

**MASTER NRC EXAM  
Vermont Yankee  
November 29, 2010**

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	295028 EA1.03	
	Importance Rating	3.9	

(K&A Statement) EA1.03- Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE: Drywell cooling system

Proposed Question: RO 1

K/A Related to  
TEMP. QUESTION IS  
ABOUT PRESSURE

While operating at rated power and ALL drywell RRUs running, a leak in the drywell has resulted in entry conditions into EOP-3, "Primary Containment Control", on Drywell Pressure AND Drywell Temperature.

All plant systems respond as expected based on the entry condition into EOP-3.

Drywell pressure is 4 psig and slowly rising. No operator actions have been taken in EOP-3.

Which ONE of the following must be performed to control drywell cooling?

The operator must \_\_\_\_\_.

- monitor drywell temperature to ensure RRUs continue to operate as drywell pressure rises toward their trip setpoint
- wait for drywell pressure to lower to less than 2.5 psig and then verify all drywell RRUs automatically restart
- depress the "DRYWELL CLG AND CTRL ROOM A/C BLOCKING RESET" pushbutton on CRP 9-25 and ALL drywell RRUs will automatically restart
- place the "DRYWELL RRU PCIS TRIP MCA BYPASS SW" keylock in the MCA Bypass position on CRP 9-25 and ALL drywell RRUs will automatically restart

Why is this plausible?

Proposed Answer: D

- INCORRECT: RRUs are not operating due to tripping at at 2.5 psig in the drywell
- INCORRECT: Drywell RRUs do not auto restart less that 2.5 psig
- INCORRECT: This switch would be operated if there was a loss of power to buses 9 and/or 9

**D. CORRECT: IAW OP 2115 Section F.2**

Technical Reference(s): OP 2115 (discussion and section F.2 (NOTE)) (Attach if not previously provided)

Proposed references to be provided to applicants during  
examination:

None

Learning Objective: LOT-00-288 objective K10 (As available)

Question Source: Bank # 246  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295016 AA1.08	
	Importance Rating	4.0	_____

(K&A Statement) AA1.08- Ability to operate and/or monitor the following as they apply to CONTROL ROOM  
ABANDONMENT: Reactor pressure

Proposed Question: RO 2

As directed by OP 3126, "Shutdown Using Alternate Shutdown Methods", SRV operation is conducted outside the Control Room by realigning power to the SRV control circuit.

Which ONE of the following is needed to allow operation of the selected SRVs to conduct a plant cooldown from outside the Control Room?

Transfer the \_\_\_\_\_ (1) \_\_\_\_\_ to allow operation of the \_\_\_\_\_ (2) \_\_\_\_\_ SRVs.

**NOTE:** Assume all Alternate Shutdown power supplies are available.

- A. (1) Appendix R Bypass Switch on CRP 9-3 to BYPASS  
(2) "A" and "B"
- B. (1) Appendix R Bypass Switch on CRP 9-3 to BYPASS  
(2) "A" and "C"
- C. (1) SRV Control Power Knife switch in the Alternate Shutdown Station ADS Safety Relief Valve Panel (RCIC Corner Room) to EMER  
(2) "A" and "B"
- D. (1) SRV Control Power Knife switch in the Alternate Shutdown Station ADS Safety Relief Valve Panel (RCIC Corner Room) to EMER  
(2) "A" and "C"

Proposed Answer: C

- A. **INCORRECT:** Appendix "R" bypass switch is needed **ONLY** to prevent adverse conditions in the Control Room from affecting SRV operation from outside the Control Room.
- B. **INCORRECT:** Appendix "R" bypass switch is needed **ONLY** to prevent adverse conditions in the Control Room from affecting SRV operation from outside the Control Room.; "C" SRV is not operated outside the Control Room
- C. CORRECT: IAW OP 3126, Appendix "C"**
- D. **INCORRECT:** "C" SRV is not operated outside the Control Room

Technical Reference(s): OP 3126, Appendix "C", (Attach if not previously  
CWD B191301 Sheet 752 provided)  
("A" SRV)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-612 objective EO (As available)  
A.5, LOT-00-218 K1.05

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Reword enhancement; MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295037 EK1.01	
	Importance Rating	4.1	_____

(K&A Statement) EK1.01- Knowledge of the operational implications of the following concepts as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Reactor pressure effects on reactor power

Proposed Question: RO 3

Which ONE of the following automatic actions occurs to limit the adverse effect on reactor power in the event of an Anticipated Transient without Scram (ATWS) transient?

A \_\_\_\_\_ (1) \_\_\_\_\_ will trip the Recirculation pump field breaker causing a rapid cessation of forced circulation which will mitigate the \_\_\_\_\_ (2) \_\_\_\_\_.

- A. (1) low-low RPV water level for 5 seconds  
(2) effects of large neutronic/thermal-hydraulic instabilities.
- B. (1) low reactor RPV water level for 10 seconds  
(2) effects of large neutronic/thermal-hydraulic instabilities.
- C. (1) high RPV pressure signal at 1035 psig  
(2) pressure spike expected in the unlikely event that rods fail to insert on the automatic scram signal.
- D. (1) high RPV pressure signal at 1150 psig  
(2) pressure spike expected in the unlikely event that rods fail to insert on the automatic scram signal.

Proposed Answer: D

- A. INCORRECT: low-low water level signal is for 10 seconds
- B. INCORRECT: low-low water level signal is for 10 seconds
- C. INCORRECT: high pressure at 1150 psig
- D. CORRECT: IAW FSAR section 7.18.3.2.1**

Technical Reference(s): FSAR Section 7.18.3.2.1, Figures 7.18-1a, 7.18-1b (Attach if not previously provided)

Proposed references to be provided to applicants during \_\_\_\_\_ None

examination: \_\_\_\_\_

Learning Objective: LOT-00-216, K1.09 (As available)Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New XQuestion History: Last NRC Exam NoQuestion Cognitive Level: Memory or Fundamental Knowledge X  
Comprehension or Analysis \_\_\_\_\_10 CFR Part 55 Content: 55.41 8,9,10  
55.43 \_\_\_\_\_

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295003 2.1.20	_____
	Importance Rating	4.6	_____

(K&A Statement) 2.1.20- Ability to interpret and execute procedure steps

Proposed Question: RO 4

With the plant operating at full rated power, a loss of Bus 1 occurs.

Shortly after all immediate actions had been taken IAW OT 3169, "Loss of Bus 1", a steam leak develops in the steam tunnel. Main Steam Line Tunnel conditions are as follows:

- Main Steam Line tunnel temperature at 204°F and slowly rising

No other electrical distribution operations have been performed.

Twenty minutes after the steam leak developed, which ONE of the following is NOT an option for Reactor pressure control?

Reactor pressure CANNOT be controlled using the \_\_\_\_\_ system.

- Mechanical Hydraulic Control (MHC)
- High Pressure Coolant Injection (HPCI)
- Reactor Core Isolation Cooling (RCIC)
- Safety Relief Valve (SRV)

Proposed Answer: A

- CORRECT: MHC system Auxiliary oil pump is powered from Bus 6 which is powered from bus 1; oil pressure to operate the bypass valves will be lost prior to 20 minutes.**
- INCORRECT: HPCI will not isolate at the 20 minute point thus will still be available
- INCORRECT: RCIC will not isolate at the 20 minute point thus will still be available
- INCORRECT: Nothing will prevent SRVs from being operated given the plant conditions

Technical Reference(s): OPOT-3169-01 (NOTES), OP 2120, OP 2121, EOP-1 (Attach if not previously provided)

Proposed references to be provided to applicants during  
examination:

None

Learning Objective: LOT-00-602 RO EO5 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295018 AK3.03	_____
	Importance Rating	3.1	_____

(K&A Statement) AK3.03- Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: Securing individual components (prevent equipment damage)

Proposed Question: RO 5

Which ONE of the following is the DESIGN BASIS for automatically isolating Turbine Building non-essential SW loads upon lowering SW pressure?

The basis behind the automatic isolation of non-essential SW loads is to \_\_\_\_\_.

- A. reduce the leak rate of a postulated design basis rupture downstream of the valves
- B. preclude the possibility of SW pump damage due to a pump runout condition
- C. ensure the design SW flow to each EDG exists following an LNP coincident with a LOCA
- D. provide adequate flow to CT-2 and the Deep Basin in the event that Alternate Cooling is required

Proposed Answer: B

- A. INCORRECT: Not the DESIGN basis for isolating non-essential SW loads
- B. CORRECT: ON 3148 discussion and SW DBD**
- C. INCORRECT: Not the DESIGN basis for isolating non-essential SW loads
- D. INCORRECT: Not the DESIGN basis for isolating non-essential SW loads

Technical Reference(s): ON 3148 discussion, Service Water DBD sections 3.4 and 3.5 (Attach if not previously provided)

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\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

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ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-603, objective RO (As available)  
EO4

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295026	EK3.01
	Importance Rating	3.8	_____

(K&A Statement) EK3.01- Knowledge of the reasons for the following responses as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Emergency/normal depressurization

Proposed Question: RO 6

EOP-3, "Primary Containment Control", directs an Emergency Depressurization (RPV-ED) if Torus temperature cannot be maintained below the Heat Capacity Temperature Limit (HCTL) curve.

Which ONE of the following identifies the basis for this action?

Performing an RPV-ED at this point will ensure that the subsequent rise in \_\_\_\_\_.

- A. Torus temperature will not raise Torus pressure above the Primary Containment Pressure Limit-A
- B. Torus level will not raise Torus pressure above the Primary Containment Pressure Limit-A.
- C. Torus temperature will not raise Torus pressure above the Pressure Suppression Pressure
- D. Torus level will not raise Torus pressure above the Pressure Suppression Pressure

Proposed Answer: A

**A. CORRECT: Basis is IAW Volume 4 section 8, page 9 of 43**

B. INCORRECT: Concern is Torus temperature

C. INCORRECT: Concern is PCPL-A

D. INCORRECT: Concern is PCPL-A

Technical Reference(s): EOP Volume 4 Study Guide section 8, page 9 of 43 (Attach if not previously provided)

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\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-00-607 objective RO3 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # 3548 (Q51 2007  
exam)  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

## Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295038 EK1.02	
	Importance Rating	4.2	_____

(K&A Statement) EK1.02 Knowledge of the operational implications of the following concepts as they apply to HIGH OFF-SITE RELEASE RATE: Protection of the general public

Proposed Question: RO 7

The calculated consequences of the design bases accidents that have the greatest potential off-site radiation exposures are proven to be less than which ONE of the following 10CFR50.67 dose limits for the Accident Source Term (AST) and subsequent exposure received at the boundary of the low population zone?

- A. 10 REM TEDE
- B. 25 REM TEDE
- C. 50 REM TEDE
- D. 75 REM TEDE

Where TEDE = Total Effective Dose Equivalent

Proposed Answer: B

- A. INCORRECT: Emergency Dose Limit for Saving property and plant equipment
- B. CORRECT: IAW 10CFR50.67 and UFSAR section 1.8.3**
- C. INCORRECT: Not a correct limit
- D. INCORRECT: Emergency Dose Limit for Saving lives on a voluntary basis

Technical Reference(s): UFSAR section 1.8.3 (Attach if not previously provided)

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\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

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ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-616, objective 8 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

10 CFR Part 55 Content: 55.41 8,9,10  
55.43 \_\_\_\_\_

Comments:  
MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295006	AA1.06
	Importance Rating	3.5	_____

(K&A Statement) AA1.06- Ability to operate and/or monitor the following as they apply to SCRAM: CRD hydraulic system

Proposed Question: RO 8

A low reactor water level condition resulted in a full scram. Water level during the transient went as low as 105" and is currently being maintained in the normal post scram water level control band. OP 0109, "Plant Restoration", actions have NOT been performed.

Which ONE correctly describes the CRD Hydraulic system response following a valid auto scram signal by RPS which resulted in the insertion of ALL control rods?

- A. The Scram Solenoid Pilot Valves (CRD-117 and CRD-118) de-energize; the ARI/RPT Valves (ARI-A and ARI-B) energize.
- B. The Scram Solenoid Pilot Valves (CRD-117 and CRD-118) energize; the ARI/RPT Valves (ARI-A and ARI-B) de-energize.
- C. The Scram Solenoid Pilot Valves (CRD-117 and CRD-118) de-energize; the Back-up Scram Valves (CRD-140A and CRD-140B) energize.
- D. The Scram Solenoid Pilot Valves (CRD-117 and CRD-118) energize; the Back-up Scram Valves (CRD-140A and CRD-140B) de-energize.

Proposed Answer: C

- A. INCORRECT: ARI valves will not energize for this scenario
- B. INCORRECT: 117/118 valves de-energize, ARI valves are not affected for this scenario
- C. CORRECT: RPS is de-energize to function; Backup scram valves are energized to function (DC power)**
- D. INCORRECT: 117/118 valves de-energize

Technical Reference(s): RPS DBD page 2 of 72

(Attach if not previously provided)

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-01-201, objective K1.07 (As available)

Question Source: Bank # 6746  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH: Why are we telling the candidate what level lowered to? To take away the possibility that ARI valves energized on low-low level for 82.5 inches

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295023 AK2.07	_____
	Importance Rating	3.6	_____

(K&A Statement) AK2.07- Knowledge of the interrelations between REFUELING ACCIDENTS and the following: Standby gas treatment/FRVS

Proposed Question: RO 9

When determining the radiological consequences of the Design Basis Refueling Accident, which ONE of the following does the accident take CREDIT for?

- A. An elevated release via the plant Stack with NO filtration provided by Standby Gas Treatment
- B. An elevated release via the plant Stack with filtration provided by ONLY one train of Standby Gas Treatment
- C. An elevated release via the plant Stack with filtration provided by BOTH trains of Standby Gas Treatment
- D. A ground level release due to a failed Secondary Containment and failure of Standby Gas Treatment

Proposed Answer: A

- A. **CORRECT- The Design Basis rod drop accident takes credit for SBGT starting (PCIS group 3) however, it does not take credit for filtration.**
- B. INCORRECT: no credit is taken for filtration
- C. INCORRECT: no credit is taken for filtration
- D. INCORRECT: credit is taken for an elevated release via plant Stack

Technical Reference(s): UFSAR Section 14.6.4.3.2 (Attach if not previously provided)

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\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

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Learning Objective: LOT-00-620 objective EO2 (As available)

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

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

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

Comments:  
MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295025 EA1.03	
	Importance Rating	4.4	_____

(K&A Statement) EA1.03- Ability to operate and/or **monitor** the following as they apply to HIGH REACTOR PRESSURE:  
Safety/relief valve: Plant specific

Proposed Question: RO 10

Which ONE of the following identifies how Safety Relief Valves (SRVs) and Safety Valves (SVs) operate to prevent exceeding the pressure Safety Limit during an overpressure transient?

- A. 4 SRVs lift by 1080 psig and 3 Safety valves lift at 1140 psig
- B. 4 SRVs lift by 1100 psig and 3 Safety valves lift at 1240 psig
- C. 3 SRVs lift by 1080 psig and 4 Safety valves lift at 1140 psig
- D. 3 SRVs lift by 1100 psig and 4 Safety valves lift at 1240 psig

Proposed Answer: B

- A. INCORRECT: SRVs lift by 1100 psig; SVs lift at 1240 psig
- B. **CORRECT TS Table 2.2.1 and TS bases 3.6.D**
- C. INCORRECT: SRVs life by 1100 psig; 3 SVs lift at 1240 psig
- D. INCORRECT: 3 SRVs do by 1100 psig, however there are only 3 SVs that lift at 1240 psig.

Technical Reference(s): TS Table 2.2.1 and TS bases 3.6.D (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-308, objective RO EO 4 (As available)

Question Source: Bank # \_\_\_\_\_

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Modified Bank # \_\_\_\_\_  
New       X      

Question History: Last NRC Exam       No      

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	295030 EK3.03	
	Importance Rating	3.6	

(K&A Statement) EK3.03- Knowledge of the reasons for the following responses as they apply to LOW SUPPRESSION POOL WATER LEVEL: RCIC operation

Proposed Question: RO 11

In accordance with EOP-3, "Primary Pressure Control", which ONE of the following describes the action and associated bases to be taken when Torus level cannot be maintained above 7 feet?

- A. Safety relief valve operation is prohibited based on uncovering the T-Quenchers. Operation below this level will directly pressurize the Torus airspace, thus reducing the margin to exceeding PCPL-A.
- B. Only RCIC operation is prevented based on uncovering the exhaust discharge device, thus reducing the margin to PCPL-A. The HPCI discharge device is not uncovered until Torus level reaches 5.5 feet in the Torus.
- C. Only HPCI operation is prevented based on uncovering the exhaust discharge device. RCIC operation exhaust flow is negligible and will not result in exceeding PCPL-A.
- D. Both HPCI and RCIC operation is prevented due to uncovering each exhaust discharge device. Operation of both systems below this Torus level will result in reducing the margin to PCPL-A.

Proposed Answer: C

- A. INCORRECT: T Quenchers uncover at 5.5 feet
- B. INCORRECT: RCIC exhaust is sized such that the adverse affects are negligible
- C. CORRECT: IAW EOP Volume 4 study guide**
- D. INCORRECT: RCIC exhaust is sized such that the adverse affects are negligible

Technical Reference(s): EOP Volume 4 Study Guide, Section 8, page 34 of 43. (Attach if not previously provided)

Proposed references to be provided to applicants during examination:

None

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-607, objective RO 3 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:  
MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295019 AK2.05	
	Importance Rating	3.4	_____

(K&A Statement) AK2.05- Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR and the following: Main steam system

Proposed Question: RO 12

The plant was operating at 80% RTP when the plant was manually scrammed due to a complete loss of instrument air. The lowest level that was reached during the scram was 98 inches before recovering to the normal band.

Which ONE of the following identifies the response to the Main Steam System on a loss of Instrument Air?

- A. ONLY the inboard MSIVs will fail shut
- B. ONLY the outboard MSIVs will fail shut
- C. ALL MSIVs will fail shut
- D. ALL MSIVs will remain open

Proposed Answer: B

- A. INCORRECT: inboard MSIVs are unaffected by a loss of air during normal operations
- B. CORRECT: outboard MSIVs will fail closed**
- C. INCORRECT: Inboard MSIV are unaffected by a loss of air during normal operations
- D. INCORRECT: outboard MSIVs will fail closed

Technical Reference(s): ON 3146, Appendix "A" (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-239, objective (As available)  
K1a.1.12a

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Question Source: Bank # 7223  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

Changed "C" from Both inboard and outboard to: ALL  
MH Operations review SAT (9-15-10)

## APPENDIX A

## EXPECTED SYSTEM RESPONSE UPON LOSS OF AIR

SYSTEM - NUCLEAR BOILERCOMPONENTEXPECTED SYSTEM RESPONSE UPON LOSS OF AIRRV-17  
RV-18

Reactor Head Vent Valves to Drywell Sump. Capacity to vent the reactor be lost due to valves failing closed.

RV-39  
RV-40

Recirc Loop Sample Isolation Valves. Capacity to obtain a sample would be lost due to the valves failing closed.

MS-86A  
MS-86B  
MS-86C  
MS-86D

MSIVs outside containment will close resulting in a reactor scram.

MS-80A  
MS-80B  
MS-80C  
MS-80D

MSIVs inside containment will close resulting in a reactor scram if the instrument air system was cross-connected to the inboard MSIVs prior to the nitrogen system being placed in service.

SYSTEM - CONTROL ROD DRIVECOMPONENTEXPECTED SYSTEM RESPONSE UPON LOSS OF AIRCRD-32A  
CRD-32B

Reactor control rod scram discharge volume (SDV) vent and drain valves close upon a loss of air. Remote vent and drain operation of the SDVs would be lost upon loss of air pressure. Local manual valve operation would be required.

CRD-33A  
CRD-33B  
CRD-33C  
CRD-33DCRD-126  
CRD-127

Upon a loss of air, these valves (89 each) open to allow control rod drive water to discharge to the scram discharge volumes. This results in a reactor scram.

CRD-19A  
CRD-19BFail closed which results in increased charging water flow and pressure. Drive and cooling water flow, and drive  $\Delta p$  go to zero.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295031 EA2.04	
	Importance Rating	4.6	_____

(K&A Statement) EA2.04- Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Adequate core cooling

Proposed Question: RO 13

A large break Loss of Coolant Accident (LOCA) coincident with an Anticipated Transient without Scram (ATWS) event has occurred.

EOP-2, "ATWS RPV Control" has been entered and due to the inability to maintain the required minimum RPV level band, an RPV-ED has been ordered.

Which ONE of the following scenarios will Adequate Core Cooling (ACC) be assured of?

ACC can be assured as long as \_\_\_\_\_ following the RPV-ED.

- A. RPV pressure can be maintained greater than Minimum Steam Cooling Pressure (MSCP) regardless of RPV level
- B. a Core Spray Pump can be started with at least 3250 gpm flow to restore and maintain RPV level above -25 inches
- C. BOTH Core Spray Pumps can be started with each providing at least 1625 gpm flow to restore and maintain RPV level above -48 inches
- D. the Residual Heat Removal (RHR) System can provide adequate injection to restore and maintain RPV level above -48 inches

Proposed Answer: A

- A. **CORRECT: Steam Cooling is provided during an ATWS as long as pressure remains above MSCP during RPV-ED**
- B. INCORRECT: Core Spray is not taken credit for ACC during an ATWS due to uncertainties in the power distribution ensuring all areas are cooled by receiving the uniform spray pattern. Although it can be used after the RPV-ED to provide steam cooling, it needs to be at least -19 inches (MSCRWL)
- C. INCORRECT: Core Spray is not taken credit for ACC during an ATWS due to uncertainties in the power distribution ensuring all areas are cooled by receiving the uniform spray pattern.
- D. INCORRECT: Level must be TAF to ensure core submergence using the RHR system

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Technical Reference(s): EOP Study Guide, Volume 4 (Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination: None

\_\_\_\_\_

Learning Objective: LOT-00-610 objective EO (As available)  
2.4.18

\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

\_\_\_\_\_

Question History: Last NRC Exam No

\_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_

Comments:

Upon Operations review, two correct answers (A,D); changed "D" to -48 inches to make incorrect and changed "B" to -19 inches to balance out distractors

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	700000 AA2.03	_____
	Importance Rating	3.5	_____

(K&A Statement) AA2.03- Ability to determine and/or interpret the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Generator current outside the capability curve

Proposed Question: RO 14

The plant is operating at full rated power when a leak in the Main Generator casing has resulted in Generator hydrogen pressure being reduced from 43.8 psig to 32 psig.

The following are the current Main Generator parameters:

- Generator Gross: 634.0 MW<sub>e</sub> and steady
- Gross VARS: 16 MVAR (lag) and steady
- Generator H<sub>2</sub> pressure: 32 psig and steady

Which ONE of the following is required based on the current Main Generator parameters?

**NOTE:** OP 2140 Figure 1 is provided as a reference

- A. Reduce real load on the Main Generator
- B. Reduce Reactive load (in) on the Main Generator
- C. Reduce Reactive load (out) on the Main Generator
- D. Monitor H<sub>2</sub> pressure and take appropriate action ONCE outside the Generator Capability Curve.

Proposed Answer: A

- A. CORRECT: IAW OP 0105 precaution, maintain within the limits of the Generator Capability Curve**
- B. INCORRECT: Reactive load reduction will not result in getting within the limits of the Generator Capability Curve
- C. INCORRECT: Reactive load reduction will not result in getting within the limits of the Generator Capability Curve
- D. INCORRECT: The current plant conditions place operation outside the Generator Capability Curve.

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Technical Reference(s): OP 2140 (Attach if not previously provided)  
RP 2161  
OP 0105  
\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination: OP 2140, Figure 1  
\_\_\_\_\_

Learning Objective: LOT-00-305, objective RO (As available)  
EO2  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295004 AK3.01	_____
	Importance Rating	3.4	_____

(K&A Statement) AK3.01 Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: load shedding: Plant specific

Proposed Question: RO 15

With the plant operating at 70% RTP, the crew is responding to a loss of DC-1.

Shortly thereafter, a loss of Bus 4 occurs. At the time of the loss of Bus 4, NO actions have been taken for the loss of DC-1 IAW ON 3159, "Loss of DC-1".

The electrical distribution system operated as designed for the loss of Bus 4.

Which ONE of the following describes the load shed response?

Due to DC control power being \_\_\_\_\_.

- A. available, all equipment on Bus 8 and MCCs 8A→8D will load shed as designed
- B. unavailable, the load shed feature for Bus 8 and MCCs 8A→8D will be disabled resulting in loads starting immediately when power is restored
- C. available, all equipment on Bus 9 and MCCs 9A→9D will load shed as designed
- D. unavailable, the load shed feature for Bus 9 and MCCs 9A→9D will be disabled resulting in loads starting immediately when power is restored

Proposed Answer: C

- A. INCORRECT: A loss of DC-1 will result in normal control power being lost to buses 1,3,8; Bus 8 equipment will NOT load shed on a loss of Bus 4
- B. INCORRECT: A loss of DC-1 will result in normal control power being lost to buses 1,3,8; Bus 8 equipment will NOT load shed on a loss of Bus 4
- C. CORRECT: Bus 9 control power is available (normal is DC-2) thus Bus 9 equipment will load shed as designed after bus 4 power is lost.**
- D. INCORRECT: A loss of DC-1 will result in normal control power being lost to buses 1,3,8; Bus 8 equipment will NOT load shed on a loss of Bus 4

Technical Reference(s): OP 2145, Appendix "C"

(Attach if not previously provided)

Proposed references to be provided to applicants during  
examination:

None  
\_\_\_\_\_

Learning Objective: LOT-01-262, objective K6.01 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

10\_CFR Part 55 Content: 55.41 5  
55.43 \_\_\_\_\_

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	600000 AA2.16	_____
	Importance Rating	3.0	_____

(K&A Statement) AA2.16 Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: Vital equipment and control systems to be maintained and operated during a fire

Proposed Question: RO 16

With the plant operating at full power operations, an LNP occurs. All plant equipment operates as designed.

Shortly after, a fire in the "A" EDG Room breaks out due to a lube oil rupture.

Which ONE of the following identifies a system that has been analyzed to be available for the safe shutdown of the plant IAW OP 3020, "Fire Emergency Response Procedure", Appendix M, if needed for the current plant conditions?

- A. SW Pump "D" for auxiliary support
- B. RHRSW Pump "A" for auxiliary support
- C. Reactor Feed Pump "C" for inventory control
- D. CRD Pump "A" for coolant inventory and reactivity control

Proposed Answer: A

A. INCORRECT: B, C, D could be adversely affected by a fire in the "A" EDG under the given conditions. Thus they have not been analyzed to be available.

**B. CORRECT: Analyzed to be available IAW OP 3020 Appendix "K"**

Technical Reference(s): OP 3020, Appendix K (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-286, K3.03 (As available)

Question Source: Bank # \_\_\_\_\_

Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Question originally stated fire in the East Switchgear room and the distractors were deemed to difficult to be able to recall from memory.

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295021 AK2.07	
	Importance Rating	3.1	_____

(K&A Statement) AK2.07- Knowledge of the interrelations between LOSS OF SHUTDOWN COOLING and the following:  
Reactor recirculation

Proposed Question: RO 17

With the reactor shutdown and vessel head installed, a trip of the ONLY available RHR pump has resulted in the loss of Shutdown Cooling. The CRS enters ON 3156, "Loss of Shutdown Cooling", and directs that RPV water level be raised due to the inability to re-establish forced circulation.

Which ONE of the following identifies the MINIMUM RPV water level which will promote natural circulation?

- A. 156 inches
- B. 166 inches
- C. 176 inches
- D. 186 inches

Proposed Answer: D

- A. INCORRECT: Minimum level is 185 inches
- B. INCORRECT: Minimum level is 185 inches
- C. INCORRECT: Minimum level is 185 inches
- D. CORRECT: IAW ON 3156, maintaining vessel level above 185 inches allows a natural circulation path between the inside and outside of the shroud. (GE SIL-357)**

Technical Reference(s): ON 3156 Note page 8, GE SIL-357 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-205, objective K4.02b (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Question needs to be replaced due to double jeopardy with another question;  
Operations rep recommends to ask why we secure a recirculation loop when going into  
SDC (9-15-10)

Questioned replaced a second time 10-4-10

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295005 AA1.04	
	Importance Rating	2.7	_____

(K&A Statement) AA1.04- Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP: Main generator controls

Proposed Question: RO 18

With the plant operating at 50% RTP, a plant transient results in activation of BOTH the primary and backup Main Generator lockout relays (86G-P and 86G-B).

Which ONE of the following describes subsequent response to the 345/115KV Electrical Distribution system and Main Turbine?

The primary and backup lockout relays will result in the loss of the \_\_\_\_\_ (1)  
Transformer and will initiate a Main Turbine trip via \_\_\_\_\_ (2).

- A. (1) Auto  
(2) MTS-1
- B. (1) Auto  
(2) MTS-3
- C. (1) Auxiliary  
(2) MTS-1
- D. (1) Auxiliary  
(2) MTS-3

Proposed Answer: C

- A. INCORRECT: Auto Transformer is not affected
- B. INCORRECT: Auto Transformer is not affected; MTS-3 does not trip the turbine for this scenario; MTS-1 does
- C. CORRECT:
- D. INCORRECT: MTS-3 does not trip the turbine for this scenario; MTS-1 does

Technical Reference(s): CWD Sheet 234/235 and OP 0105, Figure 1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-00-262, objective K4.01 (As available)  
and K6.03

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	1	_____
	K/A #	295024 2.2.44	_____
	Importance Rating	4.2	_____

(K&A Statement) 2.2.44- Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions

Proposed Question: RO 19

A loss of coolant accident has occurred. Post scram plant conditions are as follows:

- Reactor power is <2% RTP
- 3 control rods remain full out
- Reactor pressure is 880 psig and lowering slowly
- Reactor water level is 120 inches and slowly rising
- Drywell pressure is 3.8 psig and rising slowly

All systems operate as designed and the crew has entered the appropriate EOPs.

Which ONE of the following identifies the...

- (1) status of HPCI and CS/RHR Pumps
  - (2) direction provided for operation of the system(s) that automatically started
- A. (1) HPCI running ONLY  
(2) inhibit HPCI
- B. (1) HPCI running ONLY  
(2) continue to inject with HPCI until direction to terminate and prevent is required
- C. (1) HPCI AND CS/RHR pumps running  
(2) inhibit HPCI AND place CS/RHR pumps in "Pull to Lock" if NOT required for adequate Core Cooling (ACC)
- D. (1) HPCI AND CS/RHR pumps running  
(2) continue to inject with HPCI and CS/RHR until direction to terminate and prevent is required

Proposed Answer: C

- A. INCORRECT: RHR/CS pumps are operating
- B. INCORRECT: RHR/CS pumps are operating; HPCI may most likely be inhibited once adequate core cooling is ensured- for this scenario the CRS may not secure HPCI based on what sources are injecting. If there is reason to believe level will decrease after being secured, then HPCI will remain operating until Terminate and Prevent is ordered.
- C. CORRECT:
- D. INCORRECT: RHR is not injecting for the given plant pressure (interlock not met to open injection valves)

Technical Reference(s): EOP-2, override ARC/OR-1 (Attach if not previously provided)

\_\_\_\_\_

\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

\_\_\_\_\_

Learning Objective: LOT-00-610, objective 2.4.37, (As available)  
2.4.39

\_\_\_\_\_

Question Source:

Bank #

\_\_\_\_\_

Modified Bank #

\_\_\_\_\_

New

X

\_\_\_\_\_

Question History:

Last NRC Exam

No

\_\_\_\_\_

Question Cognitive Level: Memory or Fundamental Knowledge

Comprehension or Analysis

\_\_\_\_\_

X

\_\_\_\_\_

10 CFR Part 55 Content: 55.41 5

55.43 \_\_\_\_\_

Comments:

Rewording enhancement → potential of 2 correct answers if a CRS felt HCI needed to remain running if unsure whether securing it would result in level lowering toward +6 inches with a leak present.

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	2	_____
	K/A #	295022 AA1.02	
	Importance Rating	3.6	_____

(K&A Statement) AA1.02- Ability to operate and/or monitor the following as they apply to LOSS OF CRD PUMPS: RPS

Proposed Question: RO 21

A plant startup is in progress with RPV pressure at 950 psig. As the startup continues, the following annunciator is received:

- 5-C-1, "CRD PUMP B TRIP"

Two minutes after the annunciator 5-C-1, rod 14-23 accumulator low pressure alarm comes in.

In accordance with OPON-3145-01, "Loss of CRD Regulating Function", which ONE of the following identifies how the crew should respond to the given conditions?

- Immediately insert all control rods.
- Immediately insert all control rods AFTER the second accumulator alarm comes in.
- Restore charging water pressure to 940 psig within 10 minutes AFTER the 2nd accumulator alarm is received otherwise, immediately insert all control rods.
- Restore charging water pressure to 940 psig within 20 minutes AFTER the 2nd accumulator alarm is received otherwise, immediately insert all control rods.

Proposed Answer: D

- INCORRECT:** There is no reason to believe that pressure cannot be restored with the "A" CRD pump. This action is not required for another 20 minutes.
- INCORRECT:** Second accumulator alarm is for pressure <900 psig
- INCORRECT:** 20 minutes is the time criteria
- D. CORRECT IAW OPON-3145-01**

Technical Reference(s): OPON-3145-01

(Attach if not previously  
provided)

Proposed references to be provided to applicants during  
examination:

None

Learning Objective: LOT-00-601 objective RO EO3 (As available)

Question Source: Bank # 7244  
 Modified Bank # \_\_\_\_\_  
 New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

Revised the stem to remove the "A" CRD pump being unavailable  
 MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	2	_____
	K/A #	295013	2.1.31
	Importance Rating	4.6	_____

(K&A Statement) 2.1.31- Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup

Proposed Question: RO 22

A plant startup is in progress IAW OP 0105, "Reactor Operations", Phase 2C. The following plant conditions exist:

- RPV pressure 860 psig
- Main Condenser backpressure at 3.8 psig controlled by AOG
- CRP 9-5 annunciators reflect current plant conditions

Which ONE of the following identifies the required position and location of the "MSIV LOW COND VAC ISOL BYPASS" keylock switches IAW OP 0105, based on these plant conditions?

The "MSIV LOW COND VAC ISOL BYPASS" keylock switches are in the \_\_\_\_\_ (1)  
position located on \_\_\_\_\_ (2)

- A. (1) NORMAL  
(2) CRP 9-5
- B. (1) NORMAL  
(2) CRP 9-15 and CRP 9-17
- C. (1) BYPASS  
(2) CRP 9-5
- D. (1) BYPASS  
(2) CRP 9-15 and CRP 9-17

Proposed Answer: B

**Comprehension: Candidate needs to analyze plant data to determine the required position of the switches.**

- A. INCORRECT: switches are located on CRP 9-15 and CRP 9-17
- B. CORRECT: IAW OP 0105, Phase 2C, step 20- WHEN: AOG system is controlling back pressure, (less than 5 inches HgA), AND Reactor Press <850 psig AND, COND LOW VAC GRP 1 ISOL TRIP alarm on CRP 9-5 (5-J-7) is clear (this can be verified by observing computer points D504 through D507 NORMAL). THEN perform the following: Restore the four MSIV LOW COND VAC ISOL BYPASS switches (keylock) (two at CRP 9-15 and two at CRP 9-17) to NORMAL.**
- C. INCORRECT: Plant conditions warrant taking the switches to NORMAL on CRP 9-15 and CRP 9-17.
- D. INCORRECT: Plant conditions warrant taking the switches to NORMAL.

Technical Reference(s): OP 0105, Phase 2C, step 20 (Attach if not previously provided)

\_\_\_\_\_

\_\_\_\_\_

Proposed references to be provided to applicants during examination: \_\_\_\_\_ None

Learning Objective: LOT-00-302, objective RO2 (As available)

Question Source: Bank # \_\_\_\_\_

Modified Bank # \_\_\_\_\_

New X

Question History: Last NRC Exam No

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10

55.43 \_\_\_\_\_

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	2	_____
	K/A #	295015 AA2.02	
	Importance Rating	4.1	_____

(K&A Statement) AA2.02- Ability to determine and/or interpret the following as they apply to INCOMPLETE SCRAM:  
Control rod position

Proposed Question: RO 23

Following an automatic scram, power remained high in the Intermediate range (Range 7) due to six control rods that remained at position 48. The CRS entered EOP-2, "ATWS RPV Control".

All operator actions for the Anticipated Transient without Scram (ATWS) have been performed IAW station procedures.

Which ONE of the following conditions identifies the EARLIEST point at which the CRS can exit EOP-2 and enter EOP-1, "RPV Control"?

- Four control rods inserted to position 00 and two control rods inserted to position 02
- Five control rods inserted to position 00 and one control remained at position 48
- After Hot Shutdown Boron weight has been injected and based on this, Reactor Engineering determines the reactor will remain shutdown under all conditions. Additionally, boron injection has been terminated.
- After Cold Shutdown Boron weight has been injected and based on this, Reactor Engineering determines the reactor will remain shutdown under all conditions. Additionally, boron injection has been terminated.

Proposed Answer: B

- INCORRECT: Can only be one rod at any other position than 00
- CORRECT: The reactor will remain shutdown under this condition IAW Table "B"**
- INCORRECT: HSBW will not ensure the reactor remains shutdown under all conditions IAW Table "B".
- INCORRECT: CSBW will not ensure the reactor remains shutdown under all conditions IAW Table "B".

Technical Reference(s): EOP-2 Table B and EOP-2  
override (ARC/OR-1) (Attach if not previously  
provided)

Proposed references to be provided to applicants during examination:

None  
\_\_\_\_\_

Learning Objective: LOT-00-610 objectives (As available)  
2.4.32, 2.4.39, and 2.4.48

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	2	_____
	K/A #	295012 AK2.01	
	Importance Rating	3.4	_____

(K&A Statement) AK2.01- Knowledge of the interrelations between HIGH DRYWELL TEMPERATURE and the following:  
Drywell ventilation

Proposed Question: RO 24

The following pre-transient Drywell RRU line up exists:

- DWL Air Cooler RRU-1 and RRU-2 have their switches in "A+B Run"
- DWL Air Cooler RRU-3 and RRU-4 have their switches in "A+B STBY"

A leak develops in Primary Containment resulting in the following plant conditions:

- Drywell pressure is 2.2 psig and slowly rising.
- Average Drywell temperature is 155°F and slowly rising.
- CRD Area temperature in the Drywell is 170°F and slowly rising.

Which ONE of the following identifies the correct Drywell RRU lineup based on current containment conditions?

NOTE: Assume NO operator actions have been taken.

- All RRUs will be tripped.
- All RRUs will be running.
- RRU-1 and RRU-2 (A and B RRUs) will remain running. RRU-3 and RRU-4 (A and B RRUs) will remain off.
- RRU-3 and RRU-4 (A and B RRUs) will start. RRU-1 and RRU-2 (A and B RRUs) will trip off.

Proposed Answer: B

- INCORRECT: Still below the high drywell pressure setpoint
- CORRECT: All RRUs in standby will automatically start at 160F CRD area temperature**
- INCORRECT: All RRUs will be operating
- INCORRECT: All RRUs will be operating

Technical Reference(s): OP 2115 Section F  
ARS 5-C-9

(Attach if not previously  
provided)

Proposed references to be provided to applicants during  
examination:

None  
\_\_\_\_\_

Learning Objective: LOT-00-288 objective K10 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # 6930  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	2	_____
	K/A #	295032 EK 3.01	
	Importance Rating	3.5	_____

(K&A Statement) EK3.01-Knowledge of the reasons for the following responses as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: Emergency/normal depressurization

Proposed Question: RO 25

A primary system leak into the Secondary Containment has resulted in entry into EOP-4, Secondary Containment Control. Temperatures in two areas have exceeded their Maximum Safe Operating Limit. As a result, the CRS has directed an RPV Emergency Depressurization (RPV-ED).

Which ONE of the following identifies the basis for performing an RPV-ED?

An RPV-ED is performed to \_\_\_\_\_.

- A. preclude further area temperature increases, which will prevent operator access required for performance of EOPs
- B. precludes further area temperature increases, which may pose a direct and immediate threat to equipment and containment integrity
- C. reject the RPV energy to the main condenser in preference to the secondary containment
- D. reject the RPV energy to the main condenser in preference to the primary containment

Proposed Answer: B

A, C, D: INCORRECT: Not basis for RPV-ED on high area temperature IAW EOP-4  
**B: CORRECT: Basis IAW EOP-4**

Technical Reference(s): EOP Study Guide (Volume 4) (Attach if not previously provided)

Proposed references to be provided to applicants during examination:

None



Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	2	_____
	K/A #	295014 2.1.23	_____
	Importance Rating	4.3	_____

(K&A Statement) 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation.

Proposed Question: RO 26

With a plant startup in progress and reactor pressure at 880 psig, a control rod drifts out from position 20 to 26.

In accordance with OT 3167, "Control Rod Drift", which ONE of the following actions is required at a MINIMUM?

- Select the control rod that drifted out and make an attempt to insert the rod to its original position
- Select the control rod that has drifted out and insert it to position 00.
- Manually scram the control rod that has drifted out.
- Immediately scram the reactor and enter OT 3100, "Reactor Scram".

Proposed Answer: A

**A. CORRECT: IAW OT 3167**

- INCORRECT: This step is not performed anywhere in OT 3167; the rod will be scrambled.
- INCORRECT: This is not done until the drifted control rod has been inserted to its original position.
- INCORRECT: Only one control rod has drifted. This does not require a manual scram

Technical Reference(s): OT 3167

(Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

\_\_\_\_\_

Learning Objective: LOT-00-602, objective RO  
EO5

(As available)

\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Revised the stem to remove the fact there was a 2<sup>nd</sup> rod drifted out from 20→26 before the other rod drifter out. A CRS may deem that as 2 rods at the same time.

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	_____
	Group #	2	_____
	K/A #	295007 AK1.03	
	Importance Rating	3.8	_____

(K&A Statement) AK1.03- Knowledge of the operational implications of the following concepts as they apply to HIGH REACTOR PRESSURE: Pressure effects on reactor power

Proposed Question: RO 27

With the plant operating at 80% RTP the Control Room receives annunciator 7-G-2, "EPR CONTROL POWER LOSS/TROUBLE" due to a loss of power to the Electro-Hydraulic Pressure Regulator (EPR).

Which ONE of the following describes the MHC system and reactor plant response to the subsequent transient?

The EPR Stroke will fail \_\_\_\_\_ (1) \_\_\_\_\_ resulting in a(an) \_\_\_\_\_ (2) \_\_\_\_\_ in reactor power.

- A. (1) high  
(2) increase
- B. (1) high  
(2) decrease
- C. (1) low  
(2) increase
- D. (1) low  
(2) decrease

Proposed Answer: C

- A. INCORRECT: The EPR stroke fails low
- B. INCORRECT: The EPR fails low resulting in an increase in power
- C. CORRECT: EPR fails low resulting in a pressure rise, thus adding positive reactivity and a subsequent power increase.**
- D. INCORRECT: The EPR fails low resulting in an increase in power

Technical Reference(s): GEK \_\_\_\_\_ (Attach if not previously provided)

Proposed references to be provided to applicants during \_\_\_\_\_ None \_\_\_\_\_

examination: \_\_\_\_\_

Learning Objective: LOT-00-249, objective K3.02 (As available)Question Source: Bank # \_\_\_\_\_  
Modified Bank # Question 1 from  
2009 SRO re-exam  
New \_\_\_\_\_Question History: Last NRC Exam Yes  
(modified) \_\_\_\_\_Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis X10 CFR Part 55 Content: 55.41 8  
55.43 \_\_\_\_\_

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	209001 A3.06	_____
	Importance Rating	3.6	_____

(K&A Statement) A3.06- Ability to monitor automatic operations of the LOW PRESSURE CORE SPRAY SYSTEM including: Lights and alarms

Proposed Question: RO 28

The Emergency Operating Procedures have been entered to control RPV water level. Water level is steady with ONLY the "A" Core Spray Pump running.

Which of the following is (are) the expected annunciator(s) and operator action to be taken on CRP 9-3 in the event the 51C device (timed overcurrent) setpoint for the "A" Core Spray Pump is reached?

NOTE: CWD B-191301 (Sheet 1164) provided as an open reference.

- Annunciator 3-D-1 (CORE SPRAY A PUMP TRIP) ONLY; another means of injection is required to control level.
- Annunciator 3-D-2 (CORE SPRAY A PUMP OVLD) ONLY; reduce Core Spray "A" flow by throttling CS-11A (Pump Discharge) to clear the alarm.
- Annunciator 3-D-2 (CORE SPRAY A PUMP OVLD) ONLY; reduce Core Spray "A" flow by throttling CS-12A (Pump Discharge) to clear the alarm.
- Annunciator 3-D-1 (CORE SPRAY A PUMP TRIP) AND Annunciator 3-D-2 (CORE SPRAY A PUMP OVLD); another means of injection is required to control level.

Proposed Answer: A

**A. CORRECT: CWD 1164**

B. INCORRECT: OVLD annunciator does not come in on the 51C device; CS pump trips therefore another means of injection is required.

C. INCORRECT: OVLD annunciator does not come in on the 51C device; CS pump trips therefore another means of injection is required.

D. INCORRECT: OVLD annunciator does not come in on the 51C device.

Technical Reference(s): ARS 3-D-1, CWD 1164 (Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination:

CWD 1164

\_\_\_\_\_

Learning Objective: LOT-00-209, objective A3.06 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	217000 A1.05	_____
	Importance Rating	3.7	_____

(K&A Statement) A1.05 Ability to predict and/or monitor changes in parameters associated with operating the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) controls including: RCIC turbine speed

Proposed Question: RO 29

The Reactor Core Isolation Cooling (RCIC) System has been started to control RPV water level. A failure of the automatic feature of the controller has resulted in taking MANUAL control of RCIC. Pressure is currently steady at 930 psig.

If pressure lowered to 600 psig, which ONE of the following describes the RCIC governor valve (RCIC-1) response?

- A. It will open to maintain flow constant.
- B. It will close to maintain flow constant.
- C. It will open to maintain pump speed constant.
- D. It will close to maintain pump speed constant.

Proposed Answer: C

- A. **INCORRECT:** In manual, the controller will operate the governor valve to maintain pump speed constant; as pressure decreases the governor valve opens more to accomplish this.
- B. **INCORRECT:** In manual, the controller will operate the governor valve to maintain pump speed constant; as pressure decreases the governor valve opens more to accomplish this.
- C. **CORRECT: RCIC GEK operation**
- D. **INCORRECT:** In manual, the controller will operate the governor valve to maintain pump speed constant; as pressure decreases the governor valve opens more to accomplish this.

Technical Reference(s): RCIC GEK Manual 32441 (Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

\_\_\_\_\_

Learning Objective: LOT-00-217 objective A1.05, (As available)  
K5.06

Question Source: Bank # 6901  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	211000	2.4.11
	Importance Rating	4.0	

(K&A Statement) 2.4.11- Knowledge of abnormal condition procedures

Proposed Question: RO 30

Which ONE of the following identifies an alternate Boron injection flowpath identified in OE 3107, "EOP/SAG Appendices", in the event normal means of Boron injection fail?

- A. SLC Test tank → SLC Pump suction → squib valves → RPV
- B. SLC Tank → temporary hose → CRD pump suction → RPV
- C. Recirculation Loop "A" → RWCU pump suction → Cleanup Filter Demineralizer bypass line → Regenerative Heat Exchanger → RPV
- D. Recirculation Loop "B" → RWCU pump suction → Cleanup Filter Demineralizer → Non-Regenerative Heat Exchanger → RPV

Proposed Answer: B

A, C, D: INCORRECT: These are not operationally driven flowpaths IAW OE 3107 for SLC injection.

**B: Correct flowpath IAW OE 3107 Appendix "K"**

Technical Reference(s): OE 3107 Appendix K, P&IDs G-191170 and 191171 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-626 objective RO EO4 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X \_\_\_\_\_

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Sample Written Examination  
Question Worksheet

Form ES-401-5

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	400000 K4.01	_____
	Importance Rating	3.4	_____

(K&A Statement) K4.01- Knowledge of CCWS design feature(s) and or interlocks which provide for the following:  
Automatic start of standby pump.

Proposed Question: RO 31

The following lineup exists for the Turbine Building Closed Cooling Water (TBCCW) system:

- "B" TBCCW pump is operating
- "A" TBCCW pump is in AUTO

From the list below, which of the following identifies ALL of the conditions that would result in the "A" TBCCW pump automatically starting?

1. Loss of power to MCC-9C
2. Overcurrent trip of the running pump
3. Discharge header pressure at 58 psig
4. Load sequencing following a LNP

- A. #1, 2, and 3 ONLY
- B. #1, 3, and 4 ONLY
- C. #1, 2, and 4 ONLY
- D. #2, 3, and 4 ONLY

Proposed Answer: A

**A. CORRECT: All three will result in the AUTO start of the standby TBCCW pump**

B. INCORRECT: Load sequencing is not an auto start feature of the TBCCW pump

C. INCORRECT: Load sequencing is not an auto start feature of the TBCCW pump

D. INCORRECT: Load sequencing is not an auto start feature of the TBCCW pump

Technical Reference(s): OT 3165, CWD Sheet 456 (Attach if not previously provided)

\_\_\_\_\_

\_\_\_\_\_

Proposed references to be provided to applicants during \_\_\_\_\_ None \_\_\_\_\_

examination: \_\_\_\_\_

Learning Objective: LOT-00-274, objective EO (As available)  
K4.01 \_\_\_\_\_Question Source: Bank # \_\_\_\_\_  
Modified Bank # 3296 \_\_\_\_\_  
New \_\_\_\_\_Question History: Last NRC Exam No \_\_\_\_\_Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis X \_\_\_\_\_10 CFR Part 55 Content: 55.41 7 \_\_\_\_\_  
55.43 \_\_\_\_\_

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	205000 K5.02	_____
	Importance Rating	2.8	_____

(K&A Statement) K5.02- Knowledge of the operational implications of the following concepts as they apply to SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE): Valve operation

Proposed Question: RO 32

The plant is shutdown for a refueling outage with the "A" Loop of RHR in Shutdown Cooling.

Which ONE of the following identifies the operational impact on Shutdown Cooling if RPV pressure rises to 160 psig?

- A. RHR-17 and RHR-18 (RHR Shutdown Cooling Suction valves) will close  
RHR-13A and RHR-13C (pump suction valves) will open  
"A" Loop RHR pump will continue to run
- B. RHR-17 and RHR-18 (RHR Shutdown Cooling Suction valves) will close  
"A" Loop RHR pump will trip
- C. RHR-17 and RHR-18 (RHR Shutdown Cooling Suction valves) will remain open  
"A" Loop RHR pump will trip
- D. RHR-17 and RHR-18 (RHR Shutdown Cooling Suction valves) will remain open  
"A" Loop RHR pump will continue to run

Proposed Answer: B

- A. INCORRECT: RHR-13A and 13C will not auto open
- B. CORRECT: The high pressure will result in a high pressure isolation (RHR-17 and RHR-18 will close) and subsequent pump trip.**
- C. INCORRECT: RHR-17 and RHR-18 will shut on high pressure isolation signal
- D. INCORRECT: RHR-17 and RHR-18 will shut on high pressure isolation signal and the pump will trip on no suction flowpath.

Technical Reference(s): RHR DBD Page 57 of 104; (Attach if not previously  
ON 3156 automatic actions provided)

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Sample Written Examination  
Question Worksheet

Form ES-401-5

Proposed references to be provided to applicants during examination:

None  
\_\_\_\_\_

Learning Objective:      LOT-00-205, objective      (As available)  
   K4.02b  
   \_\_\_\_\_

Question Source:      Bank #      1821  
   Modified Bank #      \_\_\_\_\_  
   New      \_\_\_\_\_

Question History:      Last NRC Exam      No  
   \_\_\_\_\_

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

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

Comments:  
MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	261000 A2.03	_____
	Importance Rating	2.9	_____

(K&A Statement) A2.03- Ability to (a) predict the impacts of the following on the STANDBY GAS TREATMENT SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High train temperature

Proposed Question: RO 33

With the SBTG System in a NORMAL lineup, a spurious PCIS Group III Isolation resulted in the automatic start of BOTH SBTG trains. Minutes later, the Control Room received the following annunciator:

- 3-R-1, "SBGT TRAIN A TROUBLE"

It has been determined that the alarm was due to a low flow condition on SBTG train "A".

Which ONE of the following is:

- (1) the automatic response for this alarm?
- (2) a cause for an abnormal system lineup resulting in the high teperature?

- (1) 1KW immersion heater, EUH-1, de-energizes  
(2) a loss of instrument air to SGT-2A, "Inlet Isolation"
- (1) 1KW immersion heater, EUH-1, de-energizes  
(2) an overload trip on REF-2A, "SBGT "A" Fan"
- (1) 9KW electric heater, EUH-3, de-energizes  
(2) a loss of instrument air to SGT-2A, "Inlet Isolation"
- (1) 9KW electric heater, EUH-3, de-energizes  
(2) an overload trip on REF-2A, "SBGT "A" Fan"

Proposed Answer: D

- A. INCORRECT: 1 KW heater is not affected by the high temperature; this heater is off when SBTG is running; SGT-2A fails open on loss of air
- B. INCORRECT: 1 KW heater is not affected by the high temperature; this heater is off when SBTG is running
- C. INCORRECT: SGT-2A fails open on loss of air
- D. CORRECT: ***The 9KW heater will de-energize; the ARS directs to check the SBTG lineup to ensure suction and discharge flow paths exist (SGT-1A, 2A, and 3A are open) and the REF-2A fan should be running.***

Technical Reference(s): OP 2117, ARS 3-R-1 (Attach if not previously provided)  
 \_\_\_\_\_  
 \_\_\_\_\_

Proposed references to be provided to applicants during examination: None  
 \_\_\_\_\_

Learning Objective: LOT-00-261, objective A2.03, (As available)  
 K13.02  
 \_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
 Modified Bank # \_\_\_\_\_  
 New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

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

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

Comments:  
 MH Operations review SAT (9-15-10)

# Q33

## CRP 9-3 ALARM RESPONSE SHEETS (Continued)

STANDBY GAS TREATMENT SYSTEM A		3-R-1
		Page 1 of 1
SGBT TRAIN A TROUBLE		
<b>Causes:</b>  1. SGTS Train A running for 50 sec and low flow signal in.	<b>Setpoints:</b>  400 to 550 cfm following a 50 second time delay.	<b>Actuating Devices:</b>  1.a. FS-1-125-1A b. 42Y-REF-2A
		<b>References:</b>  CWD 1425, 1429 OP 2117 Tech. Specs. 3.7
<b>Confirmation:</b>  1. SGTS flow indication FI-1-125-1A on CRP 9-26.		
<b>Automatic Actions:</b>  Electric heater EUH-2 de-energizes.		
<b>Operator Actions:</b>  1. Verify flow is low. 2. Verify proper system lineup per OP 2117, Standby Gas Treatment Procedure. 3. Consult Tech. Specs. 3.7.		

7. Verify SGBT flow is indicated and RB  $\Delta P$  is negative.
8. Check that 9 KW duct heater SGBT-A ELECT HTR EUH-2 (SBGT-B ELECT HTR EUH-4) is energized for the operating train as indicated by the GREEN light being OFF on CRP 9-26.
9. If required, monitor drywell/torus  $\Delta P$ ,
  - a. Refer to OP 2115, Primary Containment, for limits.
10. If painting and/or chemical/fire release in the reactor building took place during SGT system operation, notify RP to obtain a charcoal sample to satisfy Tech. Spec. 4.7.B.2.a. and submit an Event Report.

C. Automatic Initiation

NOTE

- SGTS initiation and reactor building ventilation trip results in the following:

SGT-1A/B	OPEN	RSF-1A/B	OFF
SGT-2A/B	OPEN	REF-1A/B	OFF
SGT-3A/B	OPEN	REF-2A/B	ON
HVAC-9	CLOSED	HVAC-10	CLOSED
HVAC-11	CLOSED	HVAC-12	CLOSED
EUH-2	ENERGIZED (GREEN light OFF)	EUH-4	ENERGIZED (GREEN light OFF)

- SGTS initiation due only to start of the HPCI gland exhaust blower results in the following:

SGT-2A/B	OPEN	REF-2A/B	ON
SGT-3A/B	OPEN		

-----

1. Verify proper results in notes listed above.
2. Open/check open SGT-1A/B.
3. Close/check closed:
  - SGT-4A
  - SGT-4B
  - SGT-5.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	262001 A2.11	
	Importance Rating	3.2	

(K&A Statement) A2.11- Ability to (a) predict the impacts of the following on the A.C. ELECTRICAL DISTRIBUTION ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Degraded system voltages

Proposed Question: RO 34

With a plant startup in progress and reactor power at 10% RTP, the Control Room receives annunciator 8-J-9, "SAFETY BUS VOLTAGE LO".

Plant conditions when the annunciator was received are as follows:

- Bus 3 voltage: 2900 volts and lowering
- Bus 4 voltage: 4400 volts and steady
- Drywell pressure: 1.9 psig and steady
- Reactor water level: 160 inches and steady

Which ONE of the following describes the electric plant response (if any) and the actions the Balance of Plant (BOP) operator should take for the given plant conditions?

- A. A LNP signal is not generated. The applicable EDG will not start. The BOP should contact ISO-NE for operational guidance.
- B. A LNP signal will be generated once voltage drops <1925 volts. The applicable EDG will not start. A load shed will not occur until this voltage is reached.
- C. A LNP signal is generated. The applicable EDG will start ONLY. The BOP should verify a load shed occurs.
- D. A LNP signal is generated. The applicable EDG will start AND breaker will shut. The BOP should verify a load shed occurs.

Proposed Answer: D

- A. INCORRECT: LNP signal is generated on low bus 3 voltage; with the plant on the Startup Transformers, if voltage drops to 2900V, an LNP will result in the "B" EDG auto starting.
- B. INCORRECT: Setpoint is 2900V
- C. INCORRECT: A load shed will not occur
- D. CORRECT: ARS 8-J-9**

Technical Reference(s): ARS 8-J-9 (Attach if not previously

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Sample Written Examination  
Question Worksheet

Form ES-401-5

provided)

Proposed references to be provided to applicants during  
examination:

None

Learning Objective: LOT-00-264, objective EO (As available)  
K6.08

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:  
MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	300000 A4.01	_____
	Importance Rating	2.6	_____

(K&A Statement) A4.01- Ability to manually operate and / or **monitor** in the control room: Pressure gages

Proposed Question: RO 35

The plant is operating at 100% RTP with the Instrument Air system in a normal lineup. No evolutions are in progress.

The Balance of Plant (BOP) Operator observes all four Station Air Compressors running on CRP 9-6 and informs the Control Room Supervisor (CRS).

The CRS requests the BOP to report the instrument air header pressure on CRP 9-6 at the time all four compressors were operating.

Which ONE of the following reflects the setpoint at which the LAG air compressors will auto start as indicted on CRP 9-6, "A" and "B" Air Header Pressures?

**NOTE:** Assume the pressure indication in the Control Room is the same as the air receiver pressure.

- A. 90 psig
- B. 95 psig
- C. 100 psig
- D. 105 psig

Proposed Answer: B

A, C, D: INCORRECT: The auto start setpoint is 95psig

**B: CORRECT: Lag air compressors start at 95psig**

Technical Reference(s): OP 2190 discussion

(Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

\_\_\_\_\_

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Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-279 K16, A4.01 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Wording enhancing (point → setpoint)

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	259002 A4.03	_____
	Importance Rating	3.8	_____

(K&A Statement) A4.03- Ability to manually operate and/or monitor in the control room: All individual component controllers in the automatic mode

Proposed Question: RO 36

The plant is operating at full rated power. In accordance with OP 4120, "HPCI System Surveillance", HPCI is placed in Full Flow test.

Which ONE of the following describes the automatic Feedwater Level Control (FWLC) system response as observed by the Operator at the Controls (OATC) with HPCI in the Full Flow test lineup?

The FWLC system will \_\_\_\_\_.

- A. raise water level initially, then restore water level to the initial setting
- B. raise water level to some value higher than the initial setting
- C. lower water level initially, then restore water level to the initial setting
- D. lower water level to some value lower than the initial setting

Proposed Answer: D

- A. INCORRECT: FRVs throttle closed to lower water level
- B. INCORRECT: FRVs throttle closed to lower water level
- C. INCORRECT: water level will remain at a lower setting until the steam supply for HPCI is secured.
- D. **CORRECT: When HPCI is started in full flow test, steam is used to start HPCI. However, in this lineup, there is no injection to the vessel. The steam supply is before the steam flow venturi for the FWLC system. This results in a reduction in sensed steam flow. The FWLC system will shut the FRVs to match the sensed reduced steam flow since the system is in 3 element control. Water level will lower as a result.**

Technical Reference(s): P&ID G-191167

(Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

\_\_\_\_\_

Learning Objective: LOT-01-259, objective A4.03, (As available)  
K10.04

Question Source: Bank # 6907  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	212000 K4.10	
	Importance Rating	3.3	

(K&A Statement) K4.10- Knowledge of REACTOR PROTECTION SYSTEM design feature(s) and/or interlocks which provide for the following: Individual rod SCRAM testing

Proposed Question: RO 37

Single rod scram testing is in progress. The toggle switch for control rod 22-15 was just operated to scram the Control Rod.

Which ONE of the following describes how a single rod scram is reset for Control Rod 22-15?

The toggle switch for Control Rod 22-15 is \_\_\_\_\_.

- A. returned to the full up position
- B. returned to the full down position
- C. placed in the neutral position until the rod drift is reset then returned to the full up position
- D. placed in the neutral position until the rod drift is reset then returned to the full down position

Proposed Answer: A

- A. CORRECT: IAW OP 4424, the toggle switch is returned to the full up position**
- B. INCORRECT: full up position
- C. INCORRECT: Rod drift does not have to be reset; returned to the full up position
- D. INCORRECT: full up position

Technical Reference(s): OP 4424, page 22 (Attach if not previously provided)  
CWD XXX

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-212, objective K4.10 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X \_\_\_\_\_

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

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	215004 A3.02	_____
	Importance Rating	3.4	_____

(K&A Statement) A3.02- Ability to monitor automatic operations of the SOURCE RANGE MONITOR (SRM) SYSTEM including: Annunciator and alarm signals.

Proposed Question: RO 38

The reactor is shutdown for a refueling outage with Source Range Monitor (SRM) scrams enabled.

If Source Range Monitor (SRM) Channel "A" fails upscale, which of the following alarm(s) is received in the Control Room based on these plant conditions?

- A. 5-K-1 "AUTO SCRAM CH A" and 5-P-3 "SRM HI/INOP"
- B. 5-K-7 "MANUAL SCRAM CH A" and 5-P-3 "SRM HI/INOP"
- C. 5-K-1 "AUTO SCRAM CH A" ONLY
- D. 5-K-7 "MANUAL SCRAM CH A" ONLY

Proposed Answer: B

- A. INCORRECT: manual scram trip
- B. **CORRECT: SRM scram results in a trip of the A3 and B3 scram channels (manual)**
- C. INCORRECT: manual scram trip
- D. INCORRECT: The Hi/INOP alarm is also received.

Technical Reference(s): OP 5371 Section "A" NOTE, ARSs 5-K-7 and 5-L-7 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-01-215 objective K4.02, (As available) A3.02

Question Source: Bank # \_\_\_\_\_

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Modified Bank # \_\_\_\_\_

New           X          

Question History: Last NRC Exam           No          

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	263000 K5.01	_____
	Importance Rating	2.6	_____

(K&A Statement) K5.01- Knowledge of the operational implications of the following concepts as they apply to D.C. ELECTRICAL DISTRIBUTION: Hydrogen generation during charging

Proposed Question: RO 39

With the DC electrical distribution systems in a normal lineup for rated power operations, the Control Room receives annunciator 6-C-9, "HVAC TROUBLE/BATT RM EXH FAN FLOW LO". The Balance of Plant Operator (BOP) reports that SEF-3, Battery Room Exhaust Fan, does NOT indicate running on CRP 9-25.

Which ONE of the following is the operational impact of operating with this off-normal ventilation lineup?

- A. Hydrogen samples are required every four hours to ensure hydrogen concentration remains <2% until portable ventilation to the battery room is established. Sampling can be secured thereafter.
- B. Hydrogen samples are required every four hours to ensure hydrogen concentration remains <4% until portable ventilation to the battery room is established. Sampling can be secured thereafter.
- C. Hydrogen samples are required daily AND portable ventilation to the battery room is established.
- D. Hydrogen samples are NOT required as long as the battery room doors are opened and a 2 hour fire watch established.

Proposed Answer: C

- A. INCORRECT: H<sub>2</sub> samples required daily
- B. INCORRECT: H<sub>2</sub> samples required daily
- C. **CORRECT: Precaution and limitation of OP 2192 and guidance in the ARS (both stemming from a TS requirement)**
- D. INCORRECT: H<sub>2</sub> samples required daily

Technical Reference(s): ARS 6-C-9, Tech Spec 3.10.B.2, and OP 2192 (precaution and limitation) \_\_\_\_\_ (Attach if not previously provided)

Proposed references to be provided to applicants during \_\_\_\_\_

None \_\_\_\_\_

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	215005 K6.01	_____
	Importance Rating	3.7	_____

(K&A Statement) K6.01- Knowledge of the effect that a loss or malfunction of the following will have on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM: RPS

Proposed Question: RO 40

The plant is operating at 60% RTP with the 480V Electrical Distribution system aligned for normal operations.

Which ONE of the following conditions will result in a FULL reactor scram?

**NOTE:** OP 2456, Figure 1 is provided as a reference.

- A. Loss of MCC-8A with the following LPRMs bypassed: 40-25B, 32-25A, 40-17C, 24-41C, and 16-33D
- B. Loss of MCC-8B with the following LPRMs bypassed: 24-25C, 24-09B, 24-33A, 08-33C, 08-09D
- C. Loss of MCC-9A with the following LPRMs bypassed: 24-25C, 24-09B, 24-33A, 08-33C, 08-09D
- D. Loss of MCC-9B with the following LPRMs bypassed: 40-25B, 32-25A, 40-17C, 24-41C, and 16-33D

Proposed Answer: C

- A. INCORRECT: This combination will not result in a full scram
- B. INCORRECT: This combination will not result in a full scram
- C. CORRECT: The loss of MCC-9A results in a trip of RPS channel "B"; The 5 detectors that are bypassed will result in a trip of RPS channel "A" on a "too few inputs" signal. The combination will result in a full scram**
- D. INCORRECT: This combination will not result in a full scram

Technical Reference(s): OP 2132, OP 2456 (Open reference for figure 1) (Attach if not previously provided)

Proposed references to be provided to applicants during examination:

OP 2456 Figure 1

Learning Objective: LOT-03-215 objective K6.01 (As available)

Question Source: Bank # 7218  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	215003	K4.01
	Importance Rating	3.7	

(K&A Statement) K4.01- Knowledge of INTERMEDIATE RANGE MONITOR (IRM) SYSTEM design feature(s) and/or interlocks which provide for the following: Rod withdrawal blocks:

Proposed Question: RO 41

During a normal reactor shutdown, IRM Channel "C" is indicating 30 on Range 6. The Operator at the Controls (OATC) inadvertently ranges down too far on IRM Channel "C" to Range 4.

Which ONE of the following describes the plant response to this action?

- A. ONLY a rod block will be initiated
- B. ONLY a full scram will be initiated
- C. BOTH a rod block will be initiated AND a half-scram will be initiated in RPS Trip System "B".
- D. BOTH a rod block will be initiated AND a half-scram will be initiated in RPS Trip System "A".

Proposed Answer: D

- A. INCORRECT: RPS trip to channel "A"
- B. INCORRECT: Rod Block Trip generated to system "B"
- C. INCORRECT: Rod Block trip channel "B" and RPS trip channel "A"
- D. CORRECT: IRM "C" is a channel input to RPS trip system "A" and Rod Block Trip system "B". When you inadvertently range down 2 channels, that channel will read high off scale resulting in an IRM Hi-Hi signal. Thus, RPS channel "A" and RB channel "B" will trip.**

Technical Reference(s): OP 2131 discussion, ARS 5-N-1 (causes and automatic actions) (Attach if not previously provided)

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Proposed references to be provided to applicants during examination:

None

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ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-01-215 objective 4.01 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # 6854  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	218000 A4.02	_____
	Importance Rating	4.2	_____

(K&A Statement) A4.02: Ability to manually operate and/or monitor in the control room: ADS logic initiation

Proposed Question: RO 42

With RHR pumps "B" and CS "B" running, an Automatic Depressurization System (ADS) blowdown is in progress. Shortly after the blowdown commences, the plant experiences a sustained loss of Bus 3.

In response to this bus transient, which ONE of the following describes how the ADS System will respond?

The ADS system will \_\_\_\_\_.

- A. continue the blowdown with all four SRVs
- B. continue the blowdown with A and C SRVs only
- C. continue the blowdown with B and D SRVs only
- D. stop the blowdown by shutting all SRVs

Proposed Answer: A

**A. CORRECT: As long as one CS or RHR pump continues to operate (in this case RHR pump A), all SRVs will remain open due to making up the required discharge pressure in the ADS circuit.**

- B. INCORRECT: All four SRVs remain open
- C. INCORRECT: All four SRVs remain open
- D. INCORRECT: All four SRVs remain open

Technical Reference(s): CWD, ARS 3-A-7

(Attach if not previously provided)

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\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

\_\_\_\_\_

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-218 objective A4.02, (As available)  
K5.01, K6.05

Question Source: Bank # 7126  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	264000 K4.08	_____
	Importance Rating	3.8	_____

(K&A Statement) K4.08- Knowledge of EMERGENCY GENERATORS (DIESEL/JET) design feature(s) and/or interlocks which provide for the following: Automatic startup

Proposed Question: RO 43

The monthly slow start surveillance is in progress on the "B" Emergency Diesel Generator (EDG) IAW OP 4126, "Diesel Generators Surveillance". The start/selecter switch at the local diesel generator panel has been placed in the AT ENGINE position.

Moments later, a plant transient has resulted in both EDGs receiving auto start signals.

Which ONE of the following is the response of the "B" EDG to the auto start signal with the control switch in the "AT ENGINE" position?

The "B" EDG will \_\_\_\_\_.

- A. auto start but the output breaker will NOT close
- B. auto start and the output breaker will close
- C. auto start and the output breaker will attempt to close and trip
- D. NOT auto start and its output breaker will NOT close

Proposed Answer: D

- A. INCORRECT: EDG will not auto start
- B. INCORRECT: The EDG breaker will not close
- C. INCORRECT: The EDG will not attempt to close
- D. CORRECT: With the EDG control switch in AT ENGINE, the auto start feature of the EDG is disabled (precaution OP 2126)**

Technical Reference(s): OP 2126 precaution/limitation #10 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-264 K4.08 (As available)

Question Source: Bank # 1395  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	212000 K5.02	_____
	Importance Rating	3.3	_____

(K&A Statement) K5.02- Knowledge of the operational implications of the following concepts as they apply to REACTOR PROTECTION SYSTEM: Specific logic arrangements.

Proposed Question: RO 44

A plant and turbine startup is in progress with reactor power at 18% RTP. 

Which ONE of the following RPS logic arrangements will result in a half scram if the RPS relays associated with the following valves de-energized?

- A. #1 AND #3 Turbine Stop Valves are full shut
- B. #1 AND #4 Turbine Stop Valves are full shut
- C. MS-80A and MS-80D are full shut
- D. MS-80B and MS-86D are full shut

Proposed Answer: D

- A. INCORRECT: TSV scram signal is bypassed at this power
- B. INCORRECT: TSV scram is bypassed at this power; additionally, this logic would not result in a half scram had it not been bypassed.
- C. INCORRECT: This logic will not result in a half scram
- D. CORRECT: This logic will result in a half scram of the RPS system**

Technical Reference(s): ARS 5-K-8, CWD-813 and 815 (B2 scram logic) (Attach if not previously provided)

Proposed references to be provided to applicants during examination: \_\_\_\_\_ None

Learning Objective: LOT-00-212 objective K5.02 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

New X

Question History: Last NRC Exam No

Question Cognitive Level: Memory or Fundamental Knowledge           
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5  
55.43         

Comments:  
MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	203000 2.2.25	_____
	Importance Rating	3.2	_____

(K&A Statement) 2.2.25- Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

Proposed Question: RO 45

Which of the following plant operations will NOT make the Low Pressure Coolant INJECTION (LPCI) subsystem of the RHR System INOPERABLE after fully lining the system up?

NOTE: Assume all other equipment is OPERABLE

- A. Lining up the "B" Loop of RHR for Torus Cooling during RCIC surveillance
- B. Lining up the "A" Loop of RHR for Torus Spray during normal operations
- C. Lining up the "B" Loop of RHR for Torus pump down to Radwaste following Torus Spray operations
- D. Lining up the "A" Loop of RHR for Shutdown Cooling with pressure less than Shutdown Cooling Permissive

Proposed Answer: D

- A. INCORRECT: The RHR system is INOPERABLE while in this lineup
- B. INCORRECT: The RHE system is INOPERABLE while in this lineup
- C. INCORRECT: The RHR system is INOPERABLE while in this lineup
- D. CORRECT: TS bases (3.5.A)**

Technical Reference(s): OP 2124, Technical Specification Bases 3.5.A (page 110) (Attach if not previously provided)

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\_\_\_\_\_

Proposed references to be provided to applicants during examination: None

\_\_\_\_\_

Learning Objective: LOT-00-205, objective 2.2.25 (As available)

Question Source: Bank # \_\_\_\_\_  
 Modified Bank # \_\_\_\_\_  
 New X

Question History: Last NRC Exam No

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

10 CFR Part 55 Content: 55.41 5, 7  
 55.43 \_\_\_\_\_

Comments:

Operations Rep input: Changed distractor "A" from Torus spray during EOP-3 operations to Torus Spray during normal operations (even though it's rarely done, it is within the procedure to spray during normal operations); changed because when you are that far in EOP-3, there is no concern for operability.

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	206000 K2.01	
	Importance Rating	3.2	

(K&A Statement) K2.01- Knowledge of electrical power supplies to the following: System valves BWR-2,3,4

Proposed Question: RO 46

Which ONE of the following lists the possible power supply source(s) to HPCI-16, "Outboard Steam Supply Isolation" valve?

- A. DC-1 ONLY
- B. DC-2 ONLY
- C. DC-1 AND DC-1AS
- D. DC-2 AND DC-2AS

Proposed Answer: A

- A. CORRECT: OP 2145 Appendix "A"**
- B. INCORRECT: DC-2 does not provide power to HPCI-16
- C. INCORRECT: HPCI is NOT an alternate shutdown system
- D. INCORRECT: HPCI is NOT an alternate shutdown system

Technical Reference(s): OP 2145, Appendix "A" (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-206 Objective K2.01 (As available)

Question Source: Bank # \_\_\_\_\_  
 Modified Bank # \_\_\_\_\_  
 New X \_\_\_\_\_

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Sample Written Examination  
Question Worksheet

Form ES-401-5

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	223002 A2.01	_____
	Importance Rating	3.2	_____

(K&A Statement) A2.01- Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: AC electrical distribution failures.

Proposed Question: RO 47

The plant is operating at 90% RTP with the following drywell cooling lineup on CRP 9-25:

- RRU-1 in A+B RUN
- RRU-2 A+B STDBY
- RRU-3 in A+B RUN
- RRU-4 in A RUN

An electrical transient results in the supply breaker for MCC-8A tripping and a subsequent rise in drywell pressure. Which ONE of the following identifies...

- (1) the cause of the drywell pressure increase?
  - (2) the course of action to restore drywell pressure to normal?
- A. (1) Loss of drywell cooling fans RRU-1A and 1B  
(2) Start RRU-2 fans 2A and 2B
  - B. (1) Loss of drywell cooling fans RRU-3A and 3B  
(2) Start RRU-2 fans 2A and 2B
  - C. (1) Full PCIS Group 3 isolation  
(2) Reset the group 3 isolation after alternate logic power from MCC-8B is provided
  - D. (1) Full PCIS Group 3 isolation  
(2) Reset the group 3 isolation after alternate logic power from MCC-9B is provided

Proposed Answer: C

- A. INCORRECT: RRUs are unaffected by a loss of MCC-8A
- B. INCORRECT: RRUs are unaffected by a loss of MCC-8A
- C. **CORRECT: On a loss of MCC-8A, RPS "A" trips resulting in a half scram and full PCIS Group 3 isolation. Once the "A" RPS bus is repowered from MCC-8B, the half scram can be rest and PCIS Group 3 isolation reset.**
- D. INCORRECT: Alternate power for RPS Bus "A" is NOT from MCC-9B

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Technical Reference(s): OP 2134, P&ID G-191300 (Attach if not previously  
Sheet 2, CWD 1100 and provided)  
1101

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-218 objective A2.01 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:  
MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	206000 A1.03	_____
	Importance Rating	3.5	_____

(K&A Statement) A1.03- Ability to predict and/or monitor changes in parameters associated with operating the HIGH PRESSURE COLLANT INJECTION SYSTEM controls including: Condensate storage tank level: BWR-2,3,4

Proposed Question: RO 48

The plant is shutdown due to a Loss of Coolant Accident. Both HPCI and RCIC automatically started and are operating to support level control.

Which ONE of the following describes the appropriate system response to a lowering Condensate Storage Tank level?

**NOTE:** Assume ALL systems were aligned for normal operation prior to initiation.

- A. HPCI will continue to operate due to being aligned to the Torus.
- B. Torus suction valves (HPCI-57 and 58) will auto open at <3% CST level. CST suction valve (HPCI-17) auto closes once both torus suction valves are not fully closed.
- C. RCIC will continue to operate due to being aligned to the Torus.
- D. Torus suction valves (RCIC-39 and 41) auto open at <4% CST level. CST suction valve (RCIC-18) auto closes as soon as the torus suction valves begin to open.

Proposed Answer: B

- A. INCORRECT: HPCI is aligned to the CST during normal operations
- B. CORRECT: HPCI is the bigger system. The valves logic does not have to wait for valves to be completely realigned (Torus valves full open) before closing the suction valves from the CST. RCIC does have to wait for full realignment before the CST suction valves shut.**
- C. INCORRECT: RCIC is aligned to the CST during normal operations
- D. INCORRECT: When tank level drops to below 4%, Torus suction valves RCIC-39 and 41 auto open and CST suction valve RCIC-18 auto closes AFTER suction valves are full open to ensure a continuous water supply to the pump suction.

Technical Reference(s): OP 2120 discussion (Attach if not previously provided)  
OP 2121 discussion

Proposed references to be provided to applicants during  
examination:

None  
\_\_\_\_\_

Learning Objective: LOT-00-205, objective (As available)  
K4.02b  
\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # #6909  
#6935  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	203000 K2.01	
	Importance Rating	3.5	

(K&A Statement) K2.01- Knowledge of electrical power supplies to the following: Pumps.

Proposed Question: RO 49

A Loss of Normal Power (LNP) with a Loss of Coolant Accident (LOCA) occurs. ALL plant equipment operated as designed.

Which ONE of the following is the FIRST load sequenced on Bus 4 when the applicable Emergency Diesel Generator repowers the Bus?

- A. RHR pump "A"
- B. RHR pump "D"
- C. Core Spray pump "A"
- D. Core Spray pump "B"

Proposed Answer: A

- A. **CORRECT: right after power is restored**
- B. INCORRECT: Powered from Bus 3
- C. INCORRECT: 10 seconds after power is restored
- D. INCORRECT: Powered from Bus 3

Technical Reference(s): OP 4100, OP 2142 Appendix "A" (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-205 objective K2.01 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # 3741

New \_\_\_\_\_

Question History: Last NRC Exam NoQuestion Cognitive Level: Memory or Fundamental Knowledge X  
Comprehension or Analysis \_\_\_\_\_10 CFR Part 55 Content: 55.41 7  
55.43 \_\_\_\_\_

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	217000	K1.02
	Importance Rating	3.5	_____

(K&A Statement) K1.02- Knowledge of the physical connections and/or cause/effect relationships between REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) and the following: Nuclear boiler system.

Proposed Question: RO 50

Which ONE of the following identifies the physical arrangement of the Reactor Core Isolation Cooling (RCIC) System as it pertains to the Nuclear Boiler System for the following?

- 1) interconnection with the RCIC steam supply
  - 2) interconnection with RCIC pump discharge
- A. (1) "C" Main Steam line  
(2) "A" Feedwater line
- B. (1) "D" Main Steam line  
(2) "A" Feedwater line
- C. (1) "C" Main Steam line  
(2) "B" Feedwater line
- D. (1) "D" Main Steam line  
(2) "B" Feedwater line

Proposed Answer: C

- A. INCORRECT: "B" Feedwater line for RCIC discharge
- B. INCORRECT: "C" Main Steam line for supply and "B" Feedwater line for RCIC discharge
- C. CORRECT: P&ID G-191174 Sheet 1**
- D. INCORRECT: "C" Main Steam Line for supply

Technical Reference(s): P&ID G191174, Sheet 1

(Attach if not previously provided)

Proposed references to be provided to applicants during

None

examination: \_\_\_\_\_

Learning Objective: LOT-00-217 objective K1.02 (As available)Question Source: Bank # 3288  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_Question History: Last NRC Exam NoQuestion Cognitive Level: Memory or Fundamental Knowledge X  
Comprehension or Analysis \_\_\_\_\_10 CFR Part 55 Content: 55.41 2 to  
9  
55.43 \_\_\_\_\_

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	239002 K3.03	_____
	Importance Rating	4.3	_____

(K&A Statement) K3.03- Knowledge of the effect that a loss or malfunction of the RELIEF/SAFETY VALVES will have on following: Ability to rapidly depressurize the reactor.

Proposed Question: RO 51

With the plant operating at rated power conditions, one tracking Technical Specification LCO is in effect:

- The "D" SRV is inoperable due to a failed control switch

A recirculation leak and Loss of Normal Power (LNP) occurred and the plant was scrammed. EOP-3, "Primary Containment Control", was entered based on adverse Primary Containment conditions.

As the SRVs cycled following the scram, a broken "A" Safety Relief Valve (SRV) tailpipe resulted in approaching the Pressure Suppression (PSP) curve. The "A" SRV was ordered shut by the CRS and preparations made to conduct an RPV-ED IAW EOP-5.

Based on plant conditions, which ONE of the following describes the ability to conduct and emergency depressurization using the available safety relief valves?

- Alternate depressurization systems will be required. The RWCU System in "Recirculation Mode" is an available option.
- Alternate depressurization systems will be required. The Reactor Head Vents, RV-17 and RV-18, are an available option.
- Alternate depressurization systems will NOT be required. The Minimum number of SRVs required for Emergency Depressurization is 2.
- Alternate depressurization systems will NOT be required. The Minimum number of SRVs required for Emergency Depressurization is 1.

Proposed Answer: B

- INCORRECT: LNP will result in the loss of containment
- CORRECT: we have less than the MNSRV-ED, therefore alternate depressurization is required.**
- INCORRECT: MNSRV-ED is 3
- MNSRV-ED is 3

Technical Reference(s): EOP, Volume 4 study Guide (Attach if not previously

Section 13.15; OE 3107      provided)  
Appendix Q.

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Proposed references to be provided to applicants during examination: None

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Learning Objective: LOT-00-239 K3.03 (As available)

Question Source: Bank # \_\_\_\_\_  
 Modified Bank # \_\_\_\_\_  
 New X

Question History: Last NRC Exam No

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

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

Comments:  
 MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	1	_____
	K/A #	211000 A3.05	_____
	Importance Rating	4.1	_____

(K&A Statement) A3.05- Ability to monitor automatic operations of the STANDBY LIQUID CONTROL SYSTEM including: Flow indication.

Proposed Question: RO 52

Which ONE of the following are the indications the Operator at the Controls (OATC) monitors to verify that there is adequate Standby Liquid Control (SLC) flow and subsequent Boron injection when the SLC control switch is positioned to "SYS 1" IAW OP 2114, Appendix "B", "Injecting SLC into the Reactor Vessel"?

Along with verifying the "A" SLC pump starts and discharge pressure increases, the OATC will verify that \_\_\_\_\_ (1) \_\_\_\_\_ squib valve(s) fire(s) and that the red indicator light illuminates \_\_\_\_\_ (2) \_\_\_\_\_.

- A. (1) ONLY one  
(2) after adequate flow is achieved
- B. (1) ONLY one  
(2) after adequate discharge pressure is achieved
- C. (1) BOTH  
(2) after adequate flow is achieved
- D. (1) BOTH  
(2) after adequate discharge pressure is achieved

Proposed Answer: A

- A. **CORRECT: one squib valve fires off the associated side; the red light comes of flow and NOT discharge pressure.**
- B. INCORRECT: the red light comes of flow and NOT discharge pressure.
- C. INCORRECT: one squib valve fires off the associated side
- D. INCORRECT: one squib valve fires off the associated side; the red light comes of flow and NOT discharge pressure.

Technical Reference(s): OP 2114, Appendix B

(Attach if not previously provided)

Proposed references to be provided to applicants during  
examination:

None

Learning Objective: LOT-00-214 objective A3.05 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	262002 K1.01	
	Importance Rating	2.8	

(K&A Statement) K1.01- Knowledge of the physical connections and/or cause/effect relationships between UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) and the following: Feedwater level control: Plant specific

Proposed Question: RO 53

While operating at 100% RTP, the plant sustains a loss of 120V Vital AC power.

Which ONE of the following describes how reactor water level is controlled?

- A. Manually with the "A" Feedwater Regulating valve in manual control
- B. Manually with the "B" Feedwater Regulating valve in manual control
- C. Automatically with the Master Feedwater controller AND "A" Feedwater Regulating valve
- D. Automatically with the Master Feedwater controller AND "B" Feedwater Regulating valve

Proposed Answer: B

- A. INCORRECT: "B" FRV in manual control
- B. CORRECT: ON 3168 symptoms**
- C. INCORRECT: "B" FRV in manual control
- D. INCORRECT: "B" FRV in manual control

Technical Reference(s): ON 3168 (Attach if not previously provided)

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Proposed references to be provided to applicants during examination: None

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Learning Objective: LOT-04-262 objective K1.01, (As available)  
K3.01

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Question Source: Bank # 7216

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ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Modified Bank # \_\_\_\_\_

New \_\_\_\_\_

Question History: Last NRC Exam No

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

10 CFR Part 55 Content: 55.41 2 to  
9  
55.43 \_\_\_\_\_

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	271000 K4.09	_____
	Importance Rating	2.8	_____

(K&A Statement) K4.09- Knowledge of OFFGAS SYSTEM design feature(s) and/or interlocks which provide for the following: Filtration of radioactive particulate

Proposed Question: RO 54

The AOG System is operating with dryer skid and Adsorber Bed Bypass valves as follows:

- OG-145 closed
- OG-146 closed

With the lineup as described, the AOG radiation monitor, RAN-OG-3127, trips on a valid Hi-Hi signal.

Which ONE of the following describes the response of the AOG system?

- FCV-11 (stack isolation) will close in 2 minutes AND OG-3 (delay line drain) closes immediately.
- FCV-11 (stack isolation) will close in 30 minutes AND OG-3 (delay line drain) closes immediately.
- FCV-11 (stack isolation) and OG-3 (delay line drain) will close in 30 minutes.
- FCV-11 (stack isolation) and OG-3 (delay line drain) will close in 2 minutes.

Proposed Answer: C

- INCORRECT: it takes 30 minutes with a Hi-Hi signal to close both valves
- INCORRECT: it takes 30 minutes with a Hi-Hi signal to close both valves
- CORRECT- Rad Level to Holdup and Stack, RAN-OG-3127 and RAN-OG-3128 will close OG-FCV-11, Off Gas to Stack Isolation, at the stack and, Delay Pipe Solenoid Drain to Radwaste Bypass, OG-3 under the following condition: when the AOG dryer skid and adsorber bed bypass valves OG-145 or OG-146 are closed and either radiation monitor has a Hi-Hi trip signal present for 30 minutes,**
- INCORRECT: it takes 30 minutes with a Hi-Hi signal to close both valves

Technical Reference(s): OP 2150 Discussion

(Attach if not previously provided)

Proposed references to be provided to applicants during  
examination:

None  
\_\_\_\_\_

Learning Objective: LOT-00-271, objective K4.09 (As available)

Question Source: Bank # 5838  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	215002 A3.01	_____
	Importance Rating	3.1	_____

(K&A Statement) A3.01- Ability to monitor automatic operations of the ROD BLOCK MONITOR SYSTEM including: Four rod display

Proposed Question: RO 55

Which ONE of the following describes the Rod Block Monitor (RBM) indications and inputs on the four rod display when the given control rod is selected?

- A. When a 1-string control rod is selected, there will be...
- six "A" and "B" LPRM level bypass lights input to RBM "A"
  - four "C" and "D" LPRM level bypass lights input to RBM "B"
- B. When a 2-string control rod is selected there will be...
- four "A" and "C" LPRM level bypass lights input to RBM "A"
  - four "B" and "D" LPRM level bypass lights input to RBM "B"
- C. When a 3-string control rod is selected there will be...
- two "B" and "C" LPRM level bypass lights input to RBM "A"
  - two "A" and "D" LPRM level bypass lights input to RBM "B"
- D. When a 4-string control rod is selected there will be...
- no bypass lights
  - RBM "A" will receive all eight "B" and "D" LPRM level inputs
  - RBM "B" will receive all eight "A" and "C" LPRM level inputs

Proposed Answer: B

A. INCORRECT: A/C go to RBM "A", B/D to RBM "B"

**B. CORRECT:**

C. INCORRECT: A/C go to RBM "A", B/D to RBM "B"

D. INCORRECT: A/C go to RBM "A", B/D to RBM "B"

Technical Reference(s): OP 2133

(Attach if not previously  
provided)

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\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None  
\_\_\_\_\_

Learning Objective: LOT-03-201, objective A3.01 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # 6358  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	202002 K3.04	_____
	Importance Rating	2.9	_____

(K&A Statement) K3.04- Knowledge of the effect that a loss or malfunction of the RECIRCULATION FLOW CONTROL SYSTEM will have on following: Reactor/Turbine pressure regulation system.

Proposed Question: RO 56

The plant is operating at 79% RTP when the "A" Recirculation pump flow controller fails downscale.

Which ONE of the following describes how the MHC system will respond to the flow controller failure?

- A. Bypass valves will close to control pressure at the EPR setpoint
- B. Bypass valves will open to control pressure at the MPR setpoint
- C. Control valves will close to maintain constant pressure at the pressure averaging manifold
- D. Control valves will open to maintain constant pressure at the pressure averaging manifold

Proposed Answer: C

- A. As the flow controller fails downscale, reactor power will lower. This will result in steam flow and steam pressure to lower. The steam pressure is compared to the EPR setpoint which is in control.

- A. INCORRECT: Bypass valves will not operate
- B. INCORRECT: Bypass valves will not operate
- C. **CORRECT: Bypass valves will not operate; Control valves do not open on a downpower.**
- D. INCORRECT: Bypass valves will not operate

Technical Reference(s): GEK

(Attach if not previously provided)

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\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

\_\_\_\_\_

Learning Objective: LOT-00-202, objective K3.04 (As available)

Question Source: Bank # \_\_\_\_\_  
 Modified Bank # \_\_\_\_\_  
 New X

Question History: Last NRC Exam X

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

10 CFR Part 55 Content: 55.41 2 to  
9  
 55.43 \_\_\_\_\_

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	219000 K1.01	_____
	Importance Rating	3.9	_____

(K&A Statement) K1.01 Knowledge of the physical connections and/or cause/effect relationships between RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE and the following: Suppression Pool.

Proposed Question: RO 57

In accordance with OP 2124, "Residual Heat Removal System", Appendix "C", "Torus Cooling/Containment Spray", you are directed to initiate Torus Cooling with RHR Loop "B" twenty minutes after a LOCA. The following conditions are present:

- Drywell and Torus pressures are 10 psig and slowly rising.
- RPV level is +15 inches on LT-2-3-91A/B (Shroud Level) and slowly rising.
- RPV pressure is 500 psig.

Which of the following switches must be operated in order to place the "B" Loop in Torus Cooling for the given plant conditions??

- 1) Place RHRSW PP B&D LPCI AUTOSTOP OVERRIDE SWITCH keylock switch to MANUAL OVERRD
- 2) Place only the RHR B/D LOGIC CTMT SPRAY VLV LPCI SIG BYPASS SWITCH (pistol grip) in the MANUAL position.
- 3) Place only the RHR B/D LOGIC CTMT SPRAY VLV SHROUD LEVEL OVRD SWITCH (keylock) in the MANUAL OVERRIDE position.
- 4) Place the UPS FDR TRIP keylock switches (10A-S36B) to BLOCK.

- A. #1 and 2 ONLY
- B. #1 and 3 ONLY
- C. #2 and 4 ONLY
- D. #3 and 4 ONLY

Proposed Answer: A

- A. **CORRECT: IF a LPCI initiation signal is present, THEN place RHRSW PP A&C (B&D) LPCI AUTOSTOP OVERRIDE SWITCH keylock switch to MANUAL OVERRD; IF reactor water level is greater than TAF as indicated on the shroud indicators, THEN turn the RHR A/C (B/D) LOGIC CTMT SPRAY VLV LPCI SIG BYPASS to MAN.**
- B. INCORRECT: Not <TAF therefore not required to place the RHR A/C (B/D) LOGIC CTMT SPRAY VLV SHROUD OVRD keylock switch to MANUAL OVERRIDE
- C. INCORRECT: No requirement to operate UPS FDR BLOCK keylock for this scenario and thus is NOT addressed in Appendix "C"
- D. INCORRECT: No requirement to operate UPS FDR BLOCK keylock for this scenario and thus is NOT addressed in Appendix "C". Additionally, not <TAF therefore not required to place the RHR A/C (B/D) LOGIC CTMT SPRAY VLV SHROUD OVRD keylock switch to MANUAL OVERRIDE

Technical Reference(s): OP 2124, discussion and Appendix "C" (Attach if not previously provided)

\_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-205, objective K1.01 (As available)

Question Source: Bank # \_\_\_\_\_  
 Modified Bank # 5874  
 New \_\_\_\_\_

Question History: Last NRC Exam No

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

10 CFR Part 55 Content: 55.41 2 to 9  
 55.43 \_\_\_\_\_

Comments:  
 MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	290001 K1.09	_____
	Importance Rating	2.9	_____

(K&A Statement) K1.09- Knowledge of the physical connections and/or cause/effect relationships between SECONDARY CONTAINMENT and the following: Plant air systems

Proposed Question: RO 58

With the plant operating at rated full power operations, which ONE of the following describes the system inter-relationship between the Instrument Air and Secondary Containment systems?

- A. The INNER and OUTER Reactor Building Railroad Airlock Doors each have inflatable seals. On a loss of instrument air, they will deflate until the backup air bottle supply can be placed in service.
- B. The INNER and OUTER Reactor Building Railroad Airlock Doors each have inflatable seals. On a loss of instrument air, they will remain inflated automatically by the backup air bottle supply.
- C. ONLY the OUTER Reactor Building Railroad Airlock Door has an inflatable seal. On a loss of instrument air, the seal will deflate until the backup air bottle supply can be placed in service.
- D. ONLY the OUTER Reactor Building Railroad Airlock Door has an inflatable seal. On a loss of instrument air, the seal will remain inflated automatically by the backup air bottle supply.

Proposed Answer: B

- A. INCORRECT: backup air supply will maintain the seals inflated
- B. CORRECT:**
- C. INCORRECT: Both seals have inflatable seals; backup air supply will maintain the seals inflated
- D. INCORRECT: Both seals have inflatable seals

Technical Reference(s): OP 2116 discussion, ON 3146 Appendix "A" (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-02-224, objective K1.09 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

10 CFR Part 55 Content: 55.41 2 to  
9  
55.43 \_\_\_\_\_

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	201001 K6.03	
	Importance Rating	3.0	_____

(K&A Statement) K6.03- Knowledge of the effect that a loss or malfunction of the following will have on the CONTROL ROD DRIVE HYDRAULIC System: Plant air systems

Proposed Question: RO 59

With the plant operating at 100% RTP, the instrument air line to CRD-FCV-19A (Control Rod Drive "A" Flow Control Valve) ruptures resulting in a loss of air to the valve.

Which ONE of the following are the expected Control Rod Drive Hydraulic (CRD-H) indications on CRP 9-5 (Control Room Panel)?

Charging pressure will \_\_\_\_\_ (1) \_\_\_\_\_ and Drive water D/P will \_\_\_\_\_ (2) \_\_\_\_\_.

- A. (1) decrease  
(2) increase
- B. (1) decrease  
(2) decrease
- C. (1) increase  
(2) increase
- D. (1) increase  
(2) decrease

Proposed Answer: D

B, C, D INCORRECT: charging pressure increases and drive D/P will decrease

D. **CORRECT:**

Technical Reference(s): ON 3146 Appendix "A" (Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

\_\_\_\_\_

Learning Objective: LOT-01-201 objective K6.03. (As available)

Question Source: Bank # 3635  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	201003 A1.02	
	Importance Rating	2.8	_____

(K&A Statement) A1.02- Ability to predict and/or monitor changes in parameters associated with operating the CONTROL ROD AND DRIVE MECHANISM controls including: CRD Drive Pressure.

Proposed Question: RO 60

Which ONE of the following identifies how the collet fingers are released from the notch in the index tube during a control rod withdrawal as observed by the Operator at the Controls (OATC) on CRP 9-5?

A short insert signal ports \_\_\_(1)\_\_\_ drive pressure flow to the \_\_\_(2)\_\_\_ of the drive water piston.

- A. (1) 2 gpm  
(2) bottom
- B. (1) 2 gpm  
(2) top
- C. (1) 4 gpm  
(2) bottom
- D. (1) 4 gpm  
(2) top

Proposed Answer: C

- A. INCORRECT: Insert signal flow is 4 gpm
- B. INCORRECT: Insert signal flow is 4 gpm to the top
- C. CORRECT:**
- D. INCORRECT: Insert signal flow is to the top

Technical Reference(s): CRD System DBD (page 60 of 83) (Attach if not previously provided)

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-01-201, objective K1.10 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	239001 K3.15	
	Importance Rating	3.5	_____

(K&A Statement) K3.15 Knowledge of the effect that a loss or malfunction of the MAIN AND REHEAT STEAM SYSTEM will have on following: Reactor water level control

Proposed Question: RO 61

With the plant operating at 100% RTP and RPV water level at 160 inches, the "A" Safety Relief Valve (RV-71A) inadvertently opens.

Which ONE of the following describes the RPV water level response for the full open Safety Relief Valve?

**NOTE:** Assume no operator action.

RPV water level will \_\_\_\_\_.

- A. lower to ~153 inches and remain there
- B. rise to ~167 inches and remain there
- C. lower to ~153 inches before returning to 160 inches
- D. rise to ~167 inches before returning to 160 inches

Proposed Answer: A

- A. **CORRECT: IAW OT 3121 symptoms, water level decreases up to ~7inches for a full open Safety relief valve.**
- B. INCORRECT: Water level decreases due to steam flow/feed flow mismatch
- C. INCORRECT: The feed flow/steam flow mismatch will result in water level remaining low
- D. INCORRECT water level lowers

Technical Reference(s): OPOT-3121-01 Symptoms (Attach if not previously provided)

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\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

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ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-602, objective RO (As available)  
EO7

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:  
MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	272000 K5.01	_____
	Importance Rating	3.2	_____

(K&A Statement) K5.01- Knowledge of the operational implications of the following concepts as they apply to RADIATION MONITORING SYSTEM: Hydrogen injection operation's effect on process radiation indications

Proposed Question: RO 62

A plant startup is in progress with reactor power at 40% RTP. As Hydrogen Water Chemistry was being lined up to the "A" and "C" Reactor Feedwater Pumps (RFP), the Control Room received the following annunciators:

- 5-H-6, "MN STM LN RAD CH A HI"
- 5-J-6, "MN STM LN RAD CH B HI"

Which ONE of the following will occur as a result of the Hydrogen injection spike as sensed by the radiation monitors causing these two alarms?

- A. The Mechanical Vacuum pump will trip.
- B. The Steam Packing Exhauster discharge valve (AE-12A) will close.
- C. The Air Ejector Suction Press Control (OG-516A) will close.
- D. The Air Ejector Steam Supply Press Inlet valves (AS-FCV-36 and AS-FCV-37) will close

Proposed Answer: B

- A. INCORRECT: MVP is not running from this power
- B. CORRECT: ARS 5-H-6 and 5-J-6**
- C. INCORRECT: No affect on OG-516 valves
- D. INCORRECT: No affect on FCV-36/FCV-37

Technical Reference(s): OP 2199, OP 0105, ARSs 5-H-6 and 5-J-6 (Attach if not previously provided)

Proposed references to be provided to applicants during examination:

None

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-272, objective K5.01 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:  
MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	259001 K2.01	_____
	Importance Rating	3.3	_____

(K&A Statement) K2.01 Knowledge of electrical power supplies to the following: Reactor feedwater pump(s): Motor-driven-only

Proposed Question: RO 63

The plant is running at 95% power when power is lost to 4 KV Bus 2.

Based on these initial conditions, which ONE of the following lists the 4KV loads that will be operating following a loss of Bus 2 for the following systems?

- (1) Feed system
  - (2) Condensate System
- A. (1) "A" AND "B" Reactor Feed Pumps  
(2) ONLY "C" Condensate Pump
  - B. (1) ONLY "C" Reactor Feed Pump  
(2) ONLY "A" Condensate Pump
  - C. (1) ONLY "B" Reactor Feed Pump  
(2) ONLY "C" Condensate Pump
  - D. (1) ONLY "A" Reactor Feed Pump  
(2) ONLY "A" Condensate Pump

Proposed Answer: D

- A. INCORRECT: B RFP is not running, C Condensate pump is not running
- B. INCORRECT: C RFP is not running
- C. INCORRECT: B RFP is not running, C Condensate pump is not running
- D. CORRECT: OPOT-3170-01**

Technical Reference(s): OP 2172, OPOT-3170-01 (Attach if not previously provided)

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\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

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ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-259 objective K2.01 (As available)

Question Source: Bank # 6835  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:  
MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	223001	K5.01
	Importance Rating	3.1	_____

(K&A Statement) K5.01- Knowledge of the operational implications of the following concepts as they apply to PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES: Vacuum breaker/relief valve operation

Proposed Question: RO 64

Which ONE of the following describes the operation of the Reactor Building (RB) to Torus vacuum breaker relief valve system?

The vacuum breakers FIRST open to relieve pressure when \_\_\_\_\_ .

- A. RB pressure exceeds Torus pressure by 0.5 psid
- B. RB pressure exceeds Torus pressure by 1.0 psid
- C. Torus pressure exceeds RB pressure by 0.5 psid
- D. Torus pressure exceeds RB pressure by 1.0 psid

Proposed Answer: A

**A. CORRECT: CPS DBD**

B. INCORRECT: setpoint is 0.5

C. INCORRECT: RB exceeds Torus pressure

D. INCORRECT: RB exceeds Torus pressure; setpoint is incorrect

Technical Reference(s): CPS DBD page 56 of 94 (Attach if not previously provided)

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\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

\_\_\_\_\_

Learning Objective: LOT-00-223, objective 5.01 (As available)

Question Source: Bank # \_\_\_\_\_



Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	_____
	Group #	2	_____
	K/A #	201006 A1.02	
	Importance Rating	3.4	_____

(K&A Statement) A1.02- Ability to predict and/or monitor changes in parameters associated with operating the ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) controls including: Status of control rod movement blocks: Plant specific (not BWR-6)

Proposed Question: RO 65

A power reduction is in progress. Plant conditions are as follows:

- feed flow is 32% and lowering
- steam flow is 28% and lowering

Which ONE of the following identifies the EARLIEST the Rod Worth Minimizer (RWM) will enforce rod blocks?

The RWM will enforce all blocks ONCE \_\_\_\_\_.

- EITHER feed flow or steam flow is below 21%
- BOTH feed flow and steam flow are below 21%
- EITHER feed flow or steam flow is below 25%
- BOTH feed flow and steam flow are below 25%

Proposed Answer: A

- A. CORRECT: OP 2450**
- INCORRECT: either signal
- INCORRECT: 21%
- Either signal at 21%

Technical Reference(s): OP 2450

(Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

\_\_\_\_\_

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-04-201 objective K4.01, (As available)  
K4.02, A1.02

Question Source: Bank # 6853  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	_____	_____
	K/A #	2.3.4	_____
	Importance Rating	3.2	_____

(K&A Statement) 2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions

Proposed Question: RO 66

In accordance with EN-RP-201, "Dosimetry Administration", which ONE of the following identifies the ROUTINE Annual Administrative Guideline Total Effective Dose Equivalent (TEDE) limit for a qualified radiation worker?

NOTE: Assume there are no cases of undocumented quarters.

- A. 2000 mrem per calendar quarter
- B. 2000 mrem per year
- C. 4500 mrem per calendar quarter
- D. 4500 mrem per year

Proposed Answer: B

- A. INCORRECT: per calendar year
- B. CORRECT: EN-RP-102**
- C. INCORRECT: 2000 mrem limit per quarter
- D. INCORRECT: 2000 mrem limit

Technical Reference(s): EN-RP-201, section 5.3 (Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination: None

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Learning Objective: LOT-00-404, objective 2.3.4 (As available)

Question Source: Bank # 6778  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Question History: Last NRC Exam No

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

10 CFR Part 55 Content: 55.41 12  
55.43 \_\_\_\_\_

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	_____	_____
	K/A #	2.2.38	_____
	Importance Rating	3.6	_____

(K&A Statement) 2.2.38 Knowledge of conditions and limitations in the facility license

Proposed Question: RO 67

The plant was operating at full rated power when a plant transient resulted in a Minimum Critical Power Ratio (MCPR) of 1.02.

Which ONE of the following identifies the required action to be taken based on current plant conditions?

- A. MCPR is within the TS limit for current plant conditions thus no action is required.
- B. MCPR has exceeded the TS limit for current plant conditions thus a power reduction is required until RE determines MCPR is within TS limits.
- C. MCPR has exceeded the TS limit for current plant conditions thus a shutdown to cold shutdown conditions is required within 24 hours.
- D. MCPR has exceeded the TS limit for current plant conditions thus an immediate scram is required.

Proposed Answer: D

Justification for Comprehension: The candidate must have the knowledge of what a Safety Limit is. Knowing that a Safety Limit was violated in this case, the authorization to resume plant operations comes from the NRC IAW TRM section 6.4.

- A. **INCORRECT:** MRPC has exceeded a Safety Limit thus IAW TS section 6.3, the Reactor shall be shutdown immediately.
- B. **INCORRECT:** MRPC has exceeded a Safety Limit thus IAW TS section 6.3, the Reactor shall be shutdown immediately.
- C. **INCORRECT:** MRPC has exceeded a Safety Limit thus IAW TS section 6.3, the Reactor shall be shutdown immediately.
- D. **CORRECT: IAW TS section 6.3, ACTION TO BE TAKEN IF A SAFETY LIMIT IS EXCEEDED → Applies to administrative action to be followed in the event a safety limit is exceeded. If a safety limit is exceeded, the reactor shall be shutdown immediately.**

Technical Reference(s): TRM section 6.4

(Attach if not previously provided)

Proposed references to be provided to applicants during  
examination:

None

Learning Objective: LOT-00-308, RO EO6 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Operations rep believes this is SRO level of knowledge; it's in section 6.0 of TSs which an RO should know from memory. Looking at another question to find a closer RO question.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	_____	_____
	K/A #	2.3.7	_____
	Importance Rating	3.5	_____

(K&A Statement) 2.3.7 Ability to comply with radiation work permit requirements during normal or abnormal conditions

Proposed Question: RO 68

An operator needs to sign on to a Radiation Worker Permit (RWP) in order to complete a valve lineup.

Radiological conditions in the area the worker needs to enter are as follows:

- 75mr/hour measured 12 inches from the source
- 275,000dpm/100 cm<sup>2</sup> beta-gamma removable surface contamination on a majority of the area
- 550dpm/100 cm<sup>2</sup> alpha removable surface contamination on a majority of the area

Which ONE of the following identifies the radiological conditions that the RWP must allow for in order for the operator to complete the valve lineup?

The RWP must allow the worker to enter \_\_\_\_\_ AND \_\_\_\_\_ areas at a MINIMUM.

- radiation; contamination
- radiation; high contamination
- high radiation; contamination
- high radiation; high contamination

Proposed Answer: B

- INCORRECT: high contamination area
- B. CORRECT: EN-RP-108**
- INCORRECT: radiation area and high contamination area
- INCORRECT: radiation area

Technical Reference(s): EN-RP-108

(Attach if not previously  
provided)

\_\_\_\_\_  
\_\_\_\_\_

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-00-404, objective 2.3.13, (As available) 2.3.17

Question Source: Bank # \_\_\_\_\_  
Modified Bank # 6795  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

10 CFR Part 55 Content: 55.41 12  
55.43 \_\_\_\_\_

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	_____	_____
	K/A #	2.1.45	_____
	Importance Rating	4.3	_____

(K&A Statement) 2.1.45 Ability to identify and interpret diverse indications to validate the response of another indication

Proposed Question: RO 69

With the plant operating at full rated power and the electrical distribution system in a normal lineup, a loss of DC-2 occurs. No actions of ON 3160, "Loss of DC-2", have been taken.

The resultant level transient caused water level to lower below the scram setpoint. Both automatic and manual scrams failed. In response to this, the operator depressed the ARI/RPT pushbuttons.

Which of the following indications are available for the operator to determine if the Alternate Rod Insertion (ARI) valves responded as expected to successfully insert ALL control rods?

- A. Annunciators "RPT/ARI/AX" AND "RPT/ARI/CX" will alarm on CRP 9-4. ALL the Scram Discharge Volume Vent and Drain Valves as indicated on CRP 9-5 will OPEN.
- B. Annunciators "SDV NORTH/SOUTH NOT DRAINED" will alarm on CRP 9-5. ALL the CRD-126/127 scram inlet/outlet valves as indicated on the CRP 9-5 full core display will OPEN.
- C. ALL the CRD-126/127 scram inlet/outlet valves as indicated on CRP 9-5 full core display will OPEN. Scram air header pressure as read on CRP 9-5 will lower.
- D. ALL the Scram Discharge Volume Vent and Drain Valves as indicated on CRP 9-5 will OPEN. Scram air header pressure as read on CRP 9-5 will lower.

Proposed Answer: C

- A. INCORRECT: annunciator power is lost
- B. INCORRECT: annunciator power is lost
- C. CORRECT: UFSAR**
- D. INCORRECT: Vent and Drain valve close.

Technical Reference(s): ON 3160, UFSAR, P&ID (Attach if not previously

\_\_\_\_\_ provided)  
\_\_\_\_\_

Proposed references to be provided to applicants during  
examination:

None  
\_\_\_\_\_

Learning Objective: LOT-01-201, objective K4.05 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	_____	_____
	K/A #	2.4.31	_____
	Importance Rating	4.2	_____

(K&A Statement) 2.4.31 Knowledge of annunciator alarms, indications, or response procedures

Proposed Question: RO 70

With the plant operating at full rated power, a Feedwater pipe rupture results in the following annunciator in the Control room:

- 5-E-3, "REACTOR LEVEL LO-LO" due to required logic being made up LT-72-A, B, C, and D Reactor water level transmitters.

Which ONE of the following describes an expected plant operation based on this logic being made up?

- Bus 3 loads will be carried from the associated EDG that auto started
- Pressure control will be via the Mechanical Hydraulic Control system
- ADS blowdown will begin eight minutes from receiving the alarm
- Bus 5 will lose power resulting in the loss of the cooling towers

Proposed Answer: D

- INCORRECT: The EDGs will start but will not load with bus voltage SAT. There is nothing in the stem to indicate a load shed is required
- INCORRECT: The MSIVs will shut resulting in the loss of the Main Condenser as a heat sink
- ADS blowdown will begin in 10 minutes (8 minutes for the pumps to start and simulated high drywell pressure to seal in and then a 2 minute timer)
- CORRECT: breaker 53 trips on MCA signal**

Technical Reference(s): ARS 5-E-3 Automatic actions (Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

\_\_\_\_\_

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-216, K3.06 (affect on (As available)  
CS Logic) \_\_\_\_\_

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

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

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

Comments:

Question is a double jeopardy with #31. Needs to be replaced with another annunciator response question.

Question replaced on 9-16-10

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	_____	_____
	K/A #	2.3.13	_____
	Importance Rating	3.4	_____

(K&A Statement) 2.3.13 Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to **radiation monitor alarms**, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

Proposed Question: RO 71

The Control Room Supervisor (CRS) wishes for a licensed operator and RP Technician to enter the Drywell to identify the source of unidentified leakage.

IAW RPRP-PC-0507-01, "Drywell Clearance Entry", which ONE of the following identifies a completely de-inerted Containment which would allow the individuals to enter the Drywell?

- E. O<sub>2</sub> concentration is 18%, LEL is 5%
- F. O<sub>2</sub> concentration is 20%, LEL is 12%
- G. O<sub>2</sub> concentration is 22%, LEL is 5%
- H. O<sub>2</sub> concentration is 24%, LEL is 12%

**NOTE:** LEL = Lower Explosive Limit for Hydrogen

Proposed Answer: C

- A. INCORRECT: O<sub>2</sub> concentration is <19.5%
- B. INCORRECT: LEL is >10%, LEL is >10%
- C. **CORRECT: Primary Containment is considered de-inerted when two consecutive air samples, taken at least 15 minutes apart on Drywell and Torus, meet both of the following: oxygen concentration GREATER THAN 19.5% AND LESS THAN 23% AND flammable gases and vapors LESS THAN 10% Lower Explosive Limit (LEL) for Hydrogen**
- D. INCORRECT: O<sub>2</sub> concentration is >23%, LEL is 12%

Technical Reference(s): RPRP-PC-0507-01, (Attach if not previously  
Definition 5.1.1; OP 2115 provided)  
P&L #8

Proposed references to be provided to applicants during \_\_\_\_\_ None \_\_\_\_\_

examination: \_\_\_\_\_

Learning Objective: LOT-00-404, objective (As available)  
K2.3.18 \_\_\_\_\_Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

Question Cognitive Level: Memory or Fundamental Knowledge X \_\_\_\_\_  
Comprehension or Analysis \_\_\_\_\_10 CFR Part 55 Content: 55.41 12 \_\_\_\_\_  
55.43 \_\_\_\_\_

Comments:

NEW question as of 9-30-10

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	_____	_____
	K/A #	2.4.34	_____
	Importance Rating	4.2	_____

(K&A Statement) 2.4.34 Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects

Proposed Question: RO 72

A fire in the Control Room has resulted in the Control Room Supervisor implementing and directing the actions of OP 3126, "Shutdown Using Alternate Methods".

Which ONE of the following identifies the operational guidance provided to a licensed operator as directed by OP 3126?

A Control Room licensed operator is directed to \_\_\_\_\_.

- A. maintain RPV water level with HPCI during plant cooldown
- B. place "B" Loop of RHR in Torus Cooling to support SRV operations
- C. lineup the RHR system for Shutdown Cooling mode using the "B" RHR pump
- D. restore power to Bus 4 by using the preferred Vernon Tie power source

Proposed Answer: D

- A. INCORRECT: HPCI is not an alternate shutdown system
- B. INCORRECT: "A" RHR is not an alternate shutdown subsystem
- C. INCORRECT: "B" RHR pump is not used for alternate shutdown
- D. CORRECT: OP 3126**

Technical Reference(s): OP 3126 (Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination: None

\_\_\_\_\_

Learning Objective: LOT-00-612, EO A.4 and B.2 (As available)

Question Source: Bank # \_\_\_\_\_

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Modified Bank # \_\_\_\_\_  
New  X

Question History: Last NRC Exam  No

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	_____	_____
	K/A #	2.2.21	_____
	Importance Rating	2.9	_____

(K&A Statement) 2.2.21 Knowledge of pre- and post-maintenance operability requirements

Proposed Question: RO 73

Which ONE of the following identifies a maintenance activity and associated Post Maintenance Test (PMT) that would be required in order to return the component to a TECHNICAL SPECIFICATION OPERABLE status?

- A. Air Start Solenoid replacement for the “A” Emergency Diesel Generator with a PMT of ensuring the Emergency Diesel Generator starts and reaches rated voltage and frequency within 15 seconds.
- B. Packing replacement for MS-80A (“A” Main Steam Line inboard isolation valve) with a PMT of verifying the stroke time meets the 6-8 second closing time requirement.
- C. Motor replacement for RHR-31A (Drywell Spray valve) with a PMT of ensuring the valve automatically opens on a valid accident signal.
- D. Valve replacement for VG-23 (Containment Air Monitor inboard supply isolation valve) with a PMT of ensuring the Local Leak Rate Test (LLRT) is satisfactory.

Proposed Answer: D

- A. INCORRECT: EDG required TS start time is 13 seconds
- B. INCORRECT: MSIV closure time is 3-5 seconds
- C. INCORRECT: RHR-31A does not open on accident signal
- D. CORRECT: LLRT required for PCIS valve replacement**

Technical Reference(s): EN-WM-107 Attachment 9.3, (Attach if not previously provided)  
 OP 5281 Acceptance criteria,  
 OP 4030 VYOPF 4030.02  
 (Type C LLRT for VG-23),  
 OP 4100 (VYOPF 4100.04),  
 TRM, TSs, AP 0125  
 Appendix A.

Proposed references to be provided to applicants during examination:

None

Learning Objective: \_\_\_\_\_ (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

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

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

Comments:

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	_____	_____
	K/A #	2.1.23	_____
	Importance Rating	4.3	_____

(K&A Statement) 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation

Proposed Question: RO 74

The plant is being started up following a refueling outage IAW OP 0105, "Reactor Operations". In parallel with this, Primary Containment is being inerted IAW OP 2115, "Primary Containment."

The following is a timeline of events:

- 1245 Mode switch was taken to RUN
- 1510 Reactor power at 15% RTP

Which ONE of the following identifies a Primary Containment Technical Specification AND OP 2115 inerting requirement based on the given timeline?

Primary Containment Oxygen AND Drywell/Torus Differential Pressure (D/P) is required to be within specification by \_\_\_\_\_ the following day.

- A. 0045
- B. 0310
- C. 1245
- D. 1510

Proposed Answer: D

- A. INCORRECT: 24 hours from 15%
- B. INCORRECT: 24 hours from 15%
- C. INCORRECT: 24 hours from 15%
- D. CORRECT: OP 2115 precaution and limitation**

Technical Reference(s): OP 2115 precautions and limitations, Technical Specifications \_\_\_\_\_  
\_\_\_\_\_ (Attach if not previously provided)

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-00-304 RO EO4 (As available)

Question Source: Bank # \_\_\_\_\_  
 Modified Bank # 5897  
 New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

There is a P&L in Phase 2 of OP 0105 that says Drywell/Torus D/P needs to be in Spec within 24 hours of RUN. There is no mention of Oxygen AND this question specifically states TSs and OP 2115.

MH Operations review SAT (9-15-10)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	_____
	Group #	_____	_____
	K/A #	2.2.35	_____
	Importance Rating	3.6	_____

(K&A Statement) 2.2.35 Ability to determine Technical Specification Mode of Operation

Proposed Question: RO 75

Which ONE of the following conditions makes up the mode switch position(s) AND MINIMUM power needed to satisfy the Technical Specification definition of "Reactor Power Operation"?

- A. Mode switch in RUN ONLY and power above 1% RTP
- B. Mode switch in RUN ONLY and power above 5% RTP
- C. Mode switch in Startup/Hot Standby OR RUN and power above 1% RTP
- D. Mode switch in Startup/Hot Standby OR RUN and power above 5% RTP

Proposed Answer: C

- A. INCORRECT: Mode switch can also be in the Startup /Hot Standby position
- B. INCORRECT: Mode switch can also be in the Startup /Hot Standby position and minimum power is 1% RTP
- C. CORRECT: IAW TS Definition 1.0.R- Reactor power operation is any operation with the mode switch in the "Startup/Hot Standby" or "Run" position with the reactor critical and above 1% rated thermal power**
- D. INCORRECT: minimum power is 1% RTP

Technical Reference(s): Technical Specifications section 1.0 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-308 objective RO EO2.j (As available)

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New  X

Question History: Last NRC Exam  No

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>1</u>
	Group #	_____	<u>1</u>
	K/A #	<u>295031 EA2.02</u>	
	Importance Rating	_____	<u>4.2</u>

(K&A Statement) EA2.02- Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Reactor power

Proposed Question: SRO 76

The reactor is operating at full rated power when the "A" Main Steam Line flow detector fails downscale (MS-51A).

Based on the Feedwater Level Control (FWLC) system response to this failure, which ONE of the following is:

- 1) the affect on reactor power?
- 2) the direction provided by the Control Room Supervisor(CRS)?

**NOTE:** Assuming NO operator actions are taken

- A. (1) INDICATED power will increase and ACTUAL power will remain the same  
(2) Direct a power reduction of 2-5MW<sub>th</sub> due to the effect on the core heat balance calculation.
- B. (1) INDICATED power will remain the same and ACTUAL power will increase  
(2) Contact Reactor Engineering (RE) due to core thermal limits calculations being suspect.
- C. (1) Both INDICATED and ACTUAL power will decrease  
(2) Direct power be restored to 100% RTP IAW OP 0105, Phase 4B.
- D. (1) Both INDICATED and ACTUAL power will decrease  
(2) Direct and/or verify the FWLC system be placed in manual control

Proposed Answer: D

- A. **INCORRECT:** RPV water level decreases due to reduced total steam flow with the FWLC system in 3-element. The FF/SF mismatch causes the FWLC system to throttle closed the FRVs to match the lower steam flow input. Water level will stabilize at some lower value. Both indicated and actual power will decrease due to the lower water level. The direction to lower power 2-5MWth would be correct if the core heat balance was being calculated incorrectly (DP 0166) which is not the case here since the input from MS-51A is not used in the calculation.
- B. **INCORRECT:** RPV water level decreases which results in power decreasing. Thermal power calculations are unaffected by the instrument failure.
- C. **INCORRECT:** There is no procedural requirement to raise power to 100%RTP.
- D. **CORRECT:** RPV water level decreases due to reduced total steam flow with the FWLC system in 3-element. The FF/SF mismatch causes the FWLC system to throttle closed the FRVs to match the lower steam flow input. Water level will stabilize at some lower value. Both indicated and actual power will decrease due to the lower water level. As an immediate action in OT 3113, the FWLC system is placed in manual control.

Technical Reference(s): OT 3113

(Attach if not previously  
provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during  
examination:

None

\_\_\_\_\_

Learning Objective:

LOT-00-602, objective RO  
EO2

(As available)

\_\_\_\_\_

Question Source:

Bank #

\_\_\_\_\_

Modified Bank #

\_\_\_\_\_

New

X

\_\_\_\_\_

Question History:

Last NRC Exam

No

\_\_\_\_\_

Question Cognitive Level:

Memory or Fundamental Knowledge

Comprehension or Analysis

X

\_\_\_\_\_

10 CFR Part 55 Content:

55.41

\_\_\_\_\_

55.43

5

\_\_\_\_\_

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	295004 AA2.04	
	Importance Rating	_____	3.3

(K&A Statement) AA2.04- Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: System lineups

Proposed Question: SRO 77

While operating at steady state 65% RTP, the following indications are observed in the control room:

- Trip of Reactor Water Cleanup
- Loss of EPR/MPR control white light
- Loss of position indication for Feed Pump Recirc Valves

Based on these indications, which ONE of the following procedures is entered AND what guidance (if any) is provided concerning Emergency Diesel Generator (EDG) control power sources?

- A. Enter ON 3159, "Loss of DC-1", and direct transferring the applicable EDG control power source to DC-2.
- B. Enter ON 3160, "Loss of DC-2/3", and direct transferring the applicable EDG control power source to DC-1.
- C. Enter ON 3159, "Loss of DC-1". No action to transfer EDG control power is required since both EDGs maintain their normal power source.
- D. Enter ON 3160, "Loss of DC-2/3". No action to transfer EDG control power is required since both EDGs maintain their normal power source.

Proposed Answer: D

- A. INCORRECT: Indications support a loss of DC-2/3
- B. INCORRECT: Control power to the "B" EDG remains on DC-1 and control power for the "A" EDG remains on DC-2AS
- C. INCORRECT: Indications support a loss of DC-2/3
- D. **CORRECT: Indications support a loss of DC-2/3; Normal control power to the "B" EDG remains on DC-1 and normal control power for the "A" EDG remains on DC-2AS**

Technical Reference(s): ON 3160

(Attach if not previously provided)

Proposed references to be provided to applicants during  
examination:

None

Learning Objective: LOT-00-601, RO EO3 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # 6713  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	295037 EA2.02	
	Importance Rating	_____	4.2

(K&A Statement) EA2.02- Ability to determine and/or interpret the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Reactor water level

Proposed Question: SRO 78

An Anticipated Transient without Scram (ATWS) condition has occurred. Plant conditions are as follows:

- Reactor power is 40% RTP
- Reactor water level is being controlled in the required ATWS level band
- Control rod insertion appendices are being performed with NO success thus far

When is the earliest the Control Room Supervisor can order a water level band of 127-177 inches? \_\_\_\_\_

- Once SLC tank level decreases by 20% IAW the EOP-2 level leg.
- Once SLC tank level decreases by 30% IAW the EOP-2 power leg.
- Once Reactor power decreases to 2% IAW the EOP-2 level leg.
- Once Reactor power decreases to 25% IAW the EOP-2 power leg.

Proposed Answer: A

- CORRECT: Once HSBW is added, we can place level 127-177 inches.**
- INCORRECT: HSBW is 20%
- INCORRECT: Power has no impact on when we can raise level 127-177"
- INCORRECT: Power has no impact on when we can raise level 127-177"

Technical Reference(s): EOP-2 flowchart and EOP Volume 4 study guide (Attach if not previously provided)

Proposed references to be provided to applicants during examination:

None

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-610 objective 2.4.44 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	295005 2.4.45	
	Importance Rating	_____	4.3

(K&A Statement) 2.4.45- Ability to prioritize and interpret the significance of each annunciator or alarm

Proposed Question: SRO 79

A plant startup is in progress IAW OP 0105, "Reactor Operation" with the turbine online. The reactor is at 18% RTP.

Additionally, Annunciator 7-F-2, "TURB Excessive Vibration" alarms in the control room. The ERFIS screen for "Turbine Bearing Performance" indicates the following:

- Bearings 1X, 1Y and 8X are alarming with a slowly rising trend in all three values.
- All other bearing temperatures and trends are stable.

Failure to take operator action in a timely manner will result in:

- (1) Which ONE of the following plant responses?
  - (2) What required actions to be taken?
- A. (1) Bearings 1X and 1Y reach the trip setpoint causing MTS-1 to trip resulting in a turbine trip.  
(2) Enter ONLY ON 3154, "Load Reject". Verify 1T ACB, 81-1T ACB and T-1 MOD open.
  - B. (1) Bearings 1X and 8X reach the trip setpoint causing MTS-1 to trip resulting in a turbine trip.  
(2) Enter ONLY ON 3154, "Load Reject". Verify 1T ACB, 81-1T ACB and T-1 MOD open.
  - C. (1) Bearings 1X and 1Y reach the trip setpoint causing MTS-1 to trip resulting in a turbine trip.  
(2) Enter OT 3100, "Reactor Scram" AND ON 3154, "Load Reject". Verify house loads have transferred to the Startup Transformers.
  - D. (1) Bearings 1X and 8X reach the trip setpoint causing MTS-1 to trip resulting in a turbine trip.  
(2) Enter OT 3100, "Reactor Scram" AND ON 3154, "Load Reject". Verify house loads have transferred to the Startup Transformers.

Proposed Answer: A

- A. CORRECT: Logic made up for a turbine trip only**  
 B. INCORRECT: required logic not made up (X/Y on the same bearing)  
 C. INCORRECT: A scram will not occur  
 D. INCORRECT: required logic not made up (X/Y on the same bearing); A scram will not occur

Technical Reference(s): ARS 5-K-8, ARS 7-F-2, ON 3154 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-601; objective RO E03 (As available)

Question Source: Bank # #22 (2009 SRO-Re-exam)  
 Modified Bank #  
 New

Question History: Last NRC Exam Yes (2009 SRO Re-Exam)

Question Cognitive Level: Memory or Fundamental Knowledge  
 Comprehension or Analysis X

10 CFR Part 55 Content: 55.41  
 55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	295038 EA2.04	
	Importance Rating	_____	4.5

(K&A Statement) EA2.04- Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE: Source of off-site release

Proposed Question: SRO 80

EOP-3, "Primary Containment Control", has been entered do to adverse Primary Containment conditions. The CRS wishes to vent Primary Containment using OE 3107, "EOP/SAG Appendices".

The following plant conditions exist:

- Primary Containment pressure is 5.0 psig and rising slow
- ONLY one SBGT is operational

Which ONE of the following identifies an adverse affect of utilizing Appendix "HH", section 4, "8" Vent to SGT-6 SBGT to Stack"?

Use of this section may result in a path that \_\_\_\_\_.

- can be throttled
- can not be remotely operated
- can result in a ground level release
- can damage the operating SBGT train

Proposed Answer: C

**\*SRO ONLY justification:** This question ties to a specific SRO ONLY objective that also does not require ROs to have the same knowledge level concerning Containment venting.

- CORRECT:** *If containment pressure is greater than 2.0 psi, RTF-5 will fail when AC-7A or AC-7B is opened. Alert personnel to the potential for the reactor building or ground level releases.*
- INCORRECT: This flow path is monitored
- INCORRECT: This flow path is remotely operated
- INCORRECT: This flow path will not damage the SBGT train

Technical Reference(s): OE 3107, Appendix HH (Attach if not previously

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Section 4 and Table 2 provided)

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-00-625, objective SRO 1 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

RECIRCULATION SYSTEM		4-B-6 Page 1 of 1
RECIRC PUMP A FW FLOW LO INTLK		
Causes:	Setpoints:	Actuating Devices:
<ol style="list-style-type: none"> <li>1. Feedwater flow &lt;18%.</li> <li>2. Recirc pump "A" discharge valve &lt;90% open.</li> </ol>	<ol style="list-style-type: none"> <li>1. ≤18% FW flow for 15 sec.</li> <li>2. ≤90% open on RV-53A.</li> </ol>	20% speed limiter  References:  CWD 700, 705, 711 OP 2110, OT 3113, OT 3118, OT 3176 SIL 621
Confirmation:		
<ol style="list-style-type: none"> <li>1. CRP 9-5 feedwater flow &lt;1.28 x 10<sup>6</sup> lb/hr.</li> <li>2. Recirc Pump A discharge valve RV-53A position indication intermediate or closed.</li> </ol>		
Automatic Actions:		
<ol style="list-style-type: none"> <li>1. If recirc pump speed is &gt;20% and scoop tube is not locked, pump will automatically run back to 20% speed.</li> </ol>		
Operator Actions:		
<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p><b><u>NOTE</u></b></p> <p>This is an expected alarm during start-up prior to exceeding 18% FW flow.</p> </div>		
<ol style="list-style-type: none"> <li>1. Verify feedwater flow and discharge valve RV-53A position.</li> <li>2. Refer to OP 3176, Recirculation Pump Runback Due to Low Feedwater Flow or Discharge Valve Not Full Open.</li> <li>3. If the runback signal is due to low feedwater flow:             <ol style="list-style-type: none"> <li>a. If either Recirc Pump scoop tube is locked, refer to OP 2110, Reactor Recirculation System, Section F, Local Manual Control of Scoop Tube Positioner.</li> <li>b. If no Recirc Pump scoop tubes are locked:                 <ol style="list-style-type: none"> <li>1) Verify or place recirc pump A speed at minimum and in manual as follows:                     <ol style="list-style-type: none"> <li>a) Press A/M pushbutton to place individual controller in Man</li> <li>b) Press Display (D) button to display 'P' value</li> <li>c) Adjust 'P' value down to 0 (zero)</li> </ol> </li> <li>2) Refer to OT 3113, Reactor Low Level.</li> </ol> </li> </ol> </li> <li>4. If the runback signal is due to discharge valve RV-53A closure and either: (SIL 621)             <ul style="list-style-type: none"> <li>• An MG Set speed mismatch of more than 5% occurs, or</li> <li>• The discharge valve RV-53A cannot be re-opened within 15 minutes, then: Trip Recirc Pump A and enter OT 3118, Recirculation Pump Trip</li> </ul> </li> </ol>		

CRP 9-4 ALARM RESPONSE SHEETS (Continued)

RECIRCULATION SYSTEM		4-D-1
		Page 1 of 1
RECIRC MG A/B RUNBACK		
<p>Causes:</p> <ol style="list-style-type: none"> <li>1. Main Steam Line flow <math>\geq 7.2 \times 10^6</math> lbm/hr AND any Condensate OR Reed Pump NOT operating.</li> <li>2. PB1 depressed on A/B Recirculation System Individual Pump Speed Controller 2-148-16A/B.</li> </ol>	<p>Setpoints:</p> <p>N/A</p>	
		<p>Actuating Devices:</p> <p>SC-2-184-16A/B</p>
		<p>References:</p> <p>B-191301 sh. 67, 705 &amp; 719 OT 3113 OT 3175</p>
<p>Confirmation:</p> <ol style="list-style-type: none"> <li>1. Decrease in speed on individual Pump A and B controllers 2-148-16A and B.</li> </ol>		
<p>Automatic Actions:</p> <ol style="list-style-type: none"> <li>1. Individual Pump A and B Controllers 2-148-16A and B transfer to manual control and Recirculation Pumps run back to <math>\sim 35 \times 10^6</math> lbm/hr core flow within <math>\sim 15</math> sec.</li> <li>2. RX VESSEL LEVEL MASTER CONTROLLER setpoint sets down to 155 inches.</li> </ol>		
<p>Operator Actions:</p> <ol style="list-style-type: none"> <li>1. Verify that both Recirc Pumps have run back to <math>\sim 35 \times 10^6</math> lbm/hr Core flow (runback may take up to 30 seconds to go to completion).</li> <li>2. IF either Recirc Pump has failed to run back, THEN manually initiate a runback of the other Recirc Pump by depressing the PB1 pushbutton on PUMP A(B) CONTROLLER 02-184-16A(B).</li> <li>3. IF the RX VESSEL LEVEL MASTER CONTROLLER setpoint set down did not occur, THEN depress the PB2 pushbutton on the controller.</li> <li>4. Refer to OT 3175, Recirculation Pump Runback Due to Condensate or Feed Pump Trip.</li> <li>5. As necessary refer to OT 3113, Reactor Low Level.</li> </ol>		

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	295018 2.2.44	
	Importance Rating	_____	4.4

(K&A Statement) 2.2.44 Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions

Proposed Question: SRO 82

While operating at 90% RTP, a Loss of Normal Power (LNP) occurred. All plant equipment operated as designed. The Emergency Operating Procedures have been entered to control Reactor Plant parameters.

Which ONE of the following identifies an available level AND pressure control method to be used based on current plant conditions?

- A. (1) Control Level utilizing the Feed and Condensate Systems IAW EOP-1, "RPV Control"  
(2) Reopen the MSIVs IAW OT 3100, "Scram Procedure" and commence a cooldown to the Main Condenser using Bypass valves IAW EOP-1, "RPV Control"
- B. (1) Control Level utilizing the Feed and Condensate Systems IAW EOP-1, "RPV Control"  
(2) Operate SRVs in the order of A, C, B, D and commence a cooldown IAW EOP-1, "RPV Control"
- C. (1) Control Level utilizing the HPCI System IAW EOP-1, "RPV Control"  
(2) Reopen the MSIVs IAW OT 3100, "Scram Procedure" and commence a cooldown to the Main Condenser using Bypass valves IAW EOP-1, "RPV Control"
- D. (1) Control Level utilizing the HPCI System IAW EOP-1, "RPV Control"  
(2) Operate SRVs in the order of A, C, B, D and commence a cooldown IAW EOP-1, "RPV Control"

Proposed Answer: D

- A. INCORRECT: Feed and Condensate is not available for level control (Loss of Bus 1 and 2) and the Main Condenser is not available (Loss of Bus 1 and 2)
- B. INCORRECT: Feed and Condensate is not available for level control (Loss of Bus 1 and 2)
- C. INCORRECT: the Main Condenser is not available (Loss of Bus 1 and 2)
- D. CORRECT: HPCI is available as a preferred injection source (Table "C") and SRVs are available as an alternate pressure control system (Table "F")**

Technical Reference(s): EOP-1 Flowchart (Attach if not previously  
OT 3122 provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-610, objective 2.4.44 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	2
	K/A #	295029 EA 2.03	
	Importance Rating	_____	3.5

(K&A Statement) EA2.03- Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL WATER LEVEL: Drywell/containment water level

Proposed Question: SRO 83

Post large break LOCA conditions are as follows:

- All control rods are inserted
- RPV water level is -35 inches and steady
- RPV pressure is 150 psig and lowering
- Core Spray pump "A" is injecting as designed
- Drywell pressure is 32 psig and rising slow
- Torus Pressure is 30 psig and rising slow
- Torus Water level is 11.5 feet and rising slow

Based on these conditions, which ONE of the following actions is required to be directed by the CRS?

- A. Enter the Severe Accident Guideline -1 and establish containment flooding
- B. Enter EOP-5, "RPV-Emergency Depressurization" and open all SRVs
- C. Vent Primary Containment prior to prevent exceeding PCPL-A IAW OE 3107, Appendix "HH" using the Torus Hardened vent (TVS-86)
- D. Vent Primary Containment exceeding Off Site release rates IAW OE 3107, Appendix "HH" using both trains of SBTG vent through the Stack.

Proposed Answer: B

Technical Reference(s): EOP-3, EOP-5

(Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination:

PSP and PCPL-A  
curves provided

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Learning Objective: LOT-00-607, objective RO 4 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	295033 2.4.6	
	Importance Rating		4.7

(K&A Statement) 2.4.6 Knowledge of EOP mitigation strategies

Proposed Question: SRO 84

While operating at 80% RTP, a leak from the RWCU system results in the following secondary containment temperature and radiation conditions:

Temperature:

Channel	Temperature
9	86°F
10	85°F
11	86°F
12	86°F
13	174°F
14	208°F
15	112°F

Radiation:

ARM#	Rad Level
1	10 mr/hr
2	4 mr/hr
3	2 mr/hr
4	20 mr/hr
6	1300 mr/hr
7	9 mr/hr
8	9 mr/hr

The crew has entered EOP-4, "Secondary Containment and Radioactivity Release Control".

In addition to EOP-4, which ONE of the following identifies the additional operational requirements to control secondary containment parameters?

- Continue to monitor Secondary Containment parameters. When conditions are met, begin a reactor shutdown in accordance with OP 0105, "Reactor Operations".
- Immediately commence a reactor shutdown in accordance with OP 0105, "Reactor Operations".
- Scram the reactor and enter ONLY EOP-1, "RPV Control". Continue monitoring secondary Containment parameters to determine if additional EOPs are required to be implemented.
- Scram the reactor and enter EOP-1, "RPV Control". Additionally, perform an RPV-ED as directed by EOP-1, "RPV Control" and EOP-5, RPV Emergency Depressurization".

Proposed Answer: C

Technical Reference(s): EOP-4 flowchart (provided without the entry conditions); AP 3125 Off site radioactivity release row provided. (Attach if not previously provided)

\_\_\_\_\_

\_\_\_\_\_

Proposed references to be provided to applicants during examination:

None

EOP-4

Learning Objective: LOT-00-611 (SRO 3 and RO 12) (As available)

\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_

Modified Bank # \_\_\_\_\_

New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_

Comprehension or Analysis X \_\_\_\_\_

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

55.43 5 \_\_\_\_\_

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	2
	K/A #	295008 AA2.01	
	Importance Rating	_____	3.9

(K&A Statement) AA2.01- Ability to determine and/or interpret the following as they apply to HIGH REACTOR WATER LEVEL: Reactor water level

Proposed Question: SRO 85

The plant was operating at 100% RTP with the "A" CS Pump inoperable.

A seismic event and subsequent reactor scram has rendered ALL Reactor Pressure Vessel (RPV) water level instrumentation inoperable such that the water level CANNOT be determined. EOP-6, "RPV Flooding", has been entered.

Additionally, a Loss of Normal Power with a lockout trip of the "B" EDG occurred. ALL other electrical plant equipment operated as designed.

Plant conditions are as follows:

- All control rods are fully inserted
- RPV pressure is 1050 psig and slowly rising
- Torus pressure is 2 psig and slowly rising
- A leak in the Torus has resulted in Torus level slowly lowering, currently at 9 feet.

Based on these indications, determine the following:

- (1) How is RPV pressure and level controlled to flood the RPV?
- (2) What indication can be used to determine that the RPV is flooded?

- A. (1) Alternate RPV Flooding Depressurization Systems are used in accordance EOP-6/Table "U" to rapidly depressurize the RPV. Water level is then raised using EOP-6/Table "T" systems, maximizing the use of Core Spray in accordance with OP 2123.  
(2) The RPV is flooded to the Main Steam Lines as indicated by increasing RPV pressure
- B. (1) All SRVs are opened. Water level is then raised using EOP-6/Table "T" systems  
(2) The RPV is flooded to the Main Steam Lines as indicated by SRV tailpipe temperatures decreasing
- C. (1) Alternate RPV Flooding Depressurization Systems are used in accordance EOP-6/Table "U" to rapidly depressurize the RPV. Water level is then raised using EOP-6/Table "R" systems, maximizing the use of Core Spray in accordance with OP 2123.  
(2) Injection is provided to raise RPV Pressure greater than Minimum Steam Cooling Pressure (MSCP)

- D. (1) All SRVs are opened. Water level is then raised using EOP-6/Table "Q" systems  
(2) Injection is provided to raise RPV Pressure greater than Minimum Steam Cooling Pressure (MSCP)

Proposed Answer: B

Technical Reference(s): EOP-6 (provided) (Attach if not previously provided)

\_\_\_\_\_

\_\_\_\_\_

Proposed references to be provided to applicants during examination: EOP-6 flowchart

\_\_\_\_\_

Learning Objective: LOT-00-608 (RO EO 16 and SRO EO 2) (As available)

\_\_\_\_\_

Question Source: Bank # \_\_\_\_\_

Modified Bank # \_\_\_\_\_

New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

Question Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_

Comprehension or Analysis X \_\_\_\_\_

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

55.43 5 \_\_\_\_\_

Comments:



Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New  X

Question History: Last NRC Exam  No

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>1</u>
	K/A #	<u>218000 2.4.23</u>	
	Importance Rating	_____	<u>4.4</u>

(K&A Statement) 2.4.23 Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations

Proposed Question: SRO 87

A plant Startup and heatup are in progress with RPV pressure at 250 psig.

An instrument malfunction resulted in the failure of ADS relay 2E-K5B (2 minute time delay relay for "B" ADS). The CRS entered the the required TS LCO.

Shortly after the malfunction, the following transient results:

- Reactor SCRAM due to rising Drywell pressure
- EOP-2, "RPV ATWS Control" was entered due to NOT being shutdown under all conditons
- Failure to transfer Buses 1 and 2 to their immediate access source
- Drywell pressure 3.5 psig and rising slowly
- RPV water level restored to 120 inches from a minimum of 60 inches within 2 minutes using available high pressure injection systems.
- All ECCS systems operated as expected
- All operator immediate actions are completed

1. What action should the Control Room Supervisor direct related to ADS?
2. What is the basis for this action?

- A. (1). Do NOT Inhibit ADS  
(2). ADS blowdown will not auto actuate due to the relay failure.
- B. (1). Do NOT inhibit ADS  
(2). ADS blowdown can remain as a backup for high pressure injection
- C. (1). Inhibit ADS  
(2). ADS blowdown can result in a power excursion that could result in core damage.
- D. (1). Inhibit ADS  
(2). ADS blowdown will auto actuate with LP ECCS pumps running.

Proposed Answer: C

- A. INCORRECT: EOP-2 directs inhibiting ADS regardless of the circumstances; ADS blowdown will still occur due to the operability of ADS logic "A".
- B. INCORRECT: EOP-2 directs inhibiting ADS regardless of the circumstances; an ADS transient complicates an ATWS and may result power spikes and subsequent core damage.
- C. CORRECT: EOP-2 bases**
- D. INCORRECT: ADS blowdown will NOT auto actuate based on RPV water level returning to >82.5 inches within 2 minutes.

Technical Reference(s): EOP-2 study guide bases (Attach if not previously provided)  
 \_\_\_\_\_  
 \_\_\_\_\_

Proposed references to be provided to applicants during examination: None  
 \_\_\_\_\_

Learning Objective: LOT-00-610, objective \_\_\_\_\_ (As available)

Question Source: Bank # \_\_\_\_\_  
 Modified Bank # \_\_\_\_\_  
 New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	261000 A2.10	
	Importance Rating		3.2

(K&A Statement) A2.10 Ability to (a) predict the impacts of the following on the STANDBY GAS TREATMENT SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low reactor water level: Plant specific

Proposed Question: SRO 88

The plant is commencing a shutdown due to an electrical fault on MCC-8B. The rest of the electrical distribution system is in its NORMAL lineup.

A loss of normal power occurs and ALL systems operate as designed. Post scram conditions are as follows:

- Water level lowered to 106 inches and is now being controlled in the prescribed post scram level band.
- Drywell temperature is 152°F and rising slow
- All control rods fully inserted

For these given conditions, determine the following:

- (1) How is the status of the Standby Gas Treatment (SBGT) system verified?
- (2) What is the current status of the SBGT system?

The SBGT system status is checked by verifying the applicable automatic actions of Table "A", "Initiations/Isolations", in accordance with \_\_\_\_\_ (1) \_\_\_\_\_.

\_\_\_\_\_ (2) \_\_\_\_\_ train(s) of the Standby Gas Treatment System will be running.

- A. (1) EOP-1, "RPV Control"  
(2) BOTH the "A" AND "B"
- B. (1) EOP-1, "RPV Control"  
(2) ONLY the "A"
- C. (1) EOP-3, "Primary Containment Control"  
(2) BOTH the "A" AND "B"
- D. (1) EOP-3, "Primary Containment Control"  
(2) ONLY the "B"

Proposed Answer: A

Technical Reference(s): EOP-1, OE 3107 (Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination: None

\_\_\_\_\_

Learning Objective: LOT-00-610, objective 2.4.44 (As available)Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New XQuestion History: Last NRC Exam NoQuestion Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis X10 CFR Part 55 Content: 55.41 \_\_\_\_\_  
55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>1</u>
	K/A #	215004 A2.05	
	Importance Rating	_____	<u>3.5</u>

(K&A Statement) A2.05 Ability to (a) predict the impacts of the following on the SOURCE RANGE MONITOR (SRM) SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Faulty or erratic operation of detectors/system

Proposed Question: SRO 89

During a reactor Startup, the Operator at the Controls (OATC) is withdrawing a control rod next to SRM Detector "A" during the approach to criticality. Seconds later, the following Annunciator is received:

- 5-P-5, "SRM Short Period"

The OATC immediately inserts the Control Rod one notch and the reactor period immediately decays to infinity.

Which ONE of the following is the subsequent action once the period decays?

- I AW the ARS for Annunciator 5-P-5 the reactor is to be brought subcritical.
- I AW the ARS for Annunciator 5-P-5 the reactor startup may continue normally.
- I AW OP 0105, "Reactor Operations", Phase 1A, the reactor is to be brought subcritical.
- I AW OP 0105, "Reactor Operations", Phase 1A, stop the startup and notify the Shift Manager, Operations Manager, and Superintendent Reactor Engineering

Proposed Answer: B

- INCORRECT: This alarm can be expected if a control rod near an SRM detector is withdrawn or the detector is inserted into a high flux region of the core. Additionally the period was not sustained.
- CORRECT: This alarm can be expected if a control rod near an SRM detector is withdrawn or the detector is inserted into a high flux region of the core. Additionally the period was not sustained.**
- INCORRECT: There is no requirement to make the reactor subcritical for these conditions.
- INCORRECT: There is no requirement to make notifications following the alarm for these conditions.

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Technical Reference(s): OP 0105, (Phase 1, Step 28, (Attach if not previously  
pg. 17) provided)  
ARS 21005, 5-P-5

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-301, objective RO34 (As available)

Question Source: Bank # X  
Modified Bank # \_\_\_\_\_  
New \_\_\_\_\_

Question History: Last NRC Exam No

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	2
	Group #	_____	1
	K/A #	206000 2.1.32	
	Importance Rating	_____	4.0

(K&A Statement) 2.1.32 Ability to explain and apply system limits and precautions

Proposed Question: SRO 90

In accordance with OP 2120, High Pressure Coolant Injection System (HPCI)", which ONE of the following identifies an operational concern with operating HPCI with a low Condensate Storage Tank (CST) volume?

- A. When CST level lowers to <27%, the system must be filled and vented to ensure compliance with the Technical Specification requirement for maintenance of a filled discharge pipe.
- B. When CST level lowers to <35%, the system must be filled and vented to ensure compliance with the Technical Specification requirement for maintenance of a filled discharge pipe.
- C. When CST level lowers to <27%, the level no longer meets the Technical Specification required volume of 150,000 gallons needed prior to the HPCI suction automatically shifting to the Torus.
- D. When CST level lowers to <35%, the level no longer meets the Technical Specification required volume of 150,000 gallons needed prior to the HPCI suction automatically shifting to the Torus.

Proposed Answer: B

Technical Reference(s): OP 2120 (Precautions and Limitations), HPCI DBD Section 2.3.9, and Technical Specifications Section 4.5.1.3 Bases. (Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-206, objective K5.04 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>2</u>
	K/A #	<u>233000 2.2.25</u>	
	Importance Rating	_____	<u>4.2</u>

(K&A Statement) 2.2.25- Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

Proposed Question: SRO 91

Which ONE of the following is the Technical Specification for Fuel Pool temperature and the associated basis?

The Fuel Pool temperature limit is \_\_\_\_\_ (1) \_\_\_\_\_.

This temperature limit is based on the ability of the \_\_\_\_\_ (2) \_\_\_\_\_ to maintain temperatures during a full core discharge.

- A. (1) 140°F  
(2) Residual Heat Removal Augmented Fuel Pool Cooling subsystem
- B. (1) 140°F  
(2) Standby Fuel Pool Cooling system
- C. (1) 150°F  
(2) Residual Heat Removal Augmented Fuel Pool Cooling subsystem
- D. (1) 150°F  
(2) Standby Fuel Pool Cooling system

Proposed Answer: C

Technical Reference(s): Technical Specifications \_\_\_\_\_ (Attach if not previously provided)  
\_\_\_\_\_

Proposed references to be provided to applicants during examination: \_\_\_\_\_ None \_\_\_\_\_

Learning Objective: LOT-00-233, objective K12 (As available)

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>2</u>
	K/A #	286000 A2.11	_____
	Importance Rating	_____	<u>3.2</u>

(K&A Statement) A2.11- Ability to (a) predict the impacts of the following on the FIRE PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Pump trips: Plant specific

Proposed Question: SRO 92

The Fire Brigade is fighting a fire in the south warehouse.

The Electric Fire Pump started and immediately tripped on overcurrent. The Shift Manager (SM) has declared the Electric Fire Pump NON-FUNCTIONAL.

The Diesel Fire Pump is running and supplying the fire system with system pressure at 90 psig. The overcurrent trip of the Electric Fire pump is then reset.

Which ONE of the following describes:

- (1) the Diesel Fire pump response once the overcurrent trip on the Electric pump is reset?
  - (2) the Technical Requirement Manual restriction PRIOR to resetting the overcurrent trip on the Electric Fire pump?
- A. (1) The Electric Fire pump remains in standby and the Diesel Fire pump continues to run.  
(2) Restore the Electric Fire pump to functional status within 7 days.
  - B. (1) The Electric Fire pump starts and the Diesel Fire pump stops.  
(2) Restore the Electric Fire pump to functional status within 7 days.
  - C. (1) The Electric Fire pump starts and the Diesel Fire pump stops.  
(2) Initiate a Functionality Assessment to be approved within 30 days.
  - D. (1) The Electric Fire pump remains in standby and the Diesel Fire pump continues to run.  
(2) Establish backup fire suppression water system within 24 hours.

Proposed Answer: A

- A. CORRECT
- B. INCORRECT: Pressure is maintained by the DFP at 90 psig. Therefore there will not be an auto start signal for the EFP.
- C. INCORRECT: Pressure is maintained by the DFP at 90 psig. Therefore there will not be an auto start signal for the EFP.
- D. INCORRECT: This TRM call is if BOTH fire pumps are inoperable.

Technical Reference(s): TRM OP 2186 discussion (Attach if not previously provided)

Proposed references to be provided to applicants during examination: TRM section 3.13

Learning Objective: LOT-00-286, K6.01, K16.04 (As available)

Question Source: Bank # \_\_\_\_\_  
 Modified Bank # \_\_\_\_\_  
 New X

Question History: Last NRC Exam No

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

10 CFR Part 55 Content: 55.41 \_\_\_\_\_  
 55.43 1, 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>2</u>
	K/A #	<u>216000 2.1.23</u>	
	Importance Rating	_____	<u>4.4</u>

(K&A Statement) 2.1.23- Ability to perform specific system and integrated plant procedures during all modes of plant operation

Proposed Question: SRO 93

While operating at rated power, the plant has been manually scrammed due to a leak in the Torus. Post scram conditions are as follows:

- All control rods inserted
- RPV water level 140 inches and rising slow
- RPV pressure 910 psig and steady
- Torus water level is 8.5 feet and lowering slow with makeup provided via Core Spray
- Torus area level is 7 inches and steady
- HPCI Room area is 3 inches and steady

Which ONE of the following directions should the CRS provide for RPV pressure control and how is water level subsequently controlled IAW EOP-1, "RPV Control"?

The CRS should direct the control room operators to \_\_\_\_\_ (1)\_\_\_\_\_.

IAW DP 0166, Operations Department Standards, the controlling water level instrumentation associated with this pressure control is the \_\_\_\_\_ (2)\_\_\_\_\_.

- A. (1) commence a normal cooldown  
(2) compensated shroud level ERFIS point SHDAB046 or SHDBB045 down to 350 psig
- B. (1) anticipate a RPV-ED due to adverse EOP-4 conditions  
(2) compensated shroud level ERFIS point SHDAB046 or SHDBB045 down to 350 psig
- C. (1) commence a normal cooldown  
(2) compensated wide range level ERFIS point WIDEM071 down to 350 psig
- D. (1) anticipate a RPV-ED IAW due to adverse EOP-3  
(2) compensated wide range level ERFIS point WIDEM071 down to 350 psig

Proposed Answer: D

Technical Reference(s): EOP-1, EOP-3, EOP-4, and DP 0166. (Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-610, objective 2.4.44 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
Tier #		_____	3
Group #		_____	_____
K/A #		2.1.43	_____
Importance Rating		_____	4.3

(K&A Statement) 2.1.43 Ability to use procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, fuel depletion, etc.

Proposed Question: SRO 94

With a plant startup in progress and operating at 60% RTP, the extraction steam supply from the High Pressure Turbine is lost to the applicable Heater on the "A" string.

Mechanical Maintenance has determined the supply will not be restored for another ten hours.

- (1) How is the Feedwater Heater string bypassed
- (2) What is the operational restriction with a Feedwater Heater String bypassed?
  - A. (1) isolate the heater string IAW OP 2172, "Feedwater System"  
(2) IAW OT 3110, "Positive Reactivity Insertion", reduce reactor power to <23% RTP
  - B. (1) isolate the heater string IAW OP 2172, "Feedwater System"  
(2) IAW OP 0105, "Reactor Operations", do not exceed 75% with A Feedwater Heater string isolated.
  - C. (1) isolate the heater string IAW RP 2170, "Condensate System"  
(2) IAW OT 3110, "Positive Reactivity Insertion", IAW OT 3110, "Positive Reactivity Insertion", reduce reactor power to <23% RTP
  - D. (1) isolate the heater string IAW RP 2170, "Condensate System"  
(2) IAW OP 0105, "Reactor Operations", do not exceed 75% RTP with A Feedwater Heater string isolated.

Proposed Answer: A

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	_____
	K/A #	2.3.14	_____
	Importance Rating	_____	3.8

(K&A Statement) 2.3.14 Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.

Proposed Question: SRO 95

A General Emergency has been declared due to adverse radiological conditions and the Emergency Plan organization has been activated and is fully manned. Operational Emergency Appendices (OE 3107) are being performed by the Control Room and the following operation is required:

- a valve on the Torus catwalk must be manually operated to provide injection to the vessel to restore level to above TAF
- the valve is located in a 140 R/hour field
- the evolution will be performed by one Auxiliary Operator (AO) and will take 5 minutes

Whose permission is required for the AO to receive the dose?

- Shift Manger ONLY
- Emergency Director ONLY
- Shift Manager AND senior Radiological Protection representative
- Emergency Director AND senior Radiological Protection representative

Proposed Answer: D

- INCORRECT- E-Plan is manned therefore the Emergency Director is in charge of authorizing emergency dose which also requires concurrence form the Radiological Protection rep
- INCORRECT- concurrence is also required from the Radiological Protection rep
- INCORRECT- -Plan is manned therefore the Emergency Director is in charge of authorizing emergency dose
- CORRECT: IAW OP 3507, Attachment 9.1 NOTE: Authorization to the 10 Rem limit (Protecting Valuable Property) 25 or 75 Rem limit (Lifesaving or Protection of a Large Population) may only be made with the joint concurrence of the Shift Manager (or Emergency Plant Manager/Emergency Director) and Senior Radiation Protection Representative. In this case, the dose received will be 11-12 Rem.**

ES-401

Sample Written Examination  
Question Worksheet

Form ES-401-5

Technical Reference(s): OP 3507: Attachment 9.1, Attachment 9.4 (Attach if not previously provided)

\_\_\_\_\_  
\_\_\_\_\_

Proposed references to be provided to applicants during examination: None

\_\_\_\_\_

Learning Objective: LOT-00-900, objective 2.4.40 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X \_\_\_\_\_

Question History: Last NRC Exam No \_\_\_\_\_

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	_____
	K/A #	2.2.37	_____
	Importance Rating	_____	4.6

(K&A Statement) 2.2.37 Ability to determine operability and/or availability of safety related equipment.

Proposed Question: SRO 96

In preparation for the upcoming refueling outage, a plant shutdown and cooldown are being performed IAW OP 0105, "Reactor Operations". A malfunction with the MHC System has resulted in the crew shifting pressure control for the cooldown to the High Pressure Coolant Injection (HPCI) system.

Plant conditions are as follows:

- All rods inserted
- RPV pressure: 600 psig
- Cooldown rate: 60°F/hr with HPCI
- Both House Heating Boilers have tripped due to low fuel oil level.
- Outside air temperature is 24°F.

The Outside AO reports Condensate Storage Tank temperature 37°F

Determine the operability of the HPCI system and the correct guidance for assessing availability.

HPCI is \_\_\_\_\_ (1) \_\_\_\_\_.

Risk assessment availability will be assessed in accordance with \_\_\_\_\_ (2) \_\_\_\_\_.

- A. (1) OPERABLE due to being aligned to the Torus  
(2) AP 0172, "Work Schedule Risk Management – Online"
- B. (1) OPERABLE due to being aligned to the Torus  
(2) AP 0173, "Work Schedule Risk Management – Outage"
- C. (1) INOPERABLE due to Condensate Storage Tank temperature  
(2) AP 0172, "Work Schedule Risk Management – Online"
- D. (1) INOPERABLE due to Condensate Storage Tank temperature  
(2) AP 0173, "Work Schedule Risk Management – Outage"

Proposed Answer: C

Technical Reference(s): AP 0173 discussion, RP 2194 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-287 (RO 2.3), LOT-00-400 (SRO 10) (As available)

Question Source: Bank #  
Modified Bank # Modified from 2009 SRO Re-exam question number 23 and bank question 1044  
New

Question History: Last NRC Exam No

Question Cognitive Level: Memory or Fundamental Knowledge  
Comprehension or Analysis X10 CFR Part 55 Content: 55.41  
55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	_____
	K/A #	2.2.40	_____
	Importance Rating	_____	4.7

(K&A Statement) 2.2.40 Ability to apply Technical Specifications for a system.

Proposed Question: SRO 97

Following a recent refueling outage, ALL control rod speeds were declared operable and within the limits of T.S Table 4.4.C-1.

The plant has been operating 180 days into the operating cycle. The following are the results from a sampling of Control Rod Speed Checks. These have been performed to satisfy the requirement of Technical Specification section 4.3.C.1.b.

<u>CONTROL ROD</u>	<u>SPEED FROM POSITION 48 to 06</u> <u>(seconds)</u>
26-43	3.23
38-35	3.21
10-35	7.28
30-31	2.95
42-27	4.14
22-27	4.01
34-23	3.31
18-23	3.42
10-23	4.48
26-19	3.19
06-15	5.28
30-11	3.62
14-11	2.90
18-07	3.11

Based on these results, what (if any) is(are) the required Technical Specification action(s) to be taken by the Shift Manager?

- No action is required. There are several slow control rods however, the criteria for these slow rods as defined by Technical Specifications is met.
- The deficient control rod(s) shall be considered inoperable, fully inserted into the core within 3 hours, and disarmed within the following 4 hours ONLY.
- The reactor shall be placed in the HOT SHUTDOWN condition within 12 hours ONLY.
- The deficient control rod shall be considered inoperable, fully inserted into the core within 3 hours, and disarmed within the following 4 hours. Additionally, the reactor shall be placed in the HOT SHUTDOWN condition within 12 hours.



Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	_____
	K/A #	2.1.40	_____
	Importance Rating	_____	3.9

(K&A Statement) 2.1.40 Knowledge of refueling administrative requirements.

Proposed Question: SRO 98

Which ONE of the following is correct regarding refueling activities?

In accordance with Technical Specifications, the reactor shall be shut down for a minimum of

\_\_\_\_\_ (1) \_\_\_\_\_ hours prior to fuel movement within the reactor core.

The basis for this time requirement is to satisfy the postulated refuel accident assumptions for \_\_\_\_\_ (2) \_\_\_\_\_.

- A. (1) 12  
(2) shutdown margin criterion associated with moderator temperature
- B. (1) 24  
(2) shutdown margin criterion associated with moderator temperature
- C. (1) 12  
(2) post accident radiation levels associated with fission product poisons
- D. (1) 24  
(2) post accident radiation levels associated with fission product poisons

Proposed Answer: D

Technical Reference(s): TS Section 3.12.F and bases (Attach if not previously provided)  
UFSAR Section 14.6.4.3.2  
OP 1101 Prerequisites  
VYOPF 1101.01 (20)

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-00-620, Objective 2 (As available)

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

10 CFR Part 55 Content: 55.41 \_\_\_\_\_  
55.43 2, 7

Comments:

Q98

VYNPS

3.12 LIMITING CONDITIONS FOR  
OPERATION

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F. Fuel Movement

The reactor shall be shut down for a minimum of 24 hours prior to fuel movement within the reactor core.

G. Deleted

4.12 SURVEILLANCE REQUIREMENTS

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F. Fuel Movement

Prior to any fuel handling or movement in the reactor core, the licensed operator shall verify that the reactor has been shut down for a minimum of 24 hours.

G. Deleted

BASES: 3.12 & 4.12 (Cont'd)

- E. The intent of this specification is to permit the unloading of a portion of the reactor core for such purposes as inservice inspection requirements, examination of the core support plate, control rod, control rod drive maintenance, etc. This specification provides assurance that inadvertent criticality does not occur during such operation.

This operation is performed with the mode switch in the "Refuel" position to provide the refueling interlocks normally available during refueling as explained in the Bases for Specification 3.12.A. In order to withdraw more than one control rod, it is necessary to bypass the refueling interlock on each withdrawn control rod which prevents more than one control rod from being withdrawn at a time. The requirement that the fuel assemblies in the cell controlled by the control rod be removed from the reactor core before the interlock can be bypassed ensures that withdrawal of another control rod does not result in inadvertent criticality. Each control rod essentially provides reactivity control for the fuel assemblies in the cell associated with that control rod. Thus, removal of an entire cell (fuel assemblies plus control rod) results in a lower reactivity potential of the core.

One method available for unloading or reloading the core is the spiral unload/reload. Spiral reloading and unloading encompass reloading or unloading a cell on the edge of a continuous fueled region (the cell can be reloaded or unloaded in any sequence.) The pattern begins (for reloading) and ends (for unloading) around a single SRM. The spiral reloading pattern is the reverse of the unloading pattern, with the exception that two diagonally adjacent bundles, which have previously accumulated exposure in-core, and placed next to each of the four SRMs before the actual spiral reloading begins. The spiral reload can be to either the original configuration or a different configuration.

Additionally, at least 50% of the fuel assemblies to be reloaded into the core shall have previously accumulated a minimum exposure of 1000 Mwd/T to ensure the presence of a minimum neutron flux as described in Bases Section 3.12.B.

- F. The intent of this specification is to assure that the reactor core has been shut down for at least 24 hours following power operation and prior to fuel handling or movement. The safety analysis for the postulated refueling accident assumed that the reactor had been shut down for 24 hours for fission product decay prior to any fuel handling which could result in dropping of a fuel assembly.

G. Deleted

- H. The Spent Fuel Pool Cooling System is designed to maintain the pool water temperature below 125°F during normal refueling operations. If the reactor core is completely discharged, the temperature of the pool water may increase to greater than 125°F. The RHR System supplemental fuel pool cooling may be used under these conditions to maintain the pool water temperature less than 150°F.

REFUELING PREREQUISITES (Continued)

INITIALS/DATE

- 9. Fuel prep machine upper limits set at  $\geq 16$  feet (top rail to top of the prep machine upper roller). (M) By \_\_\_\_\_ / \_\_\_\_\_
- 10. Cattle chute installed in the reactor well. (M) By \_\_\_\_\_ / \_\_\_\_\_
- 11. Verify RWM SDM limit on second rod is set to 0 by verifying PTID RWMA025 is reading 0 on ERFIS while RWM is in SDM mode, or ask Computer Engineering. (OP) By \_\_\_\_\_ / \_\_\_\_\_
- 12. Secondary containment system test performed per OP 4116 and established per Tech. Spec. 3.7.C. (OP) By \_\_\_\_\_ / \_\_\_\_\_
- 13. Prior to fuel moves in the vessel, request RP Supervisor verify proper radiation protection measures are in place for potential radiation exposures in the upper Drywell area per AP 0518.  
(RP Supv.) \_\_\_\_\_ / \_\_\_\_\_
- 14. One means of communication between the refuel floor RP technician and the drywell RP technician.  
(RP Supv) \_\_\_\_\_ / \_\_\_\_\_
- 15. Ensure an ARM is mounted on the refuel trolley with an alarm set point approved by RP Management. (RP Supv) \_\_\_\_\_ / \_\_\_\_\_
- 16. ECCS requirements of Tech. Spec. Section 3.5.H.4 satisfied. (OP) By \_\_\_\_\_ / \_\_\_\_\_
- 17. X-Y coordinates on refuel platform calibrated. (M) By \_\_\_\_\_ / \_\_\_\_\_
- 18. Limit switch adjusted for grapple full down position per OP 5306, Refuel Crane Functional. (IC) By \_\_\_\_\_ / \_\_\_\_\_
- 19. Fuel pool and reactor coolant temp.  $\geq 70^{\circ}\text{F}$ . (OP) By \_\_\_\_\_ / \_\_\_\_\_
- 20. Reactor shutdown (all rods in)  $\geq 24$  hours per Tech. Spec. Section 4.12.F. (OP) By \_\_\_\_\_ / \_\_\_\_\_
- 21. During outage periods, the department whose activities require the operation of the refuel platform shall establish a dedicated spotter. By \_\_\_\_\_ / \_\_\_\_\_

Reviewed By \_\_\_\_\_ / \_\_\_\_\_  
Shift Manager (Print/Sign) Date

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	_____
	K/A #	2.4.9	_____
	Importance Rating	_____	4.2

(K&A Statement) 2.4.9 Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.

Proposed Question: SRO 99

To ensure that off site dose rate limits are not exceeded, there is a minimum Technical Specification requirement for OPERABLE systems required during "Operations with the Potential to Drain the Reactor Vessel" (OPDRV) with the reactor in a cold shutdown condition.

Which ONE of the following identifies the MINIMUM requirements IAW Technical Specifications for an OPDRV scheduled to last 12 hours?

In addition to 2 ECCS Subsystems, \_\_\_\_\_ are required.

- A. 2 Emergency Diesel Generators, and a source of water for the ECCS system equivalent to >75,000 gallons of water
- B. 1 Emergency Diesel Generator, and a source of water for the ECCS system equivalent to >75,000 gallons of water
- C. 2 Emergency Diesel Generators, and a source of water for the ECCS system equivalent to >300,000 gallons of water
- D. 1 Emergency Diesel Generator, and a source of water for the ECCS system equivalent to >300,000 gallons of water

Proposed Answer: D

Technical Reference(s): Technical Specifications bases 3.5.H (Attach if not previously provided)  
AP 0173, Appendix I

Proposed references to be provided to applicants during  
examination:

None  
\_\_\_\_\_

Learning Objective: LOT-00-308, objective SRO (As available)  
EO1

Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New X

Question History: Last NRC Exam No

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

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

Comments:

Q99

3.5 LIMITING CONDITION FOR  
OPERATION

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b. During such 14 days,  
the HPCI System is  
operable.

3. If the requirements of  
either Specification  
3.5.G or Specification  
4.5.G.1.c cannot be met,  
an orderly shutdown shall  
be initiated and the  
reactor pressure shall be  
reduced to  $\leq 150$  psig  
within 24 hours.

H. Minimum Core and Containment  
Cooling System Availability

1. Deleted.
2. Any combination of  
inoperable components in  
the Core and Containment  
Cooling Systems shall not  
defeat the capability of  
the remaining operable  
components to fulfill the  
core and containment  
cooling functions.
3. When irradiated fuel is  
in the reactor vessel and  
the reactor is in either  
a refueling or cold  
shutdown condition, all  
Core and Containment  
Cooling Subsystems may be  
inoperable provided no  
work is permitted which  
has the potential for  
draining the reactor  
vessel.

4.5 SURVEILLANCE REQUIREMENT

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d. The RCIC System shall  
deliver at least 400  
gpm at normal reactor  
operating pressure when  
recirculating to the  
Condensate Storage  
Tank.

H. Minimum Core and Containment  
Cooling System Availability

1. Deleted.

### 3.5 LIMITING CONDITION FOR OPERATION

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4. When (1) irradiated fuel is in the reactor vessel; (2) the reactor is in either a cold shutdown or refueling condition; and (3) operations with a potential for draining the reactor vessel are in progress:
  - a. Two low pressure ECCS injection/spray subsystems and one diesel generator associated with one of the ECCS subsystems shall be operable.
  - b. A source of water >300,000 gallons shall be available to the operable ECCS subsystems. With ≤300,000 gallons available, all ECCS injection/spray subsystems shall be considered inoperable.
  - c. With Specification 3.5.H.4.a not met, but with one low pressure ECCS injection/spray subsystem operable, restore compliance within 4 hours.
  - d. If the required action and associated completion time of Specification 3.5.H.4.c are not met, or if no low pressure ECCS injection/spray subsystems are operable, immediately initiate action to suspend operations with a potential for draining the reactor vessel.

### 4.5 SURVEILLANCE REQUIREMENT

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BASES: 3.5 (Cont'd)

G. Reactor Core Isolation Cooling System

The Reactor Core Isolation Cooling System (RCIC) is provided to maintain the water inventory of the reactor vessel in the event of a main steam line isolation and complete loss of outside power without the use of the emergency core cooling systems. The RCIC meets this requirement. Reference Section 14.5.4.4 FSAR. The HPCIS provides an incidental backup to the RCIC system such that in the event the RCIC should be inoperable no loss of function would occur if the HPCIS is operable.

In accordance with specification 3.5.G.2, if the RCIC System is inoperable and the HPCI System is verified to be operable, the RCIC System must be restored to operable status within 14 days during reactor power operation. In this condition, loss of the RCIC System will not affect the overall plant capability to provide makeup inventory at high reactor pressure since the HPCI System is the only high pressure system assumed to function during a loss of coolant accident. Operability of HPCI is therefore verified immediately when the RCIC System is inoperable during reactor power operation. This may be performed as an administrative check, by examining logs or other information, to determine if HPCI is out of service for maintenance or other reasons. It does not mean it is necessary to perform surveillances needed to demonstrate the operability of the HPCI System. If the operability of the HPCI System cannot be verified, however, Specification 3.5.G.3 requires that an orderly shutdown be initiated and reactor pressure reduced to  $\leq 150$  psig within 24 hours. For transients and certain abnormal events with no LOCA, RCIC (as opposed to HPCI) is the preferred source of makeup coolant because of its relatively small capacity, which allows easier control of the reactor water level. therefore, a limited time (14 days) is allowed to restore the inoperable RCIC System to operable status.

H. Minimum Core and Containment Cooling System Availability

The core cooling and containment cooling subsystems provide a method of transferring the residual heat following a shutdown or accident to a heat sink. Based on analyses, this specification assures that the core and containment cooling function is maintained with any combination of allowed inoperable components.

Operability of low pressure ECCS injection/spray subsystems is required during cold shutdown and refueling conditions to ensure adequate coolant inventory and sufficient heat removal capability for the irradiated fuel in the core in case of inadvertent draindown of the vessel. It is permissible, based upon the low heat load and other methods available to remove the residual heat, to disable all core and containment cooling systems for maintenance if the reactor is in cold shutdown or refueling and there are no operations with a potential for draining the reactor vessel (OPDRV). However, if OPDRVs are in progress with irradiated fuel in the reactor vessel, operability of low pressure ECCS injection/spray subsystems is required to ensure capability to maintain adequate reactor vessel water level in the event of an inadvertent vessel draindown. In this condition, at least 300,000 gallons of makeup water must be available to assure core flooding capability. In addition, only one diesel generator associated with one of the ECCS injection/spray subsystems is required to be operable in this condition since, upon loss of normal power supply, one ECCS subsystem is sufficient to meet this function.

APPENDIX I (Continued)

<b>Key Safety Function: Inventory Control</b>		
<i>Purpose:</i> Control of reactor coolant inventory during shutdown conditions to prevent core uncover and for maintaining the overall decay heat removal function.		
Outage Plan State <b>O-S Color</b>	Mode: <b>OPDRV</b>	Mode: <b>NON-OPDRV</b>
	Systems Required	Systems Required
<b>Minimum</b>  <b>Yellow</b>	2 ECCS injection/spray subsystems OPERABLE supplied by a source of water of greater than 300,000 gallons with: <ul style="list-style-type: none"> <li>1 emergency diesel generator OPERABLE (associated with one of the above ECCS subsystems)</li> </ul>	1 ECCS injection/spray subsystem AVAILABLE <ul style="list-style-type: none"> <li>1 emergency diesel generator AVAILABLE (associated with the ECCS subsystem) OR the Vernon Tie AVAILABLE</li> </ul>
<b>Normal</b>  <b>Green</b>	2 ECCS injection/spray subsystems OPERABLE supplied by a source of water of greater than 300,000 gallons with: <ul style="list-style-type: none"> <li>1 emergency diesel generator OPERABLE (associated with one of the above ECCS subsystems),</li> </ul> <p style="text-align: center;"><b>AND</b></p> 1 Alternate system AVAILABLE	2 ECCS injection/spray subsystems AVAILABLE <ul style="list-style-type: none"> <li>1 emergency diesel generator AVAILABLE (associated with the ECCS subsystems) OR the Vernon Tie AVAILABLE</li> </ul>

Notes to Inventory Control Table:

- The requirement for 2 ECCS injection/spray subsystems may be satisfied with any of the following combinations, supplied by a source of water of greater than 300,000 gallons:
  - two LPCI subsystems (with at least one pump available in each subsystem)
  - two Core Spray subsystems
  - one LPCI subsystem (with at least one pump available) and one Core Spray subsystem
- In the OPDRV mode, the Technical Specification for minimum ECCS requirements will be satisfied provided that 2 ECCS injection/spray subsystems and 1 diesel generator are OPERABLE, with a source of water >300,000 gallons available to the operable ECCS subsystems.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	_____
	K/A #	2.4.49	_____
	Importance Rating	_____	4.4.

(K&A Statement) 2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.

Proposed Question: SRO 100

Power is being reduced to 80% RTP for a rod pattern adjustment. It is expected that full power operations will be restored in 12 hours. The current Feedwater and Condensate system lineups are as follows:

- A, B, and C Condensate pumps are operating
- A, B, and C Feedwater pumps are operating

With power at 87% RTP, an electrical fault has resulted in the trip of the "A" condensate pump. Immediately following the pump trip, the Feedwater and condensate system lineup is as follows:

- C and B Condensate pumps are operating
- A, B, and C Feedwater pumps are operating

Which ONE of the following identifies the immediate operator action and the procedural direction to be taken by the crew?

The crew will respond by immediately \_\_\_\_\_ (1) \_\_\_\_\_.

The Control Room Supervisor will direct entry into \_\_\_\_\_ (2) \_\_\_\_\_.

- A. (1) verifying both recirculation pumps run back to 40% demand AND manually tripping the "B" Feedwater pump  
(2) OT 3113, "Reactor Low Level" ONLY
- B. (1) manually tripping the "B" Feedwater pump ONLY  
(2) OT 3175, "Recirculation Pump Runback due to Condensate or Feed Pump Trip" ONLY
- C. (1) verifying both recirculation pumps run back to 40% demand AND manually tripping the "A" Feedwater pump  
(2) OT 3113, "Reactor Low Level" AND OT 3175, "Recirculation Pump Runback due to Condensate or Feed Pump Trip"
- D. (1) manually tripping the "A" Feedwater pump ONLY  
(2) OT 3113, "Reactor Low Level" AND ARS 6-F-1, "COND PUMP A TRIP"

Proposed Answer: A

Technical Reference(s): OT 3175 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-602, objectives RO EO1, EO2, EO3, and EO 7 (As available)Question Source: Bank # \_\_\_\_\_  
Modified Bank # \_\_\_\_\_  
New XQuestion History: Last NRC Exam NoQuestion Cognitive Level: Memory or Fundamental Knowledge \_\_\_\_\_  
Comprehension or Analysis X10 CFR Part 55 Content: 55.41 \_\_\_\_\_  
55.43 5

Comments:

