Draft Submittal

(Pink Paper)

McGuire 2007-301

MARCH 29, 2007

Senior Reactor Operator Written Exam

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	007 G2.1.33	
	Importance Rating		4.0

Conduct of Operations: Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.

Proposed Question: SRO 76

Given the following on Unit 1:

- The Unit is in Mode 3, normal NC temperature and pressure.
- Shutdown Banks are withdrawn.
- Preparations are being made to perform a reactor startup.
- A problem in the DRPI Cabinet results in loss of DRPI indication on the Main Control Board and OAC.

Which ONE (1) of the following actions is required in accordance with Technical Specifications/SLC?

A. Immediately open the reactor trip breakers to ensure compliance with control rod alignment and insertion limits.

B. Verify Shutdown Margin requirements are met within 1 hour because DRPI is normally required to verify Shutdown Margin.

C. Restore DRPI within 1 hour or open the reactor trip breakers because DRPI is normally required to verify Shutdown Margin.

D. Insert all Shutdown Banks within 1 hour to ensure compliance with control rod alignment and insertion limits.

Proposed Answer: A

Explanation (Optional):

A is correct.

B is incorrect. Credible because the reason is true, but verify SDM is for rods out of alignment

C is incorrect. Credible because reason is true. Incorrect because a 1 hour grace period is not allowed in this condition

D is incorrect. Credible because basis is correct. Incorrect because action is to immediately open trip breakers

Technical Reference(s): SLC 16.7.9 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-EDA, obj 10 (As available)

Question Source: Bank # _____

Modified Bank # _____ (Note changes or attach parent)

New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 _____

55.43 2

Comments:

10.	Concerning the Technical Specifications related to the DRPI System:					
	• Given the LCO title, state the LCO (including any COLR values) and applicability.			X	X	X
	• For any LCO's that have action required within one hour, state the action.			X	X	X
	• Given a set of parameter values or system conditions, determine if any Tech. Spec. LCO's is (are) not met and any action(s) required within one hour.			X	X	X
	• Discus the bases for a given Tech. Spec. LCO or Safety Limit				X	*
	*** SRO ONLY**					

16.7 INSTRUMENTATION

16.7.9 Rod Position Indication System - Shutdown

COMMITMENT One rod position indicator (excluding demand position indication) shall be OPERABLE and capable of determining the control rod position within ± 12 steps for each shutdown or control rod not fully inserted.

APPLICABILITY MODES 3, 4 and 5 with the reactor trip breakers in the closed position.

REMEDIAL ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	One or more required rod position indicators inoperable.	A.1	Open the reactor trip breakers.	Immediately

TESTING REQUIREMENTS

Refer to Technical Specification Surveillance Requirement 3.1.7.1.

BASES

OPERABILITY of the control rod position indicators is required to determine control rod positions and thereby ensure compliance with the control rod alignment and insertion limits.

REFERENCES

None.

Given the following conditions:

- Unit 1 is at 100% power.
- The following annunciator is received in the control room:
    - 1EMF 46A TRAIN A KC HI RAD
- The RO confirms that EMF 46A is slightly above the Trip 2 setpoint and going down.
- 1KC-122, KC Surge Tank Vent Valve, indicates closed.
- OAC points for NC Pump Thermal Barrier Outlet flow trends indicate:
- A NC Pump 42 GPM
- B NC Pump 43 GPM
- C NC Pump spiked to 122 GPM, now indicates 30 GPM.
- D NC Pump 42 GPM
- 1KC-345A (C NC Pump Thermal Barrier Outlet Valve) indicates closed.
- KC Surge Tank Level is rising slowly.

Which ONE (1) of the following describes (1) the operation of 1KC-122 as radiation level goes down, and (2) the procedure required based on current plant conditions?

A. (1) 1KC-122 will automatically reopen after Trip 2 has been reset
(2) AP/1/A/5500/08, Malfunction of NC Pump

B. (1) 1KC-122 will automatically reopen after Trip 2 has been reset
(2) AP/1/A/5500/10, NC System Leakage Within the Capacity of Both NV Pumps

C. (1) 1KC-122 must be manually reopened after Trip 2 has been reset
(2) AP/1/A/5500/08, Malfunction of NC Pump

D. (1) 1KC-122 must be manually reopened after Trip 2 has been reset
(2) AP/1/A/5500/10, NC System Leakage Within the Capacity of Both NV Pumps

Proposed Answer: B

Explanation (Optional):

B is correct
A is incorrect. Based on plant conditions, an NC leak is occurring. Malfunction of NC pump would not be entered, although credible because the failure is in the NC pump
C is incorrect. Credible because the failure is in the NC pump. Applicant may also be unaware that the valve will auto reset after Trip 2 is reset
D is incorrect. Valve will reset automatically. Procedure is correct

Technical Reference(s): OP/1/A/6100/010 Q- A4 (Attach if not previously provided)
AP-10, pg 2
PSS-KC, pg 21
AP-08, pg 20

Proposed references to be provided to applicants during examination: None

Learning Objective: PSS-KC Obj 10 (As available)

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

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	009 EA2.23	
	Importance Rating		3.1

Ability to determine or interpret the following as they apply to a small break LOCA: CCW Surge Tank Vent Isolation Indication

Proposed Question: SRO 77

OBJECTIVES

10	Concerning the Component Cooling Water System: • Describe the local controls and list the indications, including operation of the local control for KC-122. • Describe the control room controls and list the indications.	X	X	X X	X X	 X
11	State the normal and backup sources of makeup water to the system.	X	X	X	X	
12	Describe the discharge paths of the Component Cooling Water Drain Tank Pump.	X	X	X	X	
13	Given a limit and/or precaution associated with an Operating Procedure, discuss it's basis and applicability.	X	X	X	X	X
14	Concerning AP/1/A/5500/21, Loss of Component Cooling Water: • State the purpose of the AP. • Recognize the symptoms that would require implementation of the AP.			X	X	X
15	Concerning the Technical Specifications related to the Component Cooling Water System: • Given the LCO title, state the LCO (including any COLR values) and applicability. • For any LCO's that have action required within one hour, state the action. • Given a set of parameter values or system conditions, determine if any Tech Spec LCO's is (are) not met and any action(s) required within one hour. • Given a set of plant parameters or system conditions and the appropriate Tech Specs, determine required actions. • Discuss the bases for a given Tech Spec LCO or Safety Limit.			 X X X	 X X X X	 X X X X *

* - SRO ONLY

2.6.6. ND Heat Exchanger Cooling Water Isolation Valves (KC-56 & 81).

These valves are located on the inlet of the ND Heat Exchanger and are controlled from Control Room MC-11. The operator must hold the open pushbutton until the valve fully opens because there is no seal-in associated with the open circuit. They are normally closed and open on a S_s signal.

2.6.7. ND Heat Exchanger Cooling Water Control Valves (KC-57 & 82).

These valves are located in the discharge lines of the ND Heat Exchangers. It is normally controlled by flow instrumentation to maintain KC flow through the heat exchanger at ≈5000 gpm. They fail open on a S_s signal. To regain automatic control, the S_s and the "Modulating Valves Reset" must be reset. The purpose of the "Modulating Valves Reset" is to ensure two actions are taken prior to removing a component from its safety alignment. These valves fail in open position.

Objective #10

2.6.8. KC Surge Tank Vent Valve (KC-122)

Located in the surge tank vent line and vents the tank to atmosphere. It is controlled from a local station at the surge tank by a two position, OPEN/CLOSE, pushbutton. It is normally open and receives a close signal on EMF-46A & B alarm. The "OPEN" position latches in so when the EMF signal clears, the valve will re-open.

2.6.9. KC Surge Tank Pressure Relief (KC-972)

Designed to relieve maximum water flow as a result of a ruptured NCP Thermal Barrier Heat Exchanger. Relief setpoint is 15 psig and discharges to Liquid Waste Recycle System, via Floor Drain System

2.6.10. KC Surge Tank Vacuum Relief (KC-123).

Vacuum breaker protects the tank from collapsing in the event of a KC leak when the KC Surge Tank vent is closed.

2.6.11. Letdown Heat Exchanger Cooling Water Control Valve (KC-132).

These valves are physically located in the Letdown Heat Exchanger line and regulate component cooling flow to maintain Letdown temperature at 115 °F. Valve is designed to fail open. Operation of this valve can cause changes in the NV System Demineralizers' temperatures. A change in demineralizer temperature can affect the boron concentration out of the demeralizer. Decrease in temperature can cause a dilution of the NC System (cooler resin holds more boron). An increase in temperature will have the opposite effect. See OE item 5.2

Nomenclature: **1EMF 46A TRAIN A KC HI RAD** Window: **A4**

Setpoint: Trip 2

Origin: 1EMF-46A Gamma Scintillation Detector (Train A)

Probable Cause:
- Tube leak on any heat exchanger with radioactive water
- Normal increase due to Sodium activation

NOTE: 1KC-122 (KC Surge Tank Vent) will reopen when 1EMF-46A alarm clears.

Automatic Action: Automatic closure of 1KC-122 (KC Surge Tank Vent).

Immediate Action: Ensure KC Surge Tank Vent closes.

Supplementary Action:

1. Notify Chemistry/RP to sample for activity.
2. Attempt to locate source of leakage.
3. **IF** KC Surge Tank level is going up in an uncontrolled manner:
   A. Check OAC points for NC Pump Thermal Barrier KC Outlet flow alarms normal.
   B. **IF** alarms are **NOT** normal, close the following valve on the affected NC Pump:
      - 1KC-394A (A NC Pump Therm Bar Otlt)
      - 1KC-364B (B NC Pump Therm Bar Otlt)
      - 1KC-345A (C NC Pump Therm Bar Otlt)
      - 1KC-413B (D NC Pump Therm Bar Otlt)
   C. **IF** NC to KC leak still exists, go to AP/1/A/5500/010 (NC System Leakage Within Capacity of Both NV Pumps).

References:
- MC-1573-1.0
- HP/0/B/1003/008 (Determination of Radiation Monitor Setpoints (EMFs))

End of Response

Unit 1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

B. Symptoms

- **"1EMF 33 COND AIR EJECT EXH HI RAD" alarm**
- **"1EMF 34 S/G SAMPLE HI RAD" alarm**
- **"1EMF 24 S/G A STEAMLINE HI RAD" alarm**
- **"1EMF 25 S/G B STEAMLINE HI RAD" alarm**
- **"1EMF 26 S/G C STEAMLINE HI RAD" alarm**
- **"1EMF 27 S/G D STEAMLINE HI RAD" alarm**
- **"1EMF 71 S/G A LEAKAGE HI RAD" alarm**
- **"1EMF 72 S/G B LEAKAGE HI RAD" alarm**
- **"1EMF 73 S/G C LEAKAGE HI RAD" alarm**
- **"1EMF 74 S/G D LEAKAGE HI RAD" alarm**
- **Unexpected decrease in VCT level trend**
- **Abnormally high frequency of auto makeup to VCT**
- **Feedwater flow and CF reg valve position indication going down in any S/G**
- **S/G level going up in an uncontrolled manner**
- **Confirmed primary to secondary leakage in excess of 125 GPD**
- **Shutdown required PER PT/1/A/4150/001C (Primary to Secondary Leakage Monitoring).**

2.6.6. ND Heat Exchanger Cooling Water Isolation Valves (KC-56 & 81).

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Objective #10

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

B. Symptoms

- **NC pump number 1 seal leakoff flow going up**
- **NC pump number 1 seal leakoff flow going down**
- **NC pump number 1 seal outlet temperature going up**
- **NC pump lower bearing temperature going up**
- **"NC PMP NO. 1 SEAL LO D/P" alarm.**

C. Operator Actions

1. **Check NC pump parameters within operating limits:**

   __ • All NC pump lower bearing temperatures - LESS THAN 225°F

   __ • All NC pump number 1 seal outlet temperatures - LESS THAN 235°F

   __ • All NC pump number 1 seal D/Ps - GREATER THAN 200 PSID.

   __ **IF trip criteria valid, THEN GO TO Step 4.**

__ 2. **IF AT ANY TIME any operating limit exceeded, THEN GO TO Step 4.**

__ 3. **GO TO Step 5.**

4. **Stop affected NC pump as follows:**

   a. **IF** A or B NC pump is the affected pump, **THEN** close associated spray valve:

   __ • 1NC-27 (A Loop PZR Spray Control)

   __ • 1NC-29 (B Loop PZR Spray Control).

   __ b. Check all NC pump number 1 seal leakoff flows - LESS THAN 6 GPM.

   __ b. Observe Caution prior to Step 4.e and **GO TO** Step 4.e.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	026 AA2.03	
	Importance Rating		2.9

Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: The valve lineups necessary to restart the CCWS while bypassing the portion of the system causing the abnormal condition

Proposed Question: SRO 78

During normal power operations AP/21 (Loss of KC or KC System Leakage) has been entered and the event has progressed to the point the following conditions exist:

- "A" and "B" Train KC pumps are running.
- All available makeup has been established to the KC surge tanks.
- "A" KC Surge tank level is decreasing 0.04 ft/min.
- "B" KC Surge Tank level is decreasing at 0.03 ft/min.
- "A" KC Surge Tank level is presently 3.2 ft.
- "B" KC Surge Tank level is presently 3.4 ft.
- NCP bearing temperatures are approximately 180 degrees F and rising slowly.

Based on these conditions the crews next action will be:

A. Trip KC Pumps in accordance with the Main Body of AP/21.

B. Trip the reactor, Trip NCPs, and trip "A" KC Pumps. Enter E-0, Reactor Trip or Safety Injection.

C. Isolate KC Non-Essential Headers in accordance with AP/21, Enclosure 2.

D. Isolate "A" KC train from "B" KC train in accordance with the main body of AP/21.

Proposed Answer: D

Explanation (Optional):

D is correct per conditions.

A, B, and C could all be performed for different conditions. NCP temperatures must exceed 195 deg F, Non-Essential header isolation at <2 ft in KC Surge Tank, and trip KC pumps if cannot maintain level > 5". All credible based upon potential performance in procedure

Technical Reference(s): AP/21 Step 20 (pg 1-9, pg 28) (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: AP-21, obj 2 (As available)

Question Source:
- Bank #
- Modified Bank # AP21004 (Note changes or attach parent)
- New

Question History: Last NRC Exam

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

10 CFR Part 55 Content:
- 55.41
- 55.43 5

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
		1.0	1.0	1.0

OBJECTIVES

	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	Explain the purpose for AP/21 (Loss of KC or KC System Leakage). AP21001			X	X	X
2	Analyze the mitigating strategy (major actions) contained in the procedure. AP21002			X	X	X
3	Given scenarios describing accident events and plant conditions, evaluate the basis for any caution, note, or step. AP21003			X	X	X
4	Given scenarios describing accident events and plant conditions, evaluate conditions which require application of continuous action steps. AP21004			X	X	X

A. Purpose

The purpose of this procedure is to identify actions required in the event of a loss of KC, or leakage on the KC System.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

B. Symptoms

- **"LO KC HX A INLET FLOW" computer alarm**
- **"LO KC HX B INLET FLOW" computer alarm**
- **Low flow alarms on components supplied by KC**
- **High temperature alarms on components supplied by KC**
- **Low level or level going down in KC Surge Tank**
- **Abnormal KC pump Flow**
- **"LO KC SURGE TANK COMPARTMENT A LEVEL" computer alarm**
- **"LO KC SURGE TANK COMPARTMENT B LEVEL" computer alarm**
- **"KC SURGE TANK ABNORMAL LEVEL" alarm.**

C. Operator Actions

__ 1. **Check any KC pump - ON.**

Perform the following:

a. Isolate:

__ • Normal letdown

__ • Excess letdown

__ • ND letdown.

__ b. Close all NM valves located on 1MC-8 (vertical board).

__ 2. **Monitor Foldout page.**

__ 3. **Secure any dilution in progress.**

__ 4. **Check ND - IN RHR MODE.**

__ **GO TO Step 7.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **Check any KC pump - ON.**	**Isolate containment as follows:** a. Announce the following on page: __ 1) Description of event. __ 2) "All personnel evacuate Unit 1 containment." __ b. Actuate containment evacuation alarm. __ c. **REFER TO** RP/0/A/5700/011 (Conducting a Site Assembly, Site Evacuation, or Containment Evacuation) while continuing with this procedure. __ d. **IF** PT/1/A/4200/002 C (Containment Closure/Integrity) in effect, **THEN** notify Containment Closure Coordinator to initiate containment closure. __ e. **GO TO** Step 8.
__ 6. **IF AT ANY TIME all KC pumps are off, THEN RETURN TO Step 5.**	
__ 7. **Announce occurrence on paging system.**	
__ 8. **Check both train's KC Surge Tank level - STABLE OR GOING UP.**	__ **IF Surge Tank level trend indicates a KC System leak, THEN GO TO Step 11.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. **Start standby KC train as follows:**

__ a. Check standby KC train - AVAILABLE TO START.

a. Perform the following:

1) **IF** any KC pump running, **THEN** perform the following as necessary to maintain KC flow less than 4000 GPM per operating KC pump:

__ a) Maintain cooling water to critical heat loads.

CAUTION **If ND in RHR and NC temperature is greater than 200°F, then KC flow must be maintained greater than 2000 GPM to operating ND train.**

__ b) Evaluate throttling KC to ND HX.

__ c) Evaluate throttling KC to KF HX.

__ d) Evaluate raising RN flow to KC HX to lower KC temperature.

__ e) Evaluate reducing NV letdown to 45 GPM.

__ f) **IF** necessary to reduce KC flow, **THEN** notify Radwaste Chemistry to ensure NB evaporator is shutdown.

g) **IF AT ANY TIME** it is desired to restart tripped KC pump, **THEN**:

__ (1) Start desired KC pump.
__ (2) Exit this procedure.

__ 2) Do not continue until KC train available to start.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. (Continued)

__ b. Check standby KC Surge Tank Level - GREATER THAN 2 FT.

b. Perform the following:

1) Initiate YM makeup to KC Surge Tank as follows:

a) Dispatch operator to open the following valves as required to maintain KC Surge Tank level:

__ • To makeup to 1A KC Surge Tank, unlock and open 1KC-107 (1A KC Surge Tank Compartment YM Supply Isol) (aux bldg, 767+2, JJ-57, under grating, between KC surge tanks)

__ • To makeup to 1B KC Surge Tank, unlock and open 1KC-111 (1B KC Surge Tank Compartment YM Supply Isol) (aux bldg, 767+2, JJ-58, under grating, between KC surge tanks).

__ b) Adjust makeup rate as required to prevent overflow of KC Surge Tank (approximately 8.5 ft).

__ 2) **IF AT ANY TIME** it is determined that YM makeup is inadequate, **THEN** align RN Makeup to KC **PER** Enclosure 3 (Aligning RN Makeup to KC Surge Tank) as required.

__ 3) Do not continue until surge tank level is greater than 2 ft.

c. Start standby KC train **PER** one of the following:

__ • To start A Train , **GO TO** Enclosure 4 (Startup of 1A KC Train)

OR

__ • To start B Train , **GO TO** Enclosure 5 (Startup of 1B KC Train).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 10. **GO TO Step 41.**

11. **Initiate YM makeup to KC Surge Tank as follows:**

a. Immediately dispatch operator to open the following valves as required to maintain KC Surge Tank level:

__ • To makeup to 1A KC Surge Tank, unlock and open 1KC-107 (1A KC Surge Tank Compartment YM Supply Isol) (aux bldg, 767+2, JJ-57, under grating, between KC surge tanks)

__ • To makeup to 1B KC Surge tank, unlock and open 1KC-111 (1B KC Surge Tank Compartment YM Supply Isol) (aux bldg, 767+2, JJ-58, under grating, between KC surge tanks).

__ b. Adjust makeup rate as required to prevent overflow of KC Surge Tank (approximately 8.5 ft).

__ 12. **Dispatch operators to locate leak.**

__ 13. **Check KC drain tank pump - OFF.**

Perform the following:

__ a. Dispatch operator to check KC drain tank level locally.

__ b. **IF** abnormal inputs to KC drain tank suspected, **THEN** reference MCFD-1573 series (Flow Diagram of Component Cooling System) for possible leak on KC drain and relief headers.

__ 14. **IF AT ANY TIME it is determined that YM makeup is inadequate to restore or stabilize KC surge tank level, THEN immediately align RN Makeup to KC PER Enclosure 3 (Aligning RN Makeup to KC Surge Tank) as required.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 15. **Check both train's KC surge tank level - GREATER THAN 3 FT.**

__ **GO TO Step 20.**

NOTE

- The following OAC points may be used to determine level drop in next step. These points are also displayed on the KC system graphic:
  - M1P1317 (1A Train KC surge tank level rate)
  - M1P1318 (1B Train KC surge tank level rate).
- A 0.10 ft/min level drop in one train's surge tank equals approximately 50 GPM leak.

__ 16. **Check sum of both trains' KC surge tank level drops - LESS THAN OR EQUAL TO 0.10 FT/MIN.**

__ **IF level is dropping faster than 0.10 ft/min, THEN GO TO Step 20.**

NOTE The next step allows maintaining current KC system alignment for small leaks that should be within the capacity of normal makeup. Allowing level to drop to 2 ft allows more time for operators to locally align makeup, prior to taking action to isolate KC headers.

17. **Do not continue until at least one of the following occurs:**

__ • KC makeup has been locally opened from RN.

OR

__ • Either train's KC Surge Tank level is less than or equal to 2 ft.

OR

__ • Both KC surge tank levels are stable or going up.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 18. **Check KC surge tank level on both train(s) - STABLE OR GOING UP.**

IF KC surge tank level is still going down in an uncontrolled manner, THEN:

__ a. **IF** level goes below 2 ft, **THEN** ensure Foldout page item 1 is implemented.

__ b. **GO TO** Step 20.

__ 19. **GO TO Step 38.**

20. **Isolate 1A KC Train from 1B KC Train as follows:**

__ a. Check any 1A KC Train pump - RUNNING.

__ a. **GO TO** Step 20.f.

b. Check the following valves - OPEN:

__ b. **GO TO** Step 20.f.

__ • 1KC-3A (Trn A Rx Bldg Non Ess Ret Isol)

__ • 1KC-230A (Trn A Rx Bldg Non Ess Sup Isol).

c. Close the following valves:

__ 1) 1KC-53B (Trn B Aux Bldg Non Ess Sup Isol).

__ 2) 1KC-2B (Trn B Aux Bldg Non Ess Ret Isol).

__ 3) 1KC-228B (Trn B Rx Bldg Non Ess Sup Isol).

__ 4) 1KC-18B (Trn B Rx Bldg Non Ess Ret Isol).

__ d. **WHEN** valves in Step 20.c are closed, **THEN** check 1A KC Surge Tank level - GOING DOWN.

__ d. **IF** 1A KC Surge Tank level stabilizes, **AND** 1B KC Surge tank level continues to go down, **THEN** leak is on 1B Essential header.

__ e. **GO TO** Step 21.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

20. (Continued)

f. Close the following valves:

__ 1) 1KC-50A (Trn A Aux Bldg Non Ess Sup Isol).

__ 2) 1KC-1A (Trn A Aux Bldg Non Ess Ret Isol).

__ 3) 1KC-230A (Trn A Rx Bldg Non Ess Sup Isol).

__ 4) 1KC-3A (Trn A Rx Bldg Non Ess Ret Isol).

__ g. **WHEN** valves in Step 20.f are closed, **THEN** check 1B KC Surge Tank level - GOING DOWN.

__ g. **IF** 1B KC Surge Tank level stabilizes, **AND** 1A KC Surge tank level continues to go down, **THEN** leak is on 1A Essential header.

__ 21. **Check Unit 2 KC Surge Tank level - STABLE.**

IF Unit 2 KC Surge Tank level is going up in an uncontrolled manner, THEN:

a. Have Rad Waste Chemistry check KC alignment for:

__ • NB and WL evaporators

__ • WG system.

b. **IF** KC drain tank pumps are aligned to Unit 2, **THEN**:

__ • Dispatch operator to align drain tank to Unit 1 **PER** OP/1/A/6400/005 (Component Cooling Water System), Enclosure 4.8 (Swapping KC Drain Tank Discharge).

__ • Have Work Control SRO evaluate any KC drain operation in progress or other potential KC drain paths.

1. **KC header isolation criteria:**

   - **IF** KC surge tank level goes below 2 ft due to KC system leak, **THEN** immediately isolate affected train **PER** Enclosure 2 (Isolation of KC Non-essential Headers).

2. **NC pump trip criteria:**

   - **IF** NC pump motor bearing temperature reaches 195°F, **THEN** perform the following:

     a. Trip the reactor.
     b. **WHEN** reactor is tripped, **THEN** trip all NC pumps.
     c. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection), while continuing in this procedure as time and conditions allow.

3. **ND pump trip and flow isolation criteria (Applies if ND aligned for RHR):**

   - **IF** KC cooling lost to either ND train's HX, **AND** NC temperature is greater than 150°F, **THEN** perform the following on train of ND that lost KC flow to its ND HX:

     a. Stop associated ND pump.

     b. **IF** 1A ND HX lost KC flow, **THEN** close:

        - 1ND-33 (A ND Hx Bypass)
        - 1ND-32 (A ND Hx To Letdown Hx).

     c. **IF** 1B ND HX lost KC flow, **THEN** close:

        - 1ND-18 (B ND Hx Bypass)
        - 1ND-17 (B ND Hx To Letdown Hx).

     d. **IF** both ND pumps off **THEN REFER TO** AP/1/A/5500/19 (Loss of ND or ND System Leak).

4. **KC pump trip criteria:**

   - **IF** KC surge tank level goes below .5 ft and valid, **THEN:**

     a. Trip affected pumps.

     b. Isolate affected train **PER** Enclosure 2 (Isolation of KC Non-essential Headers).

5. **VCT high temperature:**

   - **IF** "VCT HI TEMP" alarm (1AD-7, D-1) is received, **THEN REFER TO** Enclosure 6 (VCT High Temperature Actions).

Question 152 AP21004 AP21004
1 Pt

During normal power operations AP/21 (Loss of KC or KC System Leakage) has been entered and the event has progressed to the point the following conditions exist:

- "A" Train KC pumps are running
- YM makeup has been established to the KC surge tanks
- "A" KC Surge tank level is decreasing 0.04 ft/min
- "A" KC Surge Tank level is presently 1.9 ft

Based on these conditions the crews next action should be:

A Do not continue until RN makeup is established

B Trip "A" KC Pumps

C Perform Enclosure 2 to isolate KC headers

D Isolate "A" KC train from "B" KC train per Step 16

Answer 152

C

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	027 AA2.12	
	Importance Rating		3.8

Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: PZR level

Proposed Question: SRO 79

Given the following:

- Unit 1 is operating at 100% power.
- PZR Pressure Control is selected to Position 1-2
- PZR Level control is selected to Position 3-2.
- The common sensing line for PZR Pressure Channel 1 and PZR Level Channel 1 develops a leak.

Which ONE (1) of the following describes the effect on the Unit and the procedure selection required?

A. PZR Heaters will energize; Charging flow will go up. Refer to AP-11, Pressurizer Pressure Anomalies, and AP-12, Loss of Letdown, Charging, or Seal Injection.

B. Pressurizer Spray Valves will open; Letdown will isolate. Refer to Technical Specifications for action applicable to minimum NC Pressure, and AP-12, Loss of Letdown, Charging, or Seal Injection.

C. PZR Heaters will energize; Charging flow will remain stable. Refer to AP-11, Pressurizer Pressure Anomalies, and associated Annunciator Response Procedures.

D. Pressurizer Spray Valves will open; Charging flow will remain stable. Refer to Technical Specifications for action applicable to minimum NC Pressure, and associated Annunciator Response Procedures.

Proposed Answer: C

Explanation (Optional):

C is correct. Heaters energize because indicated pressure will go down. Level will be unaffected because channel 1 is not controlling

A is incorrect. Credible because heater energization will occur, and if the controlling level channel was affected, this would occur.

B is incorrect. Letdown would isolate if the backup channel (CH 2) failed low. Spray valves would open if pressure indicated high. Applicant can arrive at this conclusion by misunderstanding the leak and applying the principle of a level detector reference leg leak since this is a common line (Pressure higher than actual)

D is incorrect. Credible for same reason as C and also charging flow is correct for this choice

Technical Reference(s): PS-IPE, Figure 7.2 (Attach if not previously provided)
AP-11, pg 2

Proposed references to be provided to applicants during examination: None

Learning Objective: PS-IPE Obj 12 (As available)

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

Question History: Last NRC Exam _____

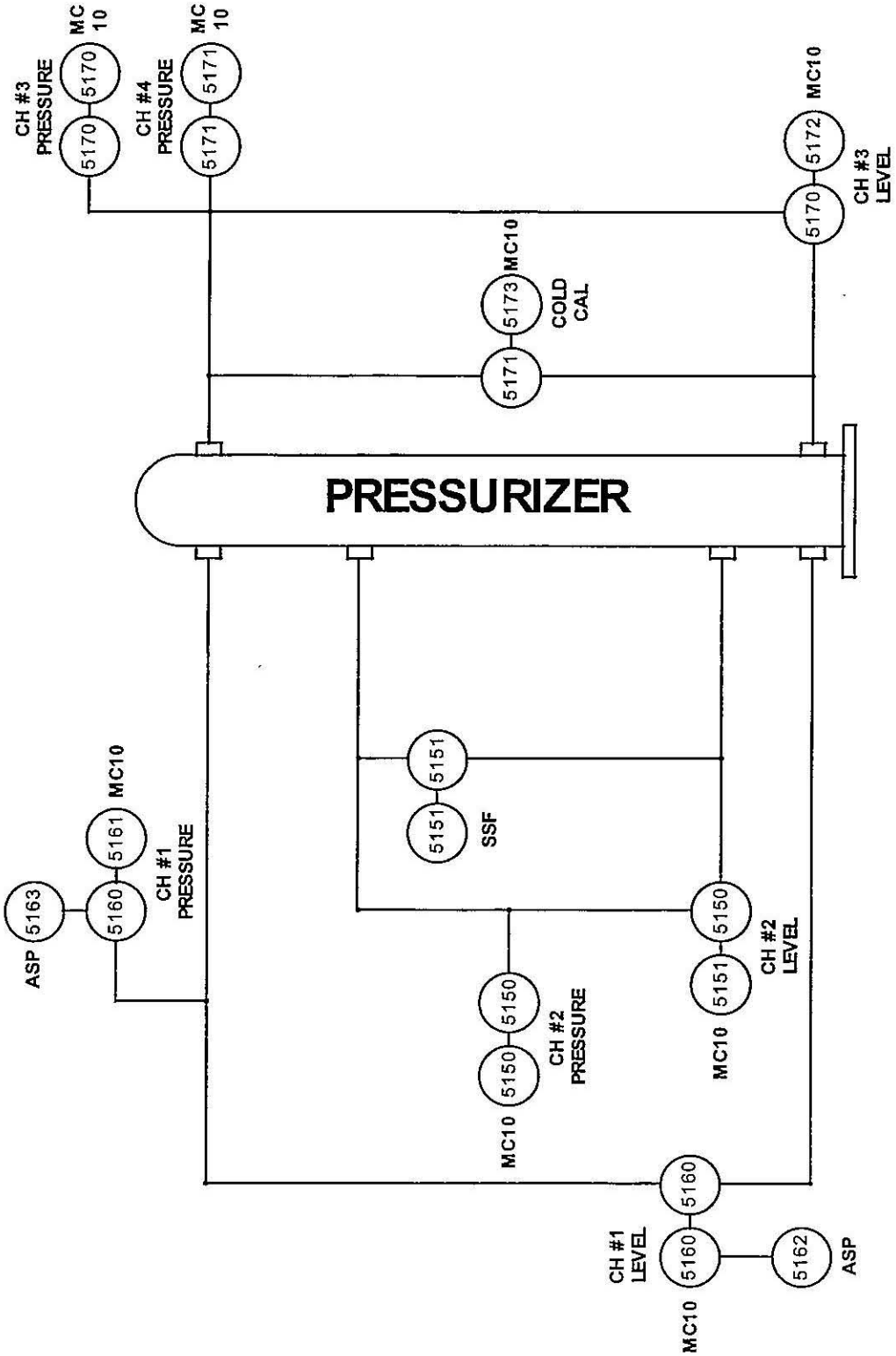
Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

10.	Describe all alarms, control functions, and interlocks generated by pressurizer pressure which are not controlled by the Pressurizer Master Controller (include setpoints).		X	X	X	X
11.	Describe the protection (signals, setpoints, permissives) associated with Pressurizer pressure (logic not required).		X	X	X	X
12.	For any Pressurizer Pressure Control System input signal failure, determine the effect and evaluate operator action to be taken.			X	X	X
13.	Concerning the Technical Specifications related to the Pressurizer Pressure Control System:					
	• Given the LCO title, state the LCO (including any COLR values) and applicability.			X	X	X
	• For any LCO's that have action required within one hour, state the action.			X	X	X
	• Given a set of parameter values or system conditions, determine if any Tech. Spec. LCO's is (are) not met and any action(s) required within one hour.			X	X	X
	• Given a set of parameters or system conditions and the appropriate Tech Spec, determine the required action(s)			X	X	X
	• Discuss the bases for a given Tech. Spec. LCO or Safety Limit *** SRO ONLY**				X	*

7.2 Pressurizer Pressure And Level Control 8/22/95



ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

B. Symptoms

- **Pzr pressure channel failed**
- **Pzr pressure going down in an uncontrolled manner**
- **Pzr pressure going up in an uncontrolled manner**
- **Any Pzr PORV or spray valve failed open**
- **"PZR PORV DISCH HI TEMP" alarm**
- **"PRT HI TEMP" alarm.**

C. Operator Actions

__ (1.) **Check actual Pzr pressure - HAS GONE DOWN.**	__ **GO TO Step 17.**
__ (2.) **Check all Pzr pressure channels - INDICATING THE SAME.**	__ **IF either controlling channel is malfunctioning, THEN place "PZR PRESS CNTRL SELECT" switch to backup channel.**
__ (3.) **Check Pzr PORVs - CLOSED.**	**Perform the following:** __ a. Close PORVs. __ b. **IF** PORV will not close, **THEN** close PORV isolation valve.
__ (4.) **Check Pzr spray valves - CLOSED.**	**Perform the following:** __ a. Close Pzr spray valve(s). __ b. **IF AT ANY TIME** a reactor trip occurs **AND** spray valve still open, **THEN** stop 1A and 1B NC pumps.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	029 G2.1.23	
	Importance Rating		4.0

Conduct of Operations: Ability to perform specific system and integrated plant procedures during all modes of plant operation.

Proposed Question: SRO 80

Given the following conditions:

- An ATWS has occurred on Unit 1.
- The crew is performing FR-S.1, Response to Nuclear Power Generation/ATWS.
- NC Boration is in progress.
- SI has actuated.
- All SG pressures are approximately 800 psig and trending down.
- NC Temperature is approximately 490 degrees F and trending down.
- Reactor Power indicates approximately 10% and trending down slowly.

Which ONE (1) of the following describes the mitigation strategy for the event in progress?

A. Remain in FR-S.1 and attempt to isolate SGs to limit NC Cooldown.

B. Exit FR-S.1; Transition to E-0, Reactor Trip or Safety Injection, and ensure all safeguards equipment is operating as required.

C. Exit FR-S.1; Transition to E-2, Faulted SG Isolation, to attempt to stop the NC Cooldown by isolating the SGs from each other.

D. Exit FR-S.1; Transition to ECA-2.1, Uncontrolled Depressurization of All SGs, to minimize CA flow and isolate any SG.

Proposed Answer: A

Explanation (Optional):
A is correct. FR-S.1 has guidance to isolate a faulted SG
B is incorrect. Would go to E-0 after FR-S.1 is complete and directed by FR-S.1
C is incorrect. Credible because it is the normal transition for a faulted SG
D is incorrect. Credible because indications support the action required in that procedure

Technical Reference(s): FR-S.1, pg 6-8 (Attach if not previously provided)
OMP 4-3, pg 17-18

Proposed references to be provided to applicants during examination: None

Learning Objective: FR-S.1 Obj 2 (As available)

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

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
		.75	.75	.75

OBJECTIVES

SEQ	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	Explain the purpose for each procedure in the FR-S series. EPFRS001			X	X	
2	Discuss the entry and exit guidance for each procedure in the FR-S series. EPFRS002			X	X	
3	Discuss the mitigating strategy (major actions) of each procedure in the FR-S series. EPFRS003			X	X	X
4	Discuss the basis for any note, caution or step for each procedure in the FR-S series. EPFRS004			X	X	X
5	Given the Foldout page, discuss the actions included and the basis for these actions. EPFRS005			X	X	X
6	Describe the immediate actions and include the RNO when appropriate. EPFRS006			X	X	X
7	Given the appropriate procedure, evaluate a given scenario describing accident events and plant conditions to determine any required action and its basis. EPFRS007			X	X	X
8	Discuss the time critical task(s) associated with the FR-S series procedures including the time requirements and the basis for these requirements. EPFRS008			X	X	X

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. **Check reactor subcritical:**

   __ • P/R channels - LESS THAN 5%

   __ • W/R Neutron Flux - LESS THAN 5%

   __ • I/R SUR - NEGATIVE.

   Perform the following:

   a. **WHEN** the following conditions are met, **THEN GO TO** Step 17.

      __ • P/R channels - LESS THAN 5%

      __ • W/R Neutron Flux - LESS THAN 5%

      __ • I/R SUR - NEGATIVE.

   __ b. **GO TO** Step 11.

__ 10. **GO TO Step 17.**

11. **Control S/G levels:**

   __ a. Check N/R level in at least one S/G - GREATER THAN 11% (32% ACC).

   a. Perform the following:

      __ 1) **IF** CA flow is less than 700 GPM, **THEN** start pumps and align valves as required.

      __ 2) Maintain total feed flow greater than 700 GPM until at least one S/G N/R level greater than 11% (32% ACC).

   __ b. Check VI header pressure - GREATER THAN 60 PSIG.

   __ b. **IF** CA flow can not be throttled with CA control valves in subsequent steps, **THEN** control flow **PER** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 16 (CA Flow Control With Loss of VI).

   __ c. Throttle feed flow to maintain S/G N/R level between 11% (32% ACC) and 50%.

12. **Check all dilution paths - ISOLATED:**

   __ a. Place "NC SYS M/U CONTROLLER" to "OFF".

   __ b. Place Reactor Makeup Water pumps to "STOP".

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. **Check steamlines intact:** __ • All S/G pressures - STABLE OR GOING UP __ • All S/Gs - PRESSURIZED.	**IF any S/G depressurized OR pressure going down in an uncontrolled manner, THEN:** a. Ensure the following valves closed: __ • All MSIVs __ • All MSIV bypass valves. __ b. **IF** any S/G depressurized **OR** pressure still going down in an uncontrolled manner, **THEN** isolate any faulted S/G(s) **PER** Enclosure 2 (Faulted S/G Isolation).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 14. **Check NC T-Colds - STABLE OR GOING UP.**	**Stop any cooldown in progress:** a. Control feed flow to non-faulted S/Gs as follows: 1) **IF** S/G N/R level is less than 11% (32% ACC) in all S/Gs, **THEN** throttle feed flow to achieve the following: __ • Minimize cooldown __ • Maintain total feed flow greater than 450 GPM. 2) **WHEN** N/R level is greater than 11% (32% ACC) in at least one S/G, **THEN** throttle feed flow further to: __ • Minimize cooldown __ • Maintain at least one S/G N/R level greater than 11% (32% ACC). __ b. Close steam dumps or SM PORVs as needed to stop cooldown. c. **IF** cooldown continues, **THEN** ensure the following valves closed: __ • All MSIVs __ • All MSIV bypass valves.
__ 15. **Check Core Exit T/Cs - LESS THAN 1200°F.**	__ **IF Core Exit T/Cs greater than 1200°F AND going up, THEN GO TO EG/1/A/MSAM/SACRG1 (Severe Accident Control Room Guideline Initial Response).**

7.15.1 Implementing CSF Path Procedures

7.15.1.1 CSF procedures are **NOT** to be implemented prior to transition from EP/1,2/A/5000/E-0 (Reactor Trip or Safety Injection). **IF** a CSF path is red or orange while the operating crew is in EP/1,2/A/5000/E-0, but has turned to green upon transition from E-0, the CSF procedure which was in alarm shall **NOT** be implemented. **IF** the CSF path is yellow, it shall be handled as any other yellow path procedure per Section 7.15.1.7. **IF** there are any valid red or orange path CSF's on transition from E-0 (unless transition is to EP/1,2/A/5000/ECA-0 (Loss of All AC Power), the associated CSF procedure shall be implemented.

7.15.1.2 **IF** a valid red or orange path flickers into alarm on SPDS but returns to green prior to the crew validating the condition and implementing the procedure (implementation of procedure being that the SRO either hands out fold-out pages or starts reading from the procedure), the CSF procedure shall **NOT** be implemented. **IF** the CSF path is yellow, it shall be handled as any other yellow path procedure per Section 7.15.1.7. Likewise, if a valid red path or orange path goes into alarm during performance of a higher priority CSF procedure, but returns to green prior to transition from the higher priority CSF path procedure to the lower priority CSF procedure, the associated CSF procedure shall **NOT** be implemented.

7.15.1.3 **IF** a CSF procedure directs the operator to return to the procedure and step in effect, **AND** the corresponding status tree continues to display the offnormal conditions, the corresponding CSF procedure does **NOT** have to be implemented again, since all recovery actions have been completed. However, if the same status tree subsequently changes to a valid higher priority condition, **OR** if it changes to lower condition and returns to higher priority condition again, the corresponding CSF procedure shall be implemented as required by its priority.

7.15.1.4 Red Path

IF any valid red path is encountered during monitoring, the operator is required to immediately implement the corresponding EP. Any recovery EP previously in progress shall be discontinued. **IF** during the performance of any red path procedure, a valid red condition of higher priority arises, the higher priority condition should be addressed first, and the lower priority red path procedure suspended.

7.15.1.5 Orange Path

IF any valid orange path is encountered, the operator is expected to scan all of the remaining trees, and then, if no valid red is encountered, promptly implement the corresponding EP. **IF** during the performance of an orange path procedure, any valid red condition or higher priority valid orange condition arises, the red or higher priority orange condition is to be addressed first, and the original orange path procedure suspended.

7.15.1.6 Completion of Red or Orange Path Procedure

Once procedure is entered due to a red or orange condition, that procedure should be performed to completion, unless preempted by some higher priority condition. It is expected that the actions in the procedure will clear the red or orange condition before all the operator actions are complete. However, these procedures should be performed to the point of the defined transition to a specific procedure or to the "procedure and step in effect" to ensure the condition remains clear. At this point any lower priority red or orange paths currently indicating or previously started but **NOT** completed shall be addressed.

FR-S.1, P.1 and Z.1 can be entered from either an orange or red path status. **IF** the color changes from orange to red while you are in one of these EPs, the crew should continue and complete the EP from where they are. Crew does **NOT** have to backup and restart the EP. **IF** the orange path is exited, and it subsequently turns red, the EP must be re-entered at Step 1.

Upon continuation of recovery actions in Optimal Recovery procedure, some judgment may be required by the operator to avoid inadvertent reinstatement of a Red or Orange condition by undoing some critical step in the Function Recovery procedure. The Optimal Recovery procedures are optimal assuming that safety equipment is available. The appearance of a Red or Orange condition in most cases implies that some equipment or function required for safety is **NOT** available, and by implication some adjustment may be required in the Optimal Recovery procedure.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	055 G2.1.20	
	Importance Rating		4.2

Conduct of Operations: Ability to execute procedure steps.

Proposed Question: SRO 81

Given the following conditions:

- A Station Blackout has occurred.
- Unit 1 is performing ECA-0.0, Loss of All AC Power.
- NC Subcooling is -1 degrees F.
- A RED Path exists on the Heat Sink CSF Status Tree.
- 1A D/G has been started and is supplying it's associated bus.
- The crew is preparing to transition to the appropriate recovery procedure.

Which ONE (1) of the following describes the recovery strategy?

A. Transition to FR-H.1 upon exit from ECA-0.0. Perform ECA-0.1, Loss of All AC Power Recovery Without SI Required, when FR-H.1 is complete.

B. Transition to FR-H.1 upon exit from ECA-0.0. Perform ECA-0.2, Loss of All AC Power Recovery with SI Required, when FR-H.1 is complete.

C. Transition to ECA-0.1, Loss of All AC Power Recovery Without SI Required, and enter FR-H.1 when directed by ECA-0.1.

D. Transition to ECA-0.2, Loss of All AC Power Recovery with SI Required, and enter FR-H.1 when directed by ECA-0.2.

Proposed Answer: D

Explanation (Optional):

A and B are incorrect because CSFST are only monitored but not addressed until allowed in appropriate recovery procedure

C is incorrect because subcooling is 0 degrees F, requiring SI

D is correct

Technical Reference(s): ECA-0.2, pg 1-12 (Attach if not previously provided)
ECA-0.0, pg 33

Proposed references to be provided to applicants during examination: None

Learning Objective: ECA-0.2 Obj 2 (As available)

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

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
		1.5	1.5	1.0

OBJECTIVES

SEQ	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	Explain the purpose for each procedure in the ECA-0 series. EPECA001			X	X	
2	Discuss the entry and exit guidance for each procedure in the ECA-0 series. EPECA002			X	X	
3	Discuss the mitigating strategy (major actions) of each procedure in the ECA-0 series. EPECA003			X	X	X
4	Discuss the basis for any note, caution or step for each procedure in the ECA-0 series. EPECA004			X	X	X
5	Describe the immediate actions and include the RNO when appropriate. EPECA005			X	X	X
6	Given the appropriate procedure, evaluate a given scenario describing accident events and plant conditions to determine any required action and its basis. EPECA006			X	X	X
7	Discuss the time critical task(s) associated with the ECA-0 series procedures including the time requirements and the basis for these requirements. EPECA007			X	X	X

A. Purpose

This procedure provides actions to use engineered safeguards systems to recover plant conditions following restoration of AC emergency power.

B. Symptoms or Entry Conditions

This procedure is entered from:

- EP/1/A/5000/ECA-0.0 (Loss Of All AC Power), Step 37, when AC emergency power is restored and S/I is required.
- EP/1/A/5000/ECA-0.1 (Loss Of All AC Power Recovery Without S/I Required), Step 10, EP/1/A/5000/ECA-0.1 (Loss Of All AC Power Recovery Without S/I Required), Step 26 if S/I is required or any time after performing EP/1/A/5000/ECA-0.1 (Loss Of All AC Power Recovery Without S/I Required), Step 16, if S/I is actuated.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **CSF Status trees should be monitored for information only. EPs referenced by them should not be implemented until directed by this procedure.**

__ 2. **Reset S/I.**

__ 3. **Check FWST level - GREATER THAN 180 INCHES.**

__ **GO TO Enclosure 1 (Cold Leg Recirc Alignment) to align S/I systems for Cold Leg Recirc.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. **Align S/I systems for Injection Mode as follows:**

   a. Align NV pumps as follows:

   __ • Open 1NV-221A (NV Pumps Suct From FWST).

   __ • Open 1NV-222B (NV Pumps Suct From FWST).

   __ • Close 1NV-141A (VCT Outlet Isol).

   __ • Close 1NV-142B (VCT Outlet Isol).

   __ • Open 1NI-9A (NC Cold Leg Inj From NV).

   __ • Open 1NI-10B (NC Cold Leg Inj From NV).

   __ • Close 1NV-244A (Charging Line Cont Outside Isol).

   __ • Close 1NV-245B (Charging Line Cont Outside Isol).

   b. Check the following ND valves - OPEN: — __ b. Open valves.

   __ • 1ND-29 (A ND Hx Outlet).

   __ • 1ND-14 (B ND Hx Outlet).

   c. Close the following FW valves:

   __ • 1FW-1A (Refueling Water Loop Isol)

   __ • 1FW-33A (FWST To Recirc Pumps)

   __ • 1FW-32B (Refueling Water Loop Isol)

   __ • 1FW-49B (FWST To Recirc Pumps).

__ 5. **Check Standby Makeup Pump - OFF.** — __ **GO TO Step 7.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Check NC pump thermal barrier KC isolation status as follows:**	
__ a. Check all KC pumps - OFF.	__ a. **GO TO** Step 7.
__ b. 1KC-425A (NC Pumps Ret Hdr Cont Outside Isol) - CLOSED.	b. Perform the following: __ 1) Close 1KC-425A. __ 2) **IF** 1KC-425A cannot be closed, **THEN** close 1KC-424B (NC Pumps Ret Hdr Cont Inside Isol).
__ 7. **Ensure loads placed on essential bus in subsequent steps do not exceed capacity of the power source.**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. **Start KC pumps as follows:**

   • A train:

   __ a. Close 1KC-50A (Trn A Aux Bldg Non Ess Sup Isol).

   __ b. Close 1KC-1A (Trn A Aux Bldg Non Ess Ret Isol).

   __ c. Place 1KC-51A (Train A Recirc Isol) in auto.

   __ d. Start 1A1 KC Pump.

   __ e. Start 1A2 KC Pump.

   __ f. Open 1KC-56A (KC To A ND Hx).

   • B train:

   __ a. Close 1KC-53B (Trn B Aux Bldg Non Ess Sup Isol).

   __ b. Close 1KC-2B (Trn B Aux Bldg Non Ess Ret Isol).

   __ c. Place 1KC-54B (Train B Recirc Isol) in auto.

   __ d. Start 1B1 KC Pump.

   __ e. Start 1B2 KC Pump.

   __ f. Open 1KC-81B (KC To B ND Hx).

__ 9. **Start ND pump.**

__ 10. **Check NI pumps suction - ALIGNED TO FWST.**

Perform the following:

__ a. **WHEN** NC pressure is less than 1600 PSIG, **THEN** start NI pump.

__ b. **GO TO** Step 12.

__ 11. **Start NI pump.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 12. **On OAC graphic for 1ETA bus, check 1ELXC load center breaker to 1EMXG - CLOSED.**	__ **IF 1ETA is energized, THEN dispatch operator to ensure 1ELXC-5C (Normal Breaker to 1EMXG) (1ETA room) is closed.**
__ 13. **On OAC graphic for 1ETB bus, check 1ELXD load center breaker to 2EMXG - CLOSED.**	__ **IF 1ETB is energized, THEN dispatch operator to ensure 1ELXD-5C (Alternate to 2EMXG) (1ETB room) is closed.**
__ 14. **Check VC and VA equipment PER EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 13 (VC and VA System Operation).**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

15. **Check if an NV pump should be started:**

__ a. Check all NV pumps - OFF.

__ a. **GO TO** Step 16.

__ b. Check standby makeup pump - OFF.

__ b. **GO TO** Step 15.d.

NOTE EP/1/A/5000/ECA-0.0 (Loss Of All AC Power), Step 15 may have locally closed NC pump seal supply valves listed in next step.

c. Check NC pump seal supply valves - CLOSED:

__ • 1NV-28 (A NC Pump Seal Water Manual Control) (aux bldg, 733, VCT hallway at reactor bldg wall)

__ • 1NV-44 (B NC Pump Seal Water Manual Control) (aux bldg, 733+2, HH-52, VCT hallway at reactor bldg wall)

__ • 1NV-60 (C NC Pump Seal Water Manual Control) (aux bldg, 733+2, JJ-51, VCT hallway 15 ft southwest of BIT)

__ • 1NV-76 (D NC Pump Seal Water Manual Control) (aux bldg, 716+14, JJ-51, room 603, 4 ft from reactor building wall).

c. **IF** valve(s) open **OR** position not known, **THEN**:

__ 1) Dispatch operator to close valve(s).

__ 2) **WHEN** valves closed, **THEN** start an NV pump.

__ 3) **GO TO** Step 16.

__ d. Start one NV pump.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

16. **Control intact S/G levels:**

a. **IF AT ANY TIME** all intact S/Gs N/R level are less than 11% (32% ACC) **AND** total feed flow is less than 450 GPM, **THEN** start available MD CA pumps as follows:

__ 1) Depress "DEFEAT" on CA pump auto start defeat.

__ 2) Start CA pump(s).

2) Perform the following:

__ a) Dispatch operator to remove and replace control power fuses for CA pump(s).

__ b) Start CA pump(s).

__ b. Check N/R level in all intact S/Gs - GREATER THAN 11% (32% ACC).

b. Perform the following:

__ 1) Maintain total feed flow greater than 450 GPM until at least one intact S/G N/R level greater than 11% (32% ACC).

2) **IF** CA flow greater than 450 GPM can not be established, **THEN:**

__ a) Ensure proper CA valve alignment.

__ b) Start MD CA pumps as required to restore CA flow.

__ c. Throttle feed flow to maintain all intact S/G N/R levels between 11% (32% ACC) and 50%.

__ d. **IF AT ANY TIME** CA Storage Tank (water tower) goes below 1.5 ft, **THEN** perform EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 20 (CA Suction Source Realignment).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

17. **Check Containment Phase A Isolation:**

__ a. Initiate Phase A.

__ b. Check OAC - IN SERVICE.

b. Perform the following on energized train(s):

1) Check ESF Monitor Light Panel:

__ • Ensure group 1 Phase A valves are dark.

NOTE OAC driven summary lights in Group 4 will not work. Only valves with individual windows need to be checked in next step.

__ • Ensure group 4 Phase A valves are lit.

__ 2) Ensure Phase A valves in EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Phase A Valve Checklist) are closed.

__ 3) **IF** valves can not be closed, **THEN** contact station management for guidance on isolating any open penetration.

__ 4) **GO TO** Step 18.

c. Check the following windows on Group 4 of ESF Monitor Light Panel - LIT FOR ENERGIZED TRAIN:

__ • C-3 "CONT ISOL PHASE A TRN A VLVS ALIGNED"

__ • C-6 "CONT ISOL PHASE A TRN B VLVS ALIGNED".

c. Perform the following on energized train(s):

__ 1) Use OAC Monitor Light Program ("MONL") to determine misaligned Phase A valves.

__ 2) Close valves as needed.

__ 3) **IF** valves can not be closed, **THEN** contact station management for guidance on isolating any open penetration.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 18. **Check Containment pressure - HAS REMAINED LESS THAN 3 PSIG.**

__ **GO TO Step 22.**

__ 19. **Ensure Containment Spray reset.**

__ 20. **Dispatch operator to replace control power fuses for NS pump breakers.**

__ 21. **GO TO Step 24.**

22. **Start NS System as follows:**

__ a. Check FWST level - GREATER THAN 33 INCHES.

a. Perform the following:

__ 1) Start NS pumps in Cold Leg Recirc mode **PER** Enclosure 2 (NS System Alignment in Recirc Mode).

__ 2) **GO TO** Step 23.

__ b. Start NS pumps in Injection mode **PER** Enclosure 3 (NS System Alignment in Injection Mode).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

23. **Check Phase B equipment as follows:**

__ a. Ensure all RV pumps are in manual and off.

__ b. Check OAC - IN SERVICE.

b. Perform the following on energized train(s):

__ 1) Ensure Phase B valves in EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 12 (Phase B Valve Checklist) are closed.

__ 2) **IF** valves can not be closed, **THEN** contact station management for guidance on isolating any open penetration.

__ 3) **GO TO** Step 23.d.

c. Check the the following windows on Group 4 of ESF Monitor Light Panel - LIT FOR ENERGIZED TRAIN:

__ • G-4 "CONT ISOL PHASE B TRN A VLVS ALIGNED"

__ • G-5 "CONT ISOL PHASE B TRN B VLVS ALIGNED".

c. Perform the following on energized train(s):

__ 1) Use OAC Monitor Light Program ("MONL") to determine misaligned Phase B valves.

__ 2) Align valves as needed.

__ 3) **IF** valves can not be aligned, **THEN** contact station management for guidance on isolating any open penetration.

__ d. Align ventilation equipment **PER** Enclosure 4 (Phase B HVAC Alignment).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

24. **Secure SSF operation as follows:**

__ a. Check Standby makeup pump - ON.

a. Perform the following:

__ 1) Dispatch operator to perform Steps 2 through 5 of Enclosure 5 (Securing SSF Operation).

__ 2) **GO TO** Step 25.

__ b. **WHEN** NC pump seal injection is established from NV pump 1A or 1B, **THEN** dispatch operator to secure SSF operation **PER** Enclosure 5 (Securing SSF Operation).

__ 25. **Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).**

__ 26. **GO TO EP/1/A/5000/E-1 (Loss Of Reactor Or Secondary Coolant).**

END

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

40. **Select recovery procedure:**

__ a. Check Standby Makeup pump - ON.

__ a. **IF** all NC pump seal cooling is lost, **THEN** notify station management that NC pump seal cooldown will occur as the entire NC system is cooled via natural circ cooldown in subsequent EPs.

__ b. Check NC subcooling based on core exit T/Cs - GREATER THAN 0°F.

b. Perform the following:

__ 1) Align additional RN valves **PER** Enclosure 24 (RN S/I Valves).

__ 2) **GO TO** EP/1/A/5000/ECA-0.2 (Loss Of All AC Power Recovery With S/I Required).

__ c. Check Pzr level - GREATER THAN 11% (29% ACC).

c. Perform the following:

__ 1) Align additional RN valves **PER** Enclosure 24 (RN S/I Valves).

__ 2) **GO TO** EP/1/A/5000/ECA-0.2 (Loss Of All AC Power Recovery With S/I Required).

d. Check the following valves - CLOSED:

__ • 1NI-9A (NC Cold Leg Inj From NV)

__ • 1NI-10B (NC Cold Leg Inj From NV).

d. **IF** any NV pump on, **THEN** perform the following:

__ 1) Align additional RN valves **PER** Enclosure 24 (RN S/I Valves).

__ 2) **GO TO** EP/1/A/5000/ECA-0.2 (Loss Of All AC Power Recovery With S/I Required).

__ e. **GO TO** EP/1/A/5000/ECA-0.1 (Loss Of All AC Power Recovery Without S/I Required).

END

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	005 G2.4.4	
	Importance Rating		4.3

Emergency Procedures / Plan Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.

Proposed Question: SRO 82

Given the following conditions on Unit 2:

- The Unit is stable at 54% power following a load reduction due to Loss of a Bus Line.
- Bank D Step Counters are at 172 steps on Group 1 and Group 2.
- All Bank D rods indicate approximately 170 steps with the exception of M-12, which is at 200 steps, and H-8, which is at 0 steps.
- QPTR is 1.014

Which ONE (1) of the following describes the action required for this condition?

A. Enter AP-14, Rod Control Malfunction, and perform Enclosure 2 for misaligned Control Rods. Verify Shutdown Margin within 1 hour in accordance with Technical Specifications.

B. Enter AP-14, Rod Control Malfunction, and perform Enclosure 1 for dropped Control Rods (misaligned more than 24 steps).

C. Trip the reactor and enter E-0, Reactor Trip or Safety Injection.

D. Initiate a load reduction using AP/1/A/5500/04, Rapid Boration. Load Reduction may be stopped when QPTR is within limits.

Proposed Answer: C

Explanation (Optional):

C correct.

A incorrect. Credible because the condition for this action does exist. Incorrect because there is more than 1 misaligned rod

B incorrect. Credible because the condition does exist for this action. Incorrect because there is a misaligned as well as a dropped rod, requiring different action

D incorrect. Credible because it would be a correct action if QPTR was out of limits. With 2 rods out by > 24 steps, QPTR is changed, but action is to trip

Technical Reference(s): AP/1/A/5500/14, pg 3-7 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: AP-14 Obj 2 (As available)

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

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
		2	2	1

OBJECTIVES

	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	Explain the purpose for AP/14 Rod Control Malfunction). AP14001			X	X	X
2	Analyze the mitigating strategy (major actions) contained in the procedure. AP14002			X	X	X
3	Given scenarios describing accident events and plant conditions, evaluate the basis for any caution, note, or step. AP14003			X	X	X
4	Given scenarios describing accident events and plant conditions, evaluate conditions which require application of continuous action steps. AP14004			X	X	X

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

1. **IF more than one rod dropped, THEN:**

   __ a. Trip reactor.

   __ b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

__ 2. **Place control rods in manual.**

__ 3. **Check rod movement - STOPPED.**

IF rod movement continues, THEN perform the following:

__ a. Trip reactor.

__ b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 4. **Check all rods - ALIGNED WITH ASSOCIATED BANK.**

Perform the following:

__ a. **IF** T-Ave has gone down, **THEN** lower Turbine load as necessary to restore T-Ave to T-Ref.

NOTE

- DRPI problems are not addressed by this AP.
- Any rod withdrawn greater than or equal to 6 steps that falls to the bottom of the core is considered "dropped".
- Any rod misaligned more than 24 steps lower than its associated bank is considered "dropped".

b. **IF** two or more rods are misaligned greater than 24 steps, **THEN:**

__ 1) Trip reactor.

__ 2) **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

c. **IF** any rod is dropped **AND** another rod is misaligned, **THEN**:

__ 1) Trip reactor.

__ 2) **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

__ d. **IF** one rod dropped, **THEN GO TO** Enclosure 1 (Response To A Dropped Rod).

__ e. **IF** rod(s) misaligned, **THEN GO TO** Enclosure 2 (Response To Rod Misalignment).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **Check "ROD CONTROL URGENT FAILURE" alarm (1AD-2, A-10) - DARK.**	__ **GO TO Enclosure 3 (Failure Of Rods To Move On Demand).**
6. **Check the following reactor control instruments - NORMAL:** __ • "1A NC LOOP T-AVG" __ • "1B NC LOOP T-AVG" __ • "1C NC LOOP T-AVG" __ • "1D NC LOOP T-AVG" __ • "TURB IMP PRESS CH 1" __ • T-Ref indication.	**Perform the following:** a. **IF** "NC LOOP T-AVE" channel failed, **THEN**: __ 1) Place "D/T DEFEAT" switch to failed loop. __ 2) Place "T-AVE DEFEAT" switch to failed loop. __ 3) Monitor CF pump speed control response. __ 4) Monitor S/G NR levels. __ 5) **IF AT ANY TIME** CF pump speed control fails to respond properly, **THEN** take manual control of CF pump(s) as necessary to stabilize S/G levels. __ b. **GO TO** Enclosure 4 (Response To Continuous Rod Movement).
__ 7. **Check Nuclear Power P/R Channels - NORMAL.**	__ **GO TO AP/1/A/5500/16 (Malfunction Of Nuclear Instrumentation), Case III (Power Range Malfunction).**
__ 8. **IF this AP entered due to unwarranted rod insertion or withdrawal, THEN GO TO Enclosure 4 (Response To Continuous Rod Movement).**	
__ 9. **IF this AP entered due to a failure of rods to withdraw or insert when required, THEN GO TO Enclosure 3 (Failure Of Rods To Move On Demand).**	

END

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 1. **Announce occurrence on paging system.**

__ 2. **Dispatch rod control system qualified IAE to correct cause of dropped rod.**

__ 3. **Check "ROD CONTROL URGENT FAILURE" alarm (1AD-2, A-10) - DARK.**

Perform the following:

__ a. Do not move control rods while the "ROD CONTROL URGENT FAILURE" alarm is lit, unless instructed by IAE.

__ b. **IF AT ANY TIME** IAE desires to reset "ROD CONTROL URGENT FAILURE" alarm, **THEN** depress the "ROD CONTROL ALARM RESET" pushbutton.

c. **IF AT ANY TIME** while in this procedure a runback occurs **AND** no rods will move, **THEN** perform the following:

__ 1) Trip Reactor.

__ 2) **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

__ 4. **Use OAC point M1P1385 (Reactor Thermal Power, Best Estimate), to determine reactor power in subsequent steps.**

__ 5. **Check AFD (Tech Spec 3.2.3) - WITHIN TECH SPEC LIMITS.**

IF reactor power greater than 50%, THEN:

__ a. Trip reactor.

__ b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 6. **Check QPTR (Tech Spec 3.2.4) - WITHIN TECH SPEC LIMITS.**

Reduce reactor power as required by Tech Specs as follows:

__ a. Do not move rods until IAE determines rod movement is available.

__ b. Borate as required during power reduction to maintain T-Ave at T-Ref.

__ c. Monitor AFD during load reduction.

d. **IF AT ANY TIME** AFD reaches Tech Spec limit **AND** reactor power is greater than 50%, **THEN**:

__ 1) Trip Reactor.

__ 2) **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

e. Reduce load **PER** one of the following procedures:

__ • OP/1/A/6100/003 (Controlling Procedure For Unit Operation), Enclosure 4.2 (Power Reduction)

OR

__ • AP/1/A/5500/04 (Rapid Downpower).

7. **REFER TO Tech Specs:**

__ • Tech Spec 3.1.4 (Rod Group Alignment Limits)

__ • Ensure shutdown margin calculation performed within 1 hour.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	051 AA2.02	
	Importance Rating		4.1

Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: Conditions requiring reactor and/or turbine trip

Proposed Question: SRO 83

Given the following events and conditions on Unit 1:

- 65% RTP
- 1A RC pump is tagged for motor repair
- 1B RC pump motor breaker tripped due to overcurrent 2 minutes ago
- While responding to the 6.9 KV switchgear room an NLO accidentally trips open the 1C RC pump breaker

Which ONE (1) of the following statements describes the correct plant response and sequence of procedure implementation?

A. An automatic turbine trip occurs on 3 of 4 RC pump trip logic. AP/1/A/5500/02 (*Turbine Generator Trip*) and EP/1/A/5000/E-0 (*Reactor Trip or Safety Injection*) will be implemented.

B. C-9 permissive will be lost and the unit will runback due to OTDT. AP/1/A/5500/03 (*Load Rejection*) and AP/1/A/5500/23 (*Loss of Condenser Vacuum*) will be implemented.

C. Condenser vacuum will go down until the turbine trips. AP/1/A/5500/23 *(Loss of Condenser Vacuum)* and EP/1/A/5000/E-0 (*Reactor Trip or Safety Injection*) will be implemented.

D. Condenser vacuum will go down until the turbine trips. AP/1/A/5500/23 *(Loss of Condenser Vacuum)* and AP/1/A/5500/02 (*Turbine Generator Trip*) will be implemented.

Proposed Answer: C

Explanation (Optional):
C is correct. In this event vacuum will decrease until a turbine trip is warranted. This is 20" vacuum by the AOP. Before 20" is reached a turbine trip should occur automatically. The reactor trip if greater than P-8. If the turbine does not trip the reactor will be tripped. In either instance the crew will enter E-0.
A is incorrect. Credible because this would be correct if power was higher
B is incorrect. Credible because C-9 will be lost, but vacuum will go down enough that a trip will be required. Load Reject implies a chance to stabilize the unit
D is incorrect. Correct except for procedure. Would be correct for a trip from power less than P-8

Technical Reference(s): AP/23 Page 2-3 (Attach if not previously provided)
MT-RC pg 47

Proposed references to be provided to applicants during examination: None

Learning Objective: MT-RC Obj 11 (As available)

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

Question History: Last NRC Exam ____

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

10 CFR Part 55 Content: 55.41 ____
55.43 5

Comments:

SEQ	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
10	Discuss the following components, controls and indications associated with the FWPT Condenser RA System: • RA Pump • Collector 1) Inlet Valve 2) Outlet Valve 3) Outlet Flap Handle • DP Manometer • RA Pump START/STOP pushbutton • High DP status light • Lower Screen levers • Upper screen handwheel	X	X			
11	Describe the operation of the RC and RA Systems to increase plant efficiency.	X	X	X	X	X
12	Given a Limit and/or Precaution associated with an operating procedure, discuss its bases and when it applies.	X	X	X	X	X
13	Concerning the Selected Licensee Commitments (SLC) related to Main Condenser Circulating Water System (RC): • For any commitments that have action required within one hour, state the action. • Given a set of parameter values or system conditions, determine if any commitment is (are) not met and any action(s) required within one hour. • Given a set of plant parameters or system conditions and the SLC Manual, determine the required action(s). • Given the SLC Manual, discuss the basis for a given commitment. *** SRO ONLY**			X X X	X X X X	X X X *

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

B. Symptoms

- **Condenser vacuum going down**
- **Hotwell temperature going up**
- **"CONDENSER LO VACUUM (PRETRIP)" alarm**
- **Main generator load going down**
- **Loss of condensate flow**
- **Loss of RC pumps.**

C. Operator Actions

__ 1. **Announce occurrence on page.**

2. **Check if turbine trip required:**

__ • Main condenser vacuum - LESS THAN 20" HG.

Perform the following:

__ a. **IF AT ANY TIME** condenser vacuum goes below 20" Hg **OR** "CONDENSER LO VACUUM TURB TRIP" (1AD-1, A-7) alarms, **THEN GO TO** Step 3.

__ b. **IF AT ANY TIME** "TURB EXH HOOD HI-HI TEMP" (1AD-1, F-8) alarms **AND** condenser vacuum is degraded, **THEN GO TO** Step 3.

__ c. Observe Note prior to Step 5 and **GO TO** Step 5.

__ 3. **Check turbine - TRIPPED.**

Perform the following:

__ a. Trip reactor.

__ b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) while continuing with this AP as time allows.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 4. **Check reactor - TRIPPED.**

Perform the following:

__ a. Trip reactor.

__ b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) while continuing with this AP as time allows.

NOTE Reducing turbine generator load will only help in maintaining vacuum during scenarios involving a reduction in RC cooling.

5. **Perform the following as necessary to assist in maintaining vacuum:**

__ • Reduce turbine generator load.

__ • Start additional RC pumps.

__ • Dispatch operator to start main vacuum pumps **PER** OP/1/B/6300/006 (Main Vacuum and Vacuum Priming), Enclosure 4.7 (ZM Pump Startup).

3.0 SYSTEM OPERATION

3.1 Normal Operation

Objective # 11

Maintaining maximum efficiency from the turbine is dependent on several factors. Some of these factors are:

Let's recall a basic heat transfer equation:

$$Q = M\ C_p\ (T_{out}-T_{in})$$

Where "Q" is the rate at which heat is being removed from the condenser,

"M" is the mass flow rate of water through the condenser,

"C_p" is a coefficient of heat transfer which depends on the type of fluid and its temperature. Basically it is a measure of the fluids capacity to transfer heat.

"T" is the temperature of the fluid at the inlet or outlet of the condenser.

For the purpose of this discussion let's assume only one parameter changes at a time. Anything we can do to increase Q, will net us more work out of the turbine, and therefore increase turbine efficiency.

Flow through the condenser tubes (M)

If flow (M) is increased, then Q increases. The RC pumps are operated as necessary to maintain condenser vacuum. The more pumps running, the more flow and the more heat removed from the condenser.

Inlet water temperature (T_{in})

In late summer, when lake temperature is at its highest level for the year, we operate the LLI Pumps in order to maintain circulating water discharge temperature below the state limit. By decreasing $T_{in} \rightarrow \Delta T\uparrow \rightarrow Q\uparrow$.

ΔT across the condenser

We can see that by increasing the ΔT across the condenser, we increase Q. To maximize the rate of heat transfer across the tube we must keep the tube surfaces as clean as possible. This may require the using more abrasive balls in the RA System.

These are all theoretical concepts and in real life changing one parameter affects another. Ideally we only want to remove the latent heat from the turbine exhaust so that less heat would be required to make it steam again in the steam generators.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	025 A2.04	
	Importance Rating		3.2

Ability to (a) predict the impacts of the following malfunctions or operations on the ice condenser system; correct, control, or mitigate the consequences of those malfunctions or operations: Containment isolation

Proposed Question: SRO 87

Given the following conditions:

- Unit 1 is in Mode 3, during a plant cooldown to Cold Shutdown.
- NC pressure is 1800 psig.
- NC temperature is 475 degrees F.
- Safety Injection Train 'A' **inadvertently** actuates.

Which ONE (1) of the following describes (1) the procedure to be entered; and (2) the action required with regard to the Ice Condenser?

A. (1) E-0, Reactor Trip or Safety Injection
(2) Shut off Glycol Pumps and Floor Cooling Pumps because Phase A isolation has occurred.

B. (1) AP-35, ECCS Actuation During Plant Shutdown
(2) Shut off Glycol Pumps and Floor Cooling Pumps because Phase A isolation has occurred.

C. (1) E-0, Reactor Trip or Safety Injection
(2) Ensure all available NF AHUs are operating to ensure that design basis accident analysis assumptions are met.

D. (1) AP-35, ECCS Actuation During Plant Shutdown
(2) Ensure all available NF AHUs are operating to ensure that design basis accident analysis assumptions are met.

Proposed Answer: B

Explanation (Optional):

B is correct. For inadvertent actuation at <P-11, AP-35 is correct choice.
A is incorrect. Wrong procedure but credible because E-0 would be entered on a valid SI signal. Action is correct.
C is incorrect. Wrong procedure but credible because E-0 would be entered on a valid SI signal. Action is incorrect because NF AHUs would be stopped on an SI signal. Credible because the applicant may assume since the signal is inadvertent, they must remain running
D is incorrect. Procedure is correct but action is not, for same reason as C

Technical Reference(s): AP-35, pg 1, 10, AP-35 Basis, pg 13 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: AP-35 LP, Obj 1, 2 (As available)

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

Question History: Last NRC Exam ____

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

10 CFR Part 55 Content: 55.41 ____
55.43 5

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
		1.5	1.5	1.5

OBJECTIVES

	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	Concerning AP/1(2)/5500/35 (ECCS Actuation During Plant Shutdown): • State the purpose of the AP • Recognize the symptoms that would require implementation of the AP. AP35001			X	X	X
2	Given scenarios describing accident events and plant conditions, evaluate the basis for any caution, note, or step. AP35002			X	X	X

A. Purpose

This procedure covers operator actions for an ECCS actuation from initial plant conditions below P-11 (Safety Injection Block Permissive, less than 1955 psig).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

18. **Maintain stable NC temperature as follows:**

__ • **IF** NC temperature is greater than 200°F, **THEN** maintain KC flow to ND HX(s) greater than 2000 GPM.

__ • Adjust KC or ND flow as necessary to maintain stable NC temperature.

19. **Stop the following:**

__ • FWST Recirc pumps

__ • FWST pump.

20. **Dispatch operator to stop the following NF pumps:**

__ • Glycol pump A

__ • Glycol pump B

__ • Glycol pump C

__ • Floor Cooling pump 1A

__ • Floor Cooling pump 1B.

Given the following:

- Unit 1 is in Mode 6.
- Refueling Operations are in progress.
- The following annunciator is received in the control room:
    - 1 EMF 16, CONTAINMENT REFUELING BRIDGE
- The RO verifies that 1EMF-16 is above the Trip 2 setpoint.
- The Refueling SRO reports that the alarm was received when withdrawing a spent fuel assembly from the core.
- The Assembly was replaced in the core.

Which ONE (1) of the following describes the plant condition, and the action required?

A. A Containment Evacuation alarm was received. Containment Evacuation should be performed and ensure at least 1 train of VC outside air pressure filtration is in service.

B. A Containment Evacuation alarm was received. Verify that Containment Purge automatically stopped; determine whether conditions still exist that require Containment Evacuation, and notify RP.

C. A Containment Evacuation alarm was NOT received unless 1EMF-39 (Containment Gas Rad Monitor) was also in alarm. Notify RP and evacuate Containment if required by RP.

D. A Containment Evacuation alarm was NOT received unless 1EMF-39 (Containment Gas Rad Monitor) was also in alarm. Containment Evacuation should be performed and ensure at least 1 train of VC outside air pressure filtration is in service.

Proposed Answer: A

Explanation (Optional):

A is correct.
B is incorrect. Credible because ENF-16 will initiate a containment evac alarm. Incorrcet because purge is not automatically stopped by EMF-16
C is incorrect. Evac alarm will be received but credible because EMF-39 does initiate the alarm also. Applicant may assume that both EMFs must alarm prior to the containment evacuation alarm
D is incorrect. Credible because actions are correct. Incorrect for same reason as C

Technical Reference(s): EMF-16 ARP (Attach if not previously provided)
WE-EMF Pg 43

Proposed references to be provided to applicants during examination: None

Learning Objective: WE EMF Obj 3 (As available)

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

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41
55.43 5,6

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	060 AA2.05	
	Importance Rating		4.2

Ability to determine and interpret the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: Need for area evacuation; check against existing limits

Proposed Question: SRO 84

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
3	3	3	3	2

OBJECTIVES

SEQ	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	State the purpose of the Process and Area Radiation Monitoring System. WEEMF001	X	X	X	X	
2	List the process monitored by each EMF and why it is monitored. WEEMF002	X	X	X	X	X
3	Describe the automatic actions that occur as a result of a Trip alarm for each of the following EMFs • 1(2) EMF 31 Unit 1(2) Conv. Waste Treatment System • 1(2) EMF 34(L) Unit 1(2) Steam Generator Sample • 1(2) EMF 35(L) Unit 1(2) Unit Vent Part. (low range) • 1(2) EMF 36(L) Unit 1(2) Unit Vent Gas (low range) • 1(2) EMF 37 Unit 1(2) Unit Vent Iodine Monitor • 1(2) EMF 38(L) Unit 1(2) Cont. Part. (low range) • 1(2) EMF 39(L) Unit 1(2) Cont. Gas (low range) • 1(2) EMF 40 Unit 1(2) Cont. Iodine • 0EMF 41 Aux. Bldg Vent. • 1(2) EMF 42 Unit 1(2) Spent Fuel Bldg. Vent. • 1(2) EMF 44(L) Unit 1(2) Cont. Vent. Drain Tank • 1(2) EMF 46A/B Unit 1(2) Component Cooling • 0EMF 47 Boron Recycle Evap. Distillate (cont.)	X	X	X	X	X

{SEQ is the order in which the objective is first covered in the lesson plan)

SEQ	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
	• 0EMF 49(L) Liquid Waste Discharge • 0EMF 50(L) Waste Gas Discharge • 0EMF 52 Interim Radwaste Facility Vent. • 0EMF 53 Contaminated Mat'ls Warehouse Vent. • 0EMF 54A/B TSC Vent. • 2EMF 59 Equipment Staging Building Vent. • 1(2) EMF 36(HH) Unit 1(2) Unit Vent Activity Monitor • 2 EMF3 Unit #2 containment Refueling Bridge • 1EMF 16 Unit #1 containment Refueling Bridge WEEMF003					
4	Describe the sampling capabilities of EMF-38, 39, 40. WEEMF004	X	X	X	X	X
5	Describe the sampling process of 0EMF-41. WEEMF005	X	X	X	X	X
6	Describe the type of detector used in each EMF. WEEMF006	X	X	X	X	
7	Describe the basic flowpath and operation of a Particulate, Iodine, and Gas Detector Assembly. WEEMF007	X	X	X	X	
8	Describe the operation of the Fixed Filter Assemblies for Unit Vent and Containment Atmosphere EMF's. WEEMF008	X	X	X	X	X
9	Describe the indications and controls on the following readout modules • RP-2A • RP-2C • RP-86A WEEMF009			X	X	X

Nomenclature: **1 EMF 16 CONTAINMENT REFUELING BRIDGE** Window: **D1**

Setpoint: Trip2

Origin: Low range Geiger Mueller detector (Trip 2 contacts) 1EMF-16

Probable Cause:
- **IF** refueling in progress, damaged fuel elements
- Radioactive leak or spill in containment
- Loss of Refueling Canal level
- EMF testing
- Loss of power
- EMF failure
- Spurious alarm
- Movement of radioactive materials

NOTE: **IF** Source Range NI channels are blocked, no automatic Containment Evacuation Alarm can occur.

Automatic Action: Containment Evacuation Alarm.

Immediate Action:

1. **IF** an expected alarm (examples: testing, movement of materials), no further action required.

2. **IF** a valid alarm:

   A. Notify RP.

   B. Evacuate containment:

      - Ensure Containment Evacuation Alarm on
      - Refer to MSD 280 (Site Assembly/Accountability and Evacuation/Containment Evacuation).

   C. Ensure at least one train of VC outside air pressure filtration is in service per OP/0/A/6450/011 (Control Area Ventilation/ Chilled Water System) Enclosure 4.4 (Control Room Atmosphere Pressurization During Abnormal Conditions).

   D. Monitor area EMFs.

Continued On Next Page

2.2 Area Monitors Functional Description

2.2.1 Area Radiation Monitors - Low Range

Objective #2

Detectors are situated to monitor the following areas for radiation hazards to personnel.

- **Auxiliary Building Corridors:** **1 EMF 1, 2, 3, 4, 6, 7, 8, 10, 23; 2EMF 9**
- **Sample Rooms:** **1 EMF 5; 2 EMF 1**
- **Control Room:** **1 EMF 12**
- **Hot Machine Shop:** **1 EMF 15**
- **Laboratory (RP Shift Office)** **1 EMF 13**
- **Waste Drumming and Shipping Area:** **1 EMF 11 & 14**
- **Rx Building and Refueling Bridge:** **1 EMF 16 & 17; 2 EMF 3 & 4**
- **Incore Instrumentation Rooms:** **1 EMF 9; 2 EMF 2**
- **New Fuel Buildings:** **1 EMF 20 & 21; 2 EMF 7 & 8**
- **Diesel Generator Rooms:** **1 EMF 28; 2 EMF 14**
- **Technical Support Center:** **EMF 22**
- **QA Radiographic Shooting Vault:** **EMF 29**

Objective #3

No control actions are performed by these channels with the exception of 1EMF 16 and 2EMF 3 (Containment Refueling Bridge). **On a Trip 2 High Radiation Alarm, the respective EMF (1EMF 16 and 2EMF 3) will actuate the Containment Evacuation alarm. This alarm is blocked when both Source Range high flux trips are blocked.**

These channels use a Geiger-Mueller detector. The instrument range is 0.1 to 10^4 mr/hr.

2.2.2 Reactor Coolant Filter Area Monitor

Objective #2

The following EMFs are used to monitor the activity level of the reactor coolant filters:

- **1 EMF 18** **Reactor Coolant Filter 1A**
- **1 EMF 19** **Reactor Coolant Filter 1B**
- **2 EMF 5** **Reactor Coolant Filter 2A**
- **2 EMF 6** **Reactor Coolant Filter 2B**

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	069 G2.1.14	
	Importance Rating		3.3

Conduct of Operations: Knowledge of system status criteria which require the notification of plant personnel.

Proposed Question: SRO 85

Given the following conditions on Unit 1:

- The unit is in Mode 6.
- Refueling has been suspended due to an RCP motor being removed from Containment.
- A report of a ruptured fuel assembly in Containment is received in the control room.
- The control room staff refers to AP-025, Spent Fuel Damage.

Which ONE (1) of the following actions must be taken in accordance with AP-025?

A. Isolate VB and VS Penetrations.

B. Ensure VF has been placed in 'Filter Mode".

C. Notify Maintenance to close the equipment hatch.

D. Notify the Fuel Handling Crew to move the Fuel Transfer Cart to the Containment.

Proposed Answer: C

Explanation (Optional):
C is correct.
A is incorrect. Performed if Containment pressurization is a concern.
B is incorrect. Performed for accident in the Spent Fuel Pool
D is incorrect. Cart would be moved to SFP

Technical Reference(s): AP-25, pg 3-6 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: AP 25 Obj 2 (As available)

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

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 _____
55.43 6

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
		1.0	1.0	1.0

OBJECTIVES

	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	Concerning AP/1(2)/5500/25 (Spent Fuel Damage): • State the purpose of the AP • Recognize the symptoms that would require implementation of the AP. AP25001			X	X	X
2	Given scenarios describing accident events and plant conditions, evaluate the basis for any caution, note, or step. AP25002			X	X	X

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **Check location of spent fuel damage - IN CONTAINMENT.**

__ **GO TO** Step 13.

CAUTION **Damage to the rubber Reactor Vessel Cavity Seal may occur if an assembly is dropped on or near it.**

2. **Evacuate containment as follows:**

a. Announce the following over paging system:

__ 1) Description of event.

__ 2) All personnel evacuate Unit 1 Containment bldg and assemble in hot side of change room.

__ b. Ensure Containment Evacuation alarm has sounded.

__ c. **REFER TO** RP/0/A/5700/011 (Conducting a Site Assembly, Site Evacuation, or Containment Evacuation).

NOTE The following enclosure is time critical and must be completed within 30 minutes of fuel assembly becoming damaged.

__ 3. **Place one Outside Air Pressure Filter train in service PER Enclosure 1 (Control Room Pressurization).**

__ 4. **Remove VP from service PER Enclosure 2 (Securing VP).**

__ 5. **Stop any VQ release in progress.**

__ 6. **Ensure Equipment Hatch closed.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. **Ensure at least one door on each of the following - CLOSED:**

__ • Upper Personnel Airlock

__ • Lower Personnel Airlock.

8. **Isolate Refueling Cavity from Spent Fuel Pool as follows:**

__ a. Notify Fuel Handling Crew to move the fuel transfer cart to the Spent Fuel Pool Building.

b. Dispatch two operators to perform the following:

__ 1) **WHEN** fuel transfer cart is in the Spent Fuel Pool Building, **THEN** close 1KF-122 (Fuel Transfer Tube Block) (spent fuel bldg, 780, PP-51, top of fuel pool at south east corner).

__ 9. **Place Containment Aux Carbon Filter Units in service, PER OP/1/A/6450/015 (Containment Purge System), Enclosure 4.1 (Containment Aux Carbon Filter System Operation).**

__ 10. **Place Refueling Cavity in purification PER OP/1/A/6200/013 (Purification of the Refueling Cavity), Enclosure 4.1 (Purification of Refueling Cavity).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. **IF AT ANY TIME pressurization of containment becomes a concern, THEN:**

    a. Evaluate isolating the following penetrations:

    __ • VS

    __ • VB.

    __ b. Evaluate VQ release.

    __ c. Evaluate placing VP in service.

__ 12. **GO TO Step 23.**

__ 13. **Check location of spent fuel damage - IN SPENT FUEL POOL BUILDING.**

__ **GO TO Step 21.**

14. **Announce the following over paging system:**

    __ • Description of event.

    __ • All personnel evacuate the Unit 1 Spent Fuel Pool bldg and assemble in hot side of change room.

NOTE The following enclosure is time critical and must be completed within 30 minutes of fuel assembly becoming damaged.

__ 15. **Place one Outside Air Pressure Filter train in service PER Enclosure 1 (Control Room Pressurization).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

16. **Isolate Spent Fuel Pool area as follows:**

    __ a. Notify RP.

    __ b. Ensure VF has been placed in filter mode by placing "UNIT 1 VF EXHAUST BYPASS DAMPER CONTROL" to the "CLOSE" position.

    __ c. Have another operator ensure all Unit 1 Spent Fuel Pool bldg doors are closed **PER** Enclosure 3 (Closure of Spent Fuel Building Doors).

__ 17. **Check Refueling Cavity level - GREATER THAN 23 FEET.**

__ **GO TO Step 19.**

18. **WHEN dose rates allow, THEN isolate Spent Fuel Pool from Refueling Cavity as follows:**

    __ a. Notify Fuel Handling Crew to move the fuel transfer cart to the Spent Fuel Pool Building.

    b. Dispatch two operators to perform the following:

    __ 1) **WHEN** fuel transfer cart is in the Spent Fuel Pool Building, **THEN** close 1KF-122 (Fuel Transfer Tube Block) (spent fuel bldg, 780, PP-51, top of fuel pool at south east corner).

__ 19. **IF damaged fuel assembly is located in the Spent Fuel Pool, THEN place KF purification loop in service PER OP/1/A/6200/005 (Spent Fuel Cooling System), Enclosure 4.2 (Spent Fuel Pool Purification Loop Operation).**

__ 20. **GO TO Step 23.**

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	010 A2.03	
	Importance Rating		4.2

Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: PORV failures

Proposed Question: SRO 86

Given the following plant conditions:

- Unit 1 is operating at 100% RTP.
- NC-32, PZR PORV lifts for no apparent cause
- The RO places the PORV Control Switch in CLOSE.
- PZR Pressure continues to go down with **Red and Green** indication for the PORV.
- The RO closes the associated block valve and PZR Pressure stops going down and is now at 2110 psig and increasing slowly.

Which ONE (1) of the following describes the required actions in accordance with Technical Specifications?

A. Close and **maintain** power available to associated block valve within one hour; restore NC System pressure to > 2185 psig within 1 hour.

B. Close and **maintain** power available to associated block valve within one hour; restore NC System pressure to > limits specified in the COLR within 1 hour.

C. Close and **remove** power from the associated block valve within one hour; restore NC System pressure to > 2185 psig within 2 hours.

D. Close and **remove** power from associated block valve within one hour; restore NC System pressure to > limits specified in the COLR within 2 hours.

Proposed Answer: D

Explanation (Optional):

D is correct.

A is incorrect. Power would not be maintained because unable to cycle the leaking PORV. Credible because conditions could exist that would allow power to be maintained, and applicant must interpret indication to make that decision. Pressure is the PORV closure setpoint if there was a failure

B is incorrect. Power would not be maintained because unable to cycle the leaking PORV. Credible because conditions could exist that would allow power to be maintained, and applicant must interpret indication to make that decision

C is incorrect. Credible because action to remove power is correct, and pressure is PORV closure setpoint.

Technical Reference(s): TS 3.4.11 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: PS-NC Obj 24, PS-IPE Obj 13 (As available)

Question Source: Bank # X

Modified Bank # _____ (Note changes or attach parent)

New _____

Question History: Last NRC Exam VC Summer 2006 Retake

Question Cognitive Level: Memory or Fundamental Knowledge _____

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 _____

55.43 2,5

Comments:

10.	Describe all alarms, control functions, and interlocks generated by pressurizer pressure which are not controlled by the Pressurizer Master Controller (include setpoints).		X	X	X	X
11.	Describe the protection (signals, setpoints, permissives) associated with Pressurizer pressure (logic not required).		X	X	X	X
12.	For any Pressurizer Pressure Control System input signal failure, determine the effect and evaluate operator action to be taken.			X	X	X
13.	Concerning the Technical Specifications related to the Pressurizer Pressure Control System:					
	• Given the LCO title, state the LCO (including any COLR values) and applicability.			X	X	X
	• For any LCO's that have action required within one hour, state the action.			X	X	X
	• Given a set of parameter values or system conditions, determine if any Tech. Spec. LCO's is (are) not met and any action(s) required within one hour.			X	X	X
	• Given a set of parameters or system conditions and the appropriate Tech Spec, determine the required action(s)			X	X	X
	• Discuss the bases for a given Tech. Spec. LCO or Safety Limit *** SRO ONLY**				X	*

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 Pressurizer Power Operated Relief Valves (PORVs)

LCO 3.4.11 Each PORV and associated block valve shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each PORV.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more PORVs inoperable and capable of being manually cycled.	A.1 Close and maintain power to associated block valve.	1 hour
B. One or two PORVs inoperable and not capable of being manually cycled.	----------NOTE---------- Required Actions B.1 and B.2 are not applicable to a PORV made inoperable by Required Action C.2. ----------	
	B.1 Close associated block valves.	1 hour
	AND	
	B.2 Remove power from associated block valves.	1 hour
	AND	(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.3 Restore one PORV to OPERABLE status if two PORVs are inoperable.	72 hours
C. One block valve inoperable.	C.1 Place associated PORV switch in closed position and verify PORV closed. AND C.2 Remove power from associated PORV.	1 hour 1 hour
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 4.	6 hours 12 hours
E. Three PORVs inoperable and not capable of being manually cycled.	E.1 Close associated block valves. AND E.2 Remove power from associated block valves. AND E.3 Be in MODE 3. AND E.4 Be in MODE 4.	1 hour 1 hour 6 hours 12 hours

(continued)

ACTIONS (continued)

CONDITION		REQUIRED ACTION		COMPLETION TIME
F.	Two block valves inoperable.	F.1	Place associated PORV switches in closed position and verify PORVs closed.	1 hour
		AND		
		F.2	Restore one block valve to OPERABLE status.	72 hours
G.	Three block valves inoperable.	G.1	Place associated PORV switches in closed position and verify PORVs closed.	1 hour
		AND		
		G.2	Restore one block valve to OPERABLE status.	2 hours
H.	Required Action and associated Completion Time of Condition F or G not met.	H.1	Be in MODE 3.	6 hours
		AND		
		H.2	Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.4.11.1	----------NOTE---------- Not required to be met with block valve closed in accordance with the Required Action of Condition A, B, or E. ---------- Perform a complete cycle of each block valve.	92 days
SR 3.4.11.2	----------NOTE---------- Required to be performed in MODE 3 or MODE 4 when the temperature of all RCS cold legs is > 300°F and the block valve closed. ---------- Perform a complete cycle of each PORV.	18 months
SR 3.4.11.3	Verify the nitrogen supply for each PORV is OPERABLE by: a. Manually transferring motive power from the air supply to the nitrogen supply, b. Isolating and venting the air supply, and c. Operating the PORV through one complete cycle.	18 months

OBJECTIVES

	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
20	Describe how NCS temperature, pressure, flow and Pzr level are measured and indicated.		X	X	X	
21	Describe the operation and indication readout of the following NCS level instrumentation: • Ultrasonic level detection • WR level • NR level • Sightglass		X	X	X	X
22	State the nominal values for NC System pressure, Th, Tc, Tave, Pzr temperature for Hot Zero Power and Hot Full Power.	X	X	X	X	
23	Given a Limit and/or Precaution associated with the NC System, discuss its basis and when it applies.		X	X	X	X
24	Concerning the Technical Specifications related to the NC System: • Given the LCO title, state the LCO (including any COLR values) and applicability. • For any LCO's that have action required within one hour, state the action. • Given a set of parameter values or system conditions, determine if any Tech Spec LCO's is(are) not met and any actions(s) required within one hour. • Given a set of parameter values or system conditions and the appropriate Tech Spec, determine required action(s). • Discuss the bases for a given Tech. Spec. LCO or Safety Limit. * SRO ONLY			X X X X	X X X X X	X X X X *

STEP 20:

PURPOSE:

Stop these NF System pumps that no longer have a flow path.

DISCUSSION:

The flow path for the Glycol Pumps is through the containment isolations (other than a little bypass filter line). With either trains' Phase "A" signal, this flow path will be isolated.

With no cooling glycol flow, there is not point in running the floor cooling pumps. They would expedite the floor heatup by the energy they add.

REFERENCES:

STEP 21:

PURPOSE:

Restore VI to Containment.

DISCUSSION:

Without the need for containment isolation valves being closed, all VI to containment is restored. VI controlled components off the essential and non-essential headers are going to be re-aligned in the following steps, so these headers need to be restored at this time. For efficiency sake, all VI is aligned in this one step. The operator is cued to allow VI header pressure to stabilize after each valve is opened to limit the potential for unintended component operation due to low pressure.

REFERENCES:

STEP 22:

PURPOSE:

Restore NV charging to normal.

DISCUSSION:

ECCS injection has been terminated per earlier steps. At this point, charging is probably just through seal injection. In preparation for establishing letdown and normal inventory control, charging to the loops is established at this point. Charging is established slowly to limit the thermal transient on the regenerative Hx. Controlling charging flowrate is a continuous action, and will need to be adjusted as letdown is placed in service.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	061 G2.1.2	
	Importance Rating		4.0

Conduct of Operations: Knowledge of operator responsibilities during all modes of plant operation.

Proposed Question: SRO 88

Given the following plant conditions:

- The Unit is operating at 50% RTP
- The Turbine Driven CA pump was taken OOS 12 hours ago because of a ruptured casing and discharge piping
- A fire occurred 30 minutes ago which damaged both Motor Driven CA pump motors to the point where neither motor will operate.
- No other plant damage occurred in the fire

Which ONE (1) of the following actions is required?

A. Immediately initiate action to restore one CA train to operable status; power operation may continue with all three CA Pumps Inoperable.

B. Restore at least 2 CA Pumps to service within 1 hour, or be in Hot Standby within the following 6 hours.

C. Restore at least 1 CA Pump to service within 1 hour, or be in Hot Standby within the following 6 hours.

D. Enter the action of TS 3.0.3; be in at least HOT STANDBY within 7 hours from the time it was determined that no CA trains were operable.

Proposed Answer: A

Explanation (Optional):

A is correct.

B is incorrect. 2 pumps not required to avoid a shutdown. Applicant may also confuse pumps versus trains required for CA system

C is incorrect. No shutdown required if no CA pumps available because there would be no source of feed during SD

D is incorrect. 3.0.3 conditions would be met for most systems, but not in this case

Technical Reference(s): CF-CA (Attach if not previously provided)
TS 3.7.5

Proposed references to be provided to applicants during examination: None

Learning Objective: CF-CA-15 (As available)

Question Source: Bank # X(ACFCAR05)
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 _____
55.43 2

Comments:

	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
13	Concerning CA Pump Discharge Check Valve leakage: • Describe how the operator determines if the check valves are leaking. • Describe the significance of leakage through the CA pump Discharge check valves. • Describe the action to be taken if leakage is identified through the CA pump Discharge check valves.	X	X	X	X	X
14	Given a Limit and/or Precaution associated with an operating procedure, discuss its basis and applicability.	X	X	X	X	X
15	Concerning the Technical Specifications related to the CA System;					
	• Given the LCO title, state the LCO (including any COLR values) and applicability.			X	X	X
	• For any LCOs that have action required within one hour, state the action.			X	X	X
	• Given a set of parameter values or system conditions, determine if any Tech Spec LCOs is(are) not met and any action(s) required within one hour.			X	X	X
	• Given a set of plant parameters or system conditions and the appropriate Tech Specs, determine required action(s).			X	X	X
	• Discuss the basis for a given Tech Spec LCO or Safety Limit. * SRO Only				X	*

3.7 PLANT SYSTEMS

3.7.5 Auxiliary Feedwater (AFW) System

LCO 3.7.5 Three AFW trains shall be OPERABLE.

---NOTE---
Only one AFW train, which includes a motor driven pump, is required to be OPERABLE in MODE 4.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 when steam generator is relied upon for heat removal.

ACTIONS

---NOTE---
LCO 3.0.4.b is not applicable when entering MODE 1.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One steam supply to turbine driven AFW pump inoperable.	A.1 Restore steam supply to OPERABLE status.	7 days AND 10 days from discovery of failure to meet the LCO
B. One AFW train inoperable in MODE 1, 2 or 3 for reasons other than Condition A.	B.1 Restore AFW train to OPERABLE status.	72 hours AND 10 days from discovery of failure to meet the LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time for Condition A or B not met. OR Two AFW trains inoperable in MODE 1, 2, or 3.	C.1 Be in MODE 3. AND C.2 Be in MODE 4.	6 hours 12 hours
D. Three AFW trains inoperable in MODE 1, 2, or 3.	D.1 ----------NOTE---------- LCO 3.0.3 and all other LCO Required Actions requiring MODE changes are suspended until one AFW train is restored to OPERABLE status. --- Initiate action to restore one AFW train to OPERABLE status.	 Immediately
E. Required AFW train inoperable in MODE 4.	E.1 Initiate action to restore AFW train to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.7.5.1	----------NOTE---------- Not applicable to automatic valves when THERMAL POWER is ≤ 10% RTP. --- Verify each AFW manual, power operated, and automatic valve in each water flow path, and in both steam supply flow paths to the steam turbine driven pump, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.7.5.2	----------NOTE---------- Not required to be performed for the turbine driven AFW pump until 24 hours after ≥ 900 psig in the steam generator. --- Verify the developed head of each AFW pump at the flow test point is greater than or equal to the required developed head.	In accordance with the Inservice Testing Program
SR 3.7.5.3	----------NOTE---------- Not applicable in MODE 4 when steam generator is relied upon for heat removal. --- Verify each AFW automatic valve that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.7.5.4	----------NOTE---------- 1. Not required to be performed for the turbine driven AFW pump until 24 hours after ≥ 900 psig in the steam generator. 2. Not applicable in MODE 4 when steam generator is relied upon for heat removal. ----------	
	Verify each AFW pump starts automatically on an actual or simulated actuation signal.	18 months

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	073 G2.4.4	
	Importance Rating		4.3

Emergency Procedures / Plan Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.

Proposed Question: SRO 89

Given the following conditions on Unit 1:

- Chemistry had confirmed two leaking fuel rods.
- A large break LOCA occurs.
- E-0 Reactor Trip or Safety Injection is complete.
- ES-1.3 Transfer to Cold Leg Recirc is complete.
- E-1 Loss of Reactor or Secondary Coolant is in progress.
- All Red and Orange Paths have been addressed.
- 1EMF 51A is reading 39R/Hr.
- Pressurizer level is 0%.
- The SRO is currently considering implementing Yellow Path procedures.

Which ONE (1) of the following describes proper procedure implementation?

A. Go to FR-I.3, (Response to Voids in the Reactor Vessel) and exit E-1

B. Stay in E-1 and implement FR-I.3 concurrently

C. Go to FR-Z.3, (Response to High Containment Radiation Level) and exit E-1

D. Stay in E-1 and implement FR-Z.3 concurrently

Proposed Answer: D

Explanation (Optional):

D is correct. FRZ has priority over FRI and yellow conditions are addressed concurrently with ORPs

A is incorrect. Credible because conditions exist for FR-I.3.

B is incorrect. Credible because FR-I.3 would be performed concurrently, but FR-Z.3 has priority

C is incorrect. Credible because the conditions exist to enter FR-Z.3

Technical Reference(s): OMP 4-3, pg 19 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: F-0 LP Obj 2, 3 (As available)

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

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
		2	2	2

OBJECTIVES

SEQ	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	State the purpose of each of the six CSF Status Trees.			X	X	
2	Explain the priority system associated with the CSF status trees.			X	X	X
3	Explain the "Rules of Usage" for Critical Safety Function status trees.			X	X	X
4	Explain the bases for all blocks in the six Status Trees.			X	X	X

7.15.1.7 Yellow Path

A yellow path does **NOT** require immediate operator attention. Frequently, it is indicative of an off-normal and/or temporary condition which will be restored to normal status by actions already in progress. In other cases, the yellow status might provide an early indication of a developing red or orange condition. The operator is allowed to decide whether or **NOT** to implement any yellow path procedure.

Implementation of a yellow path function restoration guideline is based on operator judgment when it is determined that adequate time exists to implement it. In other words, the operator does **NOT** have to implement a yellow path guideline if a judgment has been made that it is inappropriate based on available time or current plant state; and if an event of higher priority is in progress, the operator should attend to the more important matters prior to implementing a yellow path function restoration guideline. In the prioritization scheme in the EPs, the Optimal Recovery procedures (including applicable foldout pages) have priority over the yellow path function restoration procedures. The yellow path procedure can be considered as a supplementary set of actions that were provided to address one parameter being in an off-normal state. The controlling guideline in effect is the Optimal Recovery procedure that the operator is in when he decides that he has enough time to perform the yellow path procedure actions. **While performing the actions of the yellow path, continuous actions or foldout page items of the optimal recovery procedure in effect are still applicable and should be monitored by the operator.** This concurrent procedure usage should **NOT** cause the operator any difficulties since yellow path procedures are only performed when adequate time exists.

For example, if the operator is in ES-1.1 (Safety Injection Termination) and decides to implement FR-H.5 because of low SG level and NC subcooling is lost while in FR-H.5, the operator should terminate FR-H.5 and implement the action of the ES-1.1 foldout page to re-initiate S/I flow.

Given the following conditions:

- A plant cooldown is in progress.
- Current conditions are:
  - NC Pressure – 1400 psig
  - NC Temperature – 440 degrees F
  - Cold Leg Accumulators have **NOT** been isolated

An event occurs:

- NC System pressure starts to go down at approximately 2 psi per minute.
- PZR level is going down at 5% per minute.
- Containment Pressure is rising at 0.1 psig per minute.
- Train "B" Safety Injection actuates.
- Train "A" Safety Injection did NOT actuate.

Which ONE (1) of the following describes (1) the procedure to be entered, and (2) the action that must be taken with regard to the RN system?

A. (1) E-0, Reactor Trip or Safety Injection
(2) Initiate Train A Safety Injection to restore flow to Train A Essential Header and RB Non-Essential Header

B. (1) E-0, Reactor Trip or Safety Injection
(2) Reset SI Sequencers and open RN Cross-Connect valves

C. (1) AP-34, Shutdown LOCA
(2) Initiate Train A Safety Injection to restore flow to Train A Essential Header and RB Non-Essential Header

D. (1) AP-34, Shutdown LOCA
(2) Reset SI Sequencers and open RN Cross-Connect valves

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	076 A2.02	
	Importance Rating		3.1

Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Service water header pressure

Proposed Question: SRO 90

Proposed Answer: A

Explanation (Optional):

A is correct.

B is incorrect. Correct procedure to enter; do not open RN cross connect valves on a valid SI signal, and even if the action was performed, one train would not operate since the sequencer has not actuated

C is incorrect. Credible because the procedure would be entered in Mode 4 if NC pressure was lower. Action to restore RN is correct though

D is incorrect. Wrong procedure as in C above. Also wrong action. If both sequencers were actuated, the action could work, but not performed for valid SI

Technical Reference(s): OMP 4-3, pg 8 (Attach if not previously provided)
E-0 pg 1-4
AP-34, pg 1

Proposed references to be provided to applicants during examination: None

Learning Objective: E-0 Obj 7 (As available)

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

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
N/A	N/A	2.0	2.0	1.0

OBJECTIVES

SEQ	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	Describe the accidents that are diagnosed in E-0 and the diagnostic sequence. EPE0001			X	X	X
2	Explain the purpose for each procedure in the E-0 series. EPE0002			X	X	
3	Discuss the entry and exit guidance for each procedure in the E-0 series. EPE0003			X	X	
4	Discuss the symptoms of a reactor trip and/or safety injection. EPE0004			X	X	
5	Discuss the mitigating strategy (major actions) of each procedure in the E-0 series. EPE0005			X	X	X
6	Discuss the basis for any note, caution or step for each procedure in the E-0 series. EPE0006			X	X	X
7	Describe the immediate actions and include the RNO when appropriate. EPE0007			X	X	X
8	Describe the actions included on the E-0 Foldout page and the basis for these actions. EPE0008			X	X	X
9	Given the Foldout page, other than E-0, discuss the actions included and the basis for these actions. EPE0009			X	X	X

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

A. **Purpose**

Provide actions for protecting the reactor core in the event of a LOCA that occurs during either Mode 3 after the Cold Leg Accumulators are isolated or Mode 4.

A. Purpose

This procedure provides actions to check proper response of the automatic protection systems following manual or automatic actuation of a reactor trip or safety injection, to assess plant conditions, and to identify the appropriate recovery procedure.

B. Symptoms or Entry Conditions

1. **The following are symptoms that require a reactor trip, if one has not occurred:**

   - Any valid alarm on Reactor trip first out panel
   - 1/2 S/R channels - 10^5 CPS (below P6)
   - 1/2 I/R channels - Amps - 25% Power (below P10)
   - 2/4 P/R channels - 25% Power (below P10)
   - 2/4 P/R channels - 109% Power
   - 2/4 P/R channels - +5%/2 seconds
   - 2/4 Pzr Press channels - 2385 PSIG
   - 2/4 Pzr Press channels - 1945 PSIG (above P7)
   - 2/3 Pzr Level channels - 92% (above P7)
   - 2/4 NC Pump buses - 74% of normal voltage (5082 V) (above P7)
   - 2/4 NC Pump buses - 56 Hz (above P7)
   - 2/3 NC flow channels in 2/4 loops - 88% (above P7)
   - 2/3 NC flow channels in 1/4 loops - 88% (above P8)
   - 2/4 Loop Delta Ts - greater than OTDT setpoint (variable)
   - 2/4 Loop Delta Ts - greater than OPDT setpoint (variable)
   - 2/3 Auto -stop oil press channels - 45 PSIG (above P8)
   - 4/4 Turbine Throttle valves - Closed (above P8)
   - 2/4 S/G Level channels in any S/G - Lo-Lo (17%)
   - 1/2 Trains S/I - Actuated
   - 2/2 SSPS Trains - General warning alarm.

2. **The following are symptoms of a reactor trip:**

   - Any reactor trip annunciator - LIT
   - All rod bottom lights - LIT
   - Neutron flux - RAPIDLY GOING DOWN.

3. **The following are symptoms that require a reactor trip and safety injection, if one has not occurred:**

   - 2/4 Pzr pressure channels less than 1845 PSIG
   - 2/3 Containment pressure channels greater than 1 PSIG.

4. **The following are symptoms of a reactor trip and safety injection:**

   - Any S/I annunciator - LIT
   - NV, ND, NI pumps - ON
   - "SAFETY INJECTION ACTUATED" status light (1SI-18)- LIT
   - "LOCA SEQ ACTUATED TRAIN A(B)" status lights (1SI-14) - LIT.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **Monitor Foldout page.**

2. **Check Reactor Trip:**

- __ • All rod bottom lights - LIT
- __ • Reactor trip and bypass breakers - OPEN
- __ • I/R amps - GOING DOWN.

Perform the following:

__ a. Trip reactor.

b. **IF** reactor will not trip, **THEN**:

- __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).
- __ • **GO TO** EP/1/A/5000/FR-S.1 (Response To Nuclear Power Generation/ATWS).

3. **Check Turbine Trip:**

- __ • All throttle valves - CLOSED.

Perform the following:

__ a. Trip turbine.

b. **IF** turbine will not trip, **THEN**:

__ 1) Place turbine in manual.

__ 2) Close governor valves in fast action.

3) **IF** governor valves will not close, **THEN** close:

- __ • All MSIVs
- __ • All MSIV bypass valves.

__ 4. **Check 1ETA and 1ETB - ENERGIZED.**

Perform the following:

__ a. **IF** both busses de-energized, **THEN GO TO** EP/1/A/5000/ECA-0.0 (Loss Of All AC Power).

__ b. **WHEN** time allows, **THEN** try to restore power to de-energized bus **PER** AP/1/A/5500/07 (Loss of Electrical Power) while continuing with this procedure.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

5. **Check if S/I is actuated:**

__ a. "SAFETY INJECTION ACTUATED" status light (1SI-18)- LIT.

a. Perform the following:

1) Check if S/I is required:

__ • Pzr pressure less than 1845 PSIG

OR

__ • Containment pressure greater than 1 PSIG.

__ 2) **IF** S/I is required, **THEN** initiate S/I.

3) **IF** S/I is not required, **THEN**:

__ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).

__ • **GO TO** EP/1/A/5000/ES-0.1 (Reactor Trip Response).

__ b. Both LOCA Sequencer Actuated status lights (1SI-14) - LIT.

__ b. Initiate S/I.

__ 6. **Announce "Unit 1 Safety Injection".**

7.5 Manual Initiation of Safeguards Actions

In most scenarios, ROs and SROs are expected to manually initiate safeguards actions if an automatic action setpoint is being approached, to avoid challenging the automatic safeguards function. An example of this is to manually initiate safety injection if pressure is decreasing in an uncontrolled manner to 1845 psig.

Exceptions to this philosophy are listed below:

- Do **NOT** initiate Phase B/Containment Spray earlier than required. Early initiation of spray has the adverse affect of transferring FWST water to the containment sump and causing earlier transfer to Cold Leg Recirc. (NRC Bulletin 2003-01 response)

- During an ATWS, it is undesirable to initiate S/I in "anticipation" of an S/I signal if the reactor will **NOT** trip, since this will cause a loss of CF flow to the S/Gs. This exception is stated in the APs that manually initiate S/I in "anticipation" of an S/I signal.

The operator is expected to manually initiate any action which should have automatically occurred if the automatic function fails, such as the Safety Injection fails to initiate during an uncontrolled Reactor Coolant depressurization at 1845 psig (even during an ATWS) or an ECCS pump fails to start on a Safety Injection signal.

IF directed to initiate a signal, initiate both trains unless otherwise specified.

7.6 Resetting Safety Systems

IF directed to reset a signal, reset both trains unless otherwise specified.

IF a procedure directs resetting a signal that has **NOT** been received or that has been previously reset, the reset pushbuttons do **NOT** have to be depressed since the intent of the step has been met. Likewise, if a procedure directs the operator to stop, start or reposition a component which is already in the desired position; the component's control switch does **NOT** have to be depressed.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	017 A2.01	
	Importance Rating		3.5

Ability to (a) predict the impacts of the following malfunctions or operation on the ITM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Thermocouple open and short circuits

Proposed Question: SRO 91

Given the following conditions:

- The current date is 3/19/2007.
- At 0600 on 3/11/2007, 1 required channel of Core Exit thermocouples was declared inoperable in quadrant 2.
- At 1130 on 3/14/2007, 1 required channel of Core Exit thermocouples was declared inoperable in quadrant 4.
- At 1200 on 3/17/2007, quadrant 2 was returned to full operability.
- At 1400 on 3/18/2007, 1 additional required channel of Core Exit thermocouples was declared inoperable in quadrant 4.

Using the reference provided, which ONE (1) of the following describes the LATEST time that the unit was required to be in Mode 3?

A. 1730 on 3/14/2007

B. 1730 on 3/21/2007

C. 2000 on 3/18/2007

D. 2000 on 3/25/2007

Proposed Answer: D

Explanation (Optional):

A. Incorrect but credible because the candidate may assume the action is elevated when the first channel in the second quadrant becomes inop.

B. Incorrect. Incorrect but credible because the candidate may assume the action is elevated when the first channel in the second quadrant becomes inop. This distractor adds the 7 day period for more than 1 inop required channel.

C. Incorrect but credible because it represents 30 days of inoperability for 1 quadrant

D. Correct. Cannot meet minimum, 7 days is time. If cannot meet 7 days, Hot Standby in 6 hours

Technical Reference(s): TS 3.3.3 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: TS 3.3.3 and Table 3.3.3-1

Learning Objective: IC-ENB-19 (As available)

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

Question History: Last NRC Exam ____

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

10 CFR Part 55 Content: 55.41 ____
55.43 2

Comments:

12	List the Protection and Control Interlocks (Ps and Cs) associated with the Nuclear Instrumentation System. (Include setpoints and logic)		X	X	X	X
13	State the purpose of the Wide Range Neutron Detection System.		X	X	X	
14	Concerning the Wide Range Neutron Detection System: • Describe the operation. • Describe the indications and controls.		 X X	 X X	 X X	 X
15	State the purpose of the Gamma-Metrics Shutdown Monitor System.		X	X	X	
16	Concerning the Gamma-Metrics Shutdown Monitor System: • Describe the operation. • Describe the alarms, indications and controls.		 X X	 X X	 X X	 X
17	Determine the validity of indicated reactor power using alternate indications of power level.		X	X	X	X
18	Describe the Source Range instrumentation response for voiding in the core and downcomer region.		X	X	X	X
19	Concerning the Technical Specifications related to the Nuclear Instrumentation System; • Given the LCO title, state the LCO (including any COLR values) and applicability. • For any LCO's that have action required within one hour, state the action. • Given a set of parameter values or system conditions, determine if any Tech Spec LCO's is(are) not met and any action(s) required within one hour. • Given a set of plant parameters or system conditions and the appropriate Tech Specs, determine required action(s). • Discuss the basis for a given Tech Spec LCO or Safety Limit. * SRO Only			 X X X X	 X X X X X	 X X X X *

3.3 INSTRUMENTATION

3.3.3 Post Accident Monitoring (PAM) Instrumentation

LCO 3.3.3 The PAM instrumentation for each Function in Table 3.3.3-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each Function.

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	One or more Functions with one or more required channels inoperable.	A.1	Enter the Condition referenced in Table 3.3.3-1 for the channel.	Immediately
B.	One or more Functions with one required channel inoperable.	B.1	Restore required channel to OPERABLE status.	30 days
C.	Required Action and associated Completion Time of Condition B not met.	C.1	Initiate action in accordance with Specification 5.6.7	Immediately
D.	One or more Functions with one required channel inoperable.	D.1	Restore required channel to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION		REQUIRED ACTION		COMPLETION TIME
E.	One or more Functions with two required channels inoperable.	E.1	Restore one channel to OPERABLE status.	7 days
F.	Not Used	F.1	Not Used	Not Used
G.	Required Action and associated Completion Time of Condition D or E not met.	G.1	Be in MODE 3.	6 hours
		AND		
		G.2	Be in MODE 4.	12 hours
H.	Required Action and associated Completion of Condition D not met.	H.1	Initiate action in accordance with Specification 5.6.7.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTE----------
SR 3.3.3.1 and SR 3.3.3.3 apply to each PAM instrumentation Function in Table 3.3.3-1.

	SURVEILLANCE	FREQUENCY
SR 3.3.3.1	Perform CHANNEL CHECK for each required instrumentation channel that is normally energized.	31 days
SR 3.3.3.2	Not Used	Not Used
SR 3.3.3.3	----------NOTE---------- Neutron detectors are excluded from CHANNEL CALIBRATION. --- Perform CHANNEL CALIBRATION.	18 months

Table 3.3.3-1 (page 1 of 1)
Post Accident Monitoring Instrumentation

	FUNCTION	REQUIRED CHANNELS	CONDITIONS
1.	Neutron Flux (Wide Range)	2	B,C,E,G
2.	Reactor Coolant System (RCS) Hot Leg Temperature	2	B,C,E,G
3.	RCS Cold Leg Temperature	2	B,C,E,G
4.	RCS Pressure (Wide Range)	2	B,C,E,G
5.	Reactor Vessel Water Level (Dynamic Head Range)	2	B,C,E,G
6.	Reactor Vessel Water Level (Lower Range)	2	B,C,E,G
7.	Containment Sump Water Level (Wide Range)	2	B,C,E,G
8.	Containment Pressure (Wide Range)	2	B,C,E,G
9.	Containment Atmosphere Radiation (High Range)	1	D,H
10.	Not Used	Not Used	Not Used
11.	Pressurizer Level	2	B,C,E,G
12.	Steam Generator Water Level (Narrow Range)	2 per steam generator	B,C,E,G
13.	Core Exit Temperature - Quadrant 1	2(a)	B,C,E,G
14.	Core Exit Temperature - Quadrant 2	2(a)	B,C,E,G
15.	Core Exit Temperature - Quadrant 3	2(a)	B,C,E,G
16.	Core Exit Temperature - Quadrant 4	2(a)	B,C,E,G
17.	Auxiliary Feedwater Flow	2 per steam generator	B,C,E,G
18.	RCS Subcooling Margin Monitor	2	B,C,E,G
19.	Steam Line Pressure	2 per steam generator	B,C,E,G
20.	Refueling Water Storage Tank Level	2	B,C,E,G
21.	DG Heat Exchanger NSWS Flow(b)	1 per DG	D,G
22.	Containment Spray Heat Exchanger NSWS Flow(b)	1 per train	D,G

(a) A channel consists of two core exit thermocouples (CETs).

(b) Not applicable if the associated outlet valve is set to its flow balance position with power removed or if the associated outlet valve's flow balance position is fully open.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	034 G2.2.22	
	Importance Rating		4.1

Equipment Control Knowledge of limiting conditions for operations and safety limits.

Proposed Question: SRO 92

Which ONE (1) of the following describes the MAXIMUM load allowed over the Spent Fuel Pool and the reason for the limitation in accordance with SLC 16.9.20?

A. (1) 2000 lbs;
(2) place the crane load in a safe condition and suspend movement of loads over the spent fuel pool within 5 minutes;
(3) prevent exceeding 10CFR100 Site Boundary limits in the event of a dropped assembly or cask.

B. (1) 3000 lbs;
(2) Immediately place the crane load in a safe condition and suspend movement of loads over the spent fuel pool;
(3) prevent exceeding 10CFR100 Site Boundary limits in the event of a dropped assembly or cask.

C. (1) 2000 lbs;
(2) Immediately place the crane load in a safe condition and suspend movement of loads over the spent fuel pool;
(3) prevent exceeding 10CFR20 radioactive release to unrestricted area limits in the event of a dropped assembly or cask.

D. (1) 3000 lbs;
(2) place the crane load in a safe condition and suspend movement of loads over the spent fuel pool within 5 minutes;
(3) prevent exceeding 10CFR20 radioactive release to unrestricted area limits in the event of a dropped assembly or cask.

Proposed Answer: B

Explanation (Optional):

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
		1.5	1.5	1.5

OBJECTIVES

	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	Describe the roles and responsibilities of Control Room Operators during Fuel Handling operations.			X	X	X
2	Describe the roles and responsibilities of Fuel Handling SRO's during Fuel Handling operations.				X	X
3	Describe how monitoring of core reactivity is accomplished during Fuel Handling.			X	X	X
4	Deleted					
5	Describe the requirements that must be met before **bypassing** a Fuel Handling Interlock.			X	X	X
6	Concerning AP-25, Spent Fuel Damage; AP-40, Loss of Refueling Canal; and AP-41, Loss of Spent Fuel Cooling or Level: • State the purpose of the AP • Given symptoms, state the AP and Case (if applicable)			X	X	X
7	Concerning the Technical Specifications related to the FC System; • Given the LCO title, state the LCO (including any COLR values) and applicability. • For any LCO's that have action required within one hour, state the action. • Given a set of parameter values or system conditions, determine if any Tech. Spec. is (are) not met and any action(s) required within one hour. • Given a set of plant parameters values or system conditions and the appropriate Tech Specs, determine required action(s). • Discuss the basis for a given Tech. Spec. LCO or Safety Limit. *** SRO only**			X X X	X X X X	X X X *

A. Incorrect. Weight is too low (approximate weight of a fuel assembly) and 5 minutes is not allowed prior to suspension. Correct basis
B. Correct.
C. Incorrect. Incorrect basis and weight. Correct action
D. Incorrect. Incorrect basis and action. Correct weight

Technical Reference(s): SLC 16.9.20 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: NONE

Learning Objective: FH-FC-7 (As available)

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

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 _____
55.43 2

Comments:
10CFR55.43(b) item 2 because the SRO must understand Technical Specification Bases.

16.9 AUXILIARY SYSTEMS

16.9.20 Crane Travel – Spent Fuel Storage Pool Building

COMMITMENT The following requirements shall be met:

a. Loads in excess of 3000 pounds shall be prohibited from travel over fuel assemblies in the storage pool,

b. Spent fuel casks shall be carried along the path outlined in Figure 16.9.20-1 in the fuel pit and fuel pool area, and

c. The requirements of LCO 3.8.2 shall be met whenever loads are moved over the spent fuel storage pool.

----------NOTE----------
Spent fuel pool weir gates may be moved over the stored fuel provided the decay time is ≥ 17.5 days since last being part of a core at power.

APPLICABILITY With fuel assemblies in the storage pool.

REMEDIAL ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	Commitment not met.	A.1	Place the crane load in a safe condition and suspend movement of loads over the spent fuel pool.	Immediately

TESTING REQUIREMENTS

TEST	FREQUENCY
TR 16.9.20.1 Verify weight of each load, other than a fuel assembly and control rod, is < 3000 pounds.	Prior to moving the load over fuel assemblies

NOTE: Cask may move as shown in the east or west directions inside the Cask Pit once the cask has completely cleared the Cask Pit north wall.

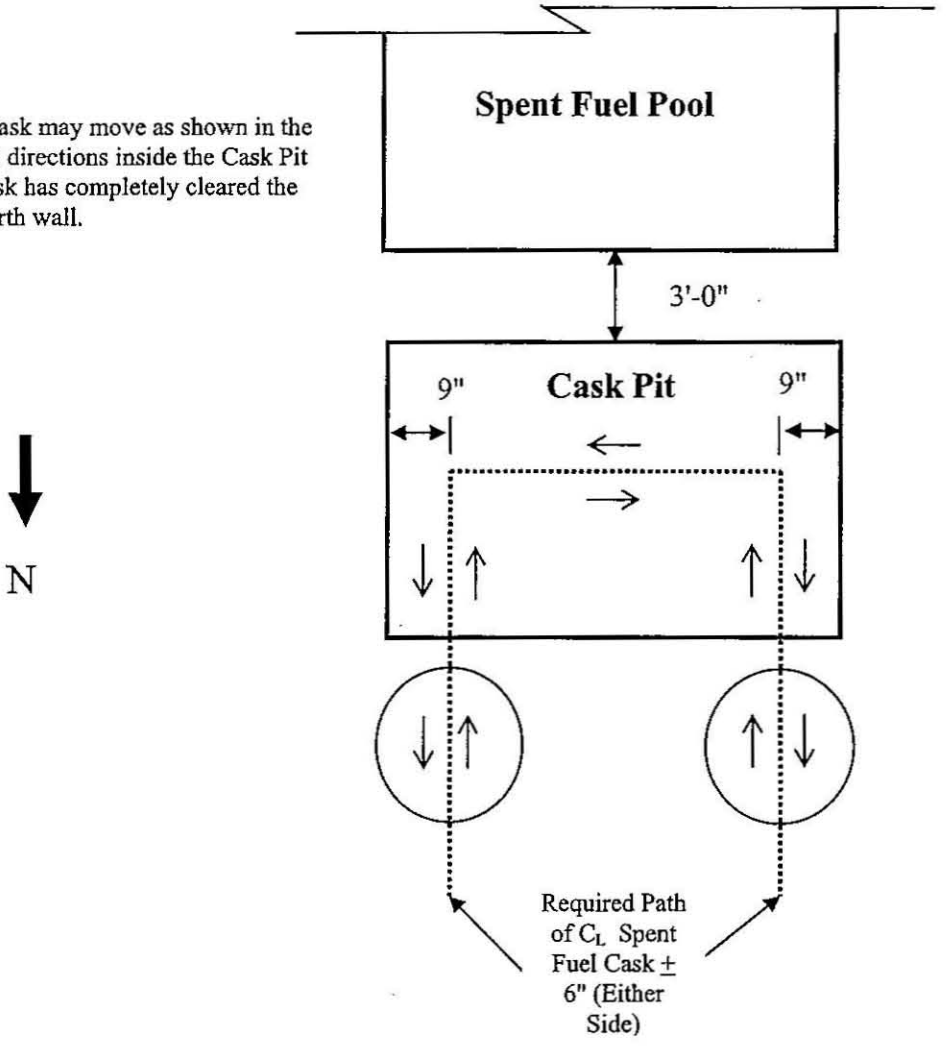


Figure 16.9.20-1

REQUIRED PATH FOR MOVEMENT OF SPENT FUEL CASKS

BASES

The restriction on movement of loads in excess of the nominal weight of a fuel and control rod assembly and associated handling tool over other fuel assemblies in the storage pool ensures that in the event this load is dropped: (1) the activity release will be limited to that contained in a single fuel assembly, and (2) any possible distortion of fuel in the storage racks will not result in a critical array. This assumption is consistent with the activity release assumed in the accident analysis. The requirement for following the load path shown in Figure 16.9.20-1 assumes that the cask can not fall into the spent fuel pool.

REFERENCES

None

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	045 A2.11	
	Importance Rating		2.9

Ability to (a) predict the impacts of the following malfunctions or operation on the MT/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Control problems in primary, e.g., axial flux imbalance; need to reduce load on secondary

Proposed Question: SRO 93

Given the following conditions:

- Unit 1 is at 100% power.
- Axial Flux Difference (AFD) indicates the following:
  - N-41 -18.5
  - N-42 -17.0
  - N-43 -18.5
  - N-44 -17.5

Which ONE (1) of the following describes the status of AFD and the action that will be required?

A. AFD exceeds the limit specified in the COLR. Reduce power to less than 50% within 30 minutes using NCS boration and turbine load reduction in accordance with AP/1/A/5500/04, Rapid Downpower.

B. AFD exceeds the limit specified in the COLR. Restore AFD to within limits in 1 hour or be in Mode 3 within the following 6 hours in accordance with T.S. 3.2.1.

C. AFD is approaching the limit specified in the COLR. Restore AFD to a normal value using NCS boration and turbine load reduction in accordance with AP/1/A/5500/04, Rapid Downpower.

D. AFD is approaching the limit specified in the COLR. Restore AFD to a normal value using manual rod insertion and turbine load reduction in accordance with AP/1/A/5500/04, Rapid Downpower.

Proposed Answer: A

Explanation (Optional):

A is correct. AFD greater than -18 on 2 of 4 NI channels is out of spec. 30 minutes to be less than 50% power.

B is incorrect. Correct effect, but 1 hour is not allowed. Credible because 1 hour restoration is a common TS action

C is incorrect. Credible because the action could be correct if the limit was not being exceeded, and the control systems used are correct.

D is incorrect. Credible because a power reduction could be required if AFD limits were being approached

Technical Reference(s): TS 3.2.3, COLR pg 23 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: CTH-CP-30 (As available)

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

Question History: Last NRC Exam _____

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

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

Comments:

SEQ	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
26	Given a set of plant parameters and/or system conditions, associated with the recovery of a misaligned / dropped rod, determine the appropriate recovery limits. CTHCP026		X	X	X	X
27	Given a set of plant parameters or system conditions, associated with the recovery of a misaligned / dropped rod, discuss the basis for the appropriate recovery limits. CTHCP027		X	X	X	X
28	Discuss the basis for the Fuel Maneuvering Limits. CTHCP028		X	X	X	X
29	Given the Fuel Maneuvering Limits, evaluate a given set of plant conditions and determine the allowable loading / rod withdrawal rates. CTHCP029		X	X	X	X
30	Concerning the Technical Specifications related to Control Bank Insertion Limits, AFD, QPTR, and RCS Pressure, Temperature, and Flow DNB Limits:					
	• Given the LCO title, state the LCO (including any COLR values) and applicability.			X	X	X
	• State the REQUIRED ACTION(s) and COMPLETION TIME for action(s) with completion times of one hour or less.			X	X	X
	• Given a set of parameter values or system conditions, determine if any Technical Specification LCO(s) is (are) not met and any action(s) required within one hour.			X	X	X
	• Given a set of plant parameters or system conditions and the appropriate Technical Specification(s), determine the REQUIRED ACTION(s) and COMPLETION TIME(s).			X	X	X
	• Discuss the bases for a given Technical Specification LCO. CTHCP030			X	X	X

3.2 POWER DISTRIBUTION LIMITS

3.2.3 AXIAL FLUX DIFFERENCE (AFD)

LCO 3.2.3 The AFD in % flux difference units shall be maintained within the limits specified in the COLR.

---NOTE---

The AFD shall be considered outside limits when two or more OPERABLE excore channels indicate AFD to be outside limits.

APPLICABILITY: MODE 1 with THERMAL POWER $\geq$ 50% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. AFD not within limits.	A.1 Reduce THERMAL POWER to < 50% RTP.	30 minutes

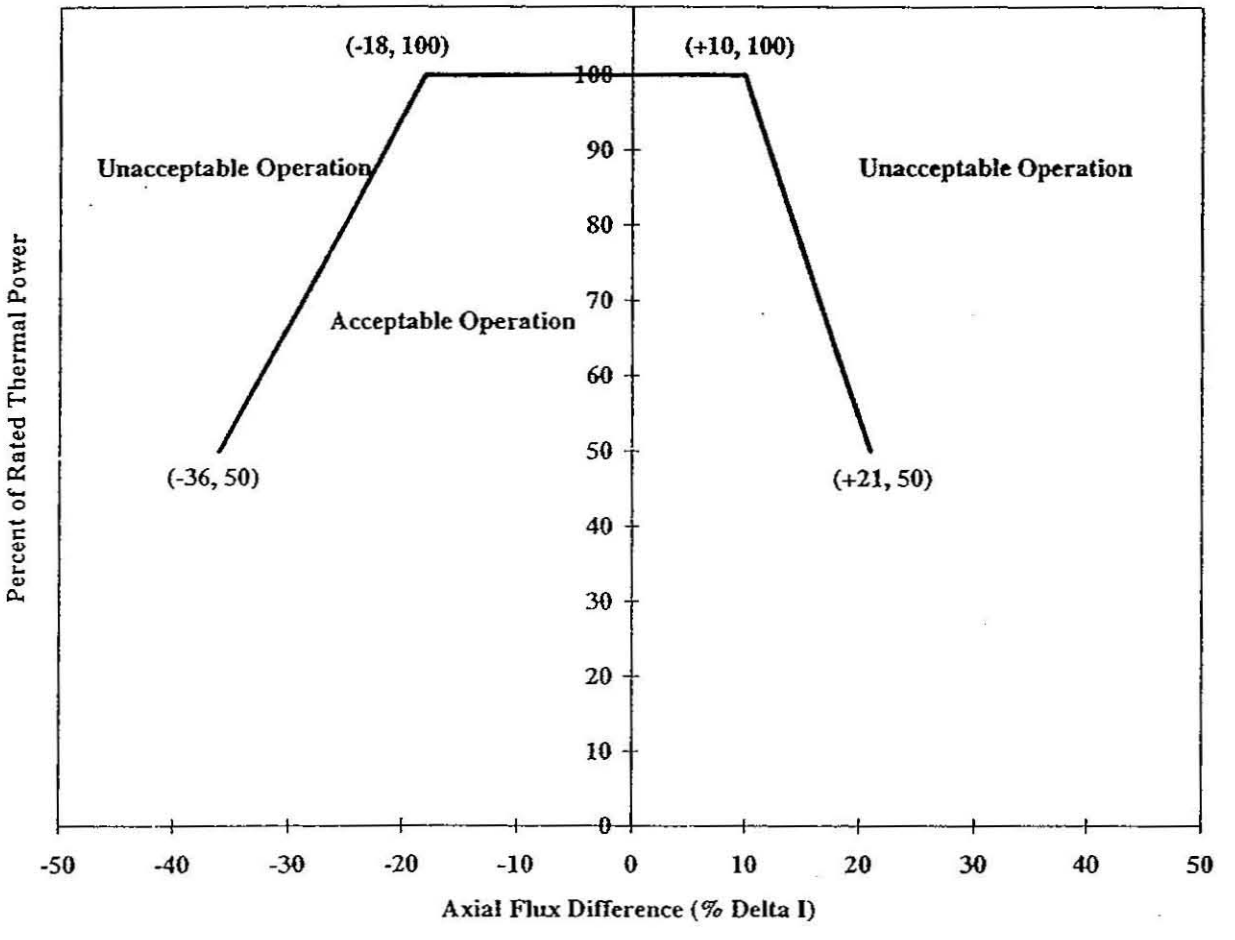
SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.3.1	Verify AFD within limits for each OPERABLE excore channel.	7 days AND Once within 1 hour and every 1 hour thereafter with the AFD monitor alarm inoperable

McGuire 1 Cycle 18 Core Operating Limits Report

Figure 5

Percent of Rated Thermal Power Versus Percent Axial Flux Difference Limits



NOTE: Compliance with Technical Specification 3.2.1 may require more restrictive AFD limits. Refer to OP/1/A/6100/22 Unit 1 Data Book of more details.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		3
	Group #		1
	K/A #	G2.1.4	
	Importance Rating		3.4

Knowledge of shift staffing requirements.

Proposed Question: SRO 94

Given the following:

- Unit 2 is in Mode 1.
- The shift is manned to the minimum composition.
- The shift has 4 hours remaining.
- The RO has become ill and must leave the site for emergency medical treatment.

Which ONE (1) of the following describes the requirements regarding the shift composition and required action in this situation?

A. Responsibilities of the RO may be turned over to the BOP for the remainder of the shift.

B. The RO may NOT leave the site until minimum manning has been maintained by calling in a qualified relief.

C. The RO may leave the site immediately after turnover of responsibilities to another qualified person on shift. A replacement must arrive within 2 hours.

D. The CRS may assume the responsibilities of the RO. The Shift Manager may perform duties of CRSRO and SM concurrently until normal shift relief, as long as a qualified STA is on site.

Proposed Answer: C

Explanation (Optional):

A is incorrect. 4 hours remaining, only 2 hours to get a relief
B is incorrect. The RO may leave for emergencies. Must be replaced in 2 hours
C is Correct.
D is incorrect. At minimum manning, this would still place the crew below the limit for personnel. Only 2 hours allowed, and immediate action required

Technical Reference(s): TS 5.2.2 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: OMP 5-8 Obj 15 (As available)

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

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 _____
55.43 1

Comments:

OBJECTIVES

	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
10.	Concerning OMP 5-2, Maintenance of Operations Logbooks: • Identify examples of logbook entries required by this OMP. • Identify any other logbook that is considered part of the Control Room Unit Logbooks • Discuss logbook review when "Relieving the Watch". • Discuss criteria for editing "Autolog" entries. ADMOMP006				X	X
11.	Concerning OMP 5-3, Technical Specifications Action Items Log: • State the responsibility of the Control Room SRO, other (second) licensed operator, Shift Work Manager, and Shift Operations Manager as it pertains to the Technical Specifications Action Items Log. • Discuss the criteria for Logging Items ADMOMP007			X	X	X
12.	Concerning OMP 5-4, Diesel Generator Logbook: • Discuss the responsibilities of the "OATC" or designee. ADMOMP008	X	X	X	X	X
13.	Concerning OMP 5-5, Surveillance Monitoring: • Discuss the "PHIT". • Discuss the Surveillance Expectations • Discuss the Surveillance Standards ADMOMP009	X	X	X	X	X
14.	Concerning OMP 5-6, RO Turnover. • Describe the procedure for RO Turnover. ADMOMP033			X	X	X
15.	Concerning OMP 5-8, Shift Supervision Turnover. • Describe the turnover process • Given attachments be able to complete attachments. • Describe the Control Room SRO Relief Process and the requirement for listing Minimum Shift Staffing Requirements ADMOMP034				X	X

5.2 Organization (continued)

5.2.2 Unit Staff

The unit staff organization shall include the following:

a. A non-licensed operator shall be assigned to each reactor containing fuel and an additional non-licensed operator shall be assigned for each control room from which a reactor is operating in MODES 1, 2, 3, or 4.

A total of three non-licensed operators are required for the two units.

b. At least one licensed Reactor Operator (RO) shall be present in the control room when fuel is in the reactor. In addition, while the unit is in MODE 1, 2, 3, or 4, at least one licensed Senior Reactor Operator (SRO) shall be present in the control room.

c. Shift crew composition may be less than the minimum requirement of 10 CFR 50.54(m)(2)(i) and 5.2.2.a and 5.2.2.g for a period of time not to exceed 2 hours in order to accommodate unexpected absence of on-duty shift crew members provided immediate action is taken to restore the shift crew composition to within the minimum requirements.

d. A Radiation Protection Technician shall be on site when fuel is in the reactor. The position may be vacant for not more than 2 hours, in order to provide for unexpected absence, provided immediate action is taken to fill the required position.

e. Administrative procedures shall be developed and implemented to limit the working hours of station staff who perform safety related functions (e.g., licensed SROs, licensed ROs, radiation protection technicians, auxiliary operators, and key maintenance personnel).

Adequate shift coverage shall be maintained without routine heavy use of overtime. The objective shall be to have operating personnel work a 12 hour day with alternating 48 hour and 36 hour weeks while the unit is operating. However, in the event that unforeseen problems require substantial amounts of overtime to be used, or during extended periods of shutdown for refueling, major maintenance, or plant modification, on a temporary basis the following guidelines shall be followed:

1. An individual should not be permitted to work more than 16 hours straight, excluding shift turnover time;

(continued)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		3
	Group #		1
	K/A #	G2.1.20	
	Importance Rating		4.2

Ability to execute procedure steps.

Proposed Question: SRO 95

Given the following plant conditions:

- A loss of all feedwater has occurred.
- The crew is performing actions of FR-H.1, Response to Loss of Secondary Heat Sink.
- CA has NOT been restored.
- NCPs have been tripped.
- CF Pumps are NOT available.

  - SG 1A Wide Range Level is 25%
  - SG 1B Wide Range Level is 30%
  - SG 1C Wide Range Level is 28%
  - SG 1D Wide Range Level is 23%
  - All SG Pressures are 1050 psig
  - NC System pressure is 1900 psig and rising slowly
  - NC System Thot is 588°F and rising slowly.
  - NC System Tcold is 550°F and stable

Which ONE (1) of the following describes the strategy for restoring heat sink?

A. Immediately initiate Bleed and Feed based on SG level criteria

B. Depressurize ALL SGs to initiate CM flow

C. Depressurize at least ONE (1) SG to initiate CM flow

D. Immediately initiate Bleed and Feed based on Thot increasing uncontrollably

Proposed Answer: C

Explanation (Optional):
C is correct. Thot is rising as natural circulation sets up. Tcold is near saturation for SG pressure. Depressurize at least 1, but preferably 2 SGs since bleed and feed has not been established. PZR pressure is rising due to the same effects as Thot.
For A and D, must recognize that criteria is not met because of these reasons.
For B, applicant must know that only 1 or 2 SGs is depressurized at a time to attempt to establish heat sink, maintaining the others above bleed and feed criteria

Technical Reference(s): FR-H.1, pg 2-17 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: FR-H.1 Obj 3 (As available)

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

Question History: Last NRC Exam VCS Retake 2006

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

10 CFR Part 55 Content: 55.41 ____
55.43 5

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
		3	3	2.5

OBJECTIVES

SEQ	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	Explain the purpose of each procedure in the FR-H series. EPFRH001			X	X	
2	Discuss the entry and exit guidance for each procedure in the FR-H series. EPFRH002			X	X	
3	Discuss the mitigating strategy (major actions) of each procedure in the FR-H series. EPFRH003			X	X	X
4	Discuss the basis for any note, caution or step for each procedure in the FR-H series. EPFRH004			X	X	X
5	Given the Foldout page, discuss the actions included and the basis for these actions. EPFRH005			X	X	X
6	Given the appropriate procedure, evaluate a given scenario describing accident events and plant conditions to determine any required action and its basis. EPFRH006			X	X	X
7	Discuss the time critical task(s) associated with the FR-H series procedures including the time requirements and the basis for these requirements. EPFRH007			X	X	X

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **IF total feed flow is less than 450 GPM due to operator action, THEN RETURN TO procedure and step in effect.**

CAUTION **If a non-faulted S/G is available, then feed flow should only be established to non-faulted S/G(s) in subsequent steps.**

2. **Check if secondary heat sink is required:**

__ a. NC pressure - GREATER THAN ANY NON-FAULTED S/G PRESSURE.

__ b. Any NC T-Hot - GREATER THAN 350°F (347°F ACC).

__ a. **RETURN TO** procedure and step in effect.

b. Perform the following while continuing in this procedure:

1) Try to place ND in RHR mode:

__ a) Ensure NC pressure is less than 385 PSIG.

__ b) **IF** S/I has occurred, **THEN** place ND in RHR mode **PER** EP/1/A/5000/G-2 (Placing ND In RHR Mode).

__ c) **IF** S/I has not occurred, **THEN** place ND in RHR mode **PER** Enclosure 2 (Placing ND in RHR mode).

__ 2) **WHEN** adequate ND cooling is established, **THEN RETURN TO** procedure and step in effect.

__ 3. **Monitor Foldout Page.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. **Check at least one of the following NV pumps - AVAILABLE:**

   __ • 1A NV pump

   OR

   __ • 1B NV pump.

   RESPONSE NOT OBTAINED: __ **GO TO Step 20.**

5. **Check if NC System feed and bleed should be initiated:**

   __ a. Check W/R level in at least 3 S/Gs - LESS THAN 24% (36% ACC).

   RESPONSE NOT OBTAINED:
   a. Perform the following:
   __ 1) Monitor feed and bleed initiation criteria.
   __ 2) **WHEN** criteria satisfied, **THEN GO TO** Step 20.
   __ 3) **GO TO** Step 6.

   __ b. **GO TO** Step 20.

__ 6. **Ensure S/G BB and NM valves closed PER Enclosure 3 (S/G BB and Sampling Valve Checklist).**

7. **Attempt to establish CA flow to at least one S/G as follows:**

   __ a. Check power to both motor driven CA pumps - AVAILABLE.

   RESPONSE NOT OBTAINED:
   a. Perform the following:
   __ • **IF** essential power is not available, **THEN** restore power to the affected essential bus **PER** AP/1/A/5500/07 (Loss of Electrical Power).
   __ • **IF** the essential bus is energized, **THEN** dispatch operator to determine cause of breaker failure.

   __ b. Ensure control room CA valves aligned **PER** Enclosure 4 (CA Valve Alignment).

   __ c. Start all available CA pumps.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. (Continued)

__ d. Check TD CA pump - RUNNING.

d. Perform the following as necessary:

1) **IF** 1SA-48ABC (SM From S/G C To TD CA Pump Isol) is closed, **THEN** dispatch operator to fail air as follows:

__ a) Close "Pilot Valve Air Supply for 1SA-48ABC" (Unit 1 interior doghouse, 767+6, EE-53).
__ b) Bleed air at associated air regulator.

2) **IF** 1SA-49AB (SM From S/G B to TD CA Pump Isol) is closed, **THEN** dispatch operator to fail air as follows:

__ a) Close "Pilot Valve Air Supply for 1SA-49AB" (Unit 1 interior doghouse, 767+5, EE-53).
__ b) Bleed air at associated air regulator.

__ 3) **IF** "TD CA PUMP STOP VLV NOT OPEN" alarm (1AD-5, F-3) is lit, **THEN** dispatch operator to reset 1SA-3 (Aux FWPT Stop Valve).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. (Continued)

4) **IF** reason for loss of steam supply to TD CA pump not determined, **THEN** dispatch operator to ensure the following valves are open:

__ • 1SA-1 (SM 1C To TD CA Pump Manual Isol) (Unit 1 interior doghouse, 767+10, FF-53, above ladder)

__ • 1SA-2 (SM 1B To TD CA Pump Manual Isol) (Unit 1 interior doghouse, 767+12, FF-53)

__ • 1SA-5 (SM 1C to #1 CA Pump Turb Chk) (Unit 1 interior doghouse, 767+10, EE-53)

__ • 1SA-6 (SM 1B to #1 CA Pump Turb Chk) (Unit 1 interior doghouse, 767+12, DD-53).

__ e. Check total flow to S/G(s) - GREATER THAN 450 GPM.

e. Perform the following:

__ 1) **IF** any CA pump is started, **AND** Step 35 has been implemented, **THEN GO TO** Step 7.h.

__ 2) **IF** no CA pump can be started, **THEN** dispatch operator and maintenance to CA pumps to try to restore one CA pump to service.

__ 3) Dispatch operator to ensure CA valves aligned **PER** Enclosure 5 (Local CA Valve Alignment).

__ 4) **GO TO** Step 8.

__ f. Check feed and bleed - ESTABLISHED PER STEPS 21 through 25.

__ f. **RETURN TO** procedure and step in effect.

__ g. **GO TO** Step 37.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. (Continued)

__ h. Check any S/G W/R level - LESS THAN 12% (17% ACC).

h. Perform the following:

__ 1) Throttle open CA control valves to establish CA flow to S/Gs.

__ 2) **GO TO** Step 37.

NOTE
- It may be preferable to feed 1B or 1C S/G first, to maintain steam supply for TD CA pump
- Selecting S/G with highest level will reduce risk of thermal shock to S/G when reestablishing feed flow.

__ i. Check core exit T/Cs - STABLE OR GOING DOWN.

i. Perform the following:

__ 1) Throttle open CA control valve to one S/G to establish flow rate required to lower core exit T/Cs.

__ 2) **IF** core exit T/Cs continue to go up, **THEN** throttle open CA control valve to feed another S/G as required to lower core exit T/Cs.

__ 3) **GO TO** Step 7.m.

__ j. Slowly throttle open CA control valve to one S/G to establish feed flow less than or equal to 100 GPM.

__ k. Maintain feed flow rate less than or equal to 100 GPM until S/G WR level is greater than 12% (17% ACC).

__ l. **WHEN** S/G W/R level is greater than 12% (17% ACC), **THEN** feed flow may be raised greater than 100 GPM.

__ m. Check S/G W/R levels on intact S/Gs with feed flow isolated - ANY GREATER THAN 12% (17% ACC).

__ m. **GO TO** Step 7.o.

__ n. Slowly establish flow to any available intact S/G with level greater than 12% (17% ACC).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. (Continued)

o. Do not continue until the following are met:

__ • NC T-Hot associated with a S/G being fed - GOING DOWN

__ • Core Exit T/Cs - GOING DOWN.

__ p. Check S/G being fed - INTACT.

p. Perform the following:

__ 1) **IF** S/G being fed is faulted or ruptured, **THEN** establish feedwater to another intact S/G, while observing the flow rate requirements of Steps 7.j through 7.l.

__ 2) **IF** no intact S/G is available to be fed, **THEN** contact station management to evaluate feeding best available S/G.

__ 3) **WHEN** a ruptured or faulted S/G is no longer required for heat sink, **THEN** isolate feed flow to the ruptured or faulted S/G.

__ q. **GO TO** Step 37.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. **Check steam dumps:**

__ a. "STEAM DUMP SELECT" - IN T-AVE MODE.

b. Perform the following to place steam dumps in steam pressure mode:

__ 1) Ensure "STM PRESS CONTROLLER" setpoint at 1092 PSIG (pot setting of 8.4).

__ 2) Place "STM PRESS CONTROLLER" in manual.

__ 3) Adjust "STM PRESS CONTROLLER" output to equal "STEAM DUMP DEMAND" signal.

__ 4) Place "STEAM DUMP SELECT" in steam pressure mode.

__ 5) Place "STM PRESS CONTROLLER" in auto.

__ a. **GO TO** Step 9.

__ 9. **Stop all NC pumps.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. **Reset Feedwater Isolation as follows:**

    a. Check the following alarms - DARK:

    __ • 1AD-5, G-6 (Inner Doghouse Level Hi)

    __ • 1AD-5, H-6 (Outer Doghouse Level Hi).

    a. Perform the following:

    1) Check the position of the following valves:

    __ • 1CF-2 (A CF Pump Discharge)
    __ • 1CF-5 (B CF Pump Discharge).

    __ 2) **IF** both valves are open, **THEN GO TO** Step 10.b.

    __ 3) Dispatch operator to block Feedwater Isolation signal **PER** Enclosure 6 (Feedwater Isolation Override).

    __ 4) Have IAE obtain Key 172 from key locker in the Work Control Center.

    5) Dispatch IAE (with Key 172) to remove the following fuses to defeat high-high doghouse level signal:

    • In 1ATC2A (750, GG-54) (MCEE 145-99.02) (Connection Drawing MC-1717-03.02-03):

    __ • FB 7-8
    __ • FA 7-8.

    • In 1ATC3 (716, GG-54) (MCEE 145-99.02-01) (Connection Drawing MC-1717-04.01-03):

    __ • GE 1-2
    __ • GE 3-4.

    __ 6) Do not continue until fuses removed.

    7) Open the following valves:

    __ • 1CF-2 (A CF Pump Discharge)
    __ • 1CF-5 (B CF Pump Discharge).

    __ 8) **GO TO** Step 10.c.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

__ b. Dispatch operator to block Feedwater Isolation signal **PER** Enclosure 6 (Feedwater Isolation Override).

__ c. Check S/I - HAS BEEN ACTUATED.

c. Perform the following:

__ 1) **IF** any S/G N/R level has exceeded 83% (P-14) during this event, **THEN GO TO** Step 10.f.

__ 2) **GO TO** Step 11.

d. Reset the following:

__ 1) S/I.

1) **IF** any reactor trip breaker is closed, **THEN**:

__ a) Dispatch operator to open Unit 1 reactor trip breakers.

__ b) **WHEN** trip breakers open, **THEN** reset S/I.

__ 2) Sequencers.

2) Dispatch operator to open breaker for affected sequencer DC control power:

__ • A Train - 1EVDA Breaker 6

__ • B Train - 1EVDD Breaker 8.

__ e. **IF AT ANY TIME** a B/O signal occurs, **THEN** restart S/I equipment previously on.

__ f. Do not continue until Enclosure 6 (Feedwater Isolation Override) is completed.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. **Check CM System in service:**

    __ • Hotwell pump(s) - ON

    __ • Condensate Booster pump(s) - ON.

    Perform the following:

    __ a. **IF** CM System is not available to be placed in service, **THEN GO TO** Step 19.

    NOTE Hotwell and Condensate Booster pump will be started in operating procedure. Once these pumps are on, this EP provides steps to start available CF pump(s).

    __ b. Place CM System in service **PER** OP/1/A/6250/001 (Condensate And Feedwater System), Enclosure 4.2 (CM System Hot Restart).

    __ c. Do not continue until condensate booster pump is on.

__ 12. **Check CF pumps - AT LEAST ONE AVAILABLE TO START.**

__ **IF both CF pumps are known to be incapable of starting, THEN GO TO Step 15.**

NOTE If it appears that CF pump might not be restored prior to reaching feed and bleed criteria, it may be preferable to hand off Enclosure 7 (Reestablishing CF Flow) to another SRO and/or RO while continuing with subsequent steps.

__ 13. **Establish CF flow PER Enclosure 7 (Reestablishing CF Flow).**

__ **GO TO Step 15.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

14. **Check S/G levels:**

__ a. N/R level in at least one S/G - GREATER THAN 11% (32% ACC).

a. Perform the following:

__ 1) **IF** feed flow to at least one S/G is indicated, **THEN** maintain flow to restore N/R level to between 11% (32% ACC) and 50%.

__ 2) **IF** feed flow not indicated, **THEN GO TO** Step 15.

__ b. Check feed and bleed - ESTABLISHED PER STEPS 21 through 25.

__ b. **RETURN TO** procedure and step in effect.

__ c. **GO TO** Step 37.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

15. **Depressurize Pzr to less than 1905 PSIG as follows:**

__ a. Check Pzr pressure - GREATER THAN 1905 PSIG.

__ a. **GO TO** Step 16.

__ b. Ensure Pzr pressure is maintained above 1845 PSIG until Pzr S/I signal is blocked in Step 16.

__ c. Check normal letdown - IN SERVICE.

c. Perform the following:

__ 1) Depressurize using one Pzr PORV to less than 1905 PSIG.

2) **IF** PORV will not operate, **THEN**:

a) Align N_2 to all PORVs by opening:

__ • 1NI-430A (Emerg N2 From CLA To 1NC-34A)

__ • 1NI-431B (Emerg N2 From CLA To 1NC-32B & 36B).

__ b) Depressurize using one Pzr PORV to less than 1905 PSIG.

3) **IF** Pzr PORV available, **THEN**:

__ a) Maintain Pzr pressure less than 1905 PSIG.

__ b) **GO TO** Step 16.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

15. (Continued)

d. Depressurize Pzr to less than 1905 PSIG using NV aux spray as follows:

1) Close Pzr spray valves:

__ • 1NC-27 (A Loop PZR Spray Control)

__ • 1NC-29 (B Loop PZR Spray Control).

__ 2) Open 1NV-21A (NV Spray To PZR Isol).

3) Close:

__ • 1NV-13B (NV Supply To A NC Loop Isol)

__ • 1NV-16A (NV Supply To D NC Loop Isol).

__ 4) Turn off Pzr heaters.

__ 5) Raise charging flow up to 200 GPM to raise depressurization rate.

__ d. Depressurize Pzr to less than 1905 PSIG using one Pzr PORV.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

16. **Block Pzr S/I actuation circuit and Low Pressure Steamline Isolation as follows:**

__ a. Check "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) - LIT.

__ a. Do not continue until "P-11 PZR S/I BLOCK PERMISSIVE" status light is lit.

__ b. Depress "BLOCK" on Pzr S/I block switches.

__ c. Depress "BLOCK" on Low Pressure Steamline Isolation block switches.

__ d. **IF AT ANY TIME** conditions degrade, **THEN** manual S/I actuation may be required.

CAUTION

- **Failure to monitor Pzr pressure and maintain pressure below P-11 may result in an S/I, main steamline isolation and subsequent loss of feed flow. An operator must monitor Pzr pressure even after leaving this EP.**
- **If NV aux spray is aligned, then failure to secure aux spray when less than or equal to 1800 PSIG per enclosure used in next step will cause excessive depressurization.**

__ e. Designate operator to continuously monitor and control Pzr pressure **PER** Enclosure 8 (Maintaining Pzr pressure below P-11).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Maintaining steam pressure negative rate less than 2 PSIG per second will prevent a Main Steam Isolation.

17. **Attempt to establish feed flow from CM System as follows:**

__ a. Check hotwell pumps - AT LEAST 2 PUMPS ON.	__ a. Start second hotwell pump.
__ b. Check condensate booster pumps - AT LEAST 2 PUMPS ON.	__ b. Start second condensate booster pump.
__ c. Check "CF HEADER PRESSURE" - GREATER THAN 500 PSIG.	__ c. Ensure S/G(s) to be fed are depressurized below "CF HEADER PRESSURE" in next steps.

NOTE
- If feed and bleed has not yet been initiated, it is preferable to depressurize 2 S/Gs in the next step in order to:
  - Leave 2 S/G levels above Feed and Bleed criteria
  - Minimize NC System cooldown.
- If feed and bleed has been initiated, it is preferable to depressurize just 1 S/G in next step.

__ d. Depressurize at least one S/G to less than 500 PSIG in following steps.

__ e. Close MSIV on S/Gs not to be depressurized.

f. Check condenser available:

__ • "C-9 COND AVAILABLE FOR STEAM DUMP" status light (1SI-18) - LIT

__ • MSIV on S/G(s) to be depressurized - OPEN.

__ f. **GO TO** RNO for Step 17.j.

__ g. Place "STM PRESS CONTROLLER" in manual.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	2	
	K/A #	G2.2.11	
	Importance Rating	3.4	

Knowledge of the process for controlling temporary changes.

Proposed Question: SRO 96

A Temporary Modification is being installed on the CF System.

The modification requires Red-Marking of drawings by the CRSRO.

Which ONE (1) of the following describes where the red-marked drawings must be identified?

A. Control Room drawings ONLY.

B. Control Room drawings and Tag-Out office ONLY.

C. Control Room and Work Control Center drawings ONLY.

D. Control Room, Work Control Center, and Tag-Out Office drawings.

Proposed Answer: D

Explanation (Optional):
D is correct. Refer to OMP 10-2
A is incorrect. Credible because it is included
B is incorrect. Credible because both areas are included
C is incorrect. Credible because both areas are included

Technical Reference(s): OMP 10-2, pg 4 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: NONE (As available)

Question Source:	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	X	
Question History:	Last NRC Exam		
Question Cognitive Level:	Memory or Fundamental Knowledge	X	
	Comprehension or Analysis		
10 CFR Part 55 Content:	55.41		
	55.43	3	

Comments:

6. Temporary Modifications

The tracking and control of Temporary Modifications (TMs) [can also be Design Changes (MD) or Equivalent Changes (ME)] is described in the McGuire Station Modification Manual. IP/0/A/3090/030 (Installing and Removing Temporary Modifications) is a procedure that ensures the TM is administered consistently and receives the appropriate reviews and approvals. This section discusses OPS responsibilities with regards to processing TMs.

6.1 An SRO on the OPS staff, or an on-shift SRO, will normally perform the Operational Control Group Review required by IP/0/A/3090/030. This review involves making a determination of Tech Spec operability, training needs, turnover requirements, and procedure changes necessitated by the TM.

6.1.1 The TM Accountable Engineer shall ensure that any flow diagrams, electrical one line drawings, or boundary interface drawings significantly affected by the installation of the temp mod are notated to refer the operators to the appropriate TM package located at the SSA desk. An example of this notation would be: "This drawing affected by Temp Mod # _____. Refer to the TM package at the SSA desk for details". This notation shall be made in red ink on the affected drawings in the Control Room, the Tagout Office, and the WCC. Normally, flow diagrams and electrical one-line drawings shall be red-marked to reflect the temporary modification by the Engineer who is controlling the Temp Mod. On duty SROs may perform the red-mark if desired. **IF** Control Room drawings are red-marked, the affected drawings in the Tagout Office and the WCC (including Boundary Interface drawings) must be marked in a similar fashion.

6.1.2 Training requirements will be administered per OMP 10-1 (Operations Modification Implementation Process).

6.1.3 Procedure changes will be written per established OPS practices. The OPS Procedure Group will provide any necessary assistance. Procedures modified due to the TM will be listed in IP/0/A/3090/030, Section 1.

6.1.4 The SRO performing Operational Control Group review will evaluate the Temp Mod against criteria for Operationally Significant Temp Mods listed in Attachment 8.1. **IF** the Temp Mod is determined to be Operationally Significant, they shall add Temp Mod information in the appropriate turnover documentation. For RO and SRO turnover, add information to "SRO Turnover" document. For NLO turnover, Temp Mod information will be added to the rounds sheet information.

6.2 After the TM is installed and appropriate retest/functional verifications are performed, the Control Room SRO signs IP/0/A/3090/030 acknowledging TM installation. At this time a copy of IP/0/A/3090/030 and "Temporary Modification" package is given to the SSA for filing in the TM Notebook. TM package and associated IP/0/A/3090/030 will be filed sequentially by "Temporary Modification" number.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	3	
	K/A #	G2.3.3	
	Importance Rating	2.9	

Knowledge of SRO responsibilities for auxiliary systems that are outside the control room (e.g., waste disposal and handling systems).

Proposed Question: SRO 97

Given the following:

- A release of WGDT "A" is in progress.
- 1EMF-36 L is **OPERABLE**.
- Trip 2 is received on 0EMF-50 (Waste Gas Discharge)
- The release is secured.
- Radwaste completes a purge of 0EMF-50 and reports that the release may be re-initiated.

Which ONE (1) of the following describes the requirements associated with the release?

A. The CRSRO may authorize only ONE (1) restart of this release without re-sampling.

B. The CRSRO may authorize up to TWO (2) restarts of this release without re-sampling.

C. 0EMF50 may be jumpered; the release may be restarted as long as grab samples are taken once per 4 hours during the release.

D. The release must be terminated. A new GWR permit must be generated after resampling WGDT "A".

Proposed Answer: B

Explanation (Optional):
B correct.
A incorrect but plausible because restart is allowed.
C incorrect because conditions do not exist that require jumpering the EMF (Only for failure)
D is incorrect but would be the correct answer if EMF 36 was NOT operable

Technical Reference(s): OP-MC-WE-RGR, 9, 1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: Obj 5 (As available)

Question Source: Bank #
Modified Bank # 1058 (Note changes or attach parent)
New

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41
55.43 4

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
N/A	N/A	2.0	2.0	2.0

OBJECTIVES

	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	State the purpose of the Radiological Gaseous Releases.			X	X	X
2	Given a completed GWR, state the recommended release rate.			X	X	X
3	State what responsibility the Control Room SRO is accepting when he signs to authorize a release.			X	X	X
4	Given a completed GWR, state the proper EMF to be used for the release.			X	X	X
5	Evaluate plant parameters to determine any abnormal system conditions that may exist			X	X	X
6	Concerning the Selected Licensee Commitments (SLC) related to Gaseous Waste Releases;					
	• Given the SLC Manual, discuss any commitments and their applicability.			X	X	X
	• For any commitments that have action required within one hour, state the action.			X	X	X
	• Given a set of parameter values or system conditions, determine if any commitment is (are) not met and any action(s) required within one hour.			X	X	X
	• Given the SLC Manual, discuss the basis for a given commitment.				X	*
	*** SRO only**					

1.0 INTRODUCTION

Objective #1

Releases of radioactive gases to the environment are necessary and occur routinely at nuclear power facilities. The Waste Gas (WG) system is used to make these releases. These releases need to be conducted within regulatory requirements and activity levels released should be "as low as reasonably achievable".

In addition, containment gas, which contains low concentrations of radioisotopes, is released to the environment via the VQ and VP systems. In all cases, controlled gas releases are documented using GWRs (Gaseous Waste Release).

This lesson deals with the Selected Licensee Commitments (SLC) and GWR's associated with these releases.

2.0 GASEOUS RELEASES

The three types of releases discussed in the section are:

- Waste Gas Decay Tank (WG)
- Containment Air Release (VQ)
- Containment Purge (VP)

2.1. Waste Gas Decay Tank Release

2.1.1. Limits and Precautions

Waste Gas Decay Tank (WGDT) to be released must be from an out-of-service bank.

Neither Shutdown (S/D) Tank can be in service when making a release, due to the release flowpath which must be used.

For the release of a S/D Tank, it must first be transferred to a WGDT (A, B, C, D, E, F) per OP/0/A/6200/18 (Waste Gas Operation). The release can then be made following this procedure.

The Unit 1 Auxiliary Building Ventilation System or Unit 1 Fuel Building Ventilation System should be in service during a release to ensure that the gas leaves the unit vent completely.

No release will be made without proper verification of flow rate. 0WGLP6140 (WG Disch Flow Loop) is the normal instrument for verifying flow. If inoperable, flow can be monitored using the decay tank pressure (for the tank being released) vs. release time.

Bulk hydrogen or nitrogen **cannot** be added to the waste gas system while releasing a tank.

Based on mutual agreement between MNS Radiation Protection Manager, General Office Protection Manager, and MNS Radwaste, **if EMF-36 and EMF-50 are operable, three release attempts are allowed. If EMF-36 or EMF-50 are inoperable only one release attempt is allowed. WGDT must be resampled if allowed number of release attempts are unsuccessful.**

If EMF-36 and EMF-50 are inoperable, RP management approval is required to make a WG release.

The discharge flow piping will be purged prior to releasing a tank. This ensures the release flowpath is clear of gas from a previously released tank and the normal flowpath for S/D B has been flushed if it has been in service frequently.

Maximum range of release flow loop is 40 SCFM.

2.1.2 Procedure

Tank to be released is sampled prior to release by Chemistry. The sample is analyzed by RP and the Discharge Document is generated based on the sample analysis.

Objective #2, 3, 4

The Discharge Document is then delivered to the Control Room where the Control Room **SRO ensures all paperwork is complete prior to authorizing the release. This authorization serves as an acknowledgment by the Control Room SRO that a release is about to take place. He should review the following prior to authorization.**

- Expected range of EMF, Trip 1, and Trip 2 setpoints.
- Special Instructions.
- GWR document agrees with release procedure (i.e. WGDT Release procedure used for WG release)
- Recommended Release Rate vs calculated release rates.

  The "Recommended Release Rate" will be the most restrictive release rate based on sample activity or the maximum observed system release rate (40 CFM for WGDT releases), whichever is less.

  The SRO reviewing the release paperwork should ensure the Recommended Release Rate is less than or equal to the Most Restrictive Release Rate.
- EMF utilized (50 or 36) and any necessary inoperable actions. It is preferable not to make a release with either 36 or 50 inoperable.

1 Pt.

Radwaste is in the process of releasing WGDT 'A'. 1EMF -36 L is inoperable due to PM. Trip 2 is received on 0EMF-50 (*Waste Gas Discharge*). The gaseous waste release is secured as a result of 1WG-160 closing. Radwaste calls the control room SRO and reports 0EMF-50 has been purged and is ready to reinitiate the release.

Which one (1) of the following describes the actions of the control room SRO?

A. The SRO can authorize up to two (2) restarts without re-sampling.

B. The SRO has Radwaste terminate the release and existing GWR paperwork, and generate new paperwork.

C. The SRO can authorize one (1) restart without re-sampling.

D. The SRO can authorize Radwaste to jumper control actions of 0EMF-50, restart release and take grab samples once per four (4) hours during release.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		3
	Group #		3
	K/A #	G2.3.9	
	Importance Rating		3.4

Knowledge of the process for performing a containment purge.

Proposed Question: SRO 98

Unit 2 is conducting a containment purge in accordance with OP/2/A/6450/015 (*Containment Purge System*). Given the following conditions provided on the GWR permit:

- Most restrictive release rate = 16000 cfm
- Recommended release rate = 16000 cfm
- 2EMF-39(L) Trip 1 setpoint = 1.0 E5 cpm
- 2EMF-39(L) Trip 2 setpoint = 2.0 E5 cpm
- 2EMF-36(L) is in service

Time	**0200**	**0215**	**0230**	**0245**
Release rate (cfm)	15750	16800	15900	16500
EMF-39 (cpm)	1.8 E5	2.8 E5	3.2 E5	3.2 E5

If the operators restart the VP purge whenever allowed by procedure, what is the **EARLIEST** time that the operators are **required** to terminate the gaseous release and obtain a revised GWR?

A. 0200

B. 0215

C. 0230

D. 0245

Proposed Answer: B

Explanation (Optional):
Normally if the release rate exceeds the recommended release rate, the operators should reduce the release rate. Termination of the GWR would not be necessary unless there was a Trip 2 alarm.

A. Incorrect. Below release rate and Trip 2
B. Correct. Trip 2 on EMF-39(L)
C. Incorrect. Should have terminated at 0215
D. Incorrect. Should already be terminated.

Technical Reference(s): SLC 16.11.7 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: WE-RGR Obj 5 (As available)

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

Question History: Last NRC Exam ____

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

10 CFR Part 55 Content: 55.41 ____
55.43 4

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
N/A	N/A	2.0	2.0	2.0

OBJECTIVES

	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	State the purpose of the Radiological Gaseous Releases.			X	X	X
2	Given a completed GWR, state the recommended release rate.			X	X	X
3	State what responsibility the Control Room SRO is accepting when he signs to authorize a release.			X	X	X
4	Given a completed GWR, state the proper EMF to be used for the release.			X	X	X
5	Evaluate plant parameters to determine any abnormal system conditions that may exist			X	X	X
6	Concerning the Selected Licensee Commitments (SLC) related to Gaseous Waste Releases;					
	• Given the SLC Manual, discuss any commitments and their applicability.			X	X	X
	• For any commitments that have action required within one hour, state the action.			X	X	X
	• Given a set of parameter values or system conditions, determine if any commitment is (are) not met and any action(s) required within one hour.			X	X	X
	• Given the SLC Manual, discuss the basis for a given commitment.				X	*
	* SRO only					

16.11 RADIOLOGICAL EFFLUENT CONTROLS

16.11.7 Radioactive Gaseous Effluent Monitoring Instrumentation

COMMITMENT

The radioactive gaseous effluent monitoring instrumentation channels shown in Table 16.11.7-1 shall be OPERABLE with Alarm/Trip Setpoints set to ensure that the limits of SLC 16.11.6 are not exceeded.

AND

The Alarm/Trip setpoints shall be determined and adjusted in accordance with the methodology and parameters in the ODCM.

----------NOTE----------
Brief periods of routine sampling (not to exceed 15 minutes) do not make the instrumentation inoperable.

APPLICABILITY

As shown in Table 16.11.7-1.

REMEDIAL ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more radioactive gaseous effluent monitoring channels Alarm/Trip setpoint less conservative than required.	A.1 Suspend the release of radioactive gaseous effluents monitored by the affected channel. OR A.2 Declare the channel inoperable. OR A.3 Adjust setpoint to within limit.	Immediately Immediately Immediately

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or more radioactive gaseous effluent monitoring instrument channels inoperable.	B.1 Enter the Remedial Action specified in Table 16.11.7-1 for the channel(s).	Immediately
C. One channel inoperable.	C.1.1 Analyze two independent samples of the tank contents. AND	Prior to initiating a release
	C.1.2 Perform independent verification of the discharge valve lineup. AND	Prior to initiating a release
	C.1.3.1 Perform independent verification of manual portion of the computer input for the release rate calculations performed by computer. OR	Prior to initiating a release
	C.1.3.2 Perform independent verification of entire release rate calculations for calculations performed manually. AND	Prior to initiating a release
	C.1.4 Restore channel to OPERABLE status. OR	14 days
	C.2 Suspend the release of radioactive effluents via this pathway.	Immediately

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or more flow rate measurement channels inoperable.	D.1 Estimate the flow rate of the release. AND D.2 Restore the channel to OPERABLE status.	Once per 4 hours during releases 30 days
E. One or more noble gas activity monitor channels inoperable.	E.1 Obtain grab samples from the effluent pathway. AND E.2 Perform an analysis of grab samples for radioactivity. AND E.3 Restore the channel to OPERABLE status.	Once per 12 hours during releases To meet LLD requirements per Table 16.11.6-1 30 days
F. Noble gas activity monitor providing automatic termination of release inoperable.	F.1 Suspend PURGING or VENTING of radioactive effluents via this pathway.	Immediately
G. One or more sampler channels inoperable.	G.1 Perform sampling with auxiliary sampling equipment as required by Table 16.11.6-1. AND G.2 Restore the channel to OPERABLE status.	Continuously 30 days

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. One or more Sampler Minimum Flow Device Channels inoperable.	H.1 Verify flow through the sampling apparatus. AND H.2 Restore the channel to OPERABLE status.	Once per 4 hours during releases 30 days
I. Required Action and associated Completion Time of Condition C, D, E, F, G, or H not met.	I.1 Explain why the inoperability was not corrected within the specified Completion Time in the Annual Radioactive Effluent Release Report.	In the next scheduled Annual Radioactive Effluent Release Report

TESTING REQUIREMENTS

----------NOTE----------
Refer to Table 16.11.7-1 to determine which TRs apply for each Radioactive Gaseous Effluent Monitoring channel.

TEST	FREQUENCY
TR 16.11.7.1 Perform CHANNEL CHECK.	Prior to each release
TR 16.11.7.2 ----------NOTE---------- The SOURCE CHECK for these channels shall be the qualitative assessment of channel response when the channel sensor is exposed to a source of increased radioactivity or a simulated source of radioactivity such as a light emitting diode. --- Perform SOURCE CHECK.	Prior to each release
TR 16.11.7.3 Perform CHANNEL CHECK.	24 hours
TR 16.11.7.4 Perform CHANNEL CHECK.	7 days

(continued)

TESTING REQUIREMENTS (continued)

	TEST	FREQUENCY
TR 16.11.7.5	----------NOTE---------- The SOURCE CHECK for these channels shall be the qualitative assessment of channel response when the channel sensor is exposed to a source of increased radioactivity or a simulated source of radioactivity such as a light emitting diode. ---------- Perform SOURCE CHECK.	31 days
TR 16.11.7.6	----------NOTES---------- 1. For noble gas activity monitors providing automatic termination of release, the COT shall also demonstrate that automatic isolation of the pathway occurs if the instrument indicates measured levels above the Alarm/Trip Setpoint. 2. For all noble gas activity monitors, the COT shall also demonstrate that control room alarm annunciation occurs if the instrument indicates measured levels above the Alarm/Trip Setpoint; circuit failure and, a downscale failure. ---------- Perform CHANNEL OPERATIONAL TEST.	92 days
TR 16.11.7.7	----------NOTE---------- For all noble gas activity monitors, the initial CHANNEL CALIBRATION shall be performed using standards certified by the National Institute of Standards and Technology (NIST) or using standards obtained from suppliers that participate in measurement assurance activities with NIST. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used. ---------- Perform a CHANNEL CALIBRATION.	18 months

TABLE 16.11.7-1
(Page 1 of 3)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENTS	MINIMUM CHANNELS OPERABLE	REMEDIAL ACTION	APPLICABILITY	TESTING REQUIREMENTS
1. WASTE GAS HOLDUP SYSTEM				
a. Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release (Low Range-EMF-50 or 1EMF-36, low-range)	1 per station	A, C, I	During gas effluent releases.	TR 16.11.7.1 TR 16.11.7.2 TR 16.11.7.6 TR 16.11.7.7
b. Effluent System Flow Rate Measuring Device	1 per station	D, I	At all times except when isolation valve is closed & locked.	TR 16.11.7.3 TR 16.11.7.6 TR 16.11.7.7
2. Condenser Evacuation System - Noble Gas Activity Monitor (EMF-33)	1	A, E, I	When air ejectors are operable.	TR 16.11.7.3 TR 16.11.7.5 TR 16.11.7.6 TR 16.11.7.7
3. Vent System				
a. Noble Gas Activity Monitor (Low Range - EMF-36)	1	A, E, I	At all times.	TR 16.11.7.3 TR 16.11.7.5 TR 16.11.7.6 TR 16.11.7.7
b. Iodine Sampler	1	G, I	At all times, except during routine sampling.	TR 16.11.7.4
c. Particulate Sampler (EMF-35)	1	G, I	At all times, except during routine sampling.	TR 16.11.7.4
d. Unit Vent Flow Rate Monitor (Totalizer)	1	D, I	At all times.	TR 16.11.7.3 TR 16.11.7.6 TR 16.11.7.7
e. Iodine Sampler Minimum Flow Device	1	H,I	At all times, except during routine sampling.	TR 16.11.7.3 TR 16.11.7.6 TR 16.11.7.7
f. Particulate Sampler Minimum Flow Device (1)	1	G,I	At all times, except during routine sampling.	TR 16.11.7.3 TR 16.11.7.6 TR 16.11.7.7
4. Containment Purge System - Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release (Low Range - EMF-39)	1	A, F, I	Modes 1 through 6, except when isolation valve is closed & locked.	TR 16.11.7.2 TR 16.11.7.3 TR 16.11.7.6 TR 16.11.7.7

(continued)

TABLE 16.11.7-1
(Page 2 of 3)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENTS	MINIMUM CHANNELS OPERABLE	REMEDIAL ACTION	APPLICABILITY	TESTING REQUIREMENTS
5. Auxiliary Building Ventilation System - Noble Gas Activity Monitor (EMF-41 or EMF-36)	1	A, E, I	At all times.	TR 16.11.7.3 TR 16.11.7.5 TR 16.11.7.6 TR 16.11.7.7
6. Fuel Storage Area Ventilation System - Noble Gas Activity Monitor (EMF-42 or EMF-36)	1	A, E, I	At all times.	TR 16.11.7.3 TR 16.11.7.5 TR 16.11.7.6 TR 16.11.7.7
7. Contaminated Parts Warehouse Ventilation System				
a. Noble Gas Activity Monitor (EMF-53)	1 per station	A, E, I	During gaseous effluent releases.	TR 16.11.7.3 TR 16.11.7.5 TR 16.11.7.6 TR 16.11.7.7
b. Flow Rate Monitor	1 per station	D, I	During gaseous effluent releases.	TR 16.11.7.3 TR 16.11.7.6 TR 16.11.7.7
c. EMF-53 Sampler Minimum Flow Device (1)	1 per station	H,I	During gaseous effluent releases.	TR 16.11.7.3 TR 16.11.7.6 TR 16.11.7.7
8. Radwaste Facility Ventilation System				
a. Noble Gas Activity Monitor (EMF-52)	1 per station	A, E, I	During gaseous effluent releases.	TR 16.11.7.3 TR 16.11.7.5 TR 16.11.7.6 TR 16.11.7.7
b. Flow Rate Monitor	1 per station	D, I	During gaseous effluent releases.	TR 16.11.7.3 TR 16.11.7.6 TR 16.11.7.7
c. EMF-52 Sampler Minimum Flow Device (1)	1 per station	H, I	During gaseous effluent releases.	TR 16.11.7.3 TR 16.11.7.6 TR 16.11.7.7

(continued)

TABLE 16.11.7-1
(Page 3 of 3)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENTS	MINIMUM CHANNELS OPERABLE	REMEDIAL ACTION	APPLICABILITY	TESTING REQUIREMENTS
9. Equipment Staging Building Ventilation System				
a. Noble Gas Activity Monitor (EMF-59)	1 per station	A, E, I	During gaseous effluent releases.	TR 16.11.7.3 TR 16.11.7.5 TR 16.11.7.6 TR 16.11.7.7
b. Flow Rate Monitor	1 per station	D, I	During gaseous effluent releases.	TR 16.11.7.3 TR 16.11.7.6 TR 16.11.7.7
c. EMF-59 Sampler Minimum Flow Device (1)	1 per station	H, I	During gaseous effluent releases.	TR 16.11.7.3 TR 16.11.7.6 TR 16.11.7.7
10. Containment Air Release and Addition System - Noble Gas Activity Monitor (EMF-39L or EMF-36L)	1	A, E, I	At all times except when isolation valve is closed & locked.	TR 16.11.7.3 TR 16.11.7.5 TR 16.11.7.6 TR 16.11.7.7

NOTES:

1. Radioactivity monitor (EMF) shall not be declared OPERABLE unless both the EMF and the associated EMF's Minimum Flow Device are rendered OPERABLE.

BASES

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The instrumentation consists of monitoring and sampling instrumentation. Monitors provide continuous display of process parameters with appropriate alarms and trip setpoints established. Samplers collect a portion of the desired process for subsequent laboratory analysis, and do not have alarm/trip capability. Samplers and the analysis program provide a method to assure that long term effluent release quantities do not exceed the requirements of SLC 16.11.6. Monitors provide assurance that instantaneous effluent releases do not exceed the requirements of SLC 16.11.6. The minimum flow devices for EMFs listed in Table 16.11.7-1 are required to provide assurance of representative sampling during actual or potential releases of gaseous effluents. The flow rate monitor quantifies the total gaseous effluent (both non-radioactive and radioactive) released to the environment. During routine sampling, instrumentation may be turned off for short periods of time (not to exceed 15 minutes) in order to meet analysis requirements of SLC 16.11.6. This is considered to be a normal operable function of the equipment. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in the ODCM to ensure that the Alarm/Trip will occur prior to exceeding the limits stated in SLC 16.11.6. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

REFERENCES

1. McGuire Nuclear Station, Offsite Dose Calculation Manual

2. 10 CFR Part 50, Appendix A

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	G2.4.27	
	Importance Rating	3.5	

Knowledge of fire in the plant procedure.

Proposed Question: SRO 99

Given the following conditions:

A fire has occurred in the Unit 1 Control Room while the unit is in Mode 1.

Which ONE (1) of the following describes the Assured Shutdown Train and the procedure that will be performed if the control room becomes uninhabitable?

A. SSS; AP/1/A/5500/17, Loss of Control Room

B. SSS; AP/1/A/5500/24, Loss of Plant Control Due to Fire or Sabotage

C. Train A; AP/1/A/5500/17, Loss of Control Room

D. Train A; AP/1/A/5500/24, Loss of Plant Control Due to Fire or Sabotage

Proposed Answer: B

Explanation (Optional):
A is incorrect because the procedure that will be entered is AP-24 as directed by AP-45
B is correct.
C and D are incorrect because the dedicated train is the SSS, but credible because Unit 1 has a large number of areas affected by fire that will use Train A as the assured train.

Technical Reference(s): AP/0/A/5500/17, pg 1 (Attach if not previously provided)
AP/0/A/5500/24, pg 1
AP/0/A/5500/45, pg 8

Proposed references to be provided to applicants during examination: None

Learning Objective: AP-24 Obj 1 (As available)

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

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content:
- 55.41 _____
- 55.43 5

Comments:

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
		1.0	1.0	1.0

OBJECTIVES

	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	Concerning AP/1(2)/5500/24 (Loss of Plant Control Due to Fire): • State the purpose of the AP • Recognize the symptoms that would require implementation of the AP. AP24001			X	X	X
2	Given scenarios describing accident events and plant conditions, evaluate the basis for any caution, note, or step. AP24002			X	X	X

A. Purpose

The purpose of this procedure is to describe steps to be taken to achieve and maintain Hot Standby following a fire event that results or could result in a loss of plant control from the Control Room or Aux Shutdown Panel.

This procedure will also be used following security events that could result in a loss of plant control from the Control Room or Aux Shutdown Panel.

This procedure will also be used when referenced by any procedure that requires plant shutdown using the SSF.

A. Purpose

To describe the steps to be taken to achieve and maintain Hot Standby in the event of a control room evacuation, except if a plant fire has damaged plant controls required to safely shutdown the plant or a security event in a vital area has the potential to damage controls required to safely shutdown the plant.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

3. (Continued)

Fire Area	Enclosure(s)	Assured Shutdown Train
AB 767' Unit 2 M/G Set Room (EFA Zone 34)	Enclosure 29 (AB 767' Unit 2 M/G Set Room Unit 2 Actions)	A Train
Control Room (EFA Zone 40, 206)	Enclosure 30 (Control Room Fire Unit 1 Actions)	SSS
	Enclosure 31 (Control Room Fire Unit 2 Actions)	SSS
AB 767' Common Area (EFA Zone 29, 33, 46, 113-124, 131)	Enclosure 32 (AB 767' Common Area Fire Unit 1 Actions)	SSS
	Enclosure 33 (AB 767' Common Area Fire Unit 2 Actions)	SSS
AB 778' Unit 1 Fuel Pool (EFA Zone 127)	Enclosure 34 (AB 778' Unit 1 Fuel Pool Area Fire Unit 1 Actions	A Train
AB 778' Unit 2 Fuel Pool (EFA Zone 125)	Enclosure 35 (AB 778' Unit 2 Fuel Pool Area Fire Unit 2 Actions	A Train

CHART CONTINUES ON NEXT PAGE

Given the following conditions:

A transient has occurred on Unit 1 resulting in the following alarms:

- OTDT RUNBACK/ROD STOP ALERT
- ROD CONTROL URGENT FAILURE
- OPDT REACTOR TRIP

Reactor power indicates the following:

- N41 – 105.2%
- N42 – 106.2%
- N43 – 105.9%
- N44 – 106.1%
- Tavg is 581 degrees F

Which ONE (1) of the following has occurred, and which action will be performed to mitigate the condition?

A. Uncontrolled Rod Withdrawal; Reduce Reactor Power to less than 100% by reducing turbine load in accordance with the annunciator response and AP/1/A/5500/14, Rod Control Malfunction.

B. Uncontrolled Rod Withdrawal; Trip the reactor and enter EP/1/A/5000/E-0, Reactor Trip or Safety Injection.

C. SG Safety Valve opened coincident with a rod control failure; Reduce Reactor Power to less than 100% by reducing turbine load in accordance with the annunciator response and AP/1/A/5500/14, Rod Control Malfunction.

D. SG Safety Valve opened coincident with a rod control failure; Trip the reactor and enter EP/1/A/5000/E-0, Reactor Trip or Safety Injection.

Proposed Answer: D

Explanation (Optional):

A and B are incorrect because Tave is lower than required for the power level. Also, rods will not withdraw for an urgent failure.
C is incorrect because a setpoint for reactor trip has been exceeded as indicated by the first out annunciator for OPDT
D is correct

Technical Reference(s): Annunciators 10 A D6 for trip (Attach if not previously provided)
E-0 Entry, AP01 BD, pg 4

Proposed references to be provided to applicants during examination: None

Learning Objective: E-0, Obj 3 (As available)

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

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	G2.4.45	
	Importance Rating	3.6	

Ability to prioritize and interpret the significance of each annunciator or alarm.

Proposed Question: SRO 100

CLASSROOM TIME (Hours)

NLO	NLOR	LPRO	LPSO	LOR
N/A	N/A	2.0	2.0	1.0

OBJECTIVES

SEQ	OBJECTIVE	NLO	NLOR	LPRO	LPSO	LOR
1	Describe the accidents that are diagnosed in E-0 and the diagnostic sequence. EPE0001			X	X	X
2	Explain the purpose for each procedure in the E-0 series. EPE0002			X	X	
3	Discuss the entry and exit guidance for each procedure in the E-0 series. EPE0003			X	X	
4	Discuss the symptoms of a reactor trip and/or safety injection. EPE0004			X	X	
5	Discuss the mitigating strategy (major actions) of each procedure in the E-0 series. EPE0005			X	X	X
6	Discuss the basis for any note, caution or step for each procedure in the E-0 series. EPE0006			X	X	X
7	Describe the immediate actions and include the RNO when appropriate. EPE0007			X	X	X
8	Describe the actions included on the E-0 Foldout page and the basis for these actions. EPE0008			X	X	X
9	Given the Foldout page, other than E-0, discuss the actions included and the basis for these actions. EPE0009			X	X	X

A. Purpose

This procedure provides actions to check proper response of the automatic protection systems following manual or automatic actuation of a reactor trip or safety injection, to assess plant conditions, and to identify the appropriate recovery procedure.

B. Symptoms or Entry Conditions

1. **The following are symptoms that require a reactor trip, if one has not occurred:**

   - Any valid alarm on Reactor trip first out panel
   - 1/2 S/R channels - 10^5 CPS (below P6)
   - 1/2 I/R channels - Amps - 25% Power (below P10)
   - 2/4 P/R channels - 25% Power (below P10)
   - 2/4 P/R channels - 109% Power
   - 2/4 P/R channels - +5%/2 seconds
   - 2/4 Pzr Press channels - 2385 PSIG
   - 2/4 Pzr Press channels - 1945 PSIG (above P7)
   - 2/3 Pzr Level channels - 92% (above P7)
   - 2/4 NC Pump buses - 74% of normal voltage (5082 V) (above P7)
   - 2/4 NC Pump buses - 56 Hz (above P7)
   - 2/3 NC flow channels in 2/4 loops - 88% (above P7)
   - 2/3 NC flow channels in 1/4 loops - 88% (above P8)
   - 2/4 Loop Delta Ts - greater than OTDT setpoint (variable)
   - 2/4 Loop Delta Ts - greater than OPDT setpoint (variable)
   - 2/3 Auto -stop oil press channels - 45 PSIG (above P8)
   - 4/4 Turbine Throttle valves - Closed (above P8)
   - 2/4 S/G Level channels in any S/G - Lo-Lo (17%)
   - 1/2 Trains S/I - Actuated
   - 2/2 SSPS Trains - General warning alarm.

2. **The following are symptoms of a reactor trip:**

   - Any reactor trip annunciator - LIT
   - All rod bottom lights - LIT
   - Neutron flux - RAPIDLY GOING DOWN.

3. **The following are symptoms that require a reactor trip and safety injection, if one has not occurred:**

   - 2/4 Pzr pressure channels less than 1845 PSIG
   - 2/3 Containment pressure channels greater than 1 PSIG.

4. **The following are symptoms of a reactor trip and safety injection:**

   - Any S/I annunciator - LIT
   - NV, ND, NI pumps - ON
   - "SAFETY INJECTION ACTUATED" status light (1SI-18)- LIT
   - "LOCA SEQ ACTUATED TRAIN A(B)" status lights (1SI-14) - LIT.

PURPOSE:

Prevent exceeding maximum thermal output and prevent an uncontrolled cooldown.

DISCUSSION:

Reactivity management dictates controlling reactor power less than or equal to 100%. Since steam demand determines reactor power, the increase in steam demand from the leak must be promptly compensated for by a decrease in steam demand from turbine load. During a transient, if reactor power is less than secondary power, temperature will decrease, adding positive reactivity. This will continue as long as reactor power is lower. The first part of the step (reactor power less than 100%) ensures maximum thermal power is not exceeded.

Determining reactor power less than 100% can be difficult during a steam leak transient. Thermal power best estimate is averaged over time, so there is a delay indicating reactor power has gone above 100%. The steam leak cools T-ave, which decreases the flux the excore NI's see, causing them to read potentially several percent low. One good real time indicator of reactor power is the NC loop D/T's.

The third part of the step (T-ave at T-ref) ensures the power transient is turned. If turbine load is cut to the extent that T-ave is restored to T-Ref, this indicates that reactor power has caught up with secondary power (or else T-ave couldn't be increasing). Reactor power catches up when the turbine load has been reduced by the amount of the steam leak.

The T-ave AT T-REF criterion is also included in this step for those scenarios involving a steam leak with the plant less than 100% power. Again, ensuring T-ave turned is a good indicator enough turbine load has been cut to control the reactivity transient.

This step is early in the procedure to prevent unnecessary isolation of L/D if NCS inventory can be maintained after reducing turbine load (by not allowing T-ave to continue to decrease).

REFERENCES:

Nomenclature: **OPDT RX TRIP** Window: **D6**

Setpoint: Delta T greater than or equal to OPDT Setpoint

Origin: Any two of the four loops OPDT bistables tripped.

Probable Cause:
1. Loss of load
2. Uncontrolled RCCA withdrawal or boron dilution
3. Excessive steam demand

Automatic Action: Reactor trip

Immediate Action:
1. Ensure Automatic Actions occur.
2. Go to EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

Supplementary Action: None

References
- McGuire UFSAR
- MCM-1399.03-47 (SH-7)
- NSM MG-11214

End Of Response