76. 008 AG2.4.2 076

Given the following:

- Unit 1 at 100% power when a pressurizer safety valve failed open.
- The operator manually tripped the reactor and initiated a safety injection.
- While performing the step to determine if the RHR spray should be placed in service in accordance with E-1, "Reactor Trip or Safety Injection", the crew determines the following:
  - When pressurizer pressure dropped to 1280 psig, the safety valve reclosed and pressurizer pressure started to rise.
  - Containment pressure rose to 2.6 psig, and began trending down.
  - Pressurizer level is 100%.
  - RCS subcooling is 43°F.
  - All four SG levels at 33% narrow range.

Which ONE of the following identifies the correct procedure implementation and operation of the RCPs for the above conditions?

A. Transition from E-1 to ES-1.1, SI Termination;
The RCPs will have remained running throughout the event.

B. Transition from E-1 to ES-1.1, SI Termination;
The RCPs would have been shutdown but will be restarted in ES-1.1, SI Termination.

C. Continue E-1 until a transition is directed to ES-1.2, Post LOCA Cooldown;
The RCPs will have remained running throughout the event.

D. A transition will be made to ES-1.2, Post LOCA Cooldown;
The RCPs would have been shutdown but will be restarted in ES-1.2, Post LOCA Cooldown.

DISTRACTOR ANALYSIS:

A. *CORRECT, with the safety valve reclosed and the conditions as identified in the stem, SI termination criteria is met. While the crew would be beyond the step in E-1 that first checks for SI termination and beyond the followup step for checking the criteria, the SI termination step is a continous action step and if the criteria is met the transition is to be made. Subcooling is greater than he 40°F setpoint, pressurizer level above the 10% setpoint, heat sink is established and RCS pressure rising meet the entry conditions for ES-1.1. Containment pressure did not rise to the automatic initiation setpoint of 2.8 psig (Phase B) nor did the RCS pressure drop to the 1250 psig setpoint, so the RCP trip criteria was not met and the pumps remained in service.*

B. *Incorrect, With the conditions identified in the stem, the SI termination criteria is met and a transition to ES-1.1 is required. The RCP trip criteria was not met and the pumps would have remained in service throughout the even. Plausible because the transition to ES-1.1 is the correct transition and if the RCPs had been stopped they would be restarted in ES-1.1.*

C. *Incorrect, While ES-1.2 would be entered if E-1 was continued, the conditions identified in the stem indicate SI termination criteria is met and a transition to ES-1.1 is required. The RCP trip criteria was not met and the pumps would have remained in service through out the event. Plausible because the transition to ES-1.2 would be the correct transition if the SI could not be terminated and the RCPs remaining in service through out the event is correct.*

D. *Incorrect, While ES-1.2 would be entered if E-1 was continued, the conditions identified in the stem indicate SI termination criteria is met and a transition to ES-1.1 is required. Because the RCP trip criteria was not met, the pumps would have remained in service through out the event. Plausible because the transition to ES-1.2 would be the correct transition if the SI could not be terminated and if the RCPs had been stopped they would be restarted in ES-1.2.*

Question No. 76

Tier 1 Group 1

K/A 008 AG2.4.2
Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)
Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.

Importance Rating: 4.5 / 4.6

Technical Reference: E-1, Loss of Reactor Or Secondary Coolant, Rev 23
ES-1.1, SI Termination, Rev 10
ES-1.2, Post LOCA Cooldown, Rev 17

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271E-1 B.5
Describe the conditions and reason for transitions within this procedure and transitions to other procedures.

Question Source:
Bank # _____
Modified Bank # _____
New __X____

Question History: New question for SQN 1/2009 exam

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis __X____

10 CFR Part 55 Content: (41.7 / 45.7 / 45.8)

10CFR55.43.b (5)

Comments: New question for SQN 1/2009 exam

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RCP TRIP CRITERIA

NEITHER CONDITION MET

IF any of the following conditions occurs:

- RCS pressure less than 1250 psig **AND** at least one CCP or SI pump running

  OR

- Phase B isolation,

THEN
STOP all RCPs.

SI REINITIATION CRITERIA

IF any of the following conditions occurs:

- RCS subcooling based on core exit T/Cs less than 40°F

  OR

- Pressurizer level CANNOT be maintained greater than 10% [20% ADV],

THEN
RAISE ECCS flow by performing one or both of the following as necessary:

- **ESTABLISH** CCPIT flow **USING** Appendix C
- **START** CCPs or SI pumps manually.

EVENT DIAGNOSTICS

- **IF** both trains of shutdown boards de-energized,
  THEN
  GO TO ECA-0.0, Loss of All AC Power.

- **IF** any S/G pressure dropping in an uncontrolled manner or less than 140 psig **AND** S/G **NOT** isolated,
  THEN
  GO TO E-2, Faulted Steam Generator Isolation.

- **IF** any S/G has level rising in uncontrolled manner or has abnormal radiation,
  THEN:

  a. **RAISE** ECCS flow by performing one or both of the following as necessary:
     - **ESTABLISH** CCPIT flow **USING** Appendix C
     - **START** CCPs or SI pumps manually.

  b. **GO TO** E-3, Steam Generator Tube Rupture.

TANK SWITCHOVER SETPOINTS

- **IF** CST level less than 5%,
  THEN
  ALIGN AFW suction to ERCW.

- **IF** RWST level less than 27%,
  THEN
  GO TO ES-1.3, Transfer to RHR Containment Sump.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ALL CONDITIONS MET

7. **MONITOR** SI termination criteria:

a. RCS subcooling based on core exit T/Cs greater than 40°F.

a. **GO TO** Step 8.

b. Secondary heat sink:

- Narrow range level in at least one Intact S/G greater than 10% [25% ADV].

OR

- Total feed flow to Intact S/Gs greater than 440 gpm.

b. **GO TO** Step 8.

c. RCS pressure STABLE or RISING.

c. **GO TO** Step 8.

d. Pressurizer level greater than 10% [20% ADV].

d. **ATTEMPT** to stabilize RCS pressure with normal pressurizer spray.

GO TO Step 8.

e. **GO TO** ES-1.1, SI Termination.

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** E-1, "Loss of Reactor or Secondary Coolant"

IV. **LENGTH OF LESSON/COURSE:** 2 hours

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of E-1, "Loss of Reactor or Secondary Coolant.

B. Enabling Objectives

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with E-1, "Loss of Reactor or Secondary Coolant that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Explain the purpose/goal of E-1.
2.	Discuss the E-1 entry conditions.
3.	Summarize the mitigating strategy for the failure that initiated entry into E-1.
4.	Describe the bases for all limits, notes, cautions, and steps of E-1.
5.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
6.	Given a set of initial plant conditions use E-1 to correctly: a. Identify required actions b. Respond to Contingencies c. Observe and Interpret Cautions and Notes
7.	Apply GFE and system response concepts to the performance of E-1 conditions.

77. 009 EA2.37 077

Given the following:

- Unit 1 is operating at 100% power when a loss of offsite power occurs.
- The operators subsequently initiate Safety Injection due to a small break LOCA.
- Thirty minutes after the Safety Injection, the following conditions exist:
  - E-1, "Loss of Reactor or Secondary Coolant" is being performed.
  - All 4 SG pressures are approximately 1010 psig and stable.
  - RCS pressure is 2230 psig and stable.
  - T_{hot} is approximately 575°F in all 4 loops and lowering slowly.
  - Core Exit TCs indicate approximately 580°F and slowly rising.
  - T_{cold} is approximately 560°F in all 4 loops and stable.

Based on the above indications, which ONE of the following identifies the condition of the RCS and the procedure transition that will be made?

A. Natural Circulation exists and a transition will be directed to ES-0.2, Natural Circulation Cooldown as the E-1 procedure is continued.

B. Natural Circulation exists and a transition will be directed to ES-1.2, Post LOCA Cooldown as the E-1 procedure is continued.

C. Natural Circulation does NOT exist and a transition will be directed to ES-0.2, Natural Circulation Cooldown as the E-1 procedure is continued.

D. Natural Circulation does NOT exist and a transition will be directed to ES-1.2, Post LOCA Cooldown as the E-1 procedure is continued.

DISTRACTOR ANALYSIS:

A. *Incorrect, Natural Circulation does not exist. Tcold (560°F) is approximately 10 degrees higher than saturation temperature of all 4 SGs (~548°F). Although SG pressures are at approximately the Atmospheric dump valve pressure, they may or may not be open. The only way to tell if natural circulation exists is by trending Tcold. The transition to ES-0.2 from E-1 is not correct. Plausible because Thot lowering and Tcold stable could exist with natural circulation and ES-0.2 is a natural circulation procedure.*

B. *Incorrect, Natural circulation does not exist. Tcold (560°F) is approximately 10 degrees higher than saturation temperature of all 4 SGs (~548°F). The only way to tell if natural circulation exists is by trending Tcold. Steam dumps are unavailable due to the loss of offsite power. The transition to ES-1.2 from E-1 is correct. Plausible because Thot lowering and Tcold stable could exist with natural circulation and ES-1.2 is the correct procedure.*

C. *Incorrect, Natural circulation does not exist. Tcold (560°F) is approximately 10 degrees higher than saturation temperature of all 4 SGs (~548°F). The only way to tell if natural circulation exists is by trending Tcold. Steam dumps are unavailable due to the loss of offsite power. The transition to ES-0.2 from E-1 is not correct. Plausible because natural circulation does not exist (Core Exit temperatures rising) and ES-0.2 is a natural circulation procedure.*

D. *CORRECT, Natural Circulation does not exist. Tcold (560°F) is approximately 10 degrees higher than saturation temperature of all 4 SGs (~548°F). Although SG pressures are at approximately the Atmospheric dump valve pressure, they may or may not be open. The only way to tell if natural circulation exists is by trending Tcold. The transition to ES-1-1 is the correct transition from E-1 for the conditions stated.*

Question No. 77

Tier 1 Group 1

K/A 009 EA2.37
Ability to determine or interpret the following as they apply to a small break LOCA:
Existence of adequate natural circulation

Importance Rating: 4.2 / 4.5

Technical Reference: E-1, Loss of Reactor or Secondary Coolant, Rev 23
Steam Tables
EA-68-6, Monitoring NAtural Circulation Conditions, Rev 0

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271E-1 B.5
Describe the conditions and reason for transitions within this procedure and transitions to other procedures.

Question Source:
Bank # _____
Modified Bank # ___X_____
New _____

Question History: SQN Bank question ES-0.2-B.6 002 modified to add SRO component

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis _X_____

10 CFR Part 55 Content: (43.5 / 45.13)

10CFR55.43.b (5)

Comments: SQN Bank question ES-0.2-B.6 002 modified to add SRO component
SQN Question modified from Salem Unit 1 NRC exam dtd 11/04/2002

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15.	c. **MONITOR** containment sump level less than 68%.	c. **NOTIFY** TSC to evaluate containment sump level and actions of FR-Z.2, Containment Flooding.
	d. **NOTIFY** TSC to initiate post-accident sampling as necessary.	
	e. **EVALUATE** plant equipment status **USING** EA-0-4, Evaluation of Equipment Status.	
16.	**DETERMINE** if RCS cooldown and depressurization is required:	
	a. **CHECK** RCS pressure greater than 300 psig.	a. **IF** RHR injection flow greater than 1000 gpm, **THEN** **GO TO** Step 17. 
	b. **GO TO** ES-1.2, Post LOCA Cooldown and Depressurization. 	

4.2 Verification of Natural Circulation

1. **MONITOR** the following indications of natural circulation at 15- to 20-minute intervals:

   - RCS subcooling greater than 40°F. ☐
   - S/G press stable or dropping. ☐
   - T-hot stable or dropping. ☐
   - Core exit T/C stable or dropping. ☐
   - T-cold at saturation temperature for S/G pressure. ☐

2. **DETERMINE** parameter trends between monitoring intervals and **EVALUATE** if natural circulation is occurring. ☐

3. **IF** natural circulation **NOT** verified,
   THEN
   NOTIFY ASOS. ☐

4. **GO TO** Section 4.1, step in effect. ☐

END OF TEXT

ES-0.2-B.6 002

Given the following:

- Unit 2 is operating at 100% RTP when a Loss of Off-Site power causes a reactor trip. Ten minutes after the trip, the following conditions exist:
  - SG #1 Pressure1010 psig and stable
  - SG #2 Pressure1005 psig and stable
  - SG #3 Pressure 1015 psig and stable
  - SG #4 Pressure1010 psig and stable
  - RCS Pressure is 2230 psig and stable
  - Thot is approximately 575 ^{0}F in all 4 loops and lowering slowly
  - Core Exit TCs indicate approximately 580 ^{0}F
  - Tcold is approximately 560 ^{0}F in all 4 loops and stable

Based on the above indications, what is the condition of the RCS?

A. Natural Circulation exists. S/G PORVs are maintaining heat removal.

B. Natural Circulation exists. The steam dumps are maintaining heat removal.

C. Natural Circulation does NOT exist. Heat removal may be established by opening the steam dumps.

D. Natural Circulation does NOT exist. Heat removal may be established by opening the S/G PORVs.

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** E-1, "Loss of Reactor or Secondary Coolant"

IV. **LENGTH OF LESSON/COURSE:** 2 hours

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of E-1, "Loss of Reactor or Secondary Coolant.

B. Enabling Objectives

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with E-1, "Loss of Reactor or Secondary Coolant that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Explain the purpose/goal of E-1.
2.	Discuss the E-1 entry conditions.
3.	Summarize the mitigating strategy for the failure that initiated entry into E-1.
4.	Describe the bases for all limits, notes, cautions, and steps of E-1.
5.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
6.	Given a set of initial plant conditions use E-1 to correctly: a. Identify required actions b. Respond to Contingencies c. Observe and Interpret Cautions and Notes
7.	Apply GFE and system response concepts to the performance of E-1 conditions.

78. 011 EA2.14 078

Given the following:

- Unit 1 is at 100% power.
- RHR Pump 1B-B is tagged for motor bearing maintenance.
- A Safety Injection occurs due to a LOCA.
- RHR Pump 1A-A trips on instantaneous overcurrent when it attempts to start.
- As the crew transitions from E-1, Loss of Reactor or Secondary Coolant, to ECA-1.1, "Loss of RHR Sump Recirculation", the STA reports a RED path to FR-P.1, "Pressurized Thermal Shock".
- RCS pressure is currently 230 psig.
- RWST level is 54% and dropping.

Which ONE of the following describes the required operator action?

A. The transition to FR-P.1 should NOT be made due to the ECA-1.1 entry requirement.

B. The transition to FR-P.1 should NOT be made until transfer to the containment sump is accomplished.

C. The transition to FR-P.1 should be made but a transition back to ECA-1.1 will be directed if SI termination criteria is NOT met in FR-P.1.

D. The transition to FR-P.1 should be made but a transition back to ECA-1.1 will be directed with no RHR pump running.

DISTRACTOR ANALYSIS:

A. *Incorrect, The transition to FR-P.1 is required to be made from ECA-1.1. Plausible because some other ECAs suspend the implementation of Status trees or direct the transition to FRGs not be made during the ECA performance.*

B. *Incorrect, The transition to FR-P.1 is required to be made from ECA-1.1. Plausible because some other ECAs suspend the implementation of Status trees or direct the transition to FRGs not be made during the ECA performance until certain conditions are met and the establishment of sump recirculation is a priority for the given conditions.*

C. *Incorrect, The transition to FR-P.1 is required to be made and the transition back to ECA-1.1 is required but not because to the status of SI termination criteria. Plausible because FR-P.1, Step 3 does direct a return to the procedure in effect prior to reaching the SI Termination check which would also direct the same transition back to the instruction in effect.*

D. *CORRECT, The transition to FR-P.1 is required to be made and when FR-P.1 is entered , Step 3 will direct a return to the procedure in effect due to the RCS pressure being less than 300 psig along with both RHR pumps being stopped and sump recirculation capability loss.*

Question No. 78

Tier 1 Group 1

K/A 011 EA2.14
Ability to determine or interpret the following as they apply to a Large Break LOCA:
Actions to be taken if limits for PTS are violated

Importance Rating: 3.6* /4.0

Technical Reference: ECA-1.1, Loss of RHR Sump Recirculation,Rev 11
FR-P.1, Pressurized Thermal Shock, Rev 13

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271FR-P.1 B.5
Describe the conditions and reason for transitions within this procedure and transitions to other procedures.

Question Source:
Bank # _____
Modified Bank # _____
New __X_____

Question History: New question for SQN 1/2009 exam

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis _X_____

10 CFR Part 55 Content: (43.5 / 45.13)

10CFR55.43.b (5)

Comments: New question for SQN 1/2009 exam

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	**MONITOR** RWST level greater than 27%.	**IF** RHR pumps aligned to RWST, **THEN** **GO TO** ES-1.3, Transfer to RHR Containment Sump.
2.	**MONITOR** CST level greater than 5%.	**ALIGN** AFW suction to ERCW **USING** EA-3-9, Establishing Turbine Driven AFW Flow, and EA-3-10, Establishing Motor Driven AFW Flow.
3.	**CHECK** RCS pressure greater than 300 psig.	**IF** any of the following conditions exist: • RHR injection flow greater than 1000 gpm **OR** • both RHR pumps STOPPED **AND** sump recirc capability has been lost **THEN** **RETURN TO** procedure and step in effect.

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** FR-P.1, PRESSURIZED THERMAL SHOCK

IV. **LENGTH OF LESSON/COURSE:** 1 hours

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of the FR-P.1, Pressurized Thermal Shock.

B. Enabling Objectives

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated FR-P.1, Pressurized Thermal Shock, that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Explain the purpose/goal of FR-P.1.
2.	Discuss the FR-P.1 entry conditions. a. Describe the setpoints, interlocks, and automatic actions associated with FR-P.1 entry conditions. b. Describe the requirements associated with FR-P.1 entry conditions.
3.	Summarize the mitigating strategy for the failure that initiated entry into FR-P.1.
4.	Describe the bases for all limits, notes, cautions, and steps of FR-P.1.
5.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
6.	Given a set of initial plant conditions use FR-P.1 to correctly: a. Identify required actions b. Respond to Contingencies c. Observe and Interpret Cautions and Notes
7.	Apply GFE and system response concepts to the performance of FR-P.1 conditions.

79. 015 AA2.01 079

Given the following:

- Unit 1 is at 32% power.
- The following annunciator windows alarm on 1-M-6:
  - FS-68-48A REACTOR COOLANT LOOP 3 LOW FLOW
  - RCP BUS UNDERFREQUENCY / UNDERVOLTAGE
- RCP #3 indications are:
  - Ammeter - '0' amps.
  - Green and white lights above the handswitch are lit.
  - Flow - '0' on all 3 indicators.
- The other RCPs remain in service and the reactor trip breakers remain closed.
- The OATC manually trips the reactor as directed by the SRO.

Which ONE of the following identifies the condition causing the RCP trip and the earliest NRC notification required by 10CFR50.72?

	Condition causing RCP Trip	**Notification Requirement**
A.	Under voltage	1 hour
B.	Under voltage	4 hours
C.	Under frequency	1 hour
D.	Under frequency	4 hours

DISTRACTOR ANALYSIS:

The RCPs have protection from undervoltage and underfrequency via relays. Both conditions can cause trips of the RCPs and if conditions and logic is met, the reactor would automatically trip.

A. *Incorrect, The conditions in the stem describe the trip of RCP #3 from an undervoltage condition on the 6.9 Kv Unit Board feeding the RCP, however NO automatic trip would be initiated at the stated power level (below P8) and the emergency plan would not be implemented. (No 1 hour notification would be required). Plausible because the condition causing the RCP trip is correct and if the power level had been greater than P8, an automatic reactor trip should have occurred.. If the reactor had failed to trip automatically, a 1 hour report would be required due to implementation of the Emergency Plan.*

B. *CORRECT, The conditions in the stem describe the trip of RCP #3 from an undervoltage condition on the 6.9 Kv Unit Board feeding the RCP. With the reactor power level below P-8, no automatic reactor trip would be initiated from low flow condition in a single loop. AOP-R.04, Malfunction of Reactor Coolant Pump, would be the controlling procedure and at the stated power level, a manual reactor trip would be directed. The reactor trip would require a 4 hour notification.*

C. *Incorrect, The conditions in the stem describe the a trip of RCP #3 from an undervoltage condition on the 6.9 Kv Unit Board feeding the RCP not an underfrequency trip. The underfrequency trip of the RCP requires 2/4 logic to be made in the SSPS which then will trip the reactor and all RCPs. The logic is not met in the stem even though power is above the P7 permissive (10%), only one RCPs is involved and the logic requires 2 out of 4. NO automatic trip would be initiated at the stated power level (below P8) and the emergency plan would not be implemented. (No 1 hour notification would be required). Plausible because underfrequency can cause RCP trip with conditions different than stated in the stem and following the underfrequency initiation at greater than P7, a failure of the reactor to automatically trip would require a 1 hour due to the implementation of the Emergency Plan.*

D. *Incorrect, The conditions in the stem describe the trip of RCP #3 from an undervoltage condition on the 6.9 Kv Unit Board feeding the RCP not an underfrequency trip. The underfrequency trip of the RCP requires 2/4 logic to be made in the SSPS which then will trip the reactor and all RCPs. The logic is not met in the stem even though power is above the P7 permissive (10%), only one RCPs is involved and the logic requires 2 out of 4. the 4 hour notification due to the manual reactor trip is correct. Plausible because underfrequency can cause RCP trip with conditions different than stated in the stem and the 4 hour notification due to the manual reactor trip is correct.*

Question No. 79

Tier 1 Group 1

K/A 015 AA2.01
Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow):
Cause of RCP failure

Importance Rating: 3.0 / 3.5*

Technical Reference: 1-AR-M6-A Reactor Protection and Safeguards 1-XA-55-6A, Rev 15.
1,2-47N763-2 R20
1-47W611-99-6 R2

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.RCP B.4.i. & 5.c
Describe the following items for each major component in the Reactor Coolant Pump system as described in this lesson:
i. Protective features (including setpoints)
Describe the operation of the RCP system as it relates to the following:
c. Alarms and Alarm Response

Question Source:
Bank # _____
Modified Bank # _____
New __X____

Question History: New question for SQN 1/2009 exam

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis __X____

10 CFR Part 55 Content: (43.5 / 45.13)

10CFR55.43.b (5)

Comments: New question for SQN 1/2009 exam

Source	Setpoint	RCP BUS UNDERFREQUENCY/ UNDERVOLTAGE
SER 460, 467, 476, 477, 478, 482, 1613, 1614 UV and UF relays One UV and UF Relay on each RCP bus. 1/4 for alarm 2/4 for trip input	57Hz and ~ 72% voltage (~5022 volts)	

Probable Causes

1. Loss of power to 6.9kV unit bds.
2. Channel malfunction or testing.
3. RCP Undervoltage or Underfrequency relay failure.

NOTE 1 Underfrequency condition on 2/4 RCPs will trip all four RCPs automatically.

NOTE 2 Undervoltage condition on individual RCP buss will block operation of associated UF relay.

Corrective Actions

[1] IF no reactor trip occurs, **THEN**

[a] **CHECK** 1-XX-55-6A Reactor Trip SI status panel for bistables that may be tripped.

[b] **EVALUATE** reactor trip criteria with SRO per AOP-R.04, *Reactor Coolant Pump Malfunctions.*

[c] **IF** reactor trip should have occurred automatically, **THEN**

GO TO E-0, *Reactor Trip or Safety Injection.*

[2] IF RCP trips, **THEN**

GO TO AOP-R.04, *Reactor Coolant Pump Malfunctions.*

[3] IF RCP undervoltage or underfrequency relay has failed, **THEN**

GO TO AOP-I.10, RCP Undervoltage or underfrequency Instrument Malfunction.

[4] **EVALUATE** Technical Specifications.

References 45B655-06A-0, 47W610-68, 47W611-99 , 45N721-1, 45N763-2

Source	Setpoint	FS-68-48A REACTOR COOLANT LOOP 3 LOW FLOW
SER 468 SER 583 SER 592 SER 596		
1-FS-68-48A 1-FS-68-48B 1-FS-68-48D 1/3 for alarm 2/3 for trip input	Flow < 90%	

Probable Causes

1. Pump trip.
2. Flow instrument malfunction or testing.
3. Operator stopping pump.

Corrective Actions

[1] IF no reactor trip occurs, **THEN**

[a] **CHECK** 1-XX-55-6A Reactor Trip SI status panel for bistables that may be tripped.

[b] **EVALUATE** reactor trip criteria with SRO per AOP-R.04, *Reactor Coolant Pump Malfunctions.*

[c] **IF** reactor trip should have occurred automatically, **THEN**

TRIP the reactor, **AND**

GO TO E-0, *Reactor Trip or Safety Injection.*

[d] **CHECK** [1-FI-68-48A], [1-FI-68-48B], and [1-FI-68-48D] for channel failure.

[e] **IF** a single flow channel has failed, **THEN**

GO TO AOP-I.03, RCS Flow Instrument Malfunction.

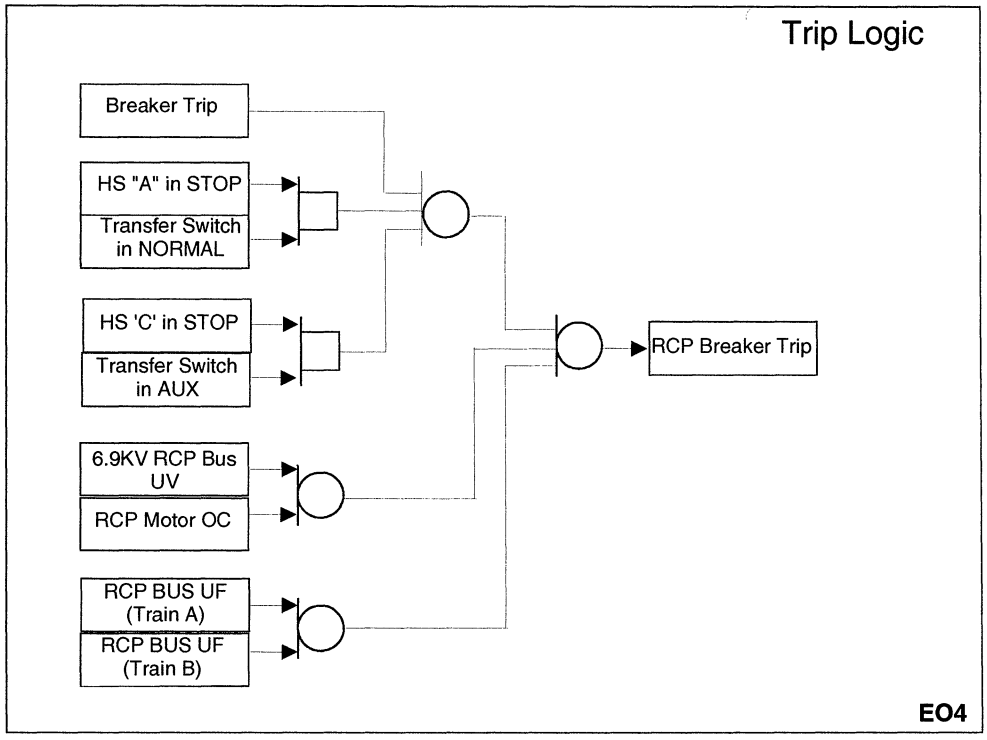
[2] **IF** RCP trips, **THEN**

GO TO AOP-R.04, *Reactor Coolant Pump Malfunctions.*

[3] **EVALUATE** Technical Specifications.

References

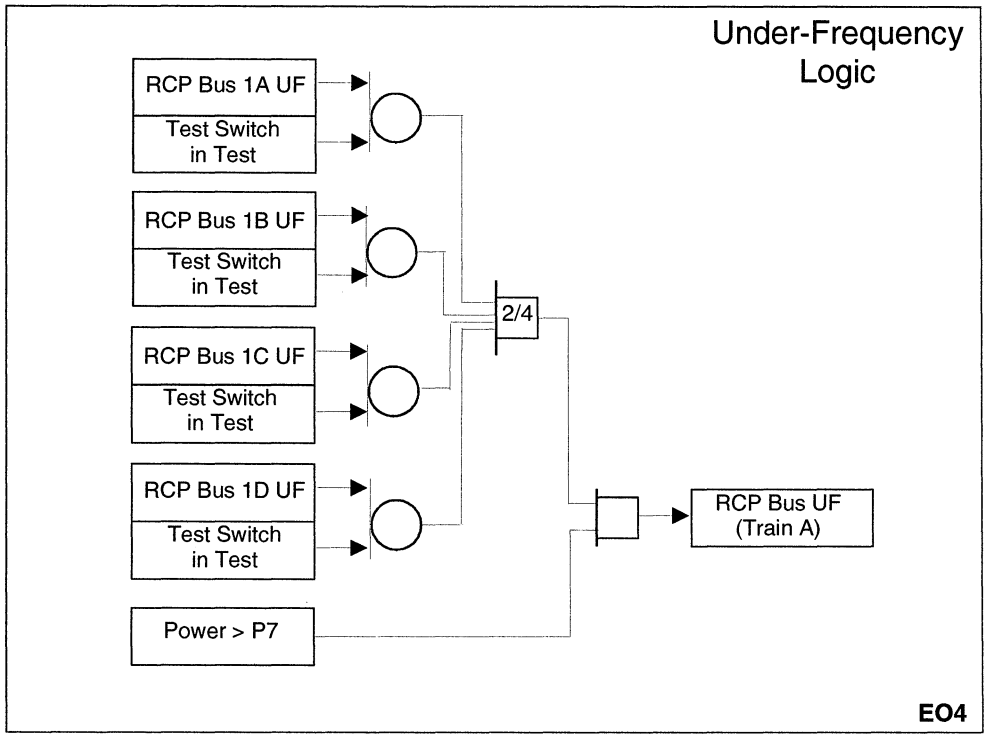
45B655-06A-0, 47W610-68, 47W611-99



X. LESSON BODY:

J. Purpose/function of components

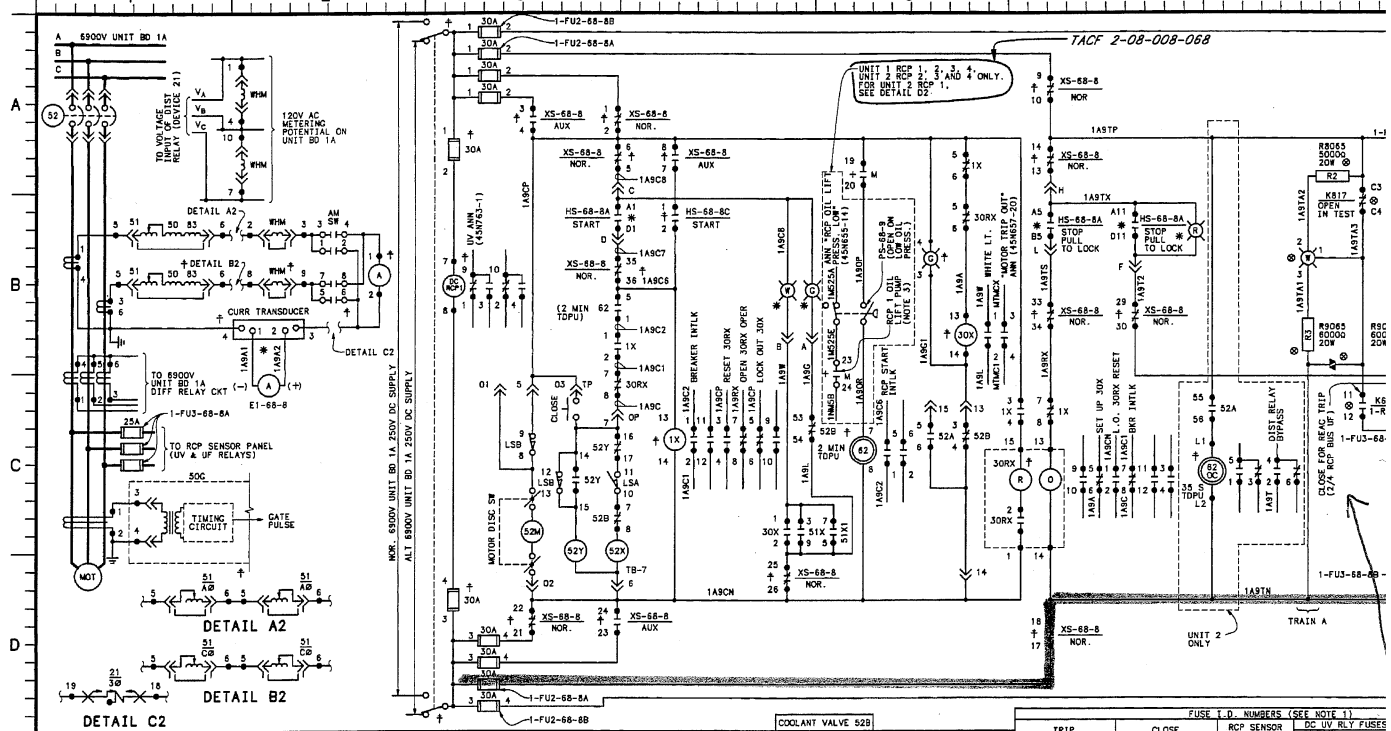
COMPONENT	PURPOSE / FUNCTION
RCP Trip logic (SD page 33)	• A RCP may be stopped from its handswitch or at the switchgear. The breaker will trip open on a motor protection fault (unit board UV, motor overcurrent) or an underfrequency trip of either reactor protection system train. • In addition to providing a trip to the RCP, an UV trip signal provides an input to the reactor protection system (RPS). The purpose of the RPS trip is to provide DNB protection to the reactor by anticipating a complete loss of flow condition. • This reactor trip requires an undervoltage condition (~70%) on two RCPs and is blocked below P-7 (10%).



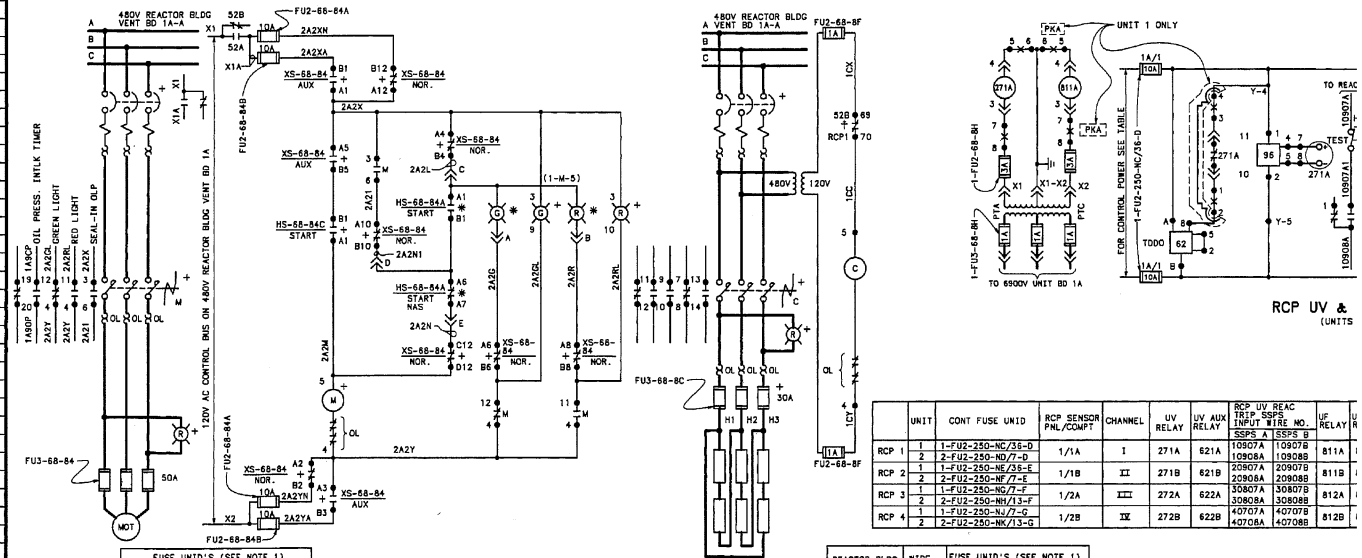
X. **LESSON BODY:**

J. Purpose/function of components

COMPONENT	PURPOSE / FUNCTION
RCP UF logic (SD page 34)	• An UF condition on two of the four RCP buses supplying the RCPs will initiate a reactor trip and trip all four RCP breakers. The purpose of the UF trip is to provide DNB protection to the reactor by anticipating a complete loss of flow condition in two or more loops. • This reactor trip requires an underfrequency condition (~57 Hz) on two RCP buses and is blocked below P-7 (10%). • A rapid decrease in electrical frequency can decelerate the RCPs faster than a complete loss of power. This trip, in conjunction with the rotational inertia provided by the RCP flywheel, ensures the proper flow coast-down time is maintained.



