Examination Outline Cross-reference:	Level	RO	SRO
Question # 1	Tier #	1	1
Ability to operate/monitor AFW on Reactor Trip	Group #	1	1
	K/A #	EPE.007.EA1.08	
	Importance Rating	4.4	4.3

Proposed Question:
The plant has just tripped from 100% power, and current conditions are as follows:

- RCS Wide Range Tcold: 545°F and slowly decreasing.
- RCS pressure: 2000 psia and slowly decreasing.
- All SG NR levels are offscale low.
- The crew is performing E-0, step 2 "Verify Turbine Trip".

What action is the BOP required to take with AFW flow, and what limitation is there on taking this action?

A. The BOP is required to throttle total AFW flow to between 530 and 600 gpm, and the BOP can only take this action after Narrow Range level in at least one SG is >8%.

B. The BOP is required to throttle total AFW flow to between 530 and 600 gpm, and the BOP can only take this action after completing his/her immediate actions.

C. The BOP is required to throttle total AFW flow as low as necessary to stop the cooldown, and the BOP should throttle flow evenly to all Steam Generators.

D. The BOP is required to throttle total AFW flow as low as necessary to stop the cooldown, and the BOP can only take this action after receiving direction from the US.

Proposed Answer: B

Explanation (Optional): "B" is correct, since the BOP operator may, at any time when not required to be performing an immediate action or sequenced steps, throttle AFW flow if minimum heat sink requirements are satisfied. This includes throttling flow to minimize cooldown. "A" is wrong, since throttling is required before SG level reaches 8% with a cooldown in progress. "A" is plausible, since the BOP must wait until at least one SG is >8% to decrease flow less than 530 gpm. "C" and "D" are wrong, since minimum heat sink requirements must be met. "C" and "D" are plausible, since throttling flow as low as necessary to stop the cooldown is required once one SG NR level reaches 8%. "C" is also plausible, since the BOP should throttle AFW flow evenly, and "D" is also plausible, since SM/US direction is required if isolating AFW flow to a ruptured SG.

Technical Reference(s): ES-0.1 step 1 and step 7 (Attach if not previously provided)
OP 3272, Attachment 3, page 30

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04454 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: Bank #75640

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 # 2	Tier #	1	1
Small Break LOCA: Ability to determine or	Group #	1	1
interpret Charging flow indication	K/A #	EPE.009.EA2.13	
	Importance Rating	3.4	3.6

Proposed Question:

With the plant at 100% power, an RCS leak occurs, and the following sequence of events takes place:

1. The crew enters AOP 3555 *Reactor Coolant System Leak.*
2. The RO fully opens the charging line flow control valve 3CHS*FCV121.
3. PZR level is still decreasing.
4. The RO starts the second charging pump.
5. PZR level stabilizes at 58%.
6. RCS pressure is 2240 psia and stable.

Approximately much charging flow is now going through 3CHS*FCV121?

A. 70 gpm

B. 100 gpm

C. 140 gpm

D. 200 gpm

Proposed Answer: C

Explanation (Optional): "C" is correct, and "A", "B", and "D" wrong, since at normal operating pressure with two running charging pumps and 3CHS*FCV121 fully open, CHS flowrate will be about 140 gpm. "A" is plausible since 65 gpm is the normal CHS flowrate from one CHS pump with 3CHS*FCV121 in automatic. "B" is plausible since 100 gpm is the approximate CHS flowrate from one CHS pump running with 3CHS*FCV121 fully open. "D" is plausible since 200 gpm is double the flowrate with one charging pump running and FCV 121` full open; and is an appropriate CHS cold leg injection flowrate through the cold leg injection path if an SIS has actuated during a small break LOCA. Note: the facility reviewer confirmed 130-gpm flow in the plant when two Charging Pumps were running with FC*121 throttled during the plant shutdown at the start of a previous outage. Flowrates were tested on the simulator.

Technical Reference(s): AOP 3555, step 2 (Attach if not previously provided)
FSAR Table 9.3-4
REALTIME Charging Pump Data

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04202 Describe the operation of the Chemical And Volume Control System under normal, abnormal, and emergency operation conditions. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5 and 41.8
55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 3	Tier #	1	1
Knowledge of reasons for criteria for shifting to recirc mode.	Group #	1	1
	K/A #	EPE.011.EK3.15	
	Importance Rating	4.3	4.4

Proposed Question:

The crew has just entered ES-1.3 *Transfer to Cold Leg Recirculation.*

What is the remaining water in the RWST used for?

A. To maintain adequate suction to the CHS and SIH pumps while switching to cold leg recirc. and for Quench Spray Pump usage after the switchover is complete.

B. To prevent cavitation of the RHR pumps, and for Quench Spray Pump usage after the switchover is complete.

C. To maintain adequate suction to the CHS and SIH pumps while switching to cold leg recirc. and to minimize boron precipitation in the hottest regions of the core.

D. To prevent cavitation of the RHR pumps, and to minimize boron precipitation in the hottest regions of the core.

Proposed Answer: A

Explanation (Optional):
"A" is correct since, when RWST level decreases to the switchover setpoint, the transfer to cold leg recirculation is made to maintain coolant flow to the core, and the remainder of the RWST is reserved for QSS pump usage ("C" and "D" wrong). "B" and "D" are wrong, since the RHR pumps trip on RWST Lo-Lo level, but plausible since RHR pumps initially provide core cooling by taking suction on the RWST. "C" and "D" are plausible, since boron precipitation is the basis for switching to hot leg recirc.

Technical Reference(s): WOG Bkgd Doc for ES-1.2 Caution prior to step 1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06261; Discuss the basis of major procedure steps and / or sequence of steps in EOP ES - 1.3 and ES - 1.4. (As available)

Question Source: Modified Bank # 63929 Parent question attached.

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 # 4	Tier #	1	1
RCP Malfunction: Ability to operate or monitor	Group #	1	1
CCW flow.	K/A #	APE.015/017.AA1.06	
	Importance Rating	3.1	2.9

Proposed Question:

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

1. A 100 gpm tube leak occurs in the "D" RCP thermal Barrier heat exchanger.
2. One minute later, with the plant still on line, the US directs the RO to monitor RPCCW flows.

What will the RO observe on MB2?

A. "A" train RPCCW CTMT header flow has increased.

B. "A" train RPCCW CTMT header flow has decreased.

C. "B" train RPCCW CTMT header flow has increased.

D. "B" train RPCCW CTMT header flow has decreased.

Proposed Answer: B

Explanation (Optional): "B" is correct since an RCP thermal Barrier heat exchanger tube leak will result in RCS leakage into the RPCCW system. To protect the RPCCW system, when flow reaches 86 gpm, the thermal barrier HX return isolation valve (3CCP*AOV178D) will auto-close to isolate the leak, isolating RPCCW flow through the "D" RCP thermal barrier and reducing RPCCW flow through the train "A" CTMT header ("A" and "C" wrong). "A" is plausible since "A" train RPCCW cools the "D" RCP and without auto action from AOV178D, there would be an increase in return flow from the thermal barrier HX. Distractors "C" and "D" are plausible since for many train specific systems, components "a" and "c" are supplied by train "A", and components "b" and "d" are train "B".

Technical Reference(s): P & ID EM-121B (Attach if not previously provided)
FSAR Page 9.2-18

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04150 Describe the operation of the... Reactor Plant Component Cooling System equipment controls and interlocks... (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 5	Tier #	1	1
Ability to operate and / or monitor pressurizer level trend	Group #	1	1
during a loss of reactor coolant makeup.	K/A #	APE.022.AA1.03	
	Importance Rating	3.2	3.2

Proposed Question:
With the plant at 100% power and the "B" Charging Pump running, the following sequence of events occur:

1. The CHARG PP FLOW HI/LO alarm is received.
2. The RO reports Charging Header Flow Control Valve, 3CHS*FCV121, has failed closed.
3. The RO reports that Pressurizer level is 60% and decreasing.
4. The US directs the RO to take manual control of 3CHS*FCV121.
5. The RO reports 3CHS*FCV121 will not open.

What PZR level trend would the RO observe if no operator action is taken; and what action will the operators take to mitigate the initial decreasing pressurizer level trend?

A. Pressurizer level would continue to decrease until the pressurizer is empty. Operators will align charging through the safety grade path via 3CHS*HCV190A.

B. Pressurizer level would continue to decrease until 22% pressurizer level, and then start increasing. Operators will align charging through the safety grade path via 3CHS*HCV190A.

C. Pressurizer level would continue to decrease until the pressurizer is empty. Operators will align charging through the safety grade path via 3CHS*HCV190B.

D. Pressurizer level would continue to decrease until 22% pressurizer level, and then start increasing. Operators will align charging through the safety grade path via 3CHS*HCV190B.

Proposed Answer: B

Explanation (Optional): "A" and "C" are wrong, since at 22% pressurizer level, letdown will automatically isolate, and since charging is still occurring through the RCP seals, pressurizer level would start to recover. "B" is correct, and "D" wrong, since both OP 3353.MB3A, 4-9 and EOP 3506 directs the operators to align charging through the safety grade path via 3CHS*HCV190A since FCV190A bypasses FCV121, and FCV190B does not. "A" and "C" are plausible, since this would occur if letdown did not isolate, or if EOP 3506 had been entered due to a loss of all Charging Pumps. "C" and "D" are plausible since 3CHS*HCV190B is a safety grade path, and the "B" Charging Pump is running, but using 190B would require locally aligning a flowpath to the RCP seals.

Technical Reference(s): EOP 3506, steps 9 and 10a, b, and c. (Attach if not previously provided)
OP 3353.MB3A, 4-9
OP 3353.MB4A, 5-1
P&ID 104A

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04202 Describe the operation of the Chemical and Volume Control System under normal, abnormal, and emergency operating conditions. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5, 41.7, and 41.10

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 6	Tier #	1	1
Explain and apply all system limits and	Group #	1	1
precautions relating to Loss of RHR	K/A #	APE.025.GEN.2.1.32	
	Importance Rating	3.4	3.8

Proposed Question:
Initial Conditions:

- RCS temperature is 150°F.
- RCS Pressure is 150 psia.
- No RCPs are running.
- A "B" Train outage is in progress.

The following sequence of events occurs:

1. The "A" RHR Pump trips.
2. The crew enters EOP 3505 *Loss of Shutdown Cooling and/or RCS Inventory*.
3. The success path specified for decay heat removal is to open the atmospheric relief valves.

What is the crew required to do with RCS pressure, and why?

A. The crew must raise RCS pressure to greater than 170 psia, to ensure subcooled natural circulation occurs.
B. The crew must raise RCS pressure to greater than 170 psia, to ensure adequate NPSH exists for starting an RCP.
C. The crew must depressurize the RCS to atmospheric to prevent lifting COPPS relief valves as the natural circulation ΔT develops.
D. The crew must depressurize the RCS to atmospheric to prevent a cold overpressure event as makeup is added to the RCS.

Proposed Answer: A
Explanation (Optional): "A" is correct, since natural circulation will proceed when RCS temperature increases to approximately 50°F greater than the saturation temperature of the secondary water. The required RCS pressure to maintain the RCS subcooled at the lowest pressure point in the RCS (SG U-Tubes), including instrument uncertainties, is 170 psia. "B" is wrong, since the 170 psia requirement is part of establishment of conditions for natural circulation. "C" and "D" are wrong, since the RO will be maintaining RCS pressure between 170 and 330 psia. "B" is plausible, since there is a pressure requirement for RCS pressure in EOP 3505 when running an RCP, but the pressure band is 310 to 375 psia. "C" is plausible, since the PZR may be solid when in MODE 5, and a heatup will cause an increase in RCS pressure. "D" is plausible, since this is a misapplication of the PTS caution that applies when adding makeup via a high head source.

Technical Reference(s): EOP 3505, Attachment B, Caution prior to step 1, step 9, step 11, EOP 3505, Attachment B, note prior to step 12 OP 3260A Basis Document, Page 21, and Section 1.4.4 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04352 Discuss the bases of major procedure steps and/or sequence of steps in EOP 3505, Loss of Shutdown Cooling and/or RCS Inventory (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.10

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 7	Tier #	1	1
Determine/interpret valve lineup to restart	Group #	1	1
CCW after bypassing portion of system	K/A #	APE.026.AA2.03	
	Importance Rating	2.6	2.9

Proposed Question:

The plant is initially in MODE 3 with the reactor trip breakers open. and RPCCW header flowrates are as follows:

	"A" Train	"B" Train
Safety Header	175 gpm	1910 gpm
Non-safety Header	2423 gpm	2541 gpm
CTMT Header	890 gpm	1350 gpm

The following sequence of events occurs:

1. RPCCW surge tank level starts rapidly lowering.
2. The crew enters AOP 3561 *Loss of Reactor Plant Component Cooling Water* and determines the leak is on the "A" Train of RPCCW.
3. The "A" non-safety header isolates due to a RPCCW lo-lo surge tank level.
4. The crew stops the affected RCPs.
5. The crew closes the "A" train CTMT supply and return header isolation valves.
6. The "A" RPCCW pump is placed in pull-to-lock.
7. A large pipe break is found on the "A" train non-safety header.
8. All AOP actions for an "A" train RPCCW leak are complete up to affected train restoration steps.
9. The crew is preparing to restore the "A" Train RPCCW per OP 3330A *Reactor Plant Component Cooling Water*.

What valve alignment, if any, needs to be completed prior to starting the "A" RPCCW pump to provide the minimum preferred load with the "A" train non-safety header isolated?

A. No further manual valve alignment needs to be completed, since the minimum preferred load is already available.

B. Restoring the "A" Train RPCCW CTMT header will provide the preferred load.

C. Aligning the Spent Fuel Pool Cooler to the "A" RPCCW train will provide the preferred load.

D. Aligning the "A" CDS Chiller Unit to the "A" RPCCW train will provide the preferred load.

Proposed Answer: C

Explanation (Optional):

The minimum preferred load for starting an RPCCW pump is 2000 gpm. "A" is plausible, since 1000 gpm is the minimum load required (although 2000 gpm is preferred) and with the leaking non-safety header isolated, there was still initially > 1000 gpm of flow available to "A" train. "B" is plausible, since with the CTMT header restored, greater than 1000 gpm of flow is available. "C" is correct, since the options for sharing loads between RPCCW trains are to shift Fuel Pool coolers ("C" correct) or to align a given CDS Chiller to a different RPCCW train ("D" plausible). "D" is wrong, since with the A" train non-safety header isolated, a CDS Chiller load cannot be placed on the "A" RPCCW train.

Technical Reference(s): AOP 3561 Attachment C, steps 10 to 13 (Attach if not previously provided)
OP 3330A, Note prior to step 4.1.1, step 4.16.4, and Attachment 1.

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04155 Given an RPCCW System leak, determine the effects on the RPCCW System and other interrelated systems. (As available)

Question Source: New

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 # 8	Tier #	1	1
Knowledge of operational implications of	Group #	1	1
expansion of liquids as temperature increases	K/A #	APE.027.AK1.02	
with pressurizer pressure control malfunction.	Importance Rating	2.8	3.1

Proposed Question:
With the plant initially at 100% power and rod control in manual, a short duration spurious runback occurs.

Current conditions are as follows:

- Power has stabilized at 80%.
- Tave has increased to 593°F.
- Pressurizer level has risen to 80%.
- Pressurizer pressure is currently 2370 psia.
- PORV 455A indicates OPEN.
- PORV 456 indicates CLOSED.
- PRT pressure and level are increasing.
- All Pressurizer backup heaters are energized.

What action is required to be taken by the operators?

A. Trip the reactor and enter E-0, since an automatic reactor trip should have occurred.

B. Open PORV 456, since it should already be OPEN.

C. Close PORV 455A, since it should have already CLOSED.

D. Turn all pressurizer backup heaters to OFF, since they should not have energized.

Proposed Answer: B
Explanation (Optional):
Justification: "B" is correct, and "C" wrong, but plausible, since the PORVs open at 2350 psia and will not close until pressure is about 2335 psia. "A" is wrong, but plausible, since the reactor trip setpoint is 2385 psia. "D" is wrong since a PZR insurge has occurred, and heaters automatically energize when actual level is 5% above program, but plausible, since RCS pressure is high.

Technical Reference(s): OP 3353.MB4A, 3-4, 4-1 (Attach if not previously provided)
OP 3353.MB4C, 2-7

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05341; Describe operation of the PZR pressure and level control systems under normal, abnormal and emergency operating conditions. (As available)

Question Source: Bank #75632
Question History 2001 Millstone 3 NRC Exam
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 # 9	Tier #	1	1
Ability to determine / interpret the occurrence	Group #	1	1
of a main turbine / reactor trip.	K/A #	EPE.029.EA2.09	
	Importance Rating	4.4	4.5

Proposed Question:
Initial Conditions:

1. A Safety Injection has occurred.
2. The crew has been progressing through the EOP network.

Current conditions:

- A valid ORANGE path is received on the "Subcriticality" status tree.
- The crew is entering FR-S.1 *Response to Nuclear Power Generation ATWS.*
- Reactor Trip and Bypass Breakers are OPEN.
- DRPI shows all rods on the bottom.
- Intermediate Range Startup Rate is positive.
- The Source Ranges have not energized.
- All 4 Turbine Stop Valves are CLOSED.
- The "A", "B", and "C" Turbine Control Valves are closed.
- The "D" Turbine Control Valve is stuck OPEN.
- The "A", "B", and "C" MSIVs are closed.
- The "D" MSIV is stuck OPEN.

As defined in the immediate actions of E-0 and FR-S.1, what is the status of the reactor and the turbine?

A. Both the reactor and the turbine are tripped.

B. The reactor is tripped, but the turbine is NOT tripped.

C. The reactor is NOT tripped, but the turbine is tripped.

D. Both the reactor and the turbine are NOT tripped.

Proposed Answer: A
Explanation (Optional): "A" is correct, since two of the three reactor-trip criteria are met ("C" and "D" are wrong); and the turbine is tripped, since all 4 stop valves are closed ("B" and "C" are wrong). "C" and "D" are plausible, since power is increasing. "B" and "C" are plausible, since one MSIV and one control valve are stuck open.
Technical Reference(s): FR-S.1, steps 1 and 2 (Attach if not previously provided)
E-0, note prior to step 1
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: Modified Bank #78909 Parent Question Attached
Question History: 2004 Millstone 3 NRC Exam prior to modification
Question Cognitive Level: Comprehension or Analysis
10 CFR Part 55 Content: 55.41.10

Examination Outline Cross-reference:	Level	RO	SRO
Question # 10	Tier #	1	1
Knowledge of operational implications of	Group #	1	1
feedwater introduction into a dry SG as it applies	K/A #	APE.040.K1.07	
to a steam line rupture.	Importance Rating	3.4	4.2

Proposed Question:

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

- One of the "B" SG Safety Valves fails fully open, and sticks fully open.
- The reactor trips, and a low steamline pressure SIS occurs.
- The crew enters E-0 *Reactor Trip or Safety Injection*.
- The "B" SG rapidly depressurizes.
- The BOP operator isolates AFW flow to the "B" SG.
- "B" SG Wide Range level reaches 4%.
- RCS WR T_{cold} slowly returns to 557°F
- While attempting to increase AFW flow to the "C" SG, the BOP operator inadvertently establishes AFW flow to the "B" SG.

Per the WOG EOP Basis Document, what is the most significant operational concern associated with the BOP's reestablishing AFW flow to the "B" SG?

A. This will allow the mass and energy release to continue into the atmosphere.

B. This will reinitiate the unplanned radiation release to the environment, potentially violating 10CFR20 limits.

C. This will minimize the cooldown capability of the non-faulted loops.

D. This will result in thermal or mechanical shocks to the SG tubes that could result in a tube rupture.

Proposed Answer: D

Explanation (Optional):
Based on wide range level, "B" SG is considered hot and dry. Reestablishment of feed flow to a dry SG could result in thermal/mechanical shock to SG tubes such that tube leakage or even a significant tube rupture could occur ("D" correct). Both distractors "A" and "C" are plausible since these statements are true in and of themselves, and also form the basis for feedwater isolation to a faulted SG, and is discussed in the WOG Background document for E-2. Distractor "B" is plausible since the steam break is outside CTMT, and depending on RCS activity and actual tube leakage, there may be a radiological release in progress.

Technical Reference(s): WOG Background for FR-H.1, Step 1, Caution 2 (Attach if not previously provided)
WOG Background for ECA-2.1, Step 2, Caution

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03882; Discuss the basis of major procedure steps and/or sequence of steps in EOP 35 ECA-2.1. (As available)

Question History: New

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 # 11	Tier #	1	1
Ability to operate/monitor HPI as it applies to total loss of MFW.	Group #	1	1
	K/A #	APE.054.AA1.04	
	Importance Rating	4.4	4.5

Proposed Question:

The crew is carrying out the actions of FR-H.1, *Response to Loss of Secondary Heat Sink.*

Current plant conditions require that RCS bleed and feed be performed.

How will the RO operate ECCS pumps to properly conduct the feed portion of bleed and feed?

A. Manually start one charging pump or one SI pump.

B. Manually start both charging pumps and both SI pumps.

C. Manually start both charging pumps.

D. Manually actuate SI.

Proposed Answer: D.

Explanation (Optional):
FR-H.1 requires that SI be initiated to start the feed portion of bleed and feed ("D" is correct). Distractor "A" is plausible since step 12 of FR-H.1 verifies a proper feed path by checking at least one charging pump or one SI pump running. Distractor "B" is plausible since starting both charging pumps and both SI pumps, would be the result (with respect to high head ECCS pumps) of initiating SI. Distractor "C" is plausible since for non-complicated FR-H.1 scenarios, RCS pressure is likely to be above the shutoff head of the SI pumps.

Technical Reference(s): FR-H.1, step 11 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04535, Discuss the basis of major procedure steps in EOP 35 FR-H.1 through H.5. (As available)

Question Source: New

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 # 12	Tier #	1	1
Ability to determine or interpret Instrumentation	Group #	1	1
and Controls operable with only DC power	K/A #	EPE.055.EA2.04	
available on a station blackout.	Importance Rating	3.7	4.1

Proposed Question:

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

1. A significant grid disturbance occurs, resulting in large RCS pressure swings.
2. All AC power is lost, and the crew enters ECA-0.0 *Loss Of All AC Power*.
3. While the crew is trying to restore AC power per ECA-0.0, step 5, the STA notes that RCS pressure is still increasing as ΔT for natural circulation is developing.

The crew is currently preparing to depressurize intact steam generators per ECA-0.0, step 19.

Which control system was available to limit the RCS pressure rise at ECA-0.0, step 5; and which controls are available to depressurize the Steam Generators at ECA-0.0, step 19?

A. The RCS overpressure event was limited by the PZR PORVs, and the crew will depressurize the SGs using the Atmospheric Relief Bypass Valves controlled locally by PEOs.

B. The RCS overpressure event was limited by the PZR spray valves, and the crew will depressurize the SGs using the Atmospheric Relief Bypass Valves controlled locally by PEOs.

C. The RCS overpressure event was limited by the PZR PORVs, and the crew will depressurize the SGs using the Atmospheric Relief Bypass Valves controlled from MB5.

D. The RCS overpressure event was limited by the PZR spray valves, and the crew will depressurize the SGs using the Atmospheric Relief Bypass Valves controlled from MB5.

Proposed Answer: A.

Explanation (Optional):
"A" is correct, since cooldown is performed using Atmospheric Relief Bypass Valves due to loss of air to Atmospheric Relief Valves. This is done locally due to loss of Control Power to Atmospheric Relief Bypass Valves ("C" and "D" wrong). The over-pressure event is limited by the PZR PORVs, since they are powered by DC power, and spray valves will not work since driving head for PZR spray valves is lost with natural circulation flow ("B" and "D" wrong). "C" and "D" are plausible, since the Atmospheric Relief Bypass Valves will be used to depressurize the RCS. "B" and "D" are plausible, since the spray valves are normally the preferred means of depressurizing the RCS.

Technical Reference(s): ECA-0.0, steps 3.a and 19. (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03852; Discuss the basis of major procedure steps and/or sequence of steps in EOP 35 ECA-0.0. (As available)

Question Source: Bank #73473

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7, 41.8, and 43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 13	Tier #	1	1
Operational implications of cooling by natural circulation	Group #	1	1
	K/A #	APE.056.AK1.01	
	Importance Rating	3.7	4.2

Proposed Question:
Offsite power is lost, and the following procedurally directed actions are taken prior to commencing the RCS cooldown:

1. The BOP closes the MSIVs.
2. The RO commences immediate boration to increase RCS boron concentration by 1500 ppm.
3. The BOP loads the SBO diesel to 500-700 Kw.
4. The BOP starts a second CRDM cooling fan.

Which of the above actions was taken to minimize complications due to the loss of RCPs during the cooldown?

A. Closing the Main Steam Isolation Valves.

B. Commencing the immediate boration.

C. Loading the SBO diesel to 500-700 Kw.

D. Starting the second CRDM Cooling Fan.

Proposed Answer: D

Explanation (Optional): "D" is correct, since the basis of running two CRDM fans is to ensure as much heat as possible is being removed from the vessel head. Maximum CRDM cooling, combined with maintaining an extra subcooling margin and a restricted cooldown rate, prevents possible void formation in the upper head (Based on analysis after the 1980 St. Lucie event). "A" is wrong, since this action is taken due to loss of secondary plant cooling on a loss of offsite power. "B" is wrong, since this action is taken due to a loss of DRPI on a loss of offsite power. "C" is wrong, since the SBO diesel is started on loss of offsite power to maintain the SBO auxiliaries powered, and loaded to prevent the buildup of combustibles. "A", "B", and "C" are plausible, since they are actions that are not normally taken by the crew on a trip, but are taken on a loss of offsite power.

Technical Reference(s): ES-0.1, steps 3 and 6.
ES-0.2, steps 3 and step 4. WOG Bkgd for step 5 and 12
Millstone 3 step deviation document for ES-0.1, steps 3 and 6
Millstone 3 step deviation document for ES-0.2, step 3
(Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05944 Discuss the basis of major procedure steps and/or sequence of steps in EOP 35 ES-0.2, Natural Circulation Cooldown. (As available)

Question Source: New

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 # 14	Tier #	1	1
Ability to determine/interpret component position which will occur on an LOP as applies to loss of Vital Instrument Bus.	Group #	1	1
	K/A #	APE.057.AA2.18	
	Importance Rating	3.1	3.1

Proposed Question:

A loss of offsite power occurs while VIAC 2 is de-energized.

What will be the effect on automatic operation of the "B" EDG and 34D bus stripping?

A. The "B" EDG starts, and 34D loads strip, but the EDG output breaker will not close.

B. The "B" EDG starts, bus 34D loads do not strip, and the EDG output breaker will not close.

C. The "B" EDG does not start and bus 34D loads are not stripped.

D. The "B" EDG does not start but bus 34D loads strip.

Proposed Answer: B

Explanation (Optional):

Loss of VIAC 1 or 2 deenergizes the associated EDG sequencer. If an ESF actuation takes place, the following will NOT occur automatically on the associated train:

- EDG start (except on LOP)
- Emergency bus load stripping
- Load sequencing

"B" is correct since it describes the proper response of the 'B' Sequencer and EDG as stated in AOP 3564. "A" is wrong since the sequencer is deenergized so it will not strip bus 34D. "A" is plausible, since this action normally occurs on an LOP. "C" and "D" are wrong since the 'B' EDG will start from the LOP signal, independent of the deenergized sequencer. "C" and "D" are plausible, since on an SIS signal, the EDG would not start with the sequencer deenergized.

Technical Reference(s): AOP 3564 Step 1 Caution (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03956; Discuss the basis of major precautions, procedure steps and/or sequence of steps within AOP 3564, Loss of One Protective System Channel. (As available)

Question Source: Bank #69207

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7 and 41.10
55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 15	Tier #	1	1
Ability to determine and interpret DC loads lost;	Group #	1	1
impact on ability to operate and monitor plant	K/A #	APE.058.AA2.03	
systems.	Importance Rating	3.5	3.9

Proposed Question:

The plant is at 22 % power.

All annunciator windows darken. The BOP announces that battery bus 5 voltage indicates zero.

Assuming no operator action has been taken, what will be the status of the reactor 30 seconds after the loss of DC bus 5?

A. The reactor will have tripped, since Main Turbine ETS pressure switches have deenergized.

B. The reactor will NOT have tripped. Steam Generator levels will be decreasing because the feedwater header has isolated.

C. The reactor will NOT have tripped. Steam Generator levels will be decreasing because feed pump recirc valves have failed open.

D. The reactor will have tripped, since the steam supply to the SJAE's has isolated, resulting in a trip on low condenser vacuum.

Proposed Answer: C

Explanation (Optional): The loss of DC Bus 5 will de-energize the turbine ETS trip switches, which will trip the turbine ("A" plausible) but not the reactor, since power is below the P-9 setpoint ("A" wrong). The main feed regulating and bypass valves will fail closed if bus 1 or 2 are lost, and feedwater will not be isolated, no FWI because no P-4 ("B" wrong, but plausible). The recirculation valves for the motor and turbine driven feed pumps fail open, causing level to decrease, but the decreasing level will be offset by feed reg valves opening and feed pump speed increasing ("C" correct). The loss of SJAE will also occur ("D" plausible) but will be a longer process to lose condenser vacuum ("D" wrong).

Technical Reference(s): AOP3563, Attachment E (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03309 Given a failure of the 125 VDC Distribution System or a portion of the system, determine the effects on the system and on interrelated systems... (As available)

Question Source: Bank #70403

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5 and 41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 16	Tier #	1	1
Knowledge of the reasons for automatic actions within	Group #	1	1
Service Water on ESF actuation.	K/A #	APE.062.AK3.02	
	Importance Rating	3.6	3.9

Proposed Question:
With the plant initially at 100% power, an earthquake occurs, resulting in an SIS, CDA, and LOP.

Service Water to RSS Valves 3SWP*MOV54A and B open as soon as 34C and D are energized, but 3SWP*MOV54C and 54D open after a three-minute time delay.

What is the purpose of the 3-minute time delay tied to the auto-opening of 3SWP*MOV54C and D?

A. Allow time for service water flow to refill the SWP piping to the Emergency Diesel Heat Exchangers (3EGS*E1A/B and E2A/B).

B. Allow time for service water flow to refill the SWP piping to the Control Building ACU Booster Pumps (3SWP*P2A/B).

C. Prevent runout flow conditions from existing on the running Service Water Pumps by allowing time for Service Water to TPCCW Supply Valves 3SWP*MOV71A and 71B to close.

D. Prevent runout flow conditions from existing on the running Service Water Pumps by allowing time for Service Water to RPCCW Supply Valves 3SWP*MOV50A and 50B to close.

Proposed Answer: B
Explanation (Optional): "B" is correct, and "A", "C", and "D" wrong, since during an LOP, SWP piping drains, and in order to guarantee the refilling of the SWP piping to the Control Building ACUs following a CDA/LOP, the time delay exists, delaying the opening of the last two SWP to RSS valves. This maintains a higher SWP pressure to refill the associated piping. "A" is plausible since this system also drains on an LOP, and requires SWP after a CDA+LOP. "C" and "D" are plausible since this is related to the reason RPCCW and TPCCW are isolated from SWP on a CDA.
Technical Reference(s): DCR M3-97105 (Attach if not previously provided)
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... Containment Recirculation Cooler Isolation Valves... (As available)
Question Source: Bank #77656
Question Cognitive Level: Memory or Fundamental Knowledge
10 CFR Part 55 Content: 55.41.4 and 41.8
Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 17	Tier #	1	1
Ability to operate and/or monitor the restoration of systems when air pressure is restored.	Group #	1	1
	K/A #	APE.065.AA1.03	
	Importance Rating	2.9	3.1

Proposed Question:
Initial Conditions:

- RCS Tave is 557°F.
- All rods are fully inserted.
- The Service Air Compressor tagged out.

The following sequence of events occurs:

1. The running "A" Instrument Air Compressor trips, and the standby "B" Compressor fails to load.
2. Air pressure starts decreasing, and the crew enters AOP 3562 *Loss of Instrument Air*.
3. Instrument Air pressure decreases to zero psig.
4. A PEO locally places the "B" compressor in "CS", and it loads.
5. Instrument air pressure recovers to 110 psig.

What actions are the operators required to take with the Reactor Plant Chilled Water System now that air pressure has been restored?

A. Restart the two previously running CDS Chillers at Main Board 1.

B. Restart the two previously running CDS Circulating Pumps at Main Board 1.

C. Open the RPCCW supply and return to Chilled Water valves, close the CDS CTVs, and close the CDS CTMT Air Recirc supply valves.

D. Close the RPCCW supply and return to Chilled Water valves, open the CDS CTVs, and open the CDS CTMT Air Recirc supply valves.

Proposed Answer: D
Explanation (Optional): "D" is correct, since on a loss of instrument air, CDS will isolate to CTMT. AOP 3562 directs the restoration CDS cooling to the CAR fans after air pressure is restored. "A" and "B" are wrong, since if CDS Circ Pumps will remain running, and if the CDS Chillers trip during the transient, they will automatically restart. "A" and "B" are plausible, since the Chillers may trip. "C" is wrong, but plausible, since these are the CDS actions that automatically occur on the loss of air, and the RPCCW valve operation directed by AOP 3562 before air pressure is restored. These operations would be proper if RPCCW was the normal supply to the CAR fans.

Technical Reference(s): AOP 3562, steps 7 and 14. (Attach if not previously provided)
OP 3330C, section 4.2

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-07008 The crew will demonstrate the ability to safely operate the plant during a loss of instrument air... (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 18	Tier #	1	1
Knowledge of interrelationships between Loss of	Group #	1	1
Emergency Coolant Recirc and components and	K/A #	W/E11.EK2.1	
functions of control and safety systems.	Importance Rating	3.6	3.9

Proposed Question:

A large break LOCA has occurred.

Which component problem would result in a loss of Cold Leg Recirculation capability, requiring the crew to enter ECA-1.1 *Loss of Emergency Coolant Recirculation*?

A. Off-site power is lost and the "B" train Emergency Diesel Generator trips ten minutes after starting due to low lube oil pressure.

B. The power lockout switch relays fail to operate when the switches are turned "ON", and none of the associated white lights are lit.

C. The "A" Charging Pump trips on overcurrent with the "B" SI pump tagged out for maintenance.

D. The "B" & "D" Containment Recirculation spray pumps are both damaged and cannot be started.

Proposed Answer: B

Explanation (Optional):
"A" is incorrect since the A EDG is still available to supply A train components for cold leg recirc.
"C" is incorrect since one charging pump and one SI pump are still available for cold leg recirculation.
"D" is incorrect since the A train of RSS is still operable.
"B" is correct since without the power lockout operating power not available to operate some of the recirculation valves, ES-1.3 directs the operator to ECA-1.1.

Technical Reference(s): ES-1.3 step 3.a, note prior to step 3, and step 5.a. (Attach if not previously provided)
ES-1.3, Attachment A, Step 1

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 #73100

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 19	Tier #	1	1
Knowledge of inoperable / stuck control rod	Group #	2	2
abnormal condition procedures	K/A #	APE.005.GEN.2.4.11	
	Importance Rating	3.4	3.6

Proposed Question:
With the plant at 100% power, the crew commences exercising control bank D rods when the following sequence of events occurs:

1. DRPI indicates that Control Bank "D" Group 1 rod M-12 drops half-way into the core.
2. The STA reports Tave has decreased by 5°F.
3. The crew enters AOP 3552 *Malfunction of the Rod Drive System*.
4. The crew is currently using AOP 3552 Attachment A for a misaligned rod.
5. I&C reports both a blown stationary gripper coil fuse and a blown moveable gripper coil fuse for rod M-12.
6. I&C reports that replacement fuses are available.
7. The rod has been misaligned for thirty minutes.

What action is the crew required to take concerning the misaligned rod?

A. Using AOP 3552, Attachment A "Misaligned rod", replace the stationary and moveable gripper coil fuses and realign the rod.

B. Using AOP 3552, Attachment C "Position Indication Malfunction", determine the rod position indication malfunction.

C. Using AOP 3552, Attachment D "Determination of Rod Trippability", determine if the rod is trippable.

D. Using AOP 3552, Attachment F "Plant Shutdown With A Stuck, Misaligned or inoperable Rods", shutdown the plant with a stuck rod.

Proposed Answer: D

Explanation (Optional):
This question is related to the Farley Unit 2 OE from 10/14/2002, where, during rod testing, a rod stuck after partially inserting into the core, and procedures were not adequate at addressing the misaligned, known stuck rod. Based on this event, Millstone 3 modified AOP 3552 by creating Attachment F, allowing the operators to shutdown the plant with a known stuck rod without having to perform the diagnostic steps. "D" is correct, since both the stationary and moveable gripper coil fuses are blown. There is no power to the rod, and the rod is not on the bottom. "A" is wrong, but plausible, since this action would be appropriate per attachment "A" if the rod was misaligned but trippable. "B" is wrong, since Tave decreased when the rod dropped, but plausible since DRPI for the one rod rapidly changed, and this action would be appropriate if the problem was due to DRPI. "C" is wrong, since the rod is known to be stuck, but plausible, since this action would be correct if the rod was not known to be trippable.

Technical Reference(s): AOP 3552, steps 1-5, especially step 5 note. (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03901 Describe the major action categories contained within AOP 3552 (As available)

Question Source: Bank #73088

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.2 and 41.10
55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 20	Tier #	1	1
Knowledge of the reasons for actions contained	Group #	2	2
in the EOP for emergency boration.	K/A #	APE.024.AK3.02	
	Importance Rating	4.2	4.4

Proposed Question:

The reactor trips, the following sequence of events occurs:

1. Three control rods fail to fully insert on the trip.
2. While performing actions in ES-0.1 *Reactor Trip Response*, the RO is directed to immediate borate the RCS per AOP 3566 *Immediate Boration* due to the stuck rods.
3. Due to problems with the alignment, the RO is required to align the gravity feed path from the Boric Acid Tanks.

What is the basis for the 75 GPM net charging flow limit when boration is being supplied via this path?

A. Ensure Charging Pump NPSH is maintained.

B. Maintain RCP Seal Injection within the required band.

C. Prevent draining the VCT at a faster rate than makeup capability.

D. Match the maximum flow achievable through Emergency Borate Valve 3CHS*MV8104.

Proposed Answer: A

Explanation (Optional): "A" is correct, and "B", "C", and "D" are wrong, since while aligned for gravity boration, all charging flow will be sent through the gravity boration line, which, due to its limited size, and limited pressure without the boric acid pump supplying pressure to the line, creates an NPSH concern for the running charging pump. "B" is plausible, since seal injection flow will change as charging flowrates are changed. "C" and "D" are plausible, since the operators are being required to limit charging flow.

Technical Reference(s): AOP 3566, step 1 (Attach if not previously provided)
AOP 3566 Basis Document, step 1

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03962 Discuss the basis of major precautions and procedure steps, including the sequence of major procedural steps (in AOP 3566). (As available)

Question Source: Bank #70369

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.5, 41.8, and 41.10

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 21	Tier #	1	1
Knowledge of the reasons for actions contained	Group #	2	2
in the EOP for Loss of Source Range NIS	K/A #	APE.032.AK3.02	
	Importance Rating	3.7	4.1

Proposed Question:
Initial Conditions:

- The reactor is critical with a startup in progress per OP 3202 *Reactor Startup*.
- The RO has verified proper overlap between the source and intermediate ranges.
- Power has just increased above the P-6 setpoint.

The following sequence of events occurs:

1. The RO reports SR Channel N31 has failed low.
2. The crew enters AOP 3571 *Instrument Failure Response*.
3. The US directs the RO to actuate both source range block switches on MB4.
4. The US directs the RO to place the Level Trip Switch in BYPASS on SR N31 drawer.
5. The crew continues the startup.

Why did AOP 3571 have the crew actuate both source range block switches and place the level trip switch in BYPASS prior to continuing the startup?

A. The block switches were placed in BLOCK to prevent a reactor trip when power reaches the SR Hi Flux Trip Setpoint during the startup. The Level Trip Switch was placed in BYPASS to ensure OPERABLE SR channel N32 automatically energizes when power is reduced below P-6 during a future shutdown.

B. The block switches were placed in BLOCK to prevent a reactor trip when power reaches the SR Hi Flux Trip Setpoint during the startup. The Level Trip Switch was placed in BYPASS to prevent a reactor trip from INOPERABLE SR channel N31 when power is reduced below P-6 during a future shutdown.

C. The block switches were placed in BLOCK to prevent a reactor trip when power reaches the P-10 setpoint during the startup. The Level Trip Switch was placed in BYPASS to ensure OPERABLE SR channel N32 automatically energizes when power is reduced below P-6 during a future shutdown.

D. The block switches were placed in BLOCK to prevent a reactor trip when power reaches the P-10 setpoint during the startup. The Level Trip Switch was placed in BYPASS to prevent a reactor trip from INOPERABLE SR channel N31 when power is reduced below P-6 during a future shutdown.

Proposed Answer: B

Explanation (Optional): "B" is correct, since the block switches are placed in BLOCK per OP 3202, even with no instrument failure, since power is increasing toward the SR Hi Flux Trip setpoint of 10^5 cps, and going to BLOCK deenergizes both SR channels and blocks both SR Hi Flux trips as long as power remains above P-6 ("C" and "D" wrong), and since going to BYPASS on the failed channel bypasses the hi flux trip function for the associated channel ("A" and "C" wrong). "C" and "D" are plausible, since P-10 is also involved in deenergizing the SR channels and blocking the hi flux trips (at 10% power), and "A" and "C" are plausible, since this is a function of going to RESET on the SR Block Switches if P-6 fails to clear on a trip.

Technical Reference(s): AOP 3571, Attachment F, step 1 (Attach if not previously provided)
Functional Drawings 3 and 4
OP 3202, step 4.33

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03977 Discuss the basis of major precautions, procedure steps/or sequence of steps (in AOP 3571). (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5 and 41.10

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 22	Tier #	1	1
Knowledge of the reasons for Fuel Handling System	Group #	2	2
Interlocks as they apply to fuel handling incidents	K/A #	APE.036.AK3.02	
	Importance Rating	2.9	3.6

Proposed Question:

A refueling outage is in progress, and initial conditions are as follows:

- Spent fuel is being offloaded from the core to the spent fuel pool.
- An operator in the fuel building is in the process of moving a spent fuel bundle from the upender to a predetermined location in the spent fuel pool.

While lowering the fuel bundle, the white SLACK CABLE LIMIT light illuminates on the spent fuel pool bridge.

What does this light signify?

A. Hoist motion has slowed down, since the hook is within 12 inches of the full-down position. This protects against fuel damage.

B. Hoist motion has slowed down, since there is less than two turns of cable left on the hoist drum. This ensures the cable won't become entangled.

C. Hoist motion has stopped, since the hook is in the full-down position. This ensures the fuel bundle will not fall over.

D. Hoist motion has stopped, since the load suspended from the hook has decreased below 200 lbs. This protects against fuel damage.

Proposed Answer: D

Explanation (Optional): "D" is correct, and "A", "B", and "C" wrong, since the slack cable interlock stops motion when the load suspended from the hook decreases below 200 lbs. This protects against fuel damage. "A" and "B" are plausible, since these are related to the "Geared Limit Switch Hoist Near Full Down" interlock, which automatically shifts the hoist into LOW speed when the fuel assembly is approximately 12 inches from the bottom of a storage cell. "C" is plausible, since this is related to the "Geared Limit Switch Hoist Full Down" interlock.

Technical Reference(s): OP 3303A, Caution prior to step 4.5.4 (Attach if not previously provided)
OP 3303A, Attachment 1.

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04541 Describe the operation of the following Fuel Handling System... Interlocks... (As available)

Question Source: Bank #69812

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 23	Tier #	1	1
Ability to execute procedure steps for Control	Group #	2	2
Room Evacuation.	K/A #	APE.068.GEN.2.1.20	
	Importance Rating	4.3	4.2

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

1. An electrical fire breaks out in the Instrument Rack Room.
2. The crew enters EOP 3509.1 *Control Room, Cable Spreading Area or Instrument Rack Room Fire.*
3. Prior to evacuating, the crew is able to complete all control room steps in EOP 3509.1.
4. The crew evacuates the control room.

What actions are required to be taken by the crew with the Atmospheric Relief Isolation Valves (3MSS*MOV18's), Atmospheric Relief Bypass Valves (3MSS*MOV74's), and/or Atmospheric Relief Valves (3MSS-PV20's) to regain control of RCS temperature?

A. 3MSS*MOV18A, 18B, 18C and 18D will be opened from the Auxiliary Shutdown Panel. 3MSS*MOV74A, 74B, 74C and 74D will then be locally throttled in the Main Steam Valve Building.

B. 3MSS*MOV18A, 18B, 18C and 18D will be opened from the Auxiliary Shutdown Panel. 3MSS-PV20A, 20B, 20C, and 20D will then be throttled from the Auxiliary Shutdown Panel.

C. 3MSS*MOV18A and 18C will be closed from the Auxiliary Shutdown Panel, and 3MSS*MOV74A and 74C will be locally opened. 3MSS*MOV18A and 18C, and MOV74B and 74D will then be throttled from the ASP.

D. 3MSS*MOV18B and 18D will be closed from the Auxiliary Shutdown Panel, and 3MSS*MOV74B and 74D will be locally opened. 3MSS-PV20A and 20C will then be throttled from the Auxiliary Shutdown Panel.

Proposed Answer: C

Explanation (Optional): Train "A" is the fire-protected Train, so EOP 3509.1 directs the operators to align the Train A components for operation outside of the Control Room following a fire. Removing electrical power to prevent spurious operation will disable all other equipment. "C" is correct since each of the listed throttled valves will be powered from energized emergency bus 34C and can be controlled from the ASP. "A" is wrong because steam can be bled from each SG from the ASP. "A" is plausible since this is the method used in ECA-0.0 *Loss of All AC Power.* "B" and "D" are wrong, since prior to leaving the control room, EOP 3509.1 directs the crew to initiate MSI, which auto-closes SG atmospheric relief valves. "B" is plausible since this method is used in EOP 3503 *Shutdown Outside the Control Room.* "D" is plausible since the components requiring local operation are labeled "B" and "D", which is normally associated with the "B" Train.

Technical Reference(s): EOP 3509.1, steps 9 and 40 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06266; Discuss the basis of major precautions, procedure steps/or sequence of steps contained within the EOP 3509 series procedures. (As available)

Question Source: New

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 # 24	Tier #	1	1
Ability to determine and interpret adherence to the	Group #	2	2
High CTMT Pressure EOP	K/A #	EPE.W/E14.EA2.2	
	Importance Rating	3.3	3.8

Proposed Question:

The plant is at 100% power when the following sequence of events occurs:

1. A large break LOCA occurs.
2. The reactor trips and safety injection actuates.
3. Both Quench Spray pumps fail to AUTO-START, and cannot be started manually.
4. The crew transitions to EOP 35 FR-Z.1 *Response To High Containment Pressure*.
5. Based on the event in progress, the crew dispatches a PEO to the ESF building to realign RSS pump "C", using EOP 35 FR-Z.1, Attachment "B".

How will EOP 35 FR-Z.1, Attachment "B" align the "C" RSS pump to provide CTMT spray?

A. The suction is aligned to the RWST, and the discharge to the RSS CTMT spray ring.

B. The suction is aligned to the CTMT sump, and the discharge to the RSS CTMT spray ring.

C. The suction is aligned to the RWST, and the discharge to the QSS CTMT spray ring.

D. The suction is aligned to the CTMT sump, and the discharge to the QSS CTMT spray ring.

Proposed Answer: A

Explanation (Optional): EOP 35 FR-Z.1 Attachment "B" is used when RWST inventory is adequate, both QSS Pumps cannot be started, and the ADTS concurs. The crew will align an RSS pump to take a suction on the RWST and discharge through its CTMT spray ring. This effectively converts one RSS pump into a QSS pump. CTMT sump level may be inadequate for taking suction on the CTMT sump ("B" and "D" wrong), and the RSS pump will discharge through its own spray ring ("C" and "D" wrong). "B" and "D" are plausible since the RSS Pumps normally take suction on CTMT Sump during a CDA, and RCS inventory has been discharged to CTMT. "C" and "D" are plausible; since this attachment is establishing an alternate lineup, and the QSS spray ring is the other spray path into CTMT.

Technical Reference(s): FR-Z.1, step 8 (Attach if not previously provided)
FR-Z.1 Attachment "B"

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04667 Describe the major action categories within EOP 35 FR-Z.1. (As available)

Question Source: Bank # 73487

Question History: 2000 Millstone 3 NRC Exam

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5, 41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 25	Tier #	1	1
Ability to operate and/or monitor Components,	Group #	2	2
Instrumentation during high containment radiation	K/A #	EPE.W/E16.EA1.1	
	Importance Rating	3.1	3.2

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

1. The plant trips due to a loss of offsite power, and the crew enters ES-0.1 *Reactor Trip Response*.
2. The crew enters ES-0.2 *Natural Circulation Cooldown*.
3. The STA reports that a yellow path has come in on CTMT Radiation, as indicated on 3RMS*RE04A and 05A, which have been slowly trending up.
4. The STA recommends entering FR-Z.3 *Response to High Containment Radiation Level*.

How is the crew currently required to utilize CTMT Hi Range Monitors 3RMS*RE04A and 05A during this event?

A. Transition to FR-Z.3 if no higher priority exists for the crew, since 3RMS*RE04A and 05A are the primary indicators of CTMT radiation for the CTMT Radiation status tree.

B. Do not transition to FR-Z.3, since 3RMS*RE04A and 05A will read spuriously high due to the temperature-induced currents during post trip conditions.

C. Confirm the 3RMS*RE04A and 05A by using CAR Fan Supply to RCP Cubicle Monitor 3CMS*RE22, and then transition to FR-Z.3 if no higher priority exists for the crew.

D. Confirm the 3RMS*RE04A and 05A by using CTMT Purge and Exhaust Monitors 3RMS*RE41 and 42, and then transition to FR-Z.3 if no higher priority exists for the crew.

Proposed Answer: D
Explanation (Optional): "A" is wrong, since 3RMS*RE04A and 05A have been declared INOPERABLE due to the temperature induced current phenomenon. "B" is wrong, since the only time 3RMS*RE04A and 05A are expected to read erroneously high is during a heatup in CTMT, such as during a LOCA, which is not in progress. "C" is wrong, and "D" is correct, since the backup monitors specified are 3RMS*RE41 and 42. "A" is plausible, since 3RMS*RE04A and 05A are the normal inputs to the yellow path status tree. "B" is plausible, since 3RMS*RE04A and 05A will read high during post LOCA conditions, and "C" is plausible, since CMS*RE22 will indicate CTMT radiation.

Technical Reference(s): Night Order on RE04A and 05A. (Attach if not previously provided)
SP 3673.6, Section 4.2

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05961 Identify plant conditions that require entry into EOP35 FR-Z.3. (As available)

Question Source: New

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 # 26	Tier #	1	1
Knowledge of interrelations between Loss of	Group #	2	2
Power to a 4.16 KV Emergency Bus and	K/A #	Site Specific Loss of Emergency Bus.AK2	
components/systems.	Importance Rating	N/A	N/A

Proposed Question:
While at 100% power, the following sequence of events occurs:

1. Emergency bus 34D deenergizes.
2. The crew enters AOP 3577, *Loss of Normal and Offsite Power to a 4.16 KV Emergency Bus.*
3. The crew is directed to shift the RCP seal return flowpath to the top of the VCT.

Why did AOP 3577 direct the crew to shift seal return to the top of the VCT?

A. RCP seal return water temperature cannot be easily monitored and its cooling has been lost. Shifting seal return to the top of the VCT allows better monitoring and control of Charging Pump suction water temperature.

B. The operating charging pump is assumed to have been lost. This results in hot RCS water flowing up through the RCP seals and into the seal return line. Shifting seal return to the top of the VCT prevents this hot water from vapor-binding the standby charging pump.

C. Letdown Heat Exchanger cooling has been lost, resulting in an uncontrolled VCT temperature increase. Shifting seal return to the top of the VCT allows cooler seal return water to better mix with the letdown water in the VCT.

D. The degassifier has tripped, resulting in an increase in VCT temperature, which can lead to a challenge to RCP trip criteria. Shifting seal return to the top of the VCT minimizes the heatup of the VCT water.

Proposed Answer: A

Explanation (Optional):
With the loss of bus 34D, cooling is lost to the seal return HX. Seal return is normally directed to the suction of the charging pumps. Thus charging pump suction temperature will increase, resulting in a heatup of seal injection water. Also, the crew will not be able to monitor actual seal injection temperature, since this is normally monitored indirectly by monitoring VCT temperature. Directing return to the top of the VCT allows for monitoring seal injection temperature using 3CHS-TI116 (VCT temperature) at MB3 ("A" correct). "B" is wrong, since a backup charging pump is started quickly in AOP 3577. "B" is plausible, since this could occur if a charging pump is not started quickly, and this is an actual basis for closing the seal return isolation valve in Millstone 3 Fire Procedure EOP 3509.1. "C" is wrong since a loss of cooling to the letdown HX occurs with a loss of bus 34C, not 34D. "C" is plausible since if cooling were lost to the letdown HX, seal return would be cooler than letdown flow into the VCT. "D" is wrong since a degassifier trip is not expected on a loss of 34D, and will not cause VCT temperature to increase. "D" is plausible, since degassifier water enters the top of the VCT, and VCT temperature is an RCP trip criterion.

Technical Reference(s): AOP 3577, step 7 (Attach if not previously provided)
AOP 3577 basis document, step 7

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-07396; Discuss the basis of major precautions, procedure steps, and/or step sequence in AOP-3577, Loss Of Normal And Offsite Power To A 4.16KV Emergency Bus. (As available)

Question Source: Bank #80558

Question Cognitive Level: Comprehension and analysis

10 CFR Part 55 Content: 55.41.7 / 45.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 27	Tier #	1	1
Operational Implications of RCS Leak concepts.	Group #	2	2
	K/A #	Site Specific RCS Leak.AK1	
	Importance Rating	N/A	N/A

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

1. RCS UNIDENTIFIED LEAKAGE increases from 0.03 gpm to 12 gpm.
2. The crew enters AOP 3555 *Reactor Coolant System Leak.*

How will the increased leakage affect plant operations after the initial transient has been stabilized?

A. VCT level will be constant, and Pressurizer level will be decreasing. Tech Specs requires a plant shutdown if leakage cannot be restored to within limits.

B. VCT level will be constant, and Pressurizer level will be decreasing. AOP 3555 requires a reactor trip.

C. VCT makeup frequency will have increased, and Pressurizer level will be stable. Tech Specs requires a plant shutdown if leakage cannot be restored to within limits.

D. VCT makeup frequency will have increased, and Pressurizer level will be stable. AOP 3555 requires a reactor trip.

Proposed Answer: C

Explanation (Optional): "C" is correct, since operators will be directed to take manual control of charging and stabilize pressurizer level. A 12 gpm leak is within the capacity of one charging pump, so charging flow will have increased, keeping pressurizer level constant, but causing VCT level to drop more rapidly ("A" and "B" wrong). A reactor trip is not required unless pressurizer level cannot be maintained with 2 charging pumps running ("B" and "D" wrong), and the Tech Spec limit for unidentified leakage is 1 gpm, so a shutdown is required. "A" and "B" are plausible, since this would be the response of the plant with charging in manual if the operators did not take action to try to restore pressurizer level. "B" and "D" are plausible, since AOP 3555 does have reactor trip criteria based on ability to control pressurizer level.

Technical Reference(s): AOP 3555, steps 2 and 6 (Attach if not previously provided)
Tech Spec LCO 3.4.6.2

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03912 Describe the major action categories within AOP 3555. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5 and 41.10

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 28	Tier #	2	2
Knowledge of RCP interlocks which provide for	Group #	1	1
Adequate lubrication of the RCP	K/A #	003.K4.03	
	Importance Rating	2.5	2.8

Proposed Question:
The crew is preparing to start the "B" RCP as part of a retest, with initial conditions as follows:

- RCS Loop "B" cold leg temperature is 150°F
- RCS Loop "B" Cold Leg Stop Valve is closed.
- RCS Loop "B" Hot Leg Stop Valve is open.
- RCS Loop "B" Cold Bypass Stop Valve is open.
- RCP "B" lift oil pump discharge pressure is 700 psig.
- RCP "B" lift oil pump has been running for one minute.

The RO takes the pump to start, and the pump fails to start.

What interlock prevented the RCP from starting?

A. RCS Loop "B" cold leg temperature needs to be greater than 170°F.

B. RCS Loop "B" Cold Leg Stop Valve needs to be open.

C. RCP "B" Lift Oil Pump discharge pressure needs to be at least 800 psig.

D. RCP "B" Lift Oil Pump needs to have been running for two minutes.

Proposed Answer: D
Explanation (Optional): RCP start interlocks are as follows:
Either the Hot and Cold Leg Stop Valves need to be open, or the Cold Leg Stop Valve needs to be closed with the bypass valve open ("B" wrong, but plausible). The RCP Lift Oil Pump must be running for two minutes ("D" correct) with discharge pressure above 600 psig ("C" wrong). "A" is wrong, but plausible, since cold leg temperature must be <170°F to open Cold Leg Loop Stop Valve.

Technical Reference(s): LSK 25-1.1A (Attach if not previously provided)
OP 3353.MB4B 5-3

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05442 Describe the operation of the following Reactor Coolant System equipment controls and interlocks... Reactor Coolant Pumps... (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 29	Tier #	2	2
Ability to predict the impact and mitigate an	Group #	1	1
inadvertent boration / dilution	K/A #	004.A2.06	
	Importance Rating	4.2	4.3

Proposed Question:
The crew is preparing to perform a Xenon-free reactor startup per OP 3202 *Reactor Startup*, and initial conditions are as follows:

- Burnup is 15,000 MWD/MTU.
- The selected ECC rod height is Control Bank D at 90 steps.

Prior to commencing the withdrawal of rods, an unobserved dilution event occurs, reducing RCS boron concentration by 250 ppm.

Rod Worth and Boron Worth curves are attached to this exam. As criticality is approached, what will the 1/M plot predict, and what action will the crew be required to take to mitigate this event?

A. Criticality will be predicted to occur below RIL. The crew will trip the reactor and enter E-0 *Reactor Trip or Safety Injection*.

B. Criticality will be predicted to occur below RIL. The crew will commence immediate boration per AOP 3566 *Immediate Boration*, and fully insert the control rods into the core.

C. Criticality will be predicted to occur below the administrative limit, but above RIL. The crew will insert all control banks back into the core and recalculate the ECC.

D. Criticality will be predicted to occur below the administrative limit, but above RIL. The crew will continue the startup, but will initiate a CR to track the reactivity management event.

Proposed Answer: B

Explanation (Optional):
IRW at RIL is 2280 pcm. IRW at the 500-pcm admin limit is 1780 pcm. IRW at ECP is 770 pcm. The reactivity difference between RIL and ECC is 2280 pcm – 770 pcm is 1510 pcm. Zero Power DBW is –7.13 pcm/ppm. 1510 pcm / -7.13 pcm/ppm = 212 ppm. Since the change in boron concentration is greater than 212 ppm, the prediction will show the reactor going critical below RIL ("C" and "D" wrong). "B" is correct, and "A" wrong, since OP 3203 requires the operators to perform an immediate boration and fully insert the control rods back into the core. "A" is plausible, since criticality below RIL is a violation of Tech Specs, and OP 3203 does have reactor trip criteria. "C" and "D" are plausible, since the admin limit is also exceeded, and the listed actions would be required if RIL was not also exceeded.

Technical Reference(s): OP 3202, steps 4.25 and 4.28 Attachment 6. (Attach if not previously provided)
Curves RE-D-03 and RE-F-02

Proposed references to be provided to applicants during examination: Curves RE-D-03 and RE-F-02

Learning Objective: MC-03375 Discuss conditions which require transition to other procedures from OP 3202 (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.1, 41.5, and 41.10
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 30	Tier #	2	2
Knowledge of the cause/effect relationship between	Group #	1	1
CVCS and Control Rod Drive System in Automatic	K/A #	004.K1.05	
	Importance Rating	2.7	3.2

Proposed Question:

The crew is performing a rapid downpower at 3% per minute from 100% to 30% power.

Control Rods are inserting in AUTO, maintaining Tave 5°F greater than Tref, when the following annunciators are received:

- MB4C 3-9, ROD CONTROL BANKS LIMIT LO
- MB4C 4-9, ROD CONTROL BANKS LIMIT LO-LO

Based on the LO-LO annunciator, the crew continues to immediate borate longer than originally planned per AOP 3575 *Rapid Downpower*.

Assuming the rate of boron addition to the RCS increases, and the turbine load decrease rate remains constant throughout the event, how will the additional boron affect the plant during the remainder of the downpower?

A. Tave/Tref error will INCREASE. Control rods will insert at a FASTER rate.

B. Tave/Tref error will DECREASE. Control rods will insert at a FASTER rate.

C. Tave/Tref error will DECREASE. Control rods will insert at a SLOWER rate.

D. Tave/Tref error will INCREASE. Control rods will insert at a SLOWER rate.

Proposed Answer: C

Explanation (Optional): Rods have been inserting, initially due to secondary power lowering faster than primary power, and because Tav is > Tref. With increased boration, boron will assist the control rods and bring Tave closer to Tref. This reduced Tav/Tref error will slow the rate of rod insertion ("C" correct, "A", "B", and "D" wrong). "A", "B", and "D" are plausible, since the rate of downpower versus boration flow can lead to cases where the boron is reducing reactor power faster than the reduction of secondary power, Tave can go low, and rods will actually withdraw. Also, if boron flow was reduced rather than increased, combinations of the other answers would be correct.

Technical Reference(s): Functional Drawing 9 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-003346 For given plant conditions, calculate the effect on the following plant parameters for any transient induced by reactivity addition... rod position, RCS loop average temperatures... (As available)

Question Source: Bank #72291

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 31	Tier #	2	2
Predict/monitor changes in RHR flowrate	Group #	1	1
associated with operating RHR controls	K/A #	005.A1.02	
	Importance Rating	3.3	3.4

Proposed Question:
Initial Conditions:

- RCS Hot Leg Temperature: 330°F.
- RCS Pressure: 360 psia.
- The crew is cooling down the RCS using "A" Train RHR per OP 3208 *Plant Cooldown.*
- The output of 3RHS*FK618 "RHR HDR FLOW" is set at 4,000 gpm.
- RHR HX Outlet Valve 3RHS*FCV606 is fully open.

The RO is slowly adjusting the output of 3RHS*FK618 "RHR HDR FLOW" to 3,200 gpm

How will the RO's actions affect flowrate through the RHR System?

	Flow through the RHR HX	RHR Pump Recirc Flow (3RHS-FCV610)
A.	Decreases	Increases
B.	Decreases	Remains at zero gpm
C.	Increases	Increases
D.	Increases	Remains at zero gpm

Proposed Answer: D

Explanation (Optional): The evolution described above is performed when full flow exists in the RHR heat exchanger and increased RCS cooldown is desired. "D" is correct since decreasing RHR Header Flow via controller 3RHS*FK618 is accomplished by throttling closed bypass valve 3RHS*FCV618. This raises RHR pump discharge pressure, increasing flow through the RHR Heat Exchanger ("A" and "B" wrong). RHR Recirc flow will remain at zero, since its auto-open setpoint is 772 gpm through the RHR Pump, and auto-close setpoint is 1541 gpm. Since total flow remains above this setpoint, the valve remains closed ("A" and "C" wrong). "A", "B", and "C" are plausible since total flow is being decreased, and each wrong distractor involves decreasing total flow or increasing recirc flow.

Technical Reference(s): OP 3208, section 4.3.11 (Attach if not previously provided)
P&ID 112A

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05445 Describe the operation of the following residual heat removal (RHR) system equipment controls and interlocks... mini-flow control valves... bypass flow control valves... heat exchanger flow control valves... (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5, 41.7, and 41.8

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 32	Tier #	2	2
Knowledge of the relationship between RHR	Group #	1	1
flowpath and refueling cavity.	K/A #	005.K4.05	
	Importance Rating	2.5	2.9

Proposed Question:
The plant is shutdown for a refueling outage, and current conditions are as follows:

- The crew is performing actions in OP 3210A *Refueling Preparation.*
- The "B" Train of RHR is providing shutdown cooling.
- The reactor vessel head has just been removed and placed on the storage stand.
- The crew is preparing to flood the refueling cavity using the "A" Train of RHR.

What is the preferred flowpath used during the initial stages of filling the refueling cavity?

A. The RWST will be gravity drained through the idle "A" RHR pump, through the "RHR Hot Leg Injection Valve" into two RCS hot legs, overflowing the vessel into the refueling cavity.

B. The RWST will be gravity drained through the idle "A" RHR pump, through a manual valve directly into the bottom of the refueling cavity.

C. The RWST will be pumped by the running "A" RHR pump through the "RHR Hot Leg Injection Valve" into two RCS hot legs, overflowing the vessel into the refueling cavity.

D. The RWST will be pumped by the running "A" RHR pump through a manual valve directly into the bottom of the refueling cavity.

Proposed Answer: A

E. Explanation (Optional): "A" is correct, since the crew will place the RHR Pump in PULL-TO-LOCK to allow the RWST to gravity drain ("C" and "D" wrong), and open the "A" Train Hot Leg Injection Valve to commence filling the cavity by overflowing the reactor vessel. "C" and "D" are plausible, since the RHR pump may be started later in the filling of the cavity after a desired minimum level is obtained. "B" and "D" are wrong, since the RHR System does not connect directly to the Refueling Cavity. "B" and "D" are plausible, since the Fuel Pool Purification system, which is used as a backup means of filling the cavity, fills the cavity through a manual valve directly into the bottom of the refueling cavity.

Technical Reference(s): OP 3210A, step 4.1.23 and section 4.4 (Attach if not previously provided)
P&ID 112A

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05453 Given a system diagram, describe the Residual Heat Removal System flow path under normal, abnormal, and emergency conditions. (As available)

Question Source: New

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 33	Tier #	2	2
Knowledge of the effect of a loss or malfunction	Group #	1	1
on pumps will have on ECCS	K/A #	006.K6.13	
	Importance Rating	2.8	3.1

Proposed Question:
Initial Conditions:

- The plant is at 100% power.
- The "B" RSS Pump is tagged OOS and is NOT available for service.

The following sequence of events occurs:

1. A large break LOCA occurs and the crew enters E-1 *Loss of Reactor or Secondary Coolant.*
2. CTMT pressure is <23 psia, and the crew resets CDA, stops both QSS Pumps, and stops the "C" RSS Pump.
3. The crew transitions to ES-1.3 *Transfer to Cold Leg Recirculation.*
4. The crew aligns the "A" Train of RSS for cold leg recirculation.
5. The ADTS recommends aligning RSS Pump D for cold leg recirculation.
6. The operator performing ES-1.3, Attachment C "Aligning Recirculation Spray Pump C or D for Cold Leg Recirculation" wrongly places the "B" RSS Pump Test/Inhibit switch in INHIBIT, leaving the "D" RSS Pump Test/Inhibit switch in TEST.
7. The Cold Leg Recirculation lineups are complete for both trains of RSS, and the crew transitions back to E-1.

A loss of offsite power occurs.

What will be the effect of the LOP on the running ECCS pumps?

A. Both Trains of Charging and SIH pumps will automatically start without adequate suction source, resulting in cavitation and damage to all four pumps.

B. Both Trains of Charging and SIH pumps will automatically start, but the "B" CHS Pump and the "B" SIH pump will be running without adequate suction source, resulting in cavitation and damage. The "A" CHS Pump and "A" SIH pump will provide sufficient cooling to the core.

C. Both Trains of Charging and SIH pumps will automatically start, but the "A" and "B" SIH pumps will be running without adequate suction source, resulting in cavitation and damage. The "A" and "B" CHS Pumps will provide sufficient cooling to the core.

D. Both Trains of Charging and SIH pumps will automatically start, and all four pumps will be provided with an adequate suction source, providing sufficient cooling to the core.

Proposed Answer: D

Explanation (Optional): With the sequencer in the SIS Recirc then LOP MODE, the sequencer will strip the busses, and after the EDGs are up to speed, sequence on loads, first starting the "A" and "B" RSS Pumps (but the "B" RSS Pump is tagged out), followed by the starting of the charging and SIH pumps. Attachment C places the "D" RSS Pump Test/Inhibit Switch in INHIBIT, so it would not strip off of the bus on the LOP, and it would immediately start when the bus is reenergized. But due to the operator's error, it still receives the strip signal. Since the "D" RSS pump does not receive a start signal, it will not supply the suction of the ECCS Pumps. However, both trains of ECCS pumps have all of their suctions tied to both the "A" and "B" trains of RSS, and since the "A" RSS Pump started, it will provide suction to all running ECCS Pumps ("D" correct, "A", "B", and "C" wrong). "A" is plausible, since only one RSS pump is running, and the plant is in an abnormal lineup. "B" is plausible, since "B" Train of RSS is not running. "C" is plausible, since the "A" Train RSS is directed via the RHS System to Charging, while the "B" RSS Train is directed to SIH (but CHS and SIH suctions are tied together by 3SIH*MV8807A/B and 3SIH*MV8924).

Technical Reference(s): LSK 24-9.4A (Attach if not previously provided)
ES-1.3, Attachment C, notes prior to step 1
P&ID 112A, and 113B

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04390 Describe the operation of the Emergency Core Cooling System under the following emergency conditions... Design Based Loss of Coolant Accident... (As available)

Question Source: New

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 # 34	Tier #	2	2
Ability to predict and/or monitor changes in RCS	Group #	1	1
temperature, including superheat, saturation, and	K/A #	006.A1.16	
Subcooled associated with operating ECCS	Importance Rating	4.1	4.2

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

- An RCS cooldown is in progress at 80°F/hour.
- PZR level: 30% and slowly decreasing.
- Highest CETC: 525°F and slowly decreasing
- Thot: 521°F and slowly decreasing
- Tcold: 515°F and slowly decreasing
- RCS Pressure: 1400 psia and slowly decreasing

The crew is evaluating conditions for stopping an SIH Pump, and the US directs the RO to monitor RCS subcooling.

What is current subcooling, and what will happen to subcooling when the SIH pump is stopped?

A. Subcooling is 62°F, and when the SIH Pump is stopped, subcooling will continue to slowly increase, since a cooldown is in progress.

B. Subcooling is 62°F, and when the SIH Pump is stopped, subcooling will initially drop, stabilize at a lower value, and then start slowly increasing.

C. Subcooling is 66°F, and when the SIH Pump is stopped, subcooling will continue to slowly increase, since a cooldown is in progress.

D. Subcooling is 66°F, and when the SIH Pump is stopped, subcooling will initially drop, stabilize at a lower value, and then start slowly increasing.

Proposed Answer: B

Explanation (Optional): With a subcooled RCS and pressure fairly stable, a balance has been established between mass injected via ECCS and mass lost out the break. "B" is correct, and "A" wrong, since when a SIH pump has been stopped, mass in will be less than mass out, and RCS pressure will start to drop, decreasing subcooling, but also increasing injection flow and decreasing break flow. A new mass balance will be obtained, and with a cooldown still in progress, subcooling will again start to increase. "A" is plausible, since a cooldown is in progress, which tends to increase subcooling. "C" and "D" are wrong, since subcooling based on CETCs is 62°F. "C" and "D" are plausible, since 66°F is subcooling based on Thot.

Technical Reference(s): Steam Tables
WOG Bkgd Doc for ES-1.2, Note 1 prior to step 13, and step 13.
WOG Bkgd Doc for ES-1.2, Figure 6 (at time 110 Minutes)
(Attach if not previously provided)

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

Learning Objective: MC-05530 Discuss the basis of major procedure steps and/or sequence of steps in EOP 35 ES-1.2 (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 35	Tier #	2	2
Ability to manually operate or monitor:	Group #	1	1
PRT spray supply valve	K/A #	007.A4.01	
	Importance Rating	2.7	2.7

Proposed Question:

Initial Conditions:

- A discharge to the PRT has occurred.
- PRT temperature is high.

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*.

Assuming the PGS CTMT Isolation Valves were closed prior to the start of this event, what action is required by the RO to open the PRT Fill Valve (3PGS-AV8030), and Primary Grade Water Containment Isolation Valves (3PGS*CV8028 and 8046) to commence cooling the PRT?

A. The RO must manually open the PRT Spray 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 spray 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 all of these valves are valves are manually opened and closed. The distractors are plausible, since the CIVs have an auto-close feature, and the PRT Vent Vale has an auto-close feature. The PRT drain valve is interlocked with PRT level.

Technical Reference(s): P&ID 119A (Attach if not previously provided)
OP 3301A, section 4.2

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05349 Describe the Pressurizer Relief Tank System operation under the following... Restoring from a high Pressurizer Relief Tank Temperature condition... (As available)

Question Source: INPO Exam Bank

Question History: 2005 Beaver Valley Unit 2 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 36	Tier #	2	2
Knowledge of bus power supplies to the CCW Pump, including emergency backup.	Group #	1	1
	K/A #	008.K2.02	
	Importance Rating	3.0	3.2

Proposed Question:

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

1. The "A" RPCCW Pump trips, and the crew takes all required actions to initially stabilize the plant per AOP 3561 *Loss of RPCCW.*
2. The crew is preparing to swap the "C" RPCCW Pump from the "B" Train to the "A" Train.
3. The primary rounds PEO is directed to mechanically shift the "C" RPCCW pump and heat exchanger to the "A" Train.
4. The secondary rounds PEO is directed to electrically shift the "C" RPCCW Pump to the "A" Train.

What action is required by the secondary rounds PEO to electrically align the "C" RPCCW pump to the "A" Train?

A. The "C" RPCCW Pump "A" Train breaker, which is normally installed in the "C" RPCCW pump breaker cubicle in 34C, needs to be racked up. The CCP transfer switch does not need to be operated.

B. Nothing needs to be operated at the breaker cubicles, since the "C" RPCCW Pump "A" Train breaker is normally racked up in its 34C breaker cubicle. The CCP transfer switch needs to be operated to realign the "C" RPCCW pump to the "A" train.

C. The "C" RPCCW pump breaker needs to be moved from the "B" train cubicle in 34D and racked up into the "A" train cubicle in 34C. The CCP transfer switch needs to be operated to realign the "C" RPCCW pump to the "A" train.

D. The "A" RPCCW pump breaker will need to be racked down from its breaker cubicle in 34C and racked up into "C" RPCCW pump breaker cubicle in 34C. The CCP transfer switch needs to be operated to realign the "C" RPCCW pump to the "A" train.

Proposed Answer: C

Explanation (Optional): To perform this shift, the breaker must be moved from the "B" Train cubicle ("A" and "B" wrong), and operate the CCP transfer switch, which prevents cross-tying the two trains through the "C" RPCCW Pump ("C" correct). "D" is wrong, since the swing pump has its own separate breaker. "A" is plausible since the swing pump may be aligned to either train, and the "A" and "B" RPCCW Pumps have their own train-specific breakers. "B" is plausible since the CCP transfer switch must be operated when aligning the swing pump to the other train, and some standby plant equipment has racked up breakers. "D" is plausible, since this is how the swing Charging (CHS) pump breaker is operated.

Technical Reference(s): OP 3330A, sections 1.2 and 4.9 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04154 Describe the operation of the Reactor Plant Component Cooling System under the following normal, abnormal, or emergency conditions... Shifting Pumps and Heat Exchangers... (As available)

Question Source: Bank # 71204

Question History: 2001 Millstone 3 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 37	Tier #	2	2
Knowledge of the effect of a loss or malfunction	Group #	1	1
of PZR sprays and heaters on PZR PCS.	K/A #	010.K6.03	
	Importance Rating	3.2	3.6

Proposed Question:
The plant is initially at 100% power with PZR pressure stable at 2250 psia.

Pressurizer control heater group 3RCS-HIC fails to the fully energized condition.

Assuming no operator action is taken, how will the Pressurizer Pressure Control System respond to this failure?

A. RCS pressure will increase to the spray valve open setpoint of 2325 psia, and spray valve(s) will open to lower pressure to 2275 psia, where the spray valve(s) will close. Pressure will cycle between 2325 psia and 2275 psia.

B. RCS pressure will increase to the spray valve open setpoint of 2325 psia, and spray valve(s) will open to lower pressure back to 2250 psia.

C. RCS pressure will increase to the spray valve setpoint of 2275 psia, and spray valve(s) will throttle open to maintain pressure at 2275 psia.

D. RCS pressure will increase to the spray valve setpoint of 2275 psia, and spray valve(s) will throttle open to stabilize pressure, and then slowly continue to throttle open to lower pressure back to 2250 psia.

Proposed Answer: D
Explanation (Optional): "D" is correct, since the spray valves start to throttle open at 2275 psia ("A" and "B" wrong), and receive a full open signal at 2325 psia; and the controller is a PI controller, so the longer the error exists, output will continue to adjust to lower pressure, until pressure is restored to 2250 psia ("C" wrong). "A" is plausible, since these pressures relate to spray valve operations and this is how PORVs work to control pressure. "B" is plausible, since this has the "PI" function of spray valve operations. "C" is plausible since this is how the controller would work if it were a "P" controller.

Technical Reference(s): Functional Sheet 11 (Attach if not previously provided)

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 systems and on interrelated systems. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 38	Tier #	2	2
Ability to monitor automatic operation of PRT temperature and pressure during PORV testing.	Group #	1	1
	K/A #	010.A3.01	
	Importance Rating	3.0	3.2

Proposed Question:

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 no further operator action is taken.
2. PRT temperature and pressure start to increase.
3. The PZR REL TK PRESSURE HI annunciator comes in on MB4.

How will PRT temperature and pressure trends initially respond when this annunciator is received?

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. "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, 2-4 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

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

Question Source: New

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
Knowledge of bus power supplies to RPS channels components, and interconnections.	Group #	1	1
	K/A #	012.K2.01	
	Importance Rating	3.3	3.7

Proposed Question:

With the plant at 100% power, VIAC 2 loses power.

What will be the effect of the loss of VIAC 2 on the Reactor Protection System?

A. All Protection Set 2 RPS bistables fail to their tripped condition; and associated instruments fail, potentially requiring manual control of some controllers.

B. The Protection Set 2 power supply will automatically revert to its backup 48 Volt Power Supply, with no effect on protection or control circuits.

C. All Reactor Protection Train B master relays will be prevented from actuating.

D. All Reactor Protection Train B slave relays will be prevented from actuating.

Proposed Answer: A

Explanation (Optional): "A" is correct, and "B" wrong, since each Protection Set is powered by its own VIAC, and when the Set loses power, it sends a "trip" signal from each associated bistable to the RPS logic cabinet. Also, VIAC 2 powers the channel 2 instruments, creating faulty inputs to controllers selected to channel 2. "B" is plausible, since there are two internal 48-volt power supplies in each cabinet. "C" and "D" are wrong, since VIAC 4 also powers RPS Train B components. "C" and "D" are plausible, since these are components within the RPS racks, and VIAC 2 powers a "B" Train Protection Set.

Technical Reference(s): AOP 3564 Entry Conditions (Attach if not previously provided)

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: INPO Bank

Question History: 2002 Diablo Canyon Unit 1 NRC Exam

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
Knowledge of physical connections or cause/effect	Group #	1	1
between ESF and RCPs.	K/A #	013.K1.02	
	Importance Rating	3.2	3.6

Proposed Question:

With the plant in MODE 3 at normal operating temperature and pressure, an inadvertent CIA occurs.

What is the status of cooling to the RCP motors, and are the operators required to trip the RCPs?

A. Cooling to both the motor air coolers and the bearing oil coolers are being supplied by RPCCW. The operators are NOT required to trip the RCPs.

B. The motor air coolers have lost cooling while the bearing oil coolers are being supplied by RPCCW. The operators are NOT required to trip the RCPs.

C. The motor air coolers have shifted to RPCCW while the bearing oil coolers have lost cooling. The operators are required to trip the RCPs.

D. Cooling to both the motor air coolers and the bearing oil coolers has been lost. The operators are required to trip the RCPs.

Proposed Answer: B

Explanation (Optional):
On a CIA, chilled water (CDS) isolates to CTMT, and the RPCCW cross tie valves to CDS open, supplying neutron shield tank cooling and CAR fans, but not RCP motor cooling ("A" wrong). RPCCW normally supplies the motor bearing oil coolers ("C" and "D" wrong). Since CDS cools the air leaving the RCP motor (assisting in maintaining CTMT temperature), the RCPs are not required to be tripped ("B" correct).

Technical Reference(s): P&ID 121B, 122A & B (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04189 Given a failure, partial or complete, of the Reactor Plant Chilled Water System, determine the effect on the system and on interrelated systems. (As available)

Question Source: Bank #69683

Question History 2001 Millstone 3 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.3, 41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 41	Tier #	2	2
Knowledge of the effect a loss or malfunction of	Group #	1	1
CCS will have on CTMT equipment	K/A #	022.K3.01	
	Importance Rating	2.9	3.2

Proposed Question:

With the plant at 100% power, one of the two running Reactor Plant Chilled Water (CDS) pumps trips, resulting in one of the running chillers to trip as well.

As the chilled water supplying CTMT ventilation heats up, what will be the first concern for the crew?

A. Overheating RCPs

B Overheating CRDMs

C. Reaching a CTMT temperature Technical Specification limit.

D. Reaching a CTMT pressure Technical Specification limit.

Proposed Answer: D

Explanation (Optional):
As CDS heats up, CTMT temperature increases, which raises CTMT pressure. CTMT pressure has much less margin than temperature before Tech Specs require action ("D" correct, "C" wrong). RCPs and CRDMs will not experience immediate problems, since the associated coolers cool the hot air exhausting from these heat loads ("A" and "B" wrong). Previous Millstone 3 chiller trips confirm "D" is the correct answer. "A", "B", and "C" are plausible, since CDS provides cooling to the CTMT ventilation systems, which impact all of the distractors.

Technical Reference(s): P&ID 122A and 122B (Attach if not previously provided)
Millstone 3 CR M3-99-2843

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04189 Given a failure, partial or complete, of the reactor plant chilled water system, determine effects on the system and on interrelated systems. (As available)

Question Source: Bank #73616

Question History: 2002 Millstone 3 NRC Exam

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 42	Tier #	2	2
Ability to monitor automatic operation of	Group #	1	1
cooling water to CTMT spray Heat Exchanger	K/A #	026.A3.02	
	Importance Rating	3.9	4.2

Proposed Question:
A CDA occurred and the crew is progressing through the EOP network. The CTMT Recirc (RSS) pumps have just started, and the RO is verifying that equipment is in the desired lineup.

What should be the position of the RPCCW heat exchanger service water inlet isolation valves (3SWP*MOV50A/B), and the service water inlet valves to the containment recirc coolers (3SWP*MOV54A/B/C/D)?

A. Both the RPCCW heat exchanger service water inlet isolation valves and the service water inlet valves to the containment recirc coolers should be OPEN.

B. The RPCCW heat exchanger service water inlet isolation valves should be OPEN and the service water inlet valves to the containment recirc coolers should be CLOSED.

C. The RPCCW heat exchanger service water inlet isolation valves should be CLOSED and the service water inlet valves to the containment recirc coolers should be OPEN.

D. Both the RPCCW heat exchanger service water inlet isolation valves and the service water inlet valves to the containment recirc coolers should be CLOSED.

Proposed Answer: C

Explanation (Optional):
"C" is correct, since on a CDA, the RPCCW heat exchanger service water inlet isolation valves receive a CLOSE signal, to prevent excessive flow for the service water pumps. The service water inlet valves to the containment recirc coolers receive an OPEN signal to provide cooling to the CTMT sump water being recirculated. "A" is plausible, since this also supplies cooling to the RSS heat exchangers. "B" and "D" are plausible since there is a 3 minute time delay prior to 3SWP-MOV54C opening, but since the RSS pumps are running, at least 11 minutes has passes since the CDA actuated.

Technical Reference(s): LSK-9-1G and 27-11L (Attach if not previously provided)
P&ID 133B

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05718 Describe the operation of the Service Water System under the following normal, abnormal, and emergency conditions... Containment Depressurization Actuation (As available)

Question Source: Bank # 69683
Question History: 2000 Millstone 3 NRC Exam
Question Cognitive Level: Memory or Fundamental Knowledge
10 CFR Part 55 Content: 55.41.7
Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 43	Tier #	2	2
Operational implication of the basis for RCS	Group #	1	1
cooldown limits as applied to Main Steam System	K/A #	039.K5.05	
	Importance Rating	2.7	3.1

Proposed Question:
The plant is being cooled down per OP 3208 *Plant Cooldown*, using all four main steam atmospheric relief valves.

What is the basis for maintaining the RCS cooldown rate within Tech Spec cooldown rate limits during the cooldown?

A. Prevent excessive thermal stresses on the RCP seal package, which could lead to a loss of coolant accident.

B. Ensure the cooldown rate remains under the control of the operator.

C. Prevent a loss of shutdown margin due to excessive positive reactivity addition

D. Maintain the RCS within its design assumptions and within its stress limits for cyclic operation.

Proposed Answer: D
Explanation (Optional): "D" is correct, and "A", "B", and "C" wrong, since the cooldown limits maintain the RCS within its design assumptions and within its stress limits for cyclic operation. This maintains a margin to brittle fracture. "A" is plausible, since this is the basis for reduced cooldown limits required after all seal cooling is lost and AC power is restored on a loss of all AC event. "B" is plausible, since this is a basis for not allowing the operators to cooldown simultaneously with depressurization during a tube rupture. "C" is plausible since cooling down the plant adds positive reactivity to the core.
Technical Reference(s): Tech Spec Basis for 3/4.4.9 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05444 Describe the major administrative or procedural precautions and limitations placed on the operation of the reactor coolant system, including the basis or each during... plant heatup and/or cooldown. (As available)

Question Source: Bank #67460
Question Cognitive Level: Memory or Fundamental Knowledge
10 CFR Part 55 Content: 55.41.5
Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 44	Tier #	2	2
Knowledge of the effect of a loss of MFW on AFW	Group #	1	1
	K/A #	059.K3.02	
	Importance Rating	3.6	3.7

Proposed Question:
Initial Conditions:

- Power is steady at 11% power.
- The crew is starting up the plant per OP 3203 *Plant Startup*.
- The "A" Turbine Driven Main Feed Pump is feeding all 4 Steam Generators.

The "A" Feed Regulating Bypass Valve fails closed, resulting in an automatic reactor trip.

Before the BOP operator takes any manual actions, which AFW pumps will he observe to be in service?

A. The "A" MDAFW Pump only, providing throttled flow to the "A" and "B" SGs.

B. The TDAFW Pump only, providing throttled flow to all 4 SGs.

C. Both MDAFW Pumps only, providing full flow to all 4 SGs.

D. All 3 AFW Pumps, providing full flow to all 4 SGs.

Proposed Answer: C

Explanation (Optional): With a loss of feed to only the "A" SG, an "A" SG lo-lo level reactor trip will occur. A lo-lo level in one SG sends a start signal to both MDAFW pumps ("C" correct). Level in only the "A" SG will decrease to the lo-lo level setpoint, since the AFW flow control valves are normally kept fully open ("A" and "B" wrong), and power is initially too low for significant shrink to occur. "A" is plausible, since the "A" MDAFW pump feeds the "A" SG, while the "B" does not. "B" is plausible, since the TDAFW pump starts on lo-lo level in 2 SGs. "D" is plausible, since on a reactor trip from high power levels, shrink will result in the start of all 3 AFW pumps. "A" and "B" are also plausible since AFW flow control valves are throttled to control flow when in service below 5% power when feeding with AFW.

Technical Reference(s): Functional Sheet 15 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04635 Describe the proper operation of the following Auxiliary Feedwater System components, controls, and interlocks... Motor Driven Auxiliary Feed Pumps, Turbine Driven Auxiliary Feed Pump... Auxiliary Feed Control Valves... (As available)

Question Source: Bank #78911

Question History: 2004 Millstone 3 NRC Exam

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 45	Tier #	2	2
Ability to interpret control room indications to verify	Group #	1	1
status and operation of AFW system and understand how	K/A #	061.GEN.2.4.48	
operator actions affect plant and system conditions.	Importance Rating	3.5	3.8

Proposed Question:
With the plant initially at 100% power, an inadvertent Safety Injection actuates, with the following two abnormal conditions existing:

- The TDAFW Pump is tagged out of service.
- The "A" Reactor Trip Breaker failed to open on the trip.

Just prior to transitioning out of E-0, the following conditions exist:

1. The RO reports the "A" Reactor Trip Breaker is still closed.
2. The STA reports that DWST level is decreasing faster than expected.
3. The BOP operator reports that the "A" MDAFW pump amps are oscillating.
4. SG NR Levels indicate as follows:
   - "A" SG: 19%
   - "B" SG: 29%
   - "C" SG: 27%
   - "D" SG: 21%

What are the minimum actions physically required to allow stopping the "A" MDAFW Pump and realigning the MDAFW Pump suctions to the CST from the control room?

A. Reset SI only.
B. Reset SI and depress both "Aux FW Isol Reset for SG Lo-Lo SG Level" pushbuttons on MB5 only.
C. Open the "A" Reactor Trip Breaker locally, and depress both "Aux FW Isol Reset for SG Lo-Lo SG Level" pushbuttons on MB5 only.
D. Reset SI, depress both "Aux FW Isol Reset for SG Lo-Lo SG Level" pushbuttons on MB5, and open the "A" Reactor Trip Breaker locally.

Proposed Answer: B
Explanation (Optional): "B" is correct, since SIS needs to be reset, SG Lo-Lo level needs to be reset ("A" wrong), and the "A" reactor trip breaker does not need to be opened ("C" and "D" wrong). "A" is plausible, since SI does need to be reset, and all four SG levels are above the low-power lo-lo level setpoint of 18%, and one SG is above the high power lo-lo level setpoint of 27% (Any SG level below this setpoint requires the lo-lo level to be reset). "C" and "D" are plausible, since P-4 feeds into numerous post-trip features such as SI reset (but SI will reset without P-4 with no actuating conditions present), and FWI.
Technical Reference(s): LSK 6-2.1A, 2.1B, 2.1.C, and 2.1.G (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None
Learning Objective: MC-04635 Describe the operation of the Auxiliary Feedwater System component controls and interlocks... Auxiliary Feedwater Pumps... DWST Supply Header Isolation Valves... Alternate Suction Valves... "Aux FW Isol Reset" Pushbuttons. (As available)
Question Source: New
Question Cognitive Level: Comprehension or Analysis
10 CFR Part 55 Content: 55.43.5
Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 46	Tier #	2	2
Knowledge of the effect of a loss or malfunction	Group #	1	1
of the AC distribution system will have on the	K/A #	062.K3.03	
DC system	Importance Rating	3.7	3.9

Proposed Question:
The plant is initially at 100% power, with Charger 4 (3BYS*CHGR 4) supplying DC Bus 4.

MCC 32-2W deenergizes due to an electrical fault, and all systems respond as designed.

What will be the effect of the loss of MCC 32-2W on Battery 4?

A. Battery 4 will begin to discharge, since its charger has been lost, and Battery 4 is now supplying VIAC 4. Swing Charger 8 is available to be placed in service.
B. Battery 4 will begin to discharge, since its charger has been lost, and Battery 4 is now supplying VIAC 4. Swing Charger 8 has lost power, so it is NOT available to be placed in service.
C. Battery 4 will NOT begin to discharge, since its charger still has power, charging Battery 4 and supplying VIAC 4. Swing Charger 8 has lost power, so it is NOT available to be placed in service.
D. Battery 4 will NOT begin to discharge, since VIAC 4 has shifted to the alternate source, and there are no loads on DC Bus 4 other than VIAC 4. Swing Charger 8 is available to be placed in service.

Proposed Answer: A
Explanation (Optional): 32-2W normally supplies VIAC 4 via the rectifier and inverter, and supplies the normal charger 4 to DC Bus 4. Swing charger 8 is powered from MCC 32-2U, so it is still available ("B" and "C" wrong). When 32-2W is lost, it no longer supplies the inverter, so the inverter supply is now the DC Bus. Battery 4 starts to discharge to supply VIAC 4, since the charger has been lost ("A" correct). "D" is wrong, since by design, the automatic switchover to the alternate AC source only occurs if the output from the inverter is lost. "B" is plausible, since it would be true if 32-2U or 32-2W were lost for Battery 1 or 2. "C" is plausible, since this would be true if 32-2W were lost to Battery 4. "D" is plausible, since this would be true if inverter output had been lost.

Technical Reference(s): EE-1BA (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03325 Given a failure of the 480 VAC distribution system or a portion of the system, determine the effects on the system and on interrelated systems... (As available)

Question Source: Modified Bank #68029 Parent Question Attached

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments: Original Bank #68029
The plant is at 30% power. All electrical systems are in their normal alignment.

Bus 32U deenergizes due to a bus differential.

Which of the following describes the effects on the 125 VDC electrical distribution system?

A. No effect. The inverter 2 static switch will transfer to the alternate AC supply.
B. Battery 2 begins to discharge, because it is supplying Bus 2 DC loads and power to Inverter 2.
C. Battery 2 momentarily begins to discharge, but will stop discharging when Inverter 2 transfers to the alternate supply.
D. Battery 2 begins to discharge, because it is now supplying power to all DC loads with the exception of Inverter 2, which transferred to the alternate supply.

Answer: B

Examination Outline Cross-reference:	Level	RO	SRO
Question # 47	Tier #	2	2
Ability to monitor auto operation of vital AC bus	Group #	1	1
Amperage	K/A #	062.A3.01	
	Importance Rating	3.0	3.1

Proposed Question:

With the plant initially at 20% power, the BOP operator is monitoring 4160 Volt bus amps on Main Board 8, and present indications are as follows:

- 34A Supply Current: 1000 Amps
- 34A-C Cross Tie Current: 300 Amps
- 34C Supply Current: 0 Amps

An NSST PRIMARY TRIP annunciator comes in on MB8.

What will the BOP observe for both 34A-C Cross Tie current and 34C Supply current?

	34A-C Cross Tie current	34C Supply current
A.	300 Amps	0 Amps
B.	300 Amps	1000 Amps
C.	700 Amps	0 Amps
D.	700 Amps	1000 Amps

Proposed Answer: D

Explanation (Optional): Initially, the total current load on 34A and 34C was 1000 Amps, with 300 Amps being supplied to 34C, and 700 Amps to 34A. An NSST Primary Lockout trips the NSST to 34A supply breaker, resulting in a "Fast-Transfer", which closes in the RSST to 34C Supply Breaker while the 34A-C cross-tie breaker remains closed. This causes the entire 34A + 34C load of 1000 Amps to shift to the RSST ("A" and "C" wrong), with 34A (700 Amps) being supplied from 34C across the cross-tie breaker ("B" wrong, "D" correct). "A" is plausible since this would be the indication if the NSST Primary Trip Signal did not impact 34A and 34C. "B" is plausible, since this would be the indication if 34A were the smaller load. "C" is plausible, since this would be the indication if the EDG picked up the bus instead of the RSST.

Technical Reference(s): OP 3353.MB8A, 2-6 (Attach if not previously provided)
EE-1A

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03333 Describe the operation of 4KV Distribution System controls and interlocks... Fast Transfer... MB8 indication and control. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7
55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 48	Tier #	2	2
Knowledge of the effect of a loss of malfunction	Group #	1	1
of DC will have on components	K/A #	063.K3.02	
	Importance Rating	3.5	3.7

Proposed Question:
With the plant initially at 100% power, a loss of DC bus 1 occurs. Current plant conditions are as follows:

- The crew is carrying out actions of ES-0.1 *Reactor Trip Response* and AOP 3563 *Loss of DC Bus Power.*
- RCS temperature is 561°F.

What method is available to the operators in the control room to commence a cooldown?

A. All 9 Condenser Steam Dumps.

B. All 4 Atmospheric Relief Valves.

C. All 4 Atmospheric Relief Bypass Valves.

D. All Steam Generator Safety Valves.

Proposed Answer: C

Explanation (Optional):
Condenser Steam Dump Valves are not available since the MSIVs have failed closed ("A" wrong). Two atmospheric relief valves have failed closed, but all atmospheric relief bypass valves are available, since they are powered from MCC 32-2R and 32-2W ("B" wrong, "C" correct). The safety valve setpoints cannot be adjusted in the control room, so they cannot be used to lower temperature ("D" wrong).

Technical Reference(s): AOP 3563, Attachment A. (Attach if not previously provided)
Form 3316A-006, page 2 of 3.

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03309; Given a failure of the 125 vdc distribution system or a portion of the system, determine the effects on the system and on interrelated systems. (As available)

Question Source: Bank #70404

Question History: 2000 Millstone 3 NRC Exam

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 # 49	Tier #	2	2
Ability to manually operate and/or monitor	Group #	1	1
Battery voltage in the control room	K/A #	063.A4.02	
	Importance Rating	2.8	2.9

Proposed Question:

The plant is at 100% power with all electrical systems aligned normally, when the battery output breaker from Battery 3 inadvertently trips open.

The BOP operator checks Battery Bus 3 voltage at MB8.

What voltage will the BOP operator observe on Battery Bus 3?

A. 0 volts

B. 125 volts

C. 133 volts

D. 140 volts

Proposed Answer: C

Explanation (Optional):
"C" is correct, and "A" is wrong, since the battery charger, which puts out 133 volts, will still keep the DC bus energized. "B" is wrong, but plausible, since this is the voltage put out by the battery, which the bus would indicate if the charger tripped off line. "D" is wrong, but plausible, since this is the voltage put out by the rectifier from the 480 VAC bus to the inverter. This voltage is prevented from flowing back to the battery bus by a reverse biased diode.

Technical Reference(s): EE Dwg 1BA (Attach if not previously provided)

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: ... Rectifier, Inverter, Static Switch, Bypass Line Regulator, Manual Bypass Switch. (As available)

Question Source: Bank #75644

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7 and 41.8
55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 50	Tier #	2	2
Ability to adjust exciter voltage	Group #	1	1
(using voltage control switch)	K/A #	064.A4.02	
	Importance Rating	3.3	3.4

Proposed Question:

The BOP operator is performing a Test-Start of the "A" EDG per OP 3346A *Emergency Diesel Generator*, and is ready to parallel the diesel to Bus 34C.

"A" EDG parameters indicate as follows:

- "INCOMING" voltage: 4100 Volts
- "RUNNING" voltage: 4150 Volts

How is the BOP operator required to adjust EDG exciter voltage?

A. Place the "SPEED/LOAD" Switch in the "RAISE" position.

B. Place the "SPEED/LOAD" Switch in the "LOWER" position.

C. Place the "VOLTAGE REGULATOR CONTROL" Switch in the "RAISE" position.

D. Place the "VOLTAGE REGULATOR CONTROL" Switch in the "LOWER" position.

Proposed Answer: C

Explanation (Optional): "C" is correct, since the operator needs to increase incoming (EDG) voltage to be slightly greater than running (Bus) voltage ("D" wrong). "A" and "B" are wrong, since the "SPEED/LOAD" switch adjusts frequency. "A", "B", and "C" are plausible, since both of these switches are operated at this point in the procedure, and the operator would go to LOWER if incoming voltage was greater than running voltage.

Technical Reference(s): OP 3346A, step 4.6.1.e (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04403 Describe the operation of the emergency diesel generator system under the following... Performance of a Test Start... Parallel Operation. (As available)

Question Source: New

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 51	Tier #	2	2
Knowledge of physical connections and/or cause/effect between PRM and systems.	Group #	1	1
	K/A #	073.K1.01	
	Importance Rating	3.6	3.9

Proposed Question:

The Secondary Rounds PEO reports that the TPCCW Sump Pumps are pumping down the TPCCW sump more often than expected.

Which radiation monitor detecting a high radiation condition could be the cause for the abnormal TPCCW Sump level increase?

A. 3DAS-RE50, Turbine Building Floor Drain Sump Rad Monitor.

B. 3CND-RE07, Waste Neutralization Sump Rad Monitor.

C. 3LWS-RE70, Liquid Waste Discharge Rad Monitor.

D. 3CNA-RE47, Aux Condensate Rad Monitor.

Proposed Answer: A

Explanation (Optional): "A" is correct, since DAS-RE50 diverts the Turbine Building Sump to the TPCCW sump on hi radiation conditions. "B", "C", and "D" are wrong since these radiation monitors do not divert water to the TPCCW sump. "B", "C", and "D" are plausible, since all of these radiation monitors isolate flowpaths on high radiation.

Technical Reference(s): AOP 3573, Att. A, page 4 of 12 (Attach if not previously provided)

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... DAS-RE50... (As available)

Question Source: Bank #67219

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.4 and 41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 52	Tier #	2	2
Predict the impact / mitigate the effect of a	Group #	1	1
detector failure	K/A #	073.A2.02	
	Importance Rating	2.7	3.2

Proposed Question:

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.

Which Blowdown System valves automatically closed as a direct result of the SSR08 failure, and what are the minimum actions physically required by the crew to allow the re-opening of the closed valves to re-establish blowdown flow?

A. The SG Blowdown Flow Control Valves (3BDG-HV20A-D) automatically closed. Operators will have to remove SSR08 from service and depress the Blowdown Isolation Reset pushbuttons on MB1.

B. The SG Blowdown Flow Control Valves (3BDG-HV20A-D) automatically closed. Operators will have to depress the Blowdown Isolation Reset pushbuttons on MB1 only.

C. The SG Blowdown Containment Isolation Valves (3BDG*CTV22A-D) automatically closed. Operators will have to remove SSR08 from service and depress the Blowdown Isolation Reset pushbuttons on MB1.

D. The SG Blowdown Containment Isolation Valves (3BDG*CTV22A-D) automatically closed. Operators will have to depress the Blowdown Isolation Reset pushbuttons on MB1 only.

Proposed Answer: D

Explanation (Optional): A Hi Radiation signal from SSR08 auto-closes the SG Blowdown CIVs ("A" and "B" wrong). "C" is wrong, and "D" correct, since the Hi Rad signal can be overridden by resetting blowdown isolation on MB1, even with the initiating signal still present. "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 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 (in this case, P-4 signal prevents another auto-SIS from actuating).

Technical Reference(s): AOP3573, Att. A, page 12 of 12 (Attach if not previously provided)
LSK 32-13A and C

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: New

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.5 and 41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 53	Tier #	2	2
Knowledge of the effect of a loss or malfunction of Service Water will have on Secondary closed cooling water	Group #	1	1
	K/A #	076.K3.02	
	Importance Rating	2.5	2.8

Proposed Question:

The plant is initially at 100% power, with the "A" and "B" TPCCW heat exchangers in service, when the following sequence of events occurs:

1. A Service Water System pipe ruptures just downstream of the Service Water to TPCCW Supply Valve 3SWP*MOV71A in the Auxiliary Building.
2. 3SWP*MOV71A and B automatically close, isolating the pipe break from the rest of the Service Water System.
3. Operators enter AOP 3560 *Loss of Service Water*.

Assuming the operators do not trip the plant, what actions, if any, are the operators required to take, and what automatic action, if any, will occur?

A. Operators will isolate the rupture in the Auxiliary Building and open the "B" Train Service Water to TPCCW Supply Valve 3SWP*MOV71B to restore cooling. No automatic actions will occur.

B. Operators will place the "C" TPCCW heat exchanger in service, remove the "A" TPCCW heat exchanger in service, and open 3SWP*MOV71B to restore cooling. No automatic actions will occur.

C. Operators will keep Service Water isolated from TPCCW. An automatic turbine runback will occur due to high bus duct cooling temperatures.

D. Operators will keep Service Water isolated from TPCCW. An automatic turbine runback will occur due to stator cooling system high temperature.

Proposed Answer: D

Explanation (Optional): The Service Water piping downstream of MOV 71A and B meet at a common header, so operators will not restore SWP cooling to TPCCW ("A" and "B" wrong). As TPCCW heats up, the most urgent load is Stator Liquid Cooling, since there is an automatic runback tied to a high temperature condition ("D" correct and "C" wrong). "A" is plausible, since AOP 3560 will attempt to restore cooling from the opposite train if the leak is upstream of MOV71A. "B" is plausible, since if the leak is in the turbine building in the area of the TPCCW heat exchangers, the crew can isolate the leak by swapping heat exchangers. "C" is plausible, since TPCCW provides cooling to bus duct cooling, but downpower requirements are manual, not automatic.

Technical Reference(s): AOP 3560, step 2 (Attach if not previously provided)
OP 3353.MB7C, 1-2

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05719 Given a failure, partial of complete, of the Service Water System, determine the effects on the system and on interrelated systems. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 54	Tier #	2	2
Knowledge of IAS design features and/or interlocks	Group #	1	1
Which provide for crossover to other air systems	K/A #	078.K4.02	
	Importance Rating	3.2	3.5

Proposed Question:
The plant is at 100% power when the following sequence of events occur:

- Annunciator "INST / SERV AIR SYS TROUBLE" alarms.
- A PEO is dispatched to locally investigate the trouble alarm.
- The RO reports that instrument air header pressure is at 88 psig and decreasing slowly.
- The crew enters AOP 3562, *Loss of Instrument Air*.

The RO is monitoring instrument air pressure for proper indications that the service air compressor is performing its emergency backup function for instrument air.

If the added capacity of the service air compressor is capable of compensating for the leak, how will instrument air header pressure respond prior to any local actions by PEO's?

A. IAS pressure will continue to drop, since local actions by a PEO is required to align 3IAS-AOV14 and 3SAS-AOV33 to supply instrument air.
B. When IAS header pressure lowers to 80 psig, pressure will start to recover since 3IAS-AOV14 opens. Pressure will begin to drop again when IAS header pressure increases to 85 psig, when 3SAS-AOV33 reopens. Pressure will then cycle between 80 and 85 psig.
C. When IAS header pressure lowers to 85 psig, pressure will start to recover as 3IAS-AOV14 and 3SAS-AOV33 realign. Pressure will start to drop again when IAS header pressure increases to 103 psig, since the valves will realign to their original positions.
D. When IAS header pressure lowers to 85 psig, pressure will start to recover as 3IAS-AOV14 and 3SAS-AOV33 realign. Pressure will start to drop again when IAS header pressure increases to 110 psig, since the 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 simultaneously cause 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" is plausible, since PEOs can locally realign the valves. "B" is plausible, since these actions occur, but at different setpoints. "D" is plausible, since this would be the system response if it did not automatically realign on increasing pressure.

Technical Reference(s): LSK-12-1C, 12-2C (Attach if not previously provided)
OP 3353.IS 1-1 ARP

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05323; Describe operation of plant air systems under the following normal, abnormal, and emergency operating conditions: Low instrument air pressure… (As available)

Question Source: Bank #67323
Question History: 2000 Millstone 3 NRC Exam
Question Cognitive Level: Memory or Fundamental Knowledge
10 CFR Part 55 Content: 55.41.7
Comments:

Examination Outline Cross-reference:	*Level*	RO	SRO
Question # 55	Tier #	2	2
Knowledge of physical connections and/or cause-effect	Group #	1	1
Relationship between Containment and SIS, including reset	K/A #	103.K1.08	
	Importance Rating	3.6	3.8

Proposed Question:

Initial Conditions:

- The plant is at 100% power.
- The "A" and "C" Containment Air Recirc (CAR) Fans are running.
- The "A" and "C" CRDM Cooling Fans are running.
- The "B" CAR Fan and the "B" CRDM Cooling fan are both in AUTO-AFTER-STOP.

A LOCA occurs, and Containment pressure peaks at 19 psia.

Assuming no operator action, what is the status of Containment Cooling Systems?

A. All three CAR Fans are RUNNING. All three CRDM Fans are RUNNING.

B. All three CAR Fans are RUNNING. All three CRDM Fans are OFF.

C. The "A" and "B" CAR Fans and CRDM Fans are RUNNING. The "C" CAR Fan and "C" CRDM Fan are OFF.

D. The "A" and "B" CAR Fans and CRDM Fans are OFF. The "C" CAR Fan and "C" CRDM Fan remain RUNNING.

Proposed Answer: A

Explanation (Optional): "A" is correct, since an SIS signal actuates at 17.7 psia, and the SIS sends an auto-start signal to the "A" and "B" CAR fans ("D" wrong) and the "A" and "B" CRDM fans ("B" wrong). Since the "C" CAR and CRDM fans were already running, all of the fans will be running ("C" wrong). A HI-3 signal is generated at Containment Pressure (2/4)>23 psia which generates a CDA signal. "B" is plausible, since E-0 has the operators verify the CAR fans running on an SIS, but not the CRDM cooling fans. Also, the CRDMs will have deenergized on the reactor trip. "C" is plausible, since "A" and "B" CAR Fans and CRDM fans are the safety related fans. "D" is plausible, since a CDA signal trips the safety related CAR and CRDM fans, but not the "C" fans, but a CDA does not actuate until 23 psia.

Technical Reference(s): P&ID 153A (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04259 Describe the operation of the following Containment Ventilation System controls and interlocks... Containment Air Recirculation System Fan controls and interlocks... Containment Rod Drive Mechanism Cooling System Fan controls and interlocks. (As available)

Question Source: Modified Bank #72259 Parent question attached

Question Cognitive Level: *Comprehension or Analysis*

10 CFR Part 55 Content: 55.41.7

Examination Outline Cross-reference:	Level	RO	SRO
Question # 56	Tier #	2	2
Knowledge of physical connections and/or cause-effect between:	Group #	2	2
CCWS must be cut in before energizing CRDS	K/A #	001.K1.09	
	Importance Rating	2.8	3.1

Proposed Question:

During a startup, a loss of configuration control results in Reactor Plant Chilled Water (CDS) NOT being supplied to the CRDM coolers.

During a main board walkdown, the BOP operator notices the CRDM CLR A CHILLED WTR FLOW LO annunciator lit on VP1.

What parameters will the Annunciator Response Procedure direct the operators to monitor, and why?

A. The crew is directed to monitor CRDM Shroud temperature, since CDS cools the air in the CRDM Shroud prior to its entry into the CRDM coil stacks. The crew is NOT directed to monitor CTMT temperature and pressure, since the CAR fans cool CTMT.

B. The crew is directed to monitor CRDM Shroud temperature, since CDS cools the air in the CRDM Shroud prior to its entry into the CRDM coil stacks. The crew is also directed to monitor CTMT temperature and pressure, since, as the air exiting the CRDM shroud heats up, the air exhausting into CTMT will also heat up.

C. The crew is directed to monitor CTMT temperature and pressure, since CDS cools the air that has flowed through the CRDM Shroud prior to its exhausting back into CTMT. The crew is NOT directed to monitor CRDM Shroud temperature, since CDS cools the air after it has exited the CRDM coil stacks.

D. The crew is directed to monitor CTMT temperature and pressure, since CDS cools the air that has flowed through the CRDM Shroud prior to its exhausting back into CTMT. The crew is also directed to monitor CRDM Shroud temperature, since, as the air in CTMT heats up, the air entering the CRDM shroud will also begin to heat up.

Proposed Answer: D

Explanation (Optional): The CRDM cooling fans take a suction on the air exiting the CRDM stacks, providing cooling to the CRDMs. CDS removes the heat from the air as it exhausts back into CTMT ("A" and "B" wrong). "C" is wrong, and "D" correct, since CDS is reducing the heat load on CTMT, and CTMT ambient air supplies CRDM cooling. "A" and "B" are plausible, since the system cools the CRDMs. "A" and "C" are plausible since the CAR fans also cool CTMT.

Technical Reference(s): OP 3353.VP1A, 3-7, step 4. (Attach if not previously provided)
OP 3313C, Prerequisite 2.1.1
P&ID 153A

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: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.4

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 57	Tier #	2	2
Ability to verify In-Core Temperature Monitoring	Group #	2	2
System alarms are consistent with plant conditions	K/A #	017.GEN.2.4.46	
	Importance Rating	3.5	3.6

Proposed Question:
With the plant at 100% power with rods in manual, the following sequence of events occurs:

1. A turbine runback occurs, and the reactor does not trip.
2. The highest "In-Scan" Core Exit Thermocouple increases to 650°F.
3. The remaining CETC temperatures indicate 638°F.
4. CORE EXIT TEMP HIGH TRAIN A (MB4C, 1-8A) is received.
5. The RO notes that SATURATION TROUBLE TRAIN A (MB4C, 2-10A) is NOT lit.

Should either or both of these annunciators be lit during this event?

A. Both annunciators should be lit, since their setpoints are being exceeded.

B. The HIGH TEMPERATURE annunciator should be lit, but the SATURATION annunciator should NOT be lit, since it is blocked when any CETC temperatures increases above 640°F.

C. The SATURATION annunciator should be lit, but the HIGH TEMPERATURE annunciator should NOT be lit, since both trains of CETCs must be above 640°F to arm this annunciator.

D. Neither annunciator should be lit, since the reactor trip breakers are still closed.

Proposed Answer: D
Explanation (Optional): "D" is correct, and "A, "B", and "C" wrong, since both annunciators require the reactor trip breakers to be open to arm the annunciators. "A" is plausible, since both alarm setpoints are being exceeded during this event. "B" and "C" are plausible, since 640°F is the setpoint of the high temperature alarm, and both annunciators are interlocked (with the trip breakers).
Technical Reference(s): OP3353.MB4C, 1-8A (Attach if not previously provided)
OP3353.MB4C, 2-10A
Proposed references to be provided to applicants during examination: None
Learning Objective: MC-04832 Describe the operation of the ICC system during the following... Normal at power operations... (As available)
Question Source: New
Question Cognitive Level: Memory or Fundamental Knowledge
10 CFR Part 55 Content: 55.41.7 and 41.10
55.43.5
Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 58	Tier #	2	2
Physical connection / cause and effect relationship	Group #	2	2
between the fuel pool and RWST.	K/A #	033.K1.05	
	Importance Rating	2.7	2.8

Proposed Question:

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

1. The crew fills the fuel transfer canal, resulting in a low fuel pool level.
2. The crew is aligning for gravity feed makeup to the Spent Fuel Pool from the RWST per OP 3305 *Fuel Pool Cooling and Purification.*

When establishing this normal makeup lineup, why are the operators directed to verify RWST Recirculation Suction Isolation Valves (3QSS*AOV27 and 28) open?

A. If 3QSS*AOV27 and 28 were closed, no gravity flow to the Spent Fuel Pool would occur, since the normal Spent Fuel Pool Makeup Valve is interlocked with these valves.

B. If 3QSS*AOV27 and 28 were closed, no gravity flow to the Fuel Pool would occur, since the RWST to Spent Fuel Pool gravity feed path comes off the RWST recirculation pump suction line.

C. If 3QSS*AOV27 and 28 were closed, no gravity flow to the Spent Fuel Pool would occur, since a vacuum will be drawn on the top of the RWST during draining.

D. If 3QSS*AOV27 and 28 were closed, the RWST could not be placed on recirculation, and this is required to sample RWST boron concentration, verifying it is greater than SFP boron concentration.

Proposed Answer: B

Explanation (Optional):
OP 3305 allows the RWST gravity feed method to provide normal makeup to the to Spent Fuel Pool. "B" is correct since the gravity feed flowpath branches off the RWST recirculation suction line, downstream of 3QSS*AOV27 and 28. "A" is wrong, since the gravity feed path flows through a manual valve. "A" is plausible since the normal makeup valve to the to Spent Fuel Pool from Primary Grade Water (used if level is low due to evaporation) is an interlocked AOV. "C" wrong, since the RWST is not vented through this line, but plausible, since this recirc line returns near the top of the RWST, and tanks must be vented (or pressurized) to allow draining. "D" is wrong, since RWST is sampled weekly, and no additional sample is required. "D" is plausible since RWST recirculation must be established to sample the RWST, and to Spent Fuel Pool boron concentration is a Tech Spec item.

Technical Reference(s): P & ID EM-111A, 115A (Attach if not previously provided)
OP 3305, Section 4.13

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05640; Given a Spent Fuel Pool Cooling System diagram, describe the system flowpath and electrical alignment under the following Normal, Abnormal, and Emergency Conditions: Purification of the RWST. (As available)

Question Source: New

Question Cognitive Level: Memory and knowledge

10 CFR Part 55 Content: 55.41.2 to 41.9

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 59	Tier #	2	2
Ability to predict and/or monitor changes in S/G pressure	Group #	2	2
associated with operating S/GS controls	K/A #	035.A1.02	
	Importance Rating	3.5	3.8

Proposed Question:

Current Conditions:

- A heatup is in progress per OP 3201 *Plant Heatup*.
- The MSIVs are closed.
- The operating crew is preparing to warm up the main steam lines.
- The RCS heatup has been temporarily stopped.

Which action will cause "A" SG pressure to INCREASE?

A. Increase the Condenser Steam Dump master pressure controller **output**.

B. Increase the Condenser Steam Dump master pressure controller **setpoint**.

C. Decrease the "A" SG Atmospheric Relief Valve controller **output**.

D. Decrease the "A" SG Atmospheric Relief Valve controller **setpoint**.

Proposed Answer: C

Explanation (Optional): "C" is correct, since decreasing the SG Atmospheric Relief valve controller output will throttle the valve in the close direction, resulting in less cold Feedwater, raising SG pressure. "A" and "B" are wrong, since the Condenser Dumps will not be placed in service until the main steam system is placed in service. "D" is wrong, since decreasing the setpoint will cause the valve to throttle in the open direction in attempt to lower SG pressure. "A" and "B" are plausible, since Condenser Dumps will be placed in service to conserve water once the secondary plant is aligned. "D" is plausible, since this action affects SG parameters.

Technical Reference(s): Functional Sheet 10 (Attach if not previously provided)
OP 3201, Step 4.4.5

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04887 Describe the major parameter changes associated with decreased heat removal by the Secondary System. (As available)

Question Source: INPO Exam Bank

Question History: Beaver Valley Unit 1 2002 NRC Exam

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.4, 41.5, 41.7, and 41.14

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 60	Tier #	2	2
Main Turbine Generator: Ability to evaluate plant performance	Group #	2	2
and make operational judgments based on operating	K/A #	045.GEN.2.1.7	
characteristics, reactor behavior, and instrument interpretation.	Importance Rating	3.7	4.4

Proposed Question:

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

1. A GEN CORE MONITOR LEVEL HI annunciator comes in on MB 7.
2. The dispatched PEO reports back that the local trace had dropped fairly rapidly from 90% to 5%.
3. The US directs the PEO to depress the "FILTER" pushbutton and report the results.
4. The PEO reports that with the FILTER pushbutton depressed, the trace returned to 90%.

What action is the crew required to take, and why?

A. Trip the reactor and go to E-0 *Reactor Trip Or Safety Injection*, since generator overheating is occurring.

B. Refer to OP 3204 *At Power Operation* and shutdown the Main Generator, since generator H_2 purity is low.

C. Submit a Condition Report, since indication of core monitor filter clogging exists.

D. Submit a Condition Report, since indication of core monitor instrument degradation exists.

Proposed Answer: A

Explanation (Optional): "A" correct, since Main Generator overheating results in organic material being released into the cooling gas stream, which results in a decreasing indication on the core monitor ("B" wrong). With actual particulates in the sample stream, the trace will return to normal when a filter is placed in the sample stream, as the particulates are filtered out ("C" wrong). "D" is wrong, since instrument degradation is characterized by a slow decline in the instrument trace, and the trace would not recover when the filter is placed in service. "B" is plausible, since hydrogen purity is also sampled locally, and the generator will be shutdown if purity cannot be maintained. "C" and "D" are plausible, since surveillances are performed on the core monitor that involve using a heater to burn a small amount of material upstream of the monitor, and the filter is placed in service to verify monitor response. A CR is generated if a problem exists with the heater, the filter, or the monitor.

Technical Reference(s): OP 3353.MB7C 4-5 Gen Core Monitor Level Hi (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04703 Given a plant condition or equipment malfunction relating to the GMO system, determine when the turbine is required to be tripped, or when the generator must be shutdown. (As available)

Question Source: Bank #74360

Question History: Millstone 3 2000 NRC Exam

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.4, 41.5, 41.7, and 41.10

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 61	Tier #	2	2
Predict impact/mitigate effect of a loss of condensate pumps on the Condensate System.	Group #	2	2
	K/A #	056.A2.04	
	Importance Rating	2.6	2.8

Proposed Question:
The plant is initially operating at 100% power with the "A" and "B" Main Condensate Pumps running when the following sequence of events occurs:

The COND PP AUTO TRIP/OVERCURRENT annunciator comes in on MB6A.
The BOP operator reports that the "A" Main Condensate Pump has tripped.

How will the "C" Condensate Pump respond to this event, and what actions are the operators required to take?

A. The "C" Main Condensate Pump should have automatically started. Operators are required to check the feed system and if necessary, take manual control of the feed pump master speed controller.

B. The "C" Main Condensate Pump should have automatically started. Operators are required to throttle open Demin Bypass Valve 3CNM-MOV78 to maintain Condensate Demineralizer DP less than 50 psid.

C. The "C" Main Condensate Pump is required to be manually started. Operators are required to check the feed system and if necessary, take manual control of the feed pump master speed controller.

D. The "C" Main Condensate Pump is required to be manually started. Operators are required to throttle open Demin Bypass Valve 3CNM-MOV78 to maintain Condensate Demineralizer DP less than 50 psid.

Proposed Answer: A
Explanation (Optional): The standby condensate pump will automatically start with either running pump not running with the switch in AUTO-AFTER_START ("C" and "D" wrong). "C" and "D" are plausible, since operators are required to check the standby pump started, and they would start the pump manually if it fails to auto-start. "A" is correct since operators are required to check feed system status during this event, since the loss of a condensate pump will decrease feed pump suction pressure, causing a decrease in feed flow, and a resulting transient. "B" is wrong, since opening the Demin Bypass Valve is required if DP reaches 60 psid, but plausible, since Demin DP will increase on loss of a condensate pump as feed pump speed increases in attempt to raise flow.

Technical Reference(s): OP 3353.MB6A, 5-1 (Attach if not previously provided)
OP 3353.MB6A, 2-7

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04235 Given a failure, partial or complete, of the Main Condensate and Makeup Control Systems determine the effects on the systems and on interrelated systems. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5 and 41.10

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 62	Tier #	2	2
Knowledge of loss or malfunction of Waste Gas	Group #	2	2
Disposal System on ARM and PRM.	K/A #	071.K3.05	
	Importance Rating	3.2	3.2

Proposed Question:

The Plant is at 100% power with the Degassifier operating in the "Letdown Degas" mode.

A through-wall piping leak develops in the Process Gas piping at the top of the Degassifier.

Which rad monitor will detect this, and what automatic action will occur at the Hi Radiation ALARM setpoint?

A. Gaseous Waste Discharge Radiation Monitor 3GWS-RE48; which will direct degassifier effluent to boron recovery, and divert letdown to the VCT (away from the degassifier).

B. Gaseous Waste Discharge Radiation Monitor 3GWS-RE48; which will close the Process Gas Receiver Pressure valve (3GWS-PV49) to isolate the discharge to the Millstone stack.

C. Aux Building Exhaust Fan Suction Radiation Monitor 3HVR-RE12A; which will direct degassifier effluent to boron recovery, and divert letdown to the VCT (away from the degassifier).

D. Aux Building Exhaust Fan Suction Radiation Monitor 3HVR-RE12A; which will close the Process Gas Receiver Pressure valve (3GWS-PV49) to isolate the discharge to the Millstone stack.

Proposed Answer: C

Explanation (Optional): "C" is correct, since Aux Bldg Exhaust Fan 7 takes a suction on the Degassifier cubicle, so the leak will be detected by 3HVR-RE12A, and this radiation monitor automatically directs degassifier effluent to boron recovery, and diverts letdown to the VCT (away from the degassifier) ("D" wrong). "A" and "B" are wrong, since 3GWS-RE48 monitors degassifier output downstream of the adsorbers, which is outside of the degassifier cubicle. "B" and "D" are plausible, since this is the auto-action of GWS-RE48, and "A" and "B" are plausible, since GWS-RE48 monitors the degassifier outlet line for radiation.

Technical Reference(s): P&ID 109 series (Attach if not previously provided)
AOP 3573 Attachment A, pages 5 and 8

Proposed references to be provided to applicants during examination: None

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

Question Source: Bank #64471

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
Ability to predict and/or monitor changes parameters associated	Group #	2	2
with operating Fire Protection System dampers	K/A #	086.A1.04	
	Importance Rating	2.7	3.3

Proposed Question:

With the plant at 100% power, a fire breaks out in the West Switchgear Area, and the following sequence of events occurs:

1. The crew enters EOP 3509 *Fire Emergency*.
2. The fire brigade is dispatched.
3. As a last resort, the decision is made to manually initiate CO_2 (FPL) into the West Switchgear area.

How will manual and automatic FPL damper operations affect CO2 pressure in the West Switchgear area after the discharge commences?

A. The CO_2 pressure rise will be limited, since an open vent path has been aligned through open FPL dampers to protect the West Switchgear area from over-pressurization.

B. The CO_2 pressure rise will be limited, since a closed, spring loaded relief damper will lift to provide a vent path as needed to protect the West Switchgear area from over-pressurization.

C. The CO_2 pressure rise will NOT be limited by a vent path, since the normally open vent paths have been isolated by FPL dampers to prevent the spread of CO_2 into the Control Room.

D. The CO_2 pressure rise will NOT be limited by a vent path, since the normally open vent paths have been isolated by FPL dampers to prevent the spread of CO_2 into the Auxiliary Shutdown Panel area.

Proposed Answer: A

Explanation (Optional): "A" is correct, since the crew will be directed to open the West Switchgear Relief Damper 3FPL-DMPR5 ("C" and "D" wrong), which is in series with the Pressure Relief Damper 3FPL*DMPR6. The Pressure Relief Damper automatically opens when a CO2 actuation is sensed by a pressure detector in the CO2 supply pipe to the West Switchgear Area ("B" wrong), providing an open vent path for the West Switchgear area. "B" is plausible, since the relief dampers for the cable spreading room are normally closed and open on high pressure. "C" and "D" are plausible, since CO2 leakage is a major concern at Millstone 3.

Technical Reference(s): OP 3341C, step 4.5.3, and Note 2 prior to step 4.33.1
OP 3341C, Attachment 1.
P&ID 146A
(Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04580 Given a CO2 Fire Protection (FPL) system diagram, describe the system operation and flowpaths upon the receipt of a fire alarm requiring the actuation of the FPL system. (As available)

Question Source: New

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.4 and 41.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 64	Tier #	2	2
Ability to operate or monitor the SBO Diesel	Group #	2	2
	K/A #	Site Specific SBO Diesel.A4	
	Importance Rating	N/A	N/A

Proposed Question:

The crew has started the SBO diesel for surveillance, in accordance with OP3346D *Station Blackout Diesel*, and the BOP operator is in communication with the PEO at the SBO Diesel.

Thirty seconds after selecting "START", the PEO reports that the engine tachometer reads 450 RPM.

What direction should the BOP operator give to the PEO, and why is the SBO diesel running at this speed?

A. Continue to monitor SBO diesel operation, since the SBO Diesel will run for about 2.5 minutes at this idle speed while it warms up.

B. Adjust SBO Diesel output voltage to 4160 Volts, since 450 rpm is the normal running speed for the SBO Diesel.

C. Adjust SBO Diesel governor speed to increase speed until generator frequency indicates 60 Hz, since the SBO Diesel is running too slow.

D. Perform an emergency shutdown of the SBO diesel, since the SBO Diesel is running too fast, and should have tripped on overspeed.

Proposed Answer: A

Explanation (Optional): "A" is correct, since when started, the SBO diesel accelerates to approximately 450 rpm ("C" wrong), and idles at this speed for 2.5 minutes, after which the SBO Diesel will accelerate to approximately 900 rpm ("B" and "D" wrong). When at 900 rpm, generator excitation is automatically applied and operators adjust output voltage and frequency. "B" and "C" are plausible, since these actions are taken after 900 rpm is reached. "D" is plausible, since the SBO diesel does have an overspeed trip, and emergency shutdown pushbuttons.

Technical Reference(s): OP 3346D, Section 4.4.11 Note (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05623 Describe the operation of the SBO system under the following normal, abnormal, and emergency conditions... SBO Diesel Startup... (As available)

Question Source: Bank #69337

Question Cognitive Level: Memory or Fundamental Knowledge

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 65	Tier #	2	2
Operational Implications of AMSAC System	Group #	2	2
	K/A #	Site Specific AMSAC.K5	
	Importance Rating	NA	NA

Proposed Question:
The plant is stable at 48% power, when the following sequence of events occurs:

Time	Event
T=0 seconds:	Turbine impulse pressure channel 3MSS-PT505 fails low.
T+30 seconds:	During the resulting transient, all main feedwater is lost due to low feed pump suction pressures.
T+40 seconds:	The low-low SG level reactor trip setpoint is reached, but the reactor fails to trip, and current SG narrow range levels are as follows:

- SG "A": 12% and decreasing.
- SG "B": 16% and decreasing.
- SG "C": 14% and decreasing.
- SG "D": 13% and decreasing.

How will the AMSAC System respond to this event?

A. AMSAC will trip the reactor with no time delay, and start the AFW pumps in 60 seconds.

B. AMSAC will trip the turbine in 30 seconds, and start the AFW pumps in 60 seconds.

C. AMSAC will not actuate, since it was procedurally in "Bypass" at the start of the event.

D. AMSAC will not actuate, since indicated turbine power was below C-20 for the required time before the ATWS event occurred.

Proposed Answer: B
Explanation (Optional): "B" is correct, since AMSAC stays armed for 260 seconds after power drops below 45% ("D" wrong), and trips the turbine ("A" wrong) and starts the AFW pumps on SG level (3/4) < 22%. It also isolates SG blowdown. "C" is wrong, since AMSAC is required to be in service with power >40%.

Technical Reference(s): OP 3350, Attachment 3 (Attach if not previously provided)
TRM 7.2

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04086 Describe operation of AMSAC circuitry including inputs, logic, outputs. (As available)

Question Source: Bank #72277

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 66	Tier #	3	3
Knowledge of conduct of operations requirements	Group #	1	1
	K/A #	GEN.2.1.1	
	Importance Rating	3.7	3.8

Proposed Question:

The plant has just tripped, and the crew has entered E-0 *Reactor Trip or Safety Injection.*

In what situation is it expected that the Unit Supervisor would call for a "Focus Brief"?

A. When it is desired to ensure the entire control room operating team understands the status of the plant.

B. Upon transition to a new Emergency Operating Procedure.

C. When pertinent information needs to be shared with the BOP operator about an upcoming procedure step.

D. Any time the entire control room operating team needs to refocus.

Proposed Answer: C

Explanation (Optional): "C" is correct, since focus briefs shall be used to share pertinent information, and can occur between as few as two persons. "A", "B", and "D" are wrong, but plausible, since these conditions involve expectations and standards for transient/crew briefs.

Technical Reference(s): OP-AA-100 Conduct of Operations Att. 2, step 7 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06923 Describe the important elements of a Transient/Crew and Focus Brief (As available)

Question Source: Bank #66046

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
Ability to determine Mode of Operation	Group #	1	1
	K/A #	GEN.2.1.22	
	Importance Rating	2.8	3.3

Proposed Question:

The crew is performing a reactor shutdown in accordance with OP-3207 *Reactor Shutdown.*

Procedurally, at what point in the shutdown will the crew log entry into MODE 3?

A. After control bank insertion commences, with all shutdown bank rods still fully withdrawn.

B. When all the control banks are fully are inserted, and all shutdown bank rods still fully withdrawn.

C. After shutdown bank insertion commences, with all the control banks fully are inserted.

D. When all the control banks and all of the shutdown banks are fully inserted.

Proposed Answer: B

Explanation (Optional): "B" is correct, and "A", "C", and "D" wrong, since MODE 3 is procedurally defined as the point in a reactor shutdown when all the control banks are fully inserted and shutdown rods fully withdrawn. All answers are plausible since Millstone 3 procedurally calls Mode 3 based on Control Bank and Shutdown Bank position.

Technical Reference(s): OP 3207, section 2.4.4 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05785 List OPERATIONAL MODES and conditions that define each MODE. (As available)

Question Source: Bank # 60704

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.10
55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 68	Tier #	3	3
Ability to locate and operate components,	Group #	1	1
including local controls	K/A #	GEN.2.1.30	
	Importance Rating	3.9	3.4

Proposed Question:
A loss of heat sink event is in progress, the crew has entered FR-H.1 *Response to Loss of Secondary Heat Sink*, and the following sequence of events occurs:

1. A PEO reports that the TDAFW Pump Trip Throttle Valve (3MSS*MSV5) is in the tripped position.
2. The US directs the BOP operator to tell the PEO to reset and open MSV5.
3. The PEO requests guidance on how to reset and open the valve.
4. The BOP operator references FR-H.1, Attachment A.

Using FR-H.1 Attachment A, page 4 of 4, attached to this exam, what guidance will the BOP operator give the PEO to successfully reset and open this valve?

A. Move the connecting rod toward MSV5, rotate the handwheel on MSV5 to the CLOSED position, ensure the Latch-Up Lever re-latches with the Trip Hook, and then rotate the handwheel on MSV5 to the OPEN position.

B. Move the connecting rod toward MSV5, rotate the handwheel on MSV5 to the OPEN position, and then ensure the Latch-Up Lever re-latches with the Trip Hook.

C. Move the connecting rod toward the TDAFW Pump, rotate the handwheel on MSV5 to the CLOSED position, ensure the Latch-Up Lever re-latches with the Trip Hook, and then rotate the handwheel on MSV5 to the OPEN position.

D. Move the connecting rod toward the TDAFW Pump, rotate the handwheel on MSV5 to the OPEN position, and then ensure the Latch-Up Lever re-latches with the Trip Hook.

Proposed Answer: A

Explanation (Optional): "A" is correct since the connecting rod must be moved toward MSV5 to allow the trip tappet to drop fully down ("C" and "D" wrong), which is necessary to allow the trip hook to engage the latch up lever. The handwheel must be then taken to close to align the latch-up lever with the trip hook ("B" and "D" wrong).

Technical Reference(s): FR-H.1, Attachment A, pages 3 and 4 (Attach if not previously provided)

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... Turbine Driven Auxiliary Feedwater Pump Steam Isolation Valve (MSV5)... (As available)

Question Source: Bank #79313

Question Cognitive Level: Memory or Fundamental Knowledge

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 69	Tier #	3	3
Ability to manipulate controls to operate the facility	Group #	2	2
between shutdown and designated power levels	K/A #	GEN.2.2.2	
	Importance Rating	4.0	3.5

Proposed Question:

INITIAL CONDITIONS:

- The plant is in MODE 5 with a cooldown in progress.
- The pressurizer is solid.
- RCS and pressurizer temperatures are equal.
- The RO has been directed to lower RCS pressure in accordance with OP 3208 *Plant Cooldown*.

What action is the RO required to take?

A. Place an additional letdown orifice in service.

B. Throttle open auxiliary spray valve 3CHS*AV8145.

C. Throttle open RHR to letdown flow control valve 3CHS*HCV128.

D. Throttle open letdown pressure control valve 3CHS*PCV131.

Proposed Answer: D

Explanation (Optional):
"D" is correct per OP 3208. "A", and "C" are plausible since each of these actions would reduce RCS inventory when solid, reducing RCS pressure. "B" is plausible, since spray would be used to reduce pressure if there was a bubble in the pressurizer.

Technical Reference(s): OP 3208 steps 4.4.3 and 4.4.15.c. (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04202 Describe the operation of the Chemical and Volume Control System under normal, abnormal, and emergency operating conditions. (As available)

Question Source: Bank #68581

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.3, 41.5, 41.7, and 41.10

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 70	Tier #	3	3
Knowledge of limiting conditions for operations	Group #	2	2
and safety limits	K/A #	GEN.2.2.22	
	Importance Rating	3.4	4.1

Proposed Question:

With the plant initially at 100% power, a severe transient has occurred, and current conditions are as follows:

- Reactor power is 80%.
- Pressurizer level is 100%.
- Pressurizer pressure is 2700 psia.
- Tave is 600°F.

Using Tech Spec Figure 2.1-1 attached to this exam, which SAFETY LIMITS, if any, are being exceeded?

A. Neither the RCS Pressure SAFETY LIMIT nor the Reactor Core SAFETY LIMIT are being exceeded.

B. The RCS Pressure SAFETY LIMIT is being exceeded, and the Reactor Core SAFETY LIMIT is NOT being exceeded.

C. The RCS Pressure SAFETY LIMIT is NOT being exceeded, and the Reactor Core SAFETY LIMIT is being exceeded.

D. Both the RCS Pressure SAFETY LIMIT and the Reactor Core SAFETY LIMIT are being exceeded.

Proposed Answer: A

Explanation (Optional): The RCS Pressure limit of 2750 psia has not been exceeded ("B" and "D" wrong), and the Reactor Core Safety Limit has NOT been exceeded ("A" correct, "C" and "D" wrong). "B" and "D" are plausible, since RCS pressure is elevated. "C" and "D" are plausible, since RCS Tave is elevated.

Technical Reference(s): Tech Spec Section 2.1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: Tech Spec Figure 2.1-1

Learning Objective: MC-05782 Given a set of parameters, determine if a reactor core safety limit has been exceeded (As available)

Question Source: Modified Bank #79953 Parent Question Attached

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.2

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 71	Tier #	3	3
Knowledge of facility ALARA program.	Group #	3	3
	K/A #	GEN.2.3.2	
	Importance Rating	2.5	2.9

Proposed Question:

What ALARA precaution exists specifically for entering CTMT with the reactor at power that does NOT apply with the reactor shutdown?

A. Be aware that entry into the loop areas within the crane wall can subject an individual to high exposure rates.

B. No entry into Containment is permitted when Containment pressure is below atmospheric pressure.

C. HP Technicians should be aware of radiation streaming paths from piping penetrations.

D. Exit Containment immediately if unanticipated radiological conditions are encountered.

Proposed Answer: A

Explanation (Optional): "A" is correct, since N-16 gamma radiation, which is power dependent, is a large contributor to dose rates within the crane wall. "B", "C", and "D" but plausible, since these relate to actual cautions or steps in RPM 2.8.1 Initial Entry to Unit 3 Containment, but are wrong, since they also apply with the reactor shutdown.

Technical Reference(s): RPM 2.8.1, section 3, (Attach if not previously provided)
RPM 2.8.1, ALARA caution prior to stem 4.2.3, and step 4.3.7

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05152 Discuss the concerns associated with entering inside the crane wall of containment while the reactor is at power... (As available)

Question Source: New

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.12

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 72	Tier #	3	3
Ability to control radiation releases.	Group #	3	3
	K/A #	GEN.2.3.11	
	Importance Rating	2.7	3.2

Proposed Question:

With the plant at 100% power and a SLCRS Fan running, the "SLCRS Filter Fan Discharge to Millstone Stack" radiation monitor (3HVR*RE19B) goes into alarm.

What two subsequent actions are required to be performed to check for potential sources of the radioactive release?

A. Check the Condenser Air Ejector Discharge Radiation Monitor 3ARC-RE21 trend, and check the CTMT Purge Exhaust Fans running.

B. Check the RPCCW Radiation Monitor 3CCP-RE31 trend, and check the CTMT Purge Exhaust Fans running.

C. Check the Condenser Air Ejector Discharge Radiation Monitor 3ARC-RE21 trend, and check the CTMT Vacuum Pumps running.

D. Check the RPCCW Radiation Monitor 3CCP-RE31 trend, and check the CTMT Vacuum Pumps running.

Proposed Answer: C

Explanation (Optional): "C" is correct since both the Condenser Air Ejectors and the CTMT Vacuum Pumps discharge to Gaseous Waste, which goes to the Millstone Stack. "A" and "B" are wrong, since the Containment Purge System exhausts to the Turbine Bldg stack, but plausible since it draws on CTMT, as does the CTMT vacuum pumps. "B" and "D" are wrong, since RPCCW is monitored by CCP-RE31, which is not alarming. "B" and "D" are plausible, since RPCCW overflows to the Aux Bldg, which is drawn on by SLCRS.

Technical Reference(s): AOP 3573, Attachment A, Page 10 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04763 Describe the operation of the HVC/HVK systems under the following...High radiation detected by HVC*RE16A or B... (As available)

Question Source: Bank # 78805

Question History: 2004 Millstone 3 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41.8, 41.10, 41.11, and 41.12
55.43.4

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 73	Tier #	3	3
Knowledge of the basis for prioritizing emergency	Group #	4	4
procedure implementation during emergency operations	K/A #	GEN.2.4.23	
	Importance Rating	2.8	3.8

Proposed Question:

The reactor has tripped, Safety Injection has actuated, and the crew is checking status trees prior to transitioning out of E-0 *Reactor Trip or Safety Injection*.

Why are the status tree-based transitions to FR Procedure prioritized as they are?

A. They are prioritized to allow diagnosis based on the indications most representative of the accident in progress.

B. They are prioritized based on which fission product barrier(s) is (are) being challenged.

C. They are prioritized based on the probability of the event occurring.

D. They are prioritized based on protecting the CTMT Barrier, when the likelihood for saving the other barriers has been lost.

Proposed Answer: B

Explanation (Optional): "B" is correct, and "A", "C", and "D" wrong, since FR-S, C, H, and P protecting the clad. H and P protecting the RCS, and Z protecting containment. FR-I is a yellow-path-only subset of FR-C. "A" is plausible since this is the basis for prioritizing the E1, E-2, and E-3 Emergency Response Guidelines. "C" is plausible, since this is the basis for which Optimal Recovery Guidelines were developed (10^{-8} events per reactor-year). "D" is plausible, since this is the philosophy behind the transition to SAMGs (Clad temperature above 1200°F, and actions of FR-C.1 have been ineffective).

Technical Reference(s): WOG ERG Executive Volume, Description of ERG Development Program, page 15, 20, 21, and Figure 2. (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04927 List the 6 CSFS in order of priority, & explain the basis for this prioritization. (As available)

Question Source: New

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: *55.41.10*

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 74	Tier #	3	3
Knowledge of fire protection procedures	Group #	4	4
	K/A #	GEN.2.4.25	
	Importance Rating	2.9	3.4

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

1. An Incipient Fire Detection (IFD) Cable Spreading Area Priority 1 "Fire" alarm is received in the Control Room.
2. A PEO is dispatched to investigate the alarm.
3. The PEO tours the Cable Spreading area, and reports that there are no visual indications of fire or smoke, and no discernable fire-related smells in the area.

What action is the crew required to take with this fire alarm?

A. Enter EOP 3509 *Fire Emergency*, and continue to EOP 3509.1 *Control Room Cable Spreading Area or Instrument Rack Room Area Fire.*

B. Lockout CO_2 to the Cable Spreading Area by placing one of the Cable Spreading Area 3-Position Keylock Switches in "Abort", and closing the Cable Spreading Area CO_2 Ball Valve.

C. Request the Fire Brigade Duty Captain to investigate the cause of the alarm, since the IFD system may be providing a valid alarm even with no other discernable effects present.

D. Request I&C to reset the faulted zone module; and after the alarm is reset, restore the affected portion of the Fire Protection System to service.

Proposed Answer: C

Explanation (Optional): "C" is correct, and "D" wrong, since the IFD system is highly sensitive, and may be providing an valid alarm, even with no other discernable indication of a fire "A" is wrong, since EOP 3509 transitions back to normal plant evolutions if confirmation if a fire is not received. "B" is wrong since the Cable Spreading automatic CO_2 actuation feature is normally locked out. "A" is plausible, since a fire alarm has been received. "B" is plausible since this is the method to lockout CO_2, and "D" is plausible, since a fire alarm has been received with no local indication of a fire.

Technical Reference(s): OP 3341D, step 4.4.1 (Attach if not previously provided)
EOP 3509, step 2

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04599 Describe the major administrative or procedural precaution and limitations placed on the operation of the fire protection detection and control system. (As available)

Question Source: Bank #69484

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 # 75	Tier #	3	3
Ability to diagnose and recognize trends using reference material	Group #	4	4
	K/A #	GEN.2.4.47	
	Importance Rating	3.4	3.7

Proposed Question:

Initial Plant Conditions:

- The plant is at 100% power at EOL.
- AFD is at the Target Flux Difference.
- Bank D rods are at 225 steps.
- All controllers are in automatic.

A transient occurs, and numerous annunciators are received, including:

- TAVE/TREF DEVIATION

The RO reports AFD is now "-7.00".

Using the AFD vs. Thermal Power (RE-G-01) curve attached to this exam, what event has occurred?

A. The controlling turbine first stage pressure transmitter has failed high.

B. An NIS power range upper detector has failed low.

C. A Makeup System pot setting error has resulted in a boration.

D. A control rod has partially dropped into the core.

Proposed Answer: D

Explanation (Optional): "A" and "C" are wrong, since AFD has moved negative, since its initial target value was –3.06. "D" is correct, and "B" wrong, since Tave/Tref error indicates reactivity has also been added to the core. "A" is plausible since first stage pressure failure affects Tref, and also inputs to rod control, but failing high will cause a "Rods out" signal, and rods won't move in AUTO above the C-11 setpoint of 223 steps. "B" is plausible since NIS upper failure would cause a change in AFD. "C" is plausible, since a boration would change Tave.

Technical Reference(s): FSAR Section 15.4.3.1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: AFD Vs. Power curve RE-G-01

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

Question Source: Modified Bank #73084 Parent Question Attached

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 76	Tier #		1
Ability to determine or interpret consequences	Group #		1
Of managing a LOCA with a loss of CCW	K/A #	EPE.011.EA2.03	
	Importance Rating		4.2

Proposed Question:

An earthquake occurs, resulting in a loss of all RPCCW pumps and a LOCA. Current conditions are as follows:

- The crew has just entered ES-1.2 *Post LOCA Cooldown and Depressurization.*
- RCS pressure is 650 psia and stable.
- Containment pressure is 17 psia and lowering.
- No RCPs are running.
- No RPCCW pumps are running.
- Technical Support is investigating options for local RPCCW pump breaker operation.

Assuming an RPCCW pump **CANNOT** be started, which potential future action would the crew still be able to perform?

A. Startup Spent Fuel Pool Cooling per ES-1.2, step 3 "Check Electrical Alignment", using GA-5 "Spent Fuel Pool Cooling System Startup".

B. Start the "B" RCP per ES-1.2, step 12 "Check If RCP(s) Should Be Started", using GA-6 "Starting Reactor Coolant Pump".

C. Place a Residual Heat Removal pump in service per ES-1.2, step 29 "Check if RHR System Can Be Placed In Service".

D. Transfer to Cold Leg Recirculation per ES-1.3, step 3 "Align RHR and Recirc Spray Systems For Cold Leg Recirculation".

Proposed Answer: D

Explanation (Optional): "D" is correct, since cooling for cold leg recirculation is provided by service water, and no operations are performed on the RPCCW system during the swap over to cold leg recirculation. "A" is wrong, since RPCCW provides cooling to the spent fuel pool cooling heat exchangers. "B" is wrong, since GA-6 requires RPCCW in order to start an RCP. "C" is wrong, since ES-1.2 step 29 places RHR in service in the cooldown mode, which uses RPCCW for cooling.

Technical Reference(s): ES-1.3 step 3. (Attach if not previously provided)
ES-1.2, steps 3.f. RNO, 12.d, and 29.
GA-5, step 3 and 4.
GA-6, step 1.

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04155 Given the following failures, partial or complete, determine the effects on the Reactor Plant Component Cooling System and on interrelated systems... (As available)

Question Source: Bank #78842

Question History: 2004 Millstone 3 NRC Exam

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 77	Tier #		1
Loss of Component Cooling Water: Knowledge of	Group #		1
limiting conditions for operation and safety limits.	K/A #	APE.026.GEN.2.2.22	
Proposed Question:	Importance Rating		4.1

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

1. A PEO reports finding a manual valve on the "A" Train RPCCW System CLOSED, that he thinks should be OPEN.
2. The SM determines that the valve is in the wrong position, and that the valve supplies safety –related equipment.
3. The STA looks at the surveillance history of the RPCCW System, and discovers that the last scheduled monthly surveillance on the RPCCW System, scheduled for 6 days ago, was inadvertently missed.
4. The STA reports that the surveillance was last performed 36 days ago.
5. The crew has not repositioned the valve to the required position.

Using LCO/Surveillance Requirement 3/4.7.3 (RPCCW), attached to the back of this exam, how is the crew required to implement the RPCCW System LCO prior to repositioning the valve?

A. The crew can delay logging into the ACTION for LCO 3.7.3 (RPCCW) for up to 24 hours while repositioning the valve and completing the surveillance.

B. The crew must immediately open the valve, and then they can delay logging into the ACTION for LCO 3.7.3 (RPCCW) as long as they complete the surveillance within the next 2.75 days.

C. The crew must log into the ACTION for LCO 3.7.3 (RPCCW), and restore "A" Train RPCCW to OPERABLE within 72 hours or be in COLD SHUTDOWN within the following 30 hours.

D. The crew must initiate action within 1 hour to place the unit in HOT STANDBY within the next 6 hours, and HOT SHUTDOWN within the following 6 hours, and COLD SHUTDOWN within the subsequent 24 hours.

Proposed Answer: C

Explanation (Optional): "A" and "B" are wrong, since Surveillance Requirement 4.0.1 states failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. "A" and "B" are plausible, since 4.0.2 allows a 25% time extension of the specified time interval to complete a surveillance (38.75 days for a monthly surveillance), and 4.0.3 allows 24 hours, or up to the limit of the specified surveillance interval, whichever is greater, to complete the surveillance if missed. "C" is correct, since this is the ACTION required per LCO 3.7.3, and this is surveiled per 4.7.3 by verifying each valve servicing safety related equipment that is not locked, sealed, or otherwise secured in position is in its correct position. "D" is wrong, since the valve affects the "A" Train only, so the LCO can be "met" via reliance on the ACTION STATEMENT. "D" is plausible, since this is the ACTION required if the LCO cannot be met by reliance on the ACTION STATEMENT, and both a valve out of position and an inadvertently missed surveillance condition exists.

Technical Reference(s): Tech Spec 3/4.7.3 (Attach if not previously provided)
Tech Specs 3.0.3, 4.0.1, 4.0.2 and 4.0.3

Proposed references to be provided to applicants during examination: Tech Spec 3/4.7.3

Learning Objective: MC-04156 Given a plant condition or equipment malfunction, use provide reference material to... Evaluate Technical Specification applicability and determine required actions. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.2

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 78	Tier #		1
Ability to determine or interpret the existence of a	Group #		1
S/G tube rupture and its potential consequences	K/A #	EPE.038.EA2.02	
	Importance Rating		4.8

Proposed Question:
The plant is at 100% power and the following conditions exist:

- All Pressurizer heaters are energized.
- Charging Flow Controller 3CHS*FK121 output has increased, causing Charging Flow Control Valve 3CHS*FCV121 to throttle open.
- RCS pressure is decreasing.
- No operator action has been taken.

What event is in progress, and what is a potential consequence that may occur within the first hour of this event if operators fail to take required actions?

A. A Pressurizer Spray Valve has failed open. Safety Injection may actuate, which can result in the PRT rupture disk failing, resulting in increased CTMT radiation levels.

B. A Pressurizer Spray Valve has failed open. Pressurizer overfill may occur, which can result in water relief through the Pressurizer Safety Valves, resulting in Safety Valve failure.

C. A Steam Generator Tube has ruptured. SG overfill may occur, which can result in increased radiation release to the environment due to water being passed though the SG safety valves.

D. A Steam Generator Tube has ruptured. Core uncovery may occur, which can result in fuel clad temperatures exceeding 2200°F.

Proposed Answer: C
Explanation (Optional): "A" and "B" are wrong, since Charging Flow Controller output has increased. If a spray valve failed open, RCS pressure would decrease, and Charging flow would increase a little, causing Pressurizer level to increase, resulting in flow controller output to decrease. "A" and "B" are plausible, since heaters have energized, indicating a drop in RCS pressure. Also, both consequences could occur if prompt operator action were not taken. "C" is correct, since FSAR operator credited action time is designed to prevent SG overfill. "D" is wrong, since ECCS flow and RWST inventory is adequate to keep the core covered for longer than an hour during a SGTR. "D" is plausible, since a SGTR is in progress, and RCS inventory is decreasing.
Technical Reference(s): FSAR, Chapter 15.6.3, pages 15.6-5 and 15.6-8 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None
Learning Objective: MC-04922 Describe the radiological consequence3s of the limiting event analyzed as a SGTR. (As available)
Question Source: New
Question Cognitive Level: Comprehension or Analysis
10 CFR Part 55 Content: 55.43.5
Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 79	Tier #		1
Knowledge of bases in technical specifications for	Group #		1
limiting conditions for operations and safety limits.	K/A #	EPE.055.GEN.2.2.25	
	Importance Rating		3.7

Proposed Question:
The crew is preparing to remove the "B" Emergency Diesel Generator from service, and plans on extending the allowed outage time (AOT) from 72 hours to 14 days to allow adequate time to complete the scheduled maintenance.

According to the Bases section of Technical Specifications, which of the below conditions would be acceptable when relying on this extended AOT?

A. Inclement weather conditions are predicted to arrive in 4 days.

B. The SBO Diesel was last verified to be available by test performance 15 days ago.

C. The "B" Charging Pump and CCE Pump are in operation, and the "A" *Charging Pump and CCE pump are* available, but the swing Charging Pump is tagged OOS.

D. Elective maintenance that could challenge offsite power availability has been scheduled for the switchyard in 3 days. The maintenance will be closely monitored and controlled.

Proposed Answer: B

Explanation (Optional): "B" is correct, since the SBO diesel must be verified available by test performance within 30 days prior to allowing the EDG to be INOP for greater than 72 hours. "A" is wrong, since extended EDG outage shall not be scheduled with inclement weather is predicted. "A" is plausible since the predicted weather is not severe, and is not actually present. "C" is wrong, since the swing charging pump must be available. "C" is plausible, since the charging pump aligned to the operable EDG is available. "D" is wrong, since elective maintenance is not allowed in the switchyard. "D" is plausible since the proposed maintenance will be closely monitored and controlled. This is a requirement for any activity in the switchyard during an extended EDG outage.

Technical Reference(s): *Tech Spec Bases, page B 3/4 8-1b* *(Attach if not previously provided)*

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04401 Describe the major administrative or procedural precautions and limitations placed on the operation of the Emergency Diesel Generator System (including Support Systems), and the basis for each. (As available)

Question Source: New

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43.2

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 80	Tier #		1
Knowledge of Loss of Instrument Air Abnormal	Group #		1
Operating Procedures	K/A #	APE.065.GEN.2.4.11	
Proposed Question:	Importance Rating		3.6

With the plant initially at 100% power, instrument air pressure starts rapidly decreasing, and the following sequence of events occurs:

1. The crew enters AOP 3562 *Loss of Instrument Air*.
2. The crew trips the reactor.
3. Instrument air pressure reaches zero psig.
4. The crew enters ES-0.1 *Reactor Trip Response*.
5. The US is directing actions per ES-0.1, while the extra SRO is looking ahead to determine which AOP 3562 steps are needed to help mitigate the loss of air.

The US is commencing ES-0.1, step 4, "Check PZR Level Control", and the extra SRO recommends performing all alignments per AOP 3562, step 4, "Verify Letdown In Service" and 5. "Monitor VCT Level -- NORMAL" to assist in mitigating the effects of the loss of air.

How will the crew align charging and letdown per AOP 3562 in this post trip condition?

	Letdown	Charging Pump Suction	Charging Header Path Via 3CHS*MV8105 and 8106
A.	Head Vent Letdown to PRT	Aligned to the VCT	In Service
B.	Head Vent Letdown to PRT	Aligned to the RWST	Isolated
C.	Head Vent Letdown to VCT	Aligned to the VCT	Isolated
D.	Head Vent Letdown to VCT	Aligned to the RWST	In Service

Proposed Answer: B

Explanation (Optional): On a loss of air, Letdown isolates, Charging Header Flow Control Valve 3CHS*FCV121 fails open, and makeup capabilities to the VCT are lost. As a result, AOP 3562 aligns head vent letdown, which is directed to the PRT ("C" and "D" wrong) since the charging header is isolated ("A" and "D" wrong) due to the failing open of FCV121, which, coupled with the loss of letdown, would quickly create an excessive RCS inventory concern. Also, since the VCT makeup valves have failed closed, the crew will align charging pump suction to the RWST ("B" correct, "A" and "C" wrong). The other answers are plausible, since the normal post-trip per ES-0.1 lineup is suction from the VCT, and Charging path aligned. Head vent letdown to the VCT is plausible since this path is aligned per ES-0.1 if letdown can not be placed in service (without a loss of air in progress).

Technical Reference(s): AOP 3562, steps 4 and 5. (Attach if not previously provided)
ES-0.1, step 4.

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-07008 The crew will demonstrate the ability to safely operate the plant during a loss of instrument air and use AOP 3562 in parallel with other procedures to successfully stabilize plant parameters. (As available)

Question Source: New

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
Adherence to appropriate procedures and operations within	Group #		1
limitations during a loss of Emergency Coolant Recirculation	K/A #	EPE.W/E11.EA2.2	
	Importance Rating		4.2

Proposed Question:

A LOCA outside Containment is in progress, and the following sequence of events has occurred:

1. The crew enters ECA-1.1 *Loss of Containment Recirculation.*
2. The crew has reduced ECCS flow to 1 train running in order to minimize the loss of RWST inventory.
3. Due to having only 40°F subcooling, the operators cannot meet the conditions to terminate SI altogether.
4. The operators have determined the minimum ECCS flow necessary to remove decay heat.

How will this minimum ECCS flow rate be established?

A. Keep one charging pump running, and operate charging and/or SI pumps as necessary.

B. Operate the SI and/or RHR pumps as necessary.

C. Maintain the single train of ECCS running, and depressurize the RCS to decrease subcooling.

D. Establish normal charging and operate any of the ECCS pumps to maintain the required flow.

Proposed Answer: A

Explanation (Optional): Step 22 of ECA-1.1 had the operators manually stop ECCS pumps to establish a maximum of one CHS, one SI, and one RHR pump running. Step 25 of ECA-1.1 has the operators evaluate if SI can be terminated. Since inadequate subcooling exists, 25.b RNO has the operators determine the minimum ECCS flow required using Att. "A" of the procedure. Once the minimum flow is determined step 25.b RNO has the operators "Start or stop CHS and/or SI pumps as necessary to establish flow..." Per the note prior to step 25, one charging pump is kept running to maintain seal injection ("A" correct and "B" wrong). "C" is wrong, but plausible since this action is taken in step 31 only if adequate subcooling exists. "D" is wrong, but plausible since normal charging is established if conditions to terminate SI are met.

Technical Reference(s): ECA-1.1, steps 22 to 31 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03871 describe the major action categories within EOP 35 ECA-1.1. (As available)

Question Source: Bank #71075

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
Ability to determine and interpret an uncontrolled rod withdrawal, from available indications	Group #		2
	K/A #	APE.001.AA2.05	
	Importance Rating		4.6

Proposed Question:

Initial Conditions:

- Reactor Power: 95%
- Time in core life: EOL
- Tave: 585°F

A plant transient occurs and the RO reports the following trends:

- Reactor Power: Increased to 98% power and now almost stable at 98%.
- Tave: 588°F and increasing.
- MWe: Increasing

What event is in progress?

A. An uncontrolled rod withdrawal is occurring.

B. Extraction Steam has isolated to the first point Feedwater heaters.

C. The low pressure Feed Heater string bypass valve has failed open.

D. A steam line break is in progress.

Proposed Answer: A

Explanation (Optional): "A" is correct, since MWe are changing in the same direction as Tave. This is indicative of a primary-plant-induced reactivity addition event. Depending on the rate of reactivity addition, MTC will terminate the power rise, and at this power level, rods are near the top with a low DRW, and at EOL, MTC is a large value. "B" and "C" are wrong, since on an efficiency loss, Tave will be fairly constant. "D" is wrong, since with a steam break, Tave would be decreasing. "B" and "C" are plausible, since reactor power will increase on a loss of efficiency. "D" is plausible, since reactor power will increase on a steam leak.

Technical Reference(s): FSAR Section 15.4.2 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03349 For given plant conditions, qualitatively state the effect of any RCS, secondary plant or reactivity induced transient in any number of the 4 plant loops on the following parameters (RCP trip, turbine trip, dropped rod, etc.): reactor power, rod position, RCS loop average temperatures (affected and non-affected loops), RCS loop delta-t (affected and non-affected loops), steam pressure (affected and non-affected loops), Pressurizer pressure, and Pressurizer level. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 83	Tier #		1
Knowledge of High RCS Activity AOP	Group #		2
	K/A #	APE.076.GEN.2.4.11	
	Importance Rating		3.6

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

1. Chemistry Department reports that, based on the latest RCS sample results, RCS activity is elevated.
2. The crew enters AOP 3553 *High Reactor Coolant System Activity*.

Current conditions are as follows:

- Purification Demineralizer Decontamination Factor: 30.
- Letdown Flow: 90 gpm.
- Letdown Filter Differential Pressure: 18 psid.
- Reactor Coolant Filter Differential Pressure: 15 psid.

In accordance with AOP 3553, which action is the crew required to take?

A. Shift the in-service Mixed Bed Purification Demineralizer.

B. Consult with a Reactor Engineer on the advisability of increasing letdown flow.

C. Remove from service, replace, and place the Letdown Filter back in service.

D. Remove from service, replace, and place the Reactor Coolant Filter back in service

Proposed Answer: B
Explanation (Optional): "B" is correct, since increasing letdown flow will increase flow through the demins and filters, increasing the removal of RCS activity sources. "A" is wrong, since purification Demin DF is required to be greater than 25, and it is. "C" is wrong, since Letdown Filter DP is required to be less than 20 psid, and it is. "D" is wrong, since Reactor Coolant Filter DP is required to be less than 20 psid, and it is. "A", "C", and "D" are plausible, since each of these actions may be required in AOP 3553, depending on plant conditions.

Technical Reference(s): AOP 3553, steps 5, 6, and 7. (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05893 Describe the basis of major procedure steps and/or sequence of steps in AOP 3553. (As available)

Question Source: New

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
Ability to determine/interpret adherence to	Group #		2
appropriate procedures as it applies to AOP 3555,	K/A #	Site Specific RCS Leak.A2	
Reactor Coolant Leak.	Importance Rating		N/A

Proposed Question:
Initial Conditions:

- The plant is at 100% power.
- The crew has entered AOP 3555, *Reactor Coolant Leak*.
- The RO has throttled open 3CHS*FCV121 and stabilized pressurizer level on program.
- The STA estimates RCS leak rate to be approximately 25 gpm.

The following sequence of events occurs:

1. The US chooses to implement AOP 3555 step 9 "Isolate Charging and Letdown", and directs the RO to isolate letdown while supplying seal injection using OP 3304A *Charging and Letdown*.
2. The RO simultaneously closes 3CHS*FCV121 and Letdown Orifice Isolation Valve 3CHS*AV8149B, and then closes Charging Isolation Valve 3CHS*MV8106.
3. The RO reports that pressurizer level is now decreasing at a very slow rate.

What action is the crew required to take?

A. Keep normal Charging and Letdown isolated, and establish Head Vent Letdown to the VCT using GA-14.
B. Keep normal Charging and Letdown isolated, and verify the RPCCW System is intact by verifying RPCCW Surge Tank level is stable.
C. Establish normal charging and letdown by throttling 3CHS*FCV121 in MANUAL, and simultaneously OPENING Charging Isolation Valve 3CHS*MV8106 and Letdown Orifice Isolation Valve 3CHS*AV8149B.
D. CLOSE Charging Loop Isolation Valves 3CHS*AV8146 and 8147, Letdown Header Inner CTMT Isolation Valve 3CHS*CV8160, and Letdown Isolation Valve 3 RCS*LCV460, to attempt to isolate the leak.

Proposed Answer: D
Explanation (Optional): "D" is correct, since the leak is still active, as evidenced by pressurizer level decreasing at a slow rate. If the leak were isolated, PZR level would be increasing, since seal injection is still being supplied; and AOP 3555 directs expanding the isolation boundary of Charging and Letdown to continue attempts to isolate the leak. "A" and "B" are wrong, since Charging and Letdown would not be kept isolated unless the leak was isolated. "A" is plausible since these actions are specified in AOP 3555 if the leak was isolated. "B" is plausible, since RPCCW is the next leak isolation step in AOP 3555. "C" is wrong, but plausible, since charging and letdown would only be restored if the leak still exists after isolation steps specified in "D" were unsuccessful.

Technical Reference(s): AOP 3555 steps 1, 9 and 10 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06404 During all operations the US will evaluate plant performance and make operational judgments to ensure that the plant operates within the Technical Specifications (As available)

Question Source: New

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
Ability to determine / interpret Instrument Failure	Group #		2
AOP procedure adherence.	K/A #	Site Specific Instrument Failure.A2	
	Importance Rating		N/A

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

1. NIS power range channel N-41 fails low.
2. The crew enters AOP 3571 *Instrument Failure Response.*
3. The US directs the RO to remove channel N-41 from input to the AFD and QPTR monitor alarms for computer program 3R5.
4. The RO completes this step 45 minutes after the instrument initially failed.

Now that the RO's actions are completed, what additional action (s), if any, is/are the US required to direct, and why?

A. The US is required to implement AFD monitoring since the AFD Monitor Alarm is considered INOPERABLE. The US is also required to implement QPTR surveillances since the QPTR Monitor Alarm is considered INOPERABLE.

B. The US is required to implement AFD monitoring since the AFD Monitor Alarm is considered INOPERABLE. The US is NOT required to implement QPTR surveillances since the QPTR Monitor Alarm is considered OPERABLE.

C. The US is NOT required to implement AFD monitoring since the AFD Monitor Alarm is considered OPERABLE. The US is required to implement QPTR surveillances since the QPTR Monitor Alarm is considered INOPERABLE.

D. The US is NOT required to implement AFD monitoring since the AFD Monitor Alarm is considered OPERABLE. The US is NOT required to implement QPTR surveillances since the QPTR Monitor Alarm is considered OPERABLE.

Proposed Answer: C

Explanation (Optional): The AOP actions have removed the affected input from the AFD program, which restores the AFD Monitor Alarm to OPERABLE, so AFD monitoring is not required ("A" and "B" wrong). The AOP actions have also removed the affected input from the QPTR program, but this does not restore OPERABILITY to the QPTR Monitor Alarm ("C" correct and "D" wrong). "A" and "B" are plausible, since the AFD alarm would be considered INOPERABLE if the RO had taken longer than one hour to complete the AOP 3571 step. "B" and "D" are plausible, since the RO has taken action to remove the failed channel from the QPTR alarm program.

Technical Reference(s): AOP 3571, Attachment D, steps 6 and 7 (Attach if not previously provided)
Surveillances 4.2.1.1.1.b and 4.2.4.1.b

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03976 Describe the major action categories contained within AOP3571 (As available)

Question Source: New

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43.2 and 43.55

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 86	Tier #		2
Reactor Coolant Pump: Ability to perform specific system and integrated plant procedures during all modes of plant operation	Group #		1
	K/A #	003.GEN.2.1.23	
	Importance Rating		4.0

Proposed Question:

PLANT CONDITIONS:

- A plant heatup is in progress after a refueling outage per OP 3201 *Plant Heatup*.
- Both RHR pumps are aligned to the safety injection mode.
- RCS temperature is currently 235°F.
- COPPS is not armed.
- The crew desires to heatup at the administrative heatup rate limit.

Assuming each running RCP will heat up the RCS at 18°F per hour, how many RCPs will the crew have running?

A. One

B. Two

C. Three

D. Four

Proposed Answer: D

Explanation (Optional): The "B" RCP was started when RCS temperature was below 160°F per step 4.2.8 and 4.2.9. The crew is at step 4.4.3 of OP 3201, since temperature is >230°F and COPPS has been blocked. Additional RCPs are started per step 4.4.4 not to exceed the administrative limit of 75°F/hr. Four RCPs will heat up the RCS at 72°F, which is below the admin limit of 75°F/hr ("D" correct, "A", "B" and "C" wrong). "A" is plausible, since if temperature was below 230°F, a maximum of one running RCP would be allowed. "B" is plausible since heatup rate is limited to 40°F/hr with temperature with RCS temperature <160°F. "C" is plausible, since RCS heatup/cooldown limits differ based on RCS temperature.

Technical Reference(s): OP 3201, steps 4.2.8, 4.2.9, 4.4.3, and 4.4.4. (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06404 During all operations the US will evaluate plant performance and make operational judgments to ensure that the plant operates within the Technical Specifications (As available)

Question Source: Bank #78761

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 87	Tier #		2
Predict impact and use procedures to mitigate consequences of failure modes for pressure, flow, motor amps, motor temperature, and tank level instrumentation.	Group #		1
	K/A #	005.A2.01	
	Importance Rating		2.9

Proposed Question:
Initial Conditions:

- The RCS is at 180°F. 360 psia.
- There is a bubble in the Pressurizer.
- The "B" RCP is in service.
- The "A" RHR pump is in service.
- The "B" RHR pump is tagged out for breaker repairs.
- All S/Gs are at 45% NR level.
- All other plant equipment is available.

The following sequence of events occurs:

1. The RHR PUMP A MOTOR TEMP HI annunciator comes in on MB3C.
2. The RO reports that the alarm is confirmed by both RTDs (computer points) indicating above the alarm setpoint of 120°C.

What action is the crew required to take?

A. Leave the "A" RHR Pump running to provide decay heat removal. Open both PORVs .

B. Trip the "A" RHR Pump, enter EOP 3505 *Loss of Shutdown Cooling and/or RCS Inventory*, open both PORVs and feed the RCS using one charging pump from the RWST.

C. Trip the "A" RHR Pump, enter EOP 3505 *Loss of Shutdown Cooling and/or RCS Inventory*, stop the "B" RCP and establish Natural Circulation cooling.

D. Trip the "A" RHR Pump, enter EOP 3505 *Loss of Shutdown Cooling and/or RCS Inventory*, and establish forced circulation cooling using the "B" RCP.

Proposed Answer: D
Explanation (Optional): "A" is wrong, since the ARP directs the crew to trip the running RHR pump and enter EOP 3505. "A" is plausible, since Mode 5, non RIO conditions dictates use of Att "B" of 3505. "D" is correct since steps 9 and 10 use the running RCP for cooling, and go to step 16 to attempt to restore RHR cooling. "B" is wrong, but plausible since Feed & Bleed using CHS pump is attempted after Forced circ (steps 9 & 10) and Natural circ (steps 11 & 12) attempts are unsuccessful. "C" is wrong, but plausible since step 9 will stop RCPs in excess of one, but will leave one running as long as RCP seal conditions are satisfactory.

Technical Reference(s): EOP 3505, Att. "B", steps 9-12 (Attach if not previously provided)
OP 3353.MB2C, 2-7A

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04351Describe major action categories within EOP 3505, Loss of Shutdown Cooling and/or RCS Inventory (As available)

Question Source: Modified Bank #78102 Parent Question Attached

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Examination Outline Cross-reference:	Level	RO	SRO
Question # 88	Tier #		2
Ability to predict impact/mitigate faulty bistable operation on RPS	Group #		1
	K/A #	012.A2.01	
	Importance Rating		3.6

Proposed Question:

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

1. The CONTAINMENT PRESSURE HI-1 Annunciator comes in on MB2.
2. The RO reports all CTMT pressure instruments indicate normal.
3. The RO reports that only one CTMT PRESS HI-1 Bistable is lit on MB2.
4. The crew enters AOP 3571 *Instrument Failure Response.*
5. The US is at AOP 3571, Attachment R, step 1.d, which has the operators attempt to distinguish whether the failure is within SSPS or at the protection channel.
6. The extra operator reports that the red GENERAL WARNING lamp on 3RPS*RAKLOGB is lit.
7. The extra operator also reports that the Train B SSPS "Multiplexer Test" switch is in NORMAL at 3RPS*RAKLOGB.

Is the US required to direct an operator to place the Train A SSPS "Multiplexer Test" switch in "A+B"? Why or why not?

A. Yes, since if this causes the affected bistable light to start flashing, I&C will need to troubleshoot SSPS prior to tripping the RPS Bistable.

B. Yes, since if this causes the affected bistable light to start flashing, I&C will NOT need to troubleshoot SSPS prior to tripping the RPS Bistable.

C. No, since this step is only required if an associated instrument has also failed.

D. No, since this step will result in a reactor trip with the plant in this configuration.

Proposed Answer: D

Explanation (Optional): This question tests a recent change to AOP 3571. "D" is correct, since with a GENERAL WARNING on train B, taking this switch to "A + B" will mean both trains of SSPS are not in a normal lineup, and a reactor trip will occur. "A" is wrong, but plausible, since this would be the correct answer if the opposite train GENERAL WARNING light was not illuminated. "B" is wrong, but plausible, since this would be the correct answer if the opposite train GENERAL WARNING light was not illuminated and the bistable light did not start flashing. "C" is wrong, but plausible, since this is a misapplication of step 1.d, which only requires the step to be performed if the bistable is tripped and the cannel indications are normal.

Technical Reference(s): AOP 3571, Attachment R. (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03976 Describe the major action categories contained within AOP 3571 (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 89	Tier #		2
Evaluate AC Electrical Distribution System performance	Group #		1
and make operational judgments	K/A #	062.GEN.2.1.7	
	Importance Rating		4.4

Proposed Question:

With the plant at 80% power, the following annunciators are received on MB8:

- BUS 34C UNDERVOLTAGE
- BUS 34D UNDERVOLTAGE
- 4KV BUS LOSS OF RESERVE POWER

The BOP operator reports Bus 34C and 34D bus voltages are stable at 3700 volts.

Assuming voltage conditions do not change, what will be the status of busses 34C and 34D one minute after the bus undervoltage annunciators came in, and what procedurally directed action may help mitigate the event?

A. 34C and 34D are still energized from the NSST, and the US is required to notify CONVEX and request that they attempt to raise system voltage.

B. 34C and 34D are still energized from the NSST, and the US will direct the BOP operator to swap redundant equipment between 34C and 34D.

C. 34C and 34D are energized from the RSST, and the US is required to enter E-0 *Reactor Trip or Safety Injection.*

D. 34C and 34D are energized from the EDGs, and the US is required to enter E-0 *Reactor Trip or Safety Injection.*

Proposed Answer: A

Explanation (Optional): If this condition exists for less than 4.5 minutes without a SIS or CDA present, the crew is directed to take one or more of the following actions: Raise main generator output voltage or reactive load, reduce 34C(D) loads by starting redundant equipment on the opposite train bus ("B" is plausible), and/or request CONVEX to raise system voltage ("A" is correct). "B" is wrong, since the cause of the low voltage on 34C and D is low supply voltage from offsite power, making the swapping of loads ineffective. "C" and "D" are wrong, but plausible since with an SIS or CDA signal present, the transfer to the RSST or EDG occurs without the 4.5-minute time delay, but with no SIS or CDA signal present, the undervoltage condition must exist for > 4.5 minutes before the Tie Breaker trips, the EDG starts and either the RSST closes in ("C" plausible), or the EDG closes in if the RSST is locked out ("D" plausible).

Technical Reference(s): OP 3353.MB8C, 3-2 and 4-3 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03337 Describe the 4kV distribution system under...LOP Sequence... MB8 Alarm Response. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 90	Tier #		2
Knowledge of which events related to Emergency Diesel operations/status should be reported to outside agencies.	Group #		1
	K/A #	064.GEN.2.4.30	
	Importance Rating		3.6

Proposed Question:
The plant is being shutdown for a refueling outage, and over the course of the week, the following events are entered into the SM log:

1. During the shutdown, a fairly large crud burst occurs, and the crew enters AOP 3553 *High Reactor Coolant System Activity*.
2. MODE 5 is reached.
3. A loss of "B" EDG starting pressure results in an unplanned "Orange" Shutdown Risk condition. Air pressure is restored after 15 minutes.
4. Three Mechanics working on a valve in Containment are contaminated.
5. An "A" Train electrical outage is commenced as part of the pre-planned schedule.
6. During the "A" Train outage, a peer-checker prevents a human performance error which, if not prevented, would have caused the "B" EDG to become INOPERABLE.

In accordance with Master Manual 14, the SM should have notified the NRC Resident of which of these events?

A. The entry into AOP 3553 *High Reactor Coolant System Activity*.

B. The unplanned "Orange" Shutdown Risk condition.

C. The contamination of the three mechanics in Containment.

D. The near-miss human performance event with the "B" EDG.

Proposed Answer: B
Explanation (Optional): "B" is correct, and "A", "C", and "D" wrong, since an unplanned entry into a SDR Orange condition is to be reported to the NRC resident, and the other events are not. "A", "C", and "D" are plausible, since AOP entry, contamination of 3 people due to a single event, and near miss human performance event all require notification of Millstone management.
Technical Reference(s): MP-14-OPS-GDL100 step 2.3.2 Table (Attach if not previously provided)
Proposed references to be provided to applicants during examination: None
Learning Objective: MC-05572 Outline the responsibilities of the Shift Manager. (As available)
Question Source: New
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
Ability to evaluate plant performance and make operational	Group #		2
judgments based on Pressurizer Level Control System	K/A #	011.GEN.2.1.7	
operating characteristics and instrument interpretation	Importance Rating		4.4

Proposed Question:
Initial Conditions:

- A plant cooldown is in progress in accordance with OP 3208 *Plant Cooldown.*
- Both trains of RHR are in service in the cooldown mode.
- Pressurizer level is stable at 55%, being maintained by 3RCS-LK459 in AUTO.
- RCS cold leg temperatures are 250°F and decreasing.
- RCS pressure is 350 psia and stable.
- PZR temperature and surge line temperature are both stable at 430°F.
- All Pressurizer heaters are energized.

The RO reports that pressurizer surge line temperature has started decreasing, indicating 420°F.

What adverse plant condition exists, and what action will the US direct?

A. Spray flow has initiated with excess ΔT across the Pressurizer spray nozzle. The US will direct the extra senior licensed operator to notify Engineering and initiate a CR.

B. Spray flow has initiated with excess ΔT across the Pressurizer spray nozzle. The US will direct the RO to deenergize pressurizer heaters to restore ΔT to within limits within 30 minutes.

C. A pressurizer insurge is in progress. The US will direct the RO to adjust 3RCS-LK459 "PZR LVL" to decrease charging flow.

D. A pressurizer insurge is in progress. The US will direct the RO to adjust 3RCS-PK131 "L/D PRES CNTL" to decrease letdown flow.

Proposed Answer: C

Explanation (Optional): In this situation, the pressurizer level control system is being used to maintain PZR level constant with spray flow adding water to the PZR at a rate greater than the net charging rate to the RCS as the RCS contracts during the cooldown. This establishes a continuous PZR outsurge, preventing a PZR insurge and the associated thermal transient. If net charging flow increases above the 35 gpm spray flow, an insurge occurs, as evidenced by the surge line temperature drop. The US must either increase letdown flow ("D" wrong, but plausible) or decrease charging flow ("C" correct). There is a 182°F temperature difference between the RCS and the PZR, which is within the 200°F spray nozzle administrative limit. "A" lists actions required if the 200°F limit is exceeded, and "B" lists the actions related to the TRM 320°F limit. ("A" and "B" wrong, but plausible).

Technical Reference(s): OP 3208, steps 4.3.30 and 4.3.31 (Attach if not previously provided)
OP 3208 basis document, steps 4.3.30 and 4.3.31
TRM 3.4.9.2.C

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03444 Describe the major action categories contained within OP 3208... (As available)

Question Source: Bank #78785

Question History: 2004 Millstone 3 NRC Exam

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 92	Tier #		2
Knowledge of Abnormal Condition Procedures related to	Group #		2
Condenser Air Removal.	K/A #	055.GEN.2.4.11	
	Importance Rating		3.6

Proposed Question:
Initial sequence of events:

1. With the plant at 50% power, CONDENSER A, B, and C VACUUM LO annunciators come in on MB6.
2. The crew enters AOP 3559 *Loss of Condenser Vacuum*.
3. The crew enters AOP 3575 *Rapid Downpower*, and commences reducing turbine load.
4. The SM directs the extra SRO to continue to direct actions in AOP 3559 while the US proceeds with the Rapid Downpower.

Current Conditions:

- Condenser Backpressure is stable at 7.0 inches Hg Absolute and stable.
- Turbine load is 500 MWe and decreasing.
- The extra SRO has just verified proper Circulating Water System operation.

Which AOP-directed action will the crew take at this point in time?

A. Check Condenser Air Removal System alignment.

B. Stop the downpower per AOP 3575 *Rapid Downpower*.

C. Trip the Turbine and enter AOP 3550 *Turbine Trip*.

D. Trip the Reactor and enter E-0 *Reactor Trip or Safety Injection*.

Proposed Answer: A
Explanation (Optional): "B" is wrong, since Condenser pressure is still above 5 inches Hg, but plausible, since pressure is stable, and this would be correct if backpressure was restored to 5 inches Hg. "C" and "D" are wrong, since tripping the reactor not required until Condenser backpressure reaches 7.5 inches Hg, or greater than 5 inches Hg with turbine load $\leq$ 360 MWe. "C" and "D" are plausible, since backpressure is elevated, and turbine load is low. AOP 3550 is also plausible, since turbine load is less than the P-9 setpoint, allowing a turbine trip without a reactor trip. "A" is correct, since the extra SRO is performing actions of AOP 3559, and no higher priority exists at the current moment in time.

Technical Reference(s): AOP 3559, steps 1-3 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03924 Discuss conditions which require use of or transition to other procedures when performing actions of AOP 3559. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 93	Tier #		2
Knowledge of Circulating Water annunciators,	Group #		2
indications, and use of response instructions.	K/A #	075.GEN.2.4.31	
	Importance Rating		3.4

Proposed Question:

A "nor'easter" is challenging plant operations, and initial conditions are as follows:

- The crew is performing actions per OP 3215 *Response to Intake Structure Degraded Conditions.*
- A downpower to 50% has been conducted.
- All Main Circulating Water Pumps are running.
- Screens are running in "FAST 2" speed.
- The TRAVEL SCRN DIFF LEVEL HI annunciator is lit on MB6.

A large mat of debris has just been driven into the intake bays, and the following sequence of events occurs:

1. Screen DPs spike up and peak at the following values:
   - "A" and "B" bays: 40 inches
   - "C" and "D" bays: 34 inches
   - "E", and "F" bays: 30 inches
2. The BOP operator reports that screen DPs are starting to trend back down.
3. The CIRC WTR PP AUTO TRIP / OVERCURRENT annunciator is received on MB6.
4. The "E" and "F" Main Circulating Water Pumps show slight oscillation of amps and increasing discharge pressure.
5. The BOP operator reports ΔT increasing across the "E" and "F" waterboxes.

What action is the US required to direct the crew to take?

A. After conditions stabilize, perform backwashes of the "E" and "F" water boxes, due to indications of fouling.

B. Open the "A" Condenser Inlet Waterbox Cross-Connect Valve, due to the automatic trip of the "B" Main Circulating Water Pump.

C. Trip the reactor and enter E-0 *Reactor Trip or Safety Injection*, due to the automatic trip of the "A" and "B" Main Circulating Water Pumps.

D. Trip the reactor and enter E-0 *Reactor Trip or Safety Injection*, due to the automatic trip of the "C" and "D" Main Circulating Water Pumps.

Proposed Answer: A

Explanation (Optional): "A" is correct, since with the screens running in FAST-2, debris may carryover and start fouling the condenser waterboxes, as indicated by increasing discharge pressure, oscillating amps, and increasing ΔT. "B" is wrong, since operators are not to open the Condenser Inlet Waterbox Cross-Connect Valve if the cause of a pump trip is high screen DP. "B" is plausible, since the "B" Circ pump is the cause of the CIRC PUMP TRIP annunciator, and the normal action for a tripped circ pump is to open the Condenser Inlet Waterbox Cross-Connect Valve. "C" is wrong, since the "A" Circ Pump trip setpoint is 42 inches DP after 10 seconds, but plausible, since the "B" Circ Pump trip setpoint is 36 inches, and the required action if two circ pumps trip in the same bay is to trip the reactor. "D" is wrong, since the auto-trip setpoint for the "C" and "D" circ pumps is 36 inches, but plausible, since the setpoint for these two pumps is less than the "A" and "F" pumps, and the required action if two circ pumps trip in the same bay is to trip the reactor.

Technical Reference(s): OP 3353,MB6B, 5-4 and 5-6 (Attach if not previously provided)
OP 3215, Precaution 3.3 and step 4.8

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04284 Given a failure, partial or complete, of the main circulation water... systems, determine the effects on the system and on interrelated systems. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.4 and 41.5
55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 94	Tier #		3
Ability to locate and use procedures and directives	Group #		1
related to shift staffing and activities	K/A #	GEN.2.1.5	
	Importance Rating		3.4

Proposed Question:
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

Why isn't the PEO eligible to work the 4 hours of overtime without additional authorization?

A. The PEO would violate the maximum consecutive hours worked requirement.

B. The PEO would violate the maximum hours worked in a 24-hour period requirement.

C. The PEO would violate the maximum hours worked in a 48-hour period requirement.

D. The PEO would violate the maximum hours worked in a 7-day period requirement.

Proposed Answer: C

Explanation (Optional "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 24 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): OA 18, Section 1.1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06803 State the overtime limits for Millstone personnel. (As available)

Question Source: New

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41.10
55.43.5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 95	Tier #		3
Knowledge of less than one hour Tech Spec	Group #		1
Action Statements for a system	K/A #	GEN.2.1.11	
	Importance Rating		3.8

Proposed Question:

The plant is at 3% power with a plant startup in progress per OP 3203 *Plant Startup.*

A steam dump malfunction causes Tave to decrease to 550°F.

What Technical Specification ACTION is required?

A. Restore Tave to within its limit within 15 minutes or be in HOT STANDBY within the next 15 minutes.

B. Restore Tave to within its limit within 15 minutes or be in HOT STANDBY within the next hour.

C. Restore Tave to within its limit within 30 minutes or be in HOT STANDBY within the next 15 minutes.

D. Restore Tave to within its limit within 30 minutes or be in HOT STANDBY within the next hour.

Proposed Answer: A

Explanation (Optional): "A" is correct, since the ACTION required is to restore Tavg to within its limit within 15 minutes ("C" and "D" wrong) or be in HOT STANDBY within the next 15 minutes ("B" and "D" wrong). "C" and "D" are plausible, since 30 minutes is the time requirement for performing surveillance 4.1.1.4 with Tavg – Tref Deviation Alarm not reset. "B" and "D" are plausible since 1 hour to HOT STANDBY is the Tech Spec ACTION required if the Reactor Core Safety Limit LCO 2.1.1 is exceeded, and this also involves RCS Temperature.

Technical Reference(s): Tech Spec LCO 3.1.1.4 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-03390 Given a plant condition requiring the use of OP 3203, identify applicable Technical Specification action requirements. (As available)

Question Source: Bank #72390

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43.2

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 96	Tier #		3
Knowledge of pre- and post-maintenance operability requirements	Group #		2
	K/A #	GEN.2.2.21	
	Importance Rating		3.5

Proposed Question:

Which ONE of the following "FIN Team" maintenance activities requires Post Maintenance Testing to meet OPERABILITY requirements for a Containment Isolation Valve?

A. Removing the insulation from the valve.

B. Adjusting the packing on the valve.

C. Tightening the air-line connection to the valve operator.

D. Replacing the OPEN-Indication light socket on MB1.

Proposed Answer: B

Explanation (Optional):, An OPERABILITY surveillance is required for Intrusive Maintenance ("A", "C", and "D" wrong) [e. g. overhaul, packing adjustment ("B" is correct), limit switch adjustment, etc.] on Safety Related equipment.

Technical Reference(s): MP-20-WP-GDL40, section 1.5.5 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-07203 Given procedure RP 5, support documents, and references, perform an Operability Determination (As available)

Question Source: INPO Exam Bank

Question History: 2001 Byron Unit 1 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43.2

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 97	Tier #		3
Knowledge of the effects of core alterations on	Group #		2
core configuration	K/A #	GEN.2.2.32	
	Importance Rating		3.3

Proposed Question:

A significant administrative error occurs during fuel loading, resulting in several new fuel assemblies being placed more toward the center of the core and more "twice-burned" assemblies more toward the periphery.

Assuming K_{excess} is the same as predicted for this fuel cycle, what affect will this loading pattern error have on the plant operations?

A. When 100% power is first reached after the refueling outage, RCS loop ΔT values will be discovered to read significantly higher than expected for this fuel cycle.

B. When 100% power is first reached after the refueling outage, RCS loop ΔT values will be discovered to read significantly lower than expected for this fuel cycle.

C. When the first calorimetric is performed after the refueling outage, the PRNIs will be discovered to read significantly higher than actual power.

D. When the first calorimetric is performed after the refueling outage, the PRNIs will be discovered to read significantly lower than actual power.

Proposed Answer: D

Explanation (Optional): "A" and "B" are wrong, since Loop ΔT will not be affected by this change, since the same thermal power is being extracted from the core as a whole. "C" is wrong, and "D" correct, since the radial flux pattern should shift with the peak toward the center and less flux at the core periphery, therefore the NIs would sense less flux than before and read lower. "A" and "B" are plausible, since core configuration has been altered, and 100% loop ΔT values are cycle-dependent. "C" is plausible, since PRNIs are affected by the alteration in core configuration.

Technical Reference(s): SOER 90-3, Shearon Harris Event (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-06286 Describe how familiarity with and use of operational experience can mitigate or preclude an event. (As available)

Question Source: INPO Exam Bank

Question History: 2003 Prairie Island Unit 1 NRC Exam

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.6

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 98	Tier #		3
Ability to perform procedures to reduce excessive levels	Group #		3
of radiation and guard against personnel exposure	K/A #	GEN.2.3.10	
	Importance Rating		3.3

Proposed Question:

Current plant conditions:

- A small break LOCA has occurred 2 hours ago.
- Fuel damage has occurred.
- Radiation levels in Containment are high.

Which equipment does EOP 35 E-1 *Loss of Reactor or Secondary Coolant* have the ADTS consider running intermittently in order to lower radiation levels in CTMT, reducing offsite release rates?

A. CTMT Air Filtration Fans

B. CTMT Spray Pumps

C. Hydrogen Recombiners

D. CTMT Purge Fans

Proposed Answer: B

Explanation (Optional):
"B" is correct, and "B", "C", and "D" wrong, since GA-8 and E-1 direct the crew to consult with the ADTS to determine if CTMT spray pumps are to be run to reduce CTMT radiation levels and reduce offsite release rates. running a CTMT spray pump, which will spray down CTMT, absorbing radioactive Iodine from the CTMT atmosphere. "A" is plausible, since CAF fans will be run to reduce activity levels in CTMT in non-accident conditions. "C" is plausible since previously, the ADTS was directed to consider use of the Hydrogen Recombiners during accidents with potential fuel damage, but a change in DBA assumptions has relegated the Recombiners to SAMG space. "D" is plausible, since purging CTMT will remove radioactive air from CTMT, and E-1 has the ADTS consider use of the Purge System if Hydrogen levels are excessive.

Technical Reference(s): E-1, steps 7.c. and 22 (Attach if not previously provided)
GA-8, step 2 RNO

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-04361 Describe the major action categories within EOP 35 E-1. (As available)

Question Source: Bank #75613

Question History: 2001 Millstone 3 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43.4

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Question # 99	Tier #		3
Knowledge of annunciator response procedures	Group #		4
	K/A #	GEN.2.4.10	
	Importance Rating		3.1

Proposed Question:

With the plant at 100% power, a RCP HI RANGE LKG FLOW HI annunciator is received on MB3, and the RO reports the following indications exist for the "A" RCP:

- Over the past 3 minutes, "A" RCP #1 seal leakoff flow has increased from 2 gpm to 6.5 gpm and is now stable.
- "A" RCP Seal Water inlet temperature indicators are reading 90°F, and steady.

What action is the crew required to take?

A. Trip the reactor, stop the "A" RCP, and close its #1 Seal Leakoff Valve after the pump has been stopped for 3 minutes.

B. Transition to AOP 3554 *RCP Trip or Stopping an RCP at Power*, and initiate action to perform an immediate shutdown of the "A" RCP.

C. Commence an orderly plant shutdown and remove the "A" RCP from service within 8 hours.

D. Notify the Duty Officer and request Engineering to evaluate the "A" Reactor Coolant Pump for continued operation.

Proposed Answer: C

Explanation (Optional): "C" is correct and "A" and "B" are wrong since #1 seal leakoff flow is less than 8 gpm, #2 seal leakoff hi annunciator is not lit, and #1 seal inlet temperatures are normal. "D" is wrong since #1 seal leakoff is greater than 6 gpm. Step 7 is used, requiring the RCP to be removed from service within 8 hours. "A", "B", and "D" are plausible, since each of these actions could be correct under different severities of the number 1 seal failure.

Technical Reference(s): OP 3353.MB3B 2-10, steps 4 and 7 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: MC-05434 Explain the effects of, and describe the required actions for the following RCP seal failures: #1 Seal Failure... (As available)

Question Source: Modified Bank #74889 Parent Question Attached

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43.5

Examination Outline Cross-reference:	Level	RO	SRO
Question # 100	Tier #		3
Knowledge of Chemistry / Health Physics tasks	Group #		4
during emergencies.	K/A #	GEN.2.4.36	
	Importance Rating		2.8

Proposed Question:

- A large break LOCA occurs, resulting in the loss of all 3 fission product barriers, and the following sequence of events occurs:

1. The CRDSEO declares a GENERAL EMERGENCY, ALPHA.
2. SERO is activated.

What action is specifically assigned as the responsibility of the on-duty Health Physics Technician?

A. Review and approve all exposures in excess of 10CFR20 limits.

B. Provide Control Room habitability support, and conduct in-plant surveys.

C. Approve offsite dose-related protective action recommendations.

D. Perform the initial dose assessment using "IDA".

Proposed Answer: B

Explanation (Optional):
"B" is correct since this is the responsibility of the HP Technician, who becomes "RMT1". "A" is wrong, since for ALERT or higher classifications, EPA-400 criteria is applied for dose limits. "C" is wrong since this is initially a CRDSEO responsibility. "D" is wrong, since this is the responsibility of the Chemistry Technician. "A", "C", and "D" are plausible since each of these are dose-related E-Plan responsibilities or activities.

Technical Reference(s): MP-26-EPI-FAP01, section 1.4.5 and Att. 2 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

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: INPO Bank

Question History: 2002 Kewaunee Unit INRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43.5

Comments: