and operation of a system, and understand how | K/A # | GEN.2.2.44 | |
| operator actions and directives affect plant and system conditions | Importance Rating | 4.2 | 4.4 |

Proposed Question:
After a mid-cycle reactor trip, a plant startup is in progress per OP 3203, *Plant Startup*, and current conditions are as follows:

- The plant is stable at 12% power.
- The oncoming BOP operator observes the following switch/indicator positions on MB5:

| MB5 Switch/Indication | Position |
|---|---|
| • FW PUMPS P4 TRIP BYPASS Switch: | NORMAL |
| • 3MSS-N07, Steam Dump "MODE SEL" Switch: | STM PRESS |
| • Atm Relief Bypass 3MSS*MOV74A Lockout Switch (MB5R): | LOCKOUT |
| • Feed Isolation Valve 3FWS*MOV35A Position Indication: | GREEN |

Which switch position/indication should the BOP operator report as "NOT expected" for current plant conditions, and what is the correct position/indication that should exist?

a) The FW PUMPS P4 TRIP BYPASS Switch should be in BYPASS.
b) The Steam Dump "MODE SEL" Switch should be in TAVE Mode.
c) The Atm Relief Bypass Valve Lockout Switch should be in NORMAL.
d) The Feed Isolation Valve position indicator should indicate RED.

Proposed Answer: A

Explanation (Optional): With the plant at 12% power, the "FW PUMPS P4 TRIP BYPASS" selector switch should be in BYPASS ("A" correct), since it is not placed in "NORMAL" until power is above 25% power. This switch is used to enable or bypass the Reactor Trip signal which trips the MFW Pumps. The Steam Dump "MODE SEL" Switch should be in the Steam Pressure Mode, since it is not placed in Tave Mode until power is above 25% ("B" is wrong, but plausible). The Atm Relief Bypass Valve Cutout Switch should be in LOCKOUT, since these BTP 9.5-1 Fire Safety cut out switches are normally in bypassed to prevent spurious operation in the event of a "hot short". These switches are switched to "Operate" prior to operating the valves, but the condenser steam dumps are in operation ("C" wrong, but plausible). The Feed Isolation Valve position indicator should indicate GREEN, since these valves are bypassed by the Feed Reg Bypass Valves, and are utilized to isolate the Main Feedwater Reg Valves while feeding with the bypass valves. They are opened at 25% power ("D" wrong, but plausible).

Technical Reference(s): OP 3203 (Rev. 23-0), steps 4.3.57, 58, and 64
(Attach if not previously provided, OP 3204 (Rev. 30-0), step 4.1.15
including version/revision number) GA-26 (Rev. 03-0), step 8

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03384 Describe the major action categories contained within OP 3203 (As available)

Question Source: Bank #86763

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.4, 41.7, and 41.10

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 71 | Tier # | 3 | 3 |
| K/A Statement: Ability to control | Group # | 3 | 3 |
| radiation releases | K/A # | GEN.2.3.11 | |
| Proposed Question: | Importance Rating | 3.8 | 4.3 |

The plant is at 100% power

The crew is preparing to discharge the "B" Low Level Liquid Waste Drain Tank (LLWDT) to the Circulating Water Discharge Tunnel per OP 3335D, *Radioactive Liquid Waste System.*

What are two actions taken **at the Rad Monitor (DRMS) Console** in the Control Room as part of controlling this discharge?

a) Check the Liquid Waste Effluent Monitor (3LWS-RE70) Sample Pump (3LWS-P10) is ON; and check the 3LWS-RE70 Alert and Alarm settings, and adjust if needed.
b) Check the Liquid Waste Effluent Monitor (3LWS-RE70) Sample Pump (3LWS-P10) is ON; and check the required dilution flowrate is met.
c) Check that an ebb tide (high tide going out) is in progress; and check the 3LWS-RE70 Alert and Alarm settings, and adjust if needed.
d) Check that an ebb tide (high tide going out) is in progress; and check the required dilution flowrate is met.

Proposed Answer: A

Explanation (Optional): Prior to discharge, the LLWDT will be recirculated and sampled. It is desirable to perform the discharge during an ebb tide ("C" plausible), but this check is not performed at the Rad Monitor Console ("C" wrong). A valve lineup will be conducted and independently verified. Adequate dilution flow will be verified by checking running Main Circ Pumps and Service Water Pumps on the Main Boards ("B" and "D" wrong, but plausible), At the Rad Monitor Console, LWS-70 will be purged, the sample pump will be checked "on", and Alert and Alarm setpoints will be checked and adjusted if needed ("A" correct).

Technical Reference(s): OP 3335D (Rev. 023-00), Sections 4.47 and 4.48
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04867; Describe the major administrative or procedural precautions and limitations placed on the operation of the LWS system, and the basis for each. (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.10 and 41.11

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 72 | Tier # | 3 | 3 |
| K/A Statement: Ability to use radiation monitoring systems, | Group # | 3 | 3 |
| such as fixed radiation monitors and alarms, portable survey | K/A # | GEN.2.3.5 | |
| instruments, personnel monitoring equipment, etc. | Importance Rating | 2.9 | 2.9 |

Proposed Question:

An operator is in the Turbine Driven Auxiliary Feedwater Pump Room, and is preparing to perform a manual frisk prior to exiting the ESF building.

How fast is the operator required to move the probe over the surface being checked; and what is the minimum count rate increase above background above which the operator would be considered contaminated?

| | Probe speed | Minimum countrate increase |
|---|---|---|
| a) | One inch per second | 100 counts per second |
| b) | One inch per second | 200 counts per second |
| c) | Four inches per second | 100 counts per second |
| d) | Four inches per second | 200 counts per second |

Proposed Answer: A

Explanation (Optional): To conduct a Manual Frisk, the hand-held frisker is required to be verified on the "x1" scale, and the background is required to be less than 200 cpm. The probe is picked up and passed slowly over the body, holding the probe one-half inch away from the surface being checked. The probe must be moved very slowly; one to two inches per second ("C" and "D" wrong). While frisking, the needle on the meter face and while listening for the clicks. If an increase of 100 counts per minute above background is observed, the person is considered contaminated and is required to contact HP ("A" correct, "B" wrong). "C" and "D" are plausible, since 1 to 2 inches per second is the speed that you are required to move the probe. "B" is plausible, since 200 counts per second is the maximum background level above which you are not allowed to frisk.

Technical Reference(s): Radiation Protection Manual (Rev. 17-0), Section 5.2.2, page 22 of 45
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05128 Outline the steps required to perform a manual frisk (As available)

Question Source: Bank #86766

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.12

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 73 | Tier # | 3 | 3 |
| K/A Statement: Knowledge of EOP entry | Group # | 4 | 4 |
| conditions and immediate action steps | K/A # | GEN.2.4.1 | |
| Proposed Question: | Importance Rating | 4.6 | 4.8 |

With the plant initially at 100% power, the following sequence of events occurs:

1. The D RCP HI HI VIBRATION Annunciator is received on MB4.
2. The US directs the RO to trip the reactor, stop the "D" RCP, and enter E-0, *Reactor Trip or Safety Injection*.
3. The RO attempts to trip the reactor from MB4, but the reactor does NOT trip.
4. The BOP operator attempts to trip the reactor from MB7, but the reactor does NOT trip.
5. The BOP operator attempts to trip the Load Center Supply breakers from Load Centers 32B and 32N, but the breakers supplying Load Center 32N do NOT open.
6. The RO verifies Rods are inserting in Automatic.
7. The BOP operator attempts to trip the Main Turbine, but the Turbine does NOT trip.

What is/are the next required action(s) to be taken by the RO and/or BOP operators?

a) Do NOT stop the "D" RCP. Close the MSIVs and MSIV Bypass Valves.
b) Do NOT stop the "D" RCP. Runback the turbine to close the Control Valves.
c) Stop the "D" RCP, and close the MSIVs and MSIV Bypass Valves.
d) Stop the "D" RCP, and runback the turbine to close the Control Valves.

Proposed Answer: B

Explanation (Optional): The initial directions from the US was to trip the reactor, stop the "D" RCP ("C" and "D" plausible), and enter E-0. Since the reactor did not trip, and the crew was not successful at tripping the Load Center 32N supply breakers, the crew is required to enter FR-S.1, *Response to Nuclear Power Generation/ATWS*. Per the Caution prior to step 1 of FR-S.1, the crew does NOT trip RCPs with power still greater than 5% ("C" and "D" wrong). Since the turbine failed to trip, the operators are directed to runback the turbine to close the control valves ("B" correct, "A" wrong). "A" is plausible, since if the turbine fails to runback, operators are required to close the MSIVs and Bypass Valves ("A" plausible).

Technical Reference(s): OP 3353.MB4B (Rev 08-0), 3-7, step 3
(Attach if not previously provided, FR-S.1 (Rev. 20-0), Caution prior to step 1, and steps 1 and 2
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04625 Describe the major action categories within EOP 35 FR-S.1. (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 74 | Tier # | 3 | 3 |
| K/A Statement: Knowledge of operator | Group # | 4 | 4 |
| response to loss of all annunciators | K/A # | GEN.2.4.32 | |
| Proposed Question: | Importance Rating | 3.6 | 4.0 |

With the plant initially at 100% power, the following sequence of events occurs:

1. The ANN PWR SPLY MB1, 2, 3, 4, 5 FAILURE annunciator is received on Main Board (MB) 6.
2. The RO reports annunciators are lost to MB 1, 2, 3, and 4.
3. The BOP reports annunciators are lost on MB 5, but annunciators are still functioning on MB 5, 6, 7, 8, and VP1.
4. The US enters AOP 3574, *Loss of Main Board Annunciation.*

Complete the following statements concerning two actions that the crew will be directed to take per AOP 3574.

Dispatch a PEO to check Annunciator power from __(1)__. Establish augmented visual monitoring of the affected Main Boards by assigning __(2)__.

a) (1) Battery 5 (3BYS-PNL 5-1 and 5-2) at the Service Building 4' level
   (2) a minimum of one extra licensed operator designated to monitor the five affected MB sections
b) (1) Battery 5 (3BYS-PNL 5-1 and 5-2) at the Service Building 4' level
   (2) licensed operators, each designated to monitor a maximum of two MB sections
c) (1) Battery 6 (3BYS-PNL 6-1 and 6-2) at the Turbine Building 48' level
   (2) a minimum of one extra licensed operator designated to monitor the five affected MB sections
d) (1) Battery 6 (3BYS-PNL 6-1 and 6-2) at the Turbine Building 48' level
   (2) licensed operators, each designated to monitor a maximum of two MB sections

Proposed Answer: B

Explanation (Optional): AOP 3574 will dispatch a PEO to check annunciator power supplies at 3BYS-PNL 5-1 and 5-2. "C" and "D" are wrong, but plausible, since Battery 6 is the other non-vital Battery, located in the Turbine Building. "B" is correct, and "A" wrong, but plausible, since AOP 3574 will establish augmented Main Board monitoring, requiring licensed operators to monitor a maximum of two Main Board sections each.