6900V UNIT BD	WIRE PREFIX	CONT RM PNL	CONT SWITCH	BACK UP SEL SW	OIL PS	K627 TERMINALS	K617 TERMINALS	COOLANT VALVE 52B INPUT WIRE PREFIX	R1 & R2	R3 & R4	VARISTORS	FUSE I.D. NUMBERS (SEE NOTE 1) TRIP	CLOSE	RCP SENSOR PNL SUPPLY FU	DC UV RLY FUSES RELAY	I.D. NUMB
REACTOR COOLANT PUMP 1	1A9	M-5	HS-68-8A & C	XS-68-8	PS-68-9	11,12	C3,C4	EBJ	R8065	R9055	RV8065	1-FU2-68-8A, 8B	1-FU2-68-8C, 8D	1-FU3-68-8A	DCRCP1	1-FU2-68-
REACTOR COOLANT PUMP 2	1B7	M-5	HS-68-31A & C	XS-68-31	PS-68-32	13,14	F3,F4	EBK	R8066	R9056	RV8065	1-FU2-68-31A, 31B	1-FU2-68-31C, 31D	1-FU3-68-31A	DCRCP2	1-FU2-68-
REACTOR COOLANT PUMP 3	1C	1C9	M-5	HS-68-50A & C	XS-68-50	PS-68-51	15,16	J3,J4	EBL	R8067	R9057	RV8067	1-FU2-68-50A, 50B	1-FU2-68-50C, 50D	1-FU3-68-50A	DCRCP3	1-FU2-68-
REACTOR COOLANT PUMP 4	1D	1D7	M-5	HS-68-73A & C	XS-68-73	PS-68-74	17,18	M3,M4	EBM	R8068	R9058	RV8068	1-FU2-68-73A, 73B	1-FU2-68-73C, 73D	1-FU3-68-73A	DCRCP4	1-FU2-68-



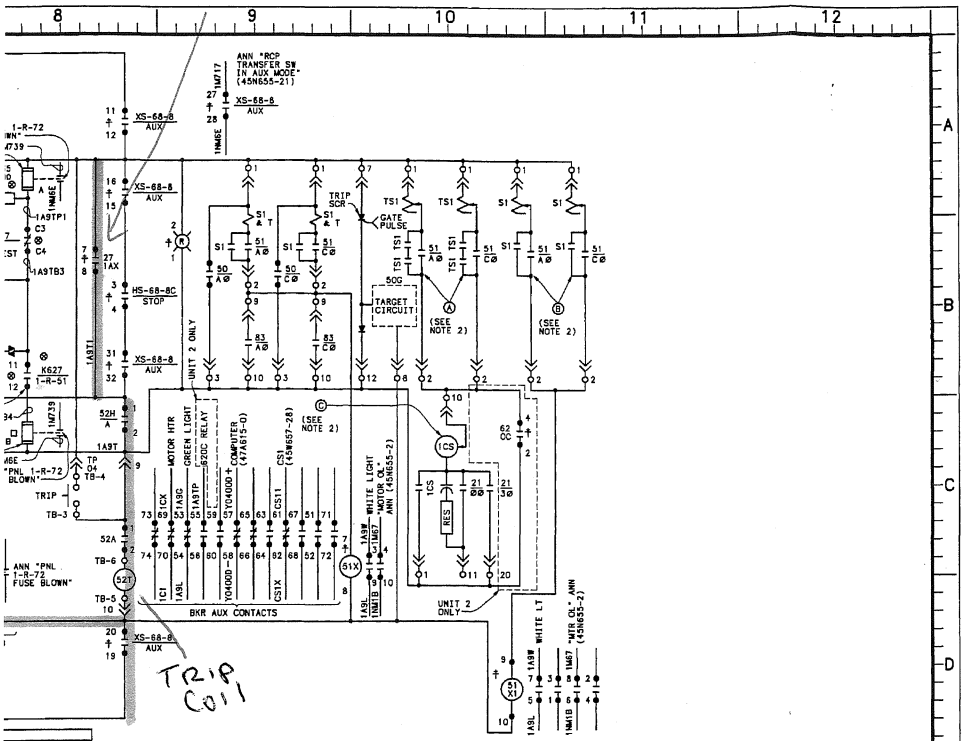
	UNIT	CONT FUSE UNID	RCP SENSOR PNL/COMPT	CHANNEL	UV RELAY	UV AUX RELAY	RCP UV REAC TRIP SSPS INPUT WIRE NO. SSPS A	SSPS B	UF RELAY
RCP 1	1	1-FU2-250-NC/36-D	1/1A	I	271A	621A	10907A	10907B	811A
	2	2-FU2-250-ND/7-D					10908A	10908B	
RCP 2	1	1-FU2-250-NE/35-E	1/1B	II	271B	621B	20907A	20907B	811B
	2	2-FU2-250-NF/7-E					20908A	20908B	
RCP 3	1	1-FU2-250-NG/7-F	1/2A	III	272A	622A	30807A	30807B	812A
	2	2-FU2-250-NH/13-F					30808A	30808B	
RCP 4	1	1-FU2-250-NJ/7-G	1/2B	IV	272B	622B	40707A	40707B	812B
	2	2-FU2-250-NK/13-G					40708A	40708B	

	FUSE UNID'S (SEE NOTE 1) NOR & AUX CONT	PENETRATION	REACTOR BLDG VENT BD	WIRE PREFIX	CONT RM PANEL	CONT SWS	BACK-UP SEL SW
RCP 1 OIL LIFT PUMP	1-FU2-68-84A, 84B	1-FU3-68-84	1A-A	2A2	M-5	HS-68-84AAC	XS-68-84
RCP 2 OIL LIFT PUMP	1-FU2-68-85A, 85B	1-FU3-68-85	1B-B	3E	M-5	HS-68-85AAC	XS-68-85
RCP 3 OIL LIFT PUMP	1-FU2-68-86A, 86B	1-FU3-68-86	1A-A	7B2	M-5	HS-68-86AAC	XS-68-86
RCP 4 OIL LIFT PUMP	1-FU2-68-87A, 87B	1-FU3-68-87	1B-B	5E	M-5	HS-68-87AAC	XS-68-87

REACTOR BLDG VENT BD	WIRE PREFIX	FUSE UNID'S (SEE NOTE 1) PEN	CONT
RCP 1 MOT HTR	1A-A	1C	1-FU3-68-8C	1-FU2-68-8F
RCP 2 MOT HTR	1B-B	1C	1-FU3-68-31C	1-FU2-68-31F
RCP 3 MOT HTR	1A-A	4D	1-FU3-68-50C	1-FU2-68-50F
RCP 4 MOT HTR	1B-B	6C	1-FU3-68-73C	1-FU2-68-73F

27 1AX – BOARD UNDERVOLTAGE

I PULL ALL DRAWINGS



ISOLATION B	C	COMPUTER PTS	RELAYS	
B-8B		Y0400D	271AX(U1), 272AX(U2)	CONTACTS 7 & 8
B-31B		Y0420D	271BX2(U1), 272BX2(U2)	CONTACTS 7 & 8
B-50B		Y0440D	271CX2(U1), 272CX2(U2)	CONTACTS 7 & 8
B-73B		Y0460D	271DX(U1), 272DX(U2)	CONTACTS 7 & 8

CP
p from
GENCY
IRES
RELAYS
BE PICKED
ON 2/4
CPs

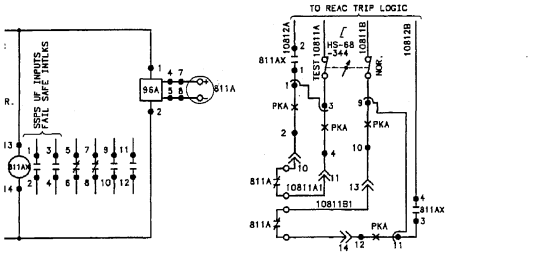
NOTES:
1. FOR UNIT 2 FUSE UNIDS CHANGE UNIT DESIGNATION.
EXAMPLE: 1-FU4-68-8A
THIS NUMBER WILL CHANGE TO 2, FOR UNIT 2 BOARDS.

2. RELAY TYPES ARE AS FOLLOWS:
A - O.C. RELAY, GE TYPE IAC77A
B - O.C. RELAY, GE TYPE IAC66A
C - DISTR RELAY, W TYPE KD10

3. WIRE DESIGNATIONS SHOWN ARE FOR RCP 1 OIL LIFT PUMP. WIRE DESIGNATIONS FOR RCP 2, 3 & 4 OIL LIFT PUMPS ARE SHOWN ON CONNECTION DIAGRAMS.

REFERENCE DRAWINGS:
45N721-1, -2 ------- 6900V UNIT BD SINGLE LINE DIAGRAMS
45N755 ------------- 480V REACTOR BLDG VENT BD SINGLE LINE DIAGRAMS
45N1721 ------------ 6900V UNIT BD CONNECTION DIAGRAMS
45N1755
45N1756 ------------ 480V REACTOR BLDG VENT BD CONNECTION DIAGRAMS

SYMBOLS:
*--- EQUIPMENT LOCATED ON UNIT CONTROL BD
†--- EQUIPMENT MOUNTED ON 6900V SWITCHGEAR
+--- EQUIPMENT MOUNTED ON 480V MOTOR CONTROL CENTER
□--- EQUIPMENT LOCATED ON TVA BOP RACKS IN AUX INSTR ROOM
⊗--- EQUIPMENT LOCATED ON NSSS RACKS IN AUX INSTR ROOM



AYS

UF REAC P SSPS IT WIRE NO.		TEST SWITCHES		FUSE NO. (NOTE 1)	CONTROL POWER UNIT 1 120V AC VITAL INSTR BD	CONTROL POWER UNIT 2 120V AC VITAL INSTR BD	FUSE UNIDS PTA/C-PRI	FUSE UNIDS PTA/C-SEC
5 A	SSPS B	UV	UF					
1A	10811B	HS-68-343	HS-68-344	1A/1	BD 1-I BKR 38	BD 2-I BKR 07	1-FU3-68-8H	1-FU2-68-8H
2A	10812B						2-FU3-68-8H	2-FU2-68-8H
1A	20811B	HS-68-345	HS-68-346	1B/1	BD 1-II, BKR 36	BD 2-II BKR 07	1-FU3-68-31H	1-FU2-68-31H
2A	20812B						2-FU3-68-31H	2-FU2-68-31H
1A	30711B	HS-68-347	HS-68-348	2A/1	BD 1-III BKR 07	BD 2-III BKR 13	1-FU3-68-50H	1-FU2-68-50H
2A	30712B						2-FU3-68-50H	2-FU2-68-50H
3A	40903B	HS-68-349	HS-68-350	2B/1	BD 1-IV BKR 07	BD 2-IV BKR 13	1-FU3-68-73H	1-FU2-68-73H
4A	40904B						2-FU3-68-73H	2-FU2-68-73H

20	TACF 2-08-008-068	DGR			6/1/08
INC: TACF 2-08-008-068					
REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
SCALE: NONE				EXCEPT AS NOTED	

TURBINE BUILDING
UNITS 1 & 2
CATEGORY 1

WIRING DIAGRAMS 6900V UNIT AUXILIARY POWER SCHEMATIC DIAGRAMS

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

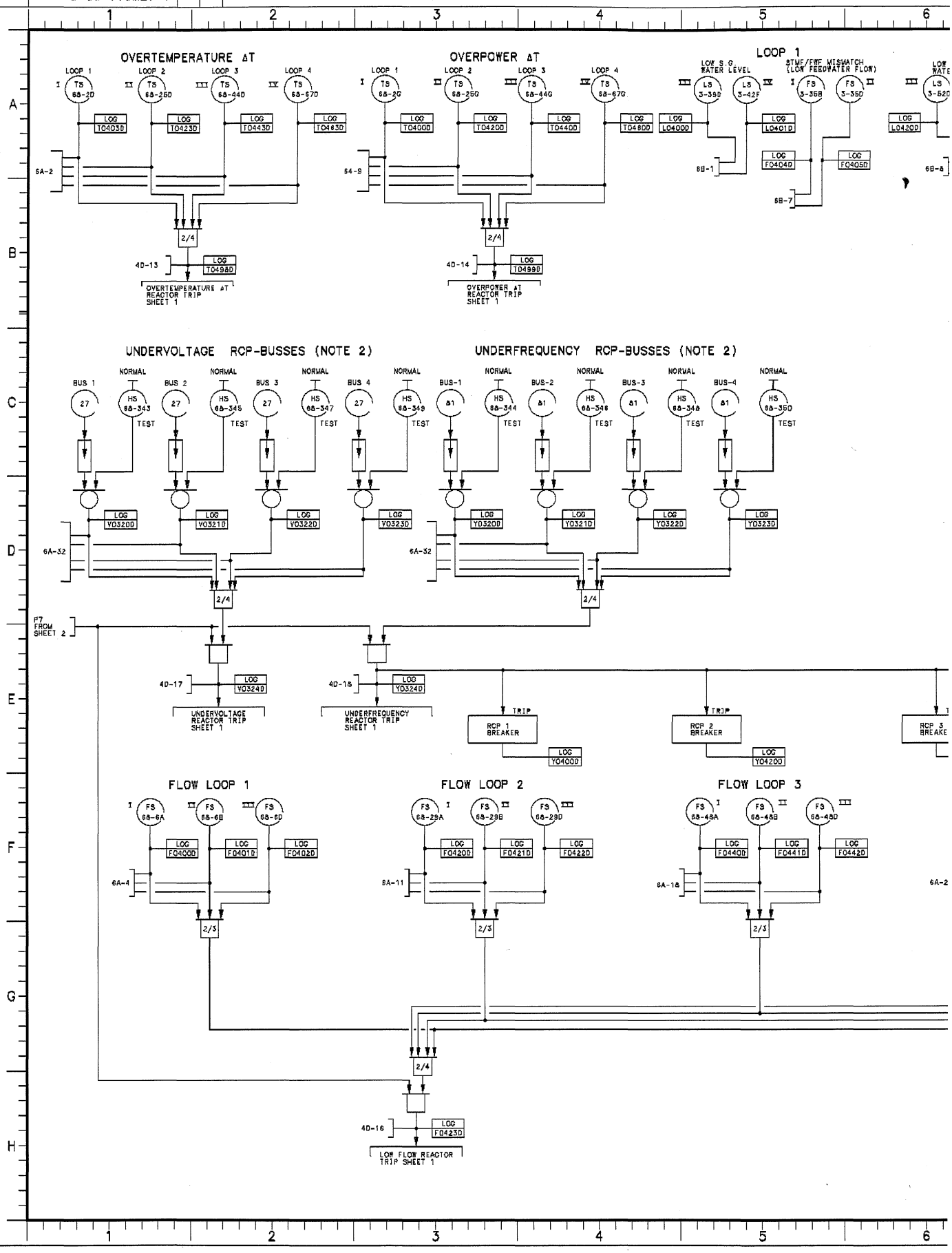
DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL	
DRAFTER: MIKE WALKER	CHECKER: E. WILLIAMS	NO ISSUE PER: CCD RECONCILIATION SHEET NO.CCD-8126. DRAWING MADE A CCD FROM AC-T & AD-R24. ALSO INCORPORATED 690D4476.	1	J.DUCK
DESIGNER: N/A	REVIEWER: H.L. SUTTON		2	H.R.SEDLACIK
			3	M.A.AGUIRRE

ISSUED BY: P.G. TRUDEL

DATE	45	E	CCD NO: 1,2-45N763-2	R20
10-20-89				

CAD MAINTAINED DRAWING

CONTROL ROOM DWG


OVERTEMPERATURE ΔT
OVERPOWER ΔT
LOOP 1
LOOP 2
LOOP 3
LOOP 4
TS 68-20
TS 68-260
TS 68-440
TS 68-670
LOG T04030
LOG T04230
LOG T04430
LOG T04630
LOG T04000
LOG T04200
LOG T04400
LOG T04600
6A-2
6A-9
2/4
4D-13
4D-14
LOG T04980
OVERTEMPERATURE ΔT REACTOR TRIP SHEET 1
OVERPOWER ΔT REACTOR TRIP SHEET 1
LOW S.G. WATER LEVEL
STM/FWE MISMATCH (LOW FEEDWATER FLOW)
LS 3-39D
LS 3-42F
FS 3-36B
FS 3-35D
LOG L04000
LOG L0401D
LOG F04040
LOG F0405D
6B-1
6B-7
6B-8
UNDERVOLTAGE RCP-BUSSES (NOTE 2)
UNDERFREQUENCY RCP-BUSSES (NOTE 2)
BUS 1
BUS 2
BUS 3
BUS 4
BUS-1
BUS-2
BUS-3
BUS-4
NORMAL
TEST
27
Δ1
HS 68-343
HS 68-345
HS 68-347
HS 68-349
HS 68-344
HS 68-346
HS 68-348
HS 68-350
LOG Y03200
LOG Y0321D
LOG Y0322D
LOG Y0323D
LOG Y03200
LOG Y0321D
LOG Y0322D
LOG Y0323D
6A-32
6A-32
2/4
2/4
F7 FROM SHEET 2
4D-17
4D-18
LOG Y0324D
LOG Y0324D
UNDERVOLTAGE REACTOR TRIP SHEET 1
UNDERFREQUENCY REACTOR TRIP SHEET 1
TRIP
RCP 1 BREAKER
RCP 2 BREAKER
RCP 3 BREAKE
LOG Y04000
LOG Y04200
FLOW LOOP 1
FLOW LOOP 2
FLOW LOOP 3
FS 68-6A
FS 68-6B
FS 68-6D
FS 68-29A
FS 68-29B
FS 68-29D
FS 68-45A
FS 68-45B
FS 68-45D
LOG F04000
LOG F0401D
LOG F0402D
LOG F04200
LOG F0421D
LOG F0422D
LOG F04400
LOG F0441D
LOG F0442D
6A-4
6A-11
6A-18
6A-2
2/3
2/3
2/3
2/4
4D-16
LOG F0423D
LOW FLOW REACTOR TRIP SHEET 1

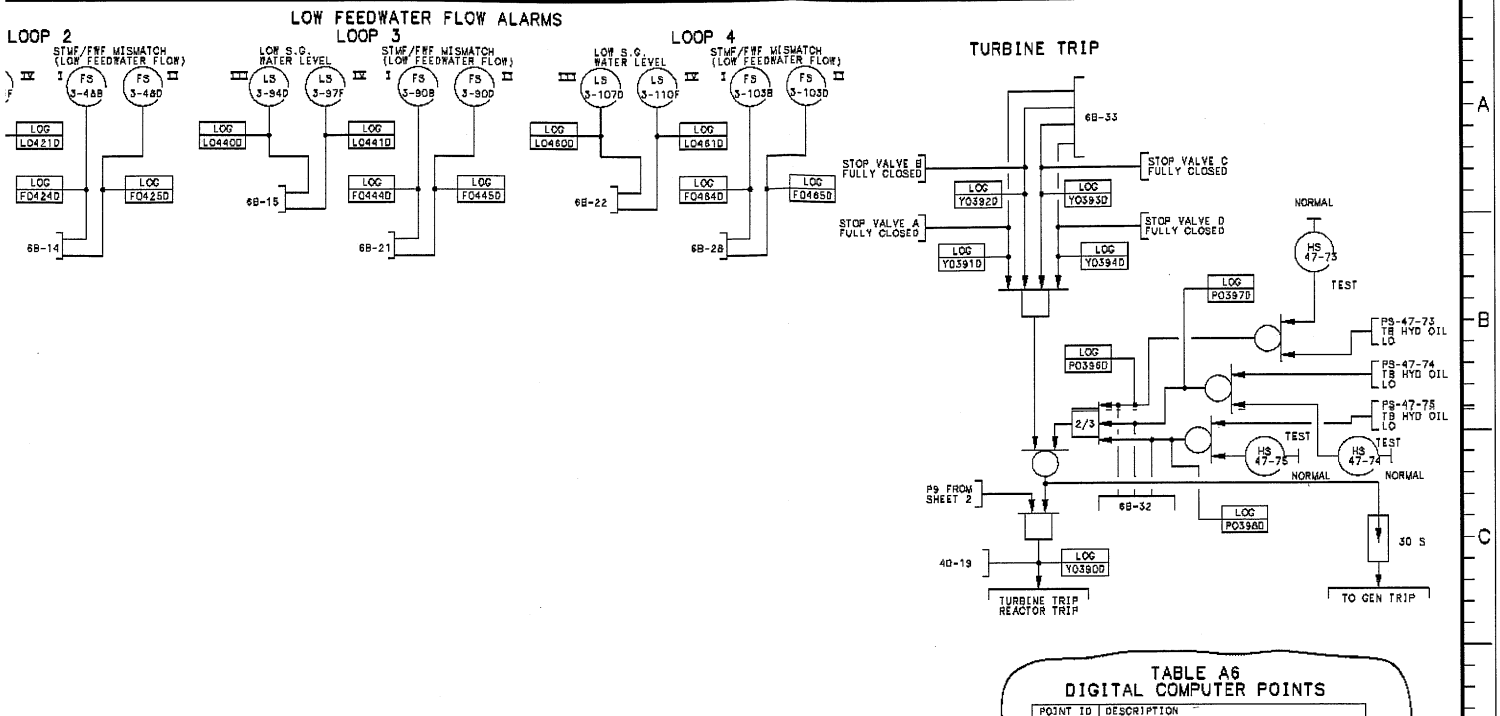


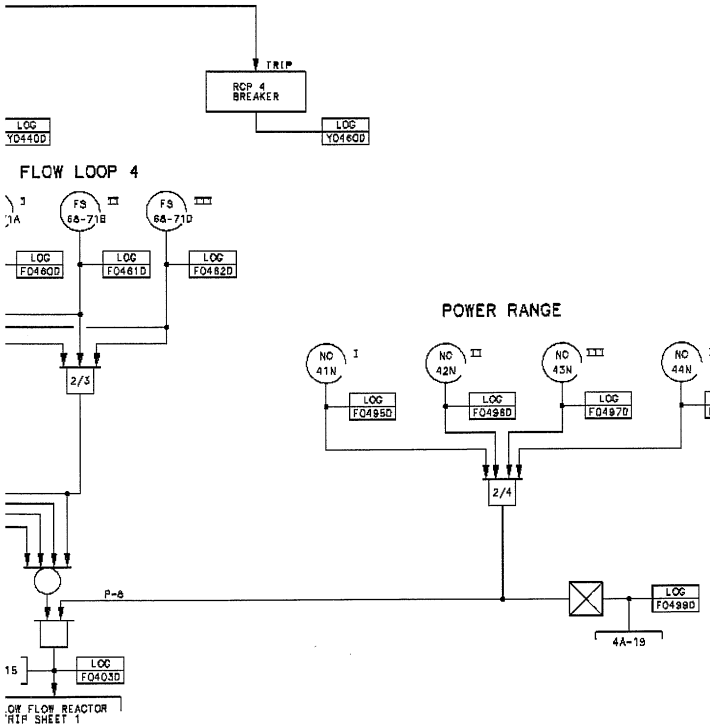
TABLE A6
DIGITAL COMPUTER POINTS

POINT ID	DESCRIPTION
YO721D	SG # 1 HI-HI LEVEL TURBINE TRIP STATUS
YO722D	SG # 2 HI-HI LEVEL TURBINE TRIP STATUS
YO723D	SG # 3 HI-HI LEVEL TURBINE TRIP STATUS
YO724D	SG # 4 HI-HI LEVEL TURBINE TRIP STATUS

NOTES:

1. FOR SYMBOLS AND GENERAL NOTES SEE SHEET 1.
2. REACTOR TRIP SYSTEM RESPONSE TIME REQUIREMENTS FOR RCP UNDERVOLTAGE IS ≤ 1.2 SECONDS AND FOR RCP UNDERFREQUENCY IS ≤ 0.6 SECONDS. THE RESPONSE TIME IS DEFINED AS THE ELAPSED TIME FROM THE RELAY CHANGE OF STATE TO THE BEGINING OF CONTROL ROD MOTION.
3. DIGITAL AND ANALOG LOGIC SYMBOLS ARE USED ON LOGIC DIAGRAMS TO FUNCTIONALLY DESCRIBE THE PROCESS CONTROL. REFER TO THE ASSOCIATED WIRING SCHEMATIC FOR THE ELECTRICAL COMPONENTS USED TO IMPLEMENT THE CONTROL SCHEME.
4. REFER TO TABLE A6 FOR ADDITIONAL DIGITAL COMPUTER POINTS (STEAM GENERATOR HI-HI LEVEL TURBINE TRIP STATUS).
5. REFER TO TABLE A5 SHEET 5 FOR ADDITIONAL DIGITAL COMPUTER POINTS (6900V SHUTDOWN BOARD BLACKOUT STATUS).

DCN M11586A
(TYP ALL BACKCIRCLES)



FOR ORIGINAL SIGNATURES IN TITLE BLOCK SEE REVISION 0 MICROFILM COPY.

2	DCN M11586A	N/A	DGR				

INC: DCA-M11585-5173 R0

REV	ECN/DCN	CHG DOC	DRWN	CHKD	APPD	DATE

SCALE: NONE — EXCEPT AS NOTED

POWERHOUSE UNIT 1 — CATEGORY 1

MECHANICAL LOGIC DIAGRAM REACTOR PROTECTION SYSTEM

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
NUCLEAR ENGINEERING

Q

DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: DR PALFREY	CHECKER: L.BEASLEY	RO ISSUE PER: WP 1443-01, -02, -03, -04, -06, DCN M01443	1 L.BEASLEY
DESIGNER: N/A	REVIEWER: K.R.SPINO	DCA M01443-419 DWG SPLIT PER ATTACHMENT E	2 P.B.NESBITT
			3 W.R.SEDLACIK/LMA

DATE 5-21-90 | 45 | M | CCD NO:1-47W611-99-6 R2

ISSUED BY: P.G.TRUDEL

DRAWING SERVICES UNIT
PROCAD MAINTAINED DRAWING
THIS CONFIGURATION CONTROL DRAWING IS MAINTAINED BY THE SQN CAD UNIT AND IS NOW PART OF THE TVA PROCADAM DATABASE.
COMPUTER GRAPHICS

CONTROL ROOM DWG

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** REACTOR COOLANT PUMP SYSTEM

IV. **LENGTH OF LESSON:** 4 hour lecture; 2 hour simulator demonstration; 2 hour self-study/workshop

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:
Upon completion of this lesson and others presented, the student should be able to apply the knowledge to support satisfactory performance of the tasks associated with the Reactor Coolant Pump system in the plant and on the simulator.

B. Enabling Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with the Reactor Coolant Pump System that are rated $\geq$ 2.5 during Initial License training for the appropriate license position as identified in Appendix A.
1. State the purpose/functions of the Reactor Coolant Pump System as described in the SQN FSAR.
2. State the design basis of the Reactor Coolant Pump System in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Reactor Coolant Pump System as illustrated on the simplified system drawing.
4. Describe the following items for each major component in the Reactor Coolant Pump System as described in this lesson:
   a. Location
   b. Power supply (include control power as applicable)
   c. Support equipment and systems
   d. Normal operating parameters
   e. Component operation
   f. Controls
   g. Interlocks (including setpoints)
   h. Instrumentation and Indications
   i. Protective features (including setpoints)
   j. Failure modes
   k. Unit differences
   l. Types of accidents for which the Reactor Coolant Pump System components are designed
   m. Location of controls and indications associated with the Reactor Coolant Pump System in the control room and auxiliary control room

V. TRAINING OBJECTIVES (Cont'd):

B. Enabling Objectives (Cont'd):

5. Describe the operation of the RCP system as it relates to the following:
   a. Precautions and limitations
   b. Major steps performed while placing the RCP system in service
   c. Alarms and alarm response
   d. How a component failure will affect system operation
   e. How a support system failure will affect RCP system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the RCP system as explained in this lesson:
   a. State Tech Specs/TRM LCOs that govern the RCPs
   b. State the $\leq$1 hour action limit TS LCOs
   c. Given the conditions/status of the RCP system components and the appropriate sections of the Tech Spec, determine if operability requirements are met and what actions are required
7. Discuss related Industry Events:
   a. SQ961761PER; RCP#4 above 15mil vibration alarm
   b. SOER-82-5; Reactor Coolant Pump seal failure
   c. SER 20-86; RCP shaft failure at Crystal River

VI. TRAINING AIDS:

A. Classroom Computer and Local Area Network (LAN) Access
B. Computer projector
C. Simulator (if available)

80. 022 AG2.1.28 080

Given the following:

- Unit 1 is in Mid-Loop Operation with RHR Train A in service during a refueling outage with the reactor core reloaded.
- SG nozzle dams are installed.
- SI pump 1B-B is tagged and disassembled for impeller replacement
- CCP 1A-A trips due to motor failure.
- RCS level begins to drop and the RHR pump 1A-A is stopped due to cavitation.
- Attempts to open 1-FCV-63-1, RHR Pump Suction from RWST, are unsuccessful.
- Core exit thermocouples have increased to 208°F.

Which ONE of the following identifies the procedure to be used and how SI pump IA-A will be aligned during performance of the procedure?

A. AOP-R.02, "Shutdown LOCA".
SI pumps will be aligned for Hot Leg injection.

B. AOP-R.02, "Shutdown LOCA".
SI pumps will be prevented from injecting due to LTOP requirements.

C. AOP-R.03, "RHR System Malfunction".
SI pumps will be aligned for Hot Leg injection.

D. AOP-R.03, "RHR System Malfunction".
SI pumps will be prevented from injecting due to LTOP requirements.

DISTRACTOR ANALYSIS:

A. Incorrect, AOP-R.03 is the correct procedure to be used not AOP-R.02. The AOP-R.03 does direct the SI pumps to be aligned in Hot Leg injection. Plausible because the conditions in the stem would exist if a shutdown LOCA was occurring and if AOP-R.02 were entered a note at the start of the AOP directs the use of AOP-R.03 if the plant is in Mid-Loop operation and the SI pumps alignment in Hot Leg injection is correct.

B. Incorrect, AOP-R.03 is the correct procedure to be used not AOP-R.02 and the AOP directs the SI pumps to be aligned in Hot Leg injection. Plausible because the conditions in the stem would exist if a shutdown LOCA was occurring and if AOP-R.02 were entered a note at the start of the AOP directs the use of AOP-R.03 if the plant is in Mid-Loop operation and the SI pumps normal alignment with injection prevented due to the LTOPS requirement.

C. CORRECT, when the charging pump trips (loss of RCS makeup) the vessel level will start to decrease. When the RHR pump is stopped due to cavitation, core cooling flow is terminated, the core starts heating up and with 1-FCV-63-1 unable to be opened, the AOP -R.03 directs the SI pumps to be aligned for Hot Leg Injection. A note prior to the step to align the pumps states that core cooling takes priority over the LTOPS requirements for the SI pumps. The conditions would be the same if a shutdown LOCA was occurring and if AOP-R.02 was entered there is a note at the start of the AOP directing the use of AOP-R.03 if the plant is in Mid-Loop operation.

D. Incorrect, AOP-R.03 is the correct procedure to be used but the AOP directs the SI pumps to be aligned in Hot Leg injection. Plausible because the procedure is the correct procedure to be used and and the SI pumps normal alignment is with injection prevented due to the LTOPS requirements.

Question No. 80

Tier 1 Group 1

K/A 022 AG2.1.28
Loss of Reactor Coolant Makeup
Knowledge of the purpose and function of major system components and controls.

Importance Rating: 4.1 / 4.1

Technical Reference: AOP-R.02, Shutdown LOCA, Rev 10
AOP-R.03, RHR System Malfunction, Rev 20

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271AOP-R.03 B.5
Summarize the mitigating strategy for the failure that initiated entry into AOP-R.03.

Question Source:
Bank # _____
Modified Bank # __X_____
New _____

Question History: SQN 1/2009 exam, AOP-R.03 006 modified

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis __X____

10 CFR Part 55 Content: (41.7)

10CFR55.43.b (5)

Comments: SQN question AOP-R.03 006 modified

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.0 OPERATOR ACTIONS

NOTE: If this procedure is entered from AOP-P.05 or AOP-P.06 due to loss of shutdown board(s), then Section 2.3 is the applicable section.

1. **DIAGNOSE** the failure:

IF...	GO TO SECTION	PAGE
RHR malfunctions due to low water level during reduced inventory or mid-loop operations	2.1	4
RHR overpressurization due to high RCS pressure	2.2	29
RHR pump(s) failure or trip	2.3	36
RHR system leak	2.4	41
Failure of RHR due to Loss of CCS	2.5	48

END OF SECTION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 RHR Malfunctions Due to Low Water Level During Reduced Inventory or Mid-Loop Ops

CAUTION **Changes in RCS pressure could result in inaccuracies in RCS level readings.**

1. **DETERMINE** whether RHR pumps should be STOPPED:

   a. **CHECK** any RHR pump RUNNING.

   a. **GO TO** Step 2.

   b. **MONITOR** RCS level greater than 695' 4" elev.

   b. **STOP** RHR pumps and **PLACE** in PULL-TO-LOCK.

      GO TO Step 2.

   c. **CHECK** RHR flow less than 2000 gpm.

   c. **REDUCE** RHR flow to between 1000 gpm and 1500 gpm. **[C.6]**

   d. **CHECK** RHR pump CAVITATING.

   d. **PERFORM** the following:

      1) **RESTORE** RCS level to normal band by adjusting charging and letdown.

      2) **IF** RHR leak is suspected, **THEN** **GO TO** Section 2.4, RHR Leak.

      3) **GO TO** appropriate procedure.

   e. **STOP** RHR pumps and **PLACE** in PULL-TO-LOCK.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 RHR Malfunctions Due to Low Water Level During Reduced Inventory or Mid-Loop Ops (continued)

2. **CHECK** RCS Vacuum Refill NOT in progress.

IF RCS vacuum refill in progress,
THEN
PERFORM the following:

a. **ENSURE** vacuum break valve VB OPEN. [Vacuum Refill Skid]

b. **ENSURE** vacuum pump STOPPED. [Vacuum Refill Skid]

c. **ENSURE** charging flow has been raised.

d. **WHEN** RCS is at atmospheric pressure,
THEN
PERFORM the following:

1) **ENSURE** PZR PORVs CLOSED.

2) **ENSURE** Rx Head Vent FSVs CLOSED.

3. **ISOLATE** RCS letdown and drain paths:

a. **CLOSE** FCV-62-83, RHR Letdown Flow Control Valve.

b. **CLOSE** CVCS letdown isolation valves:

- FCV-62-69
- FCV-62-70

c. **ISOLATE** any known RCS drain paths.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 RHR Malfunctions Due to Low Water Level During Reduced Inventory or Mid-Loop Operations (continued)

CAUTION **Containment will become a harsh environment due to steam and potential airborne activity if boiling occurs. [C.5]**

4. **INITIATE** actions to protect personnel in containment:

   a. **ANNOUNCE** over PA to evacuate non-essential personnel from containment.

   b. **NOTIFY** RADCON to evacuate non-essential personnel from containment.

   c. **NOTIFY** RADCON to monitor containment radiation conditions. **[C.10]**

5. **INITIATE** actions to establish containment closure:

   a. **NOTIFY** WCC to initiate closure of all containment penetrations being tracked in 0-GO-15, Containment Closure Control.

   b. **ENSURE** all valves with Containment Closure tags on MCR benchboards are **CLOSED**.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 RHR Malfunctions Due to Low Water Level During Reduced Inventory or Mid-Loop Operations (continued)

6. **EVALUATE** the following Tech Specs for applicability:

   - 3.4.1.4, Reactor Coolant System Cold Shutdown
   - 3.9.8.1, Refueling Operations Residual Heat Removal and Coolant Circulation
   - 3.9.8.2, Refueling Operations Low Water Level

7. **EVALUATE** EPIP-1, Emergency Plan Classification Matrix.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 **RHR Malfunctions Due to Low Water Level During Reduced Inventory or Mid-Loop Operations** (continued)

CAUTION **The following step may result in water spilling in lower containment if RCS is breached.**

NOTE: Opening FCV-63-1 will raise RCS level and flush air from the high point in the RHR suction line using gravity fill from RWST.

