Draft Submittal
(Pink Paper)

Senior Reactor Operator Written Exam

CATAWBA
2007-301

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6.	7.
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only	U/E/S	Explanation

Instructions

[Refer to Section D of ES-401 and Appendix B for additional information regarding each of the following concepts.]

1. Enter the level of knowledge (LOK) of each question as either (F)undamental or (H)igher cognitive level.
2. Enter the level of difficulty (LOD) of each question using a 1 – 5 (easy – difficult) rating scale (questions in the 2 – 4 range are acceptable).
3. Check the appropriate box if a psychometric flaw is identified:
   - The stem lacks sufficient focus to elicit the correct answer (e.g., unclear intent, more information is needed, or too much needless information).
   - The stem or distractors contain cues (i.e., clues, specific determiners, phrasing, length, etc).
   - The answer choices are a collection of unrelated true/false statements.
   - The distractors are not credible; single implausible distractors should be repaired, more than one is unacceptable.
   - One or more distractors is (are) partially correct (e.g., if the applicant can make unstated assumptions that are not contradicted by stem).
4. Check the appropriate box if a job content error is identified:
   - The question is not linked to the job requirements (i.e., the question has a valid K/A but, as written, is not operational in content).
   - The question requires the recall of knowledge that is too specific for the closed reference test mode (i.e., it is not required to be known from memory).
   - The question contains data with an unrealistic level of accuracy or inconsistent units (e.g., panel meter in percent with question in gallons).
   - The question requires reverse logic or application compared to the job requirements.
5. Check questions that are sampled for conformance with the approved K/A and those that are *designated SRO-only* (K/A and license level mismatches are unacceptable).
6. Based on the reviewer's judgment, is the question as written (U)nsatisfactory (requiring repair or replacement), in need of (E)ditorial enhancement, or (S)atisfactory?
7. At a minimum, explain any "U" ratings (e.g., how the Appendix B psychometric attributes are not being met).

1	F	1	X			X							X	U	Question not comprehension. Poorly written - LOD. Stem lacks sufficient information. The applicant is required to make too many assumptions. There are possibly three correct answers depending on what assumptions are made (A, B, & C). K/A is for APE the questions references EP. This is a Unit 2 question, however, no Unit 2 reference provided. Lesson plan not provided. Not an SRO level question.

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Question 1

Bank Question: 07-76 ***Answer: A***

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1 Pt(s). Following a safety injection on Unit 2 the crew is performing steps in EP/2/A/5000/E-3 (Steam Generator Tube Rupture). During the SI the NCP experienced a loss of seal cooling for a significant time.

EP/2/A/5000E-3 (Steam Generator Tube Rupture) directs starting of the NCP.

Should or should NOT the crew start the pumps and what is the basis for this decision?

Reference Provided

A. Do NOT start the pumps until they can be hand rotated.

B. Do NOT start the pumps until they are dismantled and inspected.

C. Start of the pumps is allowed as long as vibration and seal leakage is not excessive.

D. Start of the pumps is allowed as normal starting parameters are not required.

Required Reference: EP/2/A/5000/E-3

Distracter Analysis:

Following restoration of NC pump seal cooling, the NC pump should not be started prior to a complete NC pump status evaluation in order to minimize the potential for damage to the NC pump. The status evaluation should be performed consistent with the limitations and requirements in the plant specific NC pump Instruction and Operating Manual. In general, the status evaluation should consist of the following three elements:

a. Upon restoration of NC pump seal cooling, manually rotate the pump in accordance with the instruction book limitations and requirements.

b. Restart the NC pump, monitoring vibration and seal leakage rate:

1) If seal leakage and pump vibration are acceptable, use the NC pump for forced circulation cooldown of the plant.

2) If seal leakage or pump vibration is excessive, trip the pump.

c. Upon achieving cold shutdown conditions, disassemble the NC pump seals and inspect all seal components including O-rings, channel seals, No. 1 seal faceplates, etc.

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Question 1

A. **Correct:**

B. **Incorrect:**
Plausible: The pumps can be started if hand rotated

C. **Incorrect:**
Plausible: This is correct only after the hand rotation.

D. **Incorrect**:
Plausible: This is correct for some CSF EP's but not for all EP's.

Level: SRO

K/A: Generic Abnormal Plant Evolutions (APEs) 015 Reactor Coolant Pump Malfunctions/017 Reactor Coolant Pump Malfunctions (Loss of RC Flow) 2.2 Equipment Control (Continued) 2.2.21 Knowledge of pre- and post-maintenance operability requirements. (CFR: 43.2) IMPORTANCE RO 2.3 SRO 3.5

Lesson Plan Objective: EP220 Explain the Bases, including any identified knowledges/abilities, for all of the steps, notes, and cautions in EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation)

Source: NEW

Level of knowledge: comprehension

References:
1. EP/E-3
2.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 1. **Verify containment pressure - HAS REMAINED LESS THAN 3 PSIG.**	**Perform the following:** a. Notify station management that NC pumps cannot be started for the following reason: __ • This enclosure aligns RN to non-safety piping inside containment. If piping is damaged, sump dilution or radiological release may occur. __ b. Exit this enclosure.
2. **Verify NC pump seal cooling has been maintained from one of the following:** __ • Seal injection flow OR __ • KC flow to thermal barrier.	**Perform the following:** __ a. **IF** NC pump seal cooling has not been maintained, **THEN** notify station management to perform a status evaluation prior to starting an NC pump. __ b. **WHEN** the status evaluation has been completed, **THEN GO TO** Step 3. __ c. Do not continue in this enclosure.
__ 3. **Verify Pzr level - LESS THAN OR EQUAL TO 92%.**	__ **IF the NC System is intact, THEN ensure a steam bubble exists in the Pzr prior to starting an NC pump.**
__ 4. **Ensure Phase B Containment Isolation - RESET.**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- Preference should be given to starting 1B NC pump to provide normal Pzr spray capability. If 1B NC pump is not available, then two or three NC pumps may need to be started to provide normal Pzr spray capability.
- If B S/G is the ruptured S/G , then B NC loop may be hotter than the other NC loops. In this case A NC pump should be in operation along with B NC pump for effective spray flow.

42. **Verify NC pump status as follows:**

__ a. Verify 1B NC pump - ON.

a. Perform the following:

__ 1) **IF** all NC pumps are off, **THEN** ensure Natural Circulation. **REFER TO** Enclosure 8 (Natural Circulation Monitoring Parameters).

__ 2) Start NC pumps. **REFER TO** Enclosure 7 (NC Pump Start).

3) **IF** plant conditions do not allow start of NC pumps, **THEN** perform the following:

__ a) **WHEN** NC pump(s) become available, **THEN** observe Notes prior to Step 42 and perform Step 42.

__ b) **GO TO** Step 43.

__ 4) **GO TO** Step 43.

__ b. Stop NC pumps not needed for Pzr spray flow.

__ c. Ensure the normal Pzr spray valve associated with secured NC pump - IN MANUAL AND CLOSED.

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6.	7.
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only	U/E/S	Explanation
2	F	1	X			X							X	U	Question not comprehension. This is a system question and not SRO only. I think the question can be answered without the first part of the stem. If VI is loss which one of the following describes a system effect and what should/could be done to resolve the issue?. Please define Auxiliary Shutdown Panel. Is it different the Remote Shutdown Panel. It is my understanding that these panels are typically used when the control room is evacuated or loss of control occurs. I do not see the correlation between loss of VI and the need to go to the ASP. If this is true distractors B & D become implausible. Please explain why you consider the loss of S/G PORVs plausible

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Question 2

Bank Question: 07-77 ***Answer: A***

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1 Pt(s). The crew has implemented EP/1/A/5000/E-3 (Steam Generator Tube Rupture). VI pressure has decreased to less than 40 psig due to a failure of all VI compressors. Which of the following is a result of the loss of VI and the method to mitigate it?

A. Loss of control of charging and seal injection flow. Dispatch operators to control local valves.

B. Loss of control of charging and seal injection flow. Control must be transferred to the Auxiliary Shutdown Panels.

C. Loss of ability to open the S/G PORVs. Dispatch operators to local valves.

D. Loss of ability to open the S/G PORVs. Control Room must be evacuated to the Auxiliary Shutdown Panels.

Distracter Analysis:

A. **Correct:**

B. **Incorrect:**
Plausible: It is true that for a particular loss of some power supplies 294 and/or 309 will fail cuasing a loss of charging and letdown control and the only way to regain control is if ASP was placed in local – this is not done in this situation.

C. **Incorrect:**
Plausible: If S/G PORV control was lost then yes operators would be dispatched to locally open the valves but control is not lost the PORV will operate in manual.

D. **Incorrect**:
Plausible: This is opposite of the way the PORV operate. The S/G would operate in manual from the CR on N2 but would not operate from the ASP if no VI.

Level: SRO

K/A: EPE: 038 Steam Generator Tube Rupture (SGTR) EA2 Ability to determine or interpret the following as they apply to a SGTR: (CFR 43.5 / 45.13) EA2.10 Flowpath for charging and letdown flows 3.1 3.3

Lesson Plan Objective: EP413 Explain the Bases, including any identified knowledges/abilities, for all of the steps, notes, and cautions in EP/1/A/5000/E-3 (Steam Generator Tube Rupture)

Source: NEW

Level of knowledge: comprehension

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Question 2
References:
1. EP-3 and background
2. NV Lesson
SM Lesson

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25. (Continued)	
	__ g) Manually align associated NI Pump C-leg injection valve as required to maintain Pzr level greater than 11% (20% ACC).
	__ h) **GO TO** Step 32.
	__ 3) **WHEN** 1NI-9A **AND** 1NI-10B are closed, **THEN** perform Steps 26 through 31.
	__ 4) **GO TO** Step 32.

NOTE VI pressure less than 50 PSIG will prevent operation of 1NV-294 and 1NV-309 from the control room.

26. **Establish charging as follows:**	
__ a. Verify VI pressure - GREATER THAN 50 PSIG.	__ a. **GO TO** Step 26.b RNO.
__ b. Throttle 1NV-294 (NV Pmps A&B Disch Flow Ctrl) for 32 GPM charging line flow.	b. Perform the following:
	__ 1) Place the controller for 1NV-294 in the 100% demand position.
	__ 2) Dispatch operator with a radio to throttle 1NV-295 (NV Pmps A & B Disch Ctrl Isol) (AB-551, JJ-55, Rm 231) for 32 GPM charging line flow.
	__ 3) Throttle 1NV-295 to control charging flow as required in subsequent steps.
	__ 4) **IF** VI pressure less than 50 PSIG, **THEN GO TO** Step 26.c RNO.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26. (Continued)	
__ c. Close 1NV-309 (Seal Water Injection Flow).	c. Dispatch operator with radio to perform the following: __ 1) Close 1NV-308 (Seal Wtr Inj Flow Ctrl Isol) (AB-554, JJ-54, Rm 233) (Ladder needed). __ 2) Throttle 1NV-311 (Seal Wtr Inj Flow Ctrl Byp) (AB-555, JJ-54, Rm 233) to maintain 32 GPM seal water flow in subsequent steps.
d. Ensure one of the following valves - OPEN: __ • 1NV-32B (NV Supply To Loop A Isol) OR __ • 1NV-39A (NV Supply To Loop D Isol).	
e. Open the following valves: __ • 1NV-312A (Chrg Line Cont Isol) __ • 1NV-314B (Chrg Line Cont Isol).	e. Dispatch operator to open the affected valve(s): __ • 1NV-312A (Chrg Line Cont Isol) (AB-553, HH-JJ, 52, Rm 217) (Ladder needed) __ • 1NV-314B (Chrg Line Cont Isol) (AB-553, GG-HH, 52-53, Rm 217) (Ladder needed).
__ f. Verify 1NV-309 - ABLE TO BE OPERATED FROM THE CONTROL ROOM.	__ f. **GO TO** Step 26.h.
__ g. Place 1NV-309 in "AUTO".	
h. Perform the following: __ • Maintain charging flow less than 180 GPM __ • Maintain 32 GPM seal water flow.	

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Question 3

Bank Question: 07-78 ***Answer: C***

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1 Pt(s). Unit 1 is at 100% RTP. This RO reports the following plant parameters:

- PZR Pressure is slowly decreasing
- PZR Level is slowly decreasing
- Charging Flow is slowly increasing
- NC Temperature is slowly decreasing
- S/G Levels are being controlled at program level

Which of the following procedures should be entered?

A. AP/1/A/5500/010 (Reactor Coolant Leak) Case I (Steam Generator Tube Leak)

B. AP/1/A/5500/010 (Reactor Coolant Leak) Case II (NC System Leak)

C. AP/1/A/5500/028 (Secondary Steam Leak)

D. AP/1/A/5500/011 (Pressurizer Pressure Anomalies) Case I (Pressurizer Pressure Decreasing)

Distracter Analysis:

A. **Incorrect:**
Plausible: 3 of the 5 symptoms are correct for Tube leak.

B. **Incorrect:**
Plausible: 4 of the 5 symptoms are correct for an NC leak.

C. **Correct:**

D. **Incorrect**:
Plausible: Press is decreasing and this is an entry into AP/11 but this is not correct for this situation.

Level: SRO

K/A: APE: 040 Steam Line Rupture AA2. Ability to determine and interpret the following as they apply to the Steam Line Rupture: (CFR: 43.5 / 45.13) AA2.03 Difference between steam line rupture and LOCA 4.6 4.7

Lesson Plan Objective: None

Source: NEW

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Question 3
Level of knowledge: comprehension

References:
1. AP/10, AP/28, AP/11
2.

A. Purpose

To provide proper response for operator actions for a secondary steam leak when a Reactor Trip or Safety Injection has not occurred.

B. Symptoms

- **Reactor power greater than turbine power**
- **Reactor power greater than 100%**
- **NC T-Avg decreasing in an unexpected manner**
- **Steam pressure decreasing in an unexpected manner**
- **1AD-2, E/8 "OVER POWER ROD STOP" - LIT**
- **1AD-13, A/7 "ICE COND LOWER INLET DOORS OPEN" - LIT**
- **One or all of the following increasing without abnormal containment radiation:**
  - Containment pressure
  - Containment temperature
  - Containment humidity
  - Containment floor & equipment sump level
- **Loss of secondary condensate inventory**
- **Observed secondary steam leak.**

Case II. NC System Leak:

- Charging flow indication - INCREASING
- Pzr level - DECREASING
- Pzr pressure - DECREASING
- Any of the following EMF indications - INCREASING OR IN ALARM:
  - EMF-41 (Aux Bldg Ventilation)
  - 1EMF-38 (Containment Particulate)
  - 1EMF-39 (Containment Gas)
  - 1EMF-46A (Component Cooling Train A)
  - 1EMF-46B (Component Cooling Train B).
- Containment floor and equipment sump level(s) - INCREASING.

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Question 4

Bank Question: 07-79 ***Answer: B***

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1 Pt(s). Unit 1 is at 100% RTP when a lightening strike causes the following:

- Loss of all Offsite Power
- Loss of all phone lines entering and exiting the plant
- No fire has been reported
- Loss of all Unit 1 Annunciator Panels with the exception of 1RAD-1, 1RAD-2 and 1RAD-3.
- Operator Aid Computer is operating
- All other equipment has operated as designed.
- Additional personnel have been called in.

30 minutes after the lightening strike, which of the following states the classification of emergency for the above conditions.

Reference Provided

A. Notification of Unusual Event

B. Alert

C. Site Area Emergency

D. General Emergency

Required Reference: RP/01

Distracter Analysis:

A. **Incorrect:**
Plausible: Correct for Ann loss without transient and loss of communications and loss of offsite power.

B. **Correct:**

C. **Incorrect:**
Plausible: Would be correct if also had a loss of onsite power or if also had a loss of OAC.

D. **Incorrect**:
Plausible: Would be correct if also had a loss of onsite power and a loss of S/B M/U Pump and could not restore in 4 hours.

Level: SRO

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Question 4
K/A: APE: 056 Loss of Offsite Power 2.4 Emergency Procedures /Plan 2.4.32
Knowledge of operator response to loss of all annunciators. (CFR: 41.10 / 43.5 / 45.13)
IMPORTANCE RO 3.3 SRO 3.5

Lesson Plan Objective: SEP02 When given a set of plant conditions and access to reference materials, correctly classify an event using RP/0/A/5000/001.

Source: NEW

Level of knowledge: comprehension

References:
1. RP/01
2.

Enclosure 4.5

Loss of Power

UNUSUAL EVENT

4.5.U.1 Loss of All Offsite Power to Essential Busses for Greater Than 15 Minutes.

OPERATING MODE: 1, 2, 3, 4

4.5.U.1-1 The following conditions exist:

Loss of offsite power to essential buses ETA and ETB for greater than 15 minutes.

AND

Both emergency diesel generators are supplying power to their respective essential busses.

OPERATING MODE: 5, 6, No Mode

(Continued)

ALERT

4.5.A.1 Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses During Cold Shutdown Or Refueling Mode.

OPERATING MODE: 5, 6, No Mode

4.5.A.1-1 Loss of all offsite and onsite AC power as indicated by:

Loss of power on essential buses ETA and ETB.

AND

Failure to restore power to at least one essential bus within 15 minutes.

(Continued)

SITE AREA EMERGENCY

4.5.S.1 Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses.

OPERATING MODE: 1, 2, 3, 4

4.5.S.1-1 Loss of all offsite and onsite AC power as indicated by:

Loss of power on essential buses ETA and ETB.

AND

Failure to restore power to at least one essential bus within 15 minutes.

4.5.S.2 Loss of All Vital DC Power.

OPERATING MODE: 1, 2, 3, 4

(Continued)

GENERAL EMERGENCY

4.5.G.1 Prolonged Loss of All (Offsite and Onsite) AC Power.

OPERATING MODE: 1, 2, 3, 4

4.5.G.1-1 Prolonged loss of all offsite and onsite AC power as indicated by:

Loss of power on essential buses ETA and ETB for greater than 15 minutes.

AND

Standby Shutdown Facility (SSF) fails to supply NC pump seal injection **OR** CA supply to Steam Generators.

AND

At least one of the following conditions exist:

- Restoration of at least one essential bus within 4 hours is **NOT** likely

(Continued)

Enclosure 4.2

System Malfunctions

UNUSUAL EVENT

4.2.U.1 Inability to Reach Required Shutdown Within Technical Specification Limits.

OPERATING MODE: 1, 2, 3, 4

4.2.U.1-1 Plant is not brought to required operating mode within Technical Specifications LCO Action Statement Time.

4.2.U.2 Unplanned Loss of Most or All Safety System Annunciation or Indication in the Control Room for Greater Than 15 Minutes.

OPERATING MODE: 1 , 2, 3, 4

4.2.U.2-1 The following conditions exist:

Unplanned loss of most (>50%) annunciators associated with safety systems for greater than 15 minutes.

AND

In the opinion of the Operations Shift Manager/Emergency Coordinator/EOF Director, the loss of the annunciators or indicators requires additional personnel (beyond normal shift compliment) to safely operate the unit.

CONTINUED

ALERT

4.2.A.1 Unplanned Loss of Most or All Safety System Annunciation or Indication in Control Room With Either (1) a Significant Transient in Progress, or (2) Compensatory Non-Alarming Indicators Unavailable.

OPERATING MODE: 1, 2, 3, 4

4.2.A.1-1 The following conditions exist:

Unplanned loss of most (>50%) annunciators associated with safety systems for greater than 15 minutes.

AND

In the opinion of the Operations Shift Manager/Emergency Coordinator/EOF Director, the loss of the annunciators or indicators requires additional personnel (beyond normal shift compliment) to safely operate the unit.

AND

EITHER of the following:

- A **significant plant transient** is in progress
- Loss of the OAC.

END

SITE AREA EMERGENCY

4.2.S.1 Inability to Monitor a Significant Transient in Progress.

OPERATING MODE: 1, 2, 3, 4

4.2.S.1-1 The following conditions exist:

Loss of most (>50%) Annunciators associated with safety systems.

AND

A **significant plant transient** is in progress.

AND

Loss of the OAC.

AND

Inability to provide manual monitoring of any of the following Critical Safety Functions:

- subcriticality
- core cooling
- heat sink
- containment.

END

GENERAL EMERGENCY

END

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Question 5

Bank Question: 07-80 ***Answer: C***

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1 Pt(s). AP/0/A/5500/022 (Loss of Instrument Air) is in progress. VI pressure is as shown below:

Time	0345	0415	0430	0445
VI Pressure	74	59	54	49

Which one of the following correctly states both of the following?
1. At what time must the SRO direct the reactor to be tripped
2. What action must be taken following the trip

A. 1. 0345
2. Close the MSIVs

B. 1. 0415
2. Close CF Regs and Bypasses

C. 1. 0430
2. Close MSIVs

D. 1. 0445
2. Close CF Regs and Bypasses

Distracter Analysis:
At 80 PSIG N2 becomes the primary motive force for the S/G PORVs.
At 80 PSIG the CA valve accumulators will begin to discharge.
At 80 PSIG the PZR PORVs may be affected.
75 is when VS aligned
60 is when backup sealing must be aligned to the VI Compressor.
55 is when reactor trip is required and closure of the MSIV
50 CF reg erratic

S/G Level decreasing in an uncontrolled manner
MSIV goes closed due to loss of VI

A. **Incorrect:**
Plausible: Correct action but time (press) corresponds to when station air is aligned to VI.

B. **Incorrect:**
Plausible: Incorrect action (valves are effected but at a lower pressure than the trip) tied with the incorrect time (press). Incorrect time is associated with aligning back up sealing to the compressors.

C. **Correct**:

D. **Incorrect**:

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Question 5

Plausible: Time (press) is incorrect the trip should already have occurred. This time is would be correct for the incorrect action given.

Level: SRO

K/A: APE: 065 Loss of Instrument Air AA2. Ability to determine and interpret the following as they apply to the Loss of Instrument Air: (CFR: 43.5 / 45.13) AA2.06 When to trip reactor if instrument air pressure is de-creasing 3.6* 4.2

Lesson Plan Objective: None

Source: NEW

Level of knowledge: comprehension

References:
1. AP/22
2.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE
- At 80 PSIG N2 becomes the primary motive force for the S/G PORVs.
- At 80 PSIG the CA valve accumulators will begin to discharge.
- At 80 PSIG the PZR PORVs may be affected.

__ 6. **Verify VI pressure - GREATER THAN 80 PSIG.**	**Perform the following:** __ a. **IF** 1AD-8, F/3 "VI DRYER BYPASS VLV OPEN" is dark, **THEN** dispatch operator to open 1VI-671 (VI Dryer Manual Bypass Valve) (SB-564, T-35). __ b. Dispatch operator to ensure 1VI-499 (VI Comp D To VS Hdr Isol) (SB-582, T-32) is closed. c. **IF** PZR PORVs are required for current plant condition, **THEN** ensure the following valves - OPEN AS REQUIRED: __ • 1NI-438A (Emer N2 From CLA A To 1NC-34A) __ • 1NI-439B (Emer N2 From CLA B To 1NC-32B) __ • 2NI-438A (N2 To 2NC-34A From Accum 2A) __ • 2NI-439B (N2 To 2NC-32B From Accum 2B). __ d. **IF** fuel handling is in progress, **THEN** notify fuel handling supervisor to place components being handled in a safe position. __ e. **GO TO** Step 9.
__ 7. **IF AT ANY TIME VI pressure is less than 80 PSIG, THEN RETURN TO Step 6.**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 8. **GO TO Step 11.**	
__ 9. **Verify VI pressure - GREATER THAN 75 PSIG.**	**Perform the following:** a. Ensure VS compressors are on as follows: __ • Unit 1 OAC (VS Group Display) OR __ • Dispatch operator to ensure VS compressor(s) in service. **REFER TO** OP/0/A/6450/013 (Station Air System). b. Verify 1VS-78 (Station Air Auto Backup To Inst Air) is open by one of the following methods: __ • Unit 1 OAC OR __ • Dispatch operator to ensure 1VS-78 (Station Air Auto Backup To Inst Air) (SB-568, S-33) (Ladder needed) - OPEN. __ c. **IF** VS cannot supply VI, **THEN** dispatch operator to close 1VS-79 (VS To VI Backup Sup) (SB-568, T-33) (Ladder needed). __ d. **GO TO** Step 11.
__ 10. **IF AT ANY TIME VI pressure is less than 75 PSIG, THEN RETURN TO Step 9.**	
__ 11. **Dispatch operator(s) to locate and isolate VI System leaks.**	
__ 12. **Verify VI pressure - INCREASING.**	__ **IF VI pressure is not under operator control, THEN GO TO Step 16.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **If VI pressure is less than 60 PSIG, the operation of D, E, or F compressor without the backup air bottles aligned may damage the compressor.**

__ 18. **IF AT ANY TIME VI pressure is less than 60 PSIG, THEN ensure backup air bottles are aligned to operating VI compressors. REFER TO OP/0/A/6450/005 (Instrument Air System).**

19. **Perform the actions of the appropriate enclosure(s) for the affected unit(s) as follows:**

__ • **GO TO** Enclosure 3 (Unit 1 Loss Of VI System Actions)

__ • **GO TO** Enclosure 4 (Unit 2 Loss Of VI System Actions).

END

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. **IF AT ANY TIME VI pressure is less than 55 PSIG AND decreasing, THEN:**

__ a. Trip reactor.

__ b. **WHEN** reactor power less than 5%, **THEN** depress the "CLOSE" pushbutton for all MSIVs.

__ c. Continue in this procedure as time permits.

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

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Question 6

Bank Question: 07-81 ***Answer: C***

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1 Pt(s). The following sequence of events occurs:

- Unit 2 was operating at 100% power
- Large break LOCA occurred 25 minutes ago.
- The crew is currently implementing EP/2/A/5000/ECA 1.1 (Loss of Emergency Coolant Recirculation) due to loss of recirculation capability.
- RCS Pressure is 15 psig
- Containment pressure is 11 psig.
- FWST level is 18%
- Containment Sump level is 4.5 feet.
- Both Unit 2 RN Pumps are ON
- 1A RN Pump is ON
- 1B RN Pump is OFF

Given the attached reference, EP/2/A/5000/ECA 1.1 (Loss of Emergency Coolant Recirculation) which of the following indicates the REQUIRED correct combination of NS pumps and ND pumps which are operating to provide containment spray (NS) and how many NS HX have flow from RN (Unisolated) required under the above conditions?

Reference Provided

	NS Pump(s) On	NS HX Unisolated	ND Pump(s) aligned for Containment Spray
A.	2	2	1
B.	2	1	1
C.	1	1	0
D.	0	0	0

Reference Required
EP/2/A/5000/ECA 1.1 (Loss of Emergency Coolant Recirculation)

Distracter Analysis:
The number of required NS pumps is determined at step 7 of ECA-1.1. The candidate must use FWST level to determine if 1NS-3 and 1NS-20 are open. The FWST level provided in the stem indicates that the pump suctions are still aligned to the FWST. 15 psig in containment requires entry into Z.1. Z.1 directs operation of the NS pumps in accordance with ECA-1.1. Z.1 attempts to place one train of ND in service on cont spray but this can only be done if greater than 50 minutes since reactor trip.

A. **Incorrect:**

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Question 6

Plausible: Normal number of pumps per Z.1. Normal number of HX Unisolated if all RN available. Correct ND pumps if pressure 15 psig and grater than 50 minutes.

B. **Incorrect:**
Plausible: Normal number of pumps per Z.1. Correct number of HX Unisolated RN condition. Correct ND pumps if pressure 15 psig and grater than 50 minutes.

C. **Correct:**

D. **Incorrect**: Correct number of NS Pumps if pressure less than 10 or FWST less than 5 %.
Plausible: Correct number of NS Pumps and HX if pressure less than 10 or FWST less than 5 %. Correct ND Pump configuration.

Level: SRO

K/A: Westinghouse E11 Loss of Emergency Coolant Recirculation EA2. Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation) EA2.2 Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments. IMPORTANCE RO 3.4 SRO 4.2

Lesson Plan Objective: EP219 Explain the Bases, including any identified knowledges/abilities, for all of the steps, notes, and cautions in EP/1/A/5000/ES-1.4 (Transfer to Hot Leg Recirculation)

Source: MODIFIED (Indian Point 2004)

Level of knowledge: comprehension

References:
1.
2. EP/2/A/5000/ECA 1.1 (Loss of Emergency Coolant Recirculation)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. **Determine NS requirements as follows:**

a. Verify following NS pump suction valves - OPEN:

__ • 1NS-20A (NS Pump 1A Suct From FWST)

__ • 1NS-3B (NS Pump 1B Suct From FWST).

__ a. **GO TO** Step 10.

__ b. Determine number of NS pumps required from the following table:

FWST LEVEL	CONTAINMENT PRESSURE (PSIG)	NS PUMPS REQUIRED
GREATER THAN 5%	GREATER THAN 15	2
	BETWEEN 10 AND 15	1
	LESS THAN 10	0
LESS THAN 5%	N/A	0

__ c. Verify the number of NS pumps on - EQUAL TO NUMBER REQUIRED.

__ c. Manually operate NS pumps as required by table above.

8. **Verify criteria to align NS for recirc as follows:**

__ a. Any NS pump - ON.

__ a. **GO TO** Step 9.

__ b. Containment sump level - GREATER THAN 3.5 FT.

b. Perform the following:

__ 1) **WHEN** containment sump level greater than 3.5 ft, **THEN** perform Step 8.c.

__ 2) **GO TO** Step 9.

__ c. Align NS for recirc. **REFER TO** Enclosure 3 (Aligning NS for Recirculation).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
i. Verify proper recirc flow as follows:	__ i. **IF** any S/I pump on without a suction flowpath, **THEN** stop the affected pump(s).
__ • "NV S/I FLOW" - INDICATING FLOW	
__ • NI pumps - INDICATING FLOW	
__ • ND pumps - INDICATING FLOW.	
6. **WHEN FWST level decreases to 11% (1AD-9, E/8 "FWST LO-LO LEVEL" alarm lit), THEN perform the following:**	
__ a. Stop NS Pumps.	
__ b. Align NS for recirc. **REFER TO** Enclosure 2 (Aligning NS for Recirculation).	
7. **IF any NS pump in service with suction aligned to FWST, THEN perform the following:**	
__ a. Ensure appropriate operator is in possession of Enclosure 2 (Aligning NS for Recirculation).	
__ b. Designate operator to ensure NS pumps immediately secured when FWST level decreases to 11% **OR** 1AD-9, E/8 "FWST LO-LO LEVEL" alarm lit.	
__ c. **IF** time and manpower permit, **THEN** notify designated operator to review Enclosure 2 (Aligning NS for Recirculation) for current plant conditions.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Close the following valves:** __ • 1NS-20A (NS Pump 1A Suct From FWST) __ • 1NS-3B (NS Pump 1B Suct From FWST).	
2. **Verify at least one of the following annunciators - LIT:** __ • 1AD-20, B/3 "CONT. SUMP LEVEL >3.3 ft" OR __ • 1AD-21, B/3 "CONT. SUMP LEVEL >3.3 ft".	**Perform the following:** __ a. **WHEN** at least one "CONT. SUMP LEVEL >3.3 ft" annunciator is LIT, **THEN GO TO** Step 3. __ b. Do not continue in this enclosure until at least one annuciator is LIT.
__ 3. **Verify both NS trains - AVAILABLE FOR SERVICE.**	**Perform the following:** __ a. **IF** NS Train 1A is available, **THEN GO TO** Step 5. __ b. **IF** NS Train 1B is available, **THEN GO TO** Step 6.

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Question 7

Bank Question: 07-82 ***Answer: D***

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1 Pt(s). During Unit 1 Refueling outage, an accident occurred, causing damage to spent fuel in the Unit 1 Spent Fuel Pool. All workers were successfully evacuated and a recovery plan is being developed. A planned special exposure to allow work in the Spent Fuel Pool is being considered.

Given the following information concerning a worker:

- Lifetime occupational dose = 4 Rem
- Lifetime planned special exposure dose = 14 Rem
- Current year occupational dose = 0.5 Rem
- Current year planned special exposure dose = 1 Rem
- Projected dose for this planned special exposure = 6 Rem

You have been tasked to determine if the worker is allowed to perform this task and what is the highest level of station management required to approve a planned special exposure?

A. Yes, the worker is allowed. Must be approved by the RP Manager.

B. No, the worker is NOT allowed. Must be approved by the RP Manager

C. Yes, the worker is allowed. Must be approved by the Site VP.

D. No, the worker is NOT allowed. Must be approved by the Site VP.

Distracter Analysis:

A. **Incorrect**:
Plausible: Worker does meet the 5X lifetime requirement but not the yearly limit. RP manager approval required but not the highest.

B. **Incorrect:**
Plausible: Correct but RP manager approval required but not the highest.

C. **Incorrect:**
Plausible: Worker does meet the 5X lifetime requirement but not the yearly limit.

D. **Correct:**

Level: SRO

K/A: APE 036 Fuel Handling Incidents 2.3 Radiation Control 2.3.4 Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized. (CFR: 43.4 / 45.10) IMPORTANCE RO 2.5 SRO 3.1

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Question 7
Lesson Plan Objective: HP17 Summarize the requirements for a planned special exposure per Radiation Protection Policy II-2.

Source: NEW

Level of knowledge: comprehension

References:
1. HP lesson, 10CFR20, NSD 507, SH/0/B/2000/002

2.

2.2 Exposure Extensions and Reductions (Obj. #16)

A. Changing of administrative exposure limits above 2000 mrem shall be controlled by a step process of authorization and documentation to ensure doses are kept ALARA and NRC limits are not exceeded.

B. If it is desired for an employee to exceed the 2000 mrem admin limit, the following must be satisfied (NSD 507 requires an extension if an individual is to exceed 90% of his ADMIN limit or 1800 mrem).

1. Exposure extension request form must be completed by the Section Requester.

   a) Obtain RP assistance.

2. Cannot be declared pregnant or a minor.

3. Extension becomes invalid after employee termination or at year end.

4. Shall not be extended above 2000 mrem.

5. Must receive approval of Section and RP Managers.

6. For extensions above 4500 mrem Station Manager and Nuclear Site Vice President approvals are also required.

C. If an extension is no longer required the proper forms shall be filled out for Exposure limit reduction.

1. If the individual's dose has exceeded 80% of the yearly admin limit (i.e. 80% of 2000, or 1600 mrem), then the new limit is calculated by the following formula.

   a) 1.33 x current dose.

2. RP should assist with the reduction.

2.3 Planned Special Exposure (Obj. #17)

A PSE is an infrequent exposure to radiation separate from, and in addition to, the NRC dose limits. This type of exposure has several requirements associated with it and can be used only in an exceptional situation where alternatives that might avoid the higher exposure are unavailable or impractical.

A. The RP Manager, Section Manager, and Nuclear Site Vice President shall approve all Planned Special Exposures.

B. Dose from Planned Special Exposures will not be used in controlling future occupational doses, but will be included in future Planned Special Exposures.

C. Limits for Planned Special Exposure are per the previous exposure limit table.

D. The NRC shall be notified within 30 days of any Planned Special Exposure.

10CFR20 Limits / Duke Energy Limits (Obj. #2)

Conditions of Exposure	NRC(10CFR20) Limits	DE Basic Administrative Control	DE Maximum Administrative Control
Adult Total Effective Dose Equivalent (TEDE)	5.0 rem/year	2.0 rem/year	5.0 rem/year
Adult Lens Dose Equivalent (LDE) (Lens of Eye)	15.0 rem/year		15.0 rem/year
Adult Shallow-Dose Equivalent (SDE) 1. Skin 2. Extremities	50 rem/year		50 rem/year
Any Internal Organ (for example, thyroid)	50 rem/year		50 rem/year
Minors	10% of Adult and may not enter High Rad Area		10% of Adult and may not enter High Rad Area
Public	100 mrem		
Declared Pregnant Woman (TEDE)	500 mrem /pregnancy	50 mrem/month	500 mrem /pregnancy
If the radiation worker is found to have exceeded, or is within 50 mrem of the 500 mrem allowed by the time the pregnancy is declared, a limit of 50 mrem for the remainder of the pregnancy will be applied.			
Planned Special Exposure	Lifetime PSE limits are five times the TEDE/LDE/SDE limits. Annual PSE limits equal the TEDE/LDE/SDE limits.	Lifetime PSE limits are five times the TEDE/LDE/SDE limits. Annual PSE limits equal the TEDE/LDE/SDE limits.	Lifetime PSE limits are five times the TEDE/LDE/SDE limits. Annual PSE limits equal the TEDE/LDE/SDE limits.

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Question 8

Bank Question: 07-83 ***Answer: D***

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1 Pt(s). Unit 1 has experienced a large LOCA. All ECCS equipment is operating as designed.

Annunciator 1RAD-3 C/2 (1EMF12 594 CC, 57 Control Room) is received. The Shift RP Technician has validated the Trip 2 of 1EMF-12.

What actions should be taken to respond to this alarm?

A. Evacuate the Control Room to the SSF and secure the pressurizing filter trains allowing unfiltered in-leakage into the control room.

B. Evacuate non-essential persons from control room while essential persons don respirators and secure the pressurizing filter trains allowing unfiltered in-leakage into the control room.

C. Evacuate the Control Room to the SSF and notify Security to restrict access to the Control Room.

D. Evacuate non-essential persons from control room while essential persons don respirators and notify Security to restrict access to the Control Room.

Distracter Analysis:

A. **Incorrect**:
Plausible: Evacuating non-essential persons from the control room would be correct however, the SSF would not be manned due to this EMF alarm, essential persons would remain. The fans must be ensured on to prevent inleakage.

B. **Incorrect:**
Plausible: Evacuating non-essential persons under this condition is correct but the fans must be ensured on to prevent inleakage.

C. **Incorrect:**
Plausible: Evacuating non-essential persons from the control room would be correct however, the SSF would not be manned due to this EMF alarm. The action to have Security restrict access would be correct.

D. **Correct:**

Level: SRO

K/A: APE: 060 Accidental Gaseous Radwaste Release 2.4 Emergency Procedures /Plan (Continued) 2.4.10 Knowledge of annunciator response procedures. (CFR: 41.10 / 43.5 / 45.13) IMPORTANCE RO 3.0 SRO 3.1

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Question 8
Lesson Plan Objective:

Source: NEW

Level of knowledge: comprehension

References:
1. OP/1/B/6100/010Z Annunciator Response For Radiation Monitoring Panel 1RAD-3

2. OP/1/B/6100/010X Annunciator Response For Radiation Monitoring Panel 1RAD-1

C/2

1EMF12 594 CC, 57 CONTROL ROOM

SETPOINT: Per HP/0/B/1000/010 (Determination of Radiation Monitor Setpoints).

ORIGIN: 1EMF-12 low range G-M detector (trip 2 contacts).

PROBABLE CAUSE:
1. Radioactive material in the Control Room.
2. Pressurizing Filter Train failure allowing unfiltered inleakage through 1(2)-CRA-D-2 and/or 1(2)-CR-D-3.

AUTOMATIC ACTIONS: None

NOTE: If a LOCA is in progress, EP/1(2)/A/5000/E-0, Reactor Trip or Safety Injection, will ensure unit air intakes are aligned as required.

IMMEDIATE ACTIONS:
1. Evacuate all nonessential personnel from the Control Room (only 6 respirators available).

SUPPLEMENTARY ACTIONS:
1. Notify Radiation Protection to verify a valid alarm.
2. If any of the following have occurred, reset VC/YC per OP/0/A/6450/011 (Control Room Area Ventilation/Chilled Water System):
   - ☐ A LOCA has occurred and the pressurizing filter train on the non-selected train has failed to start.
   - ☐ A B/O on the operating train has occurred and the pressurizing filter train fails to start.
   - ☐ A B/O on the non-operating train has occurred and the pressurizing filter train fails to start.
3. If VC/YC is reset, and the pressurizing filter train on the selected train is <u>not</u> in service, swap trains of VC/YC per OP/0/A/6450/011 (Control Room Area Ventilation/Chilled Water System).
4. If alarm is valid, notify Security to restrict access to the Control Room.

REFERENCES: CNM-1346.05-33

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Question 9

Bank Question: 07-84 ***Answer: D***

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1 Pt(s). Following evacuation from the control room, the crew is attempting to maintain Mode 3 from the Auxiliary Shutdown Panels (ASP). The following is noted:

- PZR Level on 1A ASP is 12%
- PZR Level on 1B ASP is 13%
- Letdown is in service
- PZR heaters are ON

Which of the following correctly explains the above indications and provides direction for the crew?

A. Both ASP PZR Level gauges are fed from the same transmitter which has failed. A separate Level Switch actuates the auto isolation of letdown and the auto secure of the heaters.

Exit AP/1/A/5500/017 (Loss of Control Room) and enter AP/1/A/5500/12 (Loss of Charging or Letdown)

B. Both ASP PZR Level gauges are fed from the same transmitter which has failed. The auto isolation of letdown and the auto secure of the heaters are fed from the same transmitter and should have occurred but failed

Remain in AP/1/A/5500/017 (Loss of Control Room) and refer to AP/1/A/5500/12 (Loss of Charging or Letdown)

C. PZR Level indications are fed from two separate transmitters and are correct. The auto isolation of letdown and the auto secure of the heaters are fed from either transmitter and should have occurred but failed

Remain in AP/1/A/5500/017 (Loss of Control Room) and refer to AP/1/A/5500/12 (Loss of Charging or Letdown)

D. PZR Level indications are fed from two separate transmitters and are correct. There is no auto isolation of letdown or secure of the heaters when control is from the ASP.

Remain in AP/1/A/5500/017(Loss of Control Room) and do NOT enter or refer to AP/1/A/5500/12 (Loss of Charging or Letdown)

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Question 9
Distracter Analysis:

A. **Incorrect**:
Plausible: Multiple PZR Level instruments feed the actual level indication on the OAC. The Lo KC Surge tank Level does come off a separate level switch than the indication. AP/12 would not be entered or referred to in this instance as would be if in the control room.

B. **Incorrect:**
Plausible: Multiple PZR Level instruments feed the actual level indication on the OAC but each ASP indication for PZR Level has its own transmitter. Auto action does come off Level instrument in control room control but there is no auto action for letdown or the heaters if controlled from ASP. . AP/12 would not be entered or referred to in this instance as would be if in the control room.

C. **Incorrect:**
Plausible: Level instrument is correct but there is no auto action for letdown or the heaters if controlled from ASP. AP/12 would not be entered or referred to in this instance as would be if in the control room.

D. **Correct:**

Level: SRO

K/A: APE: 068 Control Room Evacuation AA2. Ability to determine and interpret the following as they apply to the Control Room Evacuation: (CFR: 43.5 / 45.13) AA2.07 PZR level 4.1 4.3

Lesson Plan Objective: RSS09 Be able to do the following: List the major actions, as described in the lesson, that are performed at S/D panels A, B, TDCA and D/G; Describe the automatic component/system alignments, as described in the lesson plan, that occur when the Aux S/D panels are placed in Local; State the control signals that are blocked when the Aux S/D panels are placed in Local

Source: NEW

Level of knowledge: comprehension

References:
1. RSS Lesson, AP/17
2. OP/**1**/A/6100/004
3. PT/1/A/4600/003A

Enclosure 13.2

Remote Shutdown Monitoring Instrumentation

#	SURVEILLANCE ITEM (Tech Spec Reference)	ACCEPTANCE CRITERIA -AND DATA	QUALIFYING CONDITIONS	COMPUTER POINT ID	APPLICABLE MODE	INITIALS
5	PZR Level Channel Check (TS Table 3.3.4-1, Item 4.a)	At least one remote indication (@ ASP "A" or "B") shall agree with Control Room indication within ± 3.5% of indicated level. Record below: PZR Level Channels ASP A (1NCP5152) _____ % Control Room _____ % C/R Instrument used _____ ASP B (1NCP5162) _____ % Control Room _____ % C/R Instrument used _____			1 2 3	
6	PZR Pressure Channel Check (TS Table 3.3.4-1, Item 2.a)	At least one remote indication (@ ASP "A" or "B") shall agree with Control Room indication within ± 28 psig. Record below: PZR Pressure Channels ASP A (1NCP5155) _____ PSIG Control Room _____ PSIG C/R Instrument used _____ ASP B (1NCP5163) _____ PSIG Control Room _____ PSIG C/R Instrument used _____	(1)		1 2 3	

(1) When NC pressure is ≤ 1700 psig, use the indicated values (may be bottom of scale) to meet this SR.

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Question 10

Bank Question: 07-85 ***Answer: C***

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1 Pt(s). A small break LOCA has occurred on Unit 1. The crew is performing EP/1/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization).

The OATC reports he has a sustained cooldown rate of 70 deg F per hour.

Which of the following describes the direction (if any) the SRO should give the OATC concerning the cooldown rate?

A. Decrease cooldown rate to 50 deg F per hour.

B. Cooldown rate is acceptable; no action is required.

C. Cooldown rate should be increased to as close as possible without exceeding 100 deg F per hour.

D. Cooldown rate should be increased to "max rate".

Distracter Analysis:

A. **Incorrect:**
Plausible: This is the rate given in several EP for "normal" C/D.

B. **Incorrect:**
Plausible: This would be correct for other EPs that only specify a rate of <100/hour.

C. **Correct:**

D. **Incorrect**:
Plausible: This is the C/D rate given for E-3 and others.

Level: SRO

K/A: Westinghouse E03 LOCA Cooldown and Depressurization EA2. Ability to determine and interpret the following as they apply to the (LOCA Cooldown and Depressurization) (CFR: 43.5 / 45.13) EA2.2 Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments. IMPORTANCE RO 3.5 SRO 4.1

Lesson Plan Objective: EP217 Explain the Bases, including any identified knowledges/abilities, for all of the steps, notes, and cautions in EP/1/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization)

Source: Modified (Point Beach 2003)

Level of knowledge: Memory

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Question 10
References:
1. EP-ES.1.2
2.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. (Continued)	
__ f. Dump steam to condenser while maintaining cooldown rate based on NC T-Colds as close as possible without exceeding 100°F in an hour.	__ f. Dump steam from intact S/G(s) PORV while maintaining cooldown rate based on NC T-Colds as close as possible without exceeding 100°F in an hour.
__ 14. **Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.**	__ **GO TO Step 30.**
15. **Verify S/I is in service as follows:**	__ **GO TO Step 25.**
__ • At least one NI pump - ON OR __ • 1NI-9A (NV Pmp C/L Inj Isol) - OPEN OR __ • 1NI-10B (NV Pmp C/L Inj Isol) - OPEN OR • At least one ND pump on with suction aligned to either of the following: __ • FWST OR __ • Containment sump.	

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Question 11

Bank Question: 07-86 ***Answer: D***

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1 Pt(s). A Safety Injection has occurred on Unit 2. The following plant status is obtained:

- W/R Neutron Power = 1E 10^{-6} and slowly increasing
- 2ETA is deenergized
- 2B NV Pump has tripped and cannot be restarted
- Containment Pressure = 4 psig and slowly decreasing
- PZR Level = 0%
- NC Pressure = 1735 psig and increasing
- Core Exit Temperature = 715 deg F and increasing
- RVLIS Level = 46%

Which of the following states the CSF Procedure which should be entered at this time?

A. EP/2/A/5000/FR-S.1 (Response to Nuclear Power Generation/ATWS)

B. EP/2/A/5000/FR-S.2 (Response to Loss of Core Shutdown)

C. EP/2/A/5000/FR-C.1 (Response to Inadequate Core Cooling)

D. EP/2/A/5000/FR-C.2 (Response to Degraded Core Cooling)

Distracter Analysis:

A. **Incorrect**:
Plausible: Power increasing is a sign the reactor is not shutdown. This is true for the given situation but S.1 entry is not required.

B. **Incorrect:**
Plausible: Power increasing is a sign the reactor is not shutdown. This is true for the given situation but the S.2 entry is a 'yellow' path which is overridden by the orange path for core cooling.

C. **Incorrect:**
Plausible: Would be true if RVLIS was less than 41%.

D. **Correct:**

Level: SRO

K/A: Westinghouse E06 Degraded Core Cooling EA2. Ability to determine and interpret the following as they apply to the (Degraded Core Cooling) (CFR: 43.5 / 45.13) EA2.2 Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments. IMPORTANCE RO 3.5 SRO 4.1

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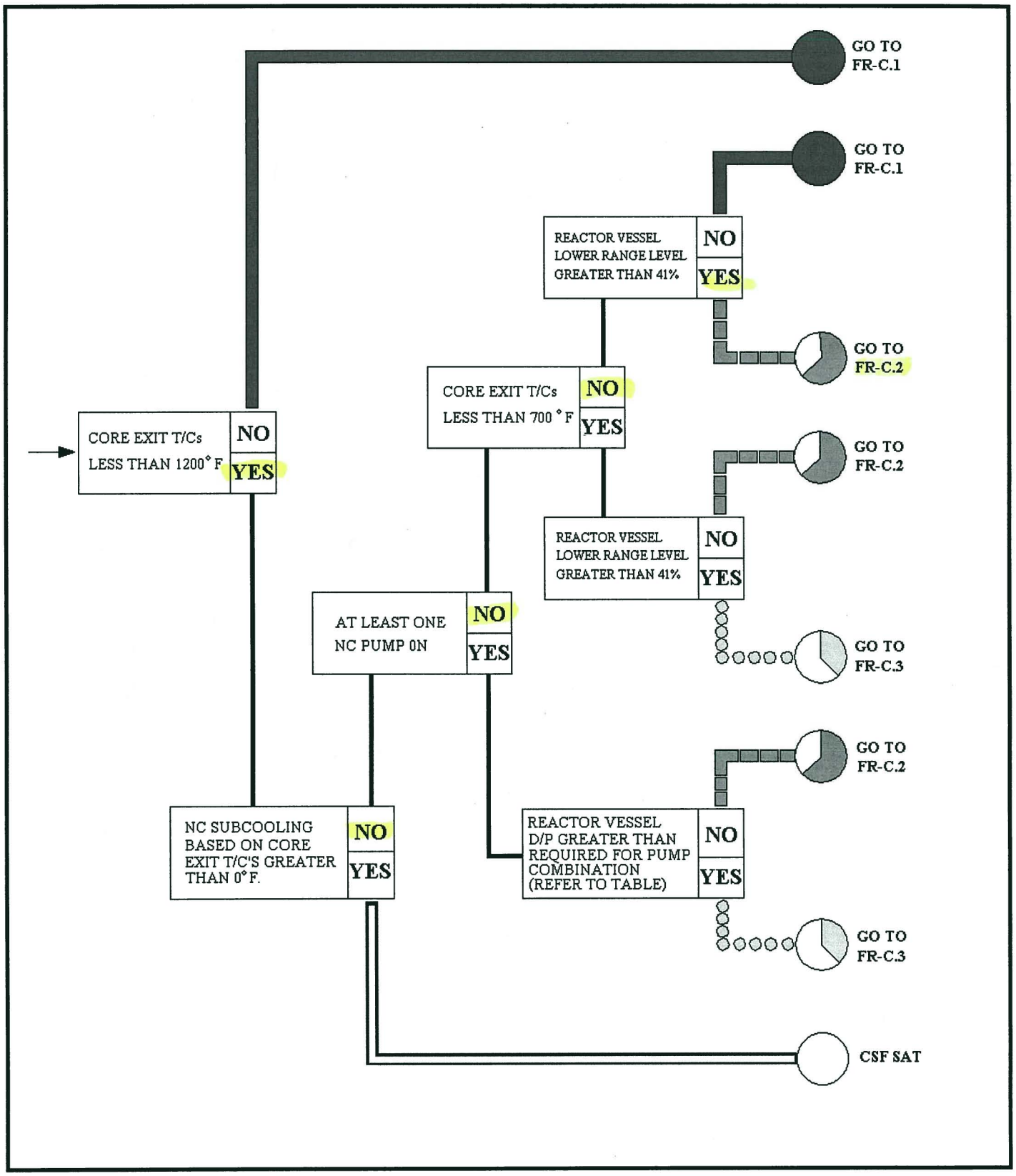
Question 11

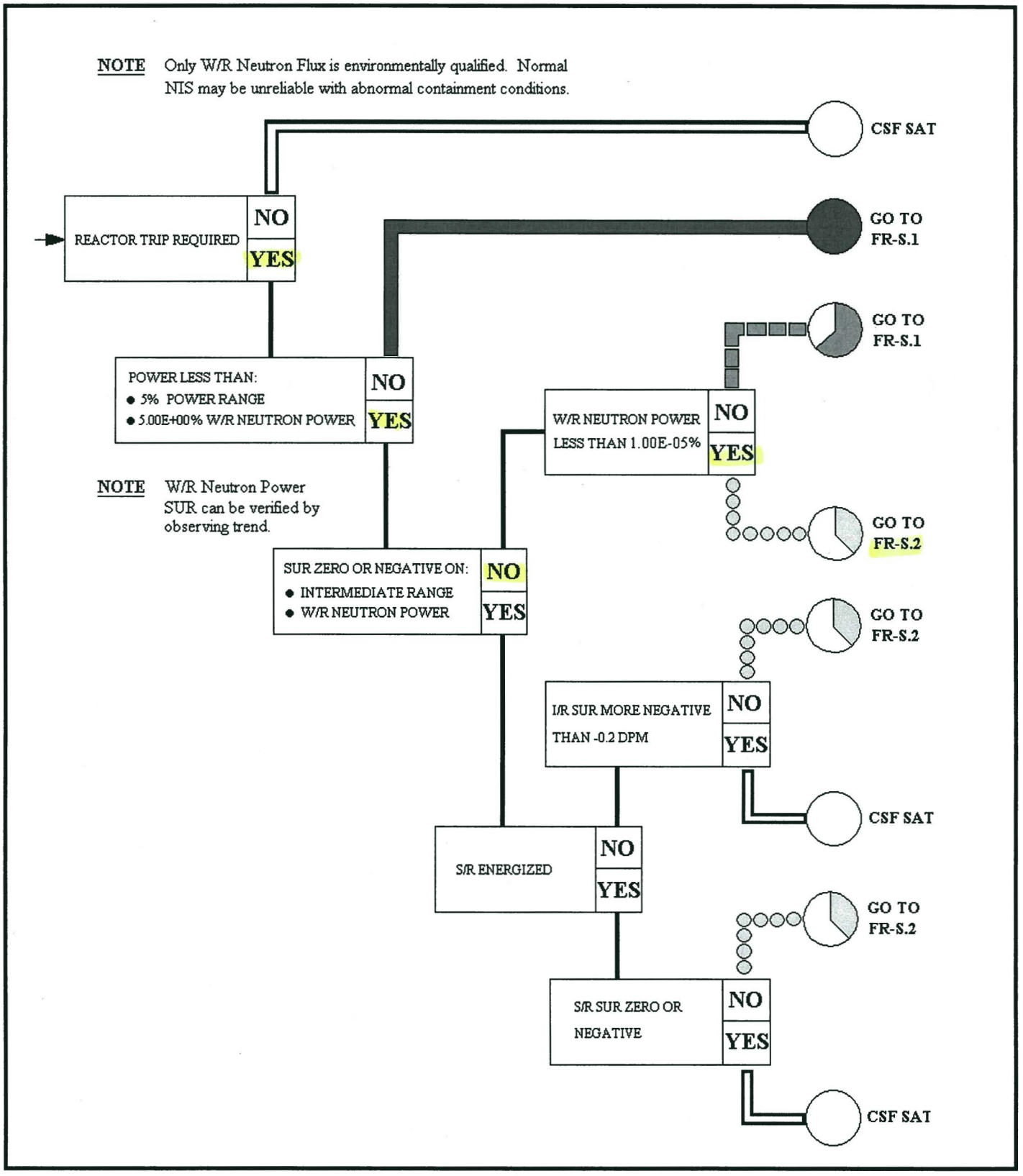
Lesson Plan Objective: CSF07 Given a set of specific plant conditions and required procedures, apply the rules of usage and outstanding PPRBs to identify the correct procedure flowpath and necessary actions

Source: NEW

Level of knowledge: comprehension

References:
1. F-0
2.


GO TO FR-C.1
GO TO FR-C.1
REACTOR VESSEL LOWER RANGE LEVEL GREATER THAN 41%
NO
YES
GO TO FR-C.2
CORE EXIT T/Cs LESS THAN 700 °F
NO
YES
CORE EXIT T/Cs LESS THAN 1200° F
NO
YES
GO TO FR-C.2
REACTOR VESSEL LOWER RANGE LEVEL GREATER THAN 41%
NO
YES
AT LEAST ONE NC PUMP ON
NO
YES
GO TO FR-C.3
GO TO FR-C.2
NC SUBCOOLING BASED ON CORE EXIT T/C'S GREATER THAN 0°F.
NO
YES
REACTOR VESSEL D/P GREATER THAN REQUIRED FOR PUMP COMBINATION (REFER TO TABLE)
NO
YES
GO TO FR-C.3
CSF SAT


NOTE Only W/R Neutron Flux is environmentally qualified. Normal NIS may be unreliable with abnormal containment conditions.
CSF SAT
REACTOR TRIP REQUIRED
NO
YES
GO TO FR-S.1
GO TO FR-S.1
POWER LESS THAN:
• 5% POWER RANGE
• 5.00E+00% W/R NEUTRON POWER
NO
YES
W/R NEUTRON POWER LESS THAN 1.00E-05%
NO
YES
NOTE W/R Neutron Power SUR can be verified by observing trend.
GO TO FR-S.2
SUR ZERO OR NEGATIVE ON:
• INTERMEDIATE RANGE
• W/R NEUTRON POWER
NO
YES
GO TO FR-S.2
I/R SUR MORE NEGATIVE THAN -0.2 DPM
NO
YES
CSF SAT
S/R ENERGIZED
NO
YES
GO TO FR-S.2
S/R SUR ZERO OR NEGATIVE
NO
YES
CSF SAT

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Question 12

Bank Question: 07-87 ***Answer: D***

---

1 Pt(s). A large break LOCA has occurred on Unit 1. During the swap to cold leg recirculation the crew was unable to open 1NI-136B (ND Supply to NI Pump 1B). All other equipment aligned as designed. As the crew begins verifying pump flow the 1B ND Pump trips.

What action(s), if any, is/are required for this event and which procedure should be used to address this issue?

A. Trip the 1B NI Pump and continue in EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation).

B. Trip the 1B NI and NV Pumps and go to EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation)

C. Trip all NI and NV Pumps and go to EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation)

D. Verify flow from all NV and NI Pumps and continue in EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation).

Distracter Analysis:

A. **Incorrect**:
Plausible: The action is implied by the name of the valve but is incorrect. Procedure is correct.

B. **Incorrect:**
Plausible: Logical to assume the B ND Pump would feed the B NV and NI Pumps but A train can feed them if 1ND-28A is open.

C. **Incorrect:**
Plausible: This would be correct if A ND Pump had tripped.

D. **Correct:**

Level: SRO

K/A: SYSTEM: 005 Residual Heat Removal System (RHRS) A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.03 RHR pump/motor malfunction 2.9 3.1

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Question 12
Lesson Plan Objective: EP218 Explain the Bases, including any identified knowledges/abilities, for all of the steps, notes, and cautions in EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation)

Source: NEW

Level of knowledge: comprehension

References:
1. EP/ES-1.3 and NI Lesson.
2.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
e. Close the following valves:	
__ • 1ND-32A (ND Train 1A Hot Leg Inj Isol)	
__ • 1ND-65B (ND Train 1B Hot Leg Inj Isol).	
f. Verify at least one of the following NV pumps miniflow valves - CLOSED:	f. Perform the following:
__ • 1NV-203A (NV Pumps A&B Recirc Isol)	__ 1) **IF** 1NI-9A (NV Pmp C/L Inj Isol) **AND** 1NI-10B (NV Pmp C/L Inj Isol) are closed, **THEN** maintain charging flow greater than 60 GPM.
OR	2) Close the following valves:
__ • 1NV-202B (NV Pmps A&B Recirc Isol).	__ • 1NV-203A (NV Pumps A&B Recirc Isol)
	__ • 1NV-202B (NV Pmps A&B Recirc Isol).
g. Align ND train discharges to NI and NV pump suctions as follows:	
1) Open the following valves:	
__ • 1NI-332A (NI Pump Suct X-Over From ND)	
__ • 1NI-333B (NI Pump Suct From ND).	
__ 2) Ensure 1NI-334B (NI Pump Suct X-Over From ND) - OPEN.	
3) Open the following valves:	
__ • 1ND-28A (ND Supply To NV & 1A NI Pmps)	
__ • 1NI-136B (ND Supply To NI Pump 1B).	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
h. Isolate FWST from NV and NI pumps as follows:	
__ 1) Place "PWR DISCON FOR 1NI-100B" switch in "ENABLE".	
__ 2) Close 1NI-100B (NI Pmps Suct From FWST).	__ 2) Dispatch operator to close 1NI-100B (NI Pmps Suct From FWST) (AB-552, HH-JJ, 53-54, Rm 234).
3) Close the following valves:	3) Perform the following:
__ • 1NV-252A (NV Pumps Suct From FWST)	a) **IF** 1NV-252A (NV Pumps Suct From FWST) cannot be closed, **THEN** dispatch operator to perform the following:
__ • 1NV-253B (NV Pumps Suct From FWST).	__ (1) Open 1EMXA-R04A (NV Pump Suction From FWST Motor (1NV252A)) (AB-577, FF-54, Rm 478).
	__ (2) Close 1NV-252A (NV Pumps Suct From FWST) (AB-554, HH-53, Rm 234) (Ladder needed).
	b) **IF** 1NV-253B (NV Pumps Suct From FWST) cannot be closed, **THEN** dispatch operator to perform the following:
	__ (1) Open 1EMXJ-R03A (NV Pump Suction From FWST Motor (1NV253B)) (AB-560, GG-56, Rm 330).
	__ (2) Close 1NV-253B (NV Pumps Suct From FWST) (AB-554, HH-JJ, 53-54, Rm 234) (Ladder needed).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
i. Verify proper recirc flow as follows:	__ i. **IF** any S/I pump on without a suction flowpath, **THEN** stop the affected pump(s).
__ • "NV S/I FLOW" - INDICATING FLOW	
__ • NI pumps - INDICATING FLOW	
__ • ND pumps - INDICATING FLOW.	
6. **WHEN FWST level decreases to 11% (1AD-9, E/8 "FWST LO-LO LEVEL" alarm lit), THEN perform the following:**	
__ a. Stop NS Pumps.	
__ b. Align NS for recirc. **REFER TO** Enclosure 2 (Aligning NS for Recirculation).	
7. **IF any NS pump in service with suction aligned to FWST, THEN perform the following:**	
__ a. Ensure appropriate operator is in possession of Enclosure 2 (Aligning NS for Recirculation).	
__ b. Designate operator to ensure NS pumps immediately secured when FWST level decreases to 11% **OR** 1AD-9, E/8 "FWST LO-LO LEVEL" alarm lit.	
__ c. **IF** time and manpower permit, **THEN** notify designated operator to review Enclosure 2 (Aligning NS for Recirculation) for current plant conditions.	

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Question 13

Bank Question: 07-88 ***Answer: B***

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1 Pt(s). You are the control room supervisor (CRS). The OATC is monitoring his boards while the BOP has gone to an onsite nurses assessment. A NC Pump malfunction occurs. While performing AP/1/A/5500/008 (Malfunction of Reactor Coolant Pump), you read the following:

3) **WHEN** reactor power less than 5%, **THEN** perform the following:
   a) Trip the affected NC pump(s).
   b) Ensure the normal spray valve associated with the tripped NC pump(s) - IN MANUAL AND CLOSED.

4) **GO TO** EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).

What actions should you direct?

A. Direct the OATC to perform the immediate actions required per EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) while you (the CRS) perform the remaining actions of AP/1/A/5500/008 (Malfunction of Reactor Coolant Pump).

B. Direct the OATC to concurrently perform the required actions of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) and the remaining actions of AP/1/A/5500/008 (Malfunction of Reactor Coolant Pump)

C. Direct the OATC to perform the remaining actions of AP/1/A/5500/008 (Malfunction of Reactor Coolant Pump) while you (the CRS) perform the required actions of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)

D. Direct the OATC to perform the immediate actions of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection). AP/1/A/5500/008 (Malfunction of Reactor Coolant Pump) must be exited upon the reactor trip.

Distracter Analysis:

A. **Incorrect:**
Plausible: This is what most SRO want to do but it is not allowed per OMP 1-8.

B. **Correct:**

C. **Incorrect:**
Plausible: This is what most SRO want to do but it is not allowed per OMP 1-8.

D. **Incorrect**:
Plausible: EP do take precedence over AP but not under these special circumstances.

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Question 13
Level: SRO

K/A: 012 Reactor Protection System 2.1 Conduct of Operations 2.1.20 Ability to execute procedure steps. (CFR: 41.10 / 43.5 / 45.12) IMPORTANCE RO 4.3 SRO 4.2

Lesson Plan Objective: EPINTRO09 Explain the rules of usage for APs including concurrent use of EPs and APs.

Source: NEW

Level of knowledge: comprehension

References:
1. OMP 1-7, AP/008
2.

7.5. Multiple Use of EPs and APs.

A. The CRS shall determine how many procedures can be implemented at a time and their priority based on manpower availability and the particular event in progress. Some APs direct concurrent use after the reactor is tripped. Concurrent use is necessary in these APs to protect the health and safety of the public or to limit damage to plant equipment. When the AP directs concurrent use after a reactor trip, ES-0.1 (Reactor Trip Response) should be completed to the step that directs concurrent AP implementation, and then concurrent use of the APs is continued. However, some extreme circumstances may require both the APs and EPs to be run simultaneously. For example, severe plant flooding may require continued use of the AP for timely isolation of plant components to prevent further damage even after the reactor is tripped, or a loss of Nuclear Service Water in the middle of an accident may require AP implementation to restore cooling to vital plant equipment needed during the accident. In these extreme circumstances, direction shall be provided to the crew to support implementation of the EPs, as well as, performing the necessary steps in the AP to place the plant in a safe condition. The crew will need to be flexible in handling these extreme circumstances to ensure the necessary procedure steps are performed in a timely manner. Possible options are; dividing the crew up into two SRO/RO teams for a short time to complete actions of both procedures, or the CRS providing direction to ROs out of both procedures simultaneously or the CRS hands off performance of AP to the BOP or other unit RO with appropriate direction and continues directing actions from the EP to remaining crew members. APs are generally written assuming S/I has NOT occurred; therefore, an evaluation of post S/I events is needed to ensure the AP steps do not conflict with any EP in effect.

B. Several APs require tripping of the reactor followed by one or more steps prior to making the transition to E-0, Reactor Trip or Safety Injection. When the direction to trip the reactor is performed in these APs, then the immediate actions of the EPs should be performed concurrently with the remaining AP steps. In most cases, the OATC can perform the immediate actions of the EP while the BOP completes the steps in the AP with direction from the CRS.

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Question 14

Bank Question: 07-89 ***Answer: D***

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1 Pt(s). Unit 1 is at 100% RTP. You are the Control Room Supervisor (CRS). The OATC reports the following:

- Reactor Power is 100.8% and increasing
- Condenser Steam Dump 1SB-27 (SM Byp To Cond Ctrl #27) is open.
- PZR Level = 51% and decreasing
- Control Rods are in "AUTO" and are not moving
- NC Temperature = 583 deg F and decreasing

Per AP/1/A/5500/028 (Secondary Steam Leak) which of the following actions has the greatest priority?

A. Place the steam dump OFF/RESET switch to the OFF position

B. Place control rods to manual and operate to maintain Tavg with 1.5 deg F of Tref.

C. Trip the reactor and enter EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) due to decreasing PZR level.

D. Decrease Turbine load to maintain Reactor power less than 100%.

Distracter Analysis:

A. **Incorrect:**
Plausible: While this should stop the leak this is not the number 1 priority.

B. **Incorrect**:
Plausible: This is the normal action per AP/28 if temperature is out of band but the Reactor has not yet been addressed.

C. **Incorrect:**
Plausible: This is true if level continues to decrease but no action has been taken to address the loss of level at this point. This would have to be addressed prior to tripping.

D. **Correct:**

Level: SRO

K/A: SYSTEM: 039 Main and Reheat Steam System (MRSS) A2 Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.04 Malfunctioning steam dump 3.4 3.7

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Question 14

Lesson Plan Objective: NONE

Source: NEW

Level of knowledge: comprehension

References:
1. AP/28
2.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
__ 2. **Verify turbine - ONLINE.**	__ **GO TO Step 6.**
3. **Verify the following:** __ • Reactor power - LESS THAN OR EQUAL TO 100% POWER __ • T-Avg - WITHIN 1.5°F OF T-Ref.	**Perform the following:** __ a. Select "MANUAL" on turbine control panel. b. Depress "CONTROL VALVES LOWER" pushbutton and reduce turbine load to maintain: __ • Reactor power - LESS THAN OR EQUAL TO 100% POWER __ • T-Avg - WITHIN 1.5°F OF T-Ref.
4. **Verify proper reactor response as follows:** __ • Control rods - IN "AUTO" AND STEPPING IN __ • P/R neutron flux - DECREASING.	__ **IF T-Avg is greater than 1.5°F higher than T-Ref, THEN manually insert control rods as required to maintain T-Avg within 1°F of T-Ref.**
__ 5. **IF AT ANY TIME reactor power is greater than 100%, THEN perform Step 3 RNO.**	
__ 6. **Verify Pzr level - STABLE OR INCREASING.**	**Perform the following:** __ a. Maintain charging flow less than 180 GPM. __ b. Manually throttle 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to stabilize Pzr level. __ c. **IF** Pzr level is stable **OR** increasing, **THEN GO TO** Step 7. (RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
__ c. Verify S/G PORVs - CLOSED.	c. **IF** S/G pressure is less than 1090 PSIG, **THEN** perform the following: __ 1) Close affected S/G PORV. 2) **IF** S/G PORV is still open, **THEN**: __ a) Close affected S/G PORV isolation valve. __ b) **IF** S/G PORV isolation valve still open, **THEN** dispatch operator to close S/G PORV isolation valve.
__ d. Verify condenser dump valves - CLOSED.	d. Perform the following: 1) Select "OFF RESET" on the following switches: __ • "STEAM DUMP INTLK BYP TRN A" __ • "STEAM DUMP INTLK BYP TRN B". __ 2) **IF** valve will not close, **THEN** dispatch operator to close affected condenser dump valve isolation valve.

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Question 15

Bank Question: 07-90 ***Answer: B***

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1 Pt(s). Which of the following is the cause and classification for any entry into EP/1/A/5000/FR-H.1 (Loss of Secondary Heat Sink) due to a Red Path on the Heat Sink Critical Safety Function?

Reference Provided

A. Potential Loss of both the NC and Fuel Clad Barriers causing an Alert Classification.

B. Potential Loss of both the NC and Fuel Clad Barriers causing a Site Area Emergency Classification.

C. Loss of both the NC and Fuel Clad Barriers causing a Site Area Emergency Classification.

D. Loss of both the NC and Fuel Clad Barriers causing a General Emergency Classification.

Required Reference RP/01

Distracter Analysis:

A. **Incorrect:**
Plausible: Correct cause but incorrect classification. This is the classification if only one potential loss was counted.

B. **Correct:**

C. **Incorrect:**
Plausible: incorrect cause with correct classification.

D. **Incorrect**:
Plausible: Incorrect cause but correct classification for the given cause.

Level: SRO
K/A: 061 Auxiliary / Emergency Feedwater (AFW) System 2.4 Emergency Procedures /Plan (Continued) 2.4.41 Knowledge of the emergency action level thresholds and classifications. (CFR: 43.5 / 45.11) IMPORTANCE RO 2.3 SRO 4.1

Lesson Plan Objective: SEP02 When given a set of plant conditions and access to reference materials, correctly classify an event using RP/0/A/5000/001.

Source: NEW

Level of knowledge: Memory

References:
1. RP/01

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Question 15
2.

Enclosure 4.1

Fission Product Barrier Matrix

4.1.C CONTAINMENT BARRIER

POTENTIAL LOSS - (1 Point)	LOSS – (3 Points)
1. Critical Safety Function Status	
• Containment-RED • Core cooling-RED Path is indicated for >15 minutes	• Not applicable
2. Containment Conditions	
• Containment Pressure > 15 PSIG • H2 concentration > 9% • Containment pressure greater than 3 psig with less than one full train of NS and a VX-CARF operating.	• Rapid unexplained decrease in containment pressure following initial increase • Containment pressure or sump level response not consistent with LOCA conditions.

CONTINUED

4.1.N NCS BARRIER

POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)
1. Critical Safety Function Status	
• NCS Integrity-Red • Heat Sink-Red	• Not applicable
2. NCS Leak Rate	
• Unisolable leak exceeding the capacity of one charging pump in the normal charging mode with letdown isolated.	• GREATER THAN available makeup capacity as indicated by a loss of NCS subcooling.

CONTINUED

4.1.F FUEL CLAD BARRIER

POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)
1. Critical Safety Function Status	
• Core Cooling-Orange • Heat Sink-Red	• Core Cooling-Red
2. Primary Coolant Activity Level	
• Not applicable	• Coolant Activity GREATER THAN 300 μCi/cc Dose Equivalent Iodine (DEI) I-131

CONTINUED

Enclosure 4.1

Fission Product Barrier Matrix

NOTE: If a barrier is affected, it has a single point value based on a "potential loss" or a "loss." "Not Applicable" is included in the table as a place holder only, and has no point value assigned.

Barrier	Points (1-5)	Potential Loss (X)	Loss (X)	Total Points	Classification
Containment		1	3	1 – 3	Unusual Event
NCS		4	5	4 – 6	Alert
Fuel Clad		4	5	7 – 10	Site Area Emergency
Total Points				11 - 13	General Emergency

1. Compare plant conditions against the Fission Barrier Matrix on pages 3 through 5 of 5.
2. Determine the "potential loss" or "loss" status for each barrier (Containment, NCS and Fuel Clad) based on the EAL symptom description.
3. For each barrier, write the highest single point value applicable for the barrier in the "Points" column and mark the appropriate "loss" column.
4. Add the points in the "Points" column and record the sum as "Total Points".
5. Determine the classification level based on the number of "Total Points".
6. In the table on page 1 of 5, under one of the four "classification" columns, select the event number (e.g. 4.1.A.1 for Loss of Nuclear Coolant System) that best fits the loss of barrier descriptions.
7. Using the number (e.g. 4.1.A.1), select the preprinted notification form **OR** a blank notification form and complete the required information for Emergency Coordinator approval and transmittal.

Enclosure 4.1

Fission Product Barrier Matrix

Use EALs to determine Fission Product Barrier status (Intact, Potential Loss, or Loss). Add points for all 3 barriers. Classify according to the table on page 2 of 5 of this enclosure.

Note 1: This table is only applicable in Modes 1-4.

Note 2: Also, an event (or multiple events) could occur which results in the conclusion that exceeding the Loss or Potential Loss thresholds is IMMINENT (i.e., within 1-3 hours). In this IMMINENT LOSS situation, use judgement and classify as if the thresholds are exceeded.

Note 3: When determining Fission Product Barrier status, the Fuel Clad Barrier should be considered to be lost or potentially lost if the conditions for the Fuel Clad Barrier loss or potential loss EALs were met previously (validated and sustained) during the event, even if the conditions do not currently exist.

Note 4: Critical Safety Function (CSF) indications are not meant to include transient alarm conditions which may appear during the start-up of engineered safeguards equipment. A CSF condition is satisfied when the alarmed state is **valid** and **sustained**. The STA should be consulted to affirm that a CSF has been validated prior to the CSF being used as a basis to classify an emergency.

Example: If ECA-0.0, Loss of All AC Power, is implemented with an appropriate CSF alarm condition **valid** and **sustained**, that CSF should be used as the basis to classify an emergency prior to any function restoration procedure being implemented within the confines of ECA-0.0.

EAL #	Unusual Event	EAL #	Alert	EAL #	Site Area Emergency	EAL #	General Emergency
4.1.U.1	Potential Loss of Containment	4.1.A.1	Loss **OR** Potential Loss of Nuclear Coolant System	4.1.S.1	Loss **OR** Potential Loss of Both Nuclear Coolant System **AND** Fuel Clad	4.1.G.1	Loss of All Three Barriers
4.1.U.2	Loss of Containment	4.1.A.2	Loss **OR** Potential Loss of Fuel Clad	4.1.S.2	Loss **AND** Potential Loss Combinations of Both Nuclear Coolant System **AND** Fuel Clad	4.1.G.2	Loss of Any Two Barriers **AND** Potential Loss of the Third
		4.1.A.3	Potential Loss of Containment **AND** Loss **OR** Potential Loss of Any Other Barrier	4.1.S.3	Loss of Containment **AND** Loss **OR** Potential Loss of Any Other Barrier		

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Question 16

Bank Question: 07-91 ***Answer: C***

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1 Pt(s). Unit 1 is in Mode 1. An NLO was performing a restoration of 1EIB per OP/1/A/6350/008 (125VDC/120VAC Vital I&C Power System) Enclosure 4.10 (1EIB Shutdown and Return to Service). During the restoration the power supply to the associated AC Panel board 1ERPB was lost.

Which of the following states 1) if this is normal for this power swap and 2) what procedure (if any) is required to be entered?

A. This is normal for swap of all vital loads. The enclosure for performing the swap will direct restoration of the required loads.

B. This is NOT normal for vital loads. AP/1/A/5500/007 (Loss of Normal Power) should be entered.

C. This is NOT normal for vital loads. AP/1/A/5500/029 (Loss of Vital or AUX Control Power) should be entered.

D. This is NOT normal for vital loads. EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) should be entered.

Distracter Analysis:

A. **Incorrect:**
Plausible: This is correct for Essential power supplies.

B. **Incorrect:**
Plausible: Correct cause but the AP entered is incorrect

C. **Correct:**

D. **Incorrect**:
Plausible: This would be correct if power was in the source range.

Level: SRO

K/A: SYSTEM: 062 AC Electrical Distribution System A2 Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.10 Effects of switching power supplies on instruments and controls 3.0 3.3

Lesson Plan Objective: EPL15 Evaluate the impact a failure of any Vital I & C component will have on unit operation

Source: NEW

Level of knowledge: comprehension

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Question 16

References:
1. EPL Lesson
2.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 24. **Verify all Vital AC panelboards - ENERGIZED.**	__ **GO TO Step 26.**
__ 25. **GO TO Step 34.**	
26. **Dispatch operator to restore power to the affected bus. REFER TO one of the following:** __ • Enclosure 10 (Restoring Power To 1ERPA) OR __ • Enclosure 11 (Restoring Power To 1ERPB) OR __ • Enclosure 12 (Restoring Power To 1ERPC) OR __ • Enclosure 13 (Restoring Power To 1ERPD).	
__ 27. **WHEN power is restored to all affected buses, THEN GO TO Step 62.**	
28. **Defeat the affected T-Avg channel as follows:** __ a. Place "CRD BANK SELECT" switch - IN MANUAL. __ b. Place "Δ TEMP DEFEAT" switch to failed loop. __ c. Place "T-AVG DEFEAT" switch to failed loop. __ d. **WHEN** T-Avg is within ±1°F of T-Ref **AND** auto rod control is desired, **THEN** return rod control to "AUTO".	

1. Six Manual Bypass Switches are utilized in this system to provide a transfer from the inverter to the alternate power source without power interruption (make-before-break contacts) to the 120 VAC panelboards (ERPA, ERPB, ERPC and ERPD).
2. The Manual Bypass Switches are designated as follows:
   a) EMA (Train A Manual Bypass Switch)
   b) EMB (Train B Manual Bypass Switch)
   c) EMC (Train C Manual Bypass Switch)
   d) EMD (Train D Manual Bypass Switch)
   e) EME (Train A Swing Inverter Manual Bypass Switch)
   f) EMF (Train B Swing Inverter Manual Bypass Switch)
3. The normal and alternate sources should be synchronized (in sync light lit) prior to transfer. There is no interlock to prevent transfer if the two sources are not synchronized.
4. Each Manual Bypass Switch has an "In Sync" indication to let the operator know that the normal and alternate power supplies to the 120 VAC panelboards are synchronized.

J. 120 VAC Vital I&C Power Panelboards
1. Four per unit, designated as follows:
   a) ERPA - Channel A
   b) ERPB - Channel B
   c) ERPC - Channel C
   d) ERPD - Channel D
2. Each channel carries similar loads, as follows:
   a) NCP Undervoltage and Underfrequency Monitor
   b) Process protection
   c) Solid State Protection System Input and Logic Bays
   d) Nuclear instruments I & C power
   e) Low Voltage Relay alarms
3. Similar to their DC related channels, "A" and "D" channels provide power to many other loads. A few are listed below:
   a) S/G PORVs (Will close on loss of power if in Manual)
   b) Boric Acid pump relaying (will trip if power is lost while in AUTO)
   c) BDMS relaying (Reactor Makeup water pumps will trip if power is lost)

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Question 17

Bank Question: 07-92 ***Answer: C***

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1 Pt(s). With the Unit at 40% RTP, compare and contrast the following occurrences:

An inadvertent A Train Phase A signal (St)
An inadvertent A Train Phase B signal (Sp)

Neither signal can be reset

Which of the following is true concerning the impact of the above signals?

A. The Sp signal will require entry into AP/0/A/5500/020 (Loss of Nuclear Service Water) to direct starting an RN Pump in the idle train.

B. The St signal will require entry into AP/0/A/5500/020 (Loss of Nuclear Service Water) to direct starting an RN Pump in the idle train.

C. The Sp signal will require entry into EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) to respond to the required manual reactor trip.

D. The St signal will require entry into EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) to respond to the required manual reactor trip.

Distracter Analysis:

A. **Incorrect:**
Plausible: Sp does initiate actions in the RN system. The RN Pump statement would be correct if were a KC Pump.

B. **Incorrect:**
Plausible: the opposite of A above.

C. **Correct:** Either train Phase B will remove KC to the NCP requiring a manual reactor trip and trip of the NCP.

D. **Incorrect**:
Plausible: The opposite of C above.

Level: SRO

K/A: SYSTEM: 103 Containment System A2 Ability to (a) predict the impacts of the following malfunctions or operations on the containment system and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.03 Phase A and B isolation 3.5* 3.8*

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Question 17
Lesson Plan Objective: KC04 (Explain what happens in the KC System during: Phase A Containment Isolation (St) and Phase B Containment Isolation (Sp))

Source: NEW

Level of knowledge: comprehension

References:
1. KC Lesson
2.

3. Components Cooled
   a) H2 recombiners (2)
   b) Waste gas comp (2)
   c) Recycle evap. pkg.
   d) Seal water Hx (1)
   e) Fuel pool cool Hx (2)
   f) KF pump motor cooler (2)
   g) Letdown Hx
   h) All flow is auto controlled except:
      1) Evaporator concentrates Hx's and pump bearing coolers (Manual isolations)
      2) KF Hx Manual loader in Control Room
      3) KF Pump Motor Cooler and PD Pump Oil Cooler (Manual)

G. Reactor Building Non-Essential Header (OBJ. #3)
   1. Supply and return isolations both normally open.
   2. Supply 228B, 230A, Return 3A, 18B
      a) Close on:
         1) Sp signal
         2) Lo-Lo level in train related surge tank (34%)
            (a) The valves can be reopened when the appropriate train's level switch is reset. This should occur between 40% and 48% KC Surge Tank Level.
         3) Lo Level in FWST following Ss. (37%)
      b) Controlled from CR and ASP
      c) Containment Supply and Return Isolations (OBJ. #3 & 4)
         1) On a Sp signal the NC Pump isolation valves (338B, 424B, and 425A) will close.
         2) On an St signal the following will close:
            (a) NCDT and Excess Letdown Hx. isolation valves (305B, 315B, 320A, 332B, 333A).
            (b) Reactor building drain header isolation valves (429B, 430A).
         3) When the ASP is transferred to "LOCAL", Excess Letdown and NC Pump isolation valves (305B, 315B, 338B, 424B, 425A) will open. (OBJ. # 17)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **IF AT ANY TIME 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" LIT, THEN perform Step 4 RNO.**	
__ 6. **Verify both KC surge tank levels - 50% - 90% AND STABLE.**	__ **GO TO Step 8.**
__ 7. **Start additional KC pump(s) as necessary to supply any KC loads presently in service.**	__ **IF KC pump(s) damaged by fire, THEN notify IAE to repair cables to pumps needed for recovery. REFER TO IP/1/A/3890/027A (Fire Damage Control Procedure).**

CAUTION **A loss of KC cooling to the NC pumps results in a gradual approach to an overheated condition in approximately 10 minutes which will result in shaft seizure.**

8. **Verify KC flow to NC pumps as follows:**	**Perform the following:**
__ • 1AD-20, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK	a. Ensure the following valves - OPEN:
__ • 1AD-21, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK.	__ • 1KC-425A (NC Pumps Ret Hdr Cont Isol)
	__ • 1KC-338B (NC Pumps Sup Hdr Cont Isol)
	__ • 1KC-424B (NC Pumps Ret Hdr Cont Isol).
	(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. (Continued)	
	b. **IF AT ANY TIME** any of the following conditions are met:
	__ • Time since loss of KC - GREATER THAN 10 MINUTES
	OR
	__ • Any NC pump trip criteria from Enclosure 1 (Foldout Page) is met
	THEN perform the following:
	1) **IF** letdown is isolated, **THEN**:
	a) Ensure NV pump suction aligned to FWST as follows:
	__ (1) 1NV-252A (NV Pumps Suct From FWST) - OPEN
	__ (2) 1NV-253B (NV Pumps Suct From FWST) - OPEN
	__ (3) 1NV-188A (VCT Otlt Isol) - CLOSED
	__ (4) 1NV-189B (VCT Otlt Isol) - CLOSED.
	__ b) **WHEN** Reactor is tripped, **THEN** attempt to establish and maintain a slow cooldown as required to maintain PZR level.
	__ 2) Ensure steam dumps - IN PRESSURE MODE.
	__ 3) Ensure the Reactor - TRIPPED.
	(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. (Continued)

4) **WHEN** reactor power less than 5%, **THEN** perform the following:

__ a) Trip all NC pumps.

__ b) Ensure the normal spray valve associated with the tripped NC pump(s) - IN MANUAL AND CLOSED.

__ 5) Secure any dilutions in progress.

6) **IF** the reactor trip breakers were closed, **THEN** perform one of the following while continuing with this procedure as time and conditions allow:

__ • **IF** above P-11, **THEN GO TO** EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).

OR

__ • **IF** below P-11, **THEN GO TO** AP/1/A/5500/005 (Reactor Trip Or Inadvertent S/I Below P-11).

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Question 18

Bank Question: 07-93 ***Answer: B***

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1 Pt(s). TS 3.6.8 Hydrogen Skimmer System (HSS) requires two Hydrogen Skimmer System trains operable. What is the design basis for this requirement?

A. Deliver hydrogen to the Hydrogen Igniter System to be burned.

B. Provide mixing of the containment atmosphere following a design basis accident.

C. To transport hydrogen out of the annulus to the unit vent.

D. To deliver hydrogen out of containment to the annulus.

Distracter Analysis:

A. **Incorrect:**
Plausible: common misconception by new operators.

B. **Correct:**

C. **Incorrect:**
Plausible: This is the done by the VE system.

D. **Incorrect**:
Plausible: This is the purpose of the Hydrogen Purge System which is not TS related.

Level: SRO

K/A: 028 Hydrogen Recombiner and Purge Control System (HRPS) 2.2 Equipment Control 2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits. (CFR: 43.2) IMPORTANCE RO 2.5 SRO 3.7

Lesson Plan Objective: VX07 Given a set of plant conditions and access to reference materials, determine the actions necessary to comply with Tech Specs/SLCs.

Source: NEW

Level of knowledge: Memory

References:
1. TS 3.6.8 Basis
2.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.8 Hydrogen Skimmer System (HSS)

BASES

BACKGROUND

The HSS reduces the potential for breach of containment due to a hydrogen oxygen reaction by providing a uniformly mixed post accident containment atmosphere, thereby minimizing the potential for local hydrogen burns due to a pocket of hydrogen above the flammable concentration. Maintaining a uniformly mixed containment atmosphere also ensures that the hydrogen monitors will give an accurate measure of the bulk hydrogen concentration and give the operator the capability of preventing the occurrence of a bulk hydrogen burn inside containment per 10 CFR 50.44, "Standards for Combustible Gas Control Systems in Light-Water-Cooled Reactors" (Ref. 1), and 10 CFR 50, GDC 41, "Containment Atmosphere Cleanup" (Ref. 2).

The post accident HSS is an Engineered Safety Feature (ESF) and is designed to withstand a loss of coolant accident (LOCA) without loss of function. The System has two independent trains, each consisting of two fans with their own motors and controls. Each train is sized for 4260 cfm. There is a normally closed, motor-operated valve on the hydrogen skimmer suction line to prevent ice condenser bypass during initial blowdown. The two trains are initiated automatically on a containment pressure high-high signal. The automatic action is to open the motor-operated valve on the hydrogen skimmer suction line after a 9 ± 1 minute delay. Once the valve starts to open, the hydrogen skimmer fan will start. Each train is powered from a separate emergency power supply. Since each train fan can provide 100% of the mixing requirements, the System will provide its design function with a limiting single active failure.

Air is drawn from the dead ended compartments by the mixing fans and is discharged toward the upper regions of the containment. This complements the air patterns established by the containment air return fans, which take suction from the operating floor level and discharge to the lower regions of the containment, and the containment spray, which cools the air and causes it to drop to lower elevations. The systems work together such that potentially stagnant areas where hydrogen pockets could develop are eliminated.

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Question 19

Bank Question: 07-94 ***Answer: C***

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1 Pt(s). Given the following:

- An event has occurred requiring implementation of the emergency procedures.
- The reactor is shutdown and adequate core cooling exists.
- Due to multiple equipment malfunctions, the AER and RNO actions for an EP step cannot be performed.
- The remainder of the procedure relies upon completion of these actions.
- The CRS develops alternative actions which will meet the intent of the EP.
- The WCC SRO, who has an active license, agrees with the proposed actions.

Which of the following correctly states if the action considered above CAN or CANNOT be taken and why?

A. The actions CANNOT be taken. No deviation from emergency or abnormal procedures is allowed.

B. The actions CANNOT be taken. Deviation from any procedure requires approval of the OSM.

C. The action can be taken. Deviations from emergency procedures beyond those actions required to place the plant in a safe condition are allowed if approved by 2 SROs.

D. The action can be taken. Deviations from emergency procedures are allowed for any reason with the approval of any single licensed SRO.

Distracter Analysis:

A. **Incorrect:**
Plausible: This is the normal response per OMP 1-7 which gives detail information about when a deviation can occur. The situation is a deviation, but meets conditions allowed by the OMP.

B. **Incorrect:**
Plausible: OMP says the OSM approval is preferred, but it isn't requirement.

C. **Correct:**

D. **Incorrect**:
Plausible: Deviations are allowed but not allowed for any reasons..

Level: SRO

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Question 19

K/A: 2.1 Conduct of Operations 2.1.6 Ability to supervise and assume a management role during plant transients and upset conditions. (CFR: 43.5 / 45.12 / 45.13)
IMPORTANCE RO 2.1 SRO 4.3

Lesson Plan Objective: EPINTRO10 Explain the rules for deviation from approved procedures.

Source: MODIFIED (Prairie Island 2004)

Level of knowledge: comprehension

References:
1. OMP 1-7
2.

7.7. Situations Not Covered by Procedure

NOTE:	If sufficient time exists, a procedure revision is always the preferred route.

When situations occur where established procedures do not apply, or plant operation can not be performed in accordance with approved procedures, use of the procedure shall be suspended and action shall be taken to place the plant in a safe condition. Any actions beyond those required to place the plant in a safe condition shall apply the conservative decision-making philosophy. (SOER 94-1). Further actions shall not be taken without first performing the following steps:

A. Based on knowledge and resources needed (including the partially applicable APs or EPs), the SRO shall develop a planned course of action. The SRO is responsible for ensuring these actions are within the bounds of Technical Specifications and licensed basis. If the required actions are outside the bounds of Technical Specifications or licensed basis, then 10CFR50.54(x) shall be declared and the associated requirements of 10CFR50.54(x) shall be implemented (PPRB OMP 1-7/94-113).

B. The planned course of action shall be reviewed and approved by a second SRO, preferably the Operations Shift Manager. The SRO should obtain other reviews such as Station Manager, Group Superintendent, TSC or other involved groups, as necessary based on the complexity of the situation and the time allowed.

C. If time allows, the plan shall be entered in the SRO logbook. Otherwise, this may be done after the actions have been taken.

D. The SRO shall carefully monitor the situation to ensure the course of action is appropriate. As soon as approved procedures can be re-entered, the SRO shall return to the applicable procedure.

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Question 20

Bank Question: 07-95 ***Answer: B***

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1 Pt(s). During power operation Tech Spec LCO 3.2.1 requires that Heat Flux Hot Channel Factor be maintained within the limits set by the COLR.

How can the operators be assured that Heat Flux Hot Channel Factor is being maintained within limits on a continuous basis??

A. The Over Temperature Delta Temperature runback will decrease Turbine and Reactor load and prevent exceeding the hot channel factor limits.

B. The Heat Flux Hot Channel Factor is controlled by maintaining the core within the limits of AFD, QPTR, and control rod insertion, overlap, and sequencing limits.

C. The Heat Flux Hot Channel Factor is not measurable, but inferred from a power distribution map using the Incore detectors. The map is done every 31 days and if within limits it can be inferred that is has been within limits since last performed.

D. The Heat Flux Hot Channel Factor is part of the core design and Westinghouse patterns the core design to ensure Heat Flux Hot Channel Factor will not be violated. Continuous monitoring of the Heat Flux Hot Channel Factor is NOT required.

Distracter Analysis:
Per HCF Lesson:

The heat flux hot channel factor limits provide assurance of fuel integrity during Condition I (normal operation) and II (Incidents of Moderate Frequency) events by: (a) Maintaining the minimum DNBR in the core greater than or equal to 1.14 during normal operation and in short term transients and (b) limiting the fission gas releases, fuel pellet temperature and cladding mechanical properties to within assumed design criteria. Each of these parameters is measurable but will normally only be determined periodically, as specified in Tech Specs. As an operator you can be assured that the limits are not exceeded during normal operations and that the periodic surveillance is sufficient provided the following limits are not exceeded.

1. The Quadrant Power Tilt Ratio is maintained within limits.

2. The control rod insertion limits of Control Bank C at 47 steps to Control Bank D at 161 steps from 0 to 100% power.

3. The axial power distribution, expressed in terms of AXIAL FLUX DIFFERENCE, is maintained within the limits.

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Question 20

A. **Incorrect:**
Plausible: See above discussion

B. **Correct:**

C. **Incorrect:**
Plausible: See above discussion

D. **Incorrect:**
Plausible: See above discussion

Level: SRO

K/A: 2.1 Conduct of Operations (continued) 2.1.32 Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12) IMPORTANCE RO 3.4 SRO 3.8

Lesson Plan Objective: HCF02 (Describe the following: Heat Flux Hot Channel Factor (Fq),Enthalpy Rise Hot Channel Factor (F Delta H).)

Source: BANK (Ginna 2004)

Level of knowledge: comprehension

References:
1. HCF Lesson
2.

2. The coolant everywhere at the bottom of the core can be assumed to be entering the core with the same Enthalpy (about 551 BTU/lbm at full power). The Enthalpy of the coolant increases as it rises up the core until it reaches maximum (about 647 BTU/lbm on the average at full power) at the very top of the core. The Enthalpy rise up the core will be different for different radial locations. The coolant adjacent to the rod producing the most power will experience the largest Enthalpy rise. Other locations will have a lower Enthalpy rise. Flow mixing between rods tends to even out the Enthalpy rise profile, cooling the hotter channels and heating the cooler channels. Flow mixing is deliberately encouraged by use of mixing vanes on the assembly grids.

   $F_{\Delta H}$ describes radial power distribution. There is however, no reason to believe that the rod with peak kw/ft is also the rod with peak kw.

   The nuclear Enthalpy rise hot channel factor, $F_{\Delta H}$, is defined as the ratio of the rod with the defined highest integrated power to the average rod power.

   The full power $F_{\Delta H}$ Technical Specification limit is variable depending on the core location.

   The limit can be relaxed at lower power levels because the core is farther from DNB at lower powers. The relaxation of $F_{\Delta H}$ as a function of thermal power allows changes in the radial power shape for all permissible rod insertion limits.

B. Operational Considerations (Obj. 3)

1. The heat flux hot channel factor limits provide assurance of fuel integrity during Condition I (normal operation) and II (Incidents of Moderate Frequency) events by: (a) Maintaining the minimum DNBR in the core greater than or equal to 1.14 during normal operation and in short term transients and (b) limiting the fission gas releases, fuel pellet temperature and cladding mechanical properties to within assumed design criteria. Each of these parameters is measurable but will normally only be determined periodically, as specified in Tech Specs. As an operator you can be assured that the limits are not exceeded during normal operations and that the periodic surveillance is sufficient provided the following limits are not exceeded.

   a) The Quadrant Power Tilt Ratio is maintained within limits.

   b) The control rod insertion limits of Control Bank C at 47 steps to Control Bank D at 161 steps from 0 to 100% power.

   c) The axial power distribution, expressed in terms of AXIAL FLUX DIFFERENCE, is maintained within the limits.

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.1 Heat Flux Hot Channel Factor ($F_Q(X,Y,Z)$)

BASES

BACKGROUND

The purpose of the limits on the values of $F_Q(X,Y,Z)$ is to limit the local (i.e., pellet) peak power density. The value of $F_Q(X,Y,Z)$ varies axially (Z) and radially (X,Y) in the core.

$F_Q(X,Y,Z)$ is defined as the maximum local fuel rod linear power density divided by the average fuel rod linear power density, assuming nominal fuel pellet and fuel rod dimensions. Therefore, $F_Q(X,Y,Z)$ is a measure of the peak fuel pellet power within the reactor core.

During power operation, the global power distribution is limited by LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," and LCO 3.2.4, "QUADRANT TILT POWER RATIO (QPTR)," which are directly and continuously measured process variables. These LCOs, along with LCO 3.1.6, "Control Bank Insertion Limits," maintain the core limits on power distributions on a continuous basis.

$F_Q(X,Y,Z)$ varies with fuel loading patterns, control bank insertion, fuel burnup, and changes in axial power distribution and to a lesser extent, with boron concentration and moderator temperature.

$F_Q(X,Y,Z)$ is measured periodically using the incore detector system. These measurements are generally taken with the core at, or near steady state conditions.

Using the measured three dimensional power distributions, it is possible to derive a measured value for $F_Q(X,Y,Z)$. However, because this value represents a steady state condition, it does not include the variations in the value of $F_Q(X,Y,Z)$ that are present during nonequilibrium situations.

To account for these possible variations, the $F_Q(X,Y,Z)$ limit is reduced by precalculated factors to account for perturbations from steady state conditions to the operating limits.

Core monitoring and control under nonsteady state conditions are accomplished by operating the core within the limits of the appropriate LCOs, including the limits on AFD, QPTR, and control rod insertion.

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Question 21

Bank Question: 07-96 ***Answer: D***

---

1 Pt(s). The Unit Supervisor wishes to momentarily close the suction valve to an operable NI Pump to confirm a valve problem. Which of the following is correct concerning the performance of this task?

A. No trouble shooting plan is required. The task can be performed with the CRSs approval due to the short term inoperability.

B. A trouble shooting plan is required. A written prejob brief will satisfy the requirements for a written plan.

C. No trouble shooting plan is required. The NI Pump breaker must be white tagged off and the pump entered into Tech. Specs.

D. A trouble shooting plan is required. The Operating Troubleshooting Guidelines procedure must be completed.

Distracter Analysis:

A. **Incorrect**:
Plausible: This would make a required ECCS pump inoperable and would not normally be done but could be done under the troubleshooting procedure.

B. **Incorrect:**
Plausible: Allowed but takes both to approve.

C. **Incorrect:**
Plausible: Allowed but takes both to approve.

D. **Correct:**

Level: SRO

K/A: 2.2 Equipment Control 2.2.7 Knowledge of the process for conducting tests or experiments not described in the safety analysis report. (CFR: 43.3 / 45.13)
IMPORTANCE RO 2.0 SRO 3.2

Lesson Plan Objective: None

Source: NEW

Level of knowledge: Memory

References:
1. OP/0/A/6350/014

Operations Troubleshooting Guidelines

1. Purpose

To establish controls and boundaries for the purpose of troubleshooting components/systems under Operations Group control.

2. Limits And Precautions

2.1 Superintendent of Operations (or Duty Superintendent) should concur with any troubleshooting plan that results in making any system or component incapable of performing intended function and/or inoperable per Technical Specifications.

2.2 Operations Shift Manager shall approve all troubleshooting plans.

2.3 Unit/WCC SRO shall approve all troubleshooting plans for assigned unit.

2.4 Use extreme caution during troubleshooting activities to minimize risk of inadvertent Reactor or Turbine trips, isolations, or equipment inoperability.

2.5 Consider the need for red tags if the troubleshooting activity could jeopardize the safety of personnel involved.

2.6 Independent Verification shall be performed per OMP 1-5 (Independent Verification).

2.7 Do **NOT** exceed design limits of operating parameters (temperature, pressure, etc.) for any system or component.

2.8 Plant Configuration shall be controlled by approved method:

- Approved procedures
- R&R process

2.9 Troubleshooting Plan procedure shall **NOT** be used if existing plant procedures (including those requiring procedure changes) are available to perform task(s) under consideration.

2.10 Every effort should be made to **NOT** turnover troubleshooting activity to on-coming shift. If it becomes necessary, a thorough turnover of procedure in-progress is required. Supervisor in charge of troubleshooting activity and operator that performed steps shall (at a minimum) be present with on-coming supervisor. This may require on-station turnover.

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Question 22

Bank Question: 07-97 ***Answer: D***

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1 Pt(s). A plant worker is unconscious and presumed badly injured in a Very High Radiation Area.

A Medical Emergency Response Team (MERT) has responded. A 50-year-old member of the rescue team is attempting to reach the man.

Which ONE of the following identifies the maximum total effective dose equivalent (TEDE) allowable exposure the rescue worker may receive in this rescue attempt?

A. No Limit

B. 10 REM

C. 5 REM

D. 25 REM

Distracter Analysis:

A. **Incorrect**:
Plausible: Plausible because there is no limit to Save a Life if the rescuer is a volunteer. 25 REM TEDE is the maximum allowable for a non-volunteer.

B. **Incorrect:**
Plausible: Incorrect, 25 REM TEDE is the maximum allowable dose for a non-volunteer. Plausible because 10 REM is listed in the RP18 Enclosure as a limit associated with Emergency Worker Exposure Limits.

C. **Incorrect:**
Plausible: Incorrect because 25 REM TEDE is the maximum allowable dose for a non-volunteer. Plausible because 5 REM is listed in the RP18 Enclosure as a limit associated with Emergency Worker Exposure Limits.

D. **Correct:**

Level: SRO

K/A: 2.3 Radiation Control 2.3.4 Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized. (CFR: 43.4 / 45.10) IMPORTANCE RO 2.5 SRO 3.1

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Question 22
Lesson Plan Objective: SEP13 When given a set of plant conditions and access to appropriate reference materials, correctly implement RP/018 (Emergency Worker Dose Extension).

Source: Modified (Turkey Point 2003)

Level of knowledge: comprehension

References:
1. RP/18
2.

Emergency Worker Dose Extension

1. Symptoms

1.1 Workers performing emergency service during a declared emergency event may be expected to exceed Duke administrative occupational radiation exposure blanket dose extension limits authorized by the Radiation Protection Manager, and potentially even exceed normal NRC (10CFR20) occupational radiation exposure limits.

1.2 This procedure **shall not be** used for "Planned Special Exposures".

2. Immediate Actions

2.1 Select Personnel based on the following:

2.1.1 Personnel shall be Duke Power Emergency Response Organization Members or Off-site Agency Emergency Workers. All personnel should be volunteers; however, personnel whose exposure during an emergency event is expected to exceed 25 rem TEDE shall be volunteers.

2.1.2 Personnel shall be advised of the risks involved, including the numerical levels of dose at which acute effects of radiation may be incurred and numerical estimates of the risks of delayed effects per EPA 400, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents." This information is summarized in Enclosure 4.1, "Health Risks Associated With Dose Extensions."

2.1.3 Performance of emergency services should be limited to non pregnant adults.

2.1.4 All factors being equal, older volunteers should be selected.

2.2 Document personnel information including Emergency Worker signature on Enclosure 4.2, "Authorization For Emergency Worker Dose Extensions."

2.3 Obtain Radiation Protection Manager (RPM) or designee signature or verbal acknowledgment of the need for extending Emergency Worker Dose Limits. Document this acknowledgment on Enclosure 4.2, "Authorization For Emergency Worker Dose Extensions."

NOTE: The Radiation Protection Manager or designee may not be readily available; therefore, this acknowledgment is optional.

2.4 Obtain Emergency Coordinator or EOF Director signature or verbal approval prior to extending the Emergency Worker Dose Limits. Document this approval on Enclosure 4.2, "Authorization For Emergency Worker Dose Extensions."

Enclosure 4.2

Authorization for Emergency Worker Dose Extensions

	DOSE LIMITS		
Activity	Total Effective Dose Equivalent (TEDE)	Lens of Eye	Other Organs (Includes skin and body extremities)
ALL	5 rem	15 rem	50 rem
Protecting Valuable Property	10 rem	30 rem	100 rem
Lifesaving or Protection of Large Populations	25 rem	75 rem	250 rem
Lifesaving or Protection of Large Populations	>25 rem	>75 rem	>250 rem

RP BADGE NO.	NAME	AGE	EMPLOYER	SIGNATURE OF INDIVIDUAL *

* My signature indicates my acknowledgment that I have been informed that I may be exposed to the levels of radiation circled in the chart on the previous page. I have been fully briefed on the task to be accomplished and on the risks of this exposure.

I _____ acknowledge this planned Emergency Exposure. _____
(RPM or designee, signature or printed name if verbal acknowledgment, Date/Time
if RPM or designee is not available this acknowledgment is optional)

I _____ approve this planned Emergency Exposure. _____
(Emergency Coordinator or EOF Director, signature or printed name if verbal approval) Date/Time

Subsequent Radiation Protection Action:

Determine need for medical evaluation
Initiate Reporting Requirements per 10 CFR20
Copy to Individual's History Exposure File

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Question 23

Bank Question: 07-98 ***Answer: A***

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1 Pt(s). An auxiliary building waste monitor tank liquid waste release (LWR) package has been delivered to the Control Room.

The following conditions exist:

- All RN pumps are on
- 1AD-12 B1 RN Pump Intake Pit A Lo Level is lit
- 1AD-12 E2 RN Pit-A Swap to SNSWP is lit
- A and B RL pumps are on and RL flow is greater than the flow required for the WL release
- EMF-49 (Liquid Waste Discharge Lo Range) is NOT operable
- EMF-57 (Monitor Tank Building Liquid Discharge Monitor) is operable

Should the Control Room Supervisor approve the release and provide the applicable reason for approval or disproval?

A. No, this release is NEVER allowed while RN is aligned to the Standby Nuclear Service Water Pond.

B. Yes, this release is allowed while RN is aligned to the Standby Nuclear Service Water Pond.

C. No, this release is NEVER allowed with EMF 49 inoperable.

D. Yes, this release is allowed with EMF 57 operable.

Distracter Analysis:

A. **Correct:**

B. **Incorrect:**
Plausible: Cannot approve due to RN being aligned to the SNSWP. Plausible because the distracter makes a true statement. RN is aligned to the SNSWP.

C. **Incorrect:**
Plausible: Correct approval but the reason is flawed. Discharge to RN is allowed with EMF-49 inop provided Radiation Protection takes action per their procedure.

D. **Incorrect**:
Plausible: Cannot approve due to RN being aligned to the SNSWP. Discharge to RL from the Monitor Tank Building is allowed with EMF-49 inop and EMF 57 operable. This release is from the Aux bldg not the Monitor Tank Bldg.

Level: SRO

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Question 23
K/A: 2.3 Radiation Control 2.3.6 Knowledge of the requirements for reviewing and approving release permits. (CFR: 43.4 / 45.10) IMPORTANCE RO 2.1 SRO 3.1

Lesson Plan Objective: WL16 (Given a set of specific plant conditions and access to reference materials, determine the actions necessary to comply with Tech Specs/SLCs)

Source: Modified (Indian Point 2003)

Level of knowledge: Memory

References:
1. SLC 16.11-2
2.

1. Initial Conditions

_____ 1.1 Review the Limits and Precautions.

_____ 1.2 Verify Radwaste Chemistry has initiated OP/0/B/6500/015 (Discharging a Monitor Tank to the Environment).

_____ 1.3 Verify LWR (Liquid Waste Release) Permit Report has been delivered to the CR Supervisor.

2. Procedure

_____ 2.1 **IF** at any time the OAC is out of service during this release, initiate a 15 minute increased surveillance per OMP 2-31 (Control Room Instrumentation Status) to verify:

2.1.1 The following RN valves remain OPEN:

- 1RN-57A (Station RN Disch To RL System)
- 1RN-843B (Station RN Disch To RL Sys)
- 1RN-54A (Station RN Disch Header X-Over)
- 1RN-53B (Station RN Discharge Header X-Over)
- 1RN-1A (RN P/H Pit A Isol From Lake)
- 1RN-2B (RN P/H Pit A Isol From Lake)
- 1RN-5A (RN P/H Pit B Isol From Lake)
- 1RN-6B (RN P/H Pit B Isol From Lake)

2.1.2 The following valves remain CLOSED:

- 1RN-3A (RN P/H Pit A Isol From SNSWP)
- 1RN-4B (RN P/H Pit B Isol From SNSWP)
- 1RN-63A (RN Header A Return To SNSWP)
- 1RN-58B (RN Header B Return To SNSWP)

2.1.3 **IF** any of the above RN Valve(s) are found out of position, secure the release immediately.

NOTE:
1. The following steps are to be completed, the information is to be entered and the appropriate steps (designated by "0") signed off on the LWR Permit Report.
2. Steps 2.2 - 2.13 provide instructions for completing the "COMPLETE PRIOR TO RELEASE" section of the LWR Permit Report.

_____ 2.2 Verify the LWR Permit Report is signed and dated by the CR Supervisor, authorizing the release.

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Question 24

Bank Question: 07-99 ***Answer: A***

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1 Pt(s). Unit 1 is in Mode 4 preparing to restart after an outage. Plant status is as follows:

- 1B ND Pump is in service in RHR Mode.
- 1A D/G is inoperable and in Maintenance Mode.
- All other required operating equipment is on B Train.

A loss of all offsite power occurs.

Which of the following procedures should be entered first and why?

A. AP/1/A/5500/007 (Loss of Normal Power); it will restore the ND pump to operation earlier.

B. AP/1/A/5500/007 (Loss of Normal Power); to verify proper ND Pump operation on restart.

C. AP/1/A/5500/019 (Loss of Residual Heat Removal System); it will restore the ND Pump to operation earlier.

D. AP/1/A/5500/019 (Loss of Residual Heat Removal System); to verify proper ND Pump operation on restart.

Distracter Analysis:

A. **Correct:**

B. **Incorrect:**
Plausible: The load sequencer will start all black out loads.

C. **Incorrect:**
Plausible: AP/19 will start the pump eventually but not anywhere near as fast as AP/07.

D. **Incorrect**:
Plausible: Would be correct if not a loss of power.

Level: SRO

K/A: 2.4 Emergency Procedures /Plan 2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (CFR 41.10 / 43.2 / 45.6) IMPORTANCE RO 4.0 SRO 4.3

Lesson Plan Objective: None

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Question 24

Source: NEW

Level of knowledge: Memory

References:
1. AP/07, AP/19
2.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **Resetting sequencer will prevent further automatic loading of B/O loads.**

8. **Verify ND System status as follows:**

__ a. Verify ND on affected train(s) - PREVIOUSLY OPERATING IN RESIDUAL HEAT REMOVAL MODE.	__ a. **GO TO** Step 9.
__ b. Verify AP/1/A/5500/019 (Loss of Residual Heat Removal System) - **NOT** IMPLEMENTED.	__ b. **GO TO** Step 9.
__ c. Reset affected D/G load sequencer.	
__ d. Start previously operating ND pump.	__ d. **REFER TO** AP/1/A/5500/019 (Loss of Residual Heat Removal System).

9. **Verify B/O busses are energized as follows:**

__ a. 1AD-11, K/3 "4KV B/O BUS FTA VOLTAGE LO" - DARK.	a. Perform the following:

NOTE Both ND Hx Bypass valves fail closed on loss of 1LXI (1FTA).

1) **IF** ND Pump 1A is operating in Residual Heat Removal Mode, **THEN** perform the following:

__ a) Place the "PWR DISCON FOR 1NI173A" in "THROT".

__ b) Throttle 1NI-173A (ND Hdr 1A To Cold Legs C&D) to stabilize NC temperature.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24. (Continued)	
__ 7) Operate the NI pump as required to maintain core exit temperature less than 200°F.	
__ 25. **Monitor Enclosure 10 (Long Term Core Cooling Parameters).**	
__ 26. **Initiate makeup to FWST. REFER TO OP/1/A/6200/014 (Refueling Water System).**	
27. **Determine cause of loss of ND train as follows:**	
__ a. Verify ND train(s) - LOST DUE TO A LEAK IN THE ND SYSTEM.	__ a. **GO TO** Step 28.
__ b. Verify Case II (Leak in ND), Step 21 - PREVIOUSLY PERFORMED.	__ b. **GO TO** Case II (Leak in ND), Step 21.
__ 28. **Verify at least one ND train - OPERATING IN RESIDUAL HEAT REMOVAL MODE.**	**NOTE** If loss of ND due to ND leak, neither ND train is considered available until affected train identified. __ **WHEN at least one ND train available, THEN restore at least one ND train to operation. GO TO Enclosure 8 (Restoring An ND Train To Operation).**
__ 29. **Verify at least one ND train - OPERATING IN RESIDUAL HEAT REMOVAL MODE.**	__ **RETURN TO Step 17.**

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Question 25

Bank Question: 07-100 ***Answer: A***

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1 Pt(s). Following a loss of the main control room the crew is directed to implement AP/1/A/5500/017 (Loss of Control Room). The Control Room Supervisor has taken over the OATC position.

Where should the two ROs be dispatched and what control capabilities will they each have?

A. One RO to A & B auxiliary shutdown panels. NC pressure and volume control.

One RO to the AFWPTCP. NC temperature control.

B. One RO to A & B auxiliary shutdown panels. NC temperature control.

One RO to the AFWPTCP. S/G level and pressure control.

C. One RO to A auxiliary shutdown panel. NC pressure and volume control.

One RO to B auxiliary shutdown panel. NC temperature control.

D. One RO to A auxiliary shutdown panel. NC pressure control.

One RO to B auxiliary shutdown panel. NC volume control

Distracter Analysis:

A. **Correct:**

B. **Incorrect:**
Plausible: NC temperature is controlled on the AFWPTCP by controlling SG pressure. NC temperature is monitored on the A ASP.

C. **Incorrect:**
Plausible: NC pressure and volume can be controlled on the A ASP. Temperature can be monitored on the B ASP, but temperature can only be controlled at the AFWPTCP.

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Question 25

D. **Incorrect**:
Plausible: Both panels can control pressure, but charging and letdown controls are on the A ASP.

Level: SRO

K/A: 2.4 Emergency Procedures /Plan 2.4.34 Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications. (CFR: 43.5 / 45.13) IMPORTANCE RO 3.8 SRO 3.6

Lesson Plan Objective: SM06 Describe the controls and indications for the S/G PORV's

Source: NEW

Level of knowledge: comprehension

References:
1. AP/17 and SM Lesson
2.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

1. **Available SRO performs the following:**

   __ a. Take over as OATC.

   __ b. Dispatch RO with key boxes to Unit 1 ASP to perform Enclosure 1 (ASP Operator Actions).

   __ c. Dispatch RO/SRO to Unit 1 AFWPTCP to perform Enclosure 2 (AFWPTCP Operator Actions).

__ 2. **Announce the following twice over plant wide communications system: "Loss of Unit 1 Control Room imminent. Assigned operations shift personnel man remote locations".**

__ 3. **Manually trip reactor.**

4. **Verify Reactor Trip:**

   __ • All rod bottom lights - LIT

   __ • All reactor trip and bypass breakers - OPEN

   __ • I/R amps - DECREASING.

IF reactor will not trip, THEN dispatch operator to open the following:

__ • Reactor trip breakers

__ • Reactor trip bypass breakers.

__ 5. **Verify all turbine stop valves - CLOSED.**

__ **Manually trip the turbine.**

__ 6. **Ensure all CRD vent fans - ON.**

__ 7. **Trip CF pumps.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued) b. Notify Unit 1 AFWPTCP operator to manually operate S/G PORVs as follows: 1) Control NC temperature by maintaining one of the following conditions: __ • NC T-Cold at 557°F OR __ • S/G pressure at 1090 PSIG. __ 2) **REFER TO** Enclosure 2 (AFWPTCP Operator Actions), Step 5. __ c. **IF AT ANY TIME** local operation of S/G PORV(s) required, **THEN** dispatch operator to perform Enclosure 12 (Local Operation of Unit 1 S/G PORVs).	__ b. Dispatch operators to locally operate S/G PORV(s). **REFER TO** Enclosure 12 (Local Operation of Unit 1 S/G PORVs).