Technical Reference(s): AOP 3574 (Rev. 05-0), steps 2 and 4, and Attachment A
(Attach if not previously provided,
including version/revision number)
Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05934 Describe the major action categories within AOP 3574 (As available)

Question Source: New
Question History:
Question Cognitive Level: Memory or Fundamental Knowledge
10 CFR Part 55 Content: 55.41.10
Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 75 | Tier # | 3 | 3 |
| K/A Statement: Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for EOPs and AOPs | Group # | 4 | 4 |
| | K/A # | GEN.2.4.4 | |
| | Importance Rating | 4.5 | 4.7 |

Proposed Question:

Which of the following conditions would require the crew to enter AOP 3566, *Immediate Boration*?

a) While performing a downpower per AOP 3575, *Rapid Downpower*, the ROD CONTROL BANKS LIMIT LO annunciator is received.
b) With the plant at 100% power, an unexplained event is causing reactor power and Tave to increase.
c) On a reactor trip, one Control Rod does NOT insert on the trip.
d) After a reactor trip, with the crew performing ES-0.1, *Reactor Trip Response*, the RCS cools down uncontrollably to 540°F.

Proposed Answer: B

Explanation (Optional): "B" is correct, since this is an indication of an unexplained positive reactivity addition. "A" is wrong, but plausible, since Rod LO-LO is the Immediate Borate setpoint, and AOP 3575 addresses a Rod Lo-Lo condition without requiring entry into AOP3566. "C" is wrong, but plausible, since immediate boration is only required for 2 or more stuck rods. "D" is wrong, but plausible, since the setpoint requiring entry into AOP 3566 is 530°F.

Technical Reference(s): AOP 3566 (Rev. 13-0), Entry Conditions
(Attach if not previously provided, ES-0.1 (Rev. 29-0), step 6
including version/revision number) AOP 3575 (Rev. 26-0), step 7

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03960 Identify plant conditions that require entry into AOP-3566, Immediate Boration. (As available)

Question Source: Bank #64275

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.10

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 76 | Tier # | | 1 |
| K/A Statement: Ability to verify alarms are consistent | Group # | | 1 |
| with plant conditions during a Pzr vapor space accident | K/A # | APE.008.GEN.2.4.46 | |
| Proposed Question: | Importance Rating | | 4.2 |

With the plant at 50% power, the following sequence of events occurs:

1. The PZR SAFETY VALVE DIS TEMP HI Annunciator is received on MB4.
2. The RO reports "A" Safety Valve Outlet Temperature indicates 190°F on MB4.
3. The RO confirms that all four PZR Pressure channels are 2240 psia and decreasing.

Assuming Safety Valve leakage exceeds Pzr Heater capacity, and the crew does not choose to trip the reactor prior to receiving procedural guidance, complete the following statement.

The US will enter the__(1)__Annunciator Response Procedure (ARP), which will direct a transition to__(2)__from that ARP.

a) (1) PZR LVL LO HTR OFF AND LTDOWN SECURE
   (2) E-0, *Reactor Trip or Safety Injection*
b) (1) PZR LVL LO HTR OFF AND LTDOWN SECURE
   (2) AOP 3555, *Reactor Coolant System Leak*
c) (1) PRESSURIZER PRESSURE LO
   (2) E-0, *Reactor Trip or Safety Injection*
d) (1) PRESSURIZER PRESSURE LO
   (2) AOP 3555, *Reactor Coolant System Leak*

Proposed Answer: C

Explanation (Optional): This question is considered SRO level, since it requires the applicant to assess plant conditions and select entry into the appropriate Annunciator Response Procedure (ARP), followed by selecting the appropriate transition from that ARP. Normally on a RCS leak or break, RCS pressure and Pzr Level both decrease ("A", "B", and "D" plausible). But for a vapor space break, RCS pressure decreases, causing subcooling to drop, but Pzr level is fairly steady, since Charging flow increases as pressure drops, and minimal RCS mass is being lost out the break. With Pzr level fairly steady, the Pressurizer Level Lo annunciator will not be received ("A" and "B" wrong). Pressurizer pressure will decrease until the hot legs and upper core reach saturation. Then, a two phase mixture flows up the surge line and into the pressurizer. This will cause pressurizer level to increase until the PZR is full of the two phase mixture. The first annunciator that will be received after the Safety Valve Discharge Temperature annunciator will be the Pressurize Pressure Deviation annunciator. This ARP directs energizing Pzr Heaters and closing spray valves. If operators do not trip the reactor at this point, pressure will continue to decrease and the Pzr Pressure Lo Annunciator will be received. This ARP directs a reactor trip if it is required. The trip can be determined to be required, since power is greater than 10%, and the alarm setpoint is the same as the low pressure trip setpoint ("C" correct, "D" wrong). "A", "B", and "D" are plausible, since the "Pzr Pressure Lo Htr off and Ltdown Secure" ARP directs entry into AOP 3555, and the "Pressurizer Pressure Lo" ARP directs entry into E-0.

| | |
|---|---|
| Technical Reference(s): | FSAR Chapter 15.6.1.1 (Rev. 20.4) |
| (Attach if not previously provided, | OP 3353.MB4A (Rev 05-0), 2-5, 5-1, and 5-4. |
| including version/revision number) | Functional Sheet 11 (Rev. H) |

Proposed references to be provided to applicants during examination: None

| | | |
|---|---|---|
| Learning Objective: | MC-04914 Outline the unique characteristics of a Pressurizer Vapor Space LOCA | (As available) |

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5, 41.7, and 43.5

Comments:

| Examination Outline Cross-Reference: | Level | RO | SRO |
|---|---|---|---|
| Question # 77 | Tier # | | 1 |
| K/A Statement: Determine/interpret location | Group # | | 1 |
| and isolability of leaks during a loss of RHR | K/A # | APE.025.AA2.4 | |
| Proposed Question: | Importance Rating | | 3.6 |

The plant is in MODE 5, and the following initial conditions exist:

- The crew has recently completed all steps to shift RHR from Train "B" to Train "A" in single loop operation per OP 3310A, *Residual Heat Removal System.*
- The "A" Train of RHR is in service in the "Plant Cooldown" Mode.
- The "A" Train is the protected "Operable" train.
- Letdown Flow indicates 100 gpm.

An earthquake occurs, resulting in the following sequence of events:

1. Offsite power is lost.
2. Pressurizer level starts to drop.
3. Neither EDG starts.
4. The crew enters EOP 3501, *Loss of All AC Power (MODE 5, 6, and Zero).*
5. The crew successfully starts the "A" EDG from MB8, and restores power to bus 34C.
6. The crew verifies the "A" CHS Pump is running, and stabilizes Pzr level at 45%.
7. PEOs are dispatched to locate the leak.
8. A PEO reports a significant leak is coming from the CHS piping at the entrance to the Letdown Heat Exchanger in the Auxiliary Building.
9. Per EOP guidance, the US directs the RO to isolate letdown by closing RHR Letdown Flow Control Valve 3CHS-HCV128 and all three Letdown Orifice Isolation Valves.

Complete the following statement concerning which procedure provided direction to the crew to isolate the leak, and whether the isolation step successfully isolated the leak.

The US remained in/entered___(1)___, and these specific actions___(2)___successfully isolate the leak from the RCS.

| | (1) | (2) |
|---|---|---|
| a) | EOP 3501, *Loss of All AC Power (MODE 5, 6, and Zero)* | DID |
| b) | EOP 3501, *Loss of All AC Power (MODE 5, 6, and Zero)* | DID NOT |
| c) | EOP 3505, *Loss of Shutdown Cooling and/or RCS Inventory)* | DID |
| d) | EOP 3505, *Loss of Shutdown Cooling and/or RCS Inventory)* | DID NOT |

Proposed Answer: C

Explanation (Optional): This question is considered SRO level, since it requires the applicant to determine whether transition from EOP 3501 to 3505 is required under current conditions, and both procedures will attempt to restore shutdown cooling. When power is restored to the Operable AC emergency bus from its emergency diesel or offsite power, EOP 3501 directs the crew to EOP 3505 ("A" and "B" wrong). "A" and "B" are plausible, since the crew will directed to establish shutdown cooling in EOP 3501 if power is not restored, or is restored to a degraded bus, or is restored by the SBO Diesel. EOP 3505 will attempt to isolate the leak by closing 3CHS-HCV128 and all three letdown orifice isolation valves. "C" is correct, and "D" wrong, since the Letdown Heat Exchanger is downstream of the Letdown Isolation Valves, and downstream of HCV128. This action will successfully isolate the leak from the RCS. "D" is plausible, since there are significant portions of piping that is not isolated by these actions.

Technical Reference(s): EOP 3501 (Rev. 20-0), step 2.a, b, and l
(Attach if not previously provided, EOP 3505 (Rev. 15-0), entry condition 2.a, and step 5.RNO.e
P&ID 104A (Rev. 54)
including version/revision number) P&ID 112A (Rev. 50)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05459 Given a failure, partial or complete, of the Residual Heat Removal System determine the effects on the system and on interrelated systems (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.3, 41.8 and 43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 78 | Tier # | | 1 |
| K/A Statement: Ability to verify system alarm | Group # | | 1 |
| setpoints and operate controls identified in the Alarm | K/A # | APE.056.GEN.2.4.50 | |
| Response Manual during a loss of offsite power | Importance Rating | | 4.0 |

Proposed Question:

With the plant initially at 100% power, the following sequence of events occurs:

1. Offsite power is lost.
2. The crew completes step 4 of E-0, *Reactor Trip or Safety Injection.*
3. As part of the transition brief, the US directs the RO and BOP to report any unexpected Main Board annunciators.
4. The BOP operator reports the following two annunciators are lit:
   - TURB BRG L/O HEADER PRES LO (MB7A, 1-8).
   - GEN EMER SEAL OIL PP RUNNING (MB7A, 4-5).
5. The BOP Operator checks the expected Lube Oil/Seal Oil Pumps running, and reports the following:
   - Bearing header pressure is decreasing.
   - The Emergency Seal Oil Pump is running.

Which of these two annunciators are UNEXPECTED, and what action will the US direct per the appropriate Annunciator Response Procedure?

a) GEN EMER SEAL OIL PP RUNNING. The US will direct the BOP to momentarily stop the Emergency Seal Oil Pump to attempt to reseat the Seal Oil Relief Valve.
b) GEN EMER SEAL OIL PP RUNNING. The US will direct a PEO to vent Main Generator Hydrogen to atmosphere to lower Generator hydrogen pressure.
c) TURB BRG L/O HEADER PRES LO. The US will direct the BOP to start the Lift Oil Pumps
d) TURB BRG L/O HEADER PRES LO. The US will direct the BOP to close the MSIVs and break Condenser Vacuum.

Proposed Answer: D

Explanation (Optional): This question is considered SRO level, since it requires the applicant to assess plant conditions and select entry into the appropriate Annunciator Response Procedure (ARP), followed by selecting a specific procedure section to mitigate the event and determining the action that will be required per the ARP, which goes beyond system knowledge. On a loss of offsite power, power is lost to the Main Seal Oil Pump, which is AC powered, and to the AC powered Lube Oil Pumps. Seal Oil and Lube Oil have DC Powered emergency pumps, and Lube Oil has a Main Shaft Oil Pump driven by the Main Turbine Shaft, and an oil-driven booster pump. The DC Emergency Seal Oil Pump automatically starts if the Main Seal Oil Pump stops ("A" and "B" wrong). "A" and "B" are plausible, since normally on a reactor trip, neither of these annunciators are expected, and the ARP does cycle the Emergency Seal Oil Pump to attempt to reseat the check valve on low pressure. Also, the Seal Oil to Hydrogen DP Lo ARP directs a PEO to vent the Main Generator Hydrogen to atmosphere if Seal Oil pressure is low. Lube oil pressure decreasing is plausible, since on a turbine trip, the Main Shaft Oil Pump, which is driven by the Main Turbine, will start slowing down, resulting in lowering Lube Oil Pressure, but backup pumps will start before the low pressure alarm is received. "D" is correct, since the Lube Oil Low Pressure ARP directs the crew to close MSIVs and break vacuum. "C" is wrong, since the ARP does not direct starting the Lift Oil Pumps. "C" is plausible, since Lift Oil Pumps normally start to increase bearing oil pressure after a turbine trip when the Turning Gear Oil Pump starts. These pumps are directed to be started following a turbine trip in other procedures such as EOP 35 GA-1.

Technical Reference(s): OP 3353.MB7A (Rev. 07-0), 1-8 and 4-5
(Attach if not previously provided, P&ID 141A (Rev. 22)
including version/revision number) P&ID 141B (Rev. 24)
P&ID 141C (Rev. 12)
P&ID 142A (Rev. 32)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05754 ...describe the turbine lube oil system flow path and alignment under the following normal, abnormal, and emergency conditions... Loss of AC power... (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55. 41.4 and 43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 79 | Tier # | | 1 |
| K/A Statement: Determine/interpret the existence of a SG tube rupture and its potential consequences | Group # | | 1 |
| | K/A # | EPE.038.EA2.02 | |
| Proposed Question: | Importance Rating | | 4.8 |

Safety Injection actuates on Low Pressurizer Pressure, and the following sequence of events occurs:

| Time (Minutes) | Action |
|---|---|
| 0 | The crew enters E-0, *Reactor Trip or Safety Injection.* |
| 12 | The BOP reports the "A" SG level is increasing in an uncontrolled manner. |
| 25 | The BOP operator isolates AFW flow to the "A" SG with NR level at 31%. |
| 27 | The "A" SG Atmospheric Relief Valve fails open. |
| 40 | The BOP notices the failed open Atmospheric Relief Valve, and closes the valve. |
| 45 | Safety Injection is terminated. |

Complete the following statement concerning "operator credited actions" assumed by the FSAR for this event.

The operators were too slow to__(1)__, and the potential adverse consequence due to this delay is__(2)__.

a) (1) isolate AFW Flow to the "A" Steam Generator
   (2) exceeding the 10CFR fuel clad temperature limit
b) (1) isolate AFW Flow to the "A" Steam Generator
   (2) rad release to the environment exceeding off-site dose estimates
c) (1) close the "A" SG Atmospheric Relief Valve
   (2) Pressurized Thermal Shock during the upcoming rapid cooldown of the RCS
d) (1) close the "A" SG Atmospheric Relief Valve
   (2) rad release to the environment exceeding off-site dose estimates

Proposed Answer: B

Explanation (Optional): This question is considered SRO level, since it requires knowledge of the FSAR accident analysis beyond system knowledge. The Millstone 3 license (10CFR55.43.1) requires compliance with Tech Specs, which are included in 10CFR55.43.2, and states that Millstone… Unit No. 3... is described in the licensees' 'Final Safety Analysis Report."… The FSAR assumes operators comply with certain action times to ensure the accident analysis is within acceptable limits, and the US is responsible for driving through the EOPs at a rate that will comply with these times. Based on low Pzr pressure and SG level increasing in an uncontrolled manner, this event can be diagnosed as a SGTR. Two operator credited actions that are required to be met to comply with the FSAR for the SGTR event are: a failed open atmospheric relief valve needs to be closed by the operators within 20 minutes of failing open (to remain within rad release assumptions), and isolating AFW flow to the ruptured SG by 30% Narrow range level, to comply with SG overfill analysis. Operators met the time requirement for the atmospheric relief valve ("C" and "D" wrong, but plausible), but did not meet the SG Level AFW requirement. The FSAR indicates that a significant partitioning factor that exists between SG water and SG steam is used in calculating off-site dose during the design basis SGTR. "B" is correct, and "A" wrong, since the basis for isolating AFW is to prevent SG overfill, and ECCS flow and RWST inventory will keep the core covered during a SGTR. "A" is plausible, since a SGTR is in progress, RCS inventory is decreasing, and 2200°F clad temperature is a 10CFR design criterion. Also, PTS is a concern in E-3 during the rapid cooldown if ruptured SG pressure is too low, but in this case, a transition to ECA-3.1would be required.

| | |
|---|---|
| Technical Reference(s): (Attach if not previously provided, including version/revision number) | FSAR Chapter 15.6.3 (Rev. 30), Section 15.6.3.1<br>FSAR Chapter 15.6.3 (Rev. 30), Section 15.6.3.2.1<br>FSAR Chapter 15.6.3.2.2 (Rev. 30), Radiological Consequences<br>FSAR Table 15.6.3-1 (Rev. 30) Operator Action Times |

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04951 Outline the anticipated Operator Actions in response to SGTRs to include the operator credited actions in FSAR chapter 15. (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.1 and 43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 80 | Tier # | | 1 |
| K/A Statement: Knowledge of operational implications of EOP warnings, cautions, and notes during a LOCA Outside Containment | Group # | | 1 |
| | K/A # | WE04.GEN.2.4.20 | |
| | Importance Rating | | 4.3 |

Proposed Question:

With the plant at 100% power, the following sequence of events occurs:

1. A LOCA outside Containment occurs, resulting in a reactor trip and safety injection.
2. Over the next 10 minutes, RCS pressure increases to and cycles at 2350 psia, with PZR PORVs cycling.
3. The crew is responding using ECA-1.2, *LOCA Outside Containment.*
4. RWST level is 900,000 gallons and slowly decreasing.
5. Pressurizer level is 65% and increasing.
6. While attempting to isolate the break, the final valve the crew closes in attempt to isolate the break is RHR pump "A" cold leg injection valve (3SIL*MV8809A).
7. After 3SIL*MV8809A closes, the RO reports that RCS pressure is still cycling at 2350 psia.
8. The STA reports that the PORVs are cycling at the same rate as before the valve was closed.

Which procedure is the crew required to transition to from ECA-1.2?

a) E-1, *Loss of Reactor or Secondary Coolant.*
b) ES-1.1, *SI Termination.*
c) ES-1.2, *Post LOCA Cooldown and Depressurization.*
d) ECA-1.1, *Loss of Emergency Coolant Recirculation.*

Proposed Answer: D

Explanation (Optional): This question is considered SRO level, since it requires knowledge of diagnostic steps and decision points in the EOPs that involve transitions to event-specific Emergency Contingency procedures. "D" is correct and "A" wrong, since it can be determined that the break is not isolated with no change in the PORV cycling rate. "A" is plausible since step 5 directs transition to E-1 if pressure is increasing, and pressure can't increase due to the PORVs cycling. The NOTE prior to step 1 must be applied while pressure is cycling on the PORVs. "B" is plausible, since with the break isolated, the crew would transition to E-1 first, and then to ES-1.1. "C" is wrong because during a LOCA outside CTMT, a loss of recirculation capability exists. "C" is plausible, since this would normally be the correct transition on a small break LOCA, which is in progress.

Technical Reference(s): ECA-1.2 (Rev. 08-0), Note prior to step 1
(Attach if not previously provided, ECA-1.2 (Rev. 08-0), steps 4 and 5
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03870 Identify plant conditions that require entry into EOP 35 ECA-1.1. (As available)

Question Source: Bank #78931

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

| | | | | |
|---|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 81 | Tier # | | 1 |
| K/A Statement: Determine/interpret facility conditions and selection of appropriate procedures during a loss of secondary heat sink | Group # | | 1 |
| | K/A # | WE05.EA2.1 | |
| Proposed Question: | Importance Rating | | 4.4 |

The crew has entered E-0, *Reactor Trip or Safety Injection*, and the RO and BOP operators report the following:

- RCS Pressure: 1000 psia
- SG pressures: 1092 psig
- SG NR Levels: Offscale Low
- Ctmt Temperature: 135°F
- No AFW Pumps are running, and none can be started at MB5.

What procedure transition(s) will be required to address the loss of AFW Pumps?

a) At E-0, step 9, transition to FR-H.1, *Loss of Secondary Heat Sink*, where no actions to restore heat sink will be required. Transition from FR-H.1 back to E-0, step 10.
b) At E-0, step 9, transition to FR-H.1, *Loss of Secondary Heat Sink*. Then take actions per FR-H.1 to restore heat sink.
c) When CSF Status Tree monitoring is initiated at E-0, step 16, transition to FR-H.1, *Loss of Secondary Heat Sink*, where no actions to restore heat sink will be required. Transition from FR-H.1 to E-1, step 1.
d) When CSF Status Tree monitoring is initiated at E-0, step 16, transition to FR-H.1, *Loss of Secondary Heat Sink*. Then take actions per FR-H.1 to restore heat sink.

Proposed Answer: A

Explanation (Optional): This question is considered SRO level, since it requires assessing plant conditions and transitioning to appropriate procedure sections. E-0 will check for heat sink at step 9, and transition to FR-H.1 ("C" and "D" wrong). "C" and "D" are plausible, since the normal transition steps in E-0 occur in steps 14-16, when status tree monitoring is initiated. FR-H.1 will direct a transition back to procedure and step in effect, since RCS pressure is less than steam generator pressure. This indicates that adequate heat removal is occurring out the break, so a secondary heat sink is not required ("A" correct, "B" wrong). "B" is plausible, since this would be correct if RCS pressure were greater than SG pressure.

Technical Reference(s): E-0 (Rev. 32-0), steps 9 and 16
(Attach if not previously provided, FR-H.1 (Rev. 26-0), step 1
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04536 Discuss conditions requiring transition to other procedures from EOP 35 FR-H.1 (As available)

Question Source: Bank #63990

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 82 | Tier # | | 1 |
| K/A Statement: Determine/interpret uncontrolled | Group # | | 2 |
| rod withdrawal from available indications | K/A # | APE.001.AA2.5 | |
| Proposed Question: | Importance Rating | | 4.6 |

Initial conditions:

- The plant is at 60% power, BOL.
- Control Bank "D" rods are at 160 steps.

The following sequence of events occurs:

1. With all other conditions stable, the RO reports the Group Step Counter for Control Bank D rods is stepping out.
2. The RO places rods in MANUAL.
3. The "T REF/AUCT TAVE DEVIATION" annunciator comes in on MB4.

What initial action is the crew required to take to minimize the Tave/Tref deviation, and per the FSAR, and what ANSI Condition Event is in progress?

a) Raise turbine load. ANS Condition II.
b) Raise turbine load. ANS Condition III.
c) Initiate boration. ANS Condition II.
d) Initiate boration. ANS Condition III.

Proposed Answer: C

Explanation (Optional): This question is considered SRO level, since it requires the applicant to assess plant conditions, select entry into the appropriate AOP, and determine the specific procedure action required to mitigate the event. Also, it requires knowledge of FSAR accident analysis beyond system knowledge. The Millstone 3 license (10CFR55.43.1) requires compliance with Tech Specs, which are included in 10CFR55.43.2, and states that Millstone… Unit No. 3... is described in the licensees' 'Final Safety Analysis Report'."… . This knowledge of FSAR ANS Accident Conditions assists the US in determining the likelihood of sustaining fuel damage during the event. An uncontrolled Control Bank D rod withdrawal event can be diagnosed, since Bank D Group position indication shows rods withdrawing, and this is confirmed by the Tref/Tave Deviation annunciator. When the rods withdraw, positive reactivity was being added to the core. This initially causes Reactor Power to increase, causing heat in to the RCS to exceed heat out via the SGs. This causes Tave to increase, which adds negative reactivity. An uncontrolled rod withdrawal event is an entry condition for 3552, *Malfunction of the Rod Drive System*, which directs the RO to place rod control in Manual. At this point, reactor power is near its original value, with an elevated Tave. Since it can be determined that Tave is now greater than Tref, AOP 3552 directs the crew to borate to minimize Tave-Tref deviation ("A" and "B" wrong). "A" and "B" are plausible, since raising Turbine Load would also lower Tave, and AOP 3552 would raise turbine load if the steam dumps had opened. It can be determined that the steam dumps did not open, since a load reject did not occur. AOP 3552 also would direct adjusting turbine load if Tave was less than Tref. "C" is correct, and "D" wrong, since an uncontrolled Bank withdrawal is classified as an ANS Condition II Event, since RPS will terminate any bank withdrawal event before DNBR falls below the safety analysis limit value. "D" is plausible, since a single rod withdrawal event is classified as a Condition III event, since an automatic reactor trip may not occur fast enough to prevent the minimum DNBR limit from being violated in localized areas in the core.

Technical Reference(s): AOP 3552 (Rev. 14-0), Entry Condition 2.1
(Attach if not previously provided, AOP 3552 (Rev. 14-0), step 1.a through 1.e
including version/revision number) FSAR, Chapter 15.4.2.1 (Rev. 30)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04898 Identify the specific types of events analyzed as Reactivity & Power Distribution Anomalies (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.1, 41.5, 43.1, and 43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 83 | Tier # | | 1 |
| K/A Statement: Knowledge of the emergency action level thresholds and classifications during high RCS activity | Group # | | 2 |
| | K/A # | APE.076.GEN.2.4.41 | |
| Proposed Question: | Importance Rating | | 4.6 |

With the plant initially at 100% power with Containment High-Range Monitor 3RMS-RE04A out of service, the following sequence of events occurs:

| Time | Event |
|---|---|
| 0 Minutes: | A locked rotor occurs on the "A" RCP, resulting in a reactor trip. |
| 5 Minutes: | While in ES-0.1, *Reactor Trip Response*, the STA reports Fuel Drop Monitors 3RMS- RE 41 and 42 are reading 0.5 R/hr and trending up. |
| 10 Minutes: | A Yellow Path is received on CTMT Radiation. |
| 120 Minutes: | 3RMS- RE 41/42 are reading 150 R/hr and continuing to trend up. |
| 120 Minutes: | Containment High-Range Monitor 3RMS- RE 05A is reading 150 R/hr and trending up. |
| 145 Minutes: | 3RMS- RE 05A and 3RMS- RE 41/42 all read 175 R/hr and stable. |
| 149 Minutes: | RMT1 reports the Core Damage Estimate is NOT yet complete. |
| 150 Minutes: | A fault occurs on the "C" Steam Generator inside Containment, and the "C" SG rapidly depressurizes. |
| 151 Minutes: | 3RMS-RE-05A rapidly increases to 1000 R/hr. |
| 151 Minutes: | 3RMS-RE 41 and 42 readings have remained stable at 175 R/hr. |

**Using the Millstone 3 EAL Tables**, what is the highest classification required for this event?

a) General Emergency – Alpha
b) Site Area Emergency – Charlie 2
c) Alert – Charlie 1
d) Unusual Event – Delta 1

Proposed Answer: C

Explanation (Optional): This question is considered SRO level, since it requires the applicant to assess plant conditions related to radiation readings and make an emergency classification, which is a duty reserved for a SRO licensed individual. The Alert classification is first met at 10 minutes for "In-plant Radiation" (RA2), Radiation reading >5R/hr in Areas Requiring Access for Safe Shutdown (CTMT), since the Yellow path for CTMT Radiation is 10 R/hr, and for Loss of the Clad Barrier (FCB3) with sustained valid RE-04A/05A reading >5R/hr without RCS release inside CTMT. At 121 minutes, the classification remains Alert, C-1, even though CTMT radiation exceeds the Table 1 "2 to 4" hour limit of 125 R/hr, since this only applies with an RCS leak inside CTMT. "C" is correct, and "A", "B", and D" wrong, since at 151 minutes, the classification does not escalate, since the CTMT loss threshold is still not exceeded. "A" is plausible, since RE05A has rapidly increased above the RG1 "In-Plant Radiation" General Emergency threshold, but this is not valid, since the steam break inside CTMT is causing Temperature-Induced Current (TIC) on RE05A, and its readings are not to be considered valid until the effects of TIC have dissipated. Also, radiation impacts all three barriers are the barrier failure reference table. "B" is plausible, since this would be correct if the applicant uses the TIC-affected reading of RE05A to assess the CNB5 CTMT loss threshold, making two barriers lost, or, if the applicant views the RCS barrier as potentially lost due to uncontrolled pressure decrease (due to the steam break) and increasing containment radiation monitors (RCB3), which are elevated, but the rad monitor indication was stable during the steam break. "D" is plausible, since a steam break inside CTMT is not classifiable if Radiation levels were lower, if only the CTMT barrier is lost, Unusual Event would be correct, and unexpected RMS reading increasing by >1000 times normal readings is an Unusual Event (RU1).

| | |
|---|---|
| Technical Reference(s): (Attach if not previously provided, including version/revision number) | MP-26-EPI-FAP06-003 (Rev. 11-0) EAL Tables |

Proposed references to be provided to applicants during examination: **EAL Tables**

| | | |
|---|---|---|
| Learning Objective: | EP-00171 Given a plant condition and associated alarms and/or indications, classify an emergency event to include NRC classification and state posture code | (As available) |

| | |
|---|---|
| Question Source: | Bank #89294 |
| Question History: | |
| Question Cognitive Level: | Comprehension or Analysis |
| 10 CFR Part 55 Content: | 55.43.5 |
| Comments: | |

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 84 | Tier # | | 1 |
| K/A Statement: Determine/interpret facility conditions and selection of appropriate procedures during LOCA cooldown and depressurization | Group # | | 2 |
| | K/A # | WE03.EA2.1 | |
| | Importance Rating | | 4.2 |

Proposed Question:

A LOCA occurs, resulting in the following sequence of events:

1. At the transition brief from E-0, *Reactor Trip or Safety Injection*, the RO reports the following:
   - The Pressurizer is empty.
   - CDA has not actuated.
2. The crew transitions to E-1, *Loss of Reactor or Secondary Coolant* due to abnormal radiation on 3CMS*RE22 (pre-trip).
3. The crew trips RCPs at E-1, Step 1, due to the RO's report that RCS pressure has slowly decreased to 1480 psia.

Assuming plant conditions do not significantly change, to what procedure will the crew be required to transition to from E-1?

a) ES-1.1, *SI Termination.*
b) ES-1.2, *Post LOCA Cooldown and Depressurization.*
c) ES-1.3, *Transfer to Cold Leg Recirculation.*
d) ES-1.4, *Transfer to Hot Leg Recirculation.*

Proposed Answer: B

Explanation (Optional): This question is considered SRO level, since it requires knowledge of diagnostic steps and decision points in the EOPs that involve transitions to event-specific Emergency Contingency procedures. "A" is wrong, but plausible, since this would be correct if PZR level was above 16%, and RCS pressure stabilizes. "B" is correct, and "C" and "D" wrong, since RCS pressure is above RHR shutoff head, and without CTMT spray running, RWST level will remain above 520,000 gallons for a long time. "C" and "D" are plausible, since entry to ES-1.3 and then 1.4 would be required if RHR was injecting or if RWST Lo-Lo was reached.

Technical Reference(s): E-1 (Rev. 26-0), Steps 1, 6, 9, 12, 14, and 23
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04363 Discuss conditions which require transition to other procedures from EOP 35 E-1 (As available)

Question Source: Bank #63935

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 85 | Tier # | | 1 |
| K/A Statement: Knowledge of the parameters and logic used to assess the status of safety functions during a loss of containment integrity | Group # | | 2 |
| | K/A # | WE14.GEN.2.4.21 | |
| | Importance Rating | | 4.6 |

Proposed Question:

A LOCA has occurred, and Initial Conditions are as follows:

1. The crew has completed E-0, *Reactor Trip or Safety Injection.*
2. The crew is performing a manual status tree check prior to transitioning to E-1, *Loss of Reactor or Secondary Coolant.*
3. The crew has verified the first four status trees are either Green or Yellow.
4. CTMT parameters currently indicate as follows:

- Containment pressure: 25 psia and slowly increasing.
- Containment radiation: 12 R/hr and slowly increasing.
- Containment sump level: 13 feet and slowly increasing.
- Both Quench Spray Pumps: Both running.

Complete the following statement.

The color of the Containment CSF Status Tree is___(1)___, and the US will transition to___(2)___.

| | (1) | (2) |
|---|---|---|
| a) | Orange | FR-Z.1, *Response to High Containment Pressure* |
| b) | Orange | FR-Z.2, *Response to Containment Flooding* |
| c) | Orange | FR-Z.3, *Response to High Containment Radiation Level* |
| d) | Yellow | E-1, *Loss of Reactor or Secondary Coolant* |

Proposed Answer: D

Explanation (Optional): This question is considered SRO level since it requires knowledge of diagnostic steps and decision points in the EOPs that involve transitions to Functional Restoration procedures. It also involves EOP rules of use based on status tree colors. "D" is correct, since Ctmt orange paths are from Ctmt pressure of 23 psia with no Ctmt Spray Pumps running. "A" is wrong, since with Ctmt pressure above 23 psia with the Ctmt spray pumps running, the tree color based on Ctmt pressure is yellow. Per EOP rules of use, yellow paths are optional, and the EOP series procedures take priority over yellow path procedures. With a LOCA in progress, entry into E-1 is desired with Ctmt spray operating as designed. "A" is plausible, since Ctmt pressure is above 23 psia. "B" is wrong, since Ctmt sump level is below the high sump level setpoint of 15.75 feet. "B" is plausible, since Ctmt High Sump Level is an Orange path procedure entry condition, and sump level is abnormally high. "C" is wrong, since High Ctmt Radiation is a yellow path procedure. "C" is plausible, since Ctmt radiation exceeds the 10R/hr high radiation entry condition.

Technical Reference(s): EOP 35 F-0.5 (Rev. 04-0), Ctmt CSF Status Tree
(Attach if not previously provided, OP 3272 (Rev. 09-0), Attachment 4, pages 4 and 5 of 7
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC- 04666 Identify plant conditions which require entry into EOP 35 FR-Z.1 (As available)

Question Source: Bank #63966

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 86 | Tier # | | 2 |
| K/A Statement: Predict impact/mitigate RHR System | Group # | | 1 |
| pressure transient protection during cold shutdown | K/A # | 005,A2.2 | |
| Proposed Question: | Importance Rating | | 3.7 |

A plant cooldown is in progress per OP 3208, *Plant Cooldown*, and initial conditions are as follows:

- The "A" PORV block valve is closed due to a leaky PORV.
- When RCS hot leg temperature reached 340°F, the "A" train of RHR was placed in service in the cooldown mode.
- When RCS hot leg temperature reached 220°F, the "B" train of RHR was also placed in service in the cooldown mode.
- Hot leg temperatures are 220°F.
- The "B" RCP is running.

The crew isolates the "B" train of RHR from the RCS due to a significant RHR piping leak.

What is the status of RCS Overpressure Protection, and does LCO 3.4.9.3 "Overpressure Protection Systems" need to be entered?

a) Adequate RCS Overpressure Protection is NOT available, since the crew has not yet been directed by OP 3208 to arm COPPS, and was relying on both RHR suction relief valves. The crew IS required to enter LCO 3.4.9.3.
b) Adequate RCS Overpressure Protection is NOT available, since either 2 PORVs, or two RHR Suction Relief Valves must be available to satisfy Cold Overpressure Protection requirements. The crew IS required to enter LCO 3.4.9.3.
c) Adequate RCS Overpressure Protection IS available, since COPPS is not required at this RCS temperature. LCO 3.4.9.3 does NOT need to be entered.
d) Adequate RCS Overpressure Protection IS available, since the crew has already armed COPPS, and a single PORV and one RHR Suction Relief are still available. LCO 3.4.9.3 does NOT need to be entered.

Proposed Answer: D

Explanation (Optional): This question is considered SRO level, since it requires the applicant to assess detailed procedural requirements for arming COPPS, and Tech Spec LCO requirements in lower Modes, and compare them to abnormal plant conditions. COPPs is required <226°F ("C" wrong), from either 2 PORVs, 2 RHR suction relief valves, or one of each ("B" wrong). "D" is correct, and "A" wrong, since COPPS is armed by procedure when hot leg temperatures decrease to 250°F. "A" is plausible, since both trains of RHR are normally available in the cooldown mode during initial plant cooldown to MODE 5, and two RHR suction reliefs provides adequate COPPS protection. "B" is plausible, since normally, two RHR suction relief valves or two PORVs are available for COPPS. "C" is plausible, since COPPS is only required at cold temperatures.

| | |
|---|---|
| Technical Reference(s): | OP 3208 (Rev. 27-0), Note 3 prior to step 4.3.1, and step 4.3.5 |
| (Attach if not previously provided, | OP 3208 (Rev. 27-0), Notes and Caution prior to step 4.3.34 |
| including version/revision number) | Tech Spec LCO 3.4.9.3 (Amendment 197) |

Proposed references to be provided to applicants during examination: None

| | | |
|---|---|---|
| Learning Objective: | MC-05457 Describe the major administrative or procedural precautions and limitations placed on the operation of the Residual Heat Removal system, including the basis for each. | (As available) |

Question Source: Bank #85273

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.2 and 43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 87 | Tier # | | 2 |
| K/A Statement: Ability to locate and operate comp- | Group # | | 1 |
| onents, including local controls for the CCW System | K/A # | 008.GEN.2.1.30 | |
| Proposed Question: | Importance Rating | | 4.0 |

With the plant at 100% power, the following sequence of events occurs:

1. The "RPCCW HX SW FLOW HI/LO" annunciator is received on Main Board 1.
2. A PEO reports an unisolable Service Water piping rupture in the Aux Building, upstream of RPCCW Heat Exchanger Service Water Inlet Isolation Valve 3SWP*MOV50A.
3. The crew starts both Train "B" Service Water Pumps.

Complete the following statements concerning procedural direction to address the pipe break, and which procedure directs action by a PEO.

The US will enter__(1)__to place both Train "A" Service Water Pumps in Pull-To-Lock and maintain 3SWP*MOV50A open. Per__(2)__a PEO will be dispatched to check/realign RPCCW Process Radiation Monitor 3CCP-RE31 to the "B" Train.

a) (1) RPCCW HX SW FLOW HI/LO ARP
(2) AOP 3560, *Loss of Service Water*

b) (1) RPCCW HX SW FLOW HI/LO ARP
(2) AOP 3561, *Loss of Reactor Plant Component Cooling Water*

c) (1) AOP 3560, *Loss of Service Water*
(2) AOP 3560, *Loss of Service Water*

d) (1) AOP 3560, *Loss of Service Water*
(2) AOP 3561, *Loss of Reactor Plant Component Cooling Water*

Proposed Answer: B

Explanation (Optional): This question is considered SRO level, since it requires the applicant to assess plant conditions and determine whether the AOP or ARP will be the appropriate entry point for this event, when both apply. This question also requires the applicant to understand AOP transition points for the specific event in progress. AOP 3560 is written assuming SWP pipe breaks have been addressed per the ARPs prior to entering the AOP ("C" and "D" wrong). The RPCCW HX SW FLOW HI/LO ARP will direct the affected train Service Water Pumps to be placed in Pull-To-Lock and 3SWP*MOV50A will be left open since the break is upstream of this valve. After taking these steps per the ARP, the crew will enter AOP 3560 ("A", "C", and "D" plausible). AOP 3560 will transition to AOP 3561 prior to address the loss of cooling to RPCCW ("A" wrong). AOP 3561 will require a PEO to check/realign RPCCW Process Radiation Monitor 3CCP-RE31 to the "B" Train ("B" correct).

Technical Reference(s): OP 3353.MB1C (Rev. 12-0), 1-1A, step 8.3.1 through 8.3.5
AOP 3560 (Rev. 11-0), steps 1 and 2
AOP 3561 (Rev. 18-0), step B.4.g

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-07541 Given a set of plant conditions, determine the required actions to be taken per AOP 3560. (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.4 and 43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 88 | Tier # | | 2 |
| K/A Statement: Predict impact/mitigate flowpaths | Group # | | 1 |
| of Main Steam System steam during a LOCA | K/A # | 039.A2.1 | |
| Proposed Question: | Importance Rating | | 3.2 |

With the plant initially at 100% power, a small break LOCA occurs, resulting in the following sequence of events:

1. SIS actuates due to low Pressurizer pressure.
2. The BOP Operator reports one "A" SG Safety Valve indicates open.
3. The crew transitions to ES-1.1, *SI Termination*, with conditions as follows:
   - Charging pumps: "A" and "B" running
   - RCS pressure: 1800 psia and stable
   - Pressurizer level: 22% and stable
   - RCS subcooling: 90°F and stable
   - Containment temperature: 145°F and stable

Per ES-1.1, the crew stops the "A" Charging Pump.

Assuming the LOCA plus the partially open Safety Valve result in RCS pressure steadily decreasing after stopping the CHS Pump, what action is the US required to direct per ES-1.1?

a) Leave the "A" Charging Pump off and transition to ES-1.2, *Post LOCA Cooldown and Depressurization.*
b) Restart the "A" Charging Pump and transition to E-1, *Loss or Reactor or Secondary Coolant.*
c) Remain in ES-1.1, *SI Termination*, and restart the "A" Charging Pump if Pressurizer level drops to 16%.
d) Remain in ES-1.1, *SI Termination*, and restart the "A" Charging Pump if RCS subcooling drops below 32°F.

Proposed Answer: A

Explanation (Optional): This question is considered SRO since it requires the applicant to assess plant conditions and determine that a transition to an event-specific Emergency Sub (ES) Procedure is required. Also, the applicant must apply EOP rules of usage and determine whether or not foldout page criteria apply at this specific point in the EOP. The US will transition to ES-1.2, since RCS pressure continuing to decrease indicates SI termination will not be successful ("C" and "D" wrong). The US will not restart the second Charging Pump, since SI Reinitiation Criteria does not apply until SI has been terminated ("A" correct, and "B" wrong). Also, the proper transition is to ES-1.2 at this point, not E-1. "B" is plausible, since if SI reinitiation criteria were in effect, the crew would be required to restart ECCS pumps as necessary, and after SI has been terminated, transition to E-1 is directed if conditions degrade. If the crew were to restart the charging pump at this point and transition to E-1, RCS conditions would again stabilize, and after transitioning to E-1, the crew would again transition to ES-1.1 per E-1, step 6, and be stuck in a "do-loop". If the crew restarted the Charging Pump and transitioned to ES-1,2, this procedure would re-stop the pump after checking subcooling. After transitioning to ES-1.2, the crew will commence a cooldown to Cold Shutdown, which increases subcooling, allowing an operator controlled depressurization of the RCS, which will increase injection flow and decrease break flow, eventually allowing SI to be terminated. "C" and "D" are plausible, since subcooling and Pzr level comprise the ES-1.1 SI Reinitiation Criteria.

Technical Reference(s): ES-1.1 (Rev. 16-2), steps 3 and 4
(Attach if not previously provided, ES-1.1 (Rev. 16-2), Foldout Page SI Reinitiation Criteria
including version/revision number) OP 3272 (Rev. 09-0), Section 1.6.

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05528 Identify plant conditions that require entry into EOP 35 ES-1.2. (As available)

Question Source: Bank #74743

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5 and 43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 89 | Tier # | | 2 |
| K/A Statement: Predict impact/mitigate consequences of | Group # | | 1 |
| paralleling out of phase/mismatch in volts on the | K/A # | 062.A2.15 | |
| AC Electrical Distribution System | Importance Rating | | 3.2 |

Proposed Question:

The BOP Operator is preparing to close the Main Generator Output Breaker per OP 3203, *Plant Startup*, and the following initial conditions exist:

- The synchroscope is rotating slowly in the fast direction.
- Incoming voltage is significantly greater than running voltage.

The BOP Operator takes the Main Generator Output Breaker to the CLOSE position.

What annunciator will be received due to closing the breaker under these conditions, and what action is required to be directed per the ARP by the US?

a) The GENERATOR OVER EXITATION annunciator will be received. The US will direct the BOP to adjust the voltage regulator at MB7. If unsuccessful at clearing the alarm, direct the BOP to trip the Main Turbine, and enter AOP 3550, *Turbine/Generator Trip*.
b) The GENERATOR OVER EXITATION annunciator will be received. The US will direct the BOP to adjust the voltage regulator at MB7. If unsuccessful at clearing the alarm, direct the RO to trip the Reactor, and enter E-0, *Reactor Trip or Safety Injection*.
c) The GEN CORE MONITOR LEVEL HI annunciator will be received. The US will direct a PEO to press and hold the "Filter" pushbutton at the Core Monitor. If the Core Monitor remains in alarm, direct the BOP to trip the Main Turbine, and enter AOP 3550, *Turbine/Generator Trip*.
d) The GEN CORE MONITOR LEVEL HI annunciator will be received. The US will direct a PEO to press and hold the "Filter" pushbutton at the Core Monitor. If the Core Monitor alarm clears, direct the RO to trip the Reactor, and enter E-0, *Reactor Trip or Safety Injection*.

Proposed Answer: A

Explanation (Optional): This question is considered SRO, since it requires the applicant to assess plant conditions and prioritize two Annunciator Response Procedures, both of which are plausible for this event, and determine which action to take per the ARP. This is followed by determining specific transition criterion from the ARP based on current plant conditions. Closing the generator output breaker with incoming voltage significantly higher than running voltage will cause the generator to pick up excessive reactive power ("VARS out"), bringing in the OVEREXITATION annunciator. It also results in overheating of the field winding due to excessively high field current. This could result in overheating, which can bring in the CORE MONITOR alarm. The OVEREXITATION ARP will direct the crew to attempt to lower Generator Voltage with the voltage regulator at MB7. If unsuccessful at clearing the alarm, the US will direct either a turbine trip if below P-9 ("A" correct, since P-9 is 51% power), or a reactor trip if above P-9 ("B" wrong, but plausible). The Core Monitor alarm comes in if thermal decomposition products are present in the Main Generator Hydrogen ("C" and "D" plausible). "C" is wrong, since if the alarm remains in while in the "Filter" position, it indicates a failed detector. "D" is wrong, since below P-9, a valid core monitor alarm requires the crew to trip the turbine, not the reactor.

Technical Reference(s): OP 3353.MB7C (Rev. 10-0), 4-5, steps 3.5 and 4.
(Attach if not previously provided, OP 3353.MB7C (Rev. 10-0), 5-5, steps 1 through 4.
including version/revision number) OP 3324A (Rev. 11-0), Precaution 3.1

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04399 (215694); Describe the operation of the following EDG system components, controls and interlocks .... Generator Output Breaker. (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.4, 41.5, and 43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 90 | Tier # | | 2 |
| K/A Statement: Knowledge of the operational | Group # | | 1 |
| implications of EOP warnings, cautions, and | K/A # | 063.GEN.2.4.20 | |
| notes for the DC Electrical Distribution System | Importance Rating | | 4.3 |

Proposed Question:

With the plant initially at 100% power, the following sequence of events occurs:

1. The crew enters EOP 3509.1, *Control Room, Cable Spreading Area or Instrument Rack Room Fire.*
2. Control power fuses supplying the two "A" Train Accumulator Vent Supply Valves blow due to the fire.
3. The crew evacuates the Control Room.

Complete the following statements concerning when during the performance of EOP 3509.1 the blown fuses will become evident, and where in the procedure fuse replacement will be directed to address the loss of Control Power.

The blown control power fuses will become evident by a loss of indicating lights when__(1)__. Fuse replacement will be directed__(2)__.

a) (1) realigning the Umbilical Cord at the Auxiliary Shutdown Panel
   (2) at the appropriate procedure step in the body of EOP 3509.1
b) (1) realigning the Umbilical Cord at the Auxiliary Shutdown Panel
   (2) per Attachment A, "Primary Side PEO Actions on a Control Room Evacuation"
c) (1) placing the transfer switches in LOCAL at the Transfer Switch Panel
   (2) at the appropriate procedure step in the body of EOP 3509.1
d) (1) placing the transfer switches in LOCAL at the Transfer Switch Panel
   (2) per Attachment A, "Primary Side PEO Actions on a Control Room Evacuation"

Proposed Answer: C

Explanation (Optional): This question is considered SRO, since it requires the applicant to apply an EOP note to a specific situation, and determine whether to use the body of the procedure or an Attachment to address the situation. Fire-related shorts can collectively draw excessive current and blow control power fuses, which provide indication and control. This will become evident when the component is placed in LOCAL at the Transfer Switch Panel. "A" and "B" are wrong, since realigning the umbilical cord at the Aux Shutdown Panel only affects indication, not control. "A" and "B" are plausible, since indication is affected by this action, and it is directed along with the Transfer Switches in Attachment E. "C" is correct, and "D" wrong, since the body of the procedure directs fuse replacement. "D" is plausible, since numerous local actions are being taken by the PEOs per Attachments "A" and "B" to address fire-related issues.

Technical Reference(s): EOP 3509.1 (Rev. 20-0), Attachment E, Note prior to step 1, and step 4
(Attach if not previously provided, EOP 3509.1 (Rev. 20-0), step 30.d.
including version/revision number) EOP 3509.1 (Rev. 20-0), Attachment A

EOP 3509.1 basis document (Rev. 19-0), for Att. E, steps 1 and 4.

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06189 Discuss the basis of major EOP 3509.1 procedure steps and/or sequence of steps (As available)

Question Source: New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 91 | Tier # | | 2 |
| K/A Statement: Knowledge of the events related to Hydrogen Recombiner and Purge Control operation/status that must be reported to internal organizations or outside agencies | Group # | | 2 |
| | K/A # | 028.GEN.2.4.30 | |
| | Importance Rating | | 4.1 |

Proposed Question:

With the plant initially at 100% power, the following sequence of events occurs:

| Time: | Event: |
|---|---|
| 0000: | A mechanic informs the Control Room that while constructing scaffolding in the area of the Containment Purge System, scaffolding piping inadvertently struck a valve in the area. |
| 0005: | A PEO is sent to investigate, and reports that the lock and chain are broken off of CTMT Purge Inlet Isolation valve, 3HVU*CTV32A. |
| 0005: | The crew logs into LCO 3.6.1.7, "CONTAINMENT VENTILATION SYSTEM." |
| 0105: | Maintenance reports that 3HVU*CTV32A is damaged, and repairs to 3HVU*CTV32A are required. |
| 0305: | The crew commences a Plant Shutdown as required by LCO 3.6.1.7, "CONTAINMENT VENTILATION SYSTEM." |
| 0452: | The crew manually trips the reactor as part of the shutdown process. |
| 0459: | Safety Injection automatically actuates due to loss of pressure control on the reactor trip. |

What was the first event that required a NRC notification to be made per RAC 14, *Non-Emergency Station Events*?

a) The discovery of the valve in the unlocked position.
b) The initiation of the plant shutdown.
c) The manual actuation of the Reactor Protection System.
d) The ECCS discharge into the Reactor Coolant System.

Proposed Answer: B

Explanation (Optional): This question is considered SRO level, since it involves knowledge of administrative procedures (Reportability) specifically related to the SRO job function. Logging into an LCO requiring a plant shutdown is not reportable ("A" wrong). "B" is correct, and "C", and "D" wrong, since the initiation of a plant shutdown required by Tech Specs requires a 4 hour report per 10CFR50.72(b)(2)(i), and this event occurred prior to the other events in the timeline. "A" is plausible, since this LCO requires a shutdown, and commencing the shutdown is reportable. "C" and "D" are plausible, since these events also require a 4 hour report.

Technical Reference(s): RAC 14 (Rev. 011-00), Attachment 1, Sheets 1 and 3 of 4.
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-00016 Given a plant condition or equipment malfunction, use provided reference material to determine… required federal and/or state reporting requirements… (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.2 and 43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 92 | Tier # | | 2 |
| K/A Statement: Predict impact/mitigate loss of the | Group # | | 2 |
| meteorological tower for the Waste Gas Disposal System | K/A # | 071.A2.7 | |
| Proposed Question: | Importance Rating | | 2.9 |

A plant startup is in progress per OP 3203, *Plant Startup*, and the following initial conditions exist:

- The plant is at 1% power.
- The crew is preparing to enter MODE 1.
- The time is 3:00 AM.

The following sequence of events occurs:

1. The STA reports the Met Tower "Wind Direction for the 142 foot elevation is "X-Tagged" on the PPC.
2. The SM determines the 142 foot wind direction channel is NOT functional per Technical Requirement (TR) 3.3.3.4-1, "Meteorological Instrumentation".
3. The RO looks back at the surveillances from midnight, and discovers its daily TRM Technical Surveillance Requirement (TSR) channel check, scheduled for midnight, was inadvertently missed.
4. The last time the "Wind Direction" Channel Check was completed was 27 hours ago.
5. I&C estimates the channel will be repaired in four hours.

**Using TRM 3.3.3.4, and Table 3.3.3.4-1, attached to this exam,** what ACTION is the crew required/allowed to take per TR 3.3.3.4 and section 3/4.0 of the TRM?

a) Within one hour, take action to place the unit in HOT STANDBY within the next 6 hours, per TR 3.0.3, since failure to perform a TSR within the specified interval shall be failure to meet the TR, per TSR 4.0.1.
b) Utilize the 24-hour delay period per TSR 4.0.3 to complete the Channel Check prior to logging into 3.3.3.4 ACTION, since the estimated time to complete repairs is less than 24 hours.
c) Enter TR 3.3.3.4 ACTION. The plant is NOT allowed to enter MODE 1 until the Wind Direction Channel is repaired, and the Channel Check is completed.
d) Enter TR 3.3.3.4 ACTION. The plant IS allowed to enter MODE 1 while repairs are ongoing for the Wind Direction Channel.

Proposed Answer: D

Explanation (Optional): This question is considered SRO level, since it requires the applicant to apply TRM actions to a given situation, and apply TRM Section 3.0/4.0 requirements to the situation. The 142 foot Wind Direction indication is required per TRM Table 3.3.3.4-1, so entry into TR 3.3.3.4 is required. The required ACTION is, "With one or more required meteorological monitoring channels nonfunctional for more than 7 days, enter condition into the corrective action program." "D" is correct, and "C" wrong, since TR 3.0.4 allows entry into an OPERATIONAL MODE may be made when conformance to an ACTION permits continued operation of the facility for an unlimited period of time. "C" is plausible, since per TR 3.0.4, entry into an OPERATIONAL MODE shall not be made if the ACTION requires a shutdown within a specified time interval. "A" is wrong, but plausible, since TR-3.0.3 does not contain the one-hour and 6-hour requirements contained on Tech Spec LCO 3.0.3. "B" is wrong, but plausible, since 4.0.2 allows 25% time extension for surveillances, and the current time of 27 hours is within the 24 hour x 1.25 = 30 hours, but the Channel has been confirmed to be non-functional.

Technical Reference(s): TRM 3.3.3.4 (LBDCR 07-MP3-018)
(Attach if not previously provided, TRM (LBDCR 07-MP3-018) Tables 3.3.3.4-1 and 3.3.3.4-2
including version/revision number) TRM 3/4.0 (LBDCR 07-MP3-018)

Proposed references to be provided to applicants during examination: **TRM 3.3.3.4, and Table 3.3.3.4-1**

Learning Objective: MC-04729 Describe the major administrative or procedural precautions and limitations placed on the operation of the GWS system, including the basis for each. (As available)

Question Source: New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.2

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 93 | Tier # | | 2 |
| K/A Statement: Predict impact/mitigate a | Group # | | 2 |
| misaligned rod in the Rod Control System | K/A # | 014.A2.4 | |
| Proposed Question: | Importance Rating | | 3.9 |

The plant is initially at 80% Power, with a load increase in progress per OP 3204, *At Power* Operation when the following sequence of events occurs:

1. The RO reports DRPI indicates one Control Bank "D" Group 1 rod has not been withdrawing, and is misaligned from its group by 35 steps.
2. The crew enters AOP 3552, *Malfunction of the Rod Drive System.*
3. The crew is NOT able to realign the bank to the rod.
4. The crew verifies SHUTDOWN MARGIN for the misaligned rod.
5. I&C reports that rod coil currents for the affected rod do NOT conform to their normal pattern, and are outside acceptable limits.
6. The rod has been misaligned for one hour.

**Using the attached copy of Tech Spec LCO 3.1.3.1**, what ACTION is required to be taken by the crew?

a) Reduce power to less than or equal to 75% within the next hour.
b) Reduce power to less than that specified in the COLR for RIL within 2 hours.
c) Restore the rod to OPERABLE within 72 hours.
d) Place the plant in HOT STANDBY within the next 6 hours.

Proposed Answer: A

Explanation (Optional): This question is considered SRO level, since it requires the applicant to diagnose whether a misaligned rod is stuck, and then apply Tech Spec LCO actions to a given situation. Based on coil current indication not conforming to normal patterns, the rod can be determined not to be misaligned, but not stuck, since the control system is not functioning normally. The crew is required to enter LCO 3.1.3.1 ACTIONs b. 3, and d), which requires the rod bank to be aligned with the rod, or power to be reduced to at least 75%. The crew has not been able to align the bank to the rod, so the power reduction is required ("A" correct), and NIS setpoints reduced. "B" is wrong, but plausible, since the rod is misaligned low, and this ACTION is required if the bank is below RIL. "C" is wrong, but plausible, since this ACTION is required if more than one rod is misaligned. "D" is wrong, but plausible, since this ACTION is required if a rod is stuck.

Technical Reference(s): AOP 3552 (Rev. 014), Attachment D, step D.3.b
(Attach if not previously provided, AOP 3552 (Rev. 014), Attachment "A", step A.4
including version/revision number) Tech Spec LCO 3.1.3.1 (Amendments 60 and 258)

Proposed references to be provided to applicants during examination: **Tech Spec LCO 3.1.3.1**

Learning Objective: MC-03904 Given a plant condition which requires the use of AOP 3552, identify applicable Technical Specification action requirements. (As available)

Question Source: Bank #65024

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.2

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 94 | Tier # | | 3 |
| K/A Statement: Ability to use procedures related to shift | Group # | | 1 |
| staffing, minimum crew compliment, overtime limitations, etc. | K/A # | GEN.2.1.5 | |
| Proposed Question: | Importance Rating | | 3.9 |

Initial Conditions:

- The plant is at 45% power, with a load increase in progress after a refueling outage.
- Shift turnover is in progress.
- One oncoming PEO called in sick, and one of the off-going PEOs volunteers to work 4 hours of overtime to assist with the load increase.
- The current day and time is Sunday night at 1800.

The off-going PEO's work history is as follows:

- Monday: 0700-1500
- Tuesday: 0600-1800
- Wednesday: Off
- Thursday: 0600-1800
- Friday: 0600-1800
- Saturday: 0600-1800
- Sunday: 0600-1800

Complete the following statement.

The PEO is NOT eligible to work the 4 hours of overtime without additional authorization since this would violate the maximum__________requirement.

a) consecutive hours worked
b) hours worked in a 24-hour period
c) hours worked in a 48-hour period
d) hours worked in a 7-day period

Proposed Answer: C

Explanation (Optional): This question is considered SRO level, since it involves knowledge of administrative procedures specifically related to the SRO job function. "A" is wrong, since the PEO has not exceeded the maximum consecutive hours limit of 16 hours. "B" is wrong, since the PEO has not exceeded the maximum of 16 hours in a 24-hour period. "C" is correct, since the PEO would exceed the maximum of 26 hours in any 48-hour period, since for the period from Saturday at 0600 until Monday at 0600; the PEO has already worked 24 hours. "D" is wrong, since the PEO has worked 68 hours in the past 7 days, which is less than the maximum-allowed 72 hours in a 7-day period. "A", "B", and "D" are plausible, since the PEO has been working a large number of hours, and there are limits for each of these cases.

Technical Reference(s): LI-AA-700 (Rev. 13-0), section 3.3
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06863 State the overtime limits for Millstone Personnel (As available)

Question Source: Bank #80918

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 95 | Tier # | | 3 |
| K/A Statement: Ability to determine | Group # | | 2 |
| Technical Specification Mode of Operation | K/A # | GEN.2.2.35 | |
| Proposed Question: | Importance Rating | | 4.5 |

The plant is initially in MODE 6, with a full core offload in progress per OP3210B, *Refueling Operations*.

Complete the following statement.

The point in the core offload when the Refueling SRO is required to declare entry into MODE Zero is when the last fuel assembly has been________.

a) removed from the reactor vessel
b) transferred out of Containment and has cleared the transfer canal
c) transferred out of Containment and the Fuel Transfer Tube Isolation Valve is closed
d) placed into its required position in one of the Spent Fuel Pool storage racks

Proposed Answer: B

Explanation (Optional): This question is considered SRO level, since it involves administrative requirements for determining MODE changes during refueling/fuel handling operations, which requires knowledge of Tech Spec Bases. The transition from MODE 6 to MODE ZERO is procedurally defined per OP 3210B, when all fuel assemblies have been removed from CTMT to the Spent Fuel Pool. This is specifically defined in Tech Spec Bases to occur when "the last fuel assembly of a full core offload has been transferred to the Spent Fuel Pool ("A" wrong) and has cleared the transfer canal ("B" correct) while in transit to a storage location" ("C" and "D" wrong). Knowledge of Tech Spec Basis information ensures MODE 6 requirements are not relaxed prematurely during fuel movement in Containment. "A" is plausible, since all fuel assemblies have been removed from the Reactor Vessel while transitioning from MODE 6 to MODE Zero. "C" and "D" are plausible, since all fuel bundles will be placed in the spent fuel pool racks after entering MODE Zero, and the Gate Valve can be closed to isolate Containment from the Spent Fuel Pool.

Technical Reference(s): OP 3210B (Rev. 010-04), Note Prior to step 4.1.13
(Attach if not previously provided, Tech Spec Basis 3/4.9.1 (Amendment #230)
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06388 Describe the basis for major procedural steps and/or sequence of steps in OP 3210 series (As available)

Question Source: Bank #69779

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43.2, 43.6 and 43.7

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 96 | Tier # | | 3 |
| K/A Statement: Knowledge of the process | Group # | | 2 |
| for conducting special or infrequent tests | K/A # | GEN.2.2.7 | |
| Proposed Question: | Importance Rating | | 3.6 |

The crew is performing a reactor startup per OP 3202, *Reactor Startup*, which is designated as an ICCE (Infrequently Conducted or Complex Evolution) procedure, and current conditions are as follows:

- The value of the 1/M plot is "0.4."
- The Reactor Engineer reports the projected critical position based on the 1/M plot is Control Bank C at 45 steps.

What action is the US required/allowed to direct?

a) Proceed with the reactor startup
b) Maintain rods at the present rod height and recalculate the Estimated Critical Condition (ECC)
c) Initiate immediate boration and drive all control bank rods into the core
d) Trip the reactor

Proposed Answer: C

Explanation (Optional): This question is considered SRO level, since it involves knowledge of administrative procedures (ICCE) specifically related to the SRO job function, and requires the applicant to assess plant conditions and determine a specific transition requirement during a reactor startup. OP 3202 is designated as an ICCE. ICCEs require criteria for terminating the test or evolution. One of the identified Termination Criteria for a reactor startup is criticality predicted below the RIL. Per Table in the COLR, RIL for zero percent power is Bank C at 51 steps, which is above what the 1/M plot is predicting. Any time calculations or instruments indicate that the reactor may go critical below the RIL, reactor startup must be terminated, all control banks inserted and immediate boration performed ("C" correct, "A", "B", and "D" wrong). "A" is plausible, since this would be correct if 1/M were above RIL. "B" is plausible, since ECC is required to be recalculated when criticality is predicted to be outside of the admin reactivity band. "D" is plausible, since termination criteria exist in OP 3202 that require a reactor trip, including a sustained SUR of 1.0 dpm, or an uncontrolled cooldown resulting in Tc being less than 530°F.

Technical Reference(s): OP-AA-106 (Rev. 10-0), step 3.2.2.c.8
(Attach if not previously provided, OP 3202 (Rev. 23-0), Cover Sheet
including version/revision number) OP 3202 (Rev. 23-0), Section 3.14 and step 4.25.1 and 4.25.2

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03375 Discuss conditions which require transition to other procedures from OP 3202. (As available)

Question Source: Bank #60751
Question History:
Question Cognitive Level: Comprehension or Analysis
10 CFR Part 55 Content: 55.41.1, 41.6, and 43.5
Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 97 | Tier # | | 3 |
| K/A Statement: Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. | Group # | | 3 |
| | K/A # | GEN.2.3.15 | |
| | Importance Rating | | 3.1 |

Proposed Question:

Initial conditions:

- The plant is at 100% power.
- N-16 Radiation Monitor, MSS-RE80A, is NOT in service.

The following sequence of events occurs:

1. Air Ejector Rad Monitor ARC21-1 goes into ALERT.
2. The crew enters AOP 3576, *Steam Generator Tube Leak.*
3. The RO reports Blowdown Rad Monitor 3SSR08-1 is trending upward.
3. Chemistry is dispatched to sample all 4 SGs for activity.
4. The crew is currently at AOP 3576, step 3 "Check Primary to Secondary Leakage," and current conditions are as follows:
   - Chemistry reports their initial sample results should be available in about 15 minutes.
   - The crew anticipates that SSR08 will exceed the ALERT setpoint in about five minutes.

Complete the following statement concerning verification of leakage per OP 3272, *EOP Users Guide*, and AOP 3576, and the procedural action the US is required to direct.

Leakage__(1)__verified. The US is required to__(2)__.

a) (1) IS
   (2) Continue on to AOP 3576, step 4
b) (1) IS NOT
   (2) Wait for a Chemistry sample to confirm the presence of leakage
c) (1) IS NOT
   (2) Wait to see if SSR08-1 exceeds the ALERT setpoint to confirm the presence leakage
d) (1) IS NOT
   (2) Request Chemistry to commence SP3861, *Primary to Secondary Leak Rate Determination* and exit AOP 3576

Proposed Answer: A

Explanation (Optional): This question is considered SRO level, since it requires the applicant to use Radiation Monitor data to make a decision as to whether or not to move forward in an AOP. This also involves knowledge of EOP Users' Guide guidance on interpreting Rad Monitor trends that are increasing but not in an alarm condition. To progress in AOP 3576 with the N-16 monitors out of service, two indications of tube leakage are required. ARC21 Rad Alert AND SSR-08 trending upward satisfy the requirement ("A" correct) even without the chemistry sample results. Since the requirement for two indications are satisfied, no further indications are required ("B" and "C" wrong). "D" is wrong, but plausible, since this action was already directed in AOP 3576, step 2. "B" and "C" are plausible, since the N-16 monitors are out of service, and SSR08 has not yet reached the ALERT setpoint.

| | |
|---|---|
| Technical Reference(s): (Attach if not previously provided, including version/revision number) | AOP 3576 (Rev. 08-0), steps 2 and 3.a-d.<br>OP 3272 (Rev. 09-0), Attachment 5, Definition of "Normal". |

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-07573 Given a set of plant conditions, determine the required actions to be taken per AOP 3576. (As available)

Question Source: Bank #72474

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.11 and 43.5

Comments:

| | | | |
|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 98 | Tier # | | 3 |
| K/A Statement: Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. | Group # | | 3 |
| | K/A # | GEN.2.3.5 | |
| | Importance Rating | | 2.9 |

Proposed Question:

A LOCA occurs, and Initial Conditions are as follows:

- An ALERT-Charlie 1 has been declared at Millstone 3.
- The CR-DSEO is preparing the Incident Report Form.
- The CR-DSEO is currently determining if the "Radiological Release in progress due to event" box is required to be checked on the IRF form.

The CR-DSEO gathers the following information from the Radiation Monitor Computer:

1. ESF Bldg Normal Vent Exhaust Monitor 3HVQ-RE49 shows an increasing trend, but is NOT in ALERT.
2. Turbine Building Stack Monitor 3HVR-RE10A is in ALERT, but is NOT in ALARM.
3. Liquid Waste Effluent Monitor 3LWS-RE70 is in ALERT, but is NOT in ALARM.
4. Containment Recirc Cooler Discharge Monitor 3SWP-RE60A is in ALARM.

In accordance with MP-26-EPI-FAP06, *Classification and PARs*, which one of these Radiation Monitors specifically requires the CR-DSEO to select the "Radiological release in progress due to event" Box?

a) 3HVQ-RE49 increasing trend.
b) 3HVR-RE10A in ALERT
c) 3LWS-RE70 in ALERT
d) 3SWP-RE60A in ALARM

Proposed Answer: B

Explanation (Optional): This question is considered SRO level, since it involves knowledge of administrative procedures related to the SRO job function in the Emergency Plan. It requires the applicant to interpret radiation readings as they pertain to making an appropriate decision about whether a radiation release considered to be in progress during an event. The Radiation Monitor input to checking the block "Radiological release in progress due to event" is a gaseous effluent radiation monitor ("A" plausible) in ALERT ("B" correct, "A" wrong) or ALARM ("C" and "D" plausible). "C" and "D" are wrong, since these are not gaseous effluent monitors. "A" is plausible, since it is a gaseous effluent monitor, and an increasing trend is considered "not normal" when diagnosing RMS Alarm/Alert status if it is anticipated it will reach the ALERT setpoint. "C" and "D" are plausible, since both of these monitors are monitoring an effluent point, and RE10A is only in ALERT.

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|---|---|
| Technical Reference(s): | MP-26-EPI-FAP06 (Rev. 10-0), Section 2.1.8 |
| (Attach if not previously provided, | MP-26-EPI-FAP06 (Rev. 10-0), Att. 6 |
| including version/revision number) | |

Proposed references to be provided to applicants during examination: None

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|---|---|---|
| Learning Objective: | MC-02534 The Shift Manager and Unit Supervisor will perform all administrative actions necessary to protect the public in accordance with emergency plan procedures. | (As available) |

Question Source: Bank #89303

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.11, 43.4, and 43.5

Comments:

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|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 99 | Tier # | | 3 |
| K/A Statement: Knowledge of the | Group # | | 4 |
| emergency plan | K/A # | GEN.2.4.29 | |
| Proposed Question: | Importance Rating | | 4.4 |

The Control Room DSEO has just declared a General Emergency - BRAVO.

How will the CRDSEO notify the state of the PAR, and what evacuation, if any, will be carried out by the state?

a) The Incident Report Form will serve as the PAR notification. State officials will evacuate a 2-mile radius around the site.
b) The Incident Report Form will serve as the PAR notification. An evacuation will NOT be conducted for a General Emergency BRAVO.
c) The PAR will be verbally transmitted to the 24 hour DEP dispatcher in Hartford. State officials will evacuate a 2-mile radius around the site.
d) The PAR will be verbally transmitted to the 24 hour DEP dispatcher in Hartford. An evacuation will NOT be conducted for a General Emergency BRAVO.

Proposed Answer: A

Explanation (Optional): This question is considered SRO level, since it involves knowledge of Emergency Plan procedures specifically related to the SRO job function. If a General Emergency BRAVO is declared, State officials automatically implement a PAR to evacuate a 2-mile radius ("B" and "D" wrong). The Incident Report Form serves as PAR notification in this instance ("A" correct, "C" wrong). "C" and "D" are plausible, since the PAR will be verbally transmitted to the 24 hour DEP dispatcher in Hartford for General Emergency ALPHA classifications requiring actions out to 10 miles. "B" and "D" are plausible, since on a Site Area Emergency CHARLIE 2, State officials will not conduct an evacuation.

Technical Reference(s): MP-26-EPI-FAP06-005 (Rev. 06-0), Note prior to Section A
(Attach if not previously provided,
including version/revision number)

Proposed references to be provided to applicants during examination:

Learning Objective: EP-00203 Explain the method for providing protective action recommendations initially and following activation of the Emergency Response Organization. (As available)

Question Source: Bank #85285

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.12 and 55.43.5

Comments:

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|---|---|---|---|
| Examination Outline Cross-Reference: | Level | RO | SRO |
| Question # 100 | Tier # | | 3 |
| K/A Statement: Knowledge of SRO responsibilities | Group # | | 4 |
| in emergency plan implementation | K/A # | GEN.2.4.40 | |
| Proposed Question: | Importance Rating | | 4.5 |

A “General Emergency” has been declared.

Which of the following tasks CAN be re-assigned by the Control Room - Director of Station Emergency Organization (CR - DSEO) to other available Control Room individuals?

a) Issuing KI tablets to the control room staff.
b) Developing Protective Action Recommendations
c) Authorizing Emergency Exposure Dose Extension
d) Conducting the Station Evacuation

Proposed Answer: D

Explanation (Optional): This question is considered SRO level, since it involves knowledge of Emergency Plan procedures specifically related to the SRO job function. "D" is correct, since the CRDSEO can delegate conducting the station evacuation. "A", "B", and "C" are wrong since these tasks cannot be delegated. "A", "B", and "C" are plausible since these are all responsibilities of the CR DSEO.

Technical Reference(s): MP-26-EPI-FAP01-001 (Rev. 14-0), Section E.7 and 10
(Attach if not previously provided, MP-26-EPI-FAP01-001 (Rev. 14-0), Section F, steps 12 and 16.
including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: EP-00208 List the responsibilities of the Shift Manager while serving as CR Director of Station Emergency Operations (CR DSEO). (As available)

Question Source: Bank #75654

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43.5

Comments: