



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. With three CW pumps running and two trip, the remaining CW pump is designed to trip. The EOPs have been revised such that with AFW and /or 100% EFW flow equivalent available, the Reactor Trip Recovery Procedure is entered. Loss of MFW Recovery Procedure would have been correct prior to the EOP revision.
- B. Incorrect. With three CW pumps running and two trip, the remaining CW pump is designed to trip. Part 2 is correct.
- C. **CORRECT:** This question is from a W3 event (CR-WF3-2015-3565). With three CW pumps running and two trip, the remaining CW pump is designed to trip. Since CWP A is initially tagged out, the plant is left with zero CW pumps running. The plant is left without Main Feed Pumps due to an eventual loss of Condenser Vacuum (this info is in OP-003-003, Main Feedwater). In this event, the crew diagnosed into the Loss of Main Feedwater Recovery Procedure (OP-902-006). The EOPs have since been revised such that with AFW and /or 100% EFW flow equivalent available, the Reactor Trip Recovery Procedure (OP-902-001) is entered. The applicant must recognize that no optimal decision block has been circled in OP-902-009 Attachment 1 and entry into OP-902-001 Reactor Trip Recovery, is allowed. The guidance for this is located in OI-038-000, EOP Operations/Expectations Guidance Procedure.
- D. Incorrect. Part 1 is correct. The EOPs have been revised such that with AFW and /or 100% EFW flow equivalent available, the Reactor Trip Recovery Procedure is entered. Loss of MFW Recovery Procedure would have been correct prior to the EOP revision

Technical Reference(s): SD-CW page 18, OI-038-000 step 5.5.1 Rev. 21  
(Attach if not previously provided) OP-902-009 Appendix 1 Rev 323  
(including version/revision number) OP-003-033 Rev 328 pages 55 and 56

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 objs. 4,6,12 (As available)

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2017 RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 4,10  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. Plausible for pressurizer level to lower due to a LOCA. Plausible due to PLC output rise or lower based on pressurizer level vs program setpoint.
- B. Incorrect. Plausible for pressurizer level to lower due to a LOCA. Plausible due to PLC output rise or lower based on pressurizer level vs. program setpoint.
- C. Incorrect. Plausible based on a steam space LOCA level will rise. Plausible due to PLC output rise or lower based on pressurizer level vs. program setpoint.
- D. **CORRECT:** Based on conditions given, steam bubble has moved to the Reactor Head, therefore pressurizer level will rise. PLC output will rise to increase letdown flow to lower pressurizer level.

Technical Reference(s): TG-OP-902-002 page 144 Rev. 20  
(Attach if not previously provided) SD-PLC pages 12,13 Ref. 12  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE02 Obj. 8 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** SIAS has occurred due to pressurizer pressure being less than 1684 psia. On a SIAS, all CFC fans will operate in slow speed.
- B. Incorrect. The running CFC's will stop and restart in SLOW, and the standby fan will sequence on in SLOW. This answer is plausible if the applicant does not identify that a SIAS has occurred.
- C. Incorrect. The running CFC's will stop and restart in SLOW, and the standby fan will sequence on in SLOW. All CFC's starting in FAST speed is plausible because all CFCs swap to FAST speed following a loss of offsite power event.
- D. Incorrect. SIAS has occurred due to pressurizer pressure being less than 1684 psia. On a SIAS, all CFC fans will operate in slow speed. This answer is plausible if the applicant does not identify that CFCs swap to SLOW speed following a SIAS.

Technical Reference(s): SD-CCS page 10 Revision 9  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-CCS00 Obj. 5 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7  
55.43 \_\_\_\_\_

Comments: No comments.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000011 EK2.03	
	Importance Rating	4.3	

K/A Statement

(011EK2.03) **Large Break LOCA:** Knowledge of the relationship between (EPE 11) LARGE Break LOCA and the following systems or components. RCS.

Proposed Question: RO 4 Rev: 0

Given:

- Plant is at 100% power when a Large Break LOCA occurred
- Crew has entered OP-902-002, Loss of Coolant Accident Recovery Procedure

As RCS pressure continues to lower, the maximum pressure at which the BOP should expect Safety Injection Tanks (SIT's) to start discharging into the RCS is       (1)       psig.

As RCS pressure becomes controlled, the CRS directs the BOP to close SIT outlet valves per OP-902-009, Appendix 14 SIT Isolation and Venting. To close the SIT outlet valves per this procedure, the crew will be required to       (2)      .

- |                        |  |
|------------------------|--|
| <u>      (1)      </u> | <u>      (2)      </u>   |
| A. 670                 | Place key switch at SIT outlet valve breaker cubicle to bypass |
| B. 670                 | Reset SIAS   |
| C. 1000                | Place key switch at SIT outlet valve breaker cubicle to bypass |
| D. 1000                | Reset SIAS   |

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. Part 1 is correct. SIT outlet valves have a key switch located on its breaker that will override SIT interlocks so that the SIT outlet valve can be closed. This is not the method directed by OP-902-009, Appendix 14 SIT Isolation and Venting. The key switch method is used during a control room evacuation.
- B. **CORRECT:** Required range of SIT pressure per OP-903-001, TS Surveillance Log, is 600-670 psig. Therefore, the maximum pressure at which a SIT is expected to inject into RCS is 670 psig. OP-902-009, Appendix 14 SIT Isolation and Venting, states that the SIT outlet valve will not close unless SIAS is reset.
- C. Incorrect. Part 1 is plausible because the pressure at which OP-902-002 will refer the crew to the Appendix to isolate SITs is 1000 psig but the SITs will not start injecting to the RCS until RCS pressure lowers to 670 psig. The SIT outlet valves have a key switch located on its breaker that will override SIT interlocks so that SIT outlet valve can be closed. This is not the method directed by OP-902-009, Appendix 14 SIT Isolation and Venting. This key switch method is used during a control room evacuation.
- D. Incorrect. Part 1 is plausible because the pressure at which OP-902-002 will refer the crew to Appendix to isolate SITs is 1000 psig. Required range of SIT pressure per OP-903-001, TS Surveillance Log, is 600-670 psig. Therefore, the maximum pressure at which a SIT is expected to inject into RCS is 670 psig. Part 2 is correct.

Technical Reference(s): OP-902-002 page 46 Rev. 21  
(Attach if not previously provided) OP-903-001 page 186 Rev. 102  
(including version/revision number) OP-902-009 pages 121 Rev. 323

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 obj. 6 (As available)

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2018 NRC Exam RO-4

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 5,10  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. The CPCs (low DNBR) would not trip the Reactor because CPCs detects flow from the RCP speed sensors, which is not affected by a sheared shaft. Plausible because RCP speed is an input to the Low DNBR trip.
- B. Incorrect. Plausible if the applicant determines that the reactor will not trip due to speed sensors not able to “see” a sheared shaft event and is not aware of the purpose of the SG Low Flow Trip.
- C. **CORRECT:** The SG Low Flow Trip provides protection against an RCP sheared shaft event. It monitors RCS flow on the primary side of the SG to trip the reactor on a loss of RCP flow. This trip actuates at 19.0 PSID across the primary side of the SG. This trip is necessary because the CPC-generated DNBR protection uses RCP speed sensors for RCS flow indication and can’t “see” a loss of flow due to a sheared shaft event.
- D. Incorrect. Plausible because the OP-901-130, Reactor Coolant Pump Malfunction, requires a rapid plant downpower in accordance with OP-901-212 for high vibration, lube oil emergency and high bearing temperature.

Technical Reference(s): SD-PPS page 26 and Figure 9 Rev. 23  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 obj. 5 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 6,7  
55.43 \_\_\_\_\_

Comments: Distractor D appears to be "none of the above". Leave as is, valid distractor, only one distractor can be “reactor trip is not required”. It is last because it is the longest distractor. Change distractor "D" to reference a rapid plant downpower. Changed distractor D to reference a rapid plant downpower. **SAT.**



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Part 1 is plausible since 24% is the level that CCW makeup pumps are interlocked to start and stop. This value is also located in OP-901-510, CCW System Malfunction. Part 2 is correct.
- B. Incorrect: Part 1 is plausible since 24% is the level that CCW makeup pumps are interlocked to start and stop. This value is also located in OP-901-510, CCW System Malfunction. Part 2 is plausible because RCP upper and lower bearings are supplied with CCW.
- C. **CORRECT:** The CCW AB header isolates at 16% level. The Reactor Coolant Pumps are on the CCW AB header. OP-901-510 caution on page 15 states that "If component cooling water is lost to reactor coolant pump seals for > 10 minutes, then restoring component cooling water to reactor coolant pumps may result in seal failure". This question is comprehensive since the applicant must determine that the RCPs lose CCW when the CCW AB header isolates.
- D. Incorrect. Part 1 is correct. Part 2 is plausible because RCP upper and lower bearings are supplied with CCW.

Technical Reference(s): OP-901-510 page 5, 6, and 11 Revision 305  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO51 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 3,10  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** The in-service Pressurizer Pressure Control Channel failing high will cause the output of the Pressurizer Pressure controller to rise. This controller feeds the Pressurizer Spray controller causing its output to raise therefore opening spray valves. OP-901-120 will direct the crew to take manual control of the spray valve controller and lower output to 0% close the spray valves.
- B. Incorrect. Plausible to think that raising the output of the spray controller would cause pressurizer pressure to rise.
- C. Incorrect. Plausible because adjusting the output of the pressurizer pressure controller would adjust the spray controller but this action is not fast enough to prevent a reactor trip. Adjusting output lower on the pressure controller works to raise Pressurizer pressure.
- D. Incorrect. Plausible because adjusting the output of the pressurizer pressure controller would adjust the spray controller but this action is not fast enough to prevent the plant from tripping on low RCS pressure. Plausible to think that raising the output of the spray controller would cause pressurizer pressure to rise.

Technical Reference(s): OP-901-120 page 6 Rev. 303  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,10  
55.43 \_\_\_\_\_

Comments: Discuss - may be too close to event 2 in scenario 3. Event 2 in Scenario 3 is a pressure control channel failing low. This question is written on a pressure control channel failing high. Completely different actions. Leave as is.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect: DRTS opens the Motor-Generator Output contactors to de-energize CEDMCS. Second part is correct.
- B. Incorrect: DRTS opens the Motor-Generator Output contactors to de-energize CEDMCS. OP-902-000, Standard Post Trip Action does not direct the operator to emergency borate when all CEAs insert into the core however, OP-901-103, Emergency Boration directs the operators to initiate emergency boration in response to an uncontrolled cooldown.
- C. **CORRECT:** DRTS opens the Motor-Generator Output contactors to de-energize CEDMCS. The applicant must recognize that an uncontrolled cooldown is in progress and therefore emergency boration is required. OP-901-103, Emergency Boration directs the operators to initiate emergency boration in response to an uncontrolled cooldown.
- D. Incorrect: First part is correct. OP-902-000, Standard Post Trip Action does not direct the operator to emergency borate when all CEAs insert into the core however, OP-901-103, Emergency Boration directs the operators to initiate emergency boration in response to an uncontrolled cooldown.

Technical Reference(s): OP-901-103 pages 2,3 Rev. 5  
(Attach if not previously provided) SD-ATS page 9 Rev. 5  
(including version/revision number) OP-902-000 page 5 Rev. 17

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 1,1 (As available)

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2015 RO NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: No comments.







**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** Per OP-902-004,  $T_c < 380$  requires 1 RCP in each loop to be secured. TG-OP-902-004 states that the PT limit curve specifies that one RCP should be tripped although OP-902-004 directs the crew to secure one RCP in each loop for even flow between the loops. The reason for this step identified in the Tech Guide is to prevent a core uplift problem.
- B. Incorrect. The temperature is correct. The basis is incorrect per TG-OP-902-004; however, it is plausible that elimination of heat addition to the RCS would aid in stabilizing RCS temperature since Waterford's ADVs are not sufficient size to prevent needing to have a minimum EFW flow to aid in RCS temperature stabilization.
- C. Incorrect. The temperature is incorrect. The temperature of 230°F is the minimum temperature for three pump configuration per OP-001-002. The basis is correct per TG-OP-902-004. 230°F the wrong answer because the stem is asking "what does OP-902-004 state in the procedure."
- D. Incorrect. The temperature is incorrect. The temperature of 230°F is the minimum temperature for three pump configuration per OP-001-002. The basis is incorrect per OP-902-004; however, it is plausible that elimination of heat addition to the RCS would aid in stabilizing RCS temperature since Waterford's ADVs are not sufficient size to prevent needing to have a minimum EFW flow to aid in RCS temperature stabilization. 230°F the wrong answer because the stem is asking "what does OP-902-004 state in the procedure."

Technical Reference(s): TGOP-902-004 page 28 Rev. 308  
(Attach if not previously provided) OP-902-004 page 9 Revision 17  
(including version/revision number) OP-001-002 page 4 Rev. 28

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE04 obj. 7 (As available)

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2017 NRC RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: Since 230 is less than 380, why is C wrong? Changed the stem to what does OP-902-004 "state" in the procedure. That makes 230°F the wrong answer. Added how 230°F is the wrong answer to explanation C and D.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	054 G2.1.20	
	Importance Rating	4.6	

K/A Statement

(054) **Loss of Main Feedwater:** (G2.1.20) CONDUCT OF OPERATIONS: Ability to interpret and execute procedure steps.

Proposed Question: RO 11 Rev: 0

Given:

- The reactor is tripped due to an Inadvertent Main Steam Isolation Signal (MSIS)
- Emergency Feedwater (EFW) Pump A is danger tagged out
- An EFAS-1 and EFAS-2 have occurred

A subsequent loss of (1) would require entry into OP-902-006, Loss of Feedwater Recovery Procedure. Upon entry into OP-902-006, the crew will be required to secure (2).

- |                |                                       |
|----------------|---------------------------------------|
| <u>(1)</u>     | <u>(2)</u>                            |
| A. EFW Pump B  | all Reactor Coolant Pumps             |
| B. EFW Pump AB | all Reactor Coolant Pumps             |
| C. EFW Pump AB | one Reactor Coolant Pump in each loop |
| D. EFW Pump B  | one Reactor Coolant Pump in each loop |

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. EFW Pump AB supplies 100% capacity to the Steam Generators, therefore, the crew will not be required to enter OP-902-006 if EFW Pump AB is the only EFW Pump running. The applicant must interpret and execute the step in the Reactor Trip Recovery procedure that requires 100% feedwater flow. EFW Pump B would be a plausible answer if the applicant determines that EFW Pump B has a greater capacity than EFW Pump AB. Part 2 is correct.
- B. CORRECT:** The inadvertent MSIS in the stem eliminated FW sources from MFW pumps and the AFW pump. The EFW motor driven pumps (EFW Pumps A and B) are 50% capacity. EFW Pump AB is 100% capacity. With the loss of EFW Pump AB, the Steam Generators no longer have 100% capacity feedwater flow and no longer meet the criteria in the Reactor Trip Recovery procedure. The diagnostic flow chart will direct the crew to enter OP-902-006, Loss of Feedwater Recovery Procedure. Upon entry into OP-902-006, the crew will be directed to secure all RCPs.
- C. Incorrect. Part 1 is correct. Part 2 is plausible because the old revision of OP-902-006 had a step to secure one RCP in each loop if 100% emergency feedwater flow was available to the Steam Generators.
- D. Incorrect. EFW Pump AB supplies 100% capacity to the Steam Generators, therefore, the crew will not be required to enter OP-902-006 if EFW Pump AB is the only EFW Pump running. The applicant must determine that OP-902-006 entry is required. EFW Pump B would be a plausible answer if the applicant determines that EFW Pump B has a greater capacity than EFW Pump AB. Part 2 is plausible because the old revision of OP-902-006 had a step to secure one RCP in each loop if 100% emergency feedwater flow was available to the Steam Generators.

Technical Reference(s): OP-902-001 pages 7, 16 Rev. 16  
(Attach if not previously provided) OP-902-009 Appendix 1 Note 2  
(including version/revision number) OP-902-006 page 6 Rev. 19

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 obj 12, 16 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

**2023 NRC Exam  
RO Written Exam Worksheet**

Comments: Discuss why student might consider EFW pump B plausible (distractors A and D). EFW Pump B would be a plausible answer if the applicant determines that EFW Pump B has a greater capacity than EFW Pump AB. Added this plausibility statement to explanations for distractors A and D.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000055 EA2.01	
	Importance Rating	3.5	

K/A Statement

(055EA2.01) **Station Blackout:** Ability to determine and/or interpret the following as they apply to (EPE55) Station Blackout: Existing valve positioning.

Proposed Question: RO 12 Rev: 0

Given:

- Station Blackout has occurred
- The crew has entered OP-902-005, Station Blackout
- Loss of DC power has occurred to EFW Pump AB Turbine Governor Valve
- The control Room has dispatched the RCA watch to determine the status of EFW Pump AB

Given these conditions, MS-416, EFW Pump AB Turbine Stop Valve is in the (1) position and MS-417, EFW Pump AB Turbine Governor is in the (2) position.

	<u>(1)</u>	<u>(2)</u>
A.	open	closed
B.	open	open
C.	closed	closed
D.	closed	open

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. Part 1 is plausible because MS-416, EFW Pump AB Turbine Stop Valve, will close on the mechanical overspeed but the valve operator for this motor operated valve is still required to be taken to the closed position to reset the overspeed condition. This is necessary because MS-416 MOV has no power on the Station Blackout. Part 2 is plausible if the applicant determines that EFW Pump AB governor valve fails in the closed position and would not fail in an overspeed condition.
- B. Incorrect. Part 1 is plausible because MS-416, EFW Pump AB Turbine Stop Valve, will close on the mechanical overspeed but the valve operator for this motor operated valve is still required to be taken to the closed position to reset the overspeed condition. This is necessary because MS-416 MOV has no power on the Station Blackout. Part 2 is correct.
- C. Incorrect. Part 1 is correct. Part 2 is plausible if the applicant determines that EFW Pump AB governor valve fails in the closed position and would not fail in an overspeed condition.
- D. **CORRECT:** On a loss of the AB-DC bus, EFW Pump AB governor valve will fail to the full open position causing EFW Pump AB to trip on a mechanical overspeed. This overspeed condition would close MS-416, EFW Pump AB Turbine Stop Valve through a mechanical leakage.

Technical Reference(s): OP-902-005 page 12 Rev. 23  
(Attach if not previously provided) SD-EFW page 16 Rev. 18  
(including version/revision number) OP-901-313 page 15 Rev. 308

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-EFW00 obj. 6 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 7, 10  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. Hot Leg temperature is not meeting natural circulation (NC) criteria. Natural Circulation criteria requires both Hot Leg and Cold Leg temperature constant or lowering.
- B. Incorrect. Subcooling is <28°F, which does not meet Natural Circulation criteria of greater than or equal to 28°F.
- C. Incorrect. Th and CET temperature are greater than 10°F, which does not meet Natural Circulation criteria of less than 10°F.
- D. **CORRECT:** Steam Generator pressure is approximately equal to saturation pressure for the existing Tcold. This requirement is a contingency action for verifying Natural Circulation.

Technical Reference(s): OP-902-003 page 15 Revision 11  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE05 obj. 4 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: Delete "ONE" in stem. Add "per OP-902-003" after "flow" in stem. Deleted "ONE" in stem and added "per OP-902-003" after "flow" in stem.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. The ADV can be operated using the local handwheel and local air station upon a loss of PDP MC. The student may assume that instrument air is not available because ADV1 does in fact fail closed upon a loss of PDP MC.
- B. **CORRECT:** The ADV can be operated using the local handwheel and local air station only upon a loss of PDP MC.
- C. Incorrect. The ADV can be operated using the local handwheel and local air station only upon a loss of PDP MC. The ADV1 controller on CP-8 is plausible because the ADV's can be operated using N2 cylinders. The student may assume that the loss of PDP MC affects only the instrument air to the valve and the use of the controller on CP-1 is available due to the nitrogen cylinders. This is not the case because the N2 cylinders use the same tubing as instrument air and is a backup in case instrument air is lost.
- D. Incorrect. The ADV can be operated using the local handwheel and local air station only upon a loss of PDP MC. The student may assume that only automatic control of ADV1 is lost during a loss of PDP MC. If that were the case, this distractor would be correct.

Technical Reference(s): OP-901-312 pages 55, 75 Revision 325  
(Attach if not previously provided) OP-005-004 pages 25-27 Rev. 37  
(including version/revision number) OP-901-511 page 19 Rev. 20

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO30 obj. 3 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam \_\_\_\_\_

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 7,10  
55.43 \_\_\_\_\_

**2023 NRC Exam  
RO Written Exam Worksheet**

Comments: Discuss why student would think an ADV opening on a loss of power is plausible (distractors B and D). There are malfunctions where the ADVs fail open off and the off-normal procedures direct the crew to take manual control of the ADVs and close them (such as a failure low of the ADV setpoint or controller output failure). The student could determine that the SUPS failure affects the ADV in this manner or the student may determine that an ADV fails open to maintain cooling to a Steam Generator to prevent opening a MSSV upon an accident. Get rid of part 2 and derive the question using part 1. Got rid of part 2 and based the question on how ADV1 will be manually controlled. Changed the question from a “bank” question to a “new” question. **SAT.**

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	058 G2.1.19	
	Importance Rating	3.9	

K/A Statement

(058) **Loss of DC Power:** (G2.1.19) CONDUCT OF OPERATIONS: Ability to use available indications to evaluate system or component status.

Proposed Question: RO 15 Rev: 0

Given:

- Loss of 125 Volt TGB-DC Bus has occurred
- Crew has entered OP-901-313, Loss of a 125 Volt DC Bus

The remote operation of the feeder breakers for the (1) feeder breakers is(are) lost.

All remote manual control and automatic protection of the switchgear and associated connected components are disabled for the (2).

- |    |                |  |                |
|----|----------------|--|----------------|
|    | <u>(1)</u>     |  | <u>(2)</u>     |
| A. | 2 bus only     |  | 1 and 2 busses |
| B. | 2 bus only     |  | 2 bus only     |
| C. | 1 and 2 busses |  | 1 and 2 busses |
| D. | 1 and 2 busses |  | 2 bus only     |

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** The remote operation of the 2 bus feeder breakers are lost upon a loss of 125V TGB-DC. The 1A and 1B busses control power are fed from A and B DC Safety busses, so they are still available (designed this way to ensure RCP overcurrent protection is from a safety bus). The control power for both the 1 busses and the 2 busses are from TGB-DC. These busses will lose all indication in the control room and locally and remote/manual remote control are lost.
- B. Incorrect. Part 1 is correct. The control power for both the 1 busses and the 2 busses are from TGB-DC. These busses will lose all indication in the control room and locally and remote/manual remote control are lost.
- C. Incorrect. The remote operation of the 2 bus feeder breakers are lost upon a loss of 125V TGB-DC. The 1A and 1B busses control power are fed from A and B DC Safety busses, so they are still available (designed this way to ensure RCP overcurrent protection is from a safety bus). Part 2 is correct.
- D. Incorrect. The remote operation of the 2 bus feeder breakers are lost upon a loss of 125V TGB-DC. The 1A and 1B busses control power are fed from A and B DC Safety busses, so they are still available (designed this way to ensure RCP overcurrent protection is from a safety bus). The control power for both the 1 busses and the 2 busses are from TGB-DC. These busses will lose all indication in the control room and locally and remote/manual remote control are lost.

Technical Reference(s): OP-901-313 pages 13 and 16 Rev 308  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PP03 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7  
55.43 \_\_\_\_\_

Comments: No comments



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Plausible because 5% is from an older revision to EOPs that did not take instrument uncertainties into account.
- B. Incorrect. Plausible because 10% is when action is required for an RWSP low level.
- C. **CORRECT:** Appendix 10 of OP-902-009 states Transfer of EFW Pump suction should be completed by a CSP level of 11% to prevent cavitation of EFW pumps.
- D. Incorrect. The optimal recovery procedures and OI-038-000, EOP Expectations/Guidance procedures states that ACCW flow to EFW should not be established until the CSP contents have depleted. The lineup should commence at 25% CSP level, however, ACCW flow to the suction of EFW should be completed before a CSP level of 11% is reached to prevent cavitation of the EFW Pumps.

Technical Reference(s): OP-902-009 Appendix 10 Rev. 323  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 obj. 6 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 8,10  
55.43 \_\_\_\_\_

Comments: Add "MINIMUM" prior to CSP in stem. Added "MINIMUM" prior to CSP in the stem. Put Minimum in CAPS. Changed MIMIMUM to CAPS. SAT.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. Part 1 is correct. SI-415 does not respond automatically to SDC outlet temperature and will stay at 50% open. This failure will cause total SDC flow to rise and cause flow to bypass the SDC heat exchanger which will make RCS temperature rise.
- B. **CORRECT:** SI-129A fails OPEN on a loss of air and will fail to the full open position. OP-901-511 directs the crew to manually throttle closed SI-129A. SI-415 does not respond automatically to SDC outlet temperature and will stay at 50% open. This failure will cause total SDC flow to rise and cause flow to bypass the SDC heat exchanger which will make RCS temperature rise.
- C. Incorrect. SI-129A fails OPEN on a loss of air and will fail to the full open position. SI-415 does not respond automatically to SDC outlet temperature and will stay at 50% open. This failure will cause total SDC flow to rise and cause flow to bypass the SDC heat exchanger which will make RCS temperature rise. OP-901-511 directs the crew to manually throttle closed SI-129A.
- D. Incorrect. SI-129A fails OPEN on a loss of air and will fail to the full open position. OP-901-511 directs the crew to manually throttle closed SI-129A. Part 2 is correct.

Technical Reference(s): OP-901-511 page 6 Rev. 19  
(Attach if not previously provided) SD-SDC Pages 6,7,14,39 Rev. 9  
(including version/revision number) OP-009-008 page 58 Revision 48

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO50 obj. 3 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 7  
55.43 \_\_\_\_\_

Comments: No comments

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	077 AA2.04	
	Importance Rating	3.6	

K/A Statement

(077AA2.04) **GENERATOR VOLTAGE AND ELECTRIC Grid Disturbances:** Ability to determine and/or interpret the following as they apply to (APE 77) GENERATOR VOLTAGE AND ELECTRIC Grid Disturbances: VAR

Proposed Question: RO 18 Rev: 0

Given:

- Reactor power is 100%
- A large load connected to the grid is lost causing a grid disturbance
- MVAR load changed from 20 MVAR out to 70 MVAR in

The administrative limit for MVAR IN as defined in OP-010-004, Power Operations (1) being exceeded.

To restore MVAR load to 20 MVAR out, the crew should adjust the Main Generator voltage adjust regulator control switch to (2).

- |    |            |            |
|----|------------|------------|
|    | <u>(1)</u> | <u>(2)</u> |
| A. | is         | raise      |
| B. | is         | lower      |
| C. | is not     | raise      |
| D. | is not     | lower      |

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Part 1 is plausible because the applicant must know what the administrative limit for MVAR IN is to get this correct. Part 2 is correct.
- B. Incorrect. Part 1 is plausible because the applicant must know what the administrative limit for MVAR IN is to get this correct. Part 2 is plausible because the applicant could determine taking the Voltage Adjust Regulator Switch to Lower would make the absolute number of MVAR go from 70 to 20.
- C. **CORRECT:** In accordance with limitation 3.2.16 and step 9.8.1.9.1 in OP-010-004, Power Operations, the administrative limit for MVAR in is 75 MVAR. To raise MVARs (Less MVAR IN or More MVAR OUT), take the Voltage Adjust Regulator Switch to Raise.
- D. Incorrect. Part 1 is correct. Part 2 is plausible because the applicant could determine taking the Voltage Adjust Regulator Switch to Lower would make the absolute number of MVAR go from 70 to 20.

Technical Reference(s): OP-010-004 pages 7, 65 Rev. 341  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided  
to applicants during examination: None

Learning Objective: WLP-OPS-PPN01 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 5,10  
55.43 \_\_\_\_\_

Comments: No comments

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	001 G2.4.12	
	Importance Rating	4.0	

K/A Statement

(001) (APE 1) **Continuous Rod Withdrawal:** (G2.4.12) Knowledge of operating crew responsibilities during emergency and abnormal operations

Proposed Question: RO 19 Rev: 0

Given:

- Plant is at 5% power
- Group P CEAs are 85 inches withdrawn
- All other CEAs are at the Upper Electrical Limit
- ATC withdraws Group P CEAs 3 steps and releases the CEA Manual Shim switch
- CEA Group P CEAs continued stepping out

Which of the following is performed FIRST per OP-901-102, CEA or CEDMCS Malfunction?

- A. Adjust Turbine load to match Tave and Tref.
- B. Place the CEDMCS Mode Select switch to OFF.
- C. Trip the Reactor and GO TO OP-902-000, Standard Post Trip Actions.
- D. Momentarily place the Manual Shim Switch to insert and then release.

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. Matching Tave and Tref by adjusting turbine load is plausible and is the third step of this procedure section. Matching Tave and Tref is the first step in many events such as a dropped rod.
- B. **CORRECT:** Placing the CEMCS mode select switch to OFF is the first step directed in the "continuous movement of CEA group" section of OP-901-102, CEA or CEDMCS Malfunction. This step is performed in an attempt to stop the CEA group movement. This is a "quick" event and this step is important for the RO to know and may be performed before the off-normal is officially entered. The Mode Select switch to OFF is the method used to attempt to stop rod motion. Matching Tave and Tref by adjusting turbine load is plausible and is the third step of this procedure section. Matching Tave and Tref is the first step in many events such as a dropped rod.
- C. Incorrect. Tripping the Reactor is performed when placing the CEDMCS mode select switch in OFF does not stop rod movement but is not the first step performed and not the preferred sequence.
- D. Incorrect. Placing the CEA manual shim switch to insert and releasing it is not a step in the off-normal for continuous motion of a group of CEAs: however, it does hold the possibility of correcting the situation by exercising the switch contacts.

Technical Reference(s): OP-901-102 page 17 Rev. 308  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided  
to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** COLR Figure 3 requires a power reduction of 10% 30 minutes from the time of the dropped rod. COLR Figure 3 requires a power reduction of 30% after a single CEA deviation, unless power is reduced to 60%, then no further reduction is required. Initial reactor power is 80%, therefore, the power reduction can be stopped at 60%.
- B. Incorrect. Part 1 is plausible because COLR figure 3 is written in 5% increments. Part 2 is correct.
- C. Incorrect. Part 1 is correct. Part 2 is plausible because COLR Figure 3 requires a power reduction of 30% after a single CEA deviation, unless power is reduced to 60%, then no further reduction is required. Initial reactor power is 80%, therefore, power reduction to 50% would be correct if the floor of 60% is not known.
- D. Incorrect. Part 1 is plausible because COLR figure 3 is written in 5% increments. Part 2 is plausible because COLR Figure 3 requires a power reduction of 30% after a single CEA deviation, unless power is reduced to 60%, then no further reduction is required. Initial reactor power is 80%, therefore, power reduction to 50% would be correct if the floor of 60% is not known.

Technical Reference(s): OP-901-102 page 12 Rev. 308  
(Attach if not previously provided) TS 3.1.3.1 and COLR Figure 3  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 3 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

**2023 NRC Exam  
RO Written Exam Worksheet**

Comments: Distractor C is also correct as written. Restructure stem such that the second part of the question asks what the highest procedurally permissible power level is when the power reduction can be stopped. Changed part 2 to read "The highest permissible power that the down power can be stopped to be in compliance with TS 3.1.3.1 is when reactor power reaches     (2)     percent." Also, added the title of TS 3.1.3.1 to the stem.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	032 AK3.02	
	Importance Rating	3.5	

K/A Statement

(032AK3.02) **LOSS OF SOURCE RANGE Nuclear Instrumentation:** Knowledge of the reasons for the following responses and/or actions as they apply to (APE 32) LOSS OF SOURCE RANGE Nuclear Instrumentation: Guidance contained in procedures for loss of source range NI

Proposed Question: RO 21 Rev: 0

Given:

- Reactor Power is  $5.5 \times 10^{-8}$
- "Startup Channel 1 OFF NORMAL" annunciates at CP-2
- The HV Control switch in Startup Channel #1 drawer is selected to PRIMARY

The annunciator response procedure will direct the crew to select ALTERNATE in Startup #1 channel drawer because ENI LOG \_\_\_\_\_ has failed high.

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

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Log Channel A controls high voltage shutoff to Startup Channel 2 if the HV control Switch in Startup Channel 2 is selected to Primary
- B. Incorrect. Log Channel B controls high voltage shutoff to Startup Channel 2 if the HV control Switch in Startup Channel 2 is selected to Alternate
- C. **CORRECT:** The startup channels are de-energized by the  $5 \times 10^{-6}\%$  bistables of the selected log channel. Log Channel C controls high voltage shutoff to Startup Channel 1 if the HV control Switch in Startup Channel 1 is selected to Primary. The power source to startup channel 1 will be log channel D when the HV control switch is taken to alternate and High Voltage power will be restored
- D. Incorrect. Log Channel D controls high voltage shutoff to Startup Channel 1 if the HV control Switch in Startup Channel 1 is selected to Alternate.

Technical Reference(s): OP-500-008 attachments 4.93 and 4.94. Rev. 26  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-ENI00 obj. 2 and 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 6, 10  
55.43 \_\_\_\_\_

Comments: No comments



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect: Hi Log Power Trip bypass is automatically removed when power is  $< 10^{-4}\%$ . The Hi Log Power trip bypass must be manually restored when power goes above  $10^{-4}\%$ . Therefore, the Hi Log Power Trip is in service at the present condition and is still in service (not in bypass) after the log channel fails high.
- B. Incorrect: DNBR/LPD Trip bypasses are automatically removed when power goes above  $10^{-4}\%$ . Therefore, DNBR/LPD trip bypasses will be removed when its log channel fails high.
- C. Incorrect. Low SG Flow Trip bypass is automatically removed when power goes above  $8.5 \times 10^{-5}\%$ . Therefore, Low SG Flow trip bypasses will be removed when its log channel fails high.
- D. **CORRECT**: High SG Level Trip bypass has no auto feature and is manually initiated and removed from service. This trip bypass is administratively controlled. Therefore, the log channel failing high has no effect on its operating bypass. The High SG Level Trip remains in bypass.

Technical Reference(s): WLP-OPS-PPS00 pages 30-32 Rev. 18  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 obj. 4 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2018 RO NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 2  
55.43 \_\_\_\_\_

Comments: Please discuss - explanations are not making sense to me. Will discuss and added words to the explanations to clear the confusion. Get rid of "one". Change "will" to "should". Got rid of "one". Changed "will" to "should". Good.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	037 G2.2.22	
	Importance Rating	4.0	

K/A Statement

(037) (APE 37) **Steam Generator Tube Leak:** (G2.2.22) EQUIPMENT CONTROL:  
Knowledge of limiting conditions for operation and safety limits

Proposed Question: RO 23 Rev: 0

Given:

- A Steam Generator Tube Leak is in progress and the crew has implemented OP-901-202, Steam Generator Tube Leakage or High Activity
- AE Discharge Radiation Monitor is in HIGH Alarm
- PSLR indicates 0.04 GPM into Steam Generator #1
- PSLR indicates 0.05 GPM into Steam Generator #2
- Secondary Coolant Specific Activity is 0.11  $\mu$ ci/gram DEI-131

Which of the following conditions will require a plant shutdown in accordance with OP-010-005, Plant Shutdown?

- A. Secondary Coolant Specific Activity
- B. AE Discharge Radiation Monitor is in HIGH Alarm
- C. Primary to Secondary Leakage in Steam Generator #2 ONLY
- D. Combined Primary to Secondary Leakage in Steam Generator #1 and Steam Generator #2

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** OP-901-202 step 4 requires a plant shutdown in accordance with OP-010-005 if the Specific activity of the Secondary Coolant System is  $>.1$  microci/gram Dose Equivalent I-131. This step complies with the actions required in TS 3.7.1.4. This action is in effect if leakage is  $< 75$  gpd, because if and steam generator leakage is  $> 75$  gpd, a rapid plant power reduction is required.
- B. Incorrect. AE Discharge Radiation Monitor is in HIGH Alarm is plausible because it is listed in OP-901-202 as the primary Rad Monitor which has the sensitivity to measure small Primary to Secondary Leakage. There is no required shutdown for this Rad Monitor being in high alarm.
- C. Incorrect. Leakage in SG#2 is 72 gpd (.05 gpmx60x24). The limit in TS 3.4.5.2 and the requirement in step 3 of OP-901-202 is 75 gpd. No shutdown is required.
- D. Incorrect. Plausible if the applicant determines that the combined leakage of the two steam generators meet the threshold of TS 3.4.5.2. TS 3.4.5.2 limits is for leakage in one steam generator.

Technical Reference(s): OP-901-202 pages 9, 10 Rev. 16  
(Attach if not previously provided) TS 3.4.5.2  
(including version/revision number) TS 3.7.1.4

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO2 obj. 3 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: Delete "ONE" in stem. Add "ONLY" at the end of C, change "Leak" to "Leakage." Incorporated these three changes. Place "only" in caps. Placed "only" in caps. GOOD.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** Per TS 3.7.1.7, the ADV automatic actuation channels shall be operable greater than 70% Rated Thermal Power. Per TS 3.7.1.7 basis, above 70% power, an ADV is required along with a HPSI Train to mitigate the effects of a SBLOCA to ensure adequate core cooling.
- B. Incorrect: Per TS 3.7.1.7 basis, above 70% power, an ADV is required along with a HPSI Train to mitigate the effects of a SBLOCA. The station blackout is credible due to the importance of the ADVs during a loss of all power.
- C. Incorrect: 85% power is the power level that the plant is required to reduce to in the event of one MSSV inoperable.
- D. Incorrect. 85% power is the power level that the plant is required to reduce to in the event of one MSSV inoperable. Per TS 3.7.1.7 basis, above 70% power, an ADV is required along with a HPSI Train to mitigate the effects of a SBLOCA to ensure adequate core cooling.

Technical Reference(s): TS 3.7.1.7  
(Attach if not previously provided) TS 3.7.1.7 basis  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS MS00 obj. 6 (As available)

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2014 RO NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 4  
55.43 \_\_\_\_\_

Comments: No comments



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. Part 1 is correct. A leakrate will be determined by subtracting the total of letdown flow and RCP CBO flow from charging flow.
- B. Incorrect. Plausible because placing the letdown flow controller to manual will maintain a steady letdown flow, but this is not what OP-901-111 directs. A leakrate will be determined by subtracting the total of letdown flow and RCP CBO flow from charging flow.
- C. Incorrect. Plausible because placing the letdown flow controller to manual will maintain a steady letdown flow, but this is not what OP-901-111 directs. Part 2 is correct.
- D. **CORRECT:** Note in OP-901-111 states if RCS leakage will result in a backup charging Pump cycling to maintain pressurizer level, starting and continuously running (place to on) an additional Charging Pump will allow for a more accurate leakrate determination. A leakrate will be determined by subtracting the total of letdown flow and RCP CBO flow from charging flow.

Technical Reference(s): OP-901-111 page 8 Rev. 307  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2015 NRC RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 5, 10  
55.43 \_\_\_\_\_

Comments: No comments



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Part 1 is plausible if the student is not aware that upon the reactor trip the Feed pump speed controller swaps from manual (in manual due to the level deviation) to auto and will go to 3900 RPM. Part 2 is correct.
- B. Incorrect. Part 1 is plausible if the student is not aware that upon the reactor trip the Feed pump speed controller swaps from manual (in manual due to the level deviation) to auto and will go to 3900 RPM. Part 2 is plausible if the student does not realize that the Main feedwater regulating valve controller and the Startup Feedwater Regulating Valve controller has swapped to manual due to the level deviation.
- C. **CORRECT:** Level deviation exists in the FWCS #1. The level deviation shifts the Feed pump speed controller, Main feedwater regulating valve controller and the Startup Feedwater Regulating Valve controllers to manual. Upon the reactor trip, Feed pump speed controller swaps to auto and goes to 3900 RPM. The Main Feedwater Regulating Valve Controller and Startup Feedwater Regulating Valves are still in manual and do **NOT** go to Reactor Trip Override position (remain in their pre-trip positions). The crew will be directed to place FWCS in RTO during Standard Post Trip Actions.
- D. Incorrect. Part 1 is correct. Part 2 is plausible if the student does not realize that the Main feedwater regulating valve controller and the Startup Feedwater Regulating Valve controller has swapped to manual due to the level deviation.

Technical Reference(s): OP-901-201 page 5, Att. 1 Rev. 7  
(Attach if not previously provided) OP-902-000 page 11 Rev. 17  
(including version/revision number) WLP-OPS-PPO20 slide 20

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO20 obj. 3 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 4,10  
55.43 \_\_\_\_\_

Comments: Close FRV A is in 3 out of four distractors, meaning it's probably in the correct answer. Adjust the start-up FRV between 13-21% open is in two distractors while closing it is in one. This cues the answer is very probably C or D without reading the

**2023 NRC Exam  
RO Written Exam Worksheet**

question. Changed distractor A and its explanation to include closing Main Feedwater Regulating Valve A. Put MFRV in the stem and try to even out distractors. This question is new. Needs a review.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	003 A1.05	
	Importance Rating	3.4	

K/A Statement

(003 A1.05) **REACTOR COOLANT PUMP SYSTEM:** Ability to predict and/ or monitor changes in parameters associated with operation of the REACTOR COOLANT PUMP SYSTEM including: RCS flow

Proposed Question: RO 27

Rev: 0

Given:

- The reactor was manually tripped due to 1A RCP ARRD High Temperature
- 1A RCP has been secured
- Five minutes later, the ATC reports that the RCP PMC Mimic indicates RCP 1A speed is 600 rpm

OP-901-130, Reactor Coolant Pump Malfunction, provides the guidance to trip the reactor if ARRD temperature exceeds (1) °F.

Based on the above conditions, the crew should (2).

- |    |            |  |
|----|------------|--|
|    | <u>(1)</u> | <u>(2)</u>                                       |
| A. | 225        | remove reactor coolant pump 1B from service only |
| B. | 210        | remove reactor coolant pump 1B from service only |
| C. | 225        | remove all reactor coolant pumps from service    |
| D. | 210        | remove all reactor coolant pumps from service    |

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Part 1 is correct. With the given conditions, RCP 1A is reverse rotating even though speed on the RCP mimic is indicating a positive number. This guidance on RCP speed indication is given in a note in the Reverse rotation section of OP-901-130. If RCP is reverse rotating, all RCPs must be secured. Part 2 is plausible because RCP 1B is on the same loop as RCP 1A and forced flow would be maintained.
- B. Incorrect. Per OP-901-130, the crew is required to trip the reactor and secure the affected RCP when ARRD temperature exceeds 225 °F. At 210°F, a plant shutdown must be commenced. With the given conditions, RCP 1A is reverse rotating. Part 2 is plausible because RCP 1B is on the same loop as RCP 1A and forced flow would be maintained.
- C. **CORRECT:** Per OP-901-130, the crew is required to trip the reactor and secure the affected RCP when ARRD temperature exceeds 225 °F. With the given conditions, RCP 1A is reverse rotating even though speed on the RCP mimic is indicating a positive number. This guidance on RCP speed indication is given in a note in the Reverse rotation section of OP-901-130. If a RCP is reverse rotating, all RCPs must be secured. The question meets the K/A because the operator is monitoring for reverse flow through the RCP.
- D. Incorrect. Per OP-901-130, the crew is required to trip the reactor and secure the affected RCP when ARRD temperature exceeds 225 °F. At 210°F, a plant shutdown must be commenced. Part 2 is correct.

Technical Reference(s): OP-901-130 page 7, 19, 21 Revision 12  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2015 NRC RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. Normal pressure range is 25 to 45 PSIG. Pressure is high in the band due to a degraded lower seal.
- B. Incorrect. Normal pressure range is 585 to 915 PSIG. Upper seal pressure is high in the band due to a degraded lower seal. The upper seal is working properly.
- C. Incorrect. Normal pressure range is 1237 to 1815 PSIG. The middle seal pressure is out of band high due a degraded lower seal.
- D. **CORRECT:** Normal pressure range is 1237 to 1815 PSIG. The middle seal pressure is out of band high due a degraded lower seal. These parameters are indicative of a degraded lower seal causing middle seal pressure to be high out of band.

Technical Reference(s): OP-901-130 page 9 Rev. 12  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 3 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,10  
55.43 \_\_\_\_\_

Comments: Delete "ONE" in stem. Discuss possibility of changing middle seal parameter to a lower value (around 1950?) to make the question a little more discriminating. Deleted "ONE" in the stem. Changed middle seal pressure to 1950 psig as recommended. Changed all explanations to indicate a degraded seal instead of a failed seal is in progress. A failed seal is indicated by D/P < 100 psid. Added the word pressure to all distractors.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. With the in-service pressurizer level control channel failed high, the PLCS will see a higher level than setpoint and raise letdown flow which would cause actual pressurizer level to lower and . Part 2 is correct.
- B. **CORRECT:** With the in-service pressurizer level control channel failed high, the PLCS will see a higher level than setpoint and raise letdown flow which would cause actual pressurizer level to lower. If the non-faulted channel is selected prior to actual level being restored to program level, the crew should expect standby charging pumps to auto start. This is not desired and there is a note in the off-normal (OP-901-110) to alert the operator of this possibility.
- C. Incorrect. With the in-service pressurizer level control channel failed high, the PLCS will see a higher level than setpoint and raise letdown flow which would cause actual pressurizer level to lower. Part 2 is plausible because the student must recognize what actual pressurizer level is doing and what would happen when the selected channel is moved to the faulted channel to the non-faulted channel.
- D. Incorrect. Part 1 is correct. Part 2 is plausible because any standby charging pumps running will have secured when a level control channel failed high, but the student must recognize what will happen once the non-faulted channel is selected.

Technical Reference(s): OP-901-110 page 7 Rev. 11  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided  
to applicants during examination: None

Learning Objective: WLP-OPS-PPO1 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,10  
55.43 \_\_\_\_\_

**2023 NRC Exam  
RO Written Exam Worksheet**

Comments: Appears to be identical to event 3 in scenario 1. This question is identical. Need to replace this question. Replaced this question. The new question uses the Y control channel for PLCS and the revised question will fail this control channel high vise low as written in the scenario. Verified this question does not overlap the audit written or the previous two NRC exams. Discuss, appears that action (2) doesn't change and the scenario would still probably cue them onto this. Develop a new question. Changed part 2 of the question to eliminate any overlap.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect: The PLCS is designed such that the first Backup Charging Pump will start at a Pressurizer level deviation of 2.5%. The second Charging Pump will start at a level deviation of 3.9% which would equate to a level of 51.7% at 100% power. Part 2 is correct.
- B. Incorrect. The PLCS is designed such that the first Backup Charging Pump will start at a Pressurizer level deviation of 2.5%. The second Charging Pump will start at a level deviation of 3.9% which would equate to a level of 51.7% at 100% power. A loss of Charging flow will raise Regenerative HX outlet temperature. If temperature reaches 470°F, letdown will isolate. The letdown HX is downstream of the Regenerative HX and is cooled by CCW
- C. Incorrect. Part 1 is correct. A loss of Charging flow will raise Regenerative HX outlet temperature. If temperature reaches 470°F, letdown will isolate. The letdown HX is downstream of the Regenerative HX and is cooled by CCW.
- D. **CORRECT:** The PLCS is designed such that the first Backup Charging Pump will start at a Pressurizer level deviation of 2.5%. The applicant must know that Pressurizer level at 100% power is programmed at 55.6%. Charging flow is the cooling medium for the Regenerative HX. Therefore, a loss of Charging flow will raise Regenerative HX outlet temperature. If temperature reaches 470°F, letdown will isolate.

Technical Reference(s): OP-901-112 page 5 and 8 Revision 11  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2017 NRC RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,10  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** Throttling the in-service SDC train LPSI Flow control valves is performed to limit maximum Transient SDC flow to 3000 gpm while the RCS is at a lowered inventory condition (20 feet MSL). This high flow could occur if SI-129 (SDC Flow Control Valve) fails open. Flow is limited to 3000 gpm to prevent vortexing in the RCS.
- B. Incorrect. Part 1 is correct. Part 2 is plausible because this is the reason flow must not be taken to greater than 3,000 gpm if the LPSI FCVs are throttled, but this not the reason the LPSI FCVs are throttled.
- C. Incorrect. Part 1 is plausible because both 3000 gpm and 4000 gpm are Tech Spec required flow rates based on hours after shutdown and both numbers are referenced to in the RCS drain down procedure (OP-001-003). Part 2 is correct.
- D. Incorrect. Part 1 is plausible because both 3000 gpm and 4000 gpm are Tech Spec required flow rates based on hours after shutdown and both numbers are referenced to in the RCS drain down procedure (OP-001-003). Part 2 is plausible because this is the reason flow must not be taken to greater than 3,000 gpm if the LPSI FCVs are throttled, but this not the reason the LPSI FCVs are throttled.

Technical Reference(s): OP-001-003 page 38 Revision 328  
(Attach if not previously provided) WLP-OPS-REQ13 slide 118 notes Rev. 28  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-REQ13 obj. 1 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 7,10  
55.43 \_\_\_\_\_

Comments: No comments



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. The current RCS pressure is above 200 psia, which is above LPSI shutoff head. Therefore, LPSI flow is meeting the curve in Attachment 2F. HPSI flow curves are not being met, because one injection line is below the required curve. Plausible because only one LPSI train has to meet the curve to obtain required flow.
- B. Incorrect. The applicant could assume LPSI flow is not within the curve if it is not determined that RCS pressure is above LPSI shutoff head. HPSI flow curves are not met.
- C. Incorrect. The applicant could assume LPSI flow is not within the curve if it is not determined that RCS pressure is above LPSI shutoff head. Attachment 2E of OP-902-009 provides the required HPSI flow for the applicable RCS pressure. The required flow is for each injection line. With one injection line below the curve, HPSI flow is not being met.
- D. **CORRECT:** Attachment 2E of OP-902-009 provides the required HPSI flow for the applicable RCS pressure. The required flow is for each injection line. With one injection line below the curve, HPSI flow is not being met. The current RCS pressure is above 200 psia, which is above LPSI shutoff head. Therefore, LPSI flow is meeting the curve in Attachment 2F.

Technical Reference(s): OP-902-009 Attachments 2E and 2F Rev. 323  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,10  
55.43 \_\_\_\_\_

**2023 NRC Exam  
RO Written Exam Worksheet**

Comments: Stem cues that the HPSI flow curve is not met, making only B and D as plausible distractors. Changed the stem to state "HPSI flow to Cold Leg 1A is zero gpm" instead of "HPSI flow is not meeting the HPSI flow curve." This question is valid because the student must know that if any HPSI flow leg is not meeting the curves than the HPSI curve is considered not met. This is different than the LPSI flow curves which only requires one train to meet the curves. Delete the 4th bullet in the stem. Deleted the 4th bullet in the stem. Good.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Part 1 is plausible because the holdup tanks accept borated waste water but not from the Quench Tank. Part 2 is correct.
- B. Incorrect. Part 1 is plausible because the holdup tanks accept borated waste water but not from the Quench Tank. Part 2 is plausible because CBO would divert to the quench tank at a pressure of 150 psig.
- C. **CORRECT:** The annunciator response and Boron Management procedure direct the crew to monitor pressure in the Reactor Drain Tank while draining the quench tank. The annunciator response states that the Quench Tank rupture disc will rupture at 124 psig.
- D. Incorrect. Part 1 is correct. Part 2 is plausible because CBO would divert to the quench tank at a pressure of 150 psig.

Technical Reference(s): OP-500-008 Attachment 4.2 and 4.12 Rev. 48  
(Attach if not previously provided) OP-007-001 page 87 Revision 40  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-RCS00 obj. 2 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 7  
55.43 \_\_\_\_\_

Comments: FIRST TEN. In stem, "is" should be "are." Two correct answers as written as the disk would certainly rupture at 150 psig if it would rupture at 124 psig. Add "MINIMUM" prior to "pressure" and change "would" to "should" in stem. Question needs LOD and CFR information. Incorporated all of the requested changes. Added LOD and CFR information. Place MIMIMUM in caps. Placed MIMIMUM in caps. SAT.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** RC-606, RCP Control Bleedoff Inside Containment Isolation Valve closes on a CIAS, redirecting RCP control bleedoff to the quench tank through a relief valve (RC-603). Controlled bleedoff from the Reactor Coolant Pumps is normally aligned to the Volume Control Tank (VCT).
- B. Incorrect. RCP Vapor seal leakage is directed to the containment sump at all times. Normally aligned to the VCT is plausible because RCP CBO is normally aligned to the VCT.
- C. Incorrect. Part 1 is correct. Part 2 is plausible because RCP Vapor Seal Leakage is normally aligned to the containment sump.
- D. Incorrect. RCP Vapor seal leakage is directed to the containment sump at all times. Part 2 is correct.

Technical Reference(s): SD-CVC pages 39, 40, Figure 9 Rev. 20  
(Attach if not previously provided) SD-RCS page 20 Rev. 26  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-RCS00 obj. 2 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7  
55.43 \_\_\_\_\_

Comments: Discuss alternatives to the word "could" in stem, as almost anything "could" happen. Changed "could" to "should".

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	008 A4.04	
	Importance Rating	2.8	

K/A Statement

(008A4.04) **COMPONENT COOLING WATER SYSTEM:** Ability to manually operate and/or monitor the (SF8 CCW) COMPONENT COOLING WATER SYSTEM in the control room: Startup of a CCW pump when the system is shut down

Proposed Question: RO 35 Rev: 0

Given:

- Component Cooling Water (CCW) pumps are being started for a system startup in accordance with OP-002-003, CCW System Startup

Lowering CCW temperature may cause containment pressure to lower. Lowering containment pressure will cause indicated containment spray riser level to (1).

Lowering CCW temperature and Letdown temperature may (2) boron from CVCS Ion Exchanger effluent.

	<u>(1)</u>	<u>(2)</u>
A.	rise	remove
B.	rise	release
C.	lower	remove
D.	lower	release

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Part 1 is plausible because the applicant must know how containment pressure will affect riser levels. Part 2 is correct.
- B. Incorrect. Part 1 is plausible because the applicant must know how containment pressure will affect riser levels. Part 2 is plausible if the applicant is not aware of the correlation between CCW temperature and reactivity.
- C. **CORRECT:** In accordance with the CCW system startup section of OP-002-003, changing CCW temperature will cause changes in containment pressure. Lowering containment pressure will cause indicated containment spray riser level to lower. Lowering letdown temperature may remove boron from ion exchanger effluent in the CVCS system. This would result in a corresponding increase in reactor power.
- D. Incorrect. Part 1 is correct. Part 2 is plausible if the applicant is not aware of the correlation between CCW temperature and reactivity.

Technical Reference(s): OP-002-003 page 10 Revision 322  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-CC00 Rev. 44 obj. 8 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: FIRST TEN. Question needs LOD and CFR information. Discuss; I remember the reactivity event at Beaver Valley involved a failure of the temperature control valve to the non-regenerative HX; would like to fully understand how just a change in CCW temp could cause this event. Added LOD and CFR information.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. Part 1 is correct. The Pressurizer backup heaters energize at an RCS pressure of 2200 psia. The stem indicates that RCS pressure is 2210 psia, therefore the backup heaters are de-energized. Part 2 is plausible because the student could assume that the backup heaters energize at 2225 psia.
- B. **CORRECT:** The Pressurizer proportional heaters should be at maximum firing rate at an RCS pressure of 2225 psia. The Pressurizer backup heaters energize at an RCS pressure of 2200 psia. The stem indicates that RCS pressure is 2210 psia, therefore the backup heaters are de-energized.
- C. Incorrect. Part 1 is plausible because the pressurizer controller output will be at 67% when it is giving the proportional heaters a signal to fire at 100%. Part 2 is plausible because the student could assume that the backup heaters energize at 2225 psia. This is the pressure that the proportional heaters are firing at 100%.
- D. Incorrect. Part 1 is plausible because the pressurizer controller output will be at 67% when it is giving the proportional heaters a signal to fire at 100%. Part 2 is correct.

Technical Reference(s): SD-PLC pages 25-27 Rev. 12  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided  
to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2017 NRC RO exam

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,10  
55.43 \_\_\_\_\_

Comments: Looks identical to event 2 in scenario 3. It is identical. Need to replace this question. This question has been replaced. Still need to send references but question is good.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	012 K2.01	
	Importance Rating	4.0	

K/A Statement

(012K2.01) **REACTOR PROTECTION SYSTEM:** Knowledge of electrical power supplies to the following: (SF7 RPS) REACTOR PROTECTION SYSTEM RPS channels, components, and interconnections

Proposed Question: RO 37 Rev: 0

Given:

- The plant is at 100% power
- A loss of PDP MD occurs

Reactor Trip Switchgear breakers       (1)       open and a reactor trip       (2)      .

- |    |                        |                        |
|----|------------------------|------------------------|
|    | <u>      (1)      </u> | <u>      (2)      </u> |
| A. | 3, 4, 7, and 8         | occurs                 |
| B. | 3, 4, 7, and 8         | does not occur         |
| C. | 1, 2, 5, and 6         | occurs                 |
| D. | 1, 2, 5, and 6         | does not occur         |

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. Correct breakers but reactor trip does not occur, as power to CEDMCS is not interrupted with these reactor trip breakers open. Reactor trip is p
- B. **CORRECT:** On a loss of SUPS MD, Reactor trip breakers 3, 4, 7, and 8 open but power is still available to CEDMCS.
- C. Incorrect. Reactor trip breakers 1, 2, 5, and 6 are A train powered and are not affected. A reactor trip would still not occur.
- D. Incorrect. Reactor trip breakers 1, 2, 5, and 6 are A train powered and are not affected. A reactor trip would still not occur

Technical Reference(s): OP-901-312 page 18 Rev. 325  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO50 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2015 NRC RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 6  
55.43 \_\_\_\_\_

Comments: No comments



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Plausible if the applicant is not aware that CVAS filtration units get a start on a SIAS. It could be assumed the unit that is running for surveillance secures for EDG loading limitations.
- B. Incorrect. Plausible because both units start on a SIAS if one unit was not already running.
- C. **CORRECT:** The applicant must first determine that a SIAS has occurred by recognizing that pressure (<1684 psia) meets the criteria. Containment pressure does not meet the criteria (>17.1 psia). CVAS provides a safety function during a design basis accident after a Safety Injection Actuation signal. Both fans will start on the SIAS. If one CVAS Filtration unit is already operating, the standby unit will not start.
- D. Incorrect. Plausible if the applicant determines that the unit not started by the SIAS secures and the other unit gets the start signal from the SIAS.

Technical Reference(s): SD-HVR page 40 Rev.15  
(Attach if not previously provided) SD-PPS page 43 Rev. 23  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-HVR00 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7  
55.43 \_\_\_\_\_

Comments: FIRST TEN. In stem, change "is" to "should be." Question needs LOD and CFR information. Made all changes as requested. Stem still needs to be changed. Changed the stem to "should be".

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013 K4.06	
	Importance Rating	4.1	

K/A Statement

(013K4.06) **ENGINEERED SAFETY FEATURES ACTUATION SYSTEM:** Knowledge of (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM design features and/or interlocks that provide for the following: Recirculation actuation/reset

Proposed Question: RO 39 Rev: 0

Recirculation Actuation Signal (RAS) occurs at an RWSP level of (1) percent.

Recirculation Actuation Signal can be initiated manually from the (2).

- |    |            |   |
|----|------------|---|
|    | <u>(1)</u> | <u>(2)</u>  |
| A. | 10         | auxiliary relay cabinets in the RAB switchgear only             |
| B. | 10         | control room and auxiliary relay cabinets in the RAB switchgear |
| C. | 20         | control room and auxiliary relay cabinets in the RAB switchgear |
| D. | 20         | auxiliary relay cabinets in the RAB switchgear only             |

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** Recirculation Actuation Signal (RAS) occurs at an RWSP level of 10%. An RAS signal is the only ESFAS signal that cannot be initiated from the Control Room. It can only be initiated from auxiliary relay cabinets in the RAB switchgear.
- B. Incorrect. Part 1 is correct. Part 2 is plausible because an RAS signal is the only ESFAS signal that cannot be initiated from the Control Room. It can only be initiated from auxiliary relay cabinets in the RAB switchgear.
- C. Incorrect. Part 1 is plausible because other ESFAS actions occur at 20% such as bypassing High SG water level trip and actions that occur with the CSP. Part 2 is plausible because an RAS signal is the only ESFAS signal that cannot be initiated from the Control Room. It can only be initiated from auxiliary relay cabinets in the RAB switchgear.
- D. Incorrect. Part 1 is plausible because other ESFAS actions occur at 20% such as bypassing High SG water level trip and actions that occur with the CSP. Part 2 is correct.

Technical Reference(s): SD-PPS page 50 and 52 Revision 23  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided  
to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 obj. 1 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 7  
55.43 \_\_\_\_\_

Comments: No comments

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	022 A1.01	
	Importance Rating	3.8	

K/A Statement

(022A1.01) **CONTAINMENT COOLING SYSTEM:** Ability to predict and/or monitor changes in parameters associated with operation of the (SF5 CCS) CONTAINMENT COOLING SYSTEM, including: Containment temperature

Proposed Question: RO 40 Rev: 0

Given:

- Plant is in Mode 1
- The BOP operator is taking Tech Spec Logs in accordance with OP-903-001, Technical Specification Surveillance Logs

When taking readings for containment temperature, which of the following is true?

- A. Containment average air temperature shall be the average of temperatures taken at any three Containment Fan Cooler (CFC) air intake locations.
- B. Containment average air temperature shall be the average of temperatures taken at any three Containment Fan Cooler (CFC) air discharge locations.
- C. Containment average air temperature shall be the average of temperatures taken at all four Containment Fan Cooler (CFC) air intake locations
- D. Containment average air temperature shall be the average of temperatures taken at all four Containment Fan Cooler (CFC) air discharge locations.

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** Note 2 of the Mode 1-4 Technical Specification Surveillance Logs states that Containment average air temperature shall be the average of temperatures taken at any three Containment Fan Cooler (CFC) air intake locations.
- B. Incorrect. Note 2 of the Mode 1-4 Technical Specification Surveillance Logs states that Containment average air temperature shall be the average of temperatures taken at any three Containment Fan Cooler (CFC) air intake locations.
- C. Incorrect. Note 2 of the Mode 1-4 Technical Specification Surveillance Logs states that Containment average air temperature shall be the average of temperatures taken at any three Containment Fan Cooler (CFC) air intake locations. Plausible because there are four CFCs at W3.
- D. Incorrect. Note 2 of the Mode 1-4 Technical Specification Surveillance Logs states that Containment average air temperature shall be the average of temperatures taken at any three Containment Fan Cooler (CFC) air intake locations. Plausible because there are four CFCs at W3.

Technical Reference(s): OP-903-001 page 48, 227 Rev. 102  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-CB00 obj. 6 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 7,10  
55.43 \_\_\_\_\_

Comments: No comments



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Plausible because the 1A bus is a 6.9 KV bus that powers major pumps at W3.
- B. Incorrect. Plausible because the 2A bus is a 4.16 KV bus that powers major pumps at W3.
- C. **CORRECT:** Containment Spray Pump A is powered from the 3A safety bus.
- D. Incorrect. Plausible because the 31A bus is a 480V safety bus that is powered from the 3A safety bus.

Technical Reference(s): OP-009-001 page 40 Rev. 308  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-CS00 obj. 4 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 7  
55.43 \_\_\_\_\_

Comments: No comments.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	039 2.1.23	
	Importance Rating	4.3	

K/A Statement

(039) (SF4S MSS) **MAIN AND REHEAT STEAM** (2.1.23) CONDUCT OF OPERATIONS: Ability to perform general and/or normal operating procedures during any plant condition.

Proposed Question: RO 42 Rev: 0

Given:

- The crew is placing Moisture Separator Reheaters (MSRs) in service following a turbine trip in accordance with OP-005-005 Reheat Steam System

The Moisture Separator Reheaters should be started in the (1) start mode. Once the (2) pushbutton is depressed on the Reheater Control Panel, the MSR temperature control valves should begin to open.

	<u>(1)</u>	<u>(2)</u>
A.	hot	Reset
B.	hot	Ramp
C.	cold	Reset
D.	cold	Ramp

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. (OP-005-005 precaution 3.1.3) The MSR Cold Start Mode should always be used. The MSR Hot Start Mode is no longer used because the MSR Warm-up valves are maintained closed. Part 2 is plausible because there is a Reset pushbutton on the Reheater Control Panel. This reset pushbutton closes the reheater TCVs following a turbine trip.
- B. Incorrect. (OP-005-005 precaution 3.1.3) The MSR Cold Start Mode should always be used. The MSR Hot Start Mode is no longer used because the MSR Warm-up valves are maintained closed. Part 2 is correct.
- C. Incorrect. Part 1 is correct. Part 2 is plausible because there is a Reset pushbutton on the Reheater Control Panel. This reset pushbutton closes the reheater TCVs following a turbine trip.
- D. **CORRECT:** (OP-005-005 precaution 3.1.3) The MSR Cold Start Mode should always be used. The MSR Hot Start Mode is no longer used because the MSR Warm-up valves are maintained closed. A necessary condition for performing an MSR Hot Start is that the MSRs have remain pressurized. With the MSR Warmup valves closed, the MSRs will not remain pressurized.

Technical Reference(s): OP-005-005 pages 5, 8, 12 Rev. 307  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-MS00 obj. 8 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 4, 10  
55.43 \_\_\_\_\_

Comments: Change "will's" to "should's" in stem. Delete "over a 5 hour span" from stem, as this cues it is a "ramp." Changed "will's" to "should's". Changed "over a 5 hour span" to "begin to open".

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	059 K1.14	
	Importance Rating	3.8	

K/A Statement

(059K1.14) **MAIN FEEDWATER SYSTEM:** Knowledge of the physical connections and/or cause and effect relationships between the (SF4S MFW) MAIN FEEDWATER SYSTEM and the following systems: ESFAS

Proposed Question: RO 43 Rev: 0

Given:

- The ATC reports that Reactor Coolant System temperature is dropping rapidly
- The reactor was manually tripped and the ATC reports the following parameters:  
     Pressurizer pressure is 1720 psia and lowering  
     Containment pressure is 17.2 psia and rising

The proper alignment for Main Feedwater is \_\_\_\_\_.

- A. Main Feed Regulating Valves closed and Startup Feed Regulating Valves 13-21% open, Main Feed Isolation Valves closed.
- B. Main Feed Regulating Valves closed and Startup Feed Regulating Valves 13-21% open. Main Feed Isolation Valves open.
- C. Main Feed Regulating, Startup Feed Regulating, and Main Feed Isolation Valves are closed.
- D. Main Feed Regulating Valves closed and Startup Feed Regulating Valves closed, Main Feed Isolation Valves open.

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Plausible because the Main Feed Isolation Valves close on a MSIS and would isolate all feedwater. The Main Feed Regulating and Startup Feed Regulating Valves also get a closed signal on a MSIS.
- B. Incorrect. Plausible because the Main Feed Regulating valve going closed and Startup Feed Regulating valve going to 13 to 21% open (RTO) would be the proper position for these valves after a reactor trip but not if a MSIS has occurred.
- C. **CORRECT:** The applicant must first determine that a Main Steam Isolation (MSIS) has occurred. The logic for a MSIS is met because containment pressure is > 17.1 psia. On a MSIS, the Main Feed Regulating, Startup Feed Regulating, and Main Feed Isolation Valves get a closed signal.
- D. Incorrect. Plausible if the applicant is not aware that the Main Feed Isolation Valves also get a closed signal on a MSIS. Main Feedwater would be effectively isolated to the Steam Generators if the Main Feed Regulating and Startup Feed Regulating Valves are closed.

Technical Reference(s): SD-FW page 4 Revision 18  
(Attach if not previously provided) OP-902-000 page 11 Revision 17  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-FW00 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 4,10  
55.43 \_\_\_\_\_

**2023 NRC Exam  
RO Written Exam Worksheet**

Comments: FIRST TEN. Discuss possibility of modifying question to have a Rx trip with no ESD (to make a little more discriminating, as it appeared one need only summarize that a main feedwater isolation occurs to determine the correct answer). Question needs LOD and CFR information. There needs to be an ESD to meet the K/A (ESFAS). Leave as is. The student must first determine that a MSIS has occurred and then determine how it affects the MFW system. Added LOD and CFR information. Find a way such that we are not telling them that an ESD has occurred. Deleted the bullet that stated "an excess steam demand has occurred" and replaced it with "the ATC reports that RCS cold leg temperature is dropping. SAT.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	059 K3.05	
	Importance Rating	2.7	

K/A Statement

(059K3.05) **MAIN FEEDWATER SYSTEM:** Knowledge of the effect that a loss or malfunction of the (SF4S MFW) MAIN FEEDWATER SYSTEM will have on the following systems or system parameters: Extraction steam

Proposed Question: RO 44 Rev: 0

Given:

- Plant is at 100% power
- Level in Feedwater Heater 2B level reached the Hi-Hi level alarm set point
- The crew has entered OP-901-221, Secondary System Transient

Level in Feedwater Heater 2B should directly cause     (1)    . This event should cause reactor power to     (2)    .

<u>    (1)    </u>	<u>    (2)    </u>
A. Heater Drain Pump B to trip	lower
B. Heater Drain Pump B to trip	rise
C. ES-205, ES to #2 Heaters Isolation to close	lower
D. ES-205, ES to #2 Heaters Isolation to close	rise

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. Part 1 is plausible because Heater Drain Pump B takes a suction from Feedwater Heater 2B, but it does not get an automatic trip signal on high level. Part 2 is plausible if the applicant is not aware of the dynamics of feedwater pre-heating nor RCS temperature effects on reactor power.
- B. Incorrect. Part 1 is plausible because Heater Drain Pump B takes a suction from Feedwater Heater 2B, but it does not get an automatic trip signal on high level. Part 2 is correct.
- C. Incorrect. Part 1 is correct. Part 2 is plausible if the applicant is not aware of the dynamics of feedwater pre-heating nor RCS temperature effects on reactor power.
- D. **CORRECT:** ES to #2 Heaters Isolation, ES-205, will automatically close if any #2 heater level continues to rise above the Hi-Hi level alarm setpoint. As a result of ES-205 going closed, RCS Tcold temperature will lower which will make reactor power rise.

Technical Reference(s): OP-003-034 page 14 Revision 29  
(Attach if not previously provided) OP-901-221 page 10 Revision 11  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO2 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 4,5  
55.43 \_\_\_\_\_

Comments: FIRST TEN. Change "will's" to "should's" in stem. Distractors missing "A" "B" "C" "D." Question appears to employ "impossible physics" - can't fathom why one would believe a loss of heating will cause temperature to rise(?) Question needs LOD and CFR information. Changed "wills" to "should" in the stem. Labeled the distractors. Added LOD and CFR information. Would like to leave as is, the student must use some system knowledge to determine part 2. Could change to "what does reactor power do". Discuss. Change part 2 to indicate effects on "reactor power". Changed part 2 from "RCS temperature" to "reactor power". SAT.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	061 K4.11	
	Importance Rating	3.6	

K/A Statement

(061K4.11) **AUXILIARY/EMERGENCY FEEDWATER SYSTEM:** Knowledge of (SF4S AFW) AUXILIARY/EMERGENCY FEEDWATER SYSTEM design features and/or interlocks that provide for the following: Automatic level control\*

Proposed Question:      RO 45      Rev:      0

Upon an EFAS-1 event, the Primary Flow Control Valve for Steam Generator 1 will \_\_\_\_\_.

- A. open at 55% WR level in Steam Generator 1 and control level at 82% WR
- B. open at 55% WR level in Steam Generator 1 and control level at 85% WR
- C. open at 27.4% NR level in Steam Generator 1 and control level at 82% WR
- D. open at 27.4% NR level in Steam Generator 1 and control level at 85% WR

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect: At 55% WR following an EFAS-1, the Primary FCV will fully open then maintain level at 85% WR. 82% WR level is where the Alternate FCV is designed to maintain
- B. **CORRECT:** At 55% WR following an EFAS-1, the Primary FCV will fully open then maintain level at 85% WR.
- C. Incorrect. At 55% WR following an EFAS-1, the Primary FCV will fully open then maintain level at 85% WR. Steam Generator level of 27.4% is the level at which EFAS-1 actuates. 82% WR level is where the Alternate FCV is designed to maintain.
- D. Incorrect. At 55% WR following an EFAS-1, the Primary FCV will fully open then maintain level at 85% WR. Steam Generator level of 27.4% is the level at which EFAS-1 actuates.

Technical Reference(s): WLP-OPS-EFW00 page 119 Rev. 49  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-EFW00 obj. 6 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 7  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. If EDG B output breaker did not close in auto, then the operator should verify voltage in band prior to manually closing the EDG output breaker.
- B. Incorrect. Closing the EDG output breaker locally is an immediate action step but is performed only after EDG voltage is verified to be within band.
- C. **CORRECT:** Per OP-902-000, the contingency action for an EDG output breaker not closing is to verify EDG voltage 3920-4350 VAC. If the voltage is not in the band, the operator is expected to manually adjust voltage to within the band and the EDG output breaker should then close. (This step is an immediate action)
- D. Incorrect. EDG frequency cannot be adjusted when the EDG is running in Emergency mode.

Technical Reference(s): OP-902-000 page 7 Revision 17  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 obj. 10 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2012 RO NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,10  
55.43 \_\_\_\_\_

Comments: Discuss possibility of modifying A and B to closer resemble C and D (using manually close instead of verify auto closed)? Changed answers to specify "manual" or "auto" closure.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	063 A4.03	
	Importance Rating	3.5	

K/A Statement

(063A4.03) **DC ELECTRICAL DISTRIBUTION SYSTEM:** Ability to manually operate and/or monitor the (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM in the control room: Battery discharge rate

Proposed Question: RO 47 Rev: 0

Given:

- A reactor trip occurred due to a Station Blackout
- The crew entered OP-902-005, Station Blackout Recovery

To ensure the Station batteries survive the designed     (1)     hours with acceptable DC voltage upon the onset of the Station Blackout, the crew will strip loads from the station batteries using Attachment 7 of OP-902-009, Standard Appendices.

The NAO can obtain Attachment 7 of OP-902-009 from the     (2)    .

<u>    (1)    </u>	<u>    (2)    </u>
A. four	electrical equipment locker for both the A and B switchgear room
B. four	Appendix R locker located at LCP-43
C. two	electrical equipment locker for both the A and B switchgear room
D. two	Appendix R locker located at LCP-43



**2023 NRC Exam  
RO Written Exam Worksheet**

Comments: Don't understand plausibility of C and D. Why would one think action is necessary in the A switchgear room while the B switchgear room could be ignored? Agreed. Removed the portion of the question concerned with where to send the NAO and substituted it with where the NAO can locate the procedure to strip DC loads upon a Station Blackout. This is important because the location of these procedures are not in the EOP and will not be able to be printed during a SBO.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	064 K5.07	
	Importance Rating	3.7	

K/A Statement

(064K5.07) **EMERGENCY DIESEL GENERATOR SYSTEM:** Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF6 EDG) EMERGENCY DIESEL GENERATOR SYSTEM: Loading the EDG\*

Proposed Question: RO 48 Rev: 0

Given:

- The crew is restoring Emergency Diesel Generator (EDG) B following a Station Blackout
- Emergency Diesel Generator B has started and the output breaker is closed
- The Input Transformer to MCC 315B develops a direct short to ground upon being re-energized by the 1 second Sequencer Load Block (S1 relay)
- An undervoltage condition exists on 4160 Volt Bus 3B

Which of the following conditions describes the Sequencer response?

- A. Immediately stops the automatic loading process due to Under Voltage Override (UVO) condition.
- B. Immediately stops the automatic loading process due to Sequencer Lockout (SLO) condition.
- C. Stops the automatic loading process when the 7 second Load Block (S3 relay) is reached.
- D. Stops the automatic loading process when the 17 second Load Block (S4 relay) is reached.

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. The Undervoltage Override (UVO) of the Sequencer occurs at 0.5 seconds. UVO is the interlock that allows the sequencer to remain running between 0.5 and 17 seconds while large transformer loads are sequenced on.
- B. Incorrect. Sequencer Lockout is blocked between the 0.5 second Sequencer Load block and the 17 Second load block (due to the UVO feature). The short occurs on the 1 Second load block so the sequencer will not stop immediately.
- C. Incorrect. A SLO condition occurs at 17 seconds not 7 seconds as stated in the distractor. Sequencer Lockout is active at the 7 second load block but is blocked by the UVO feature.
- D. **CORRECT:** A SLO condition will occur at Load Block S4 due to the undervoltage condition on Bus 3A.

Technical Reference(s): SD-EDG page 49 Revision 32  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-EDG00 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2017 NRC RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7  
55.43 \_\_\_\_\_

Comments: No comments

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	073 K1.05	
	Importance Rating	3.1	

K/A Statement

(073K1.05) **PROCESS RADIATION MONITORING SYSTEM:** Knowledge of the physical connections and/or cause and effect relationships between the (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM and the following systems: CCWS

Proposed Question: RO 49 Rev: 0

Given:

- Plant is at 100% power
- DRY COOLING TOWER SUMP 1 ACTIVITY HI annunciator is received
- High Activity reading on DCT Sump 1 radiation monitor, PRM-IRE-6775, indicated on the RM-11

Which of the following AUTOMATIC actions are expected for DCT 1 Sump?

- A. Sump pumps trip.
- B. Flow path to Circ Water isolates.
- C. Flow path aligns to the Waste Tanks.
- D. Flow path to the storm drains isolates.

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** The automatic actions on a DCT Sump 1 rad monitor high alarm are that both DCT sump pumps for the respective rad monitor will trip. K/A match because the Dry Cooling Towers are part of the CCWS. The sumps used in this question serve the Dry Cooling Towers.
- B. Incorrect. The automatic actions on a DCT Sump 1 rad monitor high alarm are that both DCT sump pumps for the respective rad monitor will trip. The DCT Sump Pumps are normally aligned to the Circ Water System. Alignment to the Waste Tanks is performed manually.
- C. Incorrect. The automatic actions on a DCT Sump 1 rad monitor high alarm are that both DCT sump pumps for the respective rad monitor will trip. The DCT sumps are aligned to the waste tanks on high radiation. Aligning the waste tanks is performed manually.
- D. Incorrect. The automatic actions on a DCT Sump 1 rad monitor high alarm are that both DCT sump pumps for the respective rad monitor will trip. The storm drains are an alternate flow path for the DCT Sump Pumps.

Technical Reference(s): OP-901-414, Effluent Discharge High Radiation  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-SP00 obj. 6 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2012 RO NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 11  
55.43 \_\_\_\_\_

**2023 NRC Exam  
RO Written Exam Worksheet**

Comments: Please fix grammar in the explanations. Discuss to ensure that D could not be argued correct. Discuss K/A match. Fixed the grammar in the explanations. The flow path to the storm drains do not isolate on a DCT Sump 1 rad monitor high alarm. The flow path is still available but the sump pumps are secured. Distractor D could not be argued as the correct answer. K/A match because the Dry Cooling Towers are part of the CCWS. The sumps used in this question serve the Dry Cooling Towers. Added the reason for the K/A match to the explanation.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	076 K5.05	
	Importance Rating	3.1	

K/A Statement

(076K5.05) **SERVICE WATER SYSTEM:** Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF4S SW) SERVICE WATER SYSTEM: Radiation alarms on SWS

Proposed Question: RO 50 Rev: 0

Given:

- Blowdown discharge to Circ Water is in progress
- Circ Water Disch Activity Hi annunciates on CP-1

Which of the following should occur as a result of the high activity?

- A. High radiation on the Blowdown Radiation Monitor
- B. BD-303, Blowdown to Circ Water or Waste Ponds Header Isolation closes
- C. Trip of the running Blowdown Pump
- D. Blow down discharge is aligned to the waste tanks

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. The blowdown radiation monitor does not send signals for any components to actuate. Alarm only. Plausible to determine that the Blowdown Radiation Monitor would be the Monitor that would annunciate when discharging blowdown to circ water.
- B. **CORRECT:** High Radiation on the Circ Water Radiation Monitor will cause Circ Water Disch Activity Hi to annunciate and automatically close BD-303, isolating blowdown flow to the circ water system.
- C. Incorrect. Plausible because Blowdown pumps is the motive force for pumping blowdown to circ water.
- D. Incorrect. Plausible because discharge from the Dry Cooling Tower sumps (normally aligned to Circ Water) and the Industrial Waste Sump align to the waste tanks on a high radiation.

Technical Reference(s): OP-500-005 Attachment 4.69 Rev. 14  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-BD00 obj. 1 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 7,11  
55.43 \_\_\_\_\_

Comments: Delete "ONE" in stem. Question asks for something that has happened but explanation says isolation occurs after the alarm. Revise question to correctly match the past and present(?). Discuss how this question meets the K/A (service water). Deleted "ONE" in the stem. Changed the stem to read "Which of the following will occur as a result of the high activity?" W3 does not have a "service water system". To match the K/As, we have always interpreted our Turbine Cooling Water System and Circ Water systems to be "service water". Change "will" to "should". Changed "will" to "should". Question is good.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** IA-909, Instrument Air to Containment, will automatically close on a Containment Isolation Actuation Signal (CIAS). The CIAS to IA-909 can be overridden using its C/S on CP-8.
- B. Incorrect. Part 1 is correct. Part 2 is plausible because not all containment isolation valves at W3 can be overridden on a CIAS.
- C. Incorrect. Part 1 is plausible because it would make sense for the containment isolation to close on a lowering instrument air pressure to isolate the leak.
- D. Incorrect. Part 1 is plausible because it would make sense for the containment isolation to close on a lowering instrument air pressure to isolate the leak. Part 2 is plausible because not all containment isolation valves at W3 can be overridden on a CIAS.

Technical Reference(s): SD-AIR page 12, 49 Rev. 15  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided  
to applicants during examination: None

Learning Objective: WLP-OPS-AIR00 obj. 1 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 4  
55.43 \_\_\_\_\_

Comments: No comments.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	078 K6.06	
	Importance Rating	3.0	

K/A Statement

(078K6.06) INSTRUMENT AIR SYSTEM: Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF8 IAS)  
INSTRUMENT AIR SYSTEM: Cross-tie valve

Proposed Question: RO 52 Rev: 0

Given:

- Plant is at 100% power
- An instrument air leak has occurred and instrument air receiver pressure is lowering
- Crew has entered OP-901-511, Instrument Air Malfunction

The BOP should direct the NAO to     (1)     the set point for SA-125, SA Backup Supply for IA Press Cntl Valve, to force it open. When instrument air pressure lowers to 105 psig,     (2)     .

	<u>    (1)    </u>	<u>    (2)    </u>
A.	raise	IA-123, Instrument Air Dryers Bypass solenoid, opens
B.	raise	the standby Instrument Air Compressor starts
C.	lower	IA-123, Instrument Air Dryers Bypass solenoid, opens
D.	lower	the standby Instrument Air Compressor starts

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. Part 1 is correct. Part 2 is plausible because IA-123 opens automatically at 95 psig on instrument air receiver pressure.
- B. **CORRECT:** OP-901-511, Instrument Air Malfunction states that SA-125 will open and the standby Instrument Air Compressor will start at an instrument air receiver pressure of 105 psig. The setpoint will be raised on SA-125 to force it open early or if it is not operating properly. If it is malfunctioning, IA pressure will drop to 105 psig, and auto start the standby air compressor.
- C. Incorrect. Part 1 is plausible because the applicant may assume that lowering the setpoint of SA-125 will open the valve sooner. Part 2 is plausible because IA-123 is opens automatically at 95 psig on instrument air receiver pressure.
- D. Incorrect. Part 1 is plausible because the applicant may assume that lowering the setpoint of SA-125 will open the valve sooner. Part 2 is correct.

Technical Reference(s): OP-901-511 page 4 and 6 Revision 19  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO50 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,10  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** With the given conditions, Safety Injection Actuation Signal (SIAS) and a Containment Isolation Actuation Signal (CIAS) are present due to RCS pressure <1684 psia. SSL-8004A is a Containment Isolation Valve that closes on a CIAS. This valve is overridden to the open position during an accident in order to sample steam generators for activity.
- B. Incorrect. BAM-126A is a normally open valve. In addition to a CIAS, the student must identify that a SIAS also exists. BAM-126A will close on a SIAS.
- C. Incorrect. HVR-313A is a normally closed valve. In addition to a CIAS, the student must identify that a SIAS also exists. On the SIAS, CVAS Train A will start and HVR-313A will open.
- D. Incorrect. FP-601A is a normally open valve and closes on a CIAS. Plausible because the student may determine that Fire Protection must remain available to containment.

Technical Reference(s): OP-902-009 Attachments 4C and 4D Rev. 323  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 obj. 6 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,8  
55.43 \_\_\_\_\_

Comments: Delete "one" in stem. Discuss plausibility of B,C, and D as correct answer appears obvious. Deleted "one" in the stem. Added words to the explanations to explain the plausibility of B, C, and D. Seems that "A" is the obvious answer only if you know what the K/A is. Got rid of "one". Good.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** SBV will cycle after starting on a SIAS at -3.0 to -8.0 of Containment Annulus to ambient differential pressure measured in inches of water.
- B. Incorrect. The -8" is correct, but +2.0 inches is the maximum containment pressure that would ensure supply air to containment from the CAR System.
- C. Incorrect. The -3.0" is correct but the 10.0 inches is the maximum value for Containment pressure before containment purge can be initiated.
- D. Incorrect. The +2.0 inches is the maximum containment pressure that would ensure supply air to containment from the CAR System and the 10.0 inches is the maximum value for Containment pressure before containment purge can be initiated.

Technical Reference(s): OP-008-008 page 11 Revision 11  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-SBV obj. 2 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2015 RO NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 8  
55.43 \_\_\_\_\_

Comments: No comments

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	001 A4.01	
	Importance Rating	2.9	

K/A Statement

(001A4.01) **CONTROL ROD DRIVE SYSTEM:** Ability to manually operate and/or monitor the (SF1 CRDS) CONTROL ROD DRIVE SYSTEM in the control room: CRDM Cooling.

Proposed Question: RO 55 Rev: 0

In accordance with OP-008-004, Control Element Drive Mechanism Cooling System, which of the following would be the correct sequence to swap Control Element Drive Mechanism (CEDM) Cooling Fans?

Assume CEDM Cooling Fans A and B are running.

- A. Start CEDM Cooling Fan D then secure CEDM Cooling Fan B.
- B. Secure CEDM Cooling Fan A then start CEDM Cooling Fan D.
- C. Start CEDM Cooling Fan D then secure CEDM Cooling Fan A.
- D. Secure CEDM Cooling Fan A then start CEDM Cooling Fan C.

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. Plausible if the applicant determines that running only one CEDM at a time is not allowed.
- B. Incorrect. Plausible if the applicant is not aware of the train requirements or not aware of which electrical bus the CEDM is designated to.
- C. Incorrect. Plausible if the applicant determines that running only one CEDM at a time is not allowed.
- D. **CORRECT:** The guidance for swapping CEDM fans in OP-008-004, Control Element Drive Mechanism Cooling System, has two requirements. 1) One train from each safety bus should normally be running. 2) Do not operate more than two CEDM Cooling fans at a time. CEDM Fans A and C (A train) CEDM fans B and D (B train). This answer is the only one that meets these requirements.

Technical Reference(s): OP-008-004 page 8 revision 9  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-CCS00 obj. 6 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 4,10  
55.43 \_\_\_\_\_

Comments: 2nd half of B and D are identical, which cues that one of those distractors is probably the correct answer. Re-arranged the swapping of the CEDM fans in the distractors such that the trains are equal between answers and distractors.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. Part 1 is correct. Part 2 is plausible because makeup to the SFP is done frequently on shift. The makeup is always from the non-borated CSP to make-up for evaporated losses. However, the off-normal procedure allows makeup from either source
- B. **CORRECT:** Tech Spec 3.9.11 states “At least 23 feet of water shall be maintained over the top of the fuel seated in the storage racks. The top of the fuel seated in the storage racks is at the 20 foot level. Therefore, required level is 43 feet. Makeup can be aligned to either the CSP or the RWSP.
- C. Incorrect. Part 1 is plausible because TS 3.9.11 requires that At least 23 feet of water shall be maintained over the top of the fuel seated in the storage racks, the top of the fuel is assembly is at 20 feet, therefore required level is 43 feet. Part 2 is plausible because makeup to the SFP is done frequently on shift. The makeup is always from the non-borated CSP to make-up for evaporated losses. However, the off-normal procedure allows makeup from either source.
- D. Incorrect. Part 1 is plausible because TS 3.9.11 requires that At least 23 feet of water shall be maintained over the top of the fuel seated in the storage racks. The top of the fuel is assembly is at 20 feet, therefore, required level is 43 feet. Part 2 is correct.

Technical Reference(s): TS 3.9.11  
(Attach if not previously provided) OP-901-513 page 6 Rev. 28  
(including version/revision number) OP-002-006 page 9 Rev. 330

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-FS00 objs. 3 and 6 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 8  
55.43 \_\_\_\_\_

**2023 NRC Exam  
RO Written Exam Worksheet**

Comments: Add "Per TS, the MINIMUM" at beginning of first sentence. Add "procedurally aligned" after "can be" in stem. Added "Per TS, the MINIMUM" at beginning of first sentence. Added "procedurally aligned" after "can be" in stem.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. MFW Pump Speed will take the high select from FWC Master #1 or #2. Pump speed will be adequate. In this case, from FWC Master #1. This is where the automatic selection of an NNI input to a control system occurs to meet the K/A.
- B. **CORRECT:** MFW regulating valve controller adjustment is the proper action at this power level. The function of the SUFRV is to maintain level at low power levels. The SUFRV has the capacity to provide feedwater up to 22% flow demand. At 40% power, the SUFRV capacity is inadequate to restore level. The Main FWRV must be opened.
- C. Incorrect. MFW regulating valve controller adjustment is the proper action at this power level. The function of the SUFRV is to maintain level at low power levels. The SUFRV has the capacity to provide feedwater up to 22% flow demand.
- D. Incorrect. The SUFRV capacity is inadequate to restore SG level at this power. Feedwater flow at this power level. MFW Pump Speed will take the high select from FWC Master #1 or #2. In this case, from FWC Master #1. Pump speed will be adequate.

Technical Reference(s): SD-FWC page 11 Rev. 14  
(Attach if not previously provided) OP-901-201 Attachment 1 Rev. 7  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO2 obj. 3 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 4  
55.43 \_\_\_\_\_

Comments: Distractor C does not appear plausible for the given conditions. Changed reactor power from 50% to 40% in the stem to make distractor C more plausible. The SUFRV has the capacity to provide feedwater up to 22% flow demand.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** The design function of the hydrogen recombiners is to limit hydrogen concentration to less than 4 percent. Each hydrogen recombiner is 100% capacity. The direction for starting a Hydrogen Recombiner is from the TSC.
- B. Incorrect. Part 1 is correct. Part 2 is plausible because OP-902-002 is the implementing procedure for a LOCA and direction to start the hydrogen analyzers is located in OP-902-002. Guidance was once provided int OP-902-002 to start the recombiners but has since been removed.
- C. Incorrect. Part 1 is plausible because the explosive limit is 13%. 8% is approximately half that number. Part 2 is correct.
- D. Incorrect. Part 1 is plausible because the explosive limit is 13%. 8% is approximately half that number. Part 2 is plausible because OP-902-002 is the implementing procedure for a LOCA and direction to start the hydrogen analyzers is located in OP-902-002. Guidance was once provided int OP-902-002 to start the recombiners but has since been removed.

Technical Reference(s): SD-HRA pages 4, 5, 8, 9 Rev. 6  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-HRA00 obj. 4 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 8  
55.43 \_\_\_\_\_

Comments: Delete "remain below" in distractors. Deleted "remain below" in the distractors.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. Part 1 is plausible because this is the level the Refuel Cavity will go to if the nozzle dams were leaking. This leak location is also listed in OP-010-006. Part 2 is correct.
- B. **CORRECT:** OP-010-006 step 9.23.1.1 states a loss of the pool seal will result in a final water level of 20 ft. MSL in the core. This level is equal to the level of the reactor vessel flange. OP-010-006, step 9.23.2.4 provides a recommendation for placing the assembly upon a leak. The locations are listed in a decreasing order of preference. The Reactor Vessel is the first preferred location.
- C. Incorrect. Part 1 is plausible because this is the level the Refuel Cavity will go to if the nozzle dams were leaking. This leak location is also listed in OP-010-006. Part 2 is plausible because the Fuel assembly storage racks in the Refuel Cavity are listed in the locations to place a fuel assembly and will still be underwater upon a refuel cavity leak to 20 ft. MSL. But, OP-010-006 list the reactor vessel as a more preferred location than the storage racks.
- D. Incorrect. Part 1 is correct. Part 2 is plausible because the Fuel assembly storage racks in the Refuel Cavity are listed in the locations to place a fuel assembly and will still be underwater upon a refuel cavity leak to 20 ft. MSL. But, OP-010-006 list the reactor vessel as a more preferred location than the storage racks.

Technical Reference(s): OP-010-006 page 108, 109 Rev. 341  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided  
to applicants during examination: None

Learning Objective: WLP-OPS-REQ04 obj. 5 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 9,10  
55.43 \_\_\_\_\_

Comments: No comments



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Condenser Vacuum Pump B or C must be operating to maintain a suction path for Condenser Air Evacuation PIG Rad Monitor (PRM-IRE-0004). Part 2 is plausible because the Loss of Condenser Vacuum off-normal procedure requires the crew to trip the reactor at 24.5 inches Hg.
- B. Incorrect. Condenser Vacuum Pump B or C must be operating to maintain a suction path for Condenser Air Evacuation PIG Rad Monitor (PRM-IRE-0004). Part 2 is correct.
- C. **CORRECT:** Condenser Vacuum Pump B or C must be operating to maintain a suction path for Condenser Air Evacuation PIG Rad Monitor (PRM-IRE-0004). Standby Condenser Vacuum Pumps will auto start at 26 inches Hg on lowering Main Condenser Vacuum.
- D. Incorrect. Part 1 is correct. Part 2 is plausible because the Loss of Condenser Vacuum off-normal procedure requires the crew to trip the reactor at 24.5 inches Hg.

Technical Reference(s): OP-003-001 page 9 and 22 Rev. 25  
(Attach if not previously provided) OP-901-220 page Rev. 306  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-AE00 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2017 NRC RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 4,10  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. Condensate Polisher D/P will rise because more flow is being forced through the polisher on HDP trips. Only Main Feedwater Pump A will trip 10 seconds after reaching 250 psig for FWP suction pressure. Main Feedwater Pump B has a 30 second time delay to trip on low suction pressure. Suction pressure should restore after the MFP A trip. Opening CD-1532 will bypass the polishers and help to restore Main Feed Suction pressure.
- B. Incorrect. Condensate Polisher D/P will rise because more flow is being forced through the polisher on HDP trips. The second part is correct.
- C. Incorrect. The first part is correct. Only Main Feedwater Pump A will trip 10 seconds after reaching 250 psig for FWP suction pressure. Main Feedwater Pump B has a 30 second time delay to trip on low suction pressure. Suction pressure should restore after the MFP A trip. Opening CD-1532 will bypass the polishers and help to restore Main Feed Suction pressure.
- D. **CORRECT:** Condensate Polisher D/P will rise because more flow is being forced through the polisher on HDP trips. Only Main Feedwater Pump A will trip 10 seconds after reaching 250 psig for FWP suction pressure. Main Feedwater Pump B has a 30 second time delay to trip on low suction pressure. Suction pressure should restore after the MFP A trip. Opening CD-1532 will bypass the polishers and help to restore Main Feed Suction pressure.

Technical Reference(s): OP-901-221 pages 4, 13 Rev. 11  
(Attach if not previously provided) SD-CDP pages 25, 26 Rev. 8  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO2 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 4,10  
55.43 \_\_\_\_\_

**2023 NRC Exam  
RO Written Exam Worksheet**

Comments: Change "will" to "should" in stem. Where is there direction to potentially throttle CD-1532 (I didn't see any in the references). Changed "will" to "should". The procedure provides the guidance to throttle the condensate polisher bypass valve to maintain D/P. Will provide the reference.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Both the Liquid Waste Management (LWM) and Boron Management (BM) systems effluent discharge to the Circulating Water System through the second discharge block of the condenser. This block contains circ water boxes B2, C1 and C2. The procedure requires one of these water boxes to be in service prior to discharging.
- B. Incorrect. Both the Liquid Waste Management (LWM) and Boron Management (BM) systems effluent discharge to the Circulating Water System through the second discharge block of the condenser. This block contains circ water boxes B2, C1 and C2. The procedure requires one of these water boxes to be in service prior to discharging.
- C. **CORRECT:** Both the Liquid Waste Management (LWM) and Boron Management (BM) systems effluent discharge to the Circulating Water System through the second discharge block of the condenser. This block contains circ water boxes B2, C1 and C2. The procedure requires one of these water boxes to be in service prior to discharging. Not a "substep" issue here because the stem is asking what does the procedure state to verify.
- D. Incorrect. Both the Liquid Waste Management (LWM) and Boron Management (BM) systems effluent discharge to the Circulating Water System through the second discharge block of the condenser. This block contains circ water boxes B2, C1 and C2. The procedure requires one of these water boxes to be in service prior to discharging.

Technical Reference(s): OP-007-004 page 21 Rev. 322  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-CW00 obj. 1 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2020 NRC RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 4,13  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. LCP-42 is the location for the Waste Gas Decay Tanks to Plant Vent Flow Indicator as mentioned in the ARP. This is not the indicator the off-normal directs use of to verify the validity of the annunciator. On high radiation during a GDT release, the Gaseous Waste Management Rad Monitor will automatically close GWM-309. The Plant Stack Vent Rad monitor is plausible because it is listed as one of the indications in OP-901-413.
- B. Incorrect. Part 1 is correct. On high radiation during a GDT release, the Gaseous Waste Management Rad Monitor will automatically close GWM-309. The Plant Stack Vent Rad monitor is plausible because it is listed as one of the indications in OP-901-413.
- C. Incorrect. LCP-42 is the location for the Waste Gas Decay Tanks to Plant Vent Flow Indicator as mentioned in the ARP. This is not the indicator the off-normal directs use of to verify the validity of the annunciator. Part 2 is correct.
- D. **CORRECT:** From the annunciator response and off-normal procedure, the validity of this annunciator is verified by checking Waste Gas Flow and Rad Recorder (GWMIFRR0648). This recorder is located on CP-4. On high radiation during a GDT release, the Gaseous Waste Management Rad Monitor will automatically close GWM-309.

Technical Reference(s): OP-901-413 page 4 and 6 Rev. 2  
(Attach if not previously provided) OP-500-007 Att. 4.50 Rev. 17  
(including version/revision number) SD-GWM page 13 Rev. 8

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 3 (As available)

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2017 NRC RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 10,13  
55.43 \_\_\_\_\_

Comments: OK, but locations of plant equipment should normally be evaluated during the operating test. OK.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	<u>2</u>	
	Group #	<u>2</u>	
	K/A #	<u>G2.1.8</u>	
	Importance Rating	<u>3.4</u>	

K/A Statement

(G2.1.8) **CONDUCT OF OPERATIONS:** Ability to coordinate personnel activities outside the control room

Proposed Question: RO 64 Rev: 0

Given:

- The control room is being evacuated due to a fire

Procedures for supporting performance of OP-901-502, Evacuation of Control Room and Subsequent Plant Shutdown, can be found in the cabinets located at LCP-43 and the RAB +35 (1). The Emergency Communicator should assist the control room staff with activating the Fire Brigade, Plant Announcements, and notifying Hahnville Fire Department in accordance with the guidance in (2).

<u>(1)</u>	<u>(2)</u>
A. Cable vault room	OP-901-524, Fires in areas affecting Safe Shutdown
B. Cable vault room	FP-001-020, Fire Emergency/Fire Report
C. Relay room	OP-901-524, Fires in areas affecting Safe Shutdown
D. Relay room	FP-001-020, Fire Emergency/Fire Report

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect. Part 1 is plausible because the Cable Spreading Room is located next to the Relay Room on the RAB +35. Actions in OP-901-502 are performed in both the Cable Vault and Relay rooms, but the cabinet where the procedures are stored are in the Relay Room. Part 2 is plausible because OP-901-524 provides the guidance for actions to be taken depending on which room the fire is located, but the guidance for plant announcements, activating the Fire Brigade, etc. are located in FP-001-020.
- B. Incorrect. Part 1 is plausible because the Cable Spreading Room is located next to the Relay Room on the RAB +35. Actions in OP-901-502 are performed in both the Cable Vault and Relay rooms, but the cabinet where the procedures are stored are in the Relay Room. Part 2 is correct.
- C. Incorrect. Part 1 is correct. Part 2 is plausible because OP-901-524 provides the guidance for actions to be taken depending on which room the fire is located, but the guidance for plant announcements, activating the Fire Brigade, etc. are located in FP-001-020.
- D. **CORRECT:** Procedures to support the performance of OP-901-502, Evacuation of Control Room and Subsequent Plant Shutdown are in a cabinet located in the RAB +35 Relay Room. FP-001-020 provides the guidance for actions to be taken such as plant announcements, activating the Fire Brigade, etc. The question is generic because the Control Room can be evacuated for many reasons and this information is located on the Notes and Information section of OP-901-502.

Technical Reference(s): OP-901-502, page 50 Rev. 41  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO51 obj. 6 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: OK, but locations of in-plant procedures should normally be evaluated during the operating test. OK.





**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	G2.2.12	
	Importance Rating	3.7	

K/A Statement

(G2.2.12) **EQUIPMENT CONTROL:** Knowledge of surveillance procedures

Proposed Question: RO 66 Rev: 0

In accordance with OP-100-014, Technical Specification and Technical Requirements Compliance, the crew is required to enter the appropriate cascading Technical Specifications upon declaring a(an) (1) inoperable.

The crew will be required to (2) within a MAXIMUM of one hour.

- |                                  |   |
|----------------------------------|---|
| <u>(1)</u>                       | <u>(2)</u>  |
| A. Emergency Diesel Generator    | complete OP-903-066, Electrical Breaker Alignment Check |
| B. Component Cooling Water Train | complete OP-903-066, Electrical Breaker Alignment Check |
| C. Component Cooling Water Train | verify Emergency Feedwater Pump AB operable             |
| D. Emergency Diesel Generator    | verify Emergency Feedwater Pump AB operable             |

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. Even though the EDG supplies power to various loads during an emergency, W3 does not cascade due to an EDG being inoperable. Part 2 is correct.
- B. **CORRECT:** OP-100-014, Technical Specification and Technical Requirements Compliance designates systems that required cascading Tech Specs, CCW is one of those systems. The Electrical Breaker Lineup Check is required to be completed w/i 1 hour in accordance with TS 3.8.1.1b. This question is generic because cascading TS applies to more than one system, cascading TS also applies to Essential Chillers and the UHS.
- C. Incorrect. Part 1 is correct. TS 3.8.1.1d (verify EFW Pump AB operable) is required during cascading Tech Specs but must be performed within 2 hours
- D. Incorrect. Even though the EDG supplies power to various loads during an emergency, W3 does not cascade due to an EDG being inoperable. TS 3.8.1.1d (verify EFW Pump AB operable) is required during cascading Tech Specs but must be performed within 2 hours.

Technical Reference(s): OP-100-014 page 43, 48 Rev. 365  
(Attach if not previously provided) TS 3.8.1.1 actions b and d  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided  
to applicants during examination: None

Learning Objective: WLP-OPS-CC00 obj. 9 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2017 RO NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: No comments



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** EN-OP-102 identifies a purpose of a “no tag” is to identify components that cannot be tagged but require positioning when hanging a tagout. Removing a drain valve meets this purpose.
- B. Incorrect. Not allowed as a “no tag” per EN-OP-102.
- C. Incorrect. Not allowed as a “no tag” per EN-OP-102.
- D. Incorrect. Not allowed as a “no tag” per EN-OP-102.

Technical Reference(s): EN-OP-102 page 78 Revision 28  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: ELP-OPS-CLR obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2012 NRC RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

- A. Incorrect: AE Discharge Radiation Monitor is considered the primary Radiation Monitor with the designed sensitivity to measure small Primary to Secondary Leakage. The Blowdown Rad Monitor is listed as available indication but is not the primary indication or backup.
- B. Incorrect: AE Discharge is primary and MS Line N-16 is backup
- C. Incorrect: Part 1 is correct. The Blowdown Rad Monitor is listed as available indication but is not the primary indication or backup.
- D. **CORRECT:** AE Discharge Radiation Monitor is considered the primary Radiation Monitor with the designed sensitivity to measure small Primary to Secondary Leakage. The MS Line N16 Rad Monitors may be used as verification for the AE Discharge Radiation Monitor or as primary indication if the AE Discharge Radiation Monitor is out of service.

Technical Reference(s): OP-901-202 page 4 Revision 16  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO2 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam 2014 NRC RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 11  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Plausible because 15 minutes and 30 minutes is used in various situations in the EOPs.
- B. Incorrect. Plausible because 30 minutes and 60 minutes is used in various situations in the EOPs.
- C. **CORRECT:** The following note is located in both the RCS inventory control and Core heat removal safety function located in OP-902-002: "Core uncover and superheated conditions may be expected for up to 45 minutes within the first 75 minutes of some LOCA events. If the SI flow is in accordance with the SI flow curves exiting this procedure to the OP-902-008, Functional Recovery Procedure will not provide any additional guidance to restore inventory control."
- D. Incorrect. Plausible because 60 minutes is used in various situations in the EOPs.

Technical Reference(s): OP-902-002 page 73 Revision 21  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE02 objective 16 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 10  
55.43 \_\_\_\_\_

Comments: A does not fit with the other distractors and is easily eliminated as a possibility. Discuss modifying times to 15/30, 30/60, 45/75. and 60/90 for A,B,C,and D. Will discuss modifying this question. Believe this question is good "as written". Would like to leave it as is. Change distractors as recommended. Changed the distractors as recommended. **SAT.**



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. An initial loss of Xenon-135 occurs during a reactor power increase. The greatest contributor to the loss of Xenon-135 is neutron absorption. This question is taken directly from the NRC Exam bank.
- B. Incorrect. An initial loss of Xenon-135 occurs during a reactor power increase. The greatest contributor to the loss of Xenon-135 is neutron absorption. This question is taken directly from the NRC Exam bank.
- C. **CORRECT:** An initial loss of Xenon-135 occurs during a reactor power increase. The greatest contributor to the loss of Xenon-135 is neutron absorption. This question is taken directly from the NRC Exam bank.
- D. Incorrect. An initial loss of Xenon-135 occurs during a reactor power increase. The greatest contributor to the loss of Xenon-135 is neutron absorption. This question is taken directly from the NRC Exam bank.

Technical Reference(s): WLP-OPS-TYR06 slide 94 Revision 8  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-TYR06 obj. 4 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam QID P460 in the NRC Exam Bank

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 1  
55.43 \_\_\_\_\_

Comments: No comments.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. Fuel depletion adds negative reactivity over core life. Buildup of fission product poison adds negative reactivity over core life. Boron concentration must be decreased over core life to compensate for this negative reactivity.
- B. **CORRECT:** Fuel depletion adds negative reactivity over core life. Buildup of fission product poison adds negative reactivity over core life. Boron concentration must be decreased over core life to compensate for this negative reactivity. This question was taken directly from the NRC Exam bank.
- C. Incorrect. Fuel depletion adds negative reactivity over core life. Buildup of fission product poison adds negative reactivity over core life. Boron concentration must be decreased over core life to compensate for this negative reactivity.
- D. Incorrect. Fuel depletion adds negative reactivity over core life. Buildup of fission product poison adds negative reactivity over core life. Boron concentration must be decreased over core life to compensate for this negative reactivity.

Technical Reference(s): WLP-OPS-TYR07 pages 41, 45 and 58 Rev. 6  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-TYR07 obj. 3 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam QID P464 in the NRC Exam Bank

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 1  
55.43 \_\_\_\_\_

Comments: No comments.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	4	
	Group #		
	K/A #	192008 K1.13	
	Importance Rating	3.6	

K/A Statement

(192008K1.13) **REACTOR OPERATIONAL PHYSICS:** (INTERMEDIATE RANGE OPERATION) Discuss the concept of the POAH and its impact on reactor power

Proposed Question: RO 72 Rev: 0

Given:

- Startup in progress
- Reactor is critical below the POAH
- RCS  $T_{AVG}$  is 541°F and steady
- Group P CEAs have been withdrawn to achieve a 0.5 DPM startup rate

Reactor power should stabilize (1) the POAH, and RCS  $T_{AVG}$  should be (1) 541°F. (Assume no change in steaming rate)

- |                 |              |
|-----------------|--------------|
| <u>(1)</u>      | <u>(2)</u>   |
| A. equal to     | equal to     |
| B. equal to     | greater than |
| C. greater than | equal to     |
| D. greater than | greater than |

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: D

Explanation: (Optional)

When the POAH is reached, FTC and MTC will add negative reactivity which will cause reactor power to stabilize above the POAH. RCS Temperature goes up when the POAH is exceeded and will remain above the initial temperature if steaming rate is not raised.

- A. Incorrect. See above.
- B. Incorrect. See above
- C. Incorrect. See above
- D. **CORRECT**: See above

Technical Reference(s): WLP-OPS-TYR08 page 112 Rev. 9  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-TYR08 obj. 14 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam \_\_\_\_\_

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 1  
55.43 \_\_\_\_\_

Comments:

A is essentially "none of the above" (not allowed). Also, two distractors have "create negative reactivity effect," while both of the others are different, which cues that either C or D is probably the correct answer. Need to revise this question. Revised the question such that "A" is no longer "none of the above. Revised the distractors such that C and D are no longer cued as the right answer. Make the question W3 specific. Question replaced on 7/19/23. Now W3 specific. SAT.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: A

Explanation: (Optional)

- A. **CORRECT:** Using steam tables, saturation pressure for 536°F is 930.6 psia.
- B. Incorrect. Using steam tables, saturation pressure for 536°F is 930.6 psia. If 15 psia is added for unit conversion, this answer is calculated.
- C. Incorrect. Using steam tables, saturation pressure for 536°F is 930.6 psia. If the table is misread, the pressure directly below the correct answer is 962 psia.
- D. Incorrect. Using steam tables, saturation pressure for 536°F is 930.6 psia. If the table is misread, the pressure directly below the correct answer is 962 psia. When 15 is added for unit conversion, this answer is calculated.

Technical Reference(s): Steam Tables  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

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

Learning Objective: WLP-OPS-TYR03 obj. 7, 8 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam QID P275

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 14  
55.43 \_\_\_\_\_

Comments: Discuss possibility of stem having a greater connection to a Waterford system. Tied to Waterford by using temperature and pressure that are consistent with Waterford 3 parameters. SAT.



**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: B

Explanation: (Optional)

- A. Incorrect. Calculated using Mollier diagram using moisture lines and pressure lines. The student must understand this is a constant enthalpy process.
- B. **CORRECT**: Calculated using Mollier diagram using moisture lines and pressure lines. The student must understand this is a constant enthalpy process.
- C. Incorrect. Calculated using Mollier diagram using moisture lines and pressure lines. The student must understand this is a constant enthalpy process.
- D. Incorrect. Calculated using Mollier diagram using moisture lines and pressure lines. The student must understand this is a constant enthalpy process.

Technical Reference(s): WLP-OPS-THY03 pages 80 and 81  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

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

Learning Objective: WLP-OPS-THY03 obj. 8 (As available)  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New X

Question History: Last NRC Exam QID P7140 in the NRC Exam Bank

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 14  
55.43 \_\_\_\_\_

Comments: No comments.

**2023 NRC Exam  
RO Written Exam Worksheet**

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	193009 K1.01	
	Importance Rating	2.8	

K/A Statement

(193009 K1.01) **CORE THERMAL LIMITS:** Explain radial peaking factor.

Proposed Question: RO 75 Rev: 0

Radial peaking factor (FX<sub>Y</sub>) is the ratio of the     (1)     heat flux at one core elevation to the average heat flux for     (2)     elevation.

- |                    |                    |
|--------------------|--------------------|
| <u>    (1)    </u> | <u>    (2)    </u> |
| A. minimum         | the same           |
| B. minimum         | a different        |
| C. maximum         | the same           |
| D. maximum         | a different        |

**2023 NRC Exam  
RO Written Exam Worksheet**

Proposed Answer: C

Explanation: (Optional)

- A. Incorrect. Plausible since minimum heat flux is used in the calculation of average heat flux. The same plane is correct.
- B. Incorrect. Plausible since minimum heat flux is used in the calculation of average heat flux. A different plane is plausible since it is used to calculate axial or linear heat flux.
- C. **CORRECT.** explanation of radial peaking factor.
- D. Incorrect. Plausible since maximum heat flux is correct and a different plane is used to calculate axial or linear heat flux.

Technical Reference(s): WLP-OPS-TYH09, Core Thermal Limits  
(Attach if not previously provided) \_\_\_\_\_  
(including version/revision number) \_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-TYH09 Objective 2 (As available)  
\_\_\_\_\_

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_ (Note changes or attach parent)  
New \_\_\_\_\_

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2  
Comprehension or Analysis \_\_\_\_\_

10 CFR Part 55 Content: 55.41 1  
55.43 \_\_\_\_\_

Comments: No comments.

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 76:                      SRO 1

Given:

- An Excess Steam Demand occurred
- SIAS, CIAS, MSIS and CSAS have been initiated
- After entering OP-902-004, Excess Steam Demand Recovery, the BOP reports that CFC A has tripped on overcurrent

The CRS should determine that the \_\_\_\_ (1) \_\_\_\_ safety function is not met. The crew should \_\_\_\_ (2) \_\_\_\_.

	(1)	(2)
A.	containment isolation	go to OP-902-008, Functional Recovery procedure
B.	containment temperature and pressure control	go to OP-902-008, Functional Recovery procedure
C.	containment isolation	remain in OP-902-004, Excess Steam Demand Recovery procedure
D.	containment temperature and pressure control	remain in OP-902-004, Excess Steam Demand Recovery procedure

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 77:                      SRO 2

Given:

- Plant is at 100% power
- Charging Pump A is running
- NAO notifies the control room of a failed pulsation dampener for Charging Pump A
- ATC operator identifies charging flow at 34 gpm and discharge pressure fluctuating

The crew should enter OP-901-112, Charging or Letdown Malfunction, subsection     (1)    . The CRS should direct the crew to     (2)    .

	<u>    (1)    </u>	<u>    (2)    </u>
A.	E1 Charging Malfunction	secure charging pump A, verify adequate VCT level, and start a standby charging pump
B.	E1 Charging Malfunction	place all charging pumps to OFF
C.	E3 Gas Bound Charging Pumps	secure charging pump A, verify adequate VCT level, and start a standby charging pump
D.	E3 Gas Bound Charging Pumps	place all charging pumps to OFF



**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 79:                    SRO 4

Given:

- Reactor tripped from 100% power due to a momentary grid disturbance
- EDG A and EDG B are running with their respective output breakers closed
- Both load sequencers have timed out
- Implementation of OP-902-009, Appendix 1, Diagnostic Flow Chart, is in progress

The CRS should diagnose to       (1)       and the implementation of Appendix 20, Operation of DCT Sump Pumps, is       (2)      .

- |    | <u>      (1)      </u>            | <u>      (2)      </u> |
|----|-----------------------------------|------------------------|
| A. | OP-902-001, Reactor Trip Recovery | required               |
| B. | OP-902-001, Reactor Trip Recovery | <b>NOT</b> required    |
| C. | OP-902-003, Loss of Offsite Power | required               |
| D. | OP-902-003, Loss of Offsite Power | <b>NOT</b> required    |

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question: 80

SRO 5

Given:

- Plant is at 100% power when a loss of B-DC-S occurs

The CRS should implement \_\_\_\_ (1) \_\_\_\_\_. To prevent overflowing the Fuel Oil Day Tank, OP-901-313 Loss of a 125V DC Bus, will direct the crew to secure the EDG B Fuel Oil Transfer Pump by locally \_\_\_\_ (2) \_\_\_\_\_.

	(1)	(2)
A.	OP-901-313, Loss of a 125V DC Bus ONLY	operating the C/S at the EDG control panel
B.	OP-901-313, Loss of a 125V DC Bus ONLY	opening the breaker for the Fuel Oil Transfer Pump at MCC-312B
C.	OP-901-313, Loss of a 125V DC Bus, and OP-902-000, Standard Post Trip Actions concurrently	operating the C/S at the EDG control panel
D.	OP-901-313, Loss of a 125V DC Bus and OP-902-000, Standard Post Trip Actions concurrently	opening the breaker for the Fuel Oil Transfer Pump at MCC-312B

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 81:                      SRO 6

Given:

- Plant is in Mode 1
- The Shift Manager receives a call from the grid operator informing him that Waterford's post-trip grid voltage would be 222 kV.
- Current Line A and B grid voltages do **NOT** meet the requirements of OP-903-066, Electrical Breaker Alignment Check

Based on this information, the crew should \_\_\_\_\_ (1) \_\_\_\_\_ because a projected trip of Waterford 3 should result in \_\_\_\_\_ (2) \_\_\_\_\_.

	(1)	(2)
A.	declare both AC off-site circuits inoperable and enter both Tech Spec 3.8.1.1 and TRM 3.8.1.1	post-trip switchyard voltages that are inadequate to supply emergency loads during a design basis accident
B.	declare both AC off-site circuits inoperable and enter both Tech Spec 3.8.1.1 and TRM 3.8.1.1	post trip excessive current from reduced voltage that will actuate the Waterford 3 SUT protective relays
C.	enter only TRM 3.8.1.1	post-trip switchyard voltages that are inadequate to supply emergency loads during a design basis accident
D.	enter only TRM 3.8.1.1	post trip excessive current from reduced voltage that will actuate the Waterford 3 SUT protective relays

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 82:                    SRO 7

Given:

- Plant is stable at 100% power
- RCS Temperature loop 1 Hot Leg (RC-ITI-0111X) has failed low
- The crew has entered OP-901-110, Pressurizer Level Control Malfunction

As a result of the failed temperature instrument, Letdown flow should     (1)    . The CRS should implement subsection     (2)     of OP-901-110.

- | <u>    (1)    </u> | <u>    (2)    </u>                               |
|--------------------|--|
| A.    rise         | E1 Pressurizer Level Control Channel Malfunction |
| B.    rise         | E2 Pressurizer Level Setpoint Malfunction        |
| C.    lower        | E1 Pressurizer Level Control Channel Malfunction |
| D.    lower        | E2 Pressurizer Level Setpoint Malfunction        |

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 83:                      SRO 8

The crew has entered OP-901-502, Evacuation of Control Room and Subsequent Plant Shutdown, due to a fire in the Control Room.

The CRS should direct a Nuclear Auxiliary Operator to perform \_\_\_\_\_ (1) \_\_\_\_\_ as an immediate operator action.

If Nuclear Indication becomes suspect at LCP-43, the crew should consider performing Attachment 14, Connecting Excore Neutron Flux Channel D Indicator. This task is performed at the preamplifier located in the \_\_\_\_\_ (2) \_\_\_\_\_.

- | _____ (1) _____  | _____ (2) _____                 |
|--|---------------------------------|
| A. Attachment 1, Electrical Lockout of Reactor Coolant Pumps | RAB Relay Room                  |
| B. Attachment 1, Electrical Lockout of Reactor Coolant Pumps | RAB Electrical Penetration Area |
| C. Attachment 9, Local Operation of ADVs                     | RAB Relay Room                  |
| D. Attachment 9, Local Operation of ADV                      | RAB Electrical Penetration Area |



**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 85:                      SRO 10

Given:

- CRS is prioritizing safety functions in accordance with OP-902-008, Functional Recovery Procedure
- SIAS, CIAS, MSIS and CSAS are present
- Two CEAs have failed to insert and ATC has verified immediate actions are complete
- ATC reports that Reactor Power is  $10^{-5}$  % and dropping
- CRS is evaluating the Reactivity Control Safety Function

\_\_\_\_\_ (1) \_\_\_\_\_ safety function acceptance criteria are met. CRS will implement success path \_\_\_\_\_ (2) \_\_\_\_\_ for Reactivity control.

- |    | _____ (1) _____ | _____ (2) _____ |
|----|-----------------|-----------------|
| A. | Only RC-1       | RC-1            |
| B. | Only RC-1       | RC-2            |
| C. | RC-1 and RC-2   | RC-2            |
| D. | RC-1 and RC-2   | RC-1            |

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 86:                      SRO 11

Given:

- RCS temperature is 180°F and steady
- RCS pressure is 320 PSIA and steady
- SDC Train B is in service
- SDC Train A is secured

The following annunciators are received:

- SIAS Train A Logic Initiated (Cabinet K, G-19)
- SIAS Train B Logic Initiated (Cabinet K, G-20)
- LOOP 1 SDC RELIEF VLV ACTIVE (Cabinet M, A-7)

The addition of borated water       (1)       the capacity of SI-406B, RC Loop 1 SDC Suction LTOP relief to CNTMT Sump. The CRS should secure High Pressure Safety Injection Pumps in accordance with the guidance in       (2)      .

	<u>      (1)      </u>	<u>      (2)      </u>
A.	is within	OP-901-504, Inadvertent ESFAS Actuation
B.	is within	OP-901-131, Shutdown Cooling Malfunction
C.	exceeds	OP-901-504, Inadvertent ESFAS Actuation
D.	exceeds	OP-901-131, Shutdown Cooling Malfunction



**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 88:                      SRO 13

Given:

- Plant is at 100% power
- RCP Speed Sensor input to CPC Channel A fails causing LPD and DNBR trips on CPC Channel A
- Crew attempted to bypass bistables 3 and 4 on CPC Channel A but the bypass pushbuttons on CP-10 failed to go to bypass

The CRS should direct the BOP to utilize the power trip test interlock in accordance with OP-009-007, Plant Protection System and \_\_\_\_\_.

- A. place the Linear Calibrate Switch to zero to bypass bistables 3 and 4
- B. place the Linear Calibrate Switch to zero to trip bistables 3 and 4
- C. pull the associated bistable comparator cards to bypass bistables 3 and 4
- D. pull the associated bistable comparator cards to trip bistables 3 and 4

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 89:                      SRO 14

Given:

- Plant is at 100% power when a loss of the 125 VOLT DC BUS TGB-DC occurs
- The crew has entered OP-901-313, Loss of a 125 Volt DC Bus

The loss of the TGB-DC bus will result in the failure to load for all       (1)       . If the 125 VOLT DC BUS TGB-DC cannot be restored, the crew should be required to perform the actions of OP-901-313 subsection E4, 125 VOLT DC BUS TGB-DC concurrently with       (2)       .

<u>      (1)      </u>	<u>      (2)      </u>
A. Station Air Compressors only	OP-010-005, Plant Shutdown
B. Station Air Compressors only	OP-901-212, Rapid Plant Power Reduction
C. Station Air and Instrument Air Compressors	OP-010-005, Plant Shutdown
D. Station Air and Instrument Air Compressors	OP-901-212, Rapid Plant Power Reduction

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 90:                      SRO 15

Given:

The plant is at 100% power when the following annunciator is received:

- EDG A FUEL OIL STORAGE TANK LEVEL HI/LO

The minimum required levels for Diesel Fuel Oil Storage local indication and PMC indication to meet TS 3.8.1.3, Diesel Fuel Oil, are located in       (1)      .

If Diesel Fuel Oil Storage Tank is below a six day supply,       (2)       entry is required.

<u>                  (1)                  </u>	<u>                  (2)                  </u>
A. OP-009-002, Emergency Diesel Generator	TS 3.8.1.3, Diesel Fuel Oil Storage only
B. OP-009-002, Emergency Diesel Generator	TS 3.8.1.3, Diesel Fuel Oil Storage and TS 3.8.1.1, AC Electrical Power Sources
C. OP-903-001 Technical Specification Surveillance Logs	TS 3.8.1.3, Diesel Fuel Oil Storage only
D. OP-903-001 Technical Specification Surveillance Logs	TS 3.8.1.3, Diesel Fuel Oil Storage and TS 3.8.1.1, AC Electrical Power Sources



**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 92:                      SRO 17

Given:

- Power is 100%
- All CEAs fully withdrawn

Five minutes later, the ATC reports the following:

- CEA 38 indicates 135 inches on the CP-2 CEAPDS
- CEA 38 indicates 150 inches on the PMC
- Both the Upper and Lower Electrical Limit lights for CEA 38 are extinguished
- All Rod Bottom lights are extinguished
- Tcold is 541 °F and slowly dropping

To verify CEA position, the CRS should request indication on the       (1)      . The CRS should enter OP-901-102, CEA or CEDMCS Malfunction, sub-section       (2)      .

(1)

(2)

(1)	(2)
A. CPC that CEA 38 is targeted to	E1, CEA Misalignment Greater than 7 inches
B. CPC that CEA 38 is targeted to	E5, CEA Position Indication Malfunction
C. CP-2 digital meter for CEA 38	E1, CEA Misalignment Greater than 7 inches
D. CP-2 digital meter for CEA 38	E5, CEA Position Indication Malfunction

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 93: SRO 18

Given: (REFERENCE PROVIDED)

- Plant is in MODE 3
- Fuel movement is occurring in the Spent Fuel Pool

<u>Containment Purge Monitor Reading</u>	<u>Monitor Alarm/Trip Setpoint</u>
ARM-IRE-5024S reads 150 mR/hr	290 mR/hr
ARM-IRE-5025S reads 140 mR/hr	300 mR/hr
ARM-IRE-5026S reads 19 mR/hr	40 mR/hr
ARM-IRE-5027S reads 15 mR/hr	50 mR/hr

ARM-IRE-\_\_\_\_(1)\_\_\_\_ are inoperable. Technical Specification 3.3.3.1 entry is  
\_\_\_\_(2)\_\_\_\_.

- | (1)                       | (2)          |
|---------------------------|--------------|
| A. 5025S <u>and</u> 5027S | required     |
| B. 5024S <u>and</u> 5026S | not required |
| C. 5025S <u>and</u> 5027S | not required |
| D. 5024S <u>and</u> 5026S | required     |

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 94:                      SRO 19

Given:

- Reactor Trip has occurred
- The BOP is Verifying RCS Heat Removal in accordance with OP-902-000, Standard Post Trip Actions
- The BOP informs the CRS that power to the Moisture Separator Reheater (MSR) Control Panel is not available

The CRS should direct the Turbine Building watch to isolate the MSR by  
\_\_\_\_\_.

- A. isolating the air and gagging closed all 5 inch and 10 inch Temperature Control valves
- B. de-energizing and manually closing the 5 inch and 10 inch Motor Operated valves only
- C. de-energizing and manually closing the 1 inch, 5 inch and 10 inch Motor Operated valves only
- D. isolating the air and opening the petcock to all 5 inch and 10 inch Temperature Control valves

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 95:                      SRO 20

Given:

- Plant is performing a cooldown for a refueling outage
- RCS temperature is 195 °F
- RCS pressure is 350 psia
- EDG B is tagged out

Offsite power train A is then declared inoperable because of a voltage problem.

The CRS should ensure \_\_\_\_\_ is aligned as the operable boration flow path per OP-903-002, Boration Flow Path Valve Lineup Verification.

- A. Boric Acid Makeup Tank B Gravity Feed Valve and Charging Pump B
- B. Boric Acid Makeup Tank A Gravity Feed Valve and Charging Pump A
- C. Boric Acid Makeup Pump A and Charging Pump A
- D. Boric Acid Makeup pump B and Charging pump B



**2023 NRC Exam  
SRO Written Exam Worksheet**

Question 97:                      SRO 22

A required 72 hour technical specification surveillance was inadvertently missed and was last performed 7 days ago. A risk evaluation has been performed and the risk impact is being managed.

Technical Specification 4.0.3 requires the surveillance be performed no later than \_\_\_\_\_ from the time of discovery or the system/component must immediately be declared inoperable.

- A. 18 hours
- B. 24 hours
- C. 72 hours
- D. 90 hours



**2023 NRC Exam  
SRO Written Exam Worksheet**

Question:99

SRO 24

Per EP-002-102, Emergency Operations Facility (EOF), Activation, Operation and Deactivation, the lowest level of event classification that requires activation of the Emergency Operations Facility (EOF) is an       (1)      . It is the responsibility of the       (2)       to direct the activities of the EOF including overall management of the total emergency response.

- |    |                                 |   |
|----|---------------------------------|---|
| A. | <u>      (1)      </u><br>Alert | <u>      (2)      </u><br>Emergency Plant Manager |
| B. | Alert                           | Emergency Director                                |
| C. | Unusual Event                   | Emergency Plant Manager                           |
| D. | Unusual Event                   | Emergency Director                                |

**2023 NRC Exam  
SRO Written Exam Worksheet**

Question:100

SRO 25

At time 0900, an Alert classification was declared

The Initial Notification to offsite agencies must be made no later than time (1). Without a change in emergency classification, subsequent notifications to offsite agencies must be made no later than 60 minutes of the (2).

- |    |            |                               |
|----|------------|-------------------------------|
|    | <u>(1)</u> | <u>(2)</u>                    |
| A. | 0915       | previous notification message |
| B. | 0915       | alert classification          |
| C. | 0930       | previous notification message |
| D. | 0930       | alert classification          |

2023 NRC Exam  
Waterford 3  
Senior Reactor Operator

1.	C
2.	D
3.	A
4.	B
5.	C
6.	C
7.	A
8.	C
9.	D
10.	A
11.	B
12.	D
13.	D
14.	B
15.	A
16.	C
17.	B
18.	C
19.	B
20.	A
21.	C
22.	D
23.	A
24.	A
25.	D
26.	C
27.	C
28.	D
29.	B
30.	D
31.	A
32.	D
33.	C
34.	A
35.	C
36.	B
37.	B
38.	C
39.	A
40.	A
41.	C
42.	D
43.	C
44.	D
45.	B
46.	C
47.	A
48.	D
49.	A
50.	B

2023 NRC Exam  
Waterford 3  
Senior Reactor Operator

51.	A	S1.	C
52.	B	S2.	D
53.	A	S3.	C
54.	A	S4.	C
55.	D	S5.	D
56.	B	S6.	A
57.	B	S7.	B
58.	A	S8.	B
59.	B	S9.	B
60.	C	S10.	C
61.	D	S11.	A
62.	C	S12.	D
63.	D	S13.	B
64.	D	S14.	D
65.	C	S15.	B
66.	B	S16.	A
67.	A	S17.	A
68.	D	S18.	C
69.	C	S19.	D
70.	C	S20.	C
71.	B	S21.	D
72.	D	S22.	C
73.	A	S23.	B
74.	B	S24.	B
75.	C	S25.	A

## INSTRUMENTATION

### 3/4.3.3 MONITORING INSTRUMENTATION

#### RADIATION MONITORING INSTRUMENTATION

### LIMITING CONDITION FOR OPERATION

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3.3.3.1 The radiation monitoring instrumentation channels shown in Table 3.3-6 shall be OPERABLE with their alarm/trip setpoints within the specified limits.

APPLICABILITY: As shown in Table 3.3-6.

ACTION:

- a. With a radiation monitoring channel alarm/trip setpoint exceeding the value shown in Table 3.3-6, adjust the setpoint to within the limit within 4 hours or declare the channel inoperable.
- b. With one or more radiation monitoring channels inoperable, take the ACTION shown in Table 3.3-6.
- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

### SURVEILLANCE REQUIREMENTS

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4.3.3.1 Each radiation monitoring instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations for the MODES and at the frequencies shown in Table 4.3-3.

TABLE 3.3-6

RADIATION MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABLE MODES</u>	<u>ALARM/TRIP SETPOINT</u>	<u>MEASUREMENT RANGE</u>	<u>ACTION</u>
1. AREA MONITORS					
a. Deleted					
b. Containment - Purge & Exhaust Isolation	1/train	1, 2, 3, 4 & **	40 mR/h or $\leq 2x$ background whichever is Higher	20 - $5 \times 10^5$ mR/h	25
2. PROCESS MONITORS					
a. DELETED					
b. Control Room Intake Monitors	1/intake	ALL MODES & ***	$\leq 5.45 \times 10^{-6}$ $\mu$ Ci/cc	$10^{-8}$ - $10^{-2}$ $\mu$ Ci/cc	26
c. Steam Generator Blowdown Monitor	1	1, 2, 3, & 4	$\leq 10^{-3}$ $\mu$ Ci/cc	$10^{-6}$ - $10^{-1}$ $\mu$ Ci/cc	28
d. Component Cooling Water Monitors A&B	1/line	ALL MODES	$\leq 10^{-4}$ $\mu$ Ci/cc	$10^{-7}$ - $10^{-2}$ $\mu$ Ci/cc	28
e. Component Cooling Water Monitor A/B	1	1, 2, 3, & 4	$\leq 10^{-4}$ $\mu$ Ci/cc	$10^{-7}$ - $10^{-2}$ $\mu$ Ci/cc	28

\*Deleted

\*\*During CORE ALTERATIONS or load movements with or over irradiated fuel within the containment.

\*\*\*During load movements with or over irradiated fuel.

SPECIFIC SYSTEM GUIDELINES (CONT'D)

Containment Isolation (Cont'd)

<u>Component</u>	<u>Applicable Mode(s)</u>	<u>Affected Systems and Tech Specs</u>	<u>Required Action(s)</u>
Containment Isolation (Cont'd)	1, 2, 3, 4	Containment Isol. - 3.6.3	<ul style="list-style-type: none"> <li>In MODES 1-4, if the minimum required Containment Purge Rad Monitors are not Operable per TS 3.3.3.1, <u>then</u> in addition to entering TS 3.3.3.1, declare the associated valves Inoperable and enter TS 3.6.3:  <u>Train A (ARMIR5025 and ARMIR5026):</u>            Valves CAP-103, CAP-104, CAR-200B  <u>Train B (ARMIR5024 and ARMIR5027):</u>            Valves CAP-203, CAP-204, CAR-202B            [CR-WF3-2017-9736]</li> </ul>