8. **RAISE** RCS level to fill RHR suction line:

a. **IF** any S/G primary side manways are OPEN,
THEN
CONTACT RADCON to verify personnel are clear of S/G platforms.

b. **DISPATCH** operator to ensure power restored to FCV-63-1 **USING** Appendix A.

b. **IF** power CANNOT be restored to FCV-63-1,
THEN
DISPATCH operator with radio to operate FCV-63-1 locally. [AB el. 669 Pipe Chase]

c. **ENSURE** FCV-74-1 and FCV-74-2 OPEN.

d. **CLOSE** FCV-74-3 and FCV-74-21.

(Step continued on next page)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 RHR Malfunctions Due to Low Water Level During Reduced Inventory or Mid-Loop Operations (continued)

8. e. **OPEN** FCV-63-1 **USING** one of the following methods:

   - handswitch in MCR
   - handswitch on Rx. MOV Bd
   - local handwheel [AB el. 669 pipe chase]

CAN NOT BE OPENED

   f. **WHEN** FCV-63-1 has been ~~FULL OPEN for approx. one minute,~~ **THEN**
   PERFORM the following:

      1) **CLOSE** FCV-63-1.

      2) **OPEN** FCV-74-3 and FCV-74-21.

NOTE: ERCW isolation valves for available upper and lower compartment coolers which were closed in step 5 may be reopened if ERCW piping is intact.

9. **START** available upper and lower compartment coolers **USING** Appendix B.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 RHR Malfunctions Due to Low Water Level During Reduced Inventory or Mid-Loop Operations (continued))

NOTE The following step establishes ECCS flow for feed-and-bleed cooling if core boiling point is approached. Restoration of core cooling takes priority over LTOPS requirements for SI pumps.

10. **MONITOR** Core Exit T/Cs less than 200°F **USING** available T/Cs on Exosensor display.

208°F

PERFORM the following:

a. **ESTABLISH** SI pump flow to hot legs as follows:

1) **ENSURE** operator dispatched to perform App. C, Restoring Power to SI Pumps and Hot Leg Inj Valves.

2) **ENSURE** FCV-63-5, SI pump suction from RWST, OPEN.

3) **ENSURE** SI pump suction valves OPEN:

- FCV-63-47, SI pump A suction
- FCV-63-48, SI pump B suction

4) **ENSURE** SI pump cold leg injection flowpath isolated:

- FCV-63-22 CLOSED

  OR

- FCV-63-152 and FCV-63-153 CLOSED

5) **OPEN** SI pump hot leg injection valve for SI pump to be started:

- FCV-63-156, SI pump A

  OR

- FCV-63-157, SI pump B

6) **ENSURE** one SI pump RUNNING.

(step continued on next page)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.0 OPERATOR ACTIONS

NOTE 1: AOP-R.03 should be used for LOCA while in reduced inventory or midloop.

NOTE 2: This procedure has a foldout page.

1. **MONITOR** if RHR pumps should be stopped:

   a. **CHECK** RHR aligned for shutdown cooling:
   - FCV-74-1 OPEN
   - FCV-74-2 OPEN.

   a. **GO TO** Step 2.

   b. **CHECK** the following:
   - Pressurizer level less than 10% [20% ADV]

   OR

   - RCS subcooling based on core exit T/Cs less than 58°F

   b. **IF** Pressurizer level greater than 10% [20% ADV] **AND** RCS subcooling greater than 58°F, **THEN PERFORM** the following:

   1) **DISPATCH** operator to ensure HCV-74-34 RHR Return to RWST CLOSED. [AB el. 690, RHR HX Room B]

   2) **GO TO** Step 2.

   c. **STOP** RHR pumps and **PLACE** in PULL-TO-LOCK.

(step continued on next page)

1.0 PURPOSE

The procedure provides the actions necessary to mitigate the effects of a LOCA which exceeds normal charging capacity during Mode 4 or Mode 5 (with the exception of leaks during reduced inventory/midloop operation resulting in loss of RHR, which are addressed in AOP-R.03). **[C.1]**

QUESTIONS REPORT
for BANK SQN Questions

AOP-R.03 006

Unit 1 is preparing for a refueling outage, the unit is in mode 6 RCS is at Reduced Inventory level. Indications of a LOCA are observed. Which of the following procedures is applicable?

A. AOP-R.02 Shutdown LOCA

B. ✔ AOP-R.03 RHR System Malfunction

C. AOP-R.05 RCS Leak & Leak Source Identification

D. E-1 Loss of Reactor or Secondary Coolant

"A" incorrect: Note in AOP-R.02 states that AOP-R.03 should be used for LOCA when in reduced inventory or midloop.

"B" correct: per note in AOP-R.02

"C" incorrect: Note in AOP states to use AOP-R.03 if in reduced inventory or midloop.

"D" incorrect: Unit in mode 5
Reference:

K/A:
2.4.4 (4.0 - 4.3) 41.10/43.2/45.6
034 A1.02 (2.9 - 3.7) 41.5/45.5

OPL273C0611 obj 6

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** AOP-R.03, RHR SYSTEM MALFUNCTION

IV. **LENGTH OF LESSON/COURSE:** 2 hours

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of AOP-R.03, RHR SYSTEM MALFUNCTION.

B. Enabling Objectives

	Objectives
0.	Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with RHR SYSTEM MALFUNCTIONs that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate position as identified in Appendix A.
1.	State the purpose/goal of this AOP-R.03.
2.	Describe the AOP-R.03 entry conditions.
	a. Describe the setpoints, interlocks, and automatic actions associated with AOP-R.03 entry conditions.
	b. Describe the ARP requirements associated with AOP-R.03 entry conditions.
	c. Interpret, prioritize, and verify associated alarms are consistent with AOP-R.03 entry conditions.
	d. Describe the plant parameters that may indicate an RHR System Malfunction.
3.	Describe the initial operator response to stabilize the plant upon entry into AOP-R.03.
4.	Upon entry into AOP-R.03, diagnose the applicable condition and transition to the appropriate procedural section for response.
5.	Summarize the mitigating strategy for the failure that initiated entry into AOP-R.03.
6.	Describe the bases for all limits, notes, cautions, and steps of AOP-R.03.

7.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
8.	Given a set of initial plant conditions use AOP-R.03 to correctly:
	a. Recognize entry conditions.
	b. Identify required actions.
	c. Respond to Contingencies.
	d. Observe and Interpret Cautions and Notes.
9.	Describe the Tech Spec and TRM actions applicable during the performance of AOP-R.03.
10.	Apply GFE and system response concepts to the abnormal condition – prior to, during and after the abnormal condition.

81. 077 AG2.4.5 081

Given the following:

- Unit 2 operating at 100% power with the switchyard in normal alignment.
- Generator operating at 24 Kv and +150 MVAR.
- A disturbance occurs causing main generator voltage to spike upward and the following annunciators alarm:
  - on 0-XA-55-ECB6-A;
    "GEN 2 MVAR ABNORMAL OR MVAR RELAY FAILURE"
    "OSCILLOGRAPH OPERATION OR FAILURE"
  - on 0-XA-55-ECB6-B;
    "CC RELAY TEST OR OPERATION"
  - on 2-XA-55-1A
    "GEN VOLT REGULATOR TRIP"
- The BLUE light on161kV CONCORD LINE CARRIER RECEIVED is lit.
- Reactive power stabilized at +230 MVARS following the disturbance and Concord line PCB in the switchyard remain closed.

Which ONE of the following statements describes additional required actions?

A. Manually open the Concord line PCB.
Notify the Southeast Area Load Dispatcher to evaluate offsite power status for determining operability.

B. Manually open the Concord line PCB.
Declare both trains of Offsite power inoperable until the Southeast Area Load Dispatcher completes evaluation of the status of the offsite power system.

C. Notify the Southeast Area Load Dispatcher to evaluate offsite power status for determining operability.
Within 24 hours, notify the Operations Duty Specialist of the time period the unit was without automatic voltage control.

D. Declare both trains of Offsite power inoperable until the Southeast Area Load Dispatcher completes evaluation of the status of the offsite power system.
Within 24 hours, notify the Operations Duty Specialist of the time period the unit was without automatic voltage control.

DISTRACTOR ANALYSIS:

A. Incorrect, The Concord Line PCB is not required to be opened with the stated conditions. The Southeast Area Load Dispatcher is required to be notified immediately to determine offsite power voltage requirements to determine if offsite power supplies are operable. Plausible because conditions would require opening the PCB and if the PCBs had opened, the MOD s are required to be opened manually. Additionally, the dispatcher notification to detemine status of the offsite power operability is required.

B. Incorrect, The Concord Line PCB is not required to be opened with the stated conditions and the Southeast Area Load Dispatcher is required to be immediately notified so that an evaluation can be performed but the offsite power operability status is determined after the evaluation is complete. Plausible because conditions would require opening the PCB and if the PCBs had opened, the MOD s are required to be opened manually. Additionally, the dispatcher notification to detemine status of the offsite power is required so that an evaluation can be completed to determine the offsite power operability status.

C. CORRECT, Operation of the unit without automatic voltage control requires the Southeast Area Load Dispatcher be notified immediately to determine offsite power voltage requirements to determine if offsite power supplies are operable and the Operations Duty Specialist is required to be notified of the time interval without automatic voltage control within 24 hours.

D. Incorrect, The Southeast Area Load Dispatcher is required to be immediately notified so that an evaluation can be performed but the offsite power operability status is determined after the evaluation is complete. The Operations Duty Specialist is required to be notified of the time interval without automatic voltage control within 24 hours. Plausible because the dispatcher notification is required so that an evaluation can be completed so that the offsite power operability status can be determined and the Operations Duty Specialist notification is required within 24 hours.

Question No. 81

Tier 1 Group 1

K/A 077 AG2.4.5
Generator Voltage and Electric Grid Disturbances
Ability to prioritize and interpret the significance of each annunciator or alarm.

Importance Rating: 4.1 / 4.3

Technical Reference: 0-AR-ECB6-A, Electrical Control Board, Rev 38
2-AR-M1-A, Generator and Transformers, Rev 33
GOI-6, Apparatus Operation, Rev. 128

Proposed references to be provided to applicants during examination: None

Learning Objective: No Learning Objective identified

Question Source:
Bank # _____
Modified Bank # _____
New __X_____

Question History: New question for Sequoyah 2009 exam

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis _X_____

10 CFR Part 55 Content: (41.10 / 43.5 / 45.3 / 45.12)

10CFR55.43.b (2,5)

Comments: New question for Sequoyah 2009 exam

Source	Setpoint	CC RELAY TEST OR OPERATION
SER 2743 1. Carrier Test Signal 2. Carrier Blocking Signal sent or received for any 161kV or 500kV PCB	N/A	

Probable Causes

1. Manual actuation of carrier test for any 161kV on 500kV PCB.
2. Carrier blocking signal sent or received for any 161 kV or 500 kV line. (EM relays only for Bradley line)

Corrective Actions

[1] **OBSERVE** Line Loading (Amps) and PCB position indicating lights to **VERIFY** affected PCB has not tripped.

[2] **IF** Line PCB has tripped, **THEN**

OPEN the related MODs.

[3] **NOTIFY** Dispatcher to **EVALUATE IF** the line needs to be returned to service.

[4] **IF** no PCB has tripped, **THEN**

RESET the Carrier Signal indicating light (light and reset button located on apron of ECB or on Static Relay Panels in Relay Room).

References

55N651, 45B655-ECB6-B

Source	Setpoint
SER 3091: RELAY 274VH OP OR FAIL	220 MVAR increasing
SER 3092: RELAY 274VL OP OR FAIL	-100 MVAR decreasing

GEN 2 MVAR ABNORMAL OR MVAR RELAY FAILURE

Probable Causes

1. High MVAR on Unit 2 main generator.
2. Low MVAR on Unit 2 main generator.
3. Failure of relay 274VH or 274VL.
4. Failure of supervisory MW relay 237W, at low power.

CAUTION

Unit 2 main generator must be operated within the limits shown in the generator capability curve (TI-28, figure A.14).

NOTE

This alarm is automatically defeated when Unit 2 output < 240 MWE by relay 237W.

Corrective Actions

[1] **CHECK** Unit 2 MVARs indicated on 2-EI-57-8 (2-M-1).

[2] **CHECK** CRT SER point to determine which relay actuated.

[3] **IF** Unit 2 MVARs out of limit, **THEN**

[a] **ADJUST** voltage **USING** Unit 2 generator voltage adjust and/or intertie transformer tap changer to restore MVARs to within limit.

[b] **REFER** to GOI-6 and 15E500 Sheet 3.

[c] **EVALUATE** off-site power sources for Tech Spec LCO 3.8.1.1.

[d] **IF** attempts to restore Unit 2 MVARs to within limit are unsuccessful, **THEN**

CONTACT Dispatcher for assistance.

[4] **IF** Unit 2 MVARs are within limits, **THEN**

CONTACT Transmission Power Supply (TPS) to investigate suspected failure of relay 274VH or 274VL.

[5] **IF** Unit 2 output < 240MWe, **THEN**

CONTACT Transmission Power Supply (TPS) to investigate suspected failure of supervisory MW relay 237W.

References

55N652-1, 1,2-45B655-ECB6A-0, 2-45W541, 55N715-1

Source	Setpoint	GEN VOLT REGULATOR TRIP
SER 1545 94RB relay 260 relay	N/A	

Probable Causes

1. Loss of 3∅ Regulating Potential.
2. Exciter Field Breaker (41) OPEN.
3. Volts-Hertz Relay Operation.
4. Generator overexcitation relay operation.

Corrective Actions

[1] **CONFIRM** alarm by verifying [2-HS-57-20] Exciter Regulator Control Switch green light **LIT**.

CAUTION

If the exciter field breaker opens with the generator tied to grid, rapid and excessive heating of the stator will occur. If this condition exists, the generator should trip by 221GB relay operation.

[2] **IF** Exciter Field Breaker is **TRIPPED, AND** PCB's **CLOSED, AND** Generator **NOT TRIPPED, THEN PERFORM** the following:

[a] **IF** Reactor Power greater than 50% (P-9), **THEN TRIP** the Reactor, **AND GO TO** E-0, *Reactor Trip or Safety Injection.*

[b] **IF** Reactor Power is less than 50% (P-9), **THEN TRIP** the turbine, **AND GO TO** AOP-S.06, *Turbine Trip.*

[3] **PLACE** [2-HS-57-20] Exciter Regulator Control Switch to OFF position.

[4] **IF** Window A-6, GENERATOR EXCITER FIELD OVERCURRENT is in alarm, **THEN GO TO** Window A-6 of this Instruction.

[5] **IF** Window B-2, GENERATOR VOLTS PER CYCLE HIGH is in alarm, **THEN GO TO** Window B-2 of this Instruction.

(step continued on next page)

CONTINUED

GEN VOLT REGULATOR TRIP

CAUTION **Operation without automatic voltage regulator may impact offsite power voltage requirements.**

Corrective Actions (Continued)

[6] **IF** Unit 2 main generator remains in service without automatic voltage regulator,
THEN
PERFORM the following:

[a] **NOTIFY** SELD to evaluate off-site power voltage requirements with Unit 2 voltage regulator in MANUAL.

[b] **MAINTAIN** Unit 2 MVARs within limits specified in GOI-6, *Apparatus Operations*, Section E, *Turbogenerator Operations*.

[7] **CHECK** for blown Voltage Regulating PT fuses with [2-HS-57-15] Generator Voltmeter Selector Switch.

[8] **NOTIFY** Operations Duty Specialist (ODS) within twenty four (24) hours of any time interval without automatic voltage control.

References 45B655-01A-0, 45N573-1, 45N551

3.0 MVAR LIMITS FOR GENERATOR STABILITY (REFERENCE USE)

NOTE Operation of main generator without automatic voltage control could impact grid voltage requirements. SELD should be notified immediately if automatic voltage regulator is lost.

Studies show that there is some risk of instability in the event of a fault at high side of SQN 500/161kV Intertie Transformer Bank plus a failure of a high side breaker to clear. Backup breakers would then take the entire 500kV bus section out of service. This double-fault event is not postulated to occur simultaneously with a LOCA and is therefore not a scenario used to determine nuclear offsite power adequacy. This is an issue related to grid reliability only and operating guidelines to ensure stability are included in this document for convenience.

SQN Units 1 and 2 must observe generation limits under certain grid conditions in order to ensure stability under the above double-fault scenario.

Both Units are limited to a **Maximum Outgoing Reactive Load of 240 Mvar**. This limitation supports offsite power source qualification.

Transmission Reliability Organization's SQN Grid Operating Guide directs that the Transmission Operator will notify the SQN Generator Operator of any Mvar Limits recommended. Grid stabilization following the loss of an element depends on the coordination of multiple changes including SQN reactive loading. Real time information on the factors affecting grid stability is not available to SQN Operators, therefore the Transmission Operator will coordinate the effort. The limits provided in the following tables are for information only.

3.1 Offsite Power Source Requirements (continued)

D. The plant will coordinate and communicate with the SELD for entry into and exit out of the alternate alignment so the transmission operators will know which criteria to use in monitoring Sequoyah Nuclear Plant offsite power adequacy.

E. The SQN 161kV bus normal scheduled voltage is 165kV, +/-1kV. The voltage may be increased up to 168kV if necessary due to light load conditions.

F. The 161kV switchyard undervoltage relay is set to alarm at 164KV to ensure the minimum 161kV grid level required to maintain a minimum of 6,560 volts at the 6,900 volt shutdown boards for design basis trips.

G. The 500kV bus voltage should be maintained at a level of 525kV. This should be done by means of the Generator No. 1 reactive control coordinated with the load tap changer for the SQN 500/161kV Intertie Transformer Bank while adhering to the 161kV bus voltage schedule. During emergencies or abnormal conditions, the 500kV bus voltage may be raised as coordinated with the power system dispatcher, but it should not exceed 535kV.

H. The load tap changer (LTC) on the high side winding of the intertie transformer, 161KV capacitor banks, and reactive output of the units shall be coordinated to maintain the published voltage schedule. **[C.3]**

I. If, for any reason, the voltage schedule cannot be maintained, the Southeast Area Load Dispatcher (SELD) should be notified as soon as possible to evaluate offsite power operability. This notification shall include the time and date of the start of the inability to maintain the voltage schedule, an explanation of the problem and the time of anticipated return to compliance.

J. Operation of main generator without automatic voltage control could impact grid voltage requirements. The Load Dispatcher should be notified immediately if generator is in service without automatic voltage regulator. Also, refer to Section E for Mvar limits.

Source	Setpoint
SER 2683 • Any actuation signal for Oscillograph No. 1 or No. 2 • Loss of control power to Oscillograph No. 1 or No. 2	N/A

OSCILLOGRAPH OPERATION OR FAILURE

Probable Causes

1. Fault condition on a transmission line.
2. Fault condition at a remote yard or substation.
3. 500KV or 161KV bus voltage drop.
4. Unit trip.
5. Loss of control power to either Oscillograph.
6. Oscillograph sending a fax.

Corrective Actions

NOTE: If alarm as a result of Oscillograph sending a fax, NO operator action required.

[1] **CHECK** for other annunciators lit or breaker disagreement lights lit.

[2] **IF** Reactor Trip, **THEN**

GO TO E-0, *Reactor Trip or Safety Injection*.

[3] **DISPATCH** operator to the relay room to check for any relay targets, **AND**

WRITE down relay targets dropped.

[4] **NOTIFY** Dispatcher of Oscillograph operation and targets noted in step **[3]**.

References

45B655-ECB6A-0
55N634-1,2
55N3763-1, 2, 3, 4

82. 068 AG2.4.7 082

Given the following:

- Conditions require that the Main Control Room (MCR) be abandoned.
- While completing the MCR actions of AOP-C.04, "Shutdown From Auxiliary Control Room", the Unit 2 OATC notices that a Safety Injection (SI) has occurred.
- All AOP-C.04 actions in the MCR were completed.
- The crew establishes control in the Auxiliary Control Room and determines that the plant is to be cooled down to Mode 5.

Which ONE of the following identifies ...

(1) how the safety injection termination will be performed
and
(2) the instruments on 2-L-10 used to trend the RCS cooldown rate if the RCPs remain out of service?

A. (1) AOP-C.04 directs the use of ES-1.1, SI Termination, to terminate the SI.
(2) The Thot instruments on each loop.

B. (1) AOP-C.04 directs the use of ES-1.1, SI Termination, to terminate the SI.
(2) The SG Main Steam Pressure instrument on each loop.

C. (1) SI termination steps are contained within AOP-C.04.
(2) The Thot instruments on each loop.

D. (1) SI termination steps are contained within AOP-C.04.
(2) The SG Main Steam Pressure instrument on each loop.

DISTRACTOR ANALYSIS:

A. *Incorrect, The SI will be terminated using AOP-C.04 Appendix F, Terminating SI flow not by the use of ES-1.1, SI Termination and with all MCR actions completed, the reactor coolant pumps are shutdown leaving the RCS cooldown to be trended by the SG pressure instruments which have a saturation temperature scale on them. Thot can only be used when the RCPs are in service. Plausible because procedure ES-1.1, SI Termination, is the procedure used for SI termination in many conditions and Thot could be used to monitor cooldown if the RCPs were in service.*

B. *Incorrect, The SI will be terminated using AOP-C.04 Appendix F, Terminating SI flow not by the use of ES-1.1, SI Termination. Since all MCR actions have been completed, the reactor coolant pumps are shutdown resulting in the steam generator pressure instruments being used to trend the RCS cooldown to be correct. Plausible because procedure ES-1.1, SI Termination, is the procedure used for SI termination in many conditions and the steam generator pressure instruments are used to monitor cooldown.*

C. *Incorrect, The SI will be terminated using AOP-C.04 Appendix F, Terminating SI flow but with all MCR actions completed, the reactor coolant pumps are shutdown leaving the RCS cooldown to be trended by the SG pressure instruments which have a saturation temperature scale on them. Thot can only be used when the RCPs are in service. Plausible because the procedure used for SI termination is correct and Thot could be used if the RCPs were in service.*

D. *CORRECT, The SI will be terminated using AOP-C.04 Appendix F, Terminating SI flow and with all MCR actions completed, the reactor coolant pumps are shutdown leaving the RCS cooldown to be trended by the SG pressure instruments which have a saturation temperature scale on them.*

Question No. 82

Tier 1 Group 2

K/A 068 AG2.4.7
Control Room Evacuation
Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.

Importance Rating: 4.2 / 4.2

Technical Reference: AOP-C.04, Shutdown From Auxiliary Control Room, Rev 16

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271-C.04 B.5 & 10.b
Describe the actions that must be taken prior to abandoning the main control room, including a basis for each actions.
Describe actions per AOP-C.04, that are required to:
b. Cooldown from Aux Control Room.

Question Source:
Bank # _____
Modified Bank # _____
New __X____

Question History: New question for SQN 1/2009 exam

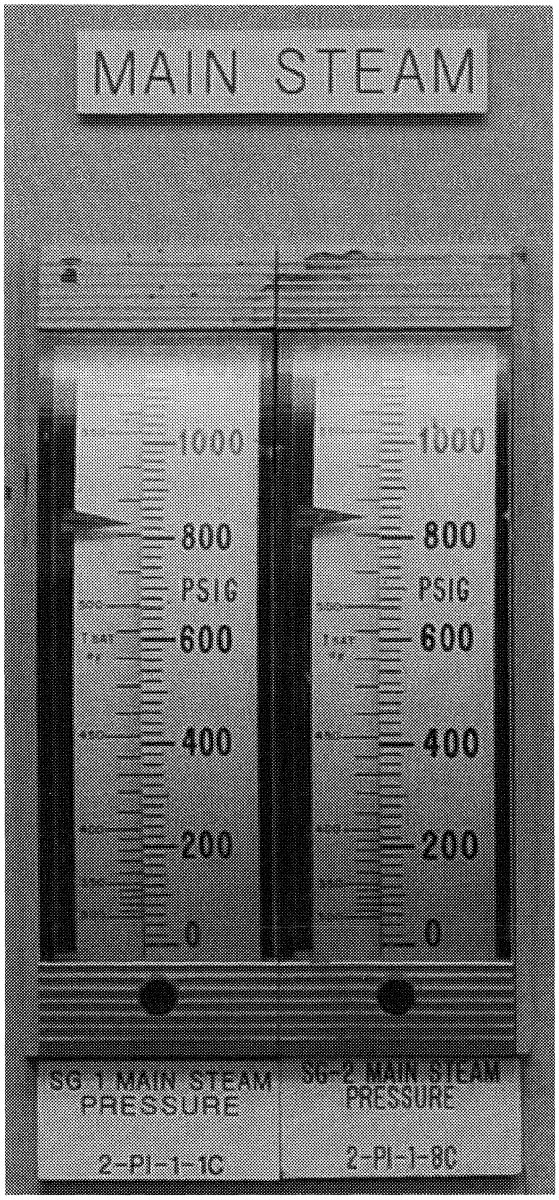
Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis __X____

10 CFR Part 55 Content: (41.10 / 43.5 / 45.12)

10CFR55.43.b (5)

Comments: New question for SQN 1/2009 exam


ANNUNCIATOR
POWER
2-HS-55-L10
OFF
ON
ANNUNCIATOR
RESET-ACK-TEST
2-XS-55-L10
ACKNOWLEDGE
RESET
TEST
1200
1000
800
PSIG
600
400
200
0
SG-3 MAIN STEAM
PRESSURE
2-PI-1-19C
SG-4 MAIN STEAM
PRESSURE
2-PI-1-26C
VENTILATION


MAIN STEAM
1000
800
PSIG
600
400
200
0
1000
800
PSIG
600
400
200
0
SG 1 MAIN STEAM PRESSURE
2-PI-1-1C
SG-2 MAIN STEAM PRESSURE
2-PI-1-8C

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Control Room Abandonment

NOTE EOPs are NOT applicable when evacuating MCR.

2. **ENSURE** reactor TRIPPED. [M-4]

3. **ENSURE** MSIVs and MSIV bypass valve handswitches in CLOSE. [M-4]

4. **PLACE** RCP handswitches in STOP/PULL TO LOCK. [M-5]

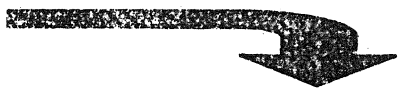
5. **ENSURE** one CCP placed in PULL TO LOCK.

6. **IF** MCR must be immediately evacuated due to life-threatening conditions,
   THEN
   PERFORM the following:

   a. **EVACUATE** MCR on affected unit(s).

   b. **NOTIFY** AUOs of MCR evacuation using radio or PA system.

   c. **GO TO** Caution prior to Step 11.



STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Control Room Abandonment (cont'd)

NOTE 1 Accidents requiring containment spray or ECCS operation are outside scope of this procedure. If containment spray or ECCS is running during MCR abandonment event, it is assumed that these pumps are not needed and should be stopped to prevent RWST depletion and/or pressurizer overfill.

NOTE Checklist 5 (Unit 1) or 6 (Unit 2) directs local operator to ensure CCPIT valves closed from Rx MOV Boards within 13 minutes.

21. **CHECK** SI signal NOT actuated:

    - NO indication of SI actuation prior to leaving MCR
    - NO reports of SI or RHR pump breakers CLOSED.

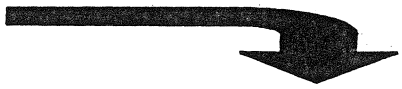
→ **IF** SI signal has actuated,
THEN
PERFORM Appendix F, Terminating SI Flow.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Control Room Abandonment (cont'd)

24. **CHECK** unit in Mode 3 (greater than 350°F).

IF unit in Mode 4, 5, or 6,
THEN
GO TO Step 26.



NOTE 1 S/G pressure indicators on L-10 are scaled to correlate S/G pressure to T-sat. S/G T-sat indicates approximate RCS T-cold.

NOTE 2 Atmospheric relief controllers should be set for 85% in AUTO to maintain T-cold at approximately 547°F.

NOTE 3 Local control of S/G #1 and 4 atmospheric relief valves may be required if essential air has been lost.

25. **CONTROL** RCS temperature:

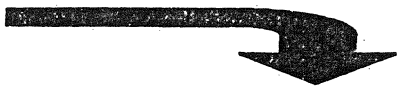
a. **ENSURE** S/G atmospheric relief valves maintaining RCS T-cold at desired value (540-550°F following trip).

a. **OPERATE** S/G #1 and 4 atmospheric relief valves locally as necessary: **(60 minutes)**

1) **DISPATCH** personnel to perform Appendix K, Local Control of S/G Atmospheric Reliefs.

2) **PLACE** S/G #1 and 4 atmospheric relief valve controllers in MANUAL and **ADJUST** controller output to zero.

b. **GO TO** Step 27.



I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** AOP-C.04, SHUTDOWN FROM AUXILIARY CONTROL ROOM

IV. **LENGTH OF LESSON/COURSE:** 3 hour(s)

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate *or* explain, using classroom evaluations and/or simulator scenarios, the requirements of AOP-C.04, SHUTDOWN FROM AUXILIARY CONTROL ROOM.

B. Enabling Objectives:

	Objectives
0.	Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with Shutdown from the Auxiliary Control Room that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate position as identified in Appendix A.
1.	State the purpose/goal of this AOP-C.04.
2.	Describe the AOP-C.04 entry conditions.
	a. Describe the setpoints, interlocks, and automatic actions associated with AOP-C.04 entry conditions.
	b. Describe the ARP requirements associated with AOP-C.04 entry conditions.
	c. Interpret, prioritize, and verify associated alarms are consistent with AOP-C.04 entry conditions.
	d. Describe the plant parameters that may indicate a Shutdown from the Auxiliary Control Room is required.
3.	Upon entry into AOP-C.04, diagnose the applicable condition and transition to the appropriate procedural section for response.
4.	Summarize the mitigating strategy for the failure that initiated entry into AOP-C.04.
5.	Describe the actions that must be taken before abandoning the main control room, including a basis for each action.
6.	Explain the staffing requirements for unit abandonment per AOP-C.04.
7.	Describe the types of equipment that are on the various checklists associated with AOP-C.04
8.	Describe the actions that may be necessary if procedure steps are taken before all checklists are complete.

	Objectives
9.	Describe the bases for the limits, notes, cautions of AOP-C.04.
10.	Describe actions per AOP-C.04, that are required to: a. Maintain Plant in Hot Shutdown b. Cooldown plant form Aux. Control Room c. Return to Main Control Room
11.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
12.	Given a set of initial plant conditions use AOP-C.04 to correctly:
	a. Recognize entry conditions.
	b. Identify required actions.
	c. Respond to Contingencies.
	d. Observe and Interpret Cautions and Notes.
13.	Describe the Tech Spec and TRM actions applicable during the performance of AOP-C.04.
14.	Discuss the parameters to be considered by the SED when making a REP classification during a control room evacuation.
15.	Apply GFE and system response concepts to the abnormal condition – prior to, during and after the abnormal condition.

83. 076 AA2.04 083

Given the following conditions:

- Unit 1 is in Mode 3 with RCS at normal operating pressure and temperature awaiting secondary plant equipment repair to continue the startup.
- At 1300 on 01/25/09 RCS Activity was determined to be 0.38 microcuries/gram DOSE EQUIVALENT I-131.
- At 1300 on 01/27/09 Chemistry reports that the RCS Activity has been on a continuous slow increase and is now 0.43 microcuries/gram DOSE EQUIVALENT I-131.

Which ONE of the following identifies actions that are required by 1900 on 01/27/09 and the bases for the RCS Specific Activity limit?

A. Reduce RCS Tavg below 500°F to limit doses at the site boundary in the event of a LOCA in conjunction with 0.25La leakage from containment.

B. ✔ Reduce RCS Tavg below 500°F to limit doses at the site boundary in the event of a SGTR in conjunction with steady state SG tube leakage of 1 gpm.

C. Reduce RCS Tavg below 350°F to limit doses at the site boundary in the event of a LOCA in conjunction with 0.25La leakage from containment.

D. Reduce RCS Tavg below 350°F to limit doses at the site boundary in the event of a SGTR in conjunction with steady state SG tube leakage of 1 gpm.

DISTRACTOR ANALYSIS:

A. Incorrect, reducing Tavg below 500°F is correct but the bases is not due to a LOCA with assumed containment leakage. Plausible because the action stated is correct and a LOCA with leakage from containment could cause elevated doses at the site boundary.

B. CORRECT, with the activity above the 0.35 microcuries/gram limit in the Tech Spec 3.4.8 for 48 continuous hours, Tavg is required to be reduced to less than 500°F within 6 hours in accordance with the Tech Spec. The T/S bases states that reducing Tavg below 500°F prevents the release of activity should a steam generator tube rupture since the saturation pressure of the primary coolant is below the lift pressure of the atmospheric steam relief valves. The limit on activity is based on the resulting 2-hour doses at the site boundary not exceeding a small fraction of the 10 CFR 100 limits following a SGTR in conjunction with an assumed steady state SG tube leak of 1 gpm.

C. Incorrect, reducing Tavg below 350°F is not correct and the bases is not due to a LOCA with assumed containment leakage. Plausible because lowering Tavg to 350°F would mean changing to Mode 4 within the next 6 hours (which is a directed action in many T/S) and a LOCA with leakage from containment could cause elevated doses at the site boundary.

D. Incorrect, reducing Tavg below 350°F is not correct but the bases is being to limit doses in the event of a SGTR is correct. Plausible because lowering Tavg to 350°F would mean changing to Mode 4 within the next 6 hours (which is a directed action in many T/S) and the bases is to limit doses at the site boundary during SGTR accident.

Question No. 83

Tier 1 Group 2

K/A 076 AA2.04
Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity:
Corrective actions required for high fission product activity in RCS

Importance Rating: 2.8 / 3.4

Technical Reference: Technical Specifications 3.4.8 and Bases, Amendments 301 and 305.

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271AOP-R.06 B.9
Describe the Tech Spec and TRM actions applicable during the performance of AOP-R.06.

Question Source:
Bank # _____
Modified Bank # __X_____
New _____

Question History: SQN questions AOP-R.06-B.2 001 and AOP-R.06-B.9 001 combined and modified for SQN 1/2009 exam.

Question Cognitive Level:
Memory or fundamental knowledge __X____
Comprehension or Analysis _____

10 CFR Part 55 Content: (43.5 / 45.13)

10CFR55.43.b (2)

Comments: SQN questions AOP-R.06-B.2 002 and 0 AOP-R.06-B.9 001combined and modified.

3/4.4.8 SPECIFIC ACTIVITY

LIMITING CONDITION FOR OPERATION

3.4.8 The specific activity of the primary coolant shall be limited to:

a. Less than or equal to 0.35 microcuries/gram DOSE EQUIVALENT I-131, and

b. Less than or equal to $100/\overline{E}$ microcuries/gram.

APPLICABILITY: MODES 1, 2, 3, 4 and 5

ACTION:

MODES 1, 2 and 3*

a. With the specific activity of the primary coolant greater than 0.35 microcuries/gram DOSE EQUIVALENT I-131 for more than 48 hours during one continuous time interval or exceeding the limit line shown on Figure 3.4-1, be in at least HOT STANDBY with T_{avg} less than 500°F within 6 hours. LCO 3.0.4.c is applicable.

b. With the specific activity of the primary coolant greater than $100/\overline{E}$ microcuries/gram, be in at least HOT STANDBY with T_{avg} less than 500°F within 6 hours.

MODES 1, 2, 3, 4 and 5

a. With the specific activity of the primary coolant greater than 0.35 microcuries/gram DOSE EQUIVALENT I-131 or greater than $100/\overline{E}$ microcuries/gram, perform the sampling and analysis requirements of item 4a of Table 4.4-4 until the specific activity of the primary coolant is restored to within its limits.

*With T_{avg} greater than or equal 500°F.

3/4.4.8 SPECIFIC ACTIVITY

The limitations on the specific activity of the primary coolant ensure that the resulting 2 hour doses at the site boundary will not exceed an appropriately small fraction of Part 100 limits following a steam generator tube rupture accident in conjunction with an assumed steady state primary-to-secondary steam generator leakage rate of 1.0 GPM. The values for the limits on specific activity represent interim limits based upon a parametric evaluation by the NRC of typical site locations. These values are conservative in that specific site parameters of the Sequoyah Nuclear Plant site, such as site boundary location and meteorological conditions, were not considered in this evaluation.

The ACTION statement permitting POWER OPERATION to continue for limited time periods with the primary coolant's specific activity greater than 0.35 microcuries/gram DOSE EQUIVALENT I-131, but within the allowable limit shown on Figure 3.4-1, accommodates possible iodine spiking phenomenon which may occur following changes in THERMAL POWER. Operation with specific activity levels exceeding 0.35 microcuries/gram DOSE EQUIVALENT I-131 but within the limits shown on Figure 3.4-1 should be limited to no more than 800 hours per year since the activity levels allowed by Figure 3.4-1 increase the 2-hour thyroid dose at the site boundary by a factor of up to 20 following a postulated steam generator tube rupture. A Note permits the use of the provisions of LCO 3.0.4.c. This allowance permits entry into the applicable MODE(S) while relying on the ACTIONS. This allowance is acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient specific activity excursions while the plant remains at, or proceeds to power operations.

Reducing T_{avg} to less than 500°F prevents the release of activity should a steam generator tube rupture since the saturation pressure of the primary coolant is below the lift pressure of the atmospheric steam relief valves. The surveillance requirements provide adequate assurance that excessive specific activity levels in the primary coolant will be detected in sufficient time to take corrective action. Information obtained on iodine spiking will be used to assess the parameters associated with spiking phenomena. A reduction in frequency of isotopic analyses following power changes may be permissible if justified by the data obtained.

AOP-R.06-B.2 001

Given the following plant conditions:

- Unit 1 has been at 90% power for 5 days
- At 1300 on 8/15/03 RCS Activity was determined to be 0.5 microcuries/gram DOSE EQUIVALENT I-131
- At 1330 on 8/17/03 Chemistry informs you RCS Activity has increased to 55 microcuries/gram DOSE EQUIVALENT I-131.

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

A. Immediately initiate a plant shutdown and reduce RCS T_{avg} below $500^{o}F$ by 1900 on 8/17/03.

B. Increase frequency of RCS sampling and analysis for RCS activity to once every 2 hours.

C. If RCS activity remains unchanged, at 1300 on 8/17/03 initiate a plant shutdown to HOT STANDBY.

D. Reduce power level to 50% of rated and have Chemistry re-sample the RCS for specific activity.

K/A: 000076SG08 [2.8 / 3.5]

Reference: Tech Spec LCO 3.4.8

Objective: OPL271C370, B.2

History: New

Level: Analysis

Note: Provide a copy section 3/4.4.8 as an attachment to the exam.

Note: Make SRO only question, developed replacement for RO exam - PEH 8/8/97

AOP-R.06-B.9 001

Which one of the following describes the basis for LCO 3.4.8, RCS Specific Activity?

Ensures that the resulting doses at the site boundary will not exceed a small fraction of 10 CFR 100 limits following a _____

A. LOCA in conjunction with 0.25 L_a leakage from containment.

B. SGTR in conjunction with steady state S/G tube leakage of 1 gpm.

C. steam line break in conjunction with steady state S/G tube leakage of 1 gpm.

D. LOCA in conjunction with 0.25 L_a leakage from secondary containment enclosure boundary.

Justification:

A. Incorrect. This is the bases for LCO 3.6.1, Primary Containment Integrity. Plausible because this is a steaming path that would affect dose rate at the site boundary.

B. Correct.

C. Incorrect. This is part of the assumptions (MSLB with S/G tube leakage) made for S/G Operational Leakage. Plausible because this is a steaming path that would affect dose rate at the site boundary.

D. Incorrect. This is the bases for LCO 3.6.2, Secondary Containment Bypass Leakage. Plausible because this is a steaming path that would affect dose rate at the site boundary.

Notes:

K/A:	076AK3.05	[2.9/3.6]	{41.5, 41.10}
	076AK3.06	[3.2/3.8]	{41.5, 41.10}
	076G2.2.25	[2.5/3.7]	{41.5}

Ref: LCO 3.4.8 bases

LP/Obj: OPL271AOP-R.06, Obj 9

History: 9/07 - New

Level: Low

Est Time: 3 min

Comment:

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** AOP-R.06 HIGH RCS ACTIVITY

IV. **LENGTH OF LESSON/COURSE:** 1.0 hour(s)

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of AOP-R.06 HIGH RCS ACTIVITY.

B. Enabling Objectives:

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with High RCS Activity that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Explain the purpose/goal of AOP-R.06.
2.	Discuss the AOP-R.06 entry conditions. a. Describe the setpoints, interlocks, and automatic actions associated with AOP-R.06 entry conditions. b. Describe the ARP requirements associated with AOP-R.06 entry conditions. c. Interpret, prioritize, and verify associated alarms are consistent with AOP-R.06 entry conditions. d. Describe the Administrative conditions that require Turbine Trip/ Reactor trip due to Reactor Coolant Pump Malfunctions.
3.	Describe the initial operator response to stabilize the plant upon entry into AOP-R.06.
4.	Upon entry into AOP-R.06, diagnose the applicable condition and transition to the appropriate procedural section for response.
5.	Summarize the mitigating strategy for the failure that initiated entry into AOP-R.06.
6.	Describe the bases for all limits, notes, cautions, and steps of AOP-R.06.

7.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
8.	Given a set of initial plant conditions use AOP-R.06 to correctly: a. Recognize entry conditions b. Identify required actions c. Respond to Contingencies d. Observe and Interpret Cautions and Notes
9.	Describe the Tech Spec and TRM actions applicable during the performance of AOP-R.06.
10.	Apply GFE and system response concepts to the abnormal condition – prior to, during and after the abnormal condition

84. W/E01 EG2.4.11 084

Given the following:

- Unit 2 is operating at 100% power when a loss of Train A CCS occurs.
- The crew enters AOP-M.03, "Loss of Component Cooling Water", and initiates a Reactor trip.
- As the crew is performing the Immediate Operator Actions of E-0, "Reactor Trip or Safety Injection", an automatic Safety Injection occurs.
- The crew performs E-0 to the last step without identifying a transition.

Which ONE of the following identifies both the correct use of the Emergency Procedure and the proper crew action relative to the use of the Abnormal Operating Procedure?

	Emergency Instructions	Abnormal Operating Procedures
A.	Loop back in E-0 to re-perform steps to identify a transition.	AOP-M.03 can NOT be implemented in in parallel with E-0.
B. ✓	Loop back in E-0 to re-perform steps to identify a transition.	AOP-M.03 can be implemented in parallel with E-0.
C.	Transition to ES-0.0, "Rediagnosis",and identify the proper transition.	AOP-M.03 can NOT be implemented in parallel with ES-0.0, "Rediagnosis".
D.	Transition to ES-0.0, "Rediagnosis", and identify the proper transition.	AOP-M.03 can be implemented in parallel with ES-0.0, "Rediagnosis".

DISTRACTOR ANALYSIS:

A. *Incorrect, if E-0 is performed to the last step, the step will direct a loop back to step 8 so that a transition can be identified either to an accident procedure or to the procedure to terminate the safety injection. EPM-4, User's Guide does permit AOP performance while in the EOP network with the conditions stated in the stem. Plausible because the loop back in E-0 is correct and the EOPs do have priority over the AOPs except under certain conditions.*

B. *CORRECT, if a transition is not made while E-0 is performed the last step will direct a loop back to step 8 so that a transition can be identified either to an accident procedure or to the procedure to terminate the safety injection. EPM-4, User's Guide, does permit the AOP performance while in the EOP network with the conditions stated in the stem.*

C. *Incorrect, while ES-0.0, Rediagnosis, can be used to determine the correct procedure, it is not applicable until a transition is made from E-0. EPM-4, User's Guide does permit AOP performance while in the EOP network with the conditions stated in the stem. Plausible because ES-0.0, Rediagnosis, can be used to determine the correct procedure under different conditions and the EOPs do have priority over the AOPs except under certain conditions.*

D. *Incorrect, while ES-0.0, Rediagnosis, can be used to determine the correct procedure, it is not applicable until a transition is made from E-0. EPM-4, User's Guide does permit AOP performance while in the EOP network with the conditions stated in the stem. Plausible because ES-0.0, Rediagnosis, can be used to determine the correct procedure under different conditions and EPM-4, User's Guide, does permit AOP performance while in the EOP network with the conditions stated in the stem.*

Question No. 84

Tier 1 Group 2

K/A WE01 EG2.4.11
Rediagnosis
Knowledge of abnormal condition procedures.

Importance Rating: 4.0 / 4.2

Technical Reference: E-0, Reactor Trip or Safety Injection, Rev 30
EPM-4, User's Guide, Rev 20

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271EPM-4 B.7 & 8
Given plant operating conditions, determine if EOP entry conditions have been met and state the resultant appropriate immediate action steps for those conditions.
Given plant operating conditions, determine if AOP entry conditions have been met and state the resultant appropriate actions for those conditions.
OPL271EPM-4 B.2.b
Discuss the ES-0.0 entry conditions. Describe the requirements associated with ES-0.0 entry conditions.

Question Source:
Bank # _____
Modified Bank # _____
New __X____

Question History: New question for Sequoyah 2009 exam

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis __X____

10 CFR Part 55 Content: (41.10 / 43.5 / 45.13)

10CFR55.43.b (5)

Comments: New question for Sequoyah 2009 exam

3.11.4 Two-Column Procedure Walkthrough Demonstration (Continued)

K. Step 7 directs the operator to **"CHECK** SI termination criteria."

1. If all of the criteria in Substeps a through d are met, the operator remains in the AER column and transitions to ES-1.1 to terminate SI.

2. If any of the criteria in Substeps a through d are NOT met, the operator moves to the RNO column and proceeds to Step 8.

L. Step 8 directs the operator to **"GO TO** E-1, Loss of Reactor or Secondary Coolant."

1. This step ends performance of procedure E-2 with a transition to E-1.

2. The highlighted word "END" centered after the last step emphasizes that the action steps for E-2 are complete.

3.11.5 Use of ES-0.0, Rediagnosis

A. ES-0.0, Rediagnosis, is unique among the EOPs in that it has no specific transition into it. It is entered strictly based on operator judgment and is applicable only if SI is in progress and E-0 has already been performed (diagnostic steps completed and transition made to another procedure). ES-0.0 should be used when the operator has any concern that he may not be in the right EOP based on plant conditions. This is most likely to happen if multiple accidents occur either simultaneously or sequentially.

B. Once entered, ES-0.0 will either transition the operator to ECA-2.1, E-1, E-2, or E-3, or will return him to the procedure and step in effect, depending on diagnostics done within the procedure. If ES-0.0 determines that an operator should be in a certain series of procedures (e.g., E-1 or ECA-1 series), and he is, then he simply returns to the procedure and step in effect. If ES-0.0 determines that an operator should be in a certain series of procedures (e.g., E-3 or ECA-3 series), and he is NOT, then he is sent to either E-1 (if he should be in E-1 or ECA-1 series) or E-3 (if he should be in E-3 or ECA-3 series) to enter the appropriate series at the beginning and work his way through the series normally from that point on.

3.11.7 Use of AOPs Within the EOP Network

A. EOPs have priority over AOPs at all times, except when a reactor trip or safety injection has occurred in conjunction with an Appendix R fire (AOP-N.08), Control Room abandonment (AOP-C.04), or Loss of all ERCW capability (AOP-M.01).

B. AOP performance while in the EOP network is allowable under the following two circumstances: **[C.1]**

1. AOP performance is directed by EOPs in effect.

2. AOP performance is deemed necessary by the SM or US to address abnormal plant conditions NOT directly addressed by the EOPs but which have a significant impact on the ability of the EOPs to perform their function (e.g., loss of ERCW, CCS, off-site power, vital instrument power board, etc.) In this case, the following guidelines should be followed:

   a. Concurrent performance of the EOPs and the AOP should enhance, NOT degrade, the performance of EOPs in progress.

   b. Manpower resources are adequate to allow performing the EOPs and the AOP concurrently.

   c. The AOP should be performed using the single perfomer method so the procedure reader remains dedicated to the EOPs in progress, which are mitigative in nature. The SM may elect to deviate from this requirement when in ES-0.1.

   d. Certain AOPs may be required to be performed concurrently with the EOPs in order for the EOPs to function as intended; for example, loss of CCS, loss of ERCW, loss of air or vital power to equipment important to safety-- any of these could have a significant impact on the ability of the EOPs to achieve their goals.

   e. Upon transition to ES-0.1, the SM will designate the mitigating crew responsibilities as appropriate, based on the events in progress. Normally, the procedure reader and OATC will perform ES-0.1 while the CRO performs the AOP using the single perfomer method.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

25. **DETERMINE** if diesel generators should be stopped:

    a. **VERIFY** shutdown boards ENERGIZED from start busses.

    a. **ATTEMPT** to restore offsite power to shutdown boards **USING** EA-202-1, Restoring Off-Site Power to 6900 V Shutdown Boards.

    b. **STOP** any unloaded diesel generators and **PLACE** in standby **USING** EA-82-1, Placing D/Gs in Standby.

26. **GO TO** Step 8.

END

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.3 Train A CCS Header Failure

CAUTION: **During operation, the Containment Spray Pumps may experience bearing failure after 10 minutes of a loss of CCS cooling.**

NOTE 1: When the associated TRAIN of CCS is out of service the CCPs, SI Pumps, and RHR Pumps are INOPERABLE for ECCS purposes due to not being able to fulfill it's design function for sump recirculation. LCOs 3.5.2, 3.5.3, 3.6.2.1, 3.7.3 should be evaluated and appropriately entered by the SRO.

NOTE 2: When CCS is out of service to mechanical seal HXs ONLY, the affected CCPs, SI Pumps, and RHR Pumps have been evaluated to be OPERABLE and AVAILABLE. These pumps can run indefinitely without CCS cooling water to mechanical seal HXs (Ref: PER 72528, DCN Q-11452-A, and RIMS B38 941123 802).

1. **MONITOR** REACTOR COOLANT PUMPS MOTOR THRUST BEARING TEMP HIGH annunciator DARK [M-5B, E-3].

PERFORM the following on the affected Unit:

a. **IF** affected unit in Mode 1 or 2,
THEN
PERFORM the following:

1) **TRIP** reactor.

2) **STOP** RCPs.

3) **GO TO** E-0, Reactor Trip or Safety Injection, **WHILE** continuing in this procedure. **[C.2]**

b. **ENSURE** RCPs are TRIPPED.

c. **IF** in Mode 4, 5, or 6,
THEN
STABILIZE RCS temperature **USING** RHR shutdown cooling.

PROGRAM: OPERATOR TRAINING - LICENSED

I. **COURSE:** LICENSE TRAINING

II. **LESSON TITLE:**

III. **LENGTH OF LESSON/COURSE:** 4-6 hour(s)

IV. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of HLC Procedures training, the participant shall be able to explain, using classroom evaluations and/or simulator scenarios, the requirements of EMP-4, EOP-E-0, "User's Guide".

B. Enabling Objectives:

1. Determine/identify the correct procedural application(s) based on the operating procedures network for normal, abnormal, and emergency evolutions.

2. Analyze an EOP layout and determine (according to EPM-4):
   a. correct procedural layout application;
   b. if the use of terms is correct (e.g.: Faulted Steam Generator, Shall, Lowering, etc per Appx. B);
   c. correct use of symbols and icons.

3. Define EOP warnings, cautions, and notes and, given an EOP condition, determine appropriate usage.

4. Compare and contrast event-based emergency/abnormal operating procedures used in parallel with the symptom-based EOPs.

5. Given an example, apply general guidelines, crew roles and responsibilities for EOP procedural use and determine:
   a. format and use of sequenced and non-sequenced sub steps;
   b. transition between Action/Expected Response column and the Response Not Obtained column;
   c. requirements for task completion prior to proceeding to the next action (and how any exceptions are identified);
   d. requirements for task completion still in progress following transition to another procedure or step;
   e. actions based on fold-out page use;
   f. actions based on hand-out page use;
   g. if EOP termination is appropriate based on given conditions.

6. Identify post-accident instrumentation and determine if its use is required.

7. Given plant operating conditions, determine if EOP entry conditions have been met and state the resultant appropriate immediate action steps for those conditions.

8. Given plant operating conditions, determine if AOP entry conditions have been met and state the resultant appropriate actions for those conditions.

9. Identify general operating crew responsibilities during emergency operations including appropriate implementation of prudent operator actions.

10. Identify general operating crew responsibilities during emergency operations including requirements for actions outside Technical Specifications/plant licensed conditions (10CFR50.54x application).

11. Given a set of conditions, analyze the EOP/FRP implementation:

    a. identify the basis for the implementation;
    b. determine the correct implementation hierarchy;
    c. determine if Critical Safety Function Status Trees (CFSTs) implementation is required;
    d. identify the status tree colors by priority and summarize each tree's purpose;
    e. identify conditions which will allow a FRP to be exited once it is entered (a RED or ORANGE condition);
    f. state the monitoring frequency of CFSTs and when this can be relaxed;
    g. determine correct coordination with other support procedures
    h. identify conditions permissible to terminate CFSTs monitoring.

12. Given an operational situation, analyze a crew brief and determine if it meets Management expectations.

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** ES-0.0, "Rediagnosis"

IV. **LENGTH OF LESSON/COURSE:** .5 hour(s)

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:
Upon completion of this lesson and others presented, the student shall demonstrate an understanding of the EOP-ES-0.0, "Rediagnosis" by successfully completing a written examination with a score of 80 percent or greater.

B. Enabling Objectives

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with ES-0.0, Rediagnosis, that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Explain the purpose/goal of ES-0.0.
2.	Discuss the ES-0.0 entry conditions. a. Describe the setpoints, interlocks, and automatic actions associated with ES-0.0 entry conditions. b. Describe the requirements associated with ES-0.0 entry conditions.
3.	Summarize the mitigating strategy for the failure that initiated entry into ES-0.0.
4.	Describe the bases for all limits, notes, cautions, and steps of ES-0.0.
5.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
6.	Given a set of initial plant conditions use ES-0.0 to correctly: a. Identify required actions b. Respond to Contingencies c. Observe and Interpret Cautions and Notes
7.	Apply GFE and system response concepts to the performance of ES-0.0 conditions.

85. W/E16 EA2.1 085

Given the following:

- Unit 1 is at 100% power.
- A LOCA occurred inside containment.
- The crew has just implemented E-1, "Loss of Reactor or Secondary Coolant".
- The STA has completed the initial performance of the status trees and reports the highest priority path exists on the CONTAINMENT status tree.
- Containment conditions are as follows:
  - Pressure is 2.6 psig and lowering.
  - Upper containment Rad Monitors read 85 R/hr.
  - Lower containment Rad Monitors read 125 R/hr .
  - Containment Sump Level is 58%.

Based on the above conditions, the Unit Supervisor ...

A. is required to IMMEDIATELY implement and complete FR-Z.2, "Containment Flooding", then transition back to E-1.

B. will acknowledge entry criteria for FR-Z.2, "Containment Flooding", is met but entry into the FR is optional.

C. is required to IMMEDIATELY implement and complete FR-Z.3, "High Containment Radiation", then transition back to E-1.

D. will acknowledge entry criteria for FR-Z.3, "High Containment Radiation", is met but entry into the FR is optional.

DISTRACTOR ANALYSIS:

A. Incorrect, the level is the sump is below the 68% level required to enter FR-Z.2, Containment Flooding but if the level was high enough for entry the transition would be required. Plausible because the containment sump level is elevated and if the required level was present an Orange would be present and require immediate transition to FR-Z.2.

B. Incorrect, the level is the sump is below the 68% level required to enter FR-Z.2, Containment Flooding but if the level was high enough for entry the transition would not be optional. Plausible because the containment sump level is elevated and if the required level being met resulted in a yellow path, the entry would be optional.

C. Incorrect, the radiation in lower containment is greater than the threshold level for entering FR-Z.3, High Containment Radiation, but the challenge is a Yellow path which allows the performance of the procedure to be optional. Only Red and Orange path challenges are required to be immediately implemented. Plausible because the entry conditions are met and if the challenge had been an Orange path, immediate transition would be required.

D. CORRECT, the radiation in lower containment is greater than the threshold level for entering FR-Z.3, High Containment Radiation, and the challenge is a yellow path which allows the performance of the procedure to be optional.

Question No. 85

Tier 1 Group 2

K/A W/E16 EA2.1
High Containment Radiation
Ability to determine and interpret the following as they apply to the (High Containment Radiation)
Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

Importance Rating: 2.9 / 3.3

Technical Reference: EPM-4, User's Guide, Rev. 20
1-FR-0, Status trees, Rev. 1

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271EPM-4 B.11
Given a set of conditions, analyze the EOP/FRP implementation.
OPL271FR-0 B.6
Given a set of initial plant conditions use FR-0 to correctly identify the : a. Identify required actions.

Question Source:
Bank # _____
Modified Bank # ___X_____
New _____

Question History: Modified from Braidwood 12-2007 SRO exam

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis _X_____

10 CFR Part 55 Content: (43.5 / 45.13)

10CFR55.43.b (5)

Comments: Modified from Braidwood 12-2007 SRO exam

3.10.5 Status Tree Rules of Usage (continued)

6. If any ORANGE challenge is encountered, the person monitoring status trees continues monitoring until all six status trees have been evaluated. This is necessary because a subsequent RED challenge has priority over any ORANGE challenge. If any RED is encountered, then Rule 3.10.5.D.4 applies. Otherwise, once it is determined that no RED challenges exist, then the person monitoring status trees informs the procedure reader of the highest priority ORANGE challenge.

7. RED or ORANGE challenges must be addressed immediately by implementing appropriate FRPs in order of priority and per the rules of usage. When the person monitoring status trees informs the procedure reader that a RED or ORANGE challenge exists, the procedure reader immediately suspends the ORP (or lower priority FRP) in progress and implements the appropriate FRP, as indicated at the terminus point of the CSF under challenge.

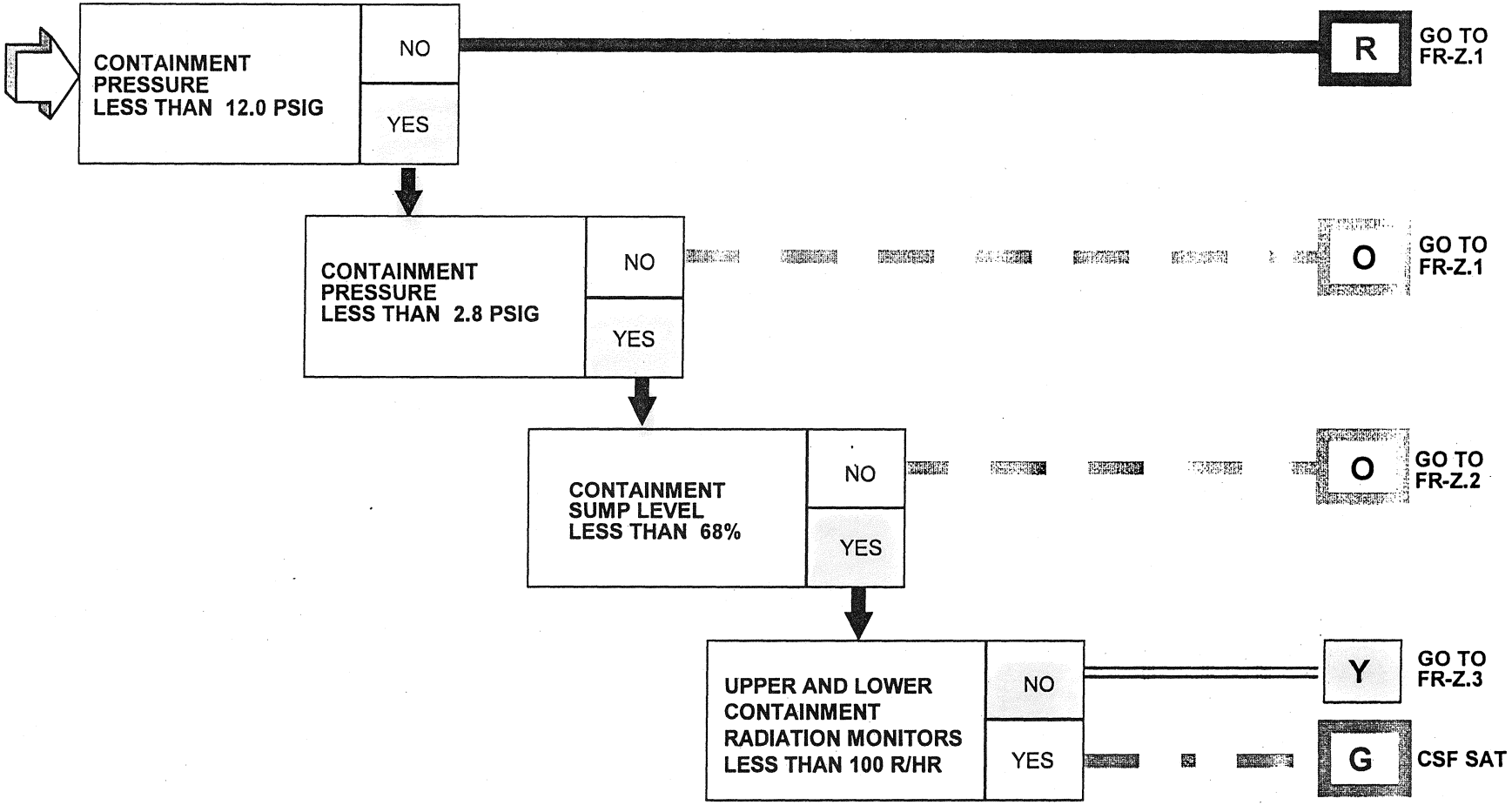
8. YELLOW challenges may be addressed by implementing appropriate FRPs if desired, but do not require immediate operator action. Addressing YELLOW challenges is optional since these are usually temporary, off-normal conditions that will be restored to normal status by actions already in progress. In other cases, the YELLOW path might provide an early indication of a developing RED or ORANGE condition. Following FRP implementation, a YELLOW might indicate a residual off-normal condition. When the person monitoring status trees informs the procedure reader that a YELLOW challenge exists, the procedure reader should evaluate if the YELLOW challenge FRP should be implemented. This decision will be based on the following:

   - Whether the procedures in effect will address the challenge as a matter of course.
   - Whether the procedures in effect are more important at that time based upon available time and current plant conditions.
   - Whether the challenge is of a nature that it will likely develop into an ORANGE or RED condition if action is not taken early.

CONTAINMENT

F-0.5

SQN
1-FR-0
Rev. 1



Braidwood 12-2007 exam Change to LOCA

Quest No: RO SRO: TIER: GROUP: Topic No: KA No: RO: SRO: Cog Level:
83 SRO 1 2 00WE14 00WE14EA2.1 3.3 3.8 High
System/Evolution Name: Category Statement:
High Containment Pressure Ability to determine and interpret the following as they apply to the High Containment Pressure:

KA Statement:
Facility conditions and selection of appropriate procedures during abnormal and emergency operations

UserID: Topic Line:
Question Stem:

Given:
- Unit 1 was at 100% power.
- All systems were normally aligned.
- A large steam break occurred inside containment.
- The crew has just implemented 1BwEP-2, FAULTED STEAM GENERATOR ISOLATION.
- The STA has completed the initial scan of the status trees and the following conditions exist:
- An ORANGE path exists on the containment status tree.
- Containment pressure is 26 psig and lowering.
- The faulted SG has NOT been isolated.
- ALL other CSFs are GREEN.

Based on the above conditions, the Unit Supervisor will direct the crew to...

A IMMEDIATELY implement and complete 1BwFR-Z.1, RESPONSE TO HIGH CONTAINMENT
PRESSURE, THEN transition back to 1BwEP-2.

B remain in 1BwEP-2 and continue to monitor containment pressure. If containment pressure

begins to rise, THEN implement 1BwFR-Z.1, RESPONSE TO HIGH CONTAINMENT PRESSURE.

C remain in 1BwEP-2 until the faulted SG is isolated, THEN implement 1BwFR-Z.1,

RESPONSE TO HIGH CONTAINMENT PRESSURE.

D IMMEDIATELY implement 1BwFR-Z.1, RESPONSE TO HIGH CONTAINMENT PRESSURE,

and remain in 1BwFR-Z.1 until the containment CSF is restored to GREEN OR YELLOW, THEN transition back to 1BwEP-2.

Answer: Task No: S-FR-015 Question Source: Question
Difficulty
A Obj No: 7D.FR-005A New
Low
Time: Cross Ref: 10CFR55.43(b)(5)
1

Reference:

No reference will be provided to examinee.
ILT lesson plan I1-FR-XL-01, BwFR-Z
BwAP 340-1, Use of Procedures for the Operating Department
1BwFR-Z.1, Response to High Containment Pressure

Explanation: Question meets KA. Question requires examinee ability to determine and interpret facility conditions and select appropriate
procedures during high containment pressure.
With containment pressure > 20 psig, an orange path conditions exist on the containment status tree. With an orange path present,
immediate transition is made to 1BwFR-Z.1 to restore the CSF. Once entered, 1BwFR-Z.1 is entirely completed, then transition is made
back to procedure and step in effect at time of transition to 1BwFR-Z.1.

A is correct, see explanation above.
B is incorrect, even though containment pressure is lowering and nearing point at which CSF will change to yellow status, transition is
made to 1BwFR-Z.1.
C is incorrect, 1BwFR-Z.1 will perform faulted SG isolation sequence.
D is incorrect, 1BwFR-Z.1 is completed and procedure is exited even if CSF is not restored.

Date Written: 6/28/2007 Author: Darren **Stiles** [?] App. Ref: none

I. PROGRAM: OPERATOR TRAINING - LICENSED

II. COURSE: LICENSE TRAINING

III. LESSON TITLE: FR-0, STATUS TREES

IV. LENGTH OF LESSON/COURSE: 1 hours

V. TRAINING OBJECTIVES:

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of FR-0 Status Trees.

B. Enabling Objectives

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with Status Trees that are rated ≥ 2.5 during Initial License Training for the appropriate license position as identified in Appendix A.
1.	Explain the purpose/goal of FR-0.
2.	Explain the bases for prioritizing safety functions during emergency operations.
3.	Summarize the mitigating strategy for the failure that initiated entry into FR-0
4.	Discuss requirements for monitoring Status Trees. a. Describe the conditions when monitoring is to be initiated . b. Describe the required frequency for monitoring the status trees and how the frequency is determined c. Describe the conditions when monitoring can be terminated.
5.	Describe the bases for all decision blocks, limits, notes, cautions, and steps of FR-0.
6.	Given a set of initial plant conditions use FR-0 to correctly identify the : a. Identify required actions b. Observe and Interpret Cautions and Notes c. Requirements when a RED or ORANGE Path is diagnosed
7.	Apply GFE and system response concepts to the performance of FR-0

PROGRAM: OPERATOR TRAINING - LICENSED

I. **COURSE:** LICENSE TRAINING

II. **LESSON TITLE:**

III. **LENGTH OF LESSON/COURSE:** 4-6 hour(s)

IV. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of HLC Procedures training, the participant shall be able to explain, using classroom evaluations and/or simulator scenarios, the requirements of EMP-4, EOP-E-0, "User's Guide".

B. Enabling Objectives:

1. Determine/identify the correct procedural application(s) based on the operating procedures network for normal, abnormal, and emergency evolutions.

2. Analyze an EOP layout and determine (according to EPM-4):
   a. correct procedural layout application;
   b. if the use of terms is correct (e.g.: Faulted Steam Generator, Shall, Lowering, etc per Appx. B);
   c. correct use of symbols and icons.

3. Define EOP warnings, cautions, and notes and, given an EOP condition, determine appropriate usage.

4. Compare and contrast event-based emergency/abnormal operating procedures used in parallel with the symptom-based EOPs.

5. Given an example, apply general guidelines, crew roles and responsibilities for EOP procedural use and determine:
   a. format and use of sequenced and non-sequenced sub steps;
   b. transition between Action/Expected Response column and the Response Not Obtained column;
   c. requirements for task completion prior to proceeding to the next action (and how any exceptions are identified);
   d. requirements for task completion still in progress following transition to another procedure or step;
   e. actions based on fold-out page use;
   f. actions based on hand-out page use;
   g. if EOP termination is appropriate based on given conditions.

6. Identify post-accident instrumentation and determine if its use is required.

7. Given plant operating conditions, determine if EOP entry conditions have been met and state the resultant appropriate immediate action steps for those conditions.

8. Given plant operating conditions, determine if AOP entry conditions have been met and state the resultant appropriate actions for those conditions.

9. Identify general operating crew responsibilities during emergency operations including appropriate implementation of prudent operator actions.

10. Identify general operating crew responsibilities during emergency operations including requirements for actions outside Technical Specifications/plant licensed conditions (10CFR50.54x application).

11. Given a set of conditions, analyze the EOP/FRP implementation:

    a. identify the basis for the implementation;
    b. determine the correct implementation hierarchy;
    c. determine if Critical Safety Function Status Trees (CFSTs) implementation is required;
    d. identify the status tree colors by priority and summarize each tree's purpose;
    e. identify conditions which will allow a FRP to be exited once it is entered (a RED or ORANGE condition);
    f. state the monitoring frequency of CFSTs and when this can be relaxed;
    g. determine correct coordination with other support procedures
    h. identify conditions permissible to terminate CFSTs monitoring.

12. Given an operational situation, analyze a crew brief and determine if it meets Management expectations.

86. 003 A2.03 086

Given the following:

- Unit 1 in Mode 3 with RCS at normal operating temperature and pressure .
- RCPs #1, #2 and #3 are running.
- Following the start of RCP #4, the pump stabilizes as follows:
- Motor current at 625 amps.
- #1 seal leakoff at 1.1 gpm.
- All pump and motor temperatures stable and within limits.
- The operators implement AOP-R.04, "Reactor Coolant Pump Malfunctions".

Which ONE of the following identifies why AOP-R.04 entry was required and the action directed by the AOP?

A. ✔ The AOP was entered due to the high motor current and the AOP will direct removal of the RCP from service.

B. The AOP was entered due to the high motor current but the AOP will NOT direct removal of the RCP unless bearing or stator temperatures are increasing.

C. The AOP was entered due to the low #1 seal leakoff flow and the AOP will direct removal of the RCP from service.

D. The AOP was entered due to the low #1 seal leakoff flow but the AOP will NOT direct removal of the RCP unless lower bearing or seal water temperatures are increasing.

DISTRACTOR ANALYSIS:

A. CORRECT, the AOP entry was required due to the high current flow to the motor and the with the current flow greater than 608 amps, the procedure directs the RCP to be stopped.

B. Incorrect, the AOP entry being required due to the high current flow to the motor is correct but with the current flow greater than 608 amps, the procedure does not require the bearing or stator temperatures to be increasing to direct the RCP to be stopped. Plausible because the high motor current is why the procedure entry was required and increasing temperatures do result in stopping the RCP with other conditions in the procedure.

C. Incorrect, the AOP entry was not required due to low #1 seal leakoff flow as the leakoff is above the low flow alarm, and if the flow was low with the bearing and seal water temperature stable, the AOP would not require the pump be stopped unless the #1 seal leakoff flow was further reduced. Plausible because low seal leakoff flow would require the procedure to be entered and if the flow were low enough the stopping of the RCP would be required.

D. Incorrect, the AOP entry was not required due to low #1 seal leakoff flow but if the seal was less than entry conditions, rising temperature would result in stopping the RCP. Plausible because low seal leakoff flow would require the procedure to be entered and if the lower bearing or seal water temperatures were increasing, the stopping of the RCP would be required.

Question No. 86

Tier 2 Group 1

K/A 003 A2.03
Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
Problems associated with RCP motors, including faulty motors and current, and winding and bearing temperature problems

Importance Rating: 2.7 / 3.1

Technical Reference: AOP-R.04, Reactor Coolant Pump Malfunctions, Rev. 23

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271AOP-R.04 B.8.a & b
Given a set of plant conditions use AOP-R.04 to correctly:
a. Recognize entry conditions
b. Identify required actions

Question Source:
Bank # _____
Modified Bank # _____
New __X____

Question History: New question for SQN 1/2009 exam

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis __X____

10 CFR Part 55 Content: (41.5 / 43.5/ 45.3 / 45/13)

10CFR55.43.b (5)

Comments: New question for SQN 1/2009 exam

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.0 OPERATOR ACTIONS

CAUTION: **Exceeding the following limitations requires trip of the affected RCP, unless RCP operation is required by FR-C.1, *Inadequate Core Cooling* or FR-C.2, *Degraded Core Cooling*:**

- **RCP #1 Seal ΔP less than 220 psid**
- **RCP #1 Seal Temperature greater than 225°F**
- **RCP Lower Bearing Temperature greater than 225°F**
- **RCP Upper Motor Bearing Temperature greater than 200°F**
- **RCP Lower Motor Bearing Temperature greater than 200°F**
- **RCP Motor Voltage less than 5940V or greater than 7260V**
- **RCP Motor Amps greater than 608 amps**
- **RCP Vibration greater than 20 mils on any axis (x and/or y) [C.3]**

NOTE 1: During plant startup following seal maintenance, the seal package should seat and operate normally following 24 hours of run time.

NOTE 2: RCP trip criteria is also located in Appendix B. This appendix should be referred to throughout the performance of this procedure.

1. **DIAGNOSE** the failure:

IF...	GO TO SECTION	PAGE
Reactor Coolant Pump(s) tripped or shutdown required	2.1	4
RCP #1 Seal Leakoff high flow (high flow Alarm)	2.2	7
RCP #1 Seal Leakoff low flow (low flow Alarm)	2.3	13
RCP #2 Seal Leakoff high flow (high RCP standpipe level)	2.4	18
RCP #3 Seal Leakoff high flow (low RCP standpipe level)	2.5	21
RCP Motor Stator Temperature High	2.6	24

> ALARM @ 0.9gpm

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Reactor Coolant Pump Tripped or Shutdown Required

CAUTION: A rapid drop in level and steam flow on the affected loop S/G may occur when RCP is tripped.

1. **CHECK** unit in Mode 1 or 2.

   GO TO Step 3.

NOTE: This procedure is intended to be performed concurrently with E-0, Reactor Trip or Safety Injection.

2. **TRIP** the reactor, and

   GO TO E-0, Reactor Trip or Safety Injection, WHILE continuing in this procedure.

3. **STOP** and **LOCK OUT** affected RCP(s).

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Reactor Coolant Pump Tripped or Shutdown Required (cont'd)

CAUTION: If the RCP seal return flow control valve (FCV) is NOT closed within 5 minutes of stopping the RCP with excessive leakoff, seal damage may occur. [C.2]

4. **MONITOR** RCP seal leakoff less than 8 gpm per pump:
   - FR-62-24 [RCP 1 & 2]
   - FR-62-50 [RCP 3 & 4]

   WHEN the RCP has coasted down (30 sec.), **THEN**
   CLOSE affected RCP seal return FCV: **[C.2]**
   - FCV-62-9 [RCP 1]
   - FCV-62-22 [RCP 2]
   - FCV-62-35 [RCP 3]
   - FCV-62-48 [RCP 4]

5. **PULL TO DEFEAT** affected loop ΔT and T-avg:
   - XS-68-2D (ΔT)
   - XS-68-2M (T-avg)

6. **CHECK** RCPs 1 and 2 RUNNING.

   CLOSE affected loop's pressurizer spray valve.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Reactor Coolant Pump Tripped or Shutdown Required (cont'd)

CAUTION: Restoring seal water injection to a hot seal package could result in failure of the RCP seals.

NOTE: The plant should be cooled down to reduce heat input into the pump seal package if RCP seal injection flow has been lost and cannot be restored prior to exceeding temperature limits.

7. **IF** RCP Seal Temperatures or Bearing Temperatures are increasing uncontrolled due to loss of Seal Injection,
   THEN
   EVALUATE initiating RCS cooldown.

8. **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.

9. **EVALUATE** the following Tech Specs for applicability:

   - 3.2.5, DNB Parameters
   - 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation
   - 3.4.1.2, Reactor Coolant System - Hot Standby
   - 3.4.1.3, Reactor Coolant System - Shutdown
   - 3.4.6.2, RCS Operational Leakage

10. **GO TO** appropriate plant procedure.

END OF SECTION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.2 RCP #1 Seal Leakoff High Flow

- **CAUTION:** **RCP bearing damage may occur if temperature exceeds 225°F.**

- **CAUTION:** **If the RCP seal return flow control valve is NOT closed within 5 minutes of stopping the RCP with excessive leakoff, seal damage may occur. [C.2]**

1. **MONITOR** #1 seal leakoff less than 6 gpm per pump:

   - FR-62-24 [RCP 1 & 2]
   - FR-62-50 [RCP 3 & 4]

a. **MONITOR** RCP lower bearing temperature and seal temperature.

IF RCP lower bearing temperature **OR** seal temperature are rising uncontrolled,
THEN
GO TO Section 2.1, RCP Tripped or Shutdown Required. **[C.1] [C.2]**

IF lower bearing temperature **AND** seal temperature indication are NOT available for affected RCP,
THEN
GO TO Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**

(Step continued on next page.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.2 RCP #1 Seal Leakoff High Flow (cont'd)

1. (Continued)

b. **CHECK** #1 seal leakoff flow:

IF #1 seal leakoff flow greater than 8 gpm,
THEN
PERFORM the following:

1) **INITIATE** plant shutdown at 2-4% per minute **USING** AOP-C.03, Rapid Shutdown or Load Reduction.

2) **WHEN** reactor is tripped,
THEN
GO TO Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**

IF #1 seal leakoff flow less than 8 gpm,
THEN
PERFORM the following:

1) **CONTROL** RCP seal injection flow for the affected RCP greater than or equal to 9 gpm.

2) **CONTACT** Engineering for recommendations WHILE continuing with this procedure.

(Step continued on next page.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.2 RCP #1 Seal Leakoff High Flow (cont'd)

1. (Continued)

3) **IMPLEMENT** Engineering recommendations to address specific RCP seal performance conditions.

OR

COMPLETE normal plant shutdown within 8 hours **USING** appropriate plant procedure.

4) **WHEN** reactor is shutdown or tripped,
THEN
GO TO Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**

2. **MONITOR** RCP lower bearing and seal water temperatures less than 225°F.

IF any of the following conditions met:

- RCP lower bearing temperature <u>or</u> seal water temperature greater than 225°F

OR

- seal leakoff flow greater than 6 gpm **AND** lower bearing <u>and</u> seal temp NOT available for affected RCP

THEN
GO TO Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.2 RCP #1 Seal Leakoff High Flow (cont'd)

3. **MONITOR** RCP #1 seal ΔP greater than 220 psid:
   - PDI-62-8A
   - PDI-62-21A
   - PDI-62-34A
   - PDI-62-47A

   GO TO Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**

4. **ENSURE** RCP seal water supply flow 6-10 gpm per pump:
   - FI-62-1A
   - FI-62-14A
   - FI-62-27A
   - FI-62-40A

   IF seal water supply flow is less than 6 gpm **AND** CANNOT be restored,
   THEN
   ENSURE CCS supply to thermal barriers less than 105°F on TR-70-161
   [CCS HX 1A1/1A2 (2A1/2A2) Outlet Temp]

5. **CONTACT** Engineering for recommendations WHILE continuing with this procedure.

6. **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.2 RCP #1 Seal Leakoff High Flow (cont'd)

7. **EVALUATE** the following Tech Specs for applicability:

   - 3.2.5, DNB Parameters
   - 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation
   - 3.4.1.2, Reactor Coolant System - Hot Standby
   - 3.4.1.3, Reactor Coolant System - Shutdown
   - 3.4.6.2, RCS Operational Leakage

CAUTION: Slow and uniform temperature adjustments (approx. 50°F in one hour) will prevent thermal shock to the seals.

8. **CHECK** VCT outlet temperature less than 130°F [TI-62-131].

   ADJUST HIC-62-78A to reduce VCT temperature to less than 130°F.

9. **ENSURE** VCT pressure between 17 psig and 45 psig [PI-62-122].

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.2 RCP #1 Seal Leakoff High Flow (cont'd)

10. **CHECK** RCP lower bearing and seal water temperature less than 180°F:

IF any of the following conditions met:

- affected RCP lower bearing or seal water temperature greater than 180°F

  OR

- lower bearing and seal water temp indication NOT available for affected RCP,

THEN
GO TO Step 1.

11. **GO TO** appropriate plant procedure.

END OF SECTION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.3 RCP #1 Seal Leakoff Low Flow

1. **CHECK** #1 seal leakoff flow greater than 0.8 gpm per pump:
   - FR-62-23 [RCP 1 & 2]
   - FR-62-49 [RCP 3 & 4]

   GO TO Step 4.

2. **CHECK** #1 seal leakoff flow greater than 0.9 gpm per pump and NOT decreasing:
   - FR-62-23 [RCP 1 & 2]
   - FR-62-49 [RCP 3 & 4]

   GO TO Step 4.

3. **GO TO** appropriate plant procedure.

4. **ENSURE** RCP seal water supply flow between 6 gpm and 10 gpm per pump:
   - FI-62-1A
   - FI-62-14A
   - FI-62-27A
   - FI-62-40A

   IF seal water supply flow is less than 6 gpm **AND** CANNOT be restored,
   THEN
   ENSURE CCS supply to thermal barriers is less than 105°F on TR-70-161.
   [CCS HX 1A1/1A2 (2A1/2A2) Outlet Temp]

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.3 RCP #1 Seal Leakoff Low Flow (cont'd)

5. **CONTACT** Engineering for recommendations WHILE continuing with this procedure.

6. **ENSURE** VCT pressure between 17 psig and 45 psig [PI-62-122].

7. **CHECK** RCP standpipe level alarms DARK [M-5B, A-2, B-2, C-2, D-2].

MONITOR the following:

a. RCDT parameters (0-L-2 AB, el. 669)
   - Level, LI-77-1
   - Pressure, PI-77-2
   - Temperature, TI-77-21

b. Cntmt Fl. & Eq. Sump Level rate of rise (ICS pt. U0969)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.3 RCP #1 Seal Leakoff Low Flow (cont'd)

8. **VERIFY** RCP #2 seal leakoff less than or equal to 0.5 gpm **USING** Appendix A, RCDT Level Rate-of-Change.

GO TO Section 2.4, RCP #2 Seal Leakoff High Flow.

9. **MONITOR** RCP lower bearing temperature and seal water temperature are stable and within limits (less than 225°F).

IF any of the following conditions met:

- affected RCP lower bearing temp <u>or</u> seal water temp rising uncontrolled

  OR

- affected RCP lower bearing temp <u>or</u> seal water temp greater than 225°F

  OR

- affected RCP lower bearing temp <u>and</u> seal temp indication NOT available

THEN
GO TO Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.3 RCP #1 Seal Leakoff Low Flow (cont'd)

CAUTION: **If low seal leakoff compensatory actions are NOT successful, seal failure may result as indicated by a sudden increase in seal leakoff flow (greater than 8 gpm).**

NOTE: Plant shutdown may be terminated if Seal Leakoff flow stabilizes at greater than 0.8 gpm with pump Lower Bearing temperature and Seal Water Temperature remaining stable (no indications of seal failure).

10. **MONITOR** RCP #1 seal leakoff flow greater than 0.8 gpm:

    - FR-62-23 [RCP 1 & 2]
    - FR-62-49 [RCP 3 & 4]

INITIATE normal plant shutdown
USING appropriate plant procedures
AND
STOP affected RCP within 8 hours.

IF RCP #1 seal leakoff flow reverts to high leakage (greater than 8.0 gpm):

- FR-62-24 [RCP 1 & 2]
- FR-62-50 [RCP 3 & 4]

THEN
GO TO Section 2.1, RCP Tripped or Shutdown Required.

11. **CHECK** #1 seal leakoff flow greater than 0.9 gpm per pump and NOT decreasing:

    - FR-62-23 [RCP 1 & 2]
    - FR-62-49 [RCP 3 & 4]

GO TO Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.3 RCP #1 Seal Leakoff Low Flow (cont'd)

12. **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.

13. **EVALUATE** the following Tech Specs for applicability:

    - 3.2.5, DNB Parameters
    - 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation
    - 3.4.1.2, Reactor Coolant System - Hot Standby
    - 3.4.1.3, Reactor Coolant System - Shutdown
    - 3.4.6.2, RCS Operational Leakage

14. **GO TO** appropriate plant procedure.

END OF SECTION

Source		Setpoint
SER 2123	Pump 1 FS-62-10	.9 gpm decreasing
SER 2122	Pump 2 FS-62-23	.9 gpm decreasing
SER 2121	Pump 3 FS-62-36	.9 gpm decreasing
SER 2120	Pump 4 FS-62-49	.9 gpm decreasing

FS-62-10 REAC COOL PMPS SEAL LEAKOFF LOW FLOW

Probable Causes

1. No. 1 seal ΔP less than 275 psid.
2. No. 1 seal damage.
3. No. 2 seal failure.

Corrective Actions

[1] **VERIFY** Low Leakoff flow condition on affected RCP(s) with the following instruments:

Pump	Leakoff Instrumentation
RCP 1	1-FR-62-23
RCP 2	1-FR-62-23
RCP 3	1-FR-62-49
RCP 4	1-FR-62-49

[2] **ENSURE** No. 1 Seal Return Isolation Valves OPEN

Pump	Valve
RCP 1	1-FCV-62-9
RCP 2	1-FCV-62-22
RCP 3	1-FCV-62-35
RCP 4	1-FCV-62-48

[3] **IF** Unit 1 is in Mode 1 or 2, **THEN**
GO TO AOP-R.04, *Reactor Coolant Pump Malfunctions.*

[4] **IF** Unit 1 is in Mode 3, 4,or 5, **THEN**
PERFORM the following:

[a] **VERIFY** No. 1 Seal ΔP ≥ 220 psid **AND** No. 1 seal leakoff greater than the minimum value shown in 1-SO-68-2 Appendix D.

CONTINUED

CORRECTIVE ACTIONS (CONTINUED)

FS-62-10
REAC COOL PMPS
SEAL LEAKOFF
LOW FLOW

[b] **ENSURE** RCP seal water supply flow is between 6 gpm and 10 gpm per pump.

[c] **IF** No. 1 Seal ΔP **OR** No. 1 seal leakoff is less than the minimum required values, **THEN**

STOP the affected RCP **USING** 1-SO-68-2.

[d] **ENSURE** VCT pressure is between 17 psig and 45 psig.

[e] **CONTACT** Engineering for assistance.

References 45B655-05B-0, 47B601-62-2, 4, 7, 9, 47W610-68-1

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** AOP-R.04, REACTOR COOLANT PUMP MALFUNCTIONS

IV. **LENGTH OF LESSON/COURSE:** 2 hours

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of AOP-R.04, Reactor Coolant Pump Malfunctions.

B. Enabling Objectives:

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with , Reactor Coolant Pump Malfunctions that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Explain the purpose/goal of AOP-R.04.
2.	Discuss the AOP-R.04 entry conditions. a. Describe the setpoints, interlocks, and automatic actions associated with AOP-R.04 entry conditions. b. Describe the ARP requirements associated with AOP-R.04 entry conditions. c. Interpret, prioritize, and verify associated alarms are consistent with AOP-R.04 entry conditions. d. Describe the Administrative conditions that require Turbine Trip/ Reactor trip due to Reactor Coolant Pump Malfunctions.
3.	Describe the initial operator response to stabilize the plant upon entry into AOP-R.04.
4.	Upon entry into AOP-R.04, diagnose the applicable condition and transition to the appropriate procedural section for response.
5.	Summarize the mitigating strategy for the failure that initiated entry into AOP-R.04.
6.	Describe the bases for all limits, notes, cautions, and steps of AOP-R.04.
7.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.

8.	Given a set of initial plant conditions use AOP-R.04 to correctly: a. Recognize entry conditions b. Identify required actions c. Respond to Contingencies d. Observe and Interpret Cautions and Notes
9.	Describe the Tech Spec and TRM actions applicable during the performance of AOP-R.04.
10.	Apply GFE and system response concepts to the abnormal condition – prior to, during and after the abnormal condition

87. 026 G2.4.20 087

Given the following:

- Unit 1 at 100% power with Containment Spray Pump 1A-A out of service and tagged.
- A LOCA results in a Reactor Trip and Safety Injection.
- After transferring to the containment sump the crew observes the amps fluctuating on Containment Spray Pump 1B-B.
- In response, the crew stops the pump and transitions to ECA-1.3, "Containment Sump Blockage".
- The STA reports a RED path to FR-Z.1, "High Containment Pressure".

Which ONE of the following identifies the condition that results in the restart of Containment Spray Pump 1B-B and what would be the desired flow rate?

A. Due to implementing FR-Z.1, the pump will be restarted and the desired flow rate is the DESIGN spray flow due to the challenge to the Containment Barrier.

B. Due to implementing FR-Z.1, the pump will be restarted and the desired flow rate is the MINIMUM spray flow required to control containment pressure provided it does not cause the RHR pump to cavitate.

C. ECA-1.3 will restart the spray pump after TSC evaluation and the desired flow rate is the DESIGN spray flow due to the challenge to the Containment Barrier.

D. ECA-1.3 will restart the spray pump after TSC evaluation and the desired flow rate is the MINIMUM spray flow required to control containment pressure provided it does not cause the RHR pump to cavitate.

DISTRACTOR ANALYSIS:

A. *Incorrect, when ECA-1.3 is entered FRGs are monitored for information only and the implementation of FRGs is suspended. Transition to FR-Z.1 will not be made and a note in the ECA Appendix E for throttling spray flow identifies the desired flow rate to be the MINIMUM to control containment pressure without causing cavitation of the RHR pump not the MAXIMUM without causing cavitation. Plausible because FR-Z.1 would restart the spray pump and with a RED path identified the Containment pressure is at or above the design pressure and a severe challenge to the barrier exists and establishing the maximum flow would cause a greater drop in containment pressure.*

B. *Incorrect, when ECA-1.3 is entered FRGs are monitored for information only and the implementation of FRGs is suspended. Transition to FR-Z.1 will not be made. A note in the ECA Appendix E for throttling spray flow identifies the desired flow rate is the MINIMUM to control containment pressure without causing cavitation of the RHR pump. Plausible because FR-Z.1 would restart the spray pump and establishing the minimum flow to control containment pressure without causing cavitation of the RHR pump is correct for the conditions in the stem.*

C. *Incorrect, The FRGs are monitored for information only so ECA-1.3 is continued and the ECA directs the TSC evaluation if containment pressure is greater than 9.5 psig and the pressure would be with a RED path present (12psig). A note in the ECA Appendix E for throttling spray flow identifies the desired flow rate to be the MINIMUM to control containment pressure without causing cavitation of the RHR pump not the MAXIMUM without causing cavitation. Plausible because the ECA is the procedure which restart and control the pump and with a RED path identified the Containment pressure is at or above the design pressure and a severe challenge to the barrier exists and establishing the maximum flow would cause a greater drop in containment pressure.*

D. *CORRECT, A RED path on the Containment Status Tree occurs when the pressure is greater than 12 psig. The FRGs are monitored for information only so ECA-1.3 is continued. The ECA directs the TSC evaluation if containment pressure is greater than 9.5 psig and the pressure would be with a RED path present (12psig). A note in the ECA Appendix E for throttling spray flow identifies the desired flow rate is the MINIMUM to control containment pressure without causing cavitation of the RHR pump.*

Question No. 87

Tier 2 Group 1

K/A 026 G2.4.20
Containment Spray
Knowledge of the operational implications of EOP warnings, cautions, and notes.

|Importance Rating: 3.8 / 4.3

Technical Reference: ECA-1.3, Containment Sump Blockage, Rev 1

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271ECA-1.3 B.4
Describe the bases for all limits, notes, cautions, and steps of ECA-1.3

Question Source:
Bank # _____
Modified Bank # _____
New _X_____

Question History: New question for SQN 1/2009 exam

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis __X____

10 CFR Part 55 Content: (41.10 / 43.5 / 45.13)

10CFR55.43.b (5)

Comments: New question for SQN 1/2009 exam

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	**SUSPEND** FRP implementation and **MONITOR** status trees for information only.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. **NOTIFY** TSC to determine optimum ECCS and containment spray alignment WHILE continuing in this procedure.

10. **ENSURE** makeup water being added to RWST **USING** EA-63-2, Refilling the RWST.

CAUTION **Re-establishing Containment Spray flow may result in RHR pump cavitation.**

11. **MONITOR** containment pressure:

    a. **CHECK** containment pressure less than 9.5 psig.

    a. **NOTIFY** TSC to evaluate restarting Containment Spray **USING** Appendix E, Throttling Containment Spray Flow.

APPENDIX E

THROTTLING CONTAINMENT SPRAY FLOW

NOTE 1 This appendix assumes containment spray suction is still aligned to containment sump as specified in ES-1.3.

NOTE 2 Throttling containment spray flow is desired to allow controlling flow to prevent RHR pump cavitation. Flow rate should be established as directed by TSC. Desired flow is the minimum flow rate needed to control containment pressure without causing RHR cavitation.

1. **RESET** Containment Spray Signal. ☐

2. **STATION** operator in communication with MCR at breaker for containment spray discharge valve (identified in Step 6). ☐

3. **ENSURE** Containment Spray pump recirc valve for train to be started in PULL P-AUTO:

   - FCV-72-34 (Train A) ☐

     OR

   - FCV-72-13 (Train B) ☐

4. **ENSURE** discharge valve CLOSED for pump to be started:

   - FCV-72-39 (Train A) ☐

     OR

   - FCV-72-2 (Train B) ☐

5. **START** one containment spray pump. ☐

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** EMERGENCY OPERATING PROCEDURE ECA-1.3, "Containment Sump Blockage"

IV. **LENGTH OF LESSON/COURSE:** 1 hour(s)

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of ECA-1.3, "Containment Sump Blockage"

B. Enabling Objectives:

B. Enabling Objectives:

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with Containment Sump Blockage that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Explain the purpose/goal of ECA-1.3.
2.	Discuss the ECA-1.3 entry conditions. a. Describe the setpoints, interlocks, and automatic actions associated with ECA-1.3 entry conditions. b. Describe the requirements associated with ECA-1.3 entry conditions.
3.	Summarize the mitigating strategy for the failure that initiated entry into ECA-1.3.
4.	Describe the bases for all limits, notes, cautions, and steps of ECA-1.3.
5.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
6.	Given a set of initial plant conditions use ECA-1.3 to correctly: a. Identify required actions b. Respond to Contingencies c. Observe and Interpret Cautions and Notes
7.	Apply GFE and system response concepts to the performance of ECA-1.3 conditions.

88. 039 A2.01 088

Given the following:

- Unit 1 is at 100% power when a LOCA occurs.
- The reactor trips when the containment pressure rise causes a Safety Injection.
- The EOP network is entered.
- RCS pressure stabilizes at 1580 psig.
- Containment pressure rises to 2.4 psig and stabilizes.
- The crew is in the process of terminating Safety Injection.
- When determining if the SI pumps should be stopped the following is noted:
    - RCS pressure is now 1540 psig and trending down.
    - RCS subcooling is 43°F.
    - Pressurizer level is 19% and dropping.
    - SG pressures: #1 - 590 psig and dropping.
      #2 - 600 psig and dropping.
      #3 - 580 psig and dropping.
      #4 - 605 psig and dropping.
    - MSIVs are open.

Which ONE of the following identifies the status of the MSIVs and the proper crew response to the conditions?

A. The MSIVs have failed to automatically close.
SI Reinitiation Criteria does NOT exist, a transition should be made to E-2, Faulted Steam Generator Isolation.

B. The MSIVs have failed to automatically close.
SI Reinitiation Criteria exist, restart the CCP, establish CCPIT flow and Go To E-1, Loss of Reactor or Secondary Coolant.

C. MSIV automatic closure signal would NOT have been initiated.
SI Reinitiation Criteria does NOT exist, a transition should be made to E-2, Faulted Steam Generator Isolation.

D. MSIV automatic closure signal would NOT have been initiated.
SI Reinitiation Criteria exists, restart the CCP, establish CCPIT flow and Go to E-1, Loss of Reactor or Secondary Coolant.

DISTRACTOR ANALYSIS:

A. *Correct, the MSIVs should have received a signal to automatically close due to SG pressure but the SI Reinitiation Criteria not being met is correct and a transition to E-2 should be made.*

B. *Incorrect, the MSIVs should have received a signal to automatically close and the SI Reinitiation Criteria not being met is correct. Plausible because of the 2 parameters that cause an MSIV to automatically close, one (containment pressure) is identified below the setpoint and the other (SG pressure) is only slightly less than setpoint and if the SI Reinitiation Criteria were applicable, the actions listed and transition to E-1 are correct.*

C. *Incorrect, the MSIVs should have received a signal to automatically close due to pressure in the steam generators. The transition to E-2 is correct. Plausible because of the 2 parameters that cause an MSIV to automatically close, one (containment pressure) is identified below the setpoint and the other (SG pressure) is only slightly less than setpoint and the transition to E-2 is correct.*

D. *Incorrect, the MSIVs having not received a signal to automatically close is correct but the SI reinitiation criteria is not met. Plausible because of the 2 parameters that cause an MSIV to automatically close, one (containment pressure) is identified below the setpoint and the other (SG pressure) is only slightly less than setpoint and if the SI Reinitiation Criteria were applicable, the actions listed and transition to E-1 are correct.*

Question No. 88

Tier 2 Group 1

K/A 039 A2.01
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:
Flow paths of steam during a LOCA

Importance Rating: 3.1 / 3.2

Technical Reference: ES-1.1, SI Termination, Rev 10
1,2-47W611-1-1 R13
TI-28, Attachment 9, Unit 1 and 2 Cycle Data Sheet, Effective Date 06/28/2007

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200.MS B.4.e & i
Describe the following features for each major component in the Main Steam System as described in this lesson.
e. Component operation
i. Protective features (including setpoints)
OPL271ES-1.1 B.5
Describe the conditions and reason for transitions within this procedure and transitions to other procedures.

Question Source:
Bank # _____
Modified Bank # _____
New _X_____

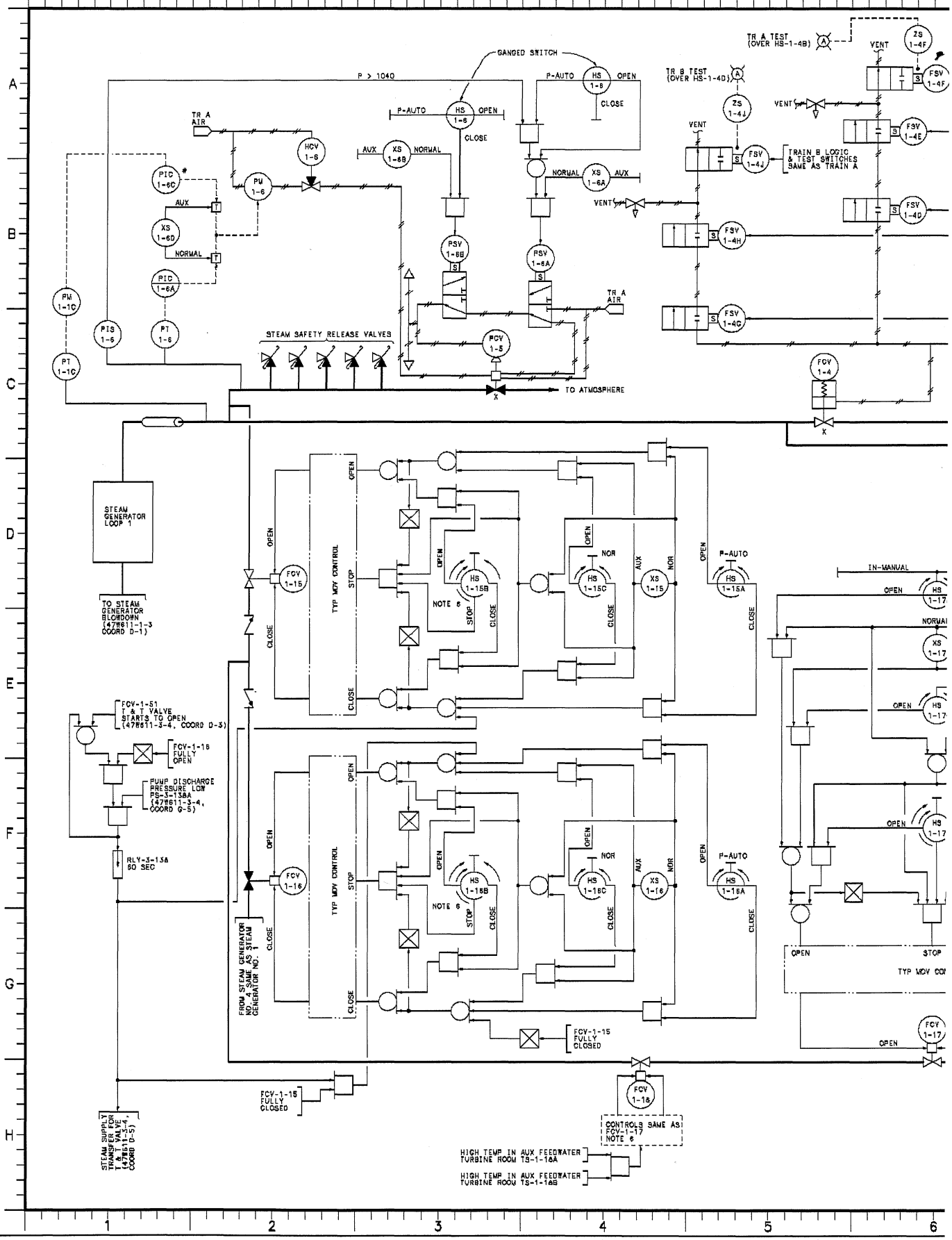
Question History: New question for SQN 1/2009 exam

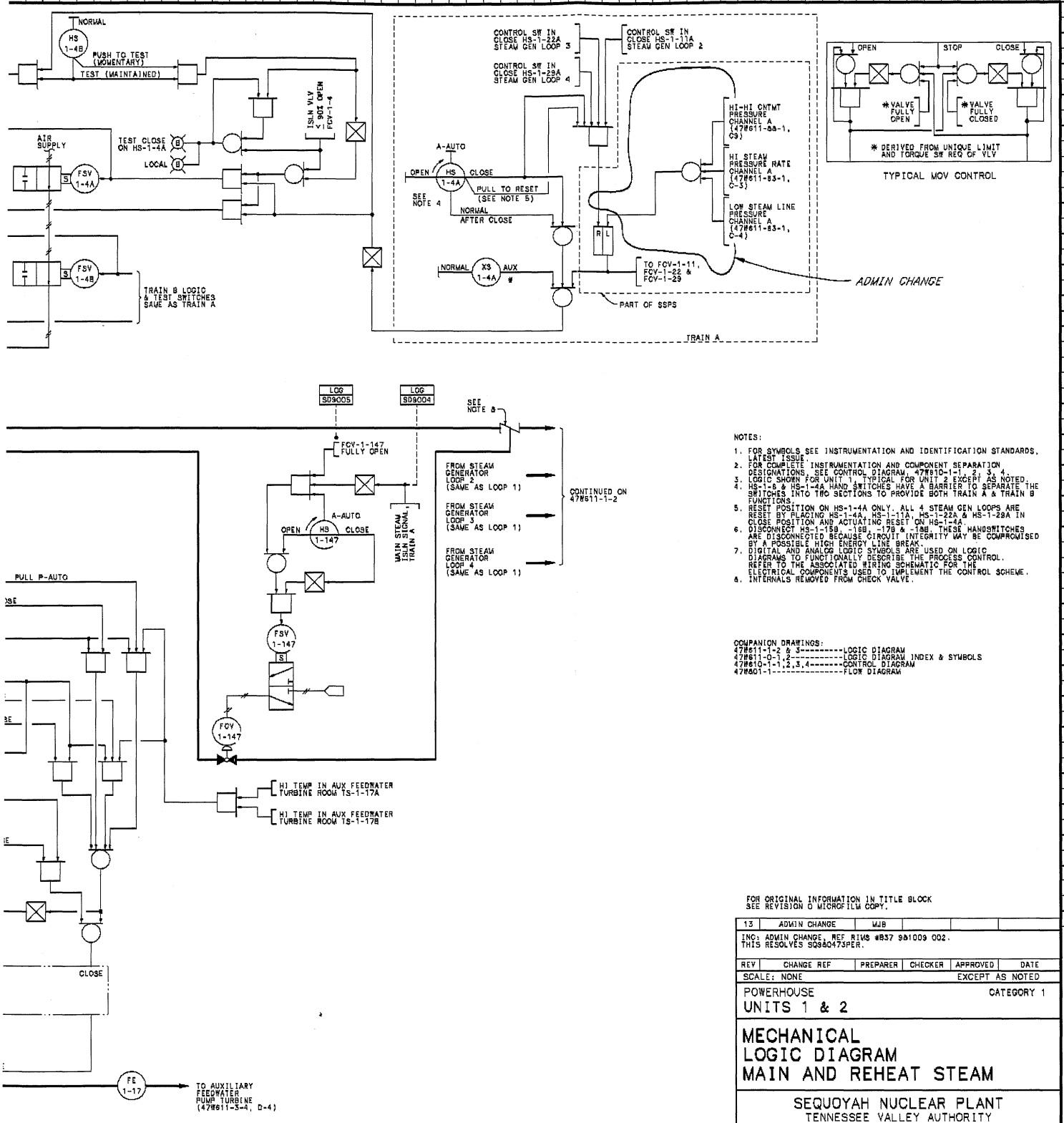
Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis __X____

10 CFR Part 55 Content: (41.5 / 43.5 / 45.3 / 45.13)

10CFR55.43.b (5)

Comments: New question for SQN 1/2009 exam


GANGED SWITCH
P > 1040
TR A AIR
HCV 1-6
PIC 1-6C
PW 1-6
AUX
XS 1-6D
NORMAL
PIC 1-6A
PW 1-1C
PT 1-1C
PIS 1-6
PT 1-6
HS 1-6
P-AUTO
OPEN
CLOSE
XS 1-6B
NORMAL
AUX
XS 1-6A
PSV 1-6B
PSV 1-6A
TR A AIR
STEAM SAFETY RELEASE VALVES
FCV 1-5
TO ATMOSPHERE
TR A TEST (OVER HS-1-4B)
TR B TEST (OVER HS-1-4D)
VENT
ZS 1-4F
FSV 1-4F
ZS 1-4J
FSV 1-4J
FSV 1-4E
FSV 1-4D
FSV 1-4H
FSV 1-4G
TRAIN B LOGIC & TEST SWITCHES SAME AS TRAIN A
FCV 1-4
STEAM GENERATOR LOOP 1
TO STEAM GENERATOR BLOWDOWN (47W611-1-3 COORD D-1)
FCV 1-15
TYP MOV CONTROL
OPEN
STOP
CLOSE
HS 1-15B
HS 1-15C
XS 1-15
HS 1-15A
NOR
AUX
P-AUTO
NOTE 6
FCV-1-15 T & T VALVE STARTS TO OPEN (47W611-3-4, COORD D-3)
FCV-1-16 FULLY OPEN
PUMP DISCHARGE PRESSURE LOW PS-3-13BA (47W611-3-4, COORD G-5)
RLY-3-13A 60 SEC
FCV 1-16
HS 1-16B
HS 1-16C
XS 1-16
HS 1-16A
FROM STEAM GENERATOR NO. 4 SAME AS STEAM GENERATOR NO. 1
FCV-1-15 FULLY CLOSED
FCV 1-18
CONTROLS SAME AS FCV-1-17 NOTE 6
HIGH TEMP IN AUX FEEDWATER TURBINE ROOM TS-1-18A
HIGH TEMP IN AUX FEEDWATER TURBINE ROOM TS-1-18B
STEAM SUPPLY TRANSFER FROM LOOP 4 (47W611-3-4, COORD D-5)
IN-MANUAL
NORMAL
FCV 1-17



NOTES:

1. FOR SYMBOLS SEE INSTRUMENTATION AND IDENTIFICATION STANDARDS, LATEST ISSUE.
2. FOR COMPLETE INSTRUMENTATION AND COMPONENT SEPARATION DESIGNATIONS, SEE CONTROL DIAGRAM, 47W610-1-1, 2, 3, 4.
3. LOGIC SHOWN FOR UNIT 1, TYPICAL FOR UNIT 2 EXCEPT AS NOTED.
4. HS-1-6 & HS-1-4A HAND SWITCHES HAVE A BARRIER TO SEPARATE THE SWITCHES INTO TWO SECTIONS TO PROVIDE BOTH TRAIN A & TRAIN B FUNCTIONS.
5. RESET POSITION ON HS-1-4A ONLY. ALL 4 STEAM GEN LOOPS ARE RESET BY PLACING HS-1-4A, HS-1-11A, HS-1-22A & HS-1-29A IN CLOSE POSITION AND ACTUATING RESET ON HS-1-4A.
6. DISCONNECT HS-1-19, -18, -17 & -18B. THESE HANDSWITCHES ARE DISCONNECTED BECAUSE CIRCUIT INTEGRITY MAY BE COMPROMISED BY A POSSIBLE HIGH ENERGY LINE BREAK.
7. DIGITAL AND ANALOG LOGIC SYMBOLS ARE USED ON LOGIC DIAGRAMS TO FUNCTIONALLY DESCRIBE THE PROCESS CONTROL. REFER TO THE ASSOCIATED WIRING SCHEMATIC FOR THE ELECTRICAL COMPONENTS USED TO IMPLEMENT THE CONTROL SCHEME.
8. INTERNALS REMOVED FROM CHECK VALVE.

COMPANION DRAWINGS:
47W611-1-2 & 3----------LOGIC DIAGRAM
47W611-0-1,2----------LOGIC DIAGRAM INDEX & SYMBOLS
47W610-1-1,2,3,4--------CONTROL DIAGRAM
47W601-1----------FLOW DIAGRAM

FOR ORIGINAL INFORMATION IN TITLE BLOCK SEE REVISION 0 MICROFILM COPY.

REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
13	ADMIN CHANGE	MJB			

INC: ADMIN CHANGE, REF RIMS #B37 901009 002.
THIS RESOLVES SQ880473PER.

SCALE: NONE — EXCEPT AS NOTED

POWERHOUSE — CATEGORY 1
UNITS 1 & 2

MECHANICAL LOGIC DIAGRAM MAIN AND REHEAT STEAM

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
NUCLEAR ENGINEERING

DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: D.G.ROOP	CHECKER: L. EDMONDSON	RO ISSUE PER: CCD RECONCILIATION SHEET NO.CCD-3466. DRAWING MADE A CCD FROM AC-N/A & AD-R14. INC.DCA-M01443-412 RO PER DCN M01443A & WP M1443-05. INC ADMIN CHANGE.	1 T.A. AGUIRE
DESIGNER: N/A	REVIEWER: KEN SPINO		2 PAUL B NESBITT
			3 M.R. SEDLACIK

DATE 05-23-90 | 45 | M | CCD NO: 1,2-47W611-1-1 R13

ISSUED BY: P.G. TRUDEL

DRAWING SERVICES UNIT
PROCAD MAINTAINED DRAWING
THIS CONFIGURATION CONTROL DRAWING IS MAINTAINED BY THE SQN CAD UNIT AND IS PART OF THE TVA PROCADAM DATABASE.
COMPUTER GRAPHICS

CONTROL ROOM DWG

Signal	Setpoint	Logic	Block/Permissive

SAFETY INJECTION SIGNALS (SIS)

1. Containment Press Hi	1.54 psid	2/3 PTs	None
2. Pressurizer Press. Low	1870 psig	2/3 PTs	Manual Below P-11
3. Steamline Press Low	600 psig	2/3 PTs on 1/4 loops	Manual Below P-11
4. Manual	N/A	1/2 HS's	

SI RESET — AFTER SI INITIATION, MUST WAIT FOR 60 SECOND TIMER TO RESET. THEN THE SI RESET PB FOR EACH TRAIN MUST BE ACTUATED. THIS WILL BLOCK ANY AUTOMATIC SI ACTUATION SIGNAL BUT MANUAL SI IS NOT BLOCKED. TO REMOVE AUTO SI BLOCK, THE RX TRIP BREAKERS MUST BE CYCLED TO REMOVE THE P-4 SEAL-IN SIGNAL.

CONTAINMENT ISOLATION SIGNALS (CIS) Phase A

1. SIS	Any Signal		
2. Manual	Phase A / CVI HS	1/2	

CONTAINMENT ISOLATION SIGNALS (CIS) Phase B

1. Containment Press Hi-Hi	2.81 psid	2/4	
2. Manual	Phase B Handswitch	2/2	

CONTAINMENT VENT ISOLATION SIGNALS (CVI)

1. RM-90-130 & 131	High Rad Signal	1/2	
2. SIS	Any Signal		
3. Manual Phase B	Phase B Handswitch	2/2	
4. Manual Phase A	Phase A Handswitch	1/2	

CONTAINMENT SPRAY ACTUATION SIGNALS

1. Containment Press Hi-Hi	2.81 psid	2/4	
2. Manual	Phase B Handswitch	2/2	

MAIN STEAMLINE ISOLATION SIGNALS

1. Containment Press Hi-Hi	2.81 psid	2/4 PTs	
2. Steamline Press Low	600 psig	2/3 PTs on 1/4 loops	Manual Below P-11
3. Steamline Press Negative Rate	100 psig decreasing in a 50 second time constant	2/3 PTs on 1/4 loops	*Enabled only when Steamline Press SI signal blocked.*

FEEDWATER ISOLATION SIGNALS

1. S/G Level Hi-Hi	81% (P-14)	2/3 LTs on any S/G	
2. Rx Trip (P-4) with Lo T_{ave}	Rx Trip Bkrs Open 550 °F	2/4 loops	
3. SIS	Any signal		

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE RCS pressure may be slowly dropping due to spray bypass flow or slight cooling of the pressurizer. This should be considered "stable" pressure.

10. **DETERMINE** if SI pumps should be stopped:

a. **CHECK** RCS pressure:

- RCS pressure STABLE or RISING
- RCS pressure greater than 1500 psig.

a. **IF** NO S/G is Faulted,
THEN
GO TO ES-1.2, Post LOCA Cooldown and Depressurization.

IF any S/G is Faulted,
THEN
PERFORM the following:

1) **DO NOT CONTINUE** this procedure UNTIL Faulted S/G depressurization stops OR criteria for stopping SI pumps are satisfied.

2) **IF** criteria for stopping SI pumps CANNOT be satisfied after Faulted S/G depressurization stops,
THEN
GO TO ES-1.2, Post LOCA Cooldown and Depressurization.

b. **STOP** SI pumps, and **PLACE** in A-AUTO.

b. **IF** pump(s) CANNOT be stopped in A-AUTO,
THEN
PLACE affected SI pump(s) in PULL TO LOCK.

FOLDOUT PAGE

SI REINITIATION CRITERIA

IF SI has been terminated (CCPIT isolated, SI pumps stopped, and RHR pumps NOT running in ECCS mode)
AND either of the following conditions occurs:

- RCS subcooling based on core exit T/Cs less than 40°F

  OR

- Pressurizer level CANNOT be maintained greater than 10% [20% ADV],

THEN

a. **ESTABLISH** ECCS flow by performing one or both of the following:
   - **ESTABLISH** CCPIT flow as necessary **USING** Appendix C
   - **START** CCPs or SI pumps manually as necessary.

b. **GO TO** E-1, Loss of Reactor or Secondary Coolant.

EVENT DIAGNOSTICS

- **IF** both trains of shutdown boards de-energized,
  THEN
  GO TO ECA-0.0, Loss of All AC Power.

- **IF** any S/G pressure dropping in an uncontrolled manner or less than 140 psig
  AND S/G NOT isolated,
  THEN
  GO TO E-2, Faulted Steam Generator Isolation.

TANK SWITCHOVER SETPOINTS

- **IF** CST level less than 5%,
  THEN
  ALIGN AFW suction to ERCW.

- **IF** RWST level less than 27%,
  THEN
  GO TO ES-1.3, Transfer to RHR Containment Sump.

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** ES-1.1, "SI Termination"

IV. **LENGTH OF LESSON/COURSE:** 1 hour(s)

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of ES-1.1, SI Termination.

B. Enabling Objectives:

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with SI Termination that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Explain the purpose/goal of ES-1.1.
2.	Discuss the ES-1.1 entry conditions. a. Describe the setpoints, interlocks, and automatic actions associated with ES-1.1 entry conditions. b. Describe the requirements associated with ES-1.1 entry conditions.
3.	Summarize the mitigating strategy for the failure that initiated entry into ES-1.1.
4.	Describe the bases for all limits, notes, cautions, and steps of ES-1.1.
5.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
6.	Given a set of initial plant conditions use ES-1.1 to correctly: a. Identify required actions b. Respond to Contingencies c. Observe and Interpret Cautions and Notes
7.	Apply GFE and system response concepts to the performance of ES-1.1 conditions.

I. PROGRAM: OPERATOR TRAINING

II. COURSE: SYSTEMS TRAINING

III. LESSON TITLE: Main Steam

IV. LENGTH OF LESSON: 1 1/2 HOURS

V. TRAINING OBJECTIVES

A. Terminal Objective: (included in slides/slide notes)

Upon completion of this lesson and others presented, the student should be able to apply the knowledge to support satisfactory performance of the tasks associated with the Main Steam System in the plant and on the simulator.

B. Enabling Objectives: (included in slides/slide notes)

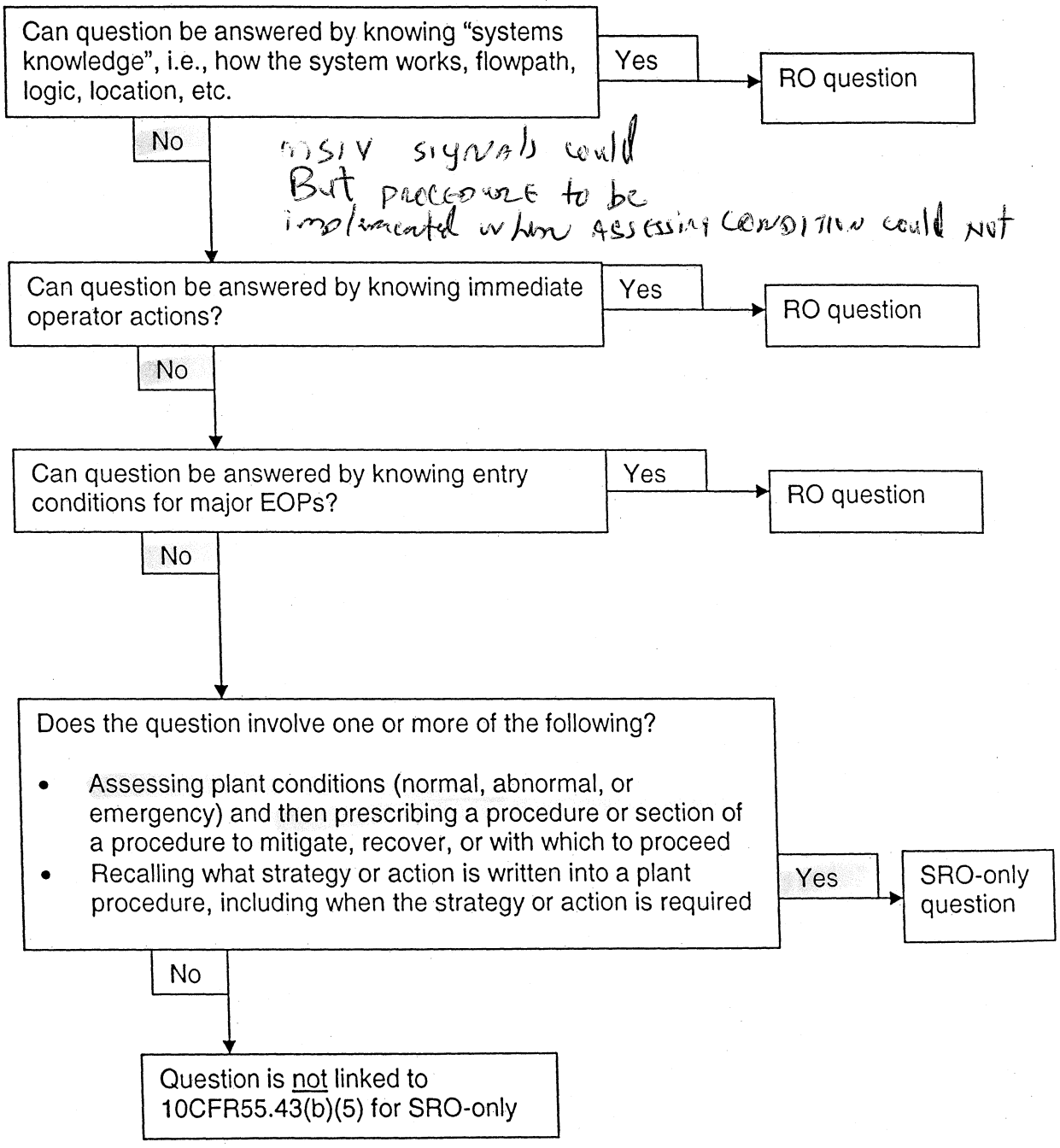
Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with the Main Steam System that are rated ≥ 2.5 during Initial License training for the appropriate license position as identified in appendix A.

1. State the purpose/functions of the Main Steam System as described in the FSAR.
2. State the design basis of the Main Steam System in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Main Steam System as illustrated on the simplified system drawing.

V. TRAINING OBJECTIVES (continued)

4. Describe the following features for each major component in the Main Steam System as described in this lesson.
   a. Location
   b. Power supply (include control power as applicable)
   c. Support equipment and systems
   d. Normal operating parameters
   e. Component operation
   f. Controls
   g. Interlocks (including setpoints)
   h. Instrumentation and Indications
   i. Protective features (including setpoints)
   j. Failure modes
   k. Unit differences
   l. Types of accidents for which the Main Steam components are designed
   m. Location of controls and indications associated with the Main Steam in the control room and auxiliary control room.

Figure 2: Screening for SRO-only linked to 10CFR55.43(b)(5) (Procedures)



89. 062 G2 4.18 089

Given the following:

- Unit 1 is operating at 100% power
- Diesel Generator 1B-B is out of service and is expected to return to service in 2 hours.

Subsequently, the following events occur:

- A loss of offsite power occurs.
- The reactor trips and the crew enters the emergency procedures.
- SI is NOT actuated.
- The crew transitions to FR-H.1, "Loss of Secondary Heat Sink" due to a RED Path condition and is performing the first step.
- No other Status Tree RED paths are present.
- A fault on Shutdown Board 1A-A results in the emergency supply breaker from Diesel Generator 1A-A tripping due a differential relay.

Which ONE of the following identifies the correct action to be taken and the bases for the action?

A. Transition to ECA-0 .0, Loss of All AC Power because the ECA will direct actions to establish heat sink with the TD-AFW pump.

B. Remain in FR-H.1 unless a higher priority RED path occurs because the FR will direct actions to establish heat sink with the TD-AFW pump.

C. Transition to ECA-0 .0, Loss of All AC Power because all other procedures in the EOP network assume a minimum of at least one 6.9kV Shutdown Board is available.

D. Remain in FR-H.1 and initiate actions to manually restore 6.9kV Shutdown Board 1B-B from 2B-B 6.9kV Shutdown Board maintenance breaker because restoring heat sink is the highest priority evolution in progress.

DISTRACTOR ANALYSIS:

A. Incorrect, The transition to ECA-0.0 is the correct action and the ECA will direct actions ensuring the TD AFW pump is in service but the reason is not because the ECA establishes the heat sink. Plausible because the transition is correct and ECA will direct actions to place the TD AFW pump in service and establish a heat sink.

B. Incorrect, Remaining is FR-H.1 is not correct, a transition to ECA-0.0 is required. Plausible because other ECAs do not take precedence over the FRGs and with a RED path there is a severe challenge to the Heat Sink function that would be addressed if the TD AFW pump were in service.

C. CORRECT, The transition to ECA-0.0 is the correct action and the reason is because all other procedures, including FR-H.1, assume a minimum of at least one train of shutdown power is available.

D. Incorrect, Remaining is FR-H.1 is not correct, a transition to ECA-0.0 is required. Plausible because power could be restored to the 1B-B board using the maintenance breaker and restoring Heat Sink is critical safety function being challenged.

Question No. 89

Tier 2 Group 1

K/A 062 G2 4.18
AC Electrical distribution
Knowledge of the specific bases for EOPs.

Importance Rating: 3.3 / 4.0

Technical Reference: 1,2-15E500-1 R26
EPM-3-ECA00.0, Basis Document for Loss of All AC Power, Rev 10

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271ECA-0.0 B.4
Describe the bases for all limits, notes, cautions and steps of ECA-0.0.

Question Source:
Bank # _____
Modified Bank # __X_____
New _____

Question History: Question modified from VC SUMMER 2007 SRO exam

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis _X_____

10 CFR Part 55 Content: (41.10 / 43.1 / 45.13)

10CFR55.43.b (5)

Comments: VC SUMMER 2007 SRO exam question modified

V C Summer 2007

2007 [?] NRC **Exam** [?] SRO 100. Given the following plant conditions:

- The plant is operating at 100% power.
- EDG "B" is out of service and is expected to return to service in two (2) hours.
- Subsequently, the following events occur:

- A loss of offsite power.
- The reactor is tripped and the crew enters EOP-1.0, *Reactor Trip or Safety Injection.*
- SI is NOT actuated.
- The crew made a transition to EOP-15.0, *Loss of Secondary Heat Sink,* based on a CSFST RED Path.
- EDG "A" output breaker subsequently trips on a differentia/lockout on Bus 1DA.

Which ONE (1) of the following describes the actions that will be taken and its bases?

A. Immediately transition to EOP-6 .0, *Loss OfAll ESF AC Power.* All other procedures in the ERG network assume both 7.2 KV ESF busses are available.

B. Immediately transition to EOP-6 .0, *Loss OfAll ESF AC Power.* All other procedures in the ERG network assume a minimum of ONE (1) 7.2 KV ESF bus is available.

C. Remain in EOP-15.0 until feed is restored and the RED condition is cleared , and then transition to EOP-6.0 , *Loss of All ESF AC Power.* RED path Function Recovery procedures must be performed until the condition is cleared.

D. Remain in EOP-15.0 until directed to return to procedure in effect, and then transition to EOP-6 .0, *Loss of All ESF AC Power.* RED path Function Recovery procedures must be finished to completion.

EOP Step Number: 1

SUSPEND FRP implementation and MONITOR status trees for information only.

ERG Step Number: 1, Note 2 of 2

CSF Status Trees should be monitored for information only. FRGs should not be implemented.

Purpose:

To inform the operator that this guideline should not be exited to perform any FRP in response to an identified CSF challenge.

ERG Basis:

The guideline has priority over all FRGs and is written to implicitly monitor and maintain critical safety functions. This priority is necessary since all FRGs are written on the premise that at least one shutdown board is energized.

Knowledge:

Guideline ECA-0.0 has priority over the FRGs.

EOP Basis:

Same.

Deviation:

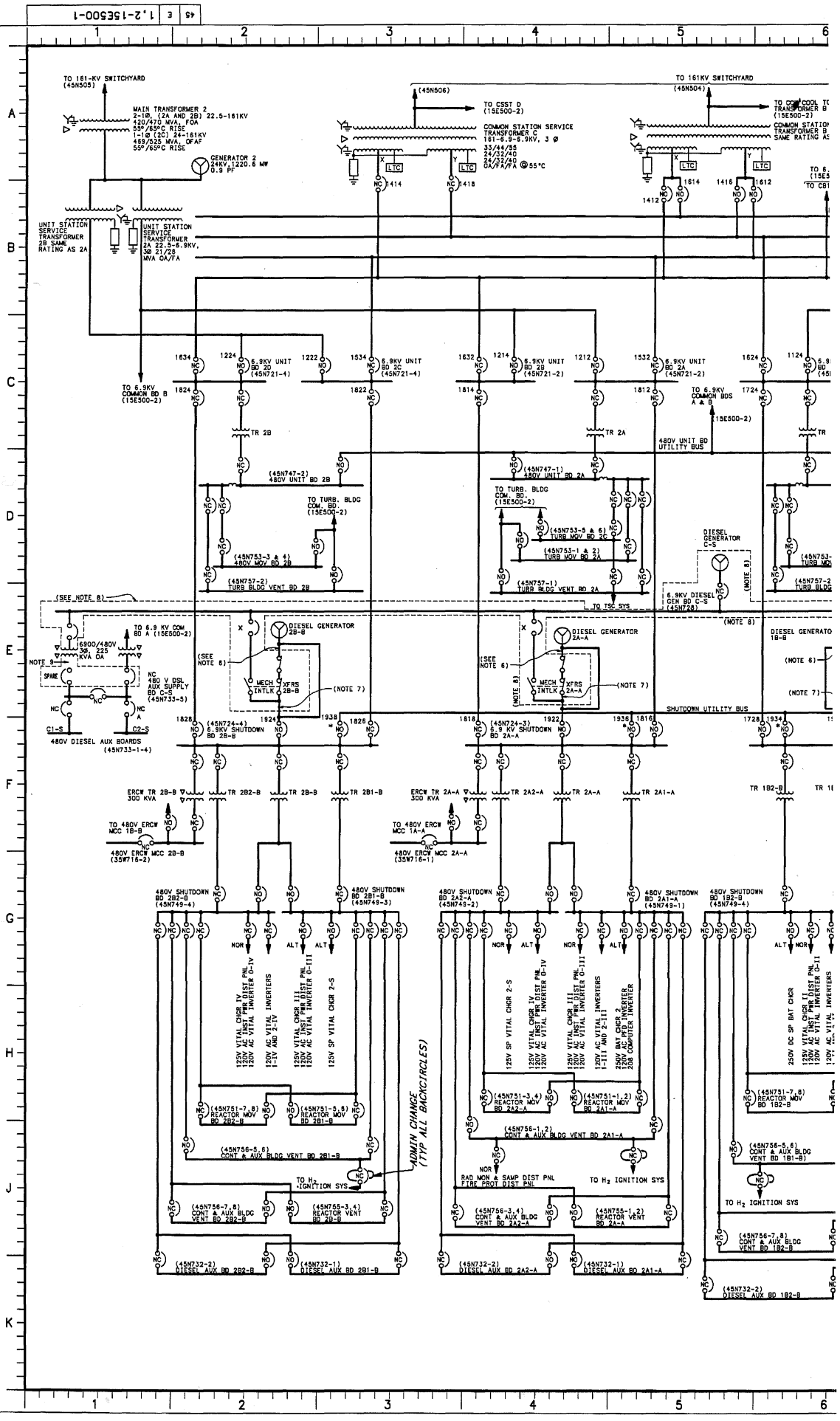
Converted note into a step.

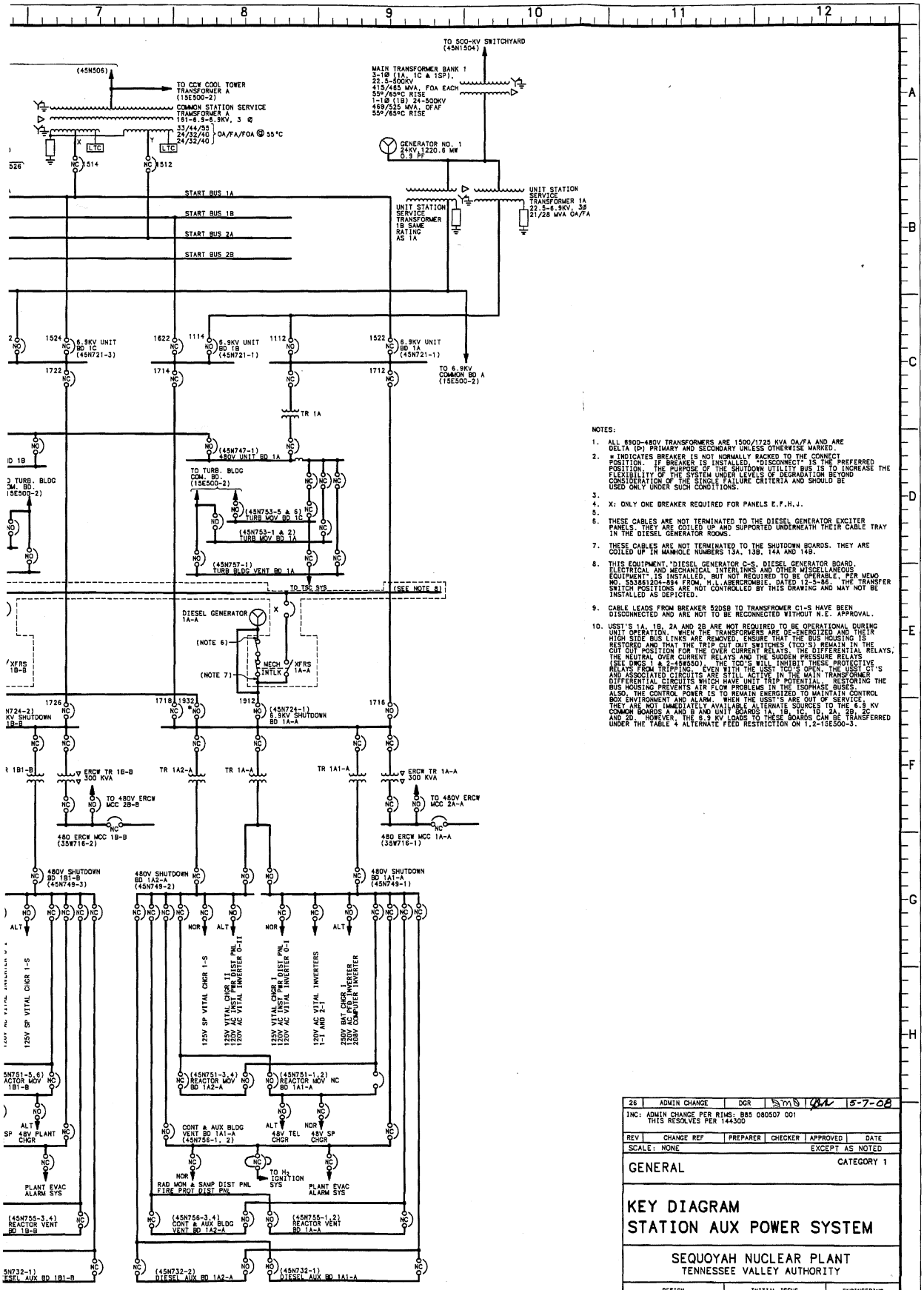
Justification:

Converted note into a step since it contains a hidden action. SQN EOP writer's guide disallows hidden actions in cautions and notes. Since the action is required upon entry to ECA-0.0, it is made an immediate action step.

Setpoint:

None.


TO 161-KV SWITCHYARD (45N505)
MAIN TRANSFORMER 2
2-1Ø, 12A AND 2B1 22.5-161KV
420/470 MVA, FOA
55°/65°C RISE
1-1Ø (2C) 24-161KV
459/525 MVA, OFAF
55°/65°C RISE
GENERATOR 2
24KV,1220.6 MW
0.9 PF
UNIT STATION SERVICE TRANSFORMER 2B SAME RATING AS 2A
UNIT STATION SERVICE TRANSFORMER 2A 22.5-6.9KV, 30 21/28 MVA OA/FA
(45N506)
TO CSST D (15E500-2)
COMMON STATION SERVICE TRANSFORMER C 161-6.9-6.9KV, 3 Ø
33/44/55
24/32/40
24/32/40
OA/FA/FA @ 55°C
TO 161KV SWITCHYARD (45N504)
COMMON STATION TRANSFORMER B SAME RATING AS
LTC
1414
1418
1412
1614
1416
1612
6.9KV UNIT BD 2D (45N721-4)
6.9KV UNIT BD 2C (45N721-4)
6.9KV UNIT BD 2B (45N721-2)
6.9KV UNIT BD 2A (45N721-2)
TO 6.9KV COMMON BD B (15E300-2)
TO 6.9KV COMMON BDS A & B (15E500-2)
TR 2B
TR 2A
480V UNIT BD UTILITY BUS
(45N747-2) 480V UNIT BD 2B
(45N747-1) 480V UNIT BD 2A
TO TURB. BLDG COM. BD. (15E500-2)
(45N753-3 & 4) 480V MOV BD 2B
(45N753-5 & 6) TURB MOV BD 2C
(45N753-1 & 2) TURB MOV BD 2A
(45N757-2) TURB BLDG VENT BD 2B
(45N757-1) TURB BLDG VENT BD 2A
DIESEL GENERATOR C-S
6.9KV DIESEL GEN BD C-S (45N728)
TO TSC SYS
(SEE NOTE 8)
(NOTE 8)
TO 6.9 KV COM BD A (15E500-2)
6900/480V 3Ø, 225 KVA OA
NOTE 9
SPARE
NC 480 V DSL AUX SUPPLY BD C-S (45N733-5)
C1-S
C2-S
480V DIESEL AUX BOARDS (45N733-1-4)
DIESEL GENERATOR 2B-B
DIESEL GENERATOR 2A-A
(SEE NOTE 6)
MECH INTLK
XFRS 2B-B
XFRS 2A-A
(NOTE 7)
SHUTDOWN UTILITY BUS
6.9 KV SHUTDOWN BD 2B-B (45N724-4)
6.9 KV SHUTDOWN BD 2A-A (45N724-3)
ERCW TR 2B-B 300 KVA
TR 2B2-B
TR 2B-B
TR 2B1-B
ERCW TR 2A-A 300 KVA
TR 2A2-A
TR 2A-A
TR 2A1-A
TR 1B2-B
TO 480V ERCW MCC 1B-B
480V ERCW MCC 2B-B (3SW716-2)
TO 480V ERCW MCC 1A-A
480V ERCW MCC 2A-A (3SW716-1)
480V SHUTDOWN BD 2B2-B (45N749-4)
480V SHUTDOWN BD 2B1-B (45N749-3)
480V SHUTDOWN BD 2A2-A (45N749-2)
480V SHUTDOWN BD 2A1-A (45N749-1)
480V SHUTDOWN BD 1B2-B (45N749-4)
NOR
ALT
125V VITAL CHGR IV
120V AC INST PNL DIST PNL
120V AC VITAL INVERTER D-IV
120V AC VITAL INVERTERS I-IV AND 2-IV
125V VITAL CHGR III
120V AC INST PNL DIST PNL
120V AC VITAL INVERTER D-III
125V SP VITAL CHGR 2-S
125V SP VITAL CHGR IV
120V AC VITAL INVERTER D-IV
125V VITAL CHGR III
120V AC INST PNL DIST PNL
120V AC VITAL INVERTER D-III
120V AC VITAL INVERTERS I-III AND 2-III
250V BAT CHGR 2
250V BAT INVERTER
208 COMPUTER INVERTER
250V DC SP BAT CHGR
125V VITAL CHGR II
120V AC INST PNL DIST PNL
120V AC VITAL INVERTER D-II
120V AC VITAL INVERTERS
(45N751-7,8) REACTOR MOV BD 2B2-B
(45N751-5,6) REACTOR MOV BD 2B1-B
(45N751-3,4) REACTOR MOV BD 2A2-A
(45N751-1,2) REACTOR MOV BD 2A1-A
(45N751-7,8) REACTOR MOV BD 1B2-B
(45N756-5,6) CONT & AUX BLDG VENT BD 2B1-B
(45N756-1,2) CONT & AUX BLDG VENT BD 2A1-A
(45N756-5,6) CONT & AUX BLDG VENT BD 1B1-B
ADMIN CHANGE (TYP ALL BACKCIRCLES)
TO H_2 IGNITION SYS
RAD MON & SAMP DIST PNL
FIRE PROT DIST PNL
(45N756-7,8) CONT & AUX BLDG VENT BD 2B2-B
(45N755-3,4) REACTOR VENT BD 2B-B
(45N756-3,4) CONT & AUX BLDG VENT BD 2A2-A
(45N755-1,2) REACTOR VENT BD 2A-A
(45N756-7,8) CONT & AUX BLDG VENT BD 1B2-B
(45N732-2) DIESEL AUX BD 2B2-B
(45N732-1) DIESEL AUX BD 2B1-B
(45N732-2) DIESEL AUX BD 2A2-A
(45N732-1) DIESEL AUX BD 2A1-A
(45N732-2) DIESEL AUX BD 1B2-B



NOTES:

1. ALL 6900-480V TRANSFORMERS ARE 1500/1725 KVA OA/FA AND ARE DELTA (D) PRIMARY AND SECONDARY UNLESS OTHERWISE MARKED.
2. * INDICATES BREAKER IS NOT NORMALLY RACKED TO THE CONNECT POSITION. IF BREAKER IS INSTALLED, "DISCONNECT" IS THE PREFERRED POSITION. THE PURPOSE OF THE SHUTDOWN UTILITY BUS IS TO INCREASE THE FLEXIBILITY OF THE SYSTEM UNDER LEVELS OF DEGRADATION BEYOND CONSIDERATION OF THE SINGLE FAILURE CRITERIA AND SHOULD BE USED ONLY UNDER SUCH CONDITIONS.
3.
4. X: ONLY ONE BREAKER REQUIRED FOR PANELS E.F.H.J.
5.
6. THESE CABLES ARE NOT TERMINATED TO THE DIESEL GENERATOR EXCITER PANELS. THEY ARE COILED UP AND SUPPORTED UNDERNEATH THEIR CABLE TRAY IN THE DIESEL GENERATOR ROOMS.
7. THESE CABLES ARE NOT TERMINATED TO THE SHUTDOWN BOARDS. THEY ARE COILED UP IN MANHOLE NUMBERS 13A, 13B, 14A AND 14B.
8. THIS EQUIPMENT, "DIESEL GENERATOR C-S, DIESEL GENERATOR BOARD, ELECTRICAL AND MECHANICAL INTERLINKS AND OTHER MISCELLANEOUS EQUIPMENT" IS INSTALLED, BUT NOT REQUIRED TO BE OPERABLE, PER MEMO NO. 553861204-894 FROM, H.L.ABERCROMBIE, DATED 12-5-86. THE TRANSFER SWITCH POSITIONS ARE NOT CONTROLLED BY THIS DRAWING AND MAY NOT BE INSTALLED AS DEPICTED.
9. CABLE LEADS FROM BREAKER 52DSB TO TRANSFROMER C1-S HAVE BEEN DISCONNECTED AND ARE NOT TO BE RECONNECTED WITHOUT N.E. APPROVAL.
10. USST'S 1A, 1B, 2A AND 2B ARE NOT REQUIRED TO BE OPERATIONAL DURING UNIT OPERATION. WHEN THE TRANSFORMERS ARE DE-ENERGIZED AND THEIR HIGH SIDE BUS LINKS ARE REMOVED, ENSURE THAT THE BUS HOUSING IS RESTORED AND THAT THE TRTD CUT OUT SWITCHES (TCO'S) REMAIN IN THE CUT OUT POSITION FOR THE OVER CURRENT RELAYS, THE DIFFERENTIAL RELAYS, THE NEUTRAL OVER CURRENT RELAYS AND THE SUDDEN PRESSURE RELAYS (SEE DWGS. 1 & 2-45W350). THE TCO'S WILL INHIBIT THESE PROTECTIVE RELAYS FROM TRIPPING. EVEN WITH THE USST TCO'S OPEN, THE USST QT'S AND ASSOCIATED CIRCUITS ARE STILL ACTIVE IN THE MAIN TRANSFORMER DIFFERENTIAL CIRCUITS WHICH HAVE UNIT TRIP POTENTIAL. RESTORING THE BUS HOUSING PREVENTS AIR FLOW PROBLEMS IN THE ISOPHASE BUSES. ALSO, THE CONTROL POWER IS TO REMAIN ENERGIZED TO MAINTAIN CONTROL BOX ENVIRONMENT AND ALARM. WHEN THE USST'S ARE OUT OF SERVICE, THEY ARE NOT IMMEDIATELY AVAILABLE ALTERNATE SOURCES TO THE 6.9 KV COMMON BOARDS A AND B AND UNIT BOARDS 1A, 1B, 1C, 1D, 2A, 2B, 2C AND 2D. HOWEVER, THE 6.9 KV LOADS TO THESE BOARDS CAN BE TRANSFERRED UNDER THE TABLE 4 ALTERNATE FEED RESTRICTION ON 1,2-15E500-3.

REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
26	ADMIN CHANGE	DGR	SMS	[illegible]	5-7-08

INC: ADMIN CHANGE PER RIMS: B85 080507 001
THIS RESOLVES PER 144300

SCALE: NONE — EXCEPT AS NOTED

CATEGORY 1

GENERAL

KEY DIAGRAM
STATION AUX POWER SYSTEM

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: PBD	CHECKER: C.A.BADGETT	RO ISSUE PER: CCD RECONCILIATION SHEET NO.CCD-8128. DRAWING MADE A CCD FROM AC-H & AD-RS .	1 CHARLES BADGETT
DESIGNER: N/A	REVIEWER: K.R.SPINO		2 MARIO A AGUIRRE
			3 M.R.SEDLACIK/LWA

DATE			
4-25-90	45	E	CCD NO: 1,2-15E500-1 R26

THIS DRAWING AND COMPANION DRAWING 15E500-3 SUPERSEDE DRAWING 15N500 PER ECN L6377.

ISSUED BY: P.G.TRUDEL

CAD MAINTAINED DRAWING

CONTROL ROOM DWG

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** EMERGENCY OPERATING PROCEDURE ECA-0.0, LOSS OF ALL AC POWER

IV. **LENGTH OF LESSON/COURSE:** 1 hour

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of ECA-0.0, LOSS OF ALL AC POWER.

B. Enabling Objectives

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with ECA-0.0, LOSS OF ALL AC POWER that are rated $\geq$ 2.5 during Initial License Training and $\geq$ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Explain the purpose/goal of ECA-0.0.
2.	Discuss the ECA-0.0 entry conditions.
3.	Summarize the mitigating strategy for the failure that initiated entry into ECA-0.0.
4.	Describe the bases for all limits, notes, cautions, and steps of ECA-0.0.
5.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
6.	Given a set of initial plant conditions use ECA-0.0 to correctly: a. Identify required actions b. Respond to Contingencies c. Observe and Interpret Cautions and Notes
7.	Apply GFE and system response concepts to the performance of ECA-0.0 conditions.

90. 076 A2.02 090

Given the following plant conditions:

- Both Units operating at 100% power.
- ERCW system in normal alignment.
- The following annunciators are LIT on Essential Raw Cooling Water 0-XA-55-27A panel on 1-M-27:
  - "UNIT 1 HEADER A PRESSURE LOW".
  - "UNIT 2 HEADER A PRESSURE LOW".
  - "PUMP J-A DISCH PRESS LOW".
  - "PUMP Q-A DISCH PRESS LOW".
- The following annunciator status on Miscellaneous 1-XA-55-15B panel on 1-M-15:
  - "ERCW DECK SUMP PUMP A RUNNING" is LIT.
- ERCW headers 1A and 2A indicating LOW flow.
- The crew implements AOP-M.01, "Loss of Essential Raw Cooling Water".

Which ONE of the following identifies the correct section of AOP-M.01 to be implemented for the conditions and a mitigating action directed to be taken in response to the conditions?

A. Section 2.7, "Supply Header 1A/2A Failure in the Yard";
Start additional ERCW pumps to maintain pressure.

B. Section 2.7, "Supply Header 1A/2A Failure in the Yard";
Stop and Lockout out all A Train ERCW pumps.

C. Section 2.9, "Supply Header A Failure Upstream of Strainer Inlet Valves";
Start additional ERCW pumps to maintain pressure.

D. Section 2.9, "Supply Header A Failure Upstream of Strainer Inlet Valves";
Stop and Lockout out all A Train ERCW pumps.

DISTRACTOR ANALYSIS:

A. *Incorrect, All conditions match entry conditions for Section 2.7 except for sump pump running alarm and the Strainer Dp alarm being lit if the leak were downstream of the strainer. While starting additional pumps might restore pressure,the mitigating action is to stop and lock out the A Train pumps to terminate the leakage for a leak at the location identified by the stem conditions. Plausible because Section 2.7 would be the correct procedure section and the starting on additional pumps is a mitigating action during performance of Section 2.7 for a leak downstream of the strainer .*

B. *Incorrect, All conditions match entry conditions for Section 2.7 except for sump pump running alarm and the Strainer Dp alarm being lit if the leak were downstream of the strainer. The A Train pumps being directed to be stopped and locked out is correct for the conditions stated. Plausible because Section 2.7 would be the correct procedure section for a leak downstream of the strainer and the stopping and locking out of the pumps in correct for the leak identified in the stem.*

C. *Incorrect, All alarms stated would be lit for a header break upstream of the Strainer. Header pressure sensors are located is located just upstream of the strainers. the sump pump running differentiates the leak upstream from a yard leak (i .e. downstream of the strainer). While starting additional pumps might restore pressure,the mitigating action is to stop and lock out the A Train pumps to terminate the leakage. Plausible because Section 2.9 is the correct procedure section and the starting on additional pumps is a mitigating action for a leak downstream of the strainer (Section 2.7).*

D. *CORRECT, All alarms stated would be lit for a header break upstream of the Strainer. Header pressure sensors are located is located just upstream of the strainers. the sump pump running differentiates the leak upstream from a yard leak (i .e. downstream of the strainer). Mitigating action in the AOP section is to stop and lock out all A Train pumps.*

Question No. 90

Tier 2 Group 1

K/A 076 A2.02
Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Service water header pressure .

Importance Rating: 2.7 / 3.1

Technical Reference: AOP-M.01, Loss of Essential Raw Cooling Water, Rev 19

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271AOP-M.01, B.4 & 5
Upon entry into AOP-M.1, diagnosis the applicable condition and transition to the appropriate procedural section for response.
Summarize the mitigating strategy for the failure that initiated entry into AOP-M.01

Question Source:
Bank # ___X_____
Modified Bank # _____
New _____

Question History: SQN question 076 A2.02 053 with some modification.

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis _X_____

10 CFR Part 55 Content: (41.5 / 43.5 / 45/3 / 45/13)

10CFR55.43.b (5)

Comments: SQN question 076 A2.02 053 with modification to correct answer, all distractors, and stem. Used most plausible 2 of original distractors and added requirement to identify mitigating actions. Changed correct answer to D. No significant modification to data in the stem.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.0 OPERATOR ACTIONS

CAUTION: ERCW header rupture in Auxiliary Building could fill the passive sump in 15 minutes. Prompt action is needed.

1. **DIAGNOSE** the failure:

IF...	GO TO SECTION	PAGE
ERCW Pump(s) tripped or failed	2.1 ERCW pump failure	5
High flow ERCW Supply Header 1A	2.2 Supply Hdr 1A Failure to Aux Bldg	8
High flow ERCW Supply Header 1B	2.3 Supply Hdr 1B Failure to Aux Bldg	12
High flow ERCW Supply Header 2A	2.4 Supply Hdr 2A Failure to Aux Bldg	16
High flow ERCW Supply Header 2B	2.5 Supply Hdr 2B Failure to Aux Bldg	23
Indications of an ERCW Return Header rupture (must be diagnosed locally since M-27 indications are not affected)	2.6 Return Hdr rupture in Aux Bldg	29
Low flow ERCW Supply Header 1A and 2A, **AND** STRAINER DIFF PRESS HIGH alarm LIT [M-27A, C-3 and/or D-2]	2.7 Supply Header 1A/2A Failure in Yard Area	41
Low flow ERCW Supply Header 1B and 2B, **AND** STRAINER DIFF PRESS HIGH alarm LIT [M-27A, C-6 and/or D-5]	2.8 Supply Header 1B/2B Failure in Yard Area	55

(step continued on next page)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.0 OPERATOR ACTIONS (Continued)

3. (Continued)

IF...	GO TO SECTION		PAGE
Low flow ERCW supply headers 1A and 2A, **AND** STRAINER DIFF PRESS alarms DARK [M-27A, C-3 and D-2], **AND** at least one of the following alarms LIT: • ERCW DECK SUMP LEVEL HI alarm LIT [1-M-15B, A-3] **OR** • ERCW DECK SUMP PMP RUNNING [1-M-15B, D-2 or D-4] **OR** • MECH EQUIP SUMP LVL HI alarm LIT [1-M-15A, B-6]	2.9	Supply Header A Failure Upstream of Strainer Inlet Valves	67
Low flow ERCW supply headers 1B and 2B, **AND** STRAINER DIFF PRESS alarms DARK [M-27A, C-6 and D-5], **AND** at least one of the following alarms LIT: • ERCW DECK SUMP LEVEL HI alarm LIT [1-M-15B, A-3] **OR** • ERCW DECK SUMP PMP RUNNING [1-M-15B, D-2 or D-4] **OR** • MECH EQUIP SUMP LVL HI alarm LIT [1-M-15A, B-6]	2.10	Supply Header B Failure Upstream of Strainer Inlet Valves	76
Loss of flow on ALL ERCW supply headers in modes 1-4.	2.11	Loss of all ERCW flow	83

END OF SECTION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.9 ERCW Supply Header A Failure Upstream of ERCW Strainer Inlet Valves

CAUTION: During operation, CCP and SI Pumps may experience bearing failure 10 minutes after loss of ERCW.

1. **STOP** and **LOCK OUT** all Train A ERCW Pumps.

2. **DISPATCH** operators with radios to perform the following:

   - **PERFORM** Appendix F, Rx MOV Board ERCW Valves [Aux Bldg el. 749', Rx MOV Boards]
   - **PERFORM** Appendix G, ERCW MCC Valves [ERCW Pumping Station]
   - **ENSURE** all pumping station watertight doors are CLOSED [ERCW Pumping Station]

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.7 ERCW Supply Header 1A/2A Failure in Yard Area

CAUTIONS:

- **During operation, CCP and SI Pumps may experience bearing failure 10 minutes after loss of ERCW cooling.**
- **Loss of 2A ERCW Supply Header affects both Units' Train A CCS Heat Exchangers. Isolation of ruptured Unit and restoration of ERCW to intact CCS Heat Exchangers is time critical to prevent tripping both Units.**

NOTE:

- Engineering may be able to identify ruptured yard header using yard piping drawings (17W300 series).

1. **DISPATCH** personnel to locate failure.

2. **DISPATCH** operators with radios to PERFORM the following appendixes:
   - Appendix F, Rx MOV Board ERCW Valves [Aux Bldg, 749' elev, Rx MOV Boards]
   - Appendix G, ERCW MCC Valves [ERCW Pumping Station]

3. **START** additional Train A ERCW Pumps as required to maintain pressure between 78 psig and 124 psig.

Source	Setpoint	UNIT 2 HEADER A PRESSURE LOW
SER 1078 (Unit 1 annunciator system) 2-PS-67-493A Retransmitted to U-2 SER 2096 (Unit 2 annunciator system)	50 psig decreasing	

Probable Causes

1. Unit 2 ERCW "A" train pumps tripped.
2. Unit 2 "A" Train ERCW line break.
3. System realignment increasing demand excessively.

Corrective Actions

[1] **IF** alarm is in conjunction with any of the following indications:

- ERCW pump trip/failure
- HIGH header flow
- LOW header flow

THEN

GO TO AOP-M.01, *Loss of Essential Raw Cooling Water.*

[2] **IF** system realignment, in progress, is most probable cause for alarm, **THEN**

CORRECT alignment in accordance with instruction in progress,

OR

START additional Train A ERCW Pump as required, in accordance with instruction in progress.

[3] **IF** cause <u>not</u> apparent, **THEN**

DISPATCH personnel to check pumping station and piping for ruptures or cause of alarm.

[4] **EVALUATE** EPIP-1 Emergency Plan Classification Matrix.

[5] **IF** Unit 2 "A" train is declared inoperable, **THEN**

CONSULT Technical Specifications 3.7.4.

References

45B655-27A-0, 45N655-32, 47B601-55-13

Source

SER 1066 (Unit 1 annunciator system)
1-PS-67-493A

Retransmitted to U-2
SER 2084 (Unit 2 annunciator system)

Setpoint

50 psig decreasing

UNIT 1 HEADER A PRESSURE LOW

Probable Causes

1. Unit 1 ERCW "A" train pumps tripped or manually stopped.
2. 1A ERCW line break.
3. System realignment increasing demand excessively.

Corrective Actions

[1] **IF** alarm is in conjunction with any of the following indications:

- ERCW pump trip/failure
- HIGH header flow
- LOW header flow

THEN

GO TO AOP-M.01, *Loss of Essential Raw Cooling Water.*

[2] **IF** system realignment, in progress, is most probable cause for alarm, **THEN**

CORRECT alignment in accordance with instruction in progress,

OR

START additional Train A ERCW Pump as required, in accordance with instruction in progress.

[3] **IF** cause <u>not</u> apparent, **THEN**

DISPATCH personnel to check pumping station and piping for ruptures or cause of alarm.

[4] **EVALUATE** EPIP-1 Emergency Plan Classification Matrix.

[5] **IF** Unit 1 "A" train is declared inoperable, **THEN**

CONSULT Technical Specifications 3.7.4.

References

45B655-27A-0, 45N655-32, 47B601-55-13

16 (C-2)

Source	Setpoint	
SER 1075 (Unit 1 annunciator system) 0-PS-67-461 and 52a on breaker Retransmitted to U-2 SER 2093 (Unit 2 annunciator system)	50 psig decreasing with pump breaker closed	**PUMP Q-A DISH PRESS LOW**

Probable Causes

1. ERCW pump Q-A damaged.
2. Train A ERCW line break.
3. Instrument malfunction.
4. Insufficient pumps running for system flow demand.

Corrective Actions

[1] **ENSURE** sufficient pumps running for system configuration.

[2] **VERIFY** ERCW pump Q-A running.

[3] **IF** pump is running, **THEN**
DISPATCH operator to determine problem.

[4] **IF** Q-A ERCW pump is failed, **THEN**
GO TO AOP-M.01, Loss of Essential Raw Cooling Water.

[5] **IF** pressure low due to ERCW line Break, **THEN**
GO TO AOP-M.01, Loss of Essential Raw Cooling Water.

[6] **IF** "A" train is declared inoperable, **THEN**
CONSULT Technical Specification 3.7.4.

References

45B655-27A-0, 45N655-32, 47B601-55-13

Source	Setpoint	
SER 1067 (Unit 1 annunciator system) 0-PS-67-433 and 52a on breaker	50 psig decreasing with pump breaker closed	**PUMP J-A DISH PRESS LOW**
Retransmitted to U-2 SER 2085 (Unit 2 annunciator system)		

Probable Causes

1. ERCW pump J-A damaged.
2. Train A ERCW line break.
3. Instrument malfunction.
4. Insufficient pumps running for system flow demand.

Corrective Actions

[1] **ENSURE** sufficient pumps running for system configuration.

[2] **VERIFY** ERCW pump J-A running.

[3] **IF** pump is running, **THEN**
DISPATCH operator to determine problem.

[4] **IF** J-A ERCW pump is failed, **THEN**
GO TO AOP-M.01, Loss of Essential Raw Cooling Water.

[5] **IF** pressure low due to ERCW line Break, **THEN**
GO TO AOP-M.01, Loss of Essential Raw Cooling Water.

[6] **IF** "A" train is declared inoperable, **THEN**
CONSULT Technical Specification 3.7.4.

References 45B655-27A-0, 45N655-32, 47B601-55-13

QUESTIONS REPORT
for BANK SQN Questions

076 A2.02 053

Given the following plant conditions:

- Both Units operating at 100% power.
- ERCW system in normal alignment.
- The following annunciators are LIT on Essential Raw Cooling Water 0-XA-55-27A panel on 1-M-27:
  - "UNIT 1 HEADER A PRESSURE LOW".
  - "UNIT 2 HEADER A PRESSURE LOW".
  - "PUMP J-A DISCH PRESS LOW".
  - "PUMP Q-A DISCH PRESS LOW".
- The following annunciator is LIT on Miscellaneous 1-XA-55-15B panel on 1-M-15:
  - "ERCW DECK SUMP PUMP B RUNNING".
- ERCW headers 1A and 2A indicating LOW flow.

Which ONE of the following describes what has occurred in the ERCW system?

A. 'A' header pumps have tripped.

B. Train A ERCW 480v. board has been deenergized.

C. Header has ruptured upstream of the '2A' strainer.

D. '1A' header has ruptured between the IPS and Auxiliary Bldg.

A. Incorrect - Low disch pressure alrams on the pumps indicate the pump breakers are closed

B. Incorrect - Strainer alarm would be lit for a clogged strainer. No sump pump running alarm with high pressure.

C. Correct - All alarms stated would be lit for this accident. Pressure sensors are located is located just upstream of the strainers.

D. Incorrect - Strainer Dp alarm would be lit, all other conditions match except sump pump running alarm.

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** AOP-M.01 LOSS OF ESSENTIAL RAW COOLING WATER

IV. **LENGTH OF LESSON/COURSE:** 2.0 hour(s)

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

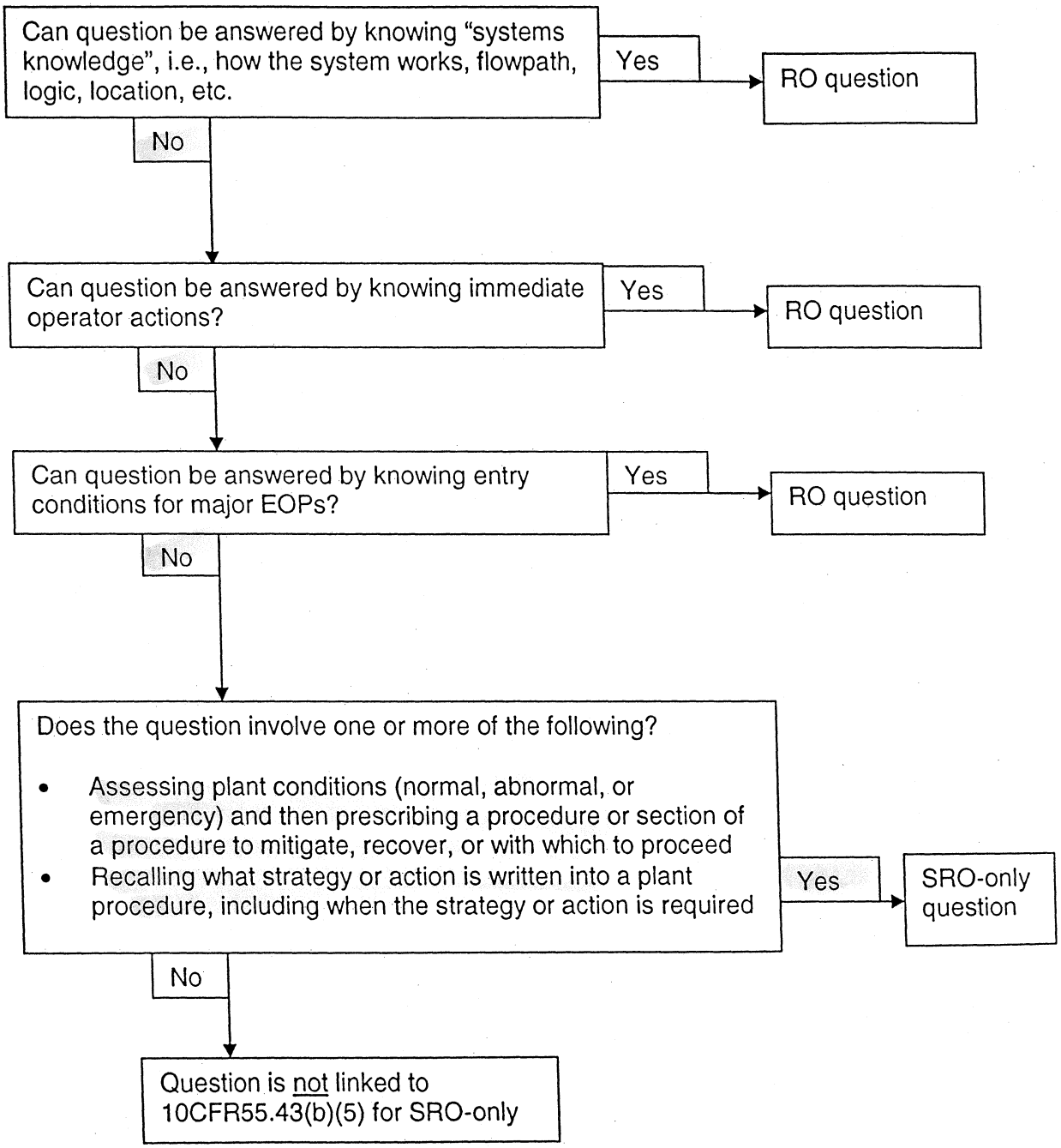
Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of AOP-M.01, LOSS OF ESSENTIAL RAW COOLING WATER

B. Enabling Objectives:

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with a Loss of Essential Raw Cooling Water that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Explain the purpose/goal of AOP-M.01.
2.	Discuss the AOP-M.01 entry conditions. a. Describe the setpoints, interlocks, and automatic actions associated with AOP-M.01 entry conditions. b. Describe the ARP requirements associated with AOP-M.01 entry conditions. c. Interpret, prioritize, and verify associated alarms are consistent with AOP-M.01 entry conditions. d. Describe the Administrative conditions that require Turbine Trip/ Reactor trip due to Loss of Essential Raw Cooling Water.
3.	Describe the initial operator response to stabilize the plant upon entry into AOP-M.01.
4.	Upon entry into AOP-M.01, diagnose the applicable condition and transition to the appropriate procedural section for response.
5.	Summarize the mitigating strategy for the failure that initiated entry into AOP-M.01.
6.	Describe the bases for all limits, notes, cautions, and steps of AOP-M.01.

7.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
8.	Given a set of initial plant conditions use AOP-M.01 to correctly: a. Recognize entry conditions b. Identify required actions c. Respond to Contingencies d. Observe and Interpret Cautions and Notes
9.	Describe the Tech Spec and TRM actions applicable during the performance of AOP-M.01.
10.	Apply GFE and system response concepts to the abnormal condition – prior to, during and after the abnormal condition

Figure 2: Screening for SRO-only linked to 10CFR55.43(b)(5) (Procedures)



91. 055 G2.4.3 091
Which ONE of the following correctly completes the statement below?

The Unit 1 Condenser Vacuum Mid Range Radiation Monitor, 1-RM-90-255, is a monitor...

A. included in Tech Spec LCO 3.3.3.7, "Accident Monitoring Instrumentation", and is used in the Radiological Emergency Plan (REP) to classify an event based on gaseous effluent release.

B. included in Tech Spec LCO 3.3.3.7, "Accident Monitoring Instrumentation", and is used in the Radiological Emergency Plan (REP) to classify an event based on the fission product barrier matrix.

C. **NOT** included in Tech Spec LCO 3.3.3.7, "Accident Monitoring Instrumentation", but is used in the Radiological Emergency Plan (REP) to classify an event based on gaseous effluent release.

D. **NOT** included in Tech Spec LCO 3.3.3.7, "Accident Monitoring Instrumentation", but is used in the Radiological Emergency Plan (REP) to classify an event based on the fission product barrier matrix.

DISTRACTOR ANALYSIS:

A. Incorrect, 1-RM-90-255 is not included in the T/S LCO for Accident Monitoring but the monitor is included in EPIP-1, Emergency Plan Classification Matrix", Table 7-1 under Gaseous Monitors whose output can be used for determining Emergency Plan classifications. Plausible that it would be included in the TS LCO because the monitor is a Post Accident Monitor and the monitor being included in EPIP-1, Emergency Plan Classification Matrix", Table 7-1 under Gaseous Monitors whose output can be used for determining Emergency Plan classifications is correct.

B. Incorrect, 1-RM-90-255 is not included in the T/S LCO for Accident Monitoring but the monitor is not used to classify an event based on the fission product barrier matrix. Plausible that it would be included in the TS LCO because the monitor is a Post Accident Monitor and there are radiation monitors used to make classifications in the fission product barrier matrix.

C. CORRECT, 1-RM-90-255 is a post accident monitor but is not included in the T/S LCO for Accident Monitoring. The monitor is included in EPIP-1, Emergency Plan Classification Matrix", Table 7-1 under Gaseous Monitors whose output can be used for determining Emergency Plan classifications.

D. Incorrect, 1-RM-90-255 is a post accident monitor but is not included in the T/S LCO for Accident Monitoring. while the monitor is included in EPIP-1, Emergency Plan Classification Matrix", Table 7-1 under Gaseous Effluent release, the monitor is not used to classify an event based on the fission product barrier matrix. Plausible because the monitor not being included in LCO for Accident Monitoring is correct and there are radiation monitors used to make classifications in the fission product barrier matrix.

Question No. 91

Tier 2 Group 2

K/A 055 G2.4.3
Condenser Air Removal System
Ability to identify post-accident instrumentation.

Importance Rating: 3.7 / 3.9

Technical Reference: EPIP-1, Emergency Plan Classification Matrix, Rev 40
Technical Specification LCO 3.3.10
FSAR Section 7.5 Amendment 2
1-AR-M30-A, Post Accident Radiation Monitoring, Rev 15

Proposed references to be provided to applicants during examination: None

Learning Objective: OPT200. RM B.4.l
Describe the following characteristics of each major component in the Radiation Monitoring system:
l. Types of accidents for which the components are designed.
OPT200. CONDVAC B.4.l
Describe the following characteristics of each major component in the CDVAC system:
l. Types of accidents for which the CDVAC components are designed.

Question Source:
Bank # _____
Modified Bank # _____
New __X____

Question History: New question for SQN 1/2009 exam

Question Cognitive Level:
Memory or fundamental knowledge __X____
Comprehension or Analysis _____

10 CFR Part 55 Content: (41.6 / 45.4)

10CFR55.43.b (2,4,5)

Comments: New question for SQN 1/2009 exam

17 (C-1)

Source	Setpoint	1-RA-255A COND VAC EXH MID RANGE HI RAD
SER 1745 1-RE-90-255	see 1-RM-90-255 display and/or data base	

Probable Causes

1. Steam generator tube rupture.
2. Instrument Malfunction.

Corrective Actions

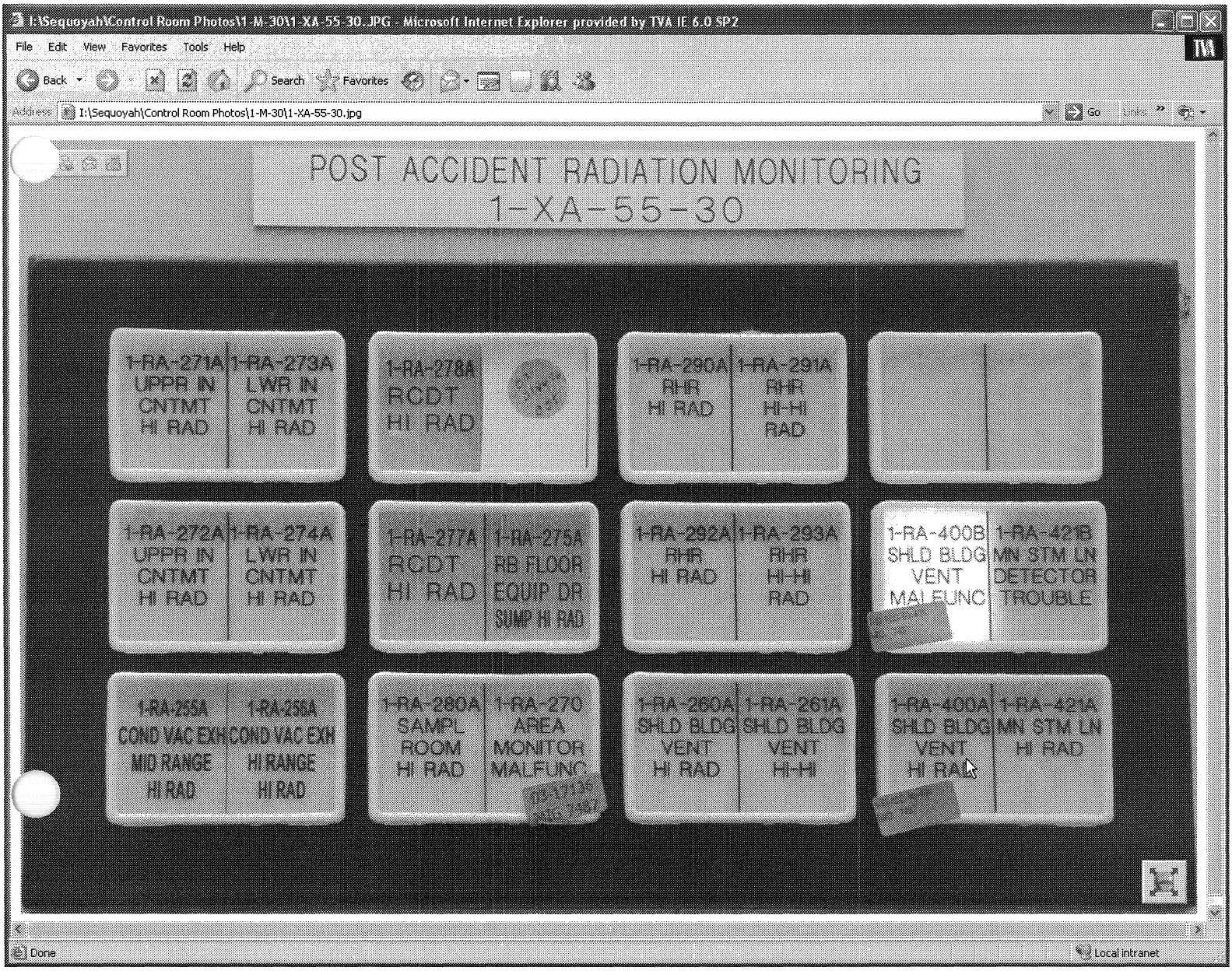
[1] **CHECK** [1-RM-90-255] on panel 1-M-30 to verify activity level.

[2] **EVALUATE** EPIP-1, Emergency Plan Classification Matrix.

[3] **IF** high radiation indicated in condenser vacuum exhaust, **THEN GO TO** AOP-R.01, *Steam Generator Tube Leak.*

References

47B601-55-75, 47W610-90-4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Go
POST ACCIDENT RADIATION MONITORING
1-XA-55-30
1-RA-271A UPPR IN CNTMT HI RAD
1-RA-273A LWR IN CNTMT HI RAD
1-RA-278A RCDT HI RAD
1-RA-290A RHR HI RAD
1-RA-291A RHR HI-HI RAD
1-RA-272A UPPR IN CNTMT HI RAD
1-RA-274A LWR IN CNTMT HI RAD
1-RA-277A RCDT HI RAD
1-RA-275A RB FLOOR EQUIP DR SUMP HI RAD
1-RA-292A RHR HI RAD
1-RA-293A RHR HI-HI RAD
1-RA-400B SHLD BLDG VENT MALFUNC
1-RA-421B MN STM LN DETECTOR TROUBLE
1-RA-255A COND VAC EXH MID RANGE HI RAD
1-RA-256A COND VAC EXH HI RANGE HI RAD
1-RA-280A SAMPL ROOM HI RAD
1-RA-270 AREA MONITOR MALFUNC
1-RA-260A SHLD BLDG VENT HI RAD
1-RA-261A SHLD BLDG VENT HI-HI
1-RA-400A SHLD BLDG VENT HI RAD
1-RA-421A MN STM LN HI RAD
Done
Local intranet

7.1 Gaseous Effluents			7.2 Liquid Effluents	
Mode	Initiating / Condition		Mode	Initiating / Condition
ALL	**EAB dose, resulting from an actual or imminent release of gaseous radioactivity > 1 Rem TEDE or > 5 Rem thyroid CDE for the actual or projected duration of release.** ***(1 or 2 or 3):*** 1. A **VALID** rad monitor reading exceeds the values under General Emergency in Table 7-1 for >15 min, unless assessment within that 15 min confirms that the criterion is not exceeded. OR 2. Field surveys indicate >1Rem/hr gamma or an I-131 concentration of 3.9E-06 $\mu Ci/cm^3$ at the **EAB** (Fig. 7-A) OR 3. Dose assessment results indicate **EAB** dose >1 Rem TEDE or >5 Rem thyroid CDE for the actual or projected duration of the release (Fig. 7-A).	GENERAL		*Not Applicable.*
ALL	**EAB dose resulting from an actual or imminent release of gaseous radioactivity >100 mrem TEDE or >500 mrem thyroid CDE for actual or projected duration of release.** ***(1 or 2 or 3):*** 1. A **VALID** rad monitor reading > Table 7-1 values under Site Area for > 15 min, unless assessment within that 15 min confirms that the criterion is not exceeded. OR 2 Field surveys indicate >100 mrem/hr gamma or an I-131 conc of 3.9E-07 $\mu Ci/cm^3$ at the **EAB** (Fig. 7-A). OR 3. Dose assessment results indicate **EAB** dose >100 mrem TEDE or >500 mrem thyroid CDE for actual or projected duration of the release (Fig. 7-A).	SITE AREA		*Not Applicable.*
ALL	**Any UNPLANNED release of gaseous radioactivity that exceeds 200 times the ODCM Section 1.2.2.1 Limit for >15 minutes.** ***(1 or 2 or 3 or 4)*** 1. A **VALID** rad monitor reading > Table 7-1 values under Alert for >15 minutes, unless assessment within that 15 minutes confirms that the criterion is not exceeded. OR 2. Field surveys indicate >10 mrem/hr gamma at the **EAB** for >15 minutes (Fig 7-A). OR 3. Dose assessment results indicate **EAB** dose >10 mrem TEDE for the duration of the release (Fig. 7-A). OR 4. Sample results exceed 200 times the **ODCM** limit value for an unmonitored release of gaseous radioactivity >15 minutes in duration.	ALERT	ALL	**Any UNPLANNED release of liquid radioactivity that exceeds 200 times the ODCM Section 1.2.1.1 Limit for >15 minutes.** ***(1 or 2)*** 1. A **VALID** rad monitor reading > Table 7-1 values under Alert for >15 minutes, unless assessment within this time period confirms that the criterion is not exceeded. OR 2. Sample results indicate an ECL >200 times the **ODCM** limit value for an unmonitored release of liquid radioactivity >15 minutes in duration
ALL	**Any UNPLANNED release of gaseous radioactivity that exceeds 2 times the ODCM Section 1.2.2.1 Limit for >60 minutes.** ***(1 or 2 or 3 or 4)*** 1. A **VALID** rad monitor reading > Table 7-1 values under UE for >60 minutes, unless assessment within that 60 minutes confirms that the criterion is not exceeded. OR 2. Field surveys indicate >0.1 mrem/hr gamma at the **EAB** for >60 minutes (Fig 7-A) OR 3. Dose assessment results indicate **EAB** dose >0.1 mrem TEDE for the duration of the release (Fig. 7-A). OR 4. Sample results exceed 2 times the **ODCM** limit value for an unmonitored release of gaseous radioactivity >60 minutes in duration	NOUE	ALL	**Any UNPLANNED release of liquid radioactivity to the environment that exceeds 2 times the ODCM Section 1.2.1.1 Limit for >60 minutes.** ***(1 or 2)*** 1. A **VALID** rad monitor reading > Table 7-1 values under UE for >60 minutes, unless assessment within this time period confirms that the criterion is not exceeded. OR 2. Sample results indicate an ECL >2 times the **ODCM** limit value for an unmonitored release of liquid radioactivity >60 minutes in duration.

TABLE 7-1

EFFLUENT RADIATION MONITOR EALS

NOTE: The monitor values below, if met or exceeded, indicate the need to perform the required assessment. If the assessment can not be completed within 15 minutes (60 minutes for UE), the appropriate emergency classification shall be made based on the **VALID** reading.

GASEOUS MONITORS	Units[2]	UE	Alert	SAE	General
Site Total Release Limit	µCi/s	4.90E+05	4.90E+07	1.31E+08	1.31E+09
1-RI-90-400 (EFF LEVEL) - *U-1 Shield Bldg*	µCi/s	4.90E+05	4.90E+07	1.31E+08	1.31E+09
2-RI-90-400 (EFF LEVEL) - *U-2 Shield Bldg*	µCi/s	4.90E+05	4.90E+07	1.31E+08	1.31E+09
0-RM-90-101B - *Auxiliary Bldg*	cpm	1.03E+05	Offscale[1]	Offscale[1]	Offscale[1]
0-RM-90-132B - *Service Bldg*	cpm	2.62E+06	Offscale[1]	Offscale[1]	Offscale[1]
1-RI-90-421 thru 424 - *U-1 MSL Monitors*[2]	µCi/cc	1.71 E-01	1.71E+01	4.58E+01	4.58E+02
2-RI-90-421 thru 424 - *U-2 MSL Monitors*[2]	µCi/cc	1.71 E-01	1.71E+01	4.58E+01	4.58E+02
1-RM-90-255 or 256 - *U-1 CVE*	mR/h	4.10E+02	4.10E+04	1.09E+05	1.09E+06
2-RM-90-255 or 256 - *U-2 CVE*	mR/h	4.10E+02	4.10E+04	1.09E+05	1.09E+06
RELEASE DURATION	*minutes*	*>60*	*>15*	*>15*	*>15*
LIQUID MONITORS	**Units**	**UE**	**Alert**	**Site Area**	**General**
Site Total Release Limit	µCi/ml	6.50E-03	6.50E-01	N/A	N/A
RM-90-122 - RadWaste	cpm	1.45E+06	Offscale[1]	N/A	N/A
RM-90-120,121 - S/G Bldn	cpm	1.07E+06	Offscale[1]	N/A	N/A
RM-90-225 - Cond Demin	cpm	1.90E+06	Offscale[1]	N/A	N/A
RM-90-212 - TB Sump	cpm	3.28E+03	3.28E+05	N/A	N/A
RELEASE DURATION	minutes	>60	>15	>15	>15

ASSESSMENT METHODS:
- ◆ Airborne Dose Assessment per SQN EPIP-13 "Dose Assessment"
- ◆ ODCM Liquid Release Rate assessment per SQN 0-TI-CEM-030.030.0
- ◆ Integrated Airborne Release Rate assessment per SQN 0-TI-CEM-030.030.0

(1) The calculated value is outside of the upper range for this detector. The maximum monitor output which can be read is 1.0E+07 cpm. Releases in excess of monitor capacity should be evaluated for proper classification by use of Dose Assessment.

(2) These unit values are based on flow rates through one PORV of 890,000 lb/hr at 1078.7 psia with 0.25% carry over (0.9975 quality). Before using these values, ensure a release to the environment is ongoing, (e.g., PORV).

NOTE 1: These EALs are based on the assumption that an emergency release is restricted to one pathway from the plant. In all cases, the total site EAL is the limiting value. Therefore, in the case where there are multiple release paths from the plant, it is the total release EAL (obtained from ICS and/or SQN 0-TI-CEM-030-030, "Manual Calculation of Plant Gas, Iodine, and Particulate Release Rates for Offsite Dose Calculation Manual (ODCM) Compliance") that will determine whether an emergency classification is warranted.

NOTE 2: In the case when there is no CECC dose assessment available, the length and relative magnitude of the release is the key in determining the classification. For example, in the case of the NOUE EAL of 2 times the Tech Spec limit, the classification is based more on the fact that a release above the limit has continued unabated for more than 60 minutes, than on the projected offsite dose.

NOTE 3: See REP Appendix B for basis information.

2.0 REFERENCES

2.1 Performance References

None

2.2 Developmental References

A. Administrative References

None

B. TVA and Vendor drawing

1. 47W610-90-1
2. 45N1620-12
3. 45W1651-16,-17,-20,-21

C. Manufacturer Manuals

1. SQN-VTM-W130-130 & VTD-W130-0150 Vendor Manual For Westronics Smartview Data Recorder
2. SQN-VTM-G063-0430, RM-1000 Digital Radiation Processor Technical Manual (Document 04508100-1TM)
3. SQN-VTM-G063-0010, Vendor Technical Manual For Radiation Monitoring System, Volumes I, II, III, and IV Contract No. 92759

D. Other Developmental References

1. FSAR Sections: 7.5, 11.4, 12.1.4, 12.2.4
2. Set Point and Scaling Document (SSD) 1-R-90-255

SQN-18

TABLE 7.5-2 (Sheet 2)

TABLE OF VARIABLES FOR POST ACCIDENT MONITORING

Variable Description	Type/ Category	Minimum Range From	Minimum Range To	Redundancy Required	Notes
Aux Bldg EXH Vent Rad Level - Particulates & Halogens	E3	1E-9	1E-4 uCi/CC	N/A	See Deviation No. 14 Remote Analysis Utilizing Removable Filter May be Used.
Aux Bldg Passive Sump (FLR & EQP DRN SMP) LVL	C3	SEE NOTES		N/A	Low & Hi Level Alarm in MCR
AUX Bldg Pressure	D2	-0.5	+0.5 Inches WG	N/A	
AUX Cntl Air Sys Pressure	D2	0	125 Psig	N/A	RG1.97 R2 - POWER SUPPLY
Boron Injection Flow	D2	0	110% (Design)	N/A	
(Flow in HPI System)		0	864 GPM		
Component Cooling Sys Surge Tank Level	D3	0 0	100% 10,000Gal	N/A	Actual Range 0 to 124 Inches
Component Cooling Water Flow to ESF Equip	D2	0 0	110% (Design) 5523 GPM	N/A	
Component Cooling Water Temp to ESF Equip	D2	30	130 DEG F	N/A	See Deviation No. 7
Condenser (Air Removal Sys) Vacuum EXH Flow	E2	0 0	110% (Design) 49.5 CFM	N/A	
Condenser (Air Removal Sys) Vacuum EXH RAD Level - Noble Gas	B3 C3 E2	1E-6	1E4 uCi/CC	N/A	Part of Sec Side RAD Lvl
Condensate Storage Tank Water Level	D2	0	367,000 GAL	N/A	Safety Source is-ERCW See ERCW to AFW Valve Position

TABLE 3.3-10

ACCIDENT MONITORING INSTRUMENTATION

INSTRUMENT	TOTAL NO. OF CHANNELS	MINIMUM CHANNELS REQUIRED	ACTION
1. Reactor Coolant T_{HOT} (Wide Range) (Instrument Loops 68-001,-024,-043,-065)	4(1/RCS Loop)	4(1/RCS Loop)	1
2. Reactor Coolant T_{COLD} (Wide Range) (Instrument Loops 68-018,-041,-060,-083)	4(1/RCS Loop)	4(1/RCS Loop)	1
3. Containment Pressure (Wide Range) (Instrument Loops 30-310,-311)	2	2	1
4. Containment Pressure (Narrow Range) (Instrument Loops 30-044,-045)	2	2	1
5. Refueling Water Storage Tank Level (Instrument Loops 63-050,-051)	2	2	1
6. Reactor Coolant Pressure (Wide Range) (Instrument Loops 68-062,-066,-069)	3	3	2
7. Pressurizer Level (Wide Range) (Instrument Loops 68-320,-335,-339)	3	3	2
8. Steam Line Pressure (Instrument Loops 1-002A,-002B,-009A,-009B,-020A,-020B,-027A,-027B)	2/steam line	2/steam line	1
9. Steam Generator Level - (Wide Range) (Instrument Loops 3-043,-056,-098,-111)	4(1/steam generator)	4(1/steam generator)	1
10. Steam Generator Level - (Narrow Range) (Instrument Loops 3-039,-042,-052,-055,-094,-097,-107,-110)	2/steam generator	2/steam generator	1
11. Auxiliary Feedwater			
a. Flow Rate (Instrument Loops 3-163,-155,-147,-170)	1/steam generator	1/steam generator	5
b. Valve Position Indication (Instrument Loops 3-164,-164A,-172,-156,-156A,-173,-148,-148A,-174,-171,-171A,-175)	3/steam generator	3/steam generator	5

TABLE 3.3-10 (Continued)

ACCIDENT MONITORING INSTRUMENTATION

INSTRUMENT	TOTAL NO. OF CHANNELS	MINIMUM CHANNELS REQUIRED	ACTION
17. Neutron Flux			
a. Source Range (Instrument Loops 92-5001,-5002)	2	2#	1
b. Intermediate Range (Instrument Loops 92-5003,-5004)	2	2	1
18. ERCW to AFW Valve Position			
a. Motor Driven Pumps (Instrument Loops 3-116A, -116B, -126A, -126B)	1/Train/Pump (2 Valves/Train)	1/Train/Pump (2 Valves/Train)	1
b. Turbine Driven Pumps (Instrument Loops 3-136A, -136B, -179A, -179B)	2 Trains (2 Valves/Train)	2 Trains (2 Valves/Train)	1
19. Containment Isolation Valve Position (Panels TR-A XX-55-6K & TR-B XX-55-6L)	1/Valve	1/Valve##	3

#Source Range outputs may be disabled above the P-6 (Block of Source Range Reactor Trip) setpoint.
##Not required for isolation valves that are closed and deactivated.

TABLE 3.3-10 (Continued)

ACCIDENT MONITORING INSTRUMENTATION

INSTRUMENT	TOTAL NO OF CHANNELS	MINIMUM CHANNELS REQUIRED	ACTION
12. Reactor Coolant System Subcooling Margin Monitor (Instrument Loops 94-101,-102)	2	2	1
13. Containment Water Level (Wide Range) (Instrument Loops 63-178,-179)	2	2	1
14. Incore Thermocouples	65		
a. Core Quadrant (1)		2(1/Train)	1
b. Core Quadrant (2)		2(1/Train)	1
c. Core Quadrant (3)		2(1/Train)	1
d. Core Quadrant (4)		2(1/Train)	1
15. Reactor Vessel Level Instrumentation	6		
a. Dynamic Range (Instrument Loops 68-367, 370)		2	1
b. Lower Range (Instrument Loops 68-368, 371)		2	1
c. Upper Range (Instrument Loops 68-369, 372)		2	1
16. Containment Area Radiation Monitors			
a. Upper Compartment (Instrument Loops 90-271,-272)	2	1	4
b. Lower Compartment (Instrument Loops 90-273,-274)	2	1	4

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** RADIATION MONITORING SYSTEM

IV. **LENGTH OF LESSON:** 4 hour lecture; 1 hour simulator demonstration; 2 hour self-study/workshop

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:
Upon completion of this lesson and others presented, the student should be able to apply the knowledge to support satisfactory performance of the tasks associated with the Radiation Monitoring System in the plant and on the simulator.

B. Enabling Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with the Radiation Monitoring System as identified in Appendix A.
1. State the purpose/functions of the Radiation Monitoring System as described in the SQN FSAR.
2. State the design basis of the Radiation Monitoring System in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Radiation Monitoring System as illustrated on a simplified system drawing.
4. Describe the following characteristics of each major component in the Radiation Monitoring System:
   a. Location
   b. Power supply (include control power as applicable)
   c. Support equipment and systems
   d. Normal operating parameters
   e. Component operation
   f. Controls
   g. Interlocks (including setpoints)
   h. Instrumentation and Indications
   i. Protective features (including setpoints)
   j. Failure modes
   k. Unit differences
   l. Types of accidents for which the components are designed
   m. Location of controls and indications in the control room and auxiliary control room

V. TRAINING OBJECTIVES (Cont'd):

B. Enabling Objectives (Cont'd):

5. Describe the operation of the Radiation Monitoring System:
   a. Precautions and limitations
   b. Major steps performed while placing the system in service
   c. Alarms and alarm response
   d. How a component failure will affect system operation
   e. How a support system failure will affect system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the Radiation Monitoring System:
   a. State Tech Specs/TRM LCOs that govern the system.
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the Radiation Monitoring System components and the appropriate sections of the Tech Spec, determine if operability requirements are met and what actions are required
7. Discuss related Industry Events

VI. TRAINING AIDS:

A. Classroom Computer and Local Area Network (LAN) Access
B. Computer projector
C. Simulator (if available)

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** SYSTEMS TRAINING

III. **TITLE:** CONDENSER VACUUM

IV. **LENGTH OF LESSON:** 2 hour lecture; 1 hour simulator demonstration; 1 hour self-study/workshop

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:
Upon completion of this lesson and others presented, the student should be able to apply the knowledge to support satisfactory performance of the tasks associated with the Condenser Vacuum (CDVAC) system in the plant and on the simulator.

B. Learning Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge and abilities associated with the CDVAC system that are rated $\geq$ 2.5 during Initial License Training for the appropriate license position as identified in Appendix A.
1. State the purpose/functions of the CDVAC system as described in the FSAR.
2. State the design basis of the CDVAC system in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the CDVAC system as illustrated on a simplified system drawing.
4. Describe the following characteristics of each major component in the CDVAC system:
   a. Location
   b. Power supply (include control power as applicable)
   c. Support equipment and systems
   d. Normal operating parameters
   e. Component operation
   f. Controls
   g. Interlocks (including setpoints)
   h. Instrumentation and Indications
   i. Protective features (including setpoints)
   j. Failure modes
   k. Unit differences
   l. Types of accidents for which the CDVAC system components are designed
   m. Location of controls and indications associated with the CDVAC system in the control room and auxiliary control room

V. TRAINING OBJECTIVES (Cont'd):

B. Learning Objectives (Cont'd):

5. Describe the operation of the CDVAC system:
   a. Precautions and limitations
   b. Major steps performed while placing the CDVAC system in service
   c. Alarms and alarm response
   d. How a component failure will affect system operation
   e. How a support system failure will affect CDVAC system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the CDVAC system:
   a. State Tech Specs/TRM LCOs that govern the CDVAC
   b. State the ≤1 hour action limit TS LCOs
   c. Given the conditions/status of the CDVAC system components and the appropriate sections of the Tech Spec, determine if operability requirements are met and what actions are required
7. Discuss related Industry Events

VI. TRAINING AIDS:

A. Classroom Computer and Local Area Network (LAN) Access
B. Computer projector
C. Simulator (if available)

92. 071 A2.05 092

Given the following:

- A planned release of Waste Gas Tank B is in progress when power is lost to 0-RM-90-118, Waste Gas Effluent Rad Monitor.

Which ONE of the following identifies (1) the effect the loss of power will have on the release and (2) the requirement to allow any additional release of the tank with the radiation monitor out of service?

A. (1) The release will automatically terminate;
(2) A new 0-SI-CEM-077-410.4, "Waste Gas Decay Tank Release", package would be required for any additional release of the tank after ODCM actions were met.

B. (1) The release will automatically terminate;
(2) The existing 0-SI-CEM-077-410.4, "Waste Gas Decay Tank Release", package could used for any additional release of the tank after ODCM actions were met.

C. (1) An alarm will be generated and MANUAL termination of the release will be required;
(2) A new 0-SI-CEM-077-410.4, "Waste Gas Decay Tank Release", package would be required for any additional release of the tank after ODCM actions were met.

D. (1) An alarm will be generated and MANUAL termination of the release will be required;
(2) The existing 0-SI-CEM-077-410.4, "Waste Gas Decay Tank Release", package could used for any additional release of the tank after ODCM actions were met.

DISTRACTOR ANALYSIS:

A. CORRECT, the release would be automatically terminated due to an instrument malfunction and a new package would be required to make any additional releases from the tank.

B. Incorrect, the release would be automatically terminated due to an instrument malfunction but the current SI package would not be used to make any additional releases from the tank, a new package would be required. Plausible because the release would be automatically terminated and releases can be stopped and restarted using the same package under other conditions.

C. Incorrect, the release would not require manual actions to terminate, it would be automatically terminated due to an instrument malfunction. A new SI package would be required to make any additional releases from the tank. Plausible because some release point radiation monitor instrument malfunctions only alarm and ta new SI isrequiredd for any addition release from the tank.

D. Incorrect, the release would not require manual actions to terminate, it would be automatically terminated due to an instrument malfunction. The current SI package would not be used to make any additional releases from the tank, a new package would be required. Plausible because some release point radiation monitor instrument malfunctions only alarm and releases can be stopped and restarted using the same package under other conditions.

Question No. 92

Tier 2 Group 2

K/A 071 A2.05
Ability to (a) predict the impacts of the following malfunctions or operations on the Waste Gas Disposal System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
Power failure to the ARM and PRM Systems

Importance Rating: 2.5* / 2.6

Technical Reference: 1,2-47W611-77-4 R10
0-AR-M12-B, Common Radiation Monitor 0-XA-55-12B, Rev 28
0-SO-77-15, Waste Gas Decay Tank Release, Rev. 15
0-SI-CEM-077-410.4,Waste Gas Decay tank Release, Rev.0014

Proposed references to be provided to applicants during examination: None

Learning Objective: No training objective identified

Question Source:
Bank # _____
Modified Bank # __X_____
New _____

Question History: WBN bank question

Question Cognitive Level:
Memory or fundamental knowledge __X____
Comprehension or Analysis _____

10 CFR Part 55 Content: (41.5 / 43.5 / 45.3 / 45.13)

10CFR55.43.b (5)

Comments:

Watts Bar

K/A: 000059 AA2.03
Accidental Liquid RadWaste Rel.
Ability to determine and interpret the following as they apply to the Accidental Liquid Radwaste Release: Failure modes, their symptoms, and the causes of misleading indications on a radioactive-liquid monitor.

Question:

Given the following:

- The unit is at 100% power and all equipment is available.
- A planned Cask Decontamination Collector Tank Release is in progress when the following occurs:
  - Annunciator 181-C "WDS RELEASE LINE 0-RM-90-122 INSTR MALF" alarms.
  - Annunciator 181-A "WDS RELEASE LINE 0-RM-90-122 LIQ RAD HI" remains dark.

Which ONE of the following failures would cause the above to prevent an accidental release, and the action required to allow the restart of the release with the radiation monitor out of service?

A. Loss of power to the rate meter.
The existing ODI package could be used to resume the release.

B. Loss of power to the rate meter.
The existing ODI package closed and new ODI package issued prior to resuming the release.

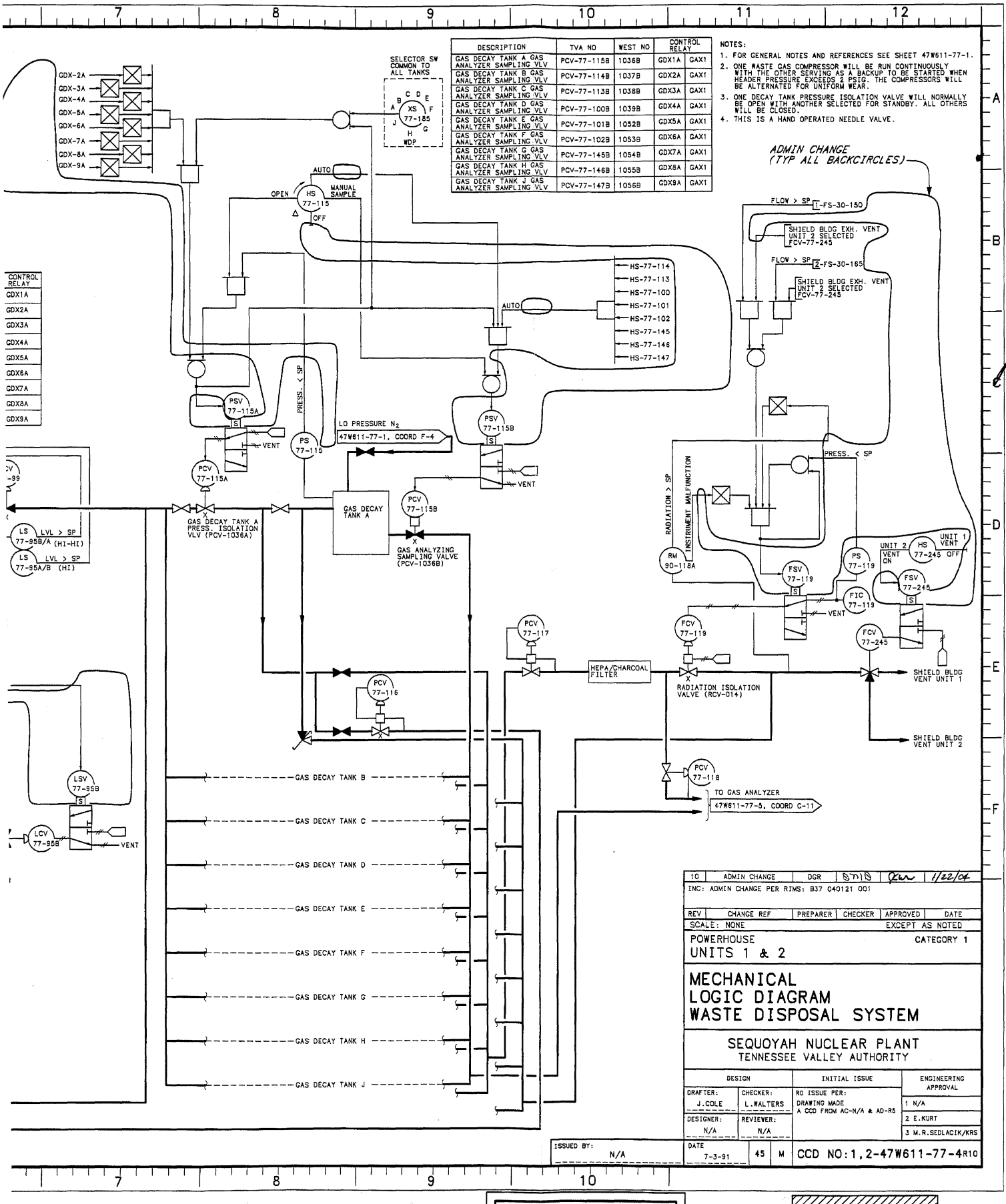
C. Loss of signal from the detector.
The existing ODI package could be used to resume the release.

D. Loss of signal from the detector.
The existing ODI package closed and new ODI package issued prior to resuming the release

---

DISTRACTOR ANALYSIS

a. Incorrect. The 'loss of power to the rate meter' would generate both the 181C and 181A alarms so the 181A alarm would also be LIT. The existing ODI package could not be used to continue the release. Plausible because the candidate may not recall the inputs to the alarms correctly and there are conditions identified in the release instructions that do allow the release to be continued using the current ODI package.
b. Incorrect. The 'loss of power to the rate meter' would generate both the 181C and 181A alarms so the 181A alarm would also be LIT. A new ODI package would be needed to continue the release. Plausible because the candidate may not recall the inputs to the alarms correctly , but realize a new ODI package is required to continue the release.
c. Incorrect. The 'loss of signal from the detector' would generate a 181-C alarm but would NOT generate a 181A alarm as stated in the distractor, however the existing ODI package could not be used to continue the release. Plausible because the alarm status listed is correct for the listed condition would cause the termination of the release and the there are conditions identified in the release instructions that do allow the release to be continued using the current ODI package.
d. CORRECT. The 'loss of signal from the detector' would generate a 181-C alarm but would NOT generate a 181A alarm and a new ODI package would be required prior to continuing the release.



CONTROL RELAY
GDX1A
GDX2A
GDX3A
GDX4A
GDX5A
GDX6A
GDX7A
GDX8A
GDX9A

DESCRIPTION	TVA NO	WEST NO	CONTROL RELAY	
GAS DECAY TANK A GAS ANALYZER SAMPLING VLV	PCV-77-115B	1036B	GDX1A	GAX1
GAS DECAY TANK B GAS ANALYZER SAMPLING VLV	PCV-77-114B	1037B	GDX2A	GAX1
GAS DECAY TANK C GAS ANALYZER SAMPLING VLV	PCV-77-113B	1038B	GDX3A	GAX1
GAS DECAY TANK D GAS ANALYZER SAMPLING VLV	PCV-77-100B	1039B	GDX4A	GAX1
GAS DECAY TANK E GAS ANALYZER SAMPLING VLV	PCV-77-101B	1052B	GDX5A	GAX1
GAS DECAY TANK F GAS ANALYZER SAMPLING VLV	PCV-77-102B	1053B	GDX6A	GAX1
GAS DECAY TANK G GAS ANALYZER SAMPLING VLV	PCV-77-145B	1054B	GDX7A	GAX1
GAS DECAY TANK H GAS ANALYZER SAMPLING VLV	PCV-77-146B	1055B	GDX8A	GAX1
GAS DECAY TANK J GAS ANALYZER SAMPLING VLV	PCV-77-147B	1056B	GDX9A	GAX1

NOTES:
1. FOR GENERAL NOTES AND REFERENCES SEE SHEET 47W611-77-1.
2. ONE WASTE GAS COMPRESSOR WILL BE RUN CONTINUOUSLY WITH THE OTHER SERVING AS A BACKUP TO BE STARTED WHEN HEADER PRESSURE EXCEEDS 2 PSIG. THE COMPRESSORS WILL BE ALTERNATED FOR UNIFORM WEAR.
3. ONE DECAY TANK PRESSURE ISOLATION VALVE WILL NORMALLY BE OPEN WITH ANOTHER SELECTED FOR STANDBY. ALL OTHERS WILL BE CLOSED.
4. THIS IS A HAND OPERATED NEEDLE VALVE.

REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
10	ADMIN CHANGE	DGR	STS	Ken	1/22/04

INC: ADMIN CHANGE PER RIMS: B37 040121 001

SCALE: NONE — EXCEPT AS NOTED

POWERHOUSE — CATEGORY 1

UNITS 1 & 2

MECHANICAL LOGIC DIAGRAM WASTE DISPOSAL SYSTEM

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

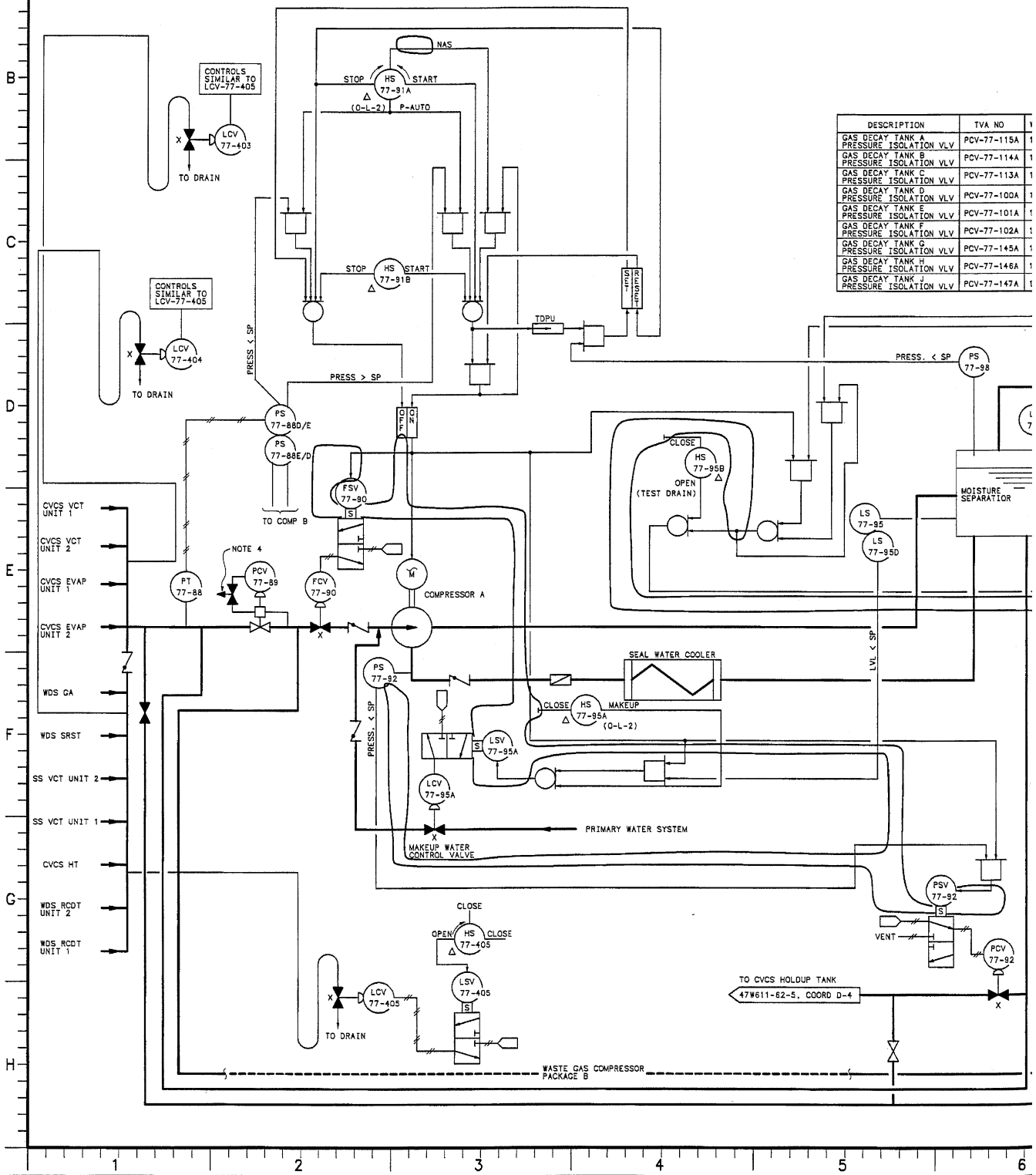
DESIGN		INITIAL ISSUE	ENGINEERING APPROVAL
DRAFTER: J.COLE	CHECKER: L.WALTERS	RO ISSUE PER: DRAWING MADE A CCD FROM AC-N/A & AD-R5	1 N/A
DESIGNER: N/A	REVIEWER: N/A		2 E.KURT
			3 M.R.SEDLACIK/KRS

ISSUED BY: N/A — DATE 7-3-91 — 45 — M

CCD NO: 1,2-47W611-77-4 R10

CAD MAINTAINED DRAWING

CONTROL ROOM DWG



DESCRIPTION	TVA NO	V
GAS DECAY TANK A PRESSURE ISOLATION VLV	PCV-77-115A	1
GAS DECAY TANK B PRESSURE ISOLATION VLV	PCV-77-114A	1
GAS DECAY TANK C PRESSURE ISOLATION VLV	PCV-77-113A	1
GAS DECAY TANK D PRESSURE ISOLATION VLV	PCV-77-100A	1
GAS DECAY TANK E PRESSURE ISOLATION VLV	PCV-77-101A	1
GAS DECAY TANK F PRESSURE ISOLATION VLV	PCV-77-102A	1
GAS DECAY TANK G PRESSURE ISOLATION VLV	PCV-77-145A	1
GAS DECAY TANK H PRESSURE ISOLATION VLV	PCV-77-146A	1
GAS DECAY TANK J PRESSURE ISOLATION VLV	PCV-77-147A	1

Source	Setpoint	0-RA-90-118B WDS GAS EFF MON INSTR MALFUNC
SER 768 (Unit 1 annunciator system) 0-RM-90-118	N/A	

Probable Causes

1. Instrument power failure.
2. Instrument placed in **TRIP ADJ** position (Except for monitors equipped with RM-1000 modules only).
3. Instrument downscale failure or loss of signal.
4. Operate/Calibrate switch set to calibrate (RM-1000 modules only).

Corrective Actions

[1] **IF** gas release in progress, **THEN**
REQUEST Radwaste AUO to verify 0-RCV-90-119 closed.

[2] **CHECK** 0-RM-90-118 on 0-M-12 for possible trouble.

[3] **IF** 0-RM-90-118 is inoperable, **THEN**

[a] **NOTIFY** the Chemistry Shift Supervisor to comply with ODCM requirements.

[b] **PLACE** equipment off normal or inop tags, identifying the condition.

[c] **WHEN** ODCM action is satisfied, **THEN**
RESUME the release using appropriate procedures.

[4] **COMPLY** with ODCM, Section 1.1.2 requirements.

[5] **INITIATE** WO for maintenance, if required.

References

45B655-12B-0,
45N657-18,
45N667-1,

Date _____

6.0 NORMAL OPERATION (Continued)

[23] **VERIFY [0-PCV-77-117]** gas release header pressure control valve is maintaining 5.3 psig as indicated on the HEPA filter inlet pressure gauge on panel 1-L-335 located under the stairway near the WGDT Valve Gallery. _____

[24] **RECORD** below the time this release was started.

Release started _____hrs. _____

[25] **RECORD** below, the rate of gas release.

Release rate _____In. H_2O _____

CAUTION **If during the remainder of this instruction a malfunction of 0-RE-90-118 or 0-FCV-77-119 occurs, this release must be stopped.**

[26] **NOTIFY** the Unit 1 Operator that a gas release is in progress. _____

NOTE The activity level recorded for RM-90-400 should be for the applicable Shield Building.

[27] **OBTAIN** the following information from the U-1 UO, **AND**

RECORD the information below:

[a] **IF** RM-90-400 operable, **THEN**

RECORD Activity Level on RM-90-400 _____CPM. _____

[b] **IF** 0-RE-90-118 operable, **THEN**

RECORD Activity Level on 0-RE-90-118_____CPM. _____

6.2 Pre-Release Instructions - Chemistry (continued)

[16] **SIGNOFF** for item A and either item B or item C and

CIRCLE B or C to indicate which one was satisfied. ☐

A. Approval of pre-release data generated by this Instruction.

_____ / _____ / _____
Performer Date Time

B. Verification that monthly projected offsite dose limits (ODCM SR 2.2.2.4) have **NOT** been exceeded, based on most recent performance of SI-422.1, **OR**

C. Verification, with Operations support, that selected WGDT has been held a minimum of 60 days and all applicable requirements have been met.

_____ / _____ / _____
Performer Date Time

[17] **TRANSMIT** release package to Operations with authorization to release. ☐

6.3 Release Instructions - Operations

[1] **REVIEW** Steps 6.1[3] and 6.1[4] and Steps 6.2[11] monitor data. _____

[2] **IF** radiation monitor 0-RM-90-118 setpoint change is required, (when setpoint in Step 6.2[11] is greater than the setpoint in Steps 6.1[3]), **THEN**

REQUEST a setpoint change. _____

6.3 Release Instructions - Operations (continued)

[3] **IF** a release is to be made outside of normal release hours (0900 - 1600), **THEN**

OBTAIN US/SRO justification and initials in remarks section of Surveillance Task Sheet. _____

[4] **OBTAIN** US/SRO approval of pre-release data generated by this Instruction and approval for this release.

_____ / _____ / _____
US/SRO Date Time

[5] **INITIATE** release of selected WGDT contents in accordance with 0-SO-77-15 at or below the flow rate (i.e., pressure drop) recorded on Appendix B, and

RECORD release start time and information requested in the table in Appendix B for release initiation and at one-half hour intervals. _____

NOTE

OPERABLE status of 0-FE-77-230 can be determined by noting deflection of indicator.

[6] **IF [0-FE-77-230]** is INOPERABLE at initiation of release, **THEN**

GO TO Step 6.3[8]. _____

[7] **IF [0-FE-77-230]** becomes INOPERABLE during release, **THEN**

PERFORM the following substeps:

[7.1] **STOP** release. _____

[7.2] **NOTIFY** US/SRO. _____

6.3 Release Instructions - Operations (continued)

[8] **IF** release is to continue with **[0-FE-77-230]** INOPERABLE, **THEN**

PERFORM the following substeps.

[8.1] **ENSURE** that a test gauge (0 - 20 inches of H_2O suggested) is installed across **[0-FE-77-230]**. _____

[8.2] **ENSURE** serial number, range and calibration due date of test gauge along with installing Instrument Mechanic's initials are recorded in remarks section of Appendix B. _____

[8.3] **ENSURE** pressure readings from test gauge are recorded in place of **[0-FE-77-230]** readings on Appendix B. _____

[9] **IF [0-RM-90-118]** or **[RM-90-400]** alarms, **THEN**

NOTIFY On-shift Chemistry Personnel who will contact the Cognizant Chemist/System Engg. for further guidance in processing tank contents. _____

[10] **WHEN** release is complete or stopped, **THEN**

RECORD the following on Appendix B. _____

[10.1] Release stop time ☐

[10.2] WGDT psig ☐

[10.3] Initials ☐

[11] **IF** radiation monitor setpoint changes were made (Step 6.3[2]), **THEN**

RETURN the radiation monitors to their initial setpoints. _____

[12] **NOTIFY** the US/SRO and On-shift Chemistry Personnel that this release is complete.

[13] **REVIEW** 0-SO-77-15. _____

[14] **ATTACH** 0-SO-77-15 to this release package. _____

[15] **TRANSMIT** the release package to the Chemistry Laboratory for post release evaluation. _____

93. 072 A2.02 093

Given the following:

- Unit 1 operating at 100% power.
- Unit 2 in MODE 6 with the core off-load in progress
- An internal electrical failure causes the output of Spent Fuel Pit area radiation monitor 0-RM-90-103 to fail above the HI RAD setpoint.

Which ONE of the following identifies how the Auxiliary Building Isolation (ABI) is affected by the failure and whether the actuation is required to be reported to the NRC in accordance with SPP-3.5, "NRC Reporting Requirements"?

A. Only Train B is initiated;
8-hour notification required.

B. Only Train B is initiated;
8-hour notification NOT required.

C. Both Train A & Train B are initiated;
8-hour notification required.

D. Both Train A & Train B are initiated;
8-hour notification NOT required.

DISTRACTOR ANALYSIS:

A. Incorrect, Only the Train B ABI will be initiated from the monitor but no 8-hour notification would be required because the actuation would be an invalid actuation. Plausible because the initiation of Train B only is correct and ESF actuations are normally reportable.

B. CORRECT, Only the Train B ABI will be initiated from the monitor and actuation would be an invalid actuation, thus,no 8-hour notification would be required.

C. Incorrect, Both trains will not be initiated, only the Train B will initiate and no 8-hour notification would be required because the actuation would be an invalid actuation. Plausible because other actuations do come from multiple sensors through isolation/separation relays and ESF actuations are normally reportable.

D. Incorrect, Both trains will not be initiated, only the Train B will initiate and no 8-hour notification would be required because the actuation would be an invalid actuation. Plausible because other actuations do come from multiple sensors through isolation/separation relays and the actuation not being reportable is correct.

Question No. 93

Tier 2 Group 2

K/A 072 A2.02
Ability to (a) predict the impacts of the following malfunctions or operations on the ARM system- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
Detector failure.

Importance Rating: 2.8 / 2.9

Technical Reference: 0-AR-M12-B, Common Radiation Monitor