

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>1</u>
	Group #	_____	<u>1</u>
	K/A #	295025 EA2.02	_____
	Importance Rating	_____	<u>4.2</u>

(K&A Statement) EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH REACTOR
PRESSURE: Reactor Power

Proposed Question: SRO 1

With the plant operating at 80% RTP IAW OP 0105, "Reactor Operations", power is lost to the Electro-Hydraulic Pressure Regulator (EPR).

Which ONE of the following describes the reactor power response and course of action taken to stabilize the plant?

Reactor Power will (1). The correct course of action is to (2).

- A. (1) decrease
(2) enter ONLY OT 3115, "Reactor Pressure Transients". Verify the MPR takes control THEN place the EPR in CUTOUT
- B. (1) increase
(2) enter OT 3110, "Positive Reactivity Insertion" AND OT 3115, "Reactor Pressure Transients". Verify the MPR takes control THEN place the EPR in CUTOUT
- C. (1) decrease
(2) enter ONLY OT 3115, "Reactor Pressure Transients". Place the EPR in CUTOUT and raise the MPR setpoint to the pre-transient pressure
- D. (1) increase
(2) enter OT 3110, "Positive Reactivity Insertion" AND OT 3115, "Reactor Pressure Transients". Place the EPR in CUTOUT and raise the MPR setpoint to the pre-transient pressure

Proposed Answer: B

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
- A. (INCORRECT): Power will increase requiring OT 3110 entry
- B. (CORRECT): With the plant at 80% RTP, the candidate must understand the EPR is in control at a particular demanded setpoint/stroke condition and the MPR stroke is approximately 10% lower and setpoint slightly higher. As the EPR stroke fails low, pressure will be controlled by the MPR once the strokes are approximately matched. The MPR will then control plant pressure higher than its original value. As pressure increases, the void fraction in the core decreases, resulting in a higher moderator to fuel ratio. This will result in positive reactivity being added and a subsequent rise in reactor power. Additionally, in accordance with the UFSAR, a pressure increase collapses the voids in the moderator, causing an insertion of positive reactivity. IAW ARS 7-G-2 and OT 3115: If pressure is rising, THEN verify the MPR takes control and place the EPR CUTOUT SWITCH on CRP 9-7 to CUTOUT. OT 3110 is entered to the positive reactivity insertion. This procedure references you directly to OT 3115.
- C. (INCORRECT): Power will increase requiring OT 3110 entry and MPR setpoint is lowered to its pre-transient pressure.
- D. (INCORRECT): The MPR setpoint is lowered to its pre-transient pressure.

Technical Reference(s): OT 3115, Revision 11 (Attach if not previously
OT 3110, Revision 23 provided)
OP 2144 Appendix B,
Revision 25
ARS 7-G-2 Revision 15
UFSAR Section 14.4.2,
Revision 22

Proposed references to be provided to applicants during examination:

None

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>1</u>
	Group #	_____	<u>1</u>
	K/A #	<u>295001 AA2.03</u>	
	Importance Rating	_____	<u>3.3</u>

(K&A Statement) AA2.03 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION : Actual core flow

Proposed Question: SRO 2

A reactor startup is in progress IAW OP 0105, "Reactor Operations" with reactor power at 20% RTP. Both Recirculation Pumps are operating at minimum speed.

The "A" Recirculation Pump trips. The drive flow in Recirculation loop "B" is observed to be 4.6 Mlbm/hr.

The crew is performing the follow-up actions per the appropriate OT Procedure.

Based on the above...

The core flow as INDICIATED on the Total Jet Pump Flow Recorder and ERFIS power to flow map compared to ACTUAL core flow will be (1).

After a required 5 minute wait, if the crew desires to maintain temperatures in the idle loop, the Control Room Supervisor will direct the Reactor Operator to re-open the "A" Recirculation Pump (2).

- A. (1) higher due to forward flow in the "A" loop jet pumps
(2) Discharge Bypass Valve, RV-54A, IAW OT 3118, "Recirculation Pump Trip"
- B. (1) higher due to reverse flow in the "A" loop jet pumps
(2) Discharge Valve, RV-53A, IAW OT 3117, "Reactor Instabilities"
- C. (1) lower due to reverse flow in the "A" loop jet pumps
(2) Discharge Bypass Valve, RV-54A, IAW OT 3117, "Reactor Instabilities"
- D. (1) lower due to forward flow in the "A" loop jet pumps
(2) Discharge Valve RV-53A, IAW OT 3118, "Recirculation Pump Trip"

Proposed Answer: D

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
- A. (INCORRECT): Actual flow is greater than indicated flow. Also, the Discharge Bypass Valve should not have been closed and is NOT directed to be opened to warm up the idle loop IAW OT 3118. The Discharge Valve is re-opened.
- B. (INCORRECT): Actual flow is greater than indicated flow. The Discharge Valve should have been closed and is directed to be opened to warm up the idle loop IAW OT 3118, NOT OT 3117.
- C. (INCORRECT): The Discharge Bypass Valve should not have been closed and is NOT directed to be opened to warm up the idle loop IAW OT 3117. The Discharge Valve is re-opened.
- D. (CORRECT): Comprehension based on understanding plant initial conditions and the flow circuitry response as a result. Some single loop conditions (<5 mlb/hr or 14 kgpm drive flow in operating loop) result in positive flow through the idle jet pumps. If positive flow through the idle jet pumps occurs, actual core flow will be greater than the core flow indicated. IAW OT 3118 step 7a and 7b, IF desired to maintain temperatures of the isolated loop, THEN verify the pump discharge valve has been closed for at least five minutes and OPEN PUMP DISCHARGE RV-53A. The valve was closed in follow-up action #1.

Technical Reference(s): OT 3118, Revision 30

(Attach if not previously provided)

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-00-202 AA2.03

(As available)

Question Source:

Bank #

Lot more

Modified Bank # 6822 (ILO)

(Note changes or

attach parent)

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:
 Developed on 3/25/09; Suction valve replaced with discharge bypass valve in A(2) and C(2) on 5/15/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>1</u>
	Group #	_____	<u>1</u>
	K/A #	<u>295031 EA2.04</u>	
	Importance Rating	_____	<u>4.8</u>

(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: SRO 3

The reactor was operating at 100% power. A large break loss of coolant accident (LOCA) has occurred with the following conditions:

- Reactor pressure < 100 psig
- Core Spray is the only available injection system

Which ONE of the following sets of **sustained** Core Spray (CS) flow rates and RPV water level conditions require exiting EOP-1, "RPV Control", and entry into the Severe Accident Guidelines (SAGs)?

- CS "A": 3500 gpm
CS "B": 0 gpm
RPV level: -45" steady
- CS "A": 2000 gpm
CS "B": 1500 gpm
RPV level: -40" steady
- CS "A": 1500 gpm
CS "B": 1500 gpm
RPV level: -15" steady
- CS "A": 0 gpm
CS "B": 0 gpm
RPV level -10" steady

Proposed Answer: B

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires detailed knowledge of diagnostic steps and decision points in the EOPs that involve transitions to event specific sub-procedures or emergency contingency procedures.
- A. Incorrect – SAG entry requires the loss of Adequate Core Cooling (ACC). Spray Cooling is satisfied IAW Table S, EOP-1 RPV water level $>-48"$, and CS flow rate on "A" or "B" is >3250 gpm
- B. Correct – SAG entry requires the loss of Adequate Core Cooling. Core Submergence is NOT satisfied because RPV water level is $<+6"$, Steam Cooling is NOT satisfied because RPV water level is $<-19"$, and Spray Cooling is NOT satisfied because CS flow for a single CS system is <3250 gpm. Without ACC, EOP-1 step RCL-17 requires SAG entry.
- C. Incorrect – RPV water level is $>-19"$, Steam Cooling is satisfied.
- D. Incorrect – RPV water level is $>-19"$, Steam Cooling is satisfied

Technical Reference(s): EOP-1, Step RC/L-14 – (Attach if not previously provided)
RC/L-17
PP-7019 EOP Manual
Volume 4 – Study Guide
Revision 13 Section 6 Page
33

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-00-610 obj. 2.4.43 (As available)

Question Source: Bank # _____ Lot more
Modified Bank # 3669 (ILO) (Note changes or
attach parent)

ES-401

Sample Written Examination
Question Worksheet

Form ES-401-5

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 _____
55.43 5

Comments:

Written: 3/24/09.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>1</u>
	Group #	_____	<u>1</u>
	K/A #	600000 2.1.20	_____
	Importance Rating	_____	<u>4.6</u>

(K&A Statement) 2.1.20 – Conduct of Operations: Ability to interpret and execute procedure steps (Plant Fire On-site)

Proposed Question: SRO 4

With the plant at full power operation, the following sequence of events occurred for the West Switchgear Room:

- At 1218, two ionization/smoke detectors alarmed.
- At 1221, a thermal cable detector alarmed.

The electrical timer associated with the West Switchgear Room CO₂ Discharge System will **BEGIN** at (1).

In response to these events, the CRS will direct a cooldown rate of (2).

- A. (1) 1218
(2) 80-100°F/hour in accordance with OP 0109, "Plant Restoration"
- B. (1) 1221
(2) 20-40°F/hour in accordance with OP 0109, "Plant Restoration"
- C. (1) 1218
(2) 20-40°F/hour in accordance with OP 3020, "Fire Emergency Response Procedure"
- D. (1) 1221
(2) 80-100°F/hour in accordance with OP 3020, "Fire Emergency Response Procedure"

Proposed Answer: D

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
- A. (INCORRECT): The electrical timer commences upon receipt of two ionization detector alarms and a thermal cable detector alarm. OP 3020 directs a cooldown rate of 80-100°F/hour. While OP 0109 references OP 0105 to cooldown at a rate not to exceed 90F/hour, OP 3020 directs a cooldown rate based on the location of the fire.
- B. (INCORRECT): OP 3020 directs a cooldown rate of 80-100°F/hour.
- C. (INCORRECT): The electrical timer commences upon receipt of two ionization detector alarms and a thermal cable detector alarm. OP 3020 directs a cooldown rate of 80-100°F/hour.
- D. (CORRECT): The electrical timer commences upon receipt of two ionization detector alarms and a thermal cable detector alarm. In accordance with OP 3020 a cooldown rate of 80-100°F/hour established.

Technical Reference(s): OP 3020 Figure 1, Revision 54 (Attach if not previously provided)
OP 2186 Discussion page 6, Revision 57

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-00-602 SRO EO10 (As available)

Question Source: Bank # _____ Lot more
Modified Bank # _____ (Note changes or
attach parent)
New X

Question History: Last NRC Exam NoQuestion Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis _____10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

Developed on 3/23/09; Revised on 4/22/09, B(2) and C(2) swapped on 5/15/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	295016 2.4.6	
	Importance Rating		4.7

(K&A Statement) 2.4.6 - Emergency Procedures / Plan: Knowledge of EOP mitigation strategies (Control Room Abandonment)

Proposed Question: SRO 5

As a result of a fire in the Control Room, the Control Room has been abandoned.

NO control room actions were completed prior to exiting the control room.

Actions required to isolate the reactor and assure the Main Steam Isolation Valves (MSIVs) remain isolated are performed IAW _____ (1) _____, which directs the operator to _____ (2) _____.

- A. (1) OP 3126, "Shutdown Using Alternate Methods"
 (2) close containment air supply valves and open containment air vent valves to close the INBOARD MSIVs

- B. (1) OP 2191, "Containment Air System"
 (2) close containment air supply valves and open containment air vent valves to close the INBOARD MSIVs

- C. (1) OP 3126, "Shutdown Using Alternate Methods"
 (2) close instrument air supply valves and open instrument air vent valves to close the OUTBOARD MSIVs

- D. (1) OP 2190, "Service and Instrument Air"
 (2) close instrument air supply valves and open instrument air vent valves to close the OUTBOARD MSIVs

Proposed Answer: C

Explanation (Optional):

Note: the implementation of OP 3126, Appendix B actions are completed by the Control Room Supervisor (SRO)

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
- A. Incorrect – the inboard MSIVs are NOT isolated.
- B. Incorrect – the inboard MSIVs are NOT isolated.
- C. Correct – the outboard MSIVs are isolated by isolating and venting instrument air using OP 3126, Appendix B steps 1a, b.
- D. Incorrect – OP 2191 provides no guidance on isolating the MSIVs following control room abandonment. Appendix B, of OP 3126 provides the correct direction. Instrument Air valves are operated, making this a plausible distractor

Technical Reference(s): OP 3126 Appendix B Rev 18 (Attach if not previously provided)
P&ID 191160 SH 3 (L-16)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-612 obj. 8, B(2) (As available)

Question Source: Bank # _____ Lot more
Modified Bank # _____ (Note changes or
attach parent)
New X

Question History: Last NRC Exam No

Question Cognitive Level: Memory or Fundamental Knowledge X

ES-401

Sample Written Examination
Question Worksheet

Form ES-401-5

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:
Written 3/24/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>1</u>
	Group #	_____	<u>1</u>
	K/A #	295006 2.4.20	_____
	Importance Rating	_____	<u>4.3</u>

(K&A Statement) 2.4.20 - Emergency Procedures / Plan: Knowledge of operational implications of EOP warnings, cautions, and notes (SCRAM)

Proposed Question: SRO 6

In accordance with the EOP Bases document, which ONE of the following correctly describes the concern and operational implication of operating the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) turbines at elevated Torus temperatures when needed to maintain adequate core cooling during post Scram Reactor Pressure Vessel (RPV) Control?

HPCI and RCIC operation with this condition is _____ (1) _____.

HPCI and RCIC turbine operation while lined up to take suction on the Torus with elevated temperatures >140°F will result in _____ (2) _____.

- A. (1) permitted as directed by the Severe Accident Guidelines (SAGs) ONLY
(2) vortexing at the pump suction leading to eventual damage to the pump impeller
- B. (1) permitted as directed by the Emergency Operating Procedures (EOPs) and Severe Accident Guidelines
(2) vortexing at the pump suction leading to eventual damage to the pump impeller
- C. (1) permitted as directed by the Severe Accident Guidelines (SAGs) ONLY
(2) pump cavitation and erosion leading to degraded pump performance or complete loss of function
- D. (1) permitted as directed by the Emergency Operating Procedures (EOPs) and Severe Accident Guidelines
(2) pump cavitation and erosion leading to degraded pump performance or complete loss of function

Proposed Answer: D

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
2. Question cannot be answered by knowing the immediate operator actions.
3. Question cannot be answered by knowing EOP entry conditions
4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
6. Question requires detailed knowledge of diagnostic steps and decision points in the EOPs that involve transitions to event specific sub-procedures or emergency contingency procedures.

Justification for K/A match: OT 3100 Reactor Scram directs level to be controlled using various systems. These systems include HPCI and RCIC. There is a statement to use these systems unless directed otherwise by the EOPs. This is the tie to using Caution 3 basis to a reactor scram (post scram level control).

- A. (INCORRECT): Vortexing in the CST is a concern based on CST water level. The basis for operating HPCI/RCIC with Torus suction <140F does not deal with vortexing concerns and damage to the pump impeller. Operation of HPCI and RCIC at high suction temperatures is permitted under emergency conditions to address adequate core cooling concerns with the understanding that the equipment may fail under continued operations.
- B. (INCORRECT): The basis for operating HPCI/RCIC with Torus suction <140F does not deal with vortexing concerns and damage to the pump impeller.
- C. (INCORRECT): Operation of HPCI and RCIC at high suction temperatures is permitted under emergency conditions to address adequate core cooling concerns with the understanding that the equipment may fail under continued operations.
- D. (CORRECT): In accordance with the HPCI and RCIC Design Basis Documents, operation <140°F ensures NPSH requirements are met in order to prevent HPCI/RCIC pump cavitation and erosion which can lead to degraded performance or complete loss of function. In accordance with OP 2120 and OP 2121 (HPCI/RCIC), operation >140°F is not permitted unless required by the EOPs. In accordance with the EOP Study Guide (Volume 4), this caution does not imply that they can't be run and that it may be necessary to operate the turbines to address adequate core cooling concerns.

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

Section 4 page 9, Revision 13 provided)
 OP 2120 precaution 11, Revision 55
 OP 2121 precaution 22, Revision 52
 HPCI DBD Section 2.4.1, Revision 33
 RCIC DBD Section 2.4.2, Revision 20

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-622 RO EO8 (As available)

Question Source: Bank # _____ Lot more
 Modified Bank # _____ (Note changes or
 attach parent)
 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 5

Comments:
 Developed 3/24/09; Distractors A, B revised on 5/15/09

ES-401	Sample Written Examination Question Worksheet	Form ES-401-5
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Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>1</u>
	Group #	_____	<u>1</u>
	K/A #	295004 2.4.3	_____
	Importance Rating	_____	<u>3.9</u>

(K&A Statement) 2.4.3 - Emergency Procedures / Plan: Ability to identify post-accident instrumentation (Partial or Total Loss of DC Pwr)

Proposed Question: SRO 7

Level Transmitters associated with Post Accident Reactor Water Level Shroud Instrumentation have the following power supplies:

- LT-2-3-73A powered from DC-2 through 24V ECCS Distribution Panel B
- LT-2-3-73B powered from DC-1 through 24V ECCS Distribution Panel A

With the plant operating at 100% power, an electrical transient occurs resulting in the following annunciators:

- CRP 8-E-8 "DG-B TROUBLE"
- CRP 8-F-8 "DG-B CTRL PWR LOSS"
- CRP 8-N-1 "DC-1/DC-2 BKR TRIP"

The Technical Specification Post Accident level Instrument that is available for use following the transient is (1).

In accordance with Technical Specifications, the Control Room Supervisor must verify that the inoperable instrument is restored to service within (2).

NOTE: ONLY Consider the Technical Specification implications on Post Accident Instrumentation.

- A. (1) LI-2-3-91A
(2) 7 days or place the reactor in a hot shutdown condition
- B. (1) LI-2-3-91B
(2) 7 days or place the reactor in a hot shutdown condition
- C. (1) LI-2-3-91A
(2) 30 days or submit a report to the Commission
- D. (1) LI-2-3-91B
(2) 30 days or submit a report to the Commission

Proposed Answer: C

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
2. Question cannot be answered by knowing the immediate operator actions.
3. Question cannot be answered by knowing EOP entry conditions
4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.

SRO-ONLY Question Validity [10CFR55.43(b)(2)]:

- (1) Question cannot be answered by knowing ≤ 1 hour TS/TRM action
 - (2) Question cannot be answered by knowing the LCO/TRM information listed above the line.
 - (3) Question cannot be answered by knowing the TS Safety Limits or their bases.
 - (4) Question can be answered by applying sections 3 and/or 4 in accordance with rules of application requirements.
- A. Incorrect- The indications provided support a loss of DC-1/24V ECCS Distribution Panel "A". LI-2-3-91B is fed from LT-2-3-73B which was lost as a result of losing power to DC-1. Additionally, the loss of one indicator requires action to be taken within 30 days (T.S. Table 3.2.6 Note 1).
- B. Incorrect- The loss of one indicator requires action to be taken within 30 days (T.S. Table 3.2.6 Note 1). After realizing DC-1 has been lost, LI-2-3-91B is plausible due to the cross arrangement of the 24V ECCS electrical distribution.
- C. Correct- The indications provided support a loss of DC-1/24V ECCS Distribution Panel "A". DC-1 provides normal control power to the "B" EDG. Therefore, LT-2-3-73A still remains (powered from DC-2). Referring to G-191267. Sheet 1, LT-2-3-73A feeds LI-2-3-91A. IAS T.S. Table 3.2.6, LI-2-3-91A is a post accident instrument. With one level instrument (LI-2-3-91A/B) unavailable for use, T.S. Table 3.2.6 (Note 1) states: Within 30 days following the loss of one indication, restore the inoperable channel to service or...
- D. Incorrect- The indications provided support a loss of DC-1/24V ECCS Distribution Panel "A". LI-2-3-91B is fed from LT-2-3-73B which was lost as a result of losing power to DC-1. After realizing DC-1 has been lost, LI-2-3-91B is plausible due to the cross arrangement of the 24V ECCS electrical distribution.

Technical Reference(s): Technical Specifications (Attach if not previously
Table 3.2.6, Amendment 207 provided)

ON 3159, Rev 15
P&ID G-191267 Sheet 1
Revision 30

Proposed references to be provided to applicants during examination:

P&ID G-191267 Sheet
1
Technical
Specifications Table
3.2.6

Learning Objective: LOT-00-601 EO-10 (As available)

Question Source:	Bank # _____	Lot more
	Modified Bank # _____	(Note changes or attach parent)
	New <u>X</u>	

Question History: Last NRC Exam No

Question Cognitive Level:	Memory or Fundamental Knowledge	_____
	Comprehension or Analysis	<u>X</u>

10 CFR Part 55 Content: 55.41 _____

55.43 2, 5

Comments: Written 3/23/09; Revised on 4/22/09; Re-written (NEW) on 4/27/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>1</u>
	Group #	_____	<u>2</u>
	K/A #	<u>295020 AA2.05</u>	
	Importance Rating	_____	<u>3.6</u>

(K&A Statement) AA2.05 - Ability to determine and/or interpret the following as they apply to INADVERTENT CONTAINMENT ISOLATION : Reactor water level

Proposed Question: SRO 8

A small break LOCA coincident with a Loss of Normal Power has occurred with the following plant conditions:

- Drywell Pressure is 5.5 psig and rising slowly
- RPV Level is 137" and steady. The lowest observed level post scram was 95".
- RPV Pressure is 870 psig and lowering slowly.
- OT 3122, "Loss of Normal Power", Immediate Actions are complete with NO other actions performed.

Five minutes after level control is established, annunciator 4-U-2 "RCIC STEAM LINE ΔP HI" alarms. RCIC responds as designed. There are NO Steam Leak Detection alarms and temperatures in the steam tunnel and Reactor Building remain steady.

IAW EOP-1, "RPV Control", the CRS must direct an RPV water level band of _____ (1) _____ using _____ (2) _____.

- (1) 127-177"
(2) Table "C", "Preferred Injection Systems"
- (1) 127-177"
(2) Table "D", "Alternate Injection Subsystems"
- (1) +6 – 177"
(2) Table "C", "Preferred Injection Systems"
- (1) +6 – 177"
(2) Table "D", "Alternate Injection Subsystems"

Proposed Answer: A

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
- A. Correct – A high DW pressure signal exists coincident with an LNP, as a result the only injection system operating is HPCI. A Group VI isolation of RCIC occurs; however, RCIC did not initiate because RPV level never reached 82.5". With RPV water level steady at 137" with HPCI injection, the correct level band is 127-177" using Table "C" Preferred Injection Systems. HPCI is a Preferred Injection System.
- B. Incorrect – Table "D" Alternate Injection Subsystems are not directed unless RPV water level can not be restored and maintained above 127" (RC/L-1). With RPV water level above 127" and HPCI injecting, Table "D" is incorrect. This is a plausible distractor based on: if the student believes that either the HPCI system is a Table "D" alternate injection subsystem or that other systems from Table "D" should be used.
- C. Incorrect – The RPV water level band should remain 127-177" since HPCI is still available and the isolation of RCIC, which was not injecting, should have no affect on RPV water level. The water level band is expanded to +6-177" when water level can not be restored and maintained above 127". If the student believes RCIC was injecting and has now isolated, this is a plausible distractor.
- D. Incorrect – The water level band is expanded to +6-177" when water level can not be restored and maintained above 127". If the student believes RCIC was injecting and has now isolated, this is a plausible distractor. This is a plausible distractor based on: if the student believes that either the HPCI system is a Table "D" alternate injection subsystem or that other systems from Table "D" should be used.

Technical Reference(s): EOP Volume 4 – Study Guide EOP-1 RPV Control Section 6 Revision 14 pages 14 of 51 – 20 of 51. (Attach if not previously provided)

ARP 4-U-2 Rev. 8

Proposed references to be provided to applicants during

None

examination: _____

Learning Objective: LOT-00-610 Rev 19 Obj (As available)
 2.4.43

Question Source: Bank # _____ Lot more
 Modified Bank # _____ (Note changes or
 New X attach parent)

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:
 Written 4/3/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>1</u>
	Group #	_____	<u>2</u>
	K/A #	295012 2.4.31	_____
	Importance Rating	_____	<u>4.1</u>

(K&A Statement) 2.4.31 - Emergency Procedures / Plan: Knowledge of annunciator alarms, indications, or response procedures (High Drywell Temperature)

Proposed Question: SRO 9

With the reactor at 95% RTP, environmental conditions in the drywell have degraded giving the Control Room the following indications:

- Annunciator 5-F-2, "Drywell Trouble", is in alarm
- Drywell temperature is 260°F and rising
- Drywell pressure is 1.9 psig and slowly rising

EOP-3, "Primary Containment Control", has been entered and all specified actions have been attempted. In the event that drywell temperature cannot be restored and maintained below its structural design limit, entry into what other Emergency Operating Procedure(s) is (are) required?

- (1) EOP-1, "RPV Level Control"
- (2) EOP-5, "RPV-Emergency Depressurization"
- (3) SAG-2, "RPV, Containment and Radioactive Release Control"

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

Proposed Answer: C

Explanation (Optional):

See comments section for why this is a justifiable SRO-ONLY question

- A. (INCORRECT): WHEN drywell temperature cannot be restored and maintained below 280°F, verify EOP-1 has been entered. At this point an RPV-ED is required as well.
- B. (INCORRECT): There is no SAG entry requirement based on the indications in the stem. Conditions do warrant an entry into EOP-1 and EOP-5.
- C. (CORRECT): Indications may be indicative of a fire in the drywell. In accordance with EOP-3, WHEN drywell temperature cannot be restored and maintained below 280°F, verify EOP-1 has been entered. At this point an RPV-ED is required. The override in EOP-1 (Step RC/OR-4) states that if an RPV-ED is or has been required, exit the pressure flowpath and enter EOP-5 RPV-ED.
- D. (INCORRECT): There is no SAG entry requirement based on the indications in the stem. EOP-1 is required to be entered to get you into EOP-5 which is required in EOP-3.

Technical Reference(s): EOP-1, Revision 3 (Attach if not previously provided)
 EOP-3, Revision 4
 EOP Study Guide (Volume 4), Section 8, Revision 13
 ARS 5-F-2, Revision 7

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-607 CRS 3 and 4 (As available)

Question Source: Bank # _____ Lot more
 Modified Bank # _____ (Note changes or
 attach parent)
 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 5* (See
comments)

Comments: *This question has been developed with the intent of 10CFR55.43 (b) (5) in mind although the generic K/A for this question (2.4.31) does not reference the same 10CFR55.43 requirement. However, this concept is tied to a specific site SRO objective which is written as follows: LOT-00-607 (EOP-3), CRS objective #3 (Implement EOPs to mitigate adverse plant trends) and objective #4 (Direct and prioritize crew actions to mitigate plant transients/accidents). This objective is not redundant with any RO objective. A RO objective dealing with this concept is objective #2 (Given a step or combination of steps from the procedure, describe what is accomplished by the step(s), and the reason the step is important to Primary Containment Control).

Developed on 3/25/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>1</u>
	Group #	_____	<u>2</u>
	K/A #	<u>500000 EA2.03</u>	
	Importance Rating	_____	<u>3.8</u>

(K&A Statement) EA2.03 - Ability to determine and / or interpret the following as they apply to HIGH PRIMARY CONTAINMENT HYDROGEN CONCENTRATIONS: Combustible limits for drywell

Proposed Question: SRO 10

The Severe Accident Guidelines (SAGs) have been entered and the containment has the following conditions:

- Drywell H2 – 5%
- Drywell O2 – 5%
- Torus H2 – 7%
- Torus O2 – 4%

As the SRO designated as the Decision Maker, utilizing the attached steps from SAG-2, "RPV, Containment, and Radioactivity Release Control", determine the venting methodology and criteria for venting termination for the drywell.

IAW SAG-2 Action Level _____ (1) _____, vent/purge the drywell using _____ (2) _____ vent the containment: _____ (3) _____.

- A. (1) 2
(2) nitrogen only
(3) until off site release rates reach the General Emergency criteria
- B. (1) 3
(2) nitrogen only
(3) until off site release rates reach the General Emergency criteria
- C. (1) 2
(2) air or nitrogen
(3) irrespective of off site release rates
- D. (1) 3
(2) air or nitrogen
(3) irrespective of off site release rates

Proposed Answer: D

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
- A. Incorrect – Drywell conditions should be evaluated as Action Level 3. Answer is correct for Action Level 2
- B. Incorrect – Air or Nitrogen should be used and venting should not be terminated at the General Emergency release rate criteria
- C. Incorrect - Drywell conditions should be evaluated as Action Level 3.
- D. Correct - Drywell conditions should be evaluated as Action Level 3, air or nitrogen should be used, venting should be performed irrespective of off site release rates

Technical Reference(s): SAG-2, Rev 1 (Attach if not previously provided)
PP 7019 Technical Support
Guidelines, Appendix E,
Section 7.4 Combustible Gas
Vent, Rev 2

Proposed references to be provided to applicants during examination: SAG-2 Steps H-2 – H-5

Learning Objective: LOT-01-624 SRO 2 (As available)

Question Source: Bank # _____ Lot more
Modified Bank # 5615 (ILO) (Note changes or
attach parent)
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:

Written 3/26/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>1</u>
	K/A #	262001 A2.10	_____
	Importance Rating	_____	<u>3.4</u>

(K&A Statement) A2.10 - 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: Exceeding current limitations

Proposed Question: SRO 11

The "B" Residual Heat Removal (RHR) Pump is tagged out for corrective maintenance.

With the plant operating at 70% RTP, a Loss of Normal Power (LNP) occurs coincident with a Loss of Coolant Accident (LOCA).

Post scram plant conditions are as follows:

- The Reactor Building is **NOT** accessible due to high radiation levels.
- The "B" EDG failed to start due to a fault on the respective bus.
- Buses 8 and 9 are **NOT** cross tied.
- All other systems respond as designed.
- Drywell and Torus pressures are identical at 12.0 psig and rising quickly.
- Torus level is 11 feet and rising slowly.

Additionally, the control room receives the following:

- Annunciator 3-J-1, "RHR PUMP A TRIP"
- Annunciator 3-J-3, "RHR PUMP A/B OVLD"
- Report from the TBAO that **ONLY** the 51A and 51B targets on the "A" RHR pump breaker cubicle are dropped.

IAW OP 2142, "4KV Electrical System", under some circumstances the "A" RHR Pump can be restarted **WITHOUT** being cleared by the Maintenance Department if it tripped on _____ (1) _____.

Given these conditions, the Control Room Supervisor should direct spraying the Torus and Drywell in accordance with EOP-3, "Primary Containment Control", using _____ (2) _____.

- A. (1) time delayed (TIME target) overcurrent
(2) OP 2124, "Residual Heat Removal System", Appendix "C", "Torus Cooling/Containment Spray"

- B. (1) time delayed (TIME target) overcurrent
(2) OE 3107, "SAG/EOP Appendices", Appendix "S", "Primary Containment Spray Using Alternate Methods"

- C. (1) instantaneous (INST target) overcurrent
(2) OP 2124, "Residual Heat Removal System", Appendix "C", "Torus Cooling/Containment Spray"

- D. (1) instantaneous (INST target) overcurrent
(2) OE 3107, "SAG/EOP Appendices", Appendix "S", "Primary Containment Spray Using Alternate Methods"

Proposed Answer: A

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
2. Question cannot be answered by knowing the immediate operator actions.
3. Question cannot be answered by knowing EOP entry conditions
4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.

- A. (CORRECT): The candidate must first understand the nature of the trip. In this case, it's a time delay overcurrent trip which is allowed to be re-started IAW OP 2142 Precaution # 15 if the pump is needed for an emergency condition. In this case, with Drywell and Torus pressures equal, there is a problem with containment. If this problem is not addressed, the PSP curve will be challenged. The options are to spray the torus using alternate systems or to restart the only available RHR pump (C and D are powered from Bus 3 which is not powered and B was tagged out for maintenance leaving A as the only available RHR pump). Because the RB is inaccessible, OE 3107 Appendix "S" cannot be performed (local operation of RHR-183, 184, 70A/B, 71A/B). Therefore the only other option is to restart the pump that tripped on time delay overcurrent in an effort to prevent exceeding the PSP curve limits.
- B. (INCORRECT): The RB is inaccessible to perform OE 3107 Appendix S
- C. (INCORRECT): OP 2142 Precaution #14 does not allow restarting a pump on instantaneous overcurrent unless cleared by the maintenance department.
- D. (INCORRECT): The RB is inaccessible to perform OE 3107 Appendix S. Also, OP 2142 Precaution #14 does not allow restarting a pump on instantaneous overcurrent unless cleared by the maintenance department.

Technical Reference(s): OP 2142, Revision 50, LPC 1 (Attach if not previously provided)
EOP-3 Revision 4
OP 2124 Revision 113 LPC 3
ARS 3-J-3, Revision 14 LPC 2

Proposed references to be provided to applicants during examination:

Partial ARS 3-J-1 and
3-J-3 up to automatic
actions statement.

Learning Objective: LOT-01-262 A2.10 (As available)

Question Source: Bank # _____ Lot more
Modified Bank # _____ (Note changes or
attach parent)
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:

Developed on 4/13/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	2
	Group #	_____	1
	K/A #	215005 A2.04	_____
	Importance Rating	_____	3.9

(K&A Statement) A2.04 - Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions: SCRAM trip signals

Proposed Question: SRO 12

The reactor is being restarted following a refueling outage.

- The Mode Switch is in “**START AND HOT STBY**”.
- All IRMs are operating reading between 25 and 35 on Range 10.
- All APRMs downscale lights are clear, with indicated power at approximately 3%.
- APRMs “C” and “D” are bypassed IAW OP 2132, “Average Power Range Monitor Channels”.

A feedwater temperature transient occurs causing the following APRM & IRM readings:

APRM Power (%)	
APRM A	15
APRM B	11
APRM C	13
APRM D	11
APRM E	12
APRM F	11

IRM Power (%)	
IRM A	60/125
IRM B	55/125
IRM C	55/125
IRM D	122/125
IRM E	55/125
IRM F	50/125

All other plant parameters are within their normal range.

(1) Predict the Reactor Protection System response

(2) Determine the required procedural direction.

A. (1) Full Reactor Scram

(2) Enter OT 3100, “Reactor Scram” and VERIFY the Individual Recirculation Pump controllers are in manual at minimum speed.

- B. (1) Full Reactor Scram
(2) Enter OT 3100, "Reactor Scram" and SHIFT the Individual Recirculation Pump controllers to manual and reduce to minimum speed.
- C. (1) Half Scram Channel "A" only,
(2) IAW OP 2134, "Reactor Protection System", bypass "A" APRM, and reset the half scram
- D. (1) Half Scram Channel "B" only
(2) IAW OP 2134, "Reactor Protection System", bypass "B" IRM, and reset the half scram

Proposed Answer: A

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
- A. Correct – "A" RPS trips based on "A" APRM at 15% with the mode switch out of RUN. "B" RPS trips based on "D" IRM HI HI condition >120/125. OT 3100 will be entered. Because initial power was 3%, the status of the Recirculation Pumps is manual and minimum. The operator would verify the controllers for the given plant conditions.
- B. Incorrect – Because initial power was 3%, the status of the Recirculation Pumps is manual and minimum. The operator would verify the controllers for the given plant conditions. There is NO need to shift the controllers to manual.
- C. Incorrect – "B" RPS also trips due to the "D" IRM HI HI condition. Plausible distractor because candidate may believe with "D" APRM bypassed, the "D" IRM may not trip.
- D. Incorrect – "A" RPS also trips due to the "A" APRM at 15% with the mode switch out of RUN. Plausible distractor if mode switch was in RUN.

Technical Reference(s): Tech Spec Table 3.1.1 (Attach if not previously
Amendment 229 provided)
OP 2132, APRM Rev. 23/1

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-05-215 obj. 4.01, 4.02 (As available)

Question Source: Bank # _____ Lot more
 Modified Bank # 6740 (ILO) (Note changes or
 attach parent)
 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:
 Written 3/24/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>1</u>
	K/A #	223002 2.4.18	_____
	Importance Rating	_____	<u>4.0</u>

(K&A Statement) 2.4.18 - Emergency Procedures / Plan: Knowledge of the specific bases for EOPs (PCIS/Nuclear Steam Supply Shutoff)

Proposed Question: SRO 13

Following a scram, power remains at 25% RTP. The CRS enters and directs actions IAW EOP-2, "ATWS RPV Control". OE 3107, "EOP/SAG Appendices", Appendix P, "Bypassing Group 1 Low-Low Level Isolation Signals" has been ordered. Additionally:

- While installing jumpers required by the Appendix, a Loss of Normal Power (LNP) occurred.
- RPV water level reached 79 inches before rising again.

The basis for bypassing the PCIS Group 1 isolation signal is to _____ (1) _____.

EOP-2 RPV Pressure leg control, step ARC/OR-5, directs the MSIVs to be re-opened if conditions permit. In this case, the MSIVs _____ (2) _____.

- (1) preserve the condenser as a heat sink
(2) shall be re-opened using Appendix P as long as there is no indication of a Main Steam Line (MSL) Break
- (1) preserve the condenser as a heat sink
(2) shall remain closed until OT 3122, "Loss of Normal Power", has been implemented and power to Circ Water equipment restored.
- (1) prevent the possibility of reaching 110°F in the Torus
(2) shall be re-opened using Appendix CC, "RPV Venting or Depressurization using MSIVs", as long as there is no indication of a Main Steam Line (MSL) Break
- (1) prevent the possibility of reaching 110°F in the Torus
(2) shall remain closed until OT 3122, "Loss of Normal Power", has been implemented and power to Circ Water equipment restored.

Proposed Answer: B

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
 6. Question requires detailed knowledge of diagnostic steps and decision points in the EOPs that involve transitions to event specific sub-procedures or emergency contingency procedures.
- A. (INCORRECT): Power is lost to Group 1 logic and the Main Condenser is not available.
- B. (CORRECT): To prepare for the possibility of the MSIVs closing as water level is intentionally lowered, Appendix P is implemented to prevent an unintended loss of the main condenser. Preserving the Main Condenser as a heat sink significantly reduces the energy that must be absorbed by the Torus and prolongs the availability of the Condensate/Feedwater Systems. With a loss of Normal Power (LNP), power is lost to both RPS buses therefore the MSIVs go shut due to a loss of power to Group 1 logic. Additionally, the Main Condenser is not available as required by step ARC/OR-5. Once power is restored to Bus 1 and/or Bus 2, the CW System can be restored to make the Main Condenser available. The MSIVs should remain closed and cannot be re-opened.
- C. (INCORRECT): If the MSIVs could be re-opened, step ARC/OR-5 directs the use of Appendix P, not CC.
- D. (INCORRECT): To prepare for the possibility of the MSIVs closing as water level is intentionally lowered, Appendix P is implemented to prevent an unintended loss of the main condenser. Preserving the Main Condenser as a heat sink significantly reduces the energy that must be absorbed by the Torus and prolongs the availability of the Condensate/Feedwater Systems.

Technical Reference(s): EOP Study Guide, Volume 4, (Attach if not previously
Section 7, Revision 13 provided)
EOP-2 Revision 5
OT 3122, Revision 21

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-00-610 2.4.18 and 2.4.41 (As available)

Question Source: Bank # _____ Lot more
 Modified Bank # _____ (Note changes or
 New X attach parent)

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:
 Developed on 3/27/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	2
	Group #	_____	1
	K/A #	212000 2.1.32	_____
	Importance Rating	_____	4.0

(K&A Statement) 2.1.32 - Conduct of Operations: Ability to explain and apply system limits and precautions (RPS)

Proposed Question: SRO 14

The plant is operating at 100% power IAW OP 0105, "Reactor Operations". "A" and "F" APRMs are bypassed IAW OP 2132, "Average Power Range Monitor Channels". Two LPRMs are currently bypassed on **each** of the following APRMs:

- "B" APRM
- "D" APRM
- "F" APRM

All APRMs are OPERABLE.

A trip of "A" Reactor Protection System Motor Generator occurs with the following annunciators:

- 5-K-1 "AUTO SCRAM CH A"
- 5-K-7 "MANUAL SCRAM CH A"
- 5-M-1 "APRM A, C, E HI-HI/INOP"
- 5-M-2 "APRM B, D, F HI-HI/INOP"
- 5-M-6 "APRM BUS A/B ALT PWR SOURCE"

Based on these indications, **ALL** the ATWS actions of DP-0166, "Operations Department Standards", have been performed. Additionally, the STA reported that **NO** control rod motion occurred.

What is the basis for the action directed by the Control Room Supervisor and what Emergency Action Level classification IAW AP 3125, "Emergency Plan Classification and Action Level Scheme" should be declared?

Based on the above, the Control Room Supervisor must ensure a manual Reactor Scram has been initiated. RPS "B" should have also tripped based on an APRM _____ (1) _____.

The correct EAL declaration IAW AP 3125, "Emergency Plan Classification and Action Level Scheme" is _____ (2) _____.

- A. (1) downscale condition due to too few LPRM inputs to APRM "B"
(2) an Alert (A-7-c)

- B. (1) downscale condition due to too few LPRM inputs to APRM "D"
(2) an Alert (A-7-c)
- C. (1) INOP condition due to too few LPRM inputs to APRM "B"
(2) a Site Area Emergency (S-7-c)
- D. (1) INOP condition due to too few LPRM inputs to APRM "D"
(2) a Site Area Emergency (S-7-c)

Proposed Answer: D

Explanation (Optional):

In accordance with OP 2134, Reactor Protection System, Precaution 1b "When shifting to any RPS alternate power supply: A full scram can occur under certain LPRM bypass conditions."

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
2. Question cannot be answered by knowing the immediate operator actions.
3. Question cannot be answered by knowing EOP entry conditions
4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.

SRO-ONLY Question Validity [10CFR55.43(b)(7)]:

1. Emergency classifications

Note- The OATC actions IAW DP-0166 include manual scram pushbuttons, ARI/RPT, and tripping the recirc drive motor breakers.

A. - Incorrect - APRM "B" does not share LPRMs. Each APRM has 20 LPRMs assigned. Two LPRMs bypassed would not result in an INOP trip because its value would be greater than 12 LPRMs

B. – Incorrect -The failure of the AUTO scram signal to function meets the criteria for EAL A-7-c; however, the manual scram also failed as indicated by the OATC completing his immediate actions and no rod motion.

C. – Incorrect – Incorrect – APRM "B" does not share LPRMs. Each APRM has 20 LPRMs assigned. Two LPRMs bypassed would not result in an INOP trip because its value would be greater than 12 LPRMs

D. – Correct – APRM "D" is associated with "B" RPS. Ten LPRMs are assigned to "D" APRM. With two LPRMs bypassed and all of the shared LPRMs from "A" RPS de-energized an INOP trip signal will be generated because there are <9 LPRMs available as indicated by annunciator 5-M-2. The INOP trip signal on "B" RPS and the shutdown of "A" RPS MG set should result in a full reactor scram. The failure of the AUTO "B" RPS scram signal to function resulted in a failure of the auto scram function which meets the criteria for EAL A-7-c. Since the OATC actions failed to move the control rods, the manual scram failure will meet the criteria for EAL S-7-c since power is >2%.

Technical Reference(s): OP 2134, Rev. 17 (Attach if not previously provided)
 OP 2132, Rev 23/1
 AP 3125 App A, Rev. 21
 T.S. Table 3.1.1 Note 5
 Amendment 229
 EAL Technical Bases Section
 7, Rev. 6
 DP-0166, Rev 19

Proposed references to be provided to applicants during examination: AP 3125 EAL A-7-c and S-7-c

Learning Objective: LOT-00-900 SRO 2 (As available)

Question Source: Bank # _____ Lot more
 Modified Bank # _____ (Note changes or
 attach parent)
 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, 7

Comments:
 Written 3/21/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>1</u>
	K/A #	211000 2.4.11	_____
	Importance Rating	_____	<u>4.2</u>

(K&A Statement) 2.4.11 – Emergency Procedures / Plan: Knowledge of abnormal condition procedures (SLC)

Proposed Question: SRO 15

An Anticipated Transient Without Scram (ATWS) has occurred. The reactor is at 45% RTP and EOP-2, "ATWS RPV Control", has been entered. Additionally:

- Both SLC Pumps are unavailable.
- The Field Support Supervisor is directed to implement alternate measures for Boron injection using OE 3107, "EOP/SAG Appendices".

After Boron has been injected using OE 3107 _____ (1) _____, a plant cooldown can commence as directed by EOP-2 "ATWS RPV Control", when _____ (2) _____.

- (1) Appendix K, "Boron injection CRD System from SLC Tank"
(2) 2.5 drums of Boric Acid and 2.5 drums of Borax have been injected
- (1) Appendix I, "Alternate SLC Initiation"
(2) SLC tank level has decreased by at least 15% volume
- (1) Appendix K, "Boron injection CRD System from SLC Tank"
(2) SLC tank level has decreased by at least 30% volume
- (1) Appendix I, "Alternate SLC Initiation"
(2) two consecutive chemistry samples reveal that at least 660 ppm naturally enriched boron has been added

Proposed Answer: C

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
 6. Question requires detailed knowledge of diagnostic steps and decision points in the EOPs that involve transitions to event specific sub-procedures or emergency contingency procedures.
- A. (INCORRECT): Appendix K uses the CRD System to pump the contents of the SLC Tank to the RPV. This Appendix does NOT use drums of Boric Acid or Borax. Those are used by Appendix J. Also, this amount is equivalent to HSBW.
- B. (INCORRECT): Under boron injection conditions where the SLC tank is available and a flowpath exists this would be the amount of Hot Shutdown Boron Weight- not CSBW. Additionally, the use of Appendix I requires at least one SLC pump be available.
- C. (CORRECT): Under boron injection conditions where the SLC tank is available and a flowpath exists (Appendix K with CRD) then this is the Cold Shutdown Boron Weight. Appendix K will result in the SLC Tank being injected to the RPV. IAW EOP-2, once the tank level decreases by 30% (CSBW), then a cooldown can commence.
- D. (INCORRECT): While 660 ppm represents the correct amount of boron injected into the RPV for CSBW conditions (OE 3107 Appendix J discussion), 2 samples are not required to prove the concentration for use of any boron injection procedure. Additionally, the use of Appendix I requires at least one SLC pump be available.

Technical Reference(s): OE 3107 Appendix K, Revision 25 (Attach if not previously provided)
EOP-2 Table "L", Revision 5

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-610 2.4.11 and 2.4.41 (As available)

Question Source: Bank # _____ Lot more
 Modified Bank # _____ (Note changes or
 New X attach parent)

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:
 Developed on 3/24/09

ES-401	Sample Written Examination Question Worksheet	Form ES-401-5
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Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>2</u>
	K/A #	201002 A2.04	_____
	Importance Rating	_____	<u>3.1</u>

(K&A Statement) A2.04 - Ability to (a) predict the impacts of the following on the REACTOR MANUAL CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Control rod block

Proposed Question: SRO 16

The plant is operating at 75% RTP with the “C” and “D” APRMs bypassed in accordance with OP 2132, “Average Power Range Monitor Channels”.

Following a rod sequence exchange the order has gone out to return to full power operations. As control rods are withdrawn, the “E” APRM power supply fails giving the control room the following annunciator:

- 5-M-1, “APRM A, C, E HI-HI/INOP”

All other APRMs are indicating 75-80%.

Which ONE of the following identifies the expected plant response and direction in order to continue with the power ascension?

The plant response is a _____ (1) _____. After UN-bypassing the “C” APRM, the CRS will direct the CRO to _____ (2) _____.

- (1) Rod Block AND half scram
(2) bypass the “E” APRM IAW OP 2133, “Rod Block Monitor” and reset the half scram IAW OP 2134, “Reactor Protection System”
- (1) Rod Block ONLY
(2) bypass the “E” APRM IAW OP 2133, “Rod Block Monitor”
- (1) Rod Block AND half scram
(2) bypass the “E” APRM IAW ARS 5-M-1 and reset the half scram IAW OP 2134, “Reactor Protection System”.
- (1) Rod Block ONLY
(2) bypass the “E” APRM IAW ARS 5-M-1

Proposed Answer: C

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
- A. (INCORRECT): The "E" APRM needs to be bypassed IAW ARS 5-M-1 and NOT OP 2133.
- B. (INCORRECT): A half scram will also result from an APRM INOP condition (ARS 5-M-1). Additionally, the "E" APRM needs to be bypassed IAW ARS 5-M-1 and NOT OP 2133.
- C.
- D. (CORRECT): The failed APRM has resulted in an INOP condition. This INOP will cause a Rod Block Withdrawal (ARS 5-D-3) and half scram on RPS channel "A". To bypass the "E" APRM, the "C" APRM has to be taken out of bypass. After this, the half scram is reset to allow power ascension to continue.
- E. (INCORRECT): A half scram will also result from an APRM INOP condition (ARS 5-M-1).

Technical Reference(s): ARSs 5-D-3 and 5-M-1, (Attach if not previously
Revision 7, LPC #1 provided)
OP 2132 Section B, Revision
23, LPC #1

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-03-201 A2.04 (As available)

Question Source:	Bank # _____	Lot more
	Modified Bank # _____	(Note changes or attach parent)
	New <u>X</u>	

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 _____
55.43 5

Comments:
Developed on 3/25/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>2</u>
	K/A #	234000 A2.02	_____
	Importance Rating	_____	<u>3.6</u>

(K&A Statement) A2.02 – Ability to (a) predict the impacts of the following on FUEL HANDLING EQUIPMENT; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of refueling platform air system

Proposed Question: SRO 17

Refueling operations are in progress with the following plant conditions:

- All control rods are inserted.
- The Refuel Platform is over the core.
- The grapple is loaded with a fuel assembly that is being withdrawn for movement to the spent fuel pool.

As the fuel assembly is being withdrawn, breaker LSW-CO, “Air Compressor Motor Starter”, on the Refuel Platform trips open. Air compressor pressure as read on the dryer output pressure gage lowers to 0 psig.

Based on the above...

The _____ (1) _____.

IAW OP 1101, “Management of Refueling Activities and Fuel Assembly Movement”, refueling operations are halted and may be re-initiated only by the _____ (2) _____.

- A. (1) grapple fails closed
(2) Refuel Floor Supervisor with concurrence from the Shift Manager
- B. (1) grapple fails closed
(2) Shift Manager with concurrence from the Operations Manager
- C. (1) hoist fails in the “as-is” position
(2) Refuel Floor Supervisor with concurrence from the Shift Manager
- D. (1) hoist fails in the “as-is” position
(2) Shift Manager with concurrence from the Operations Manager

Proposed Answer: B

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
2. Question cannot be answered by knowing the immediate operator actions.
3. Question cannot be answered by knowing EOP entry conditions
4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.

SRO-ONLY Question Validity [10CFR55.43(b)(7)]:

1. Refuel Floor SRO Responsibilities
 - A. (INCORRECT): IAW OP 1101 Precaution #18, If refueling has been halted, in the event of any unusual or abnormal occurrence, refueling operations may only be re-initiated by the Shift Manager after receiving concurrence from the Operations Manager
 - B. (CORRECT): The grapple fails closed on a loss of air. Also, IAW OP 1101 Precaution #18, If refueling has been halted, in the event of any unusual or abnormal occurrence, refueling operations may only be re-initiated by the Shift Manager after receiving concurrence from the Operations Manager
 - C. (INCORRECT): There is no affect on the hoist when the Refuel Platform Air Compressors are lost.
 - D. (INCORRECT): There is no affect on the hoist when the Refuel Platform Air Compressors are lost. Also, IAW OP 1101 Precaution #18, If refueling has been halted, in the event of any unusual or abnormal occurrence, refueling operations may only be re-initiated by the Shift Manager after receiving concurrence from the Operations Manager

Technical Reference(s): Electrical Drawing 5920-12001 Sheet 1, Revision 0 (Attach if not previously provided)
OP 1101, Revision 46
LOT-00-234 Instructor Guide, Revision 28

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOT-00-234, AA2.02, K6.04 (As available)

ES-401	Sample Written Examination Question Worksheet	Form ES-401-5
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Question Source: Bank # _____ Lot more
 Modified Bank # _____ (Note changes or
 attach parent)
 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 5, 7

Comments: Developed on 4/3/09 (Redrawn K/A as directed by Lead Examiner)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>2</u>
	Group #	_____	<u>2</u>
	K/A #	233000 A2.01	_____
	Importance Rating	_____	<u>2.9</u>

(K&A Statement) A2.01 - Ability to (a) predict the impacts of the following on the FUEL POOL COOLING AND CLEAN-UP ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High pool level

Proposed Question: SRO 18

During a refueling outage with the fuel pool gates OUT, Normal Fuel Pool Cooling is aligned to the Fuel Pool IAW OP 2184, "Normal Fuel Pool Cooling". Additionally, the following indications are observed:

- Annunciator 4-H-8, "FUEL POOL CLG SYS TROUBLE" alarming.
- Fuel Storage Pool Level reading on ERFIS is 37.52 feet.

Which ONE of the following actions is required to control Fuel Pool Level?

IAW Fuel Pool Annunciator Response Procedure _____ (1) _____ check the RCU drain flow regulator (RMC-12-143) and drain flow line up on CRP 9-4 and _____ (2) _____ SETPOINT if necessary.

- (1) FP-D-4, "HIGH LEVEL FUEL STORAGE POOL"
(2) increase
- (1) FP-D-3, "LOW LEVEL FUEL STORAGE POOL"
(2) increase
- (1) FP-D-3, "LOW LEVEL FUEL STORAGE POOL"
(2) reduce
- (1) FP-D-4, "HIGH LEVEL FUEL STORAGE POOL"
(2) reduce

Proposed Answer: A

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
2. Question cannot be answered by knowing the immediate operator actions.
3. Question cannot be answered by knowing EOP entry conditions
4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.

A – Correct – 37.47 feet is a high level condition. During a refueling, ARS FP-D-4 provides guidance to increase the RCU drain flow regulator setpoint for a high water level condition.

B – Incorrect – 37.47 feet is a high level condition

C – Incorrect – 37.47 feet is a high level condition

D – Incorrect – ARS FP-D-3, LOW LEVEL FUEL STORAGE POOL provides guidance to reduce the RCU drain flow regulator setpoint for a low water level condition

Technical Reference(s): ARS 4-H-8, Rev. 8 (Attach if not previously provided)
ARS FP-D-4, Rev. 1
ARS FP-D-3, Rev. 1

Proposed references to be provided to applicants during examination: _____ None

Learning Objective: LOT-00-601 EO7, 10 (As available)

Question Source: Bank # _____ Lot more
Modified Bank # _____ (Note changes or
attach parent)
New X

Question History: Last NRC Exam No

Question Cognitive Level: Memory or Fundamental Knowledge X

ES-401

Sample Written Examination
Question Worksheet

Form ES-401-5

Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 _____
55.43 5 _____

Comments:
Written 3/21/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	_____
	K/A #	2.1.4	_____
	Importance Rating	_____	3.8

(K&A Statement) 2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management.

Proposed Question: SRO 19

A plant startup and heatup are in progress. Criticality has just been achieved with 18 control rods fully withdrawn. While obtaining criticality data, the Rod Worth Minimizer fails and becomes INOP. The Control Room Supervisor (CRS) directs the Operator at the Controls (OATC) to withdraw control rods to reach the Point of Adding Heat (POAH) and establish a heat up rate.

Which ONE of the following describes the guidance concerning Reactivity Management for this scenario?

In accordance with EN-OP-115, "Conduct of Operations", ALL control rod withdrawals require a peer checker to verify the correct control rod is selected and observe various panel indications. This peer check can be made by _____ (1) _____.

In accordance with Technical Specifications, when the RWM is inoperable and a startup is to proceed, the control rod sequence must be verified by _____ (2) _____.

- A. (1) the Reactivity SRO or Reactor Engineering
(2) Reactor Engineering
- B. (1) the Shift Technical Advisor or a second licensed operator
(2) Reactor Engineering
- C. (1) the Reactivity SRO or Reactor Engineering
(2) a second licensed operator
- D. (1) the Shift Technical Advisor or a second licensed operator
(2) a second licensed operator

Proposed Answer: D

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(6)]:

- Knowledge of Tech Spec Bases for reactivity controls
- A. Incorrect- A second individual (licensed operator or Shift Technical Advisor) with no concurrent activities should be present during manual rod insertion or withdrawal. In accordance with Technical Specifications, Continuing a reactor startup if the RWM subsequently fails is acceptable if a second licensed operator verifies the withdrawal sequence.
- B. Incorrect- A second individual (licensed operator or Shift Technical Advisor) with no concurrent activities should be present during manual rod insertion or withdrawal. In accordance with Technical Specifications, Continuing a reactor startup if the RWM subsequently fails is acceptable if a second licensed operator verifies the withdrawal sequence.
- C. Incorrect- A second individual (licensed operator or Shift Technical Advisor) with no concurrent activities should be present during manual rod insertion or withdrawal. In accordance with Technical Specifications, Continuing a reactor startup if the RWM subsequently fails is acceptable if a second licensed operator verifies the withdrawal sequence.
- D. Correct- A second individual (licensed operator or Shift Technical Advisor) with no concurrent activities should be present during manual rod insertion or withdrawal. In accordance with Technical Specifications, Continuing a reactor startup if the RWM subsequently fails is acceptable if a second licensed operator verifies the withdrawal sequence.

Technical Reference(s): EN-OP-115, Section 5.4(28) (Attach if not previously
T.S. Section 3.3.B.3.a and provided)
Bases 3.3

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-701 Obj. 8 (As available)
LOT-03-215 K8

Question Source: Bank # Lot more
Modified Bank # 3698 (ILO) (Note changes or
attach parent)

ES-401

Sample Written Examination
Question Worksheet

Form ES-401-5

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 _____
55.43 6

Comments: Selected 3/23/09; Re-written following K/A redraw on 5-5-09

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 20

With the plant at full power operations, a 14 day LCO is in progress for corrective maintenance on the HPCI Aux Oil Pump. Additionally:

- A surveillance inspection revealed that several snubbers for the “A” and “B” Loops of the Residual Heat Removal (RHR) System have failed.
- Engineering has performed an evaluation: risk is assessed and managed.
- It is expected that the snubbers will not be operable for another 20 hours.

For the conditions above, which ONE of the following describes the **MOST** limiting Technical Specification LCO required?

- A. The “A” AND “B” Loops of RHR are declared inoperable. An orderly shutdown shall be initiated and the reactor shall be in a cold shutdown condition within 24 hours.
- B. ONLY one Loop of RHR is declared inoperable. An orderly shutdown shall be initiated and the reactor pressure shall be reduced to within ≤ 150 psig within 24 hours.
- C. A tracking LCO is entered for the “A” AND “B” Loops of RHR. Since the snubbers will be operable within 72 hours, the plant will remain in a 14 day LCO for HPCI being inoperable.
- D. No action is required. Snubber operability does not affect the operability of the RHR System. The plant remains in a 14 day LCO for HPCI being inoperable.

Proposed Answer: A

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(2)]:

- (1) Question cannot be answered by knowing ≤ 1 hour TS/TRM action
- (2) Question cannot be answered by knowing the LCO/TRM information listed above the line.
- (3) Question cannot be answered by knowing the TS Safety Limits or their bases.
- (4) Question can be answered by applying sections 3 and/or 4 in accordance with rules of application requirements.

- A. (CORRECT): Technical Specification 3.0.8.b. provides a time limit of 12 hours for inoperable snubbers associated with more than one train or subsystem. The stem of the question indicates snubbers have been identified in both the "A" and "B" trains of RHR and the time frame for repair is 20 hours. Therefore, both trains of RHR are declared inoperable, resulting in entry to 3.5.A.6, 24 hour cold shutdown LCO. This LCO is more restrictive than the 3.5.E.3 24 hour 150 psig LCO.
- B. (INCORRECT): If the candidate was to interpret T.S. 3.0.8.a incorrectly, he could conclude that ONLY one loop of RHR needs to be declared Inoperable. In this instance, the candidate would apply the 3.5.E.3 LCO. However two trains of RHR inoperable based on reported snubber conditions.
- C. (INCORRECT): The 72 hour tracking LCO is for a single system as specified in 3.0.8.a. Since both trains of RHR are affected, this is incorrect. The candidate's misapplication of this LCO makes this a plausible distractor.
- D. (INCORRECT): The stem of the question indicates the snubbers are being "assessed and managed"; however, there are more restrictions in 3.0.8.b which need to be applied. If the student reads only the first paragraph of 3.0.8, this becomes a plausible distractor.

Technical Reference(s): Tech Specs Section 3.0.8.b (Attach if not previously
Amendment 230, and 3.5.A.6 provided)
Amendment 228

Proposed references to be provided to applicants during examination:

Tech Specs 3/4.0 and 3/4.5 without bases.

Learning Objective: LOT-00-308 SRO#1 (As available)

Question Source: Bank # _____ Lot more
 Modified Bank # 6948 (ILO) (Note changes or
 attach parent)
 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 2

Comments: Developed on 4/3/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3 _____
	Group #	_____	_____
	K/A #	2.3.4	_____
	Importance Rating	_____	3.7 _____

(K&A Statement) 2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions.

Proposed Question: SRO 21

The Control Room has declared a Site Area Emergency.

The Emergency Plan has been activated but the supporting facilities have **NOT** been manned.

It has been determined that four (4) valves on the Refuel Floor must be closed to mitigate the transient.

The following information is applicable to the task to be performed:

- Personnel required: one Auxiliary Operator (AO)
- Current exposure for the only available AO: 380 mR for current year
- Time estimate: 20 minutes
- Radiation Field: 10.5 R/hr

The exposure to complete the task must be authorized by the _____ (1) _____ as specified IAW _____ (2) _____.

- A. (1) Shift Manager
(2) EN-RP-201, "Dosimetry Administration"
- B. (1) General Manager Plant Operations
(2) EN-RP-201, "Dosimetry Administration"
- C. (1) Shift Manager
(2) OP 3507, "Emergency Radiation Exposure Control"
- D. (1) General Manager Plant Operations
(2) OP 3507, "Emergency Radiation Exposure Control"

Proposed Answer: C

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(4)]:

1. Question requires analysis and interpretation of radiation readings as they pertain to selection of administrative, normal, abnormal, and emergency procedures.

A 20 minute exposure in a 10.5 R/hr field is an exposure of 3.5 R plus the current exposure of 380 mR equals a total exposure of 3.88 R.

IAW OP 3507 the following provides guidance:

- Section 4.1 “The Shift Manager is responsible for authorizing emergency dose guidelines depending on the emergency until relieved by the Emergency Plant Manager or Emergency Director.”
 - Section 5.2 “**IF** tasks are being conducted within areas that show a significant increase in general area dose rates from normal plant radiological conditions, **OR** **THEN** the emergency dose control process will be used to control radiation exposure of personnel.”
 - Attachment 9.5 Emergency Dose Limits. Line 1 – Dose Limit 5 Rem (TEDE) for All Work Activities
- A. Incorrect – EN-RP-201 is for normal planned exposures. The SM is not the approving authority for this exposure.
- B. Incorrect – This is the correct answer for normal planned exposures and the GMPO is the approving authority since the total exposure is between 3 – 4 R.
- C. Correct – OP 3507 Emergency Radiation Exposure Control provides guidance on exposure limits during an emergency. During an emergency condition, the Plant Emergency Director (PED) authorizes the exposure limits. Since the EOF, TSC, and OSC are not manned, the SM is the PED. An exposure limit of 5 R TEDE is authorized IAW Attachment 9.5 of OP 3507.
- D. Incorrect – the GMPO is not the approving authority. The GMPO approves extensions between 3-4R IAW EN-RP-201 Section 5.4 for normal planned exposures.

Technical Reference(s): OP 3507 Sections 4.1, 5.2, (Attach if not previously
5.3, Att 9.5, Rev 40 provided)
EN-RP-201 Sections 5.4 Rev
2

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-900 SRO 3 (As available)

Question Source: Bank # _____ Lot more
 Modified Bank # _____ (Note changes or
 attach parent)
 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 4

Comments:
 Written 3/29/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>3</u>
	Group #	_____	_____
	K/A #	<u>2.4.11</u>	_____
	Importance Rating	_____	<u>4.2</u>

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

Proposed Question: SRO 22

A plant startup is in progress IAW OP 0105, "Reactor Operation" with the turbine online. The reactor is at 20% RTP with annunciator 5-K-8, "STOP/CTRL VLV FAST CLOSURE BYP", illuminated.

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

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

2. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 3. Question cannot be answered by knowing the immediate operator actions.
 4. Question cannot be answered by knowing EOP entry conditions
 5. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 6. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.
- A. (CORRECT): First the candidate needs to understand the logic. A turbine trip will occur if both axes on the same bearing reach the trip setpoint. Then the candidate must integrate the fact that power is <25% RTP, therefore annunciator 5-K-8 is lit (bypass of the auto scram on a turbine trip). Since a scram will not occur, OT 3100 is not entered. ON 3154 is entered based on ARS 7-F-2.
- B. (INCORRECT): The same axis for two different bearings will not result in a turbine trip.
- C. (INCORRECT): With power <25% RTP, an automatic scram will not occur. Also, there is nothing in the stem that suggests a manual scram is required. Therefore entry into OT 3100 and verification of house load transfer is not applicable.
- D. (INCORRECT): The same axis for two different bearings will not result in a turbine trip. Also, with power <25% RTP, an automatic scram will not occur. Also, there is nothing in the stem that suggests a manual scram is required. Therefore entry into OT 3100 and verification of house load transfer is not applicable.

Technical Reference(s): ON 3154, Revision 11 LPC 1 (Attach if not previously
ARS 7-F-2, Revision 15 provided)

Proposed references to be provided to applicants during
examination:

None

Learning Objective: LOT-00-600 RO EO4 and (As available)
SRO EO1

ES-401	Sample Written Examination Question Worksheet	Form ES-401-5
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Question Source: Bank # _____ Lot more
 Modified Bank # 6163 (ILO) _____ (Note changes or
 attach parent)
 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:
 Developed on 3/25/09

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 23

A plant shutdown and cooldown are being performed IAW OP 0105, "Reactor Operations" with the following conditions:

- All rods inserted
- RPV pressure: 800 psig
- Cooldown rate: 60°F/hr
- Both House Heating Boilers tripped due to low fuel oil level.
- Outside air temperature is 10°F.

The Turbine Building AO reports the "A" Diesel Room temperature is 47°F

Determine the operability of the "A" Emergency Diesel Generator (EDG) and the correct guidance for assessing availability.

"A" EDG is _____ (1) _____.

Risk assessment availability will be assessed IAW _____ (2) _____.

- A. (1) OPERABLE
(2) AP 0172, "Work Schedule Risk Management – Online"
- B. (1) OPERABLE
(2) AP 0173, "Work Schedule Risk Management – Outage"
- C. (1) INOPERABLE
(2) AP 0172, "Work Schedule Risk Management – Online"
- D. (1) INOPERABLE
(2) AP 0173, "Work Schedule Risk Management – Outage"

Proposed Answer: C

Explanation (Optional):

Precautions in OP 2192 (#10) and OP 2126 (#17) specify the UFSAR minimum temperature is 50°F

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
2. Question cannot be answered by knowing the immediate operator actions.
3. Question cannot be answered by knowing EOP entry conditions
4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
5. Question requires assessing plant conditions and then prescribing a plant procedure or section of a procedure to mitigate recover, or with which to proceed.

SRO-ONLY Question Validity [10CFR55.43(b)(2)]:

1. Question cannot be answered by knowing ≤ 1 hour TS/TRM action
 2. Question cannot be answered by knowing the LCO/TRM information listed above the line.
 3. Question cannot be answered by knowing the TS Safety Limits or their bases.
 4. Question can be answered by applying sections 3 and/or 4 in accordance with rules of application requirements.
- A. Incorrect – With EDG room temperature $< 50^\circ\text{F}$, the associated EDG should be declared INOPERABLE. Risk Management – availability will be assessed using AP 0172. When RCS pressure is 100 psig, the transition from AP-0172 – Online to AP-0173 – Outage Risk is performed. At 800 psig, AP 0172 should still be used to assess availability.
- B. Incorrect - AP 0173 is a plausible distractor since the plant is shutdown, while the outage period has begun by output breaker status, risk management transitions to AP-0173 has not been met with RCS pressure greater than 100 psig.
- C. Correct – “A” EDG is INOPERABLE with room temperature $< 50^\circ\text{F}$ and AP 0172 will assess the availability of “A” EDG
- D. Incorrect - At 800 psig, AP 0172 should still be used to assess availability.

Technical Reference(s): OP 2192, Rev. 65, (Attach if not previously
Precaution #10 provided)
OP 2126, Rev. 55,
Precaution #17
AP 0173, Rev. 21 Section
1.2.1, 1.2.2

Proposed references to be provided to applicants during examination: _____ None

Learning Objective: LOT-00-601 EO5 (As available)

Question Source:	Bank # _____	Lot more
	Modified Bank # _____	(Note changes or attach parent)
	New <u>X</u>	

Question History: Last NRC Exam No

Question Cognitive Level:	Memory or Fundamental Knowledge	<u>X</u>
	Comprehension or Analysis	_____

10 CFR Part 55 Content: 55.41 _____
55.43 2,5

Comments:
Written 3/26/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>3</u>
	Group #	_____	_____
	K/A #	<u>2.1.34</u>	_____
	Importance Rating	_____	<u>3.5</u>

(K&A Statement) 2.1.34 Knowledge of primary and secondary plant chemistry limits.

Proposed Question: SRO 24

A plant startup is in progress IAW OP 0105, "Reactor Operations". Reactor Power is being held at ~22%. Chemistry has taken reactor coolant samples IAW OP 4612, "Reactor Water System Sampling and Treatment". The following results were given to the Control Room Supervisor for review:

- Conductivity is 2.8 $\mu\text{mho/cm}$
- Chloride ion concentration is 0.15 ppm
- I-131 dose equivalent is 1.8 $\mu\text{Ci/gm}$. (This is the first I-131 sample)

Which ONE of the following actions is required based on these coolant chemistry results?

- A. The startup shall continue IAW OP 0105 since all given chemistry samples are satisfactory.
- B. The coolant shall be sampled every 4 hours and analyzed for radioactive iodines until iodine dose equivalent is within specification.
- C. The reactor shall be in the cold shutdown condition within 24 hours based on chlorides being out of specification.
- D. The reactor shall be in the cold shutdown condition within 24 hours based on iodines being out of specification.

Proposed Answer: B

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(2)]:

- (1) Question cannot be answered by knowing ≤ 1 hour TS/TRM action
- (2) Question cannot be answered by knowing the LCO/TRM information listed above the line.
- (3) Question cannot be answered by knowing the TS Safety Limits or their bases.
- (4) Question can be answered by applying sections 3 and/or 4 in accordance with rules of application requirements.

- A. (INCORRECT): The candidate may believe these results are sat based on thinking the Iodine limit is $4 \mu\text{Ci/gm}$ (T.S. 3.6.B.1.c), Conductivity limit is $10 \mu\text{mho/cm}$ (TRM 3.6.B.3), and chloride limit is 0.1 ppm (TRM 3.6.B.3). However, in this case, Radioiodine concentrations are UNSAT IAW OP 4612 Table 3 and TS limits. Samples are required every 4 hours to ensure $1.1 \mu\text{Ci/gm}$ is not exceeded for greater than 24 hours. This action to continue a startup may not be conservative since a concentration $>1.1 \mu\text{Ci/gm}$ is indicative of failure of the cleanup demineralizer or gross activity in the gaseous effluents is near the limit which is indicative of a potential fuel failure.
- B. (CORRECT): T.S section 4.6.B.1.e
- C. (INCORRECT): Chlorides are not out of spec. Because steaming rate is greater than $100,000 \text{ lbm/hour}$, the chloride spec is now 0.5 ppm . If steaming rate was $<100,000 \text{ lbm/hour}$, then chlorides would be out of spec. 22% power provides greater than $100,000 \text{ lbm/hour}$.
- D. (INCORRECT): This would be the case if either radiochemistry iodine concentration exceeded $1.1 \mu\text{Ci/gm}$ for greater than 24 hours or if concentration exceeded $4.0 \mu\text{Ci/gm}$ at any time. $4.0 \mu\text{Ci/gm}$ is the iodine spike limit. Exceeding this limit will not guarantee we will be within the 10CFR50.67 dose guidelines in the event of a postulated LOCA.

Technical Reference(s): OP 0105, Revision 86 LPC 2 (Attach if not previously provided)
OP 4612, Revision 37
Technical Specifications
section 4.6.B.1.e Amendment
190

Proposed references to be provided to applicants during examination:

T.S Section 3.6
without bases.
TRM Section 3/4.6

Learning Objective: LOT-00-301 SRO #3 (As available)

Question Source: Bank # _____ Lot more
Modified Bank # 6296 (ILO) (Note changes or
attach parent)
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 2

Comments:

Developed on 4/14/09

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	<u>3</u>
	Group #	_____	_____
	K/A #	<u>2.4.35</u>	_____
	Importance Rating	_____	<u>4.0</u>

(K&A Statement) 2.4.35 Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects.

Proposed Question: SRO 25

An Anticipated Transient Without Scram (ATWS) has occurred. Additionally:

- NO rod motion occurred
- The Scram Air Header remains pressurized
- RPS remains energized
- RPV Pressure is steady at 920 psig.

The CRS directs the Reactor Building Auxiliary Operator (RBAO) to perform Appendix D, "Manual Isolation and Venting of the Scram Air Header". When the RBAO reported the scram air header has been isolated and vented, SOME control rod motion occurred.

NO additional actions have been performed IAW Appendix D.

Which of the following (if any) can be directed by the CRS to successfully insert the remaining control rods?

- (1) Appendix G, "Manual Insertion of Individual Control Rods"
- (2) Appendix H, "Vent the Control Rod Drive Over Piston Volume"

- A. BOTH (1) and (2)
- B. Neither (1) nor (2)
- C. ONLY (1)
- D. ONLY (2)

Proposed Answer: D

Explanation (Optional):

SRO-ONLY Question Validity [10CFR55.43(b)(5)]:

1. Question cannot be answered by knowing system operation, flowpath, logic, initiation.
 2. Question cannot be answered by knowing the immediate operator actions.
 3. Question cannot be answered by knowing EOP entry conditions
 4. Question cannot be answered by knowing the purpose, overall sequence of events, or overall mitigation strategy of a procedure.
 5. Question requires detailed knowledge of when to implement attachments and appendices, including how to coordinate these items with procedure steps.
- A. Incorrect – Appendix G CAN NOT be implemented because the CRD flow control valve fails closed rendering drive and cooling water pressures unavailable for control rod insertion.
- B. Incorrect – Appendix G CAN NOT be implemented because the CRD flow control valve fails closed rendering drive and cooling water pressures unavailable for control rod insertion. There are notes in Appendix D, G, and BB providing this information. Nothing in the stem prevents Appendix H from being performed.
- C. Incorrect – Appendix G CAN NOT be implemented because the CRD flow control valve fails closed rendering drive and cooling water pressures unavailable for control rod insertion.
- D. Correct – Appendix H CAN be implemented because there is no affect on the ability to vent the overpiston area. Also, there is adequate RPV Pressure to insert control rods (>500#).

Technical Reference(s): OE 3107 Rev. 25, (Attach if not previously
Appendices D, G, H provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: LOT-00-626 EO3 (As available)

Question Source: Bank # _____ Lot more
Modified Bank # _____ (Note changes or
attach parent)
New X

ES-401	Sample Written Examination Question Worksheet	Form ES-401-5
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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:
 Written 3/24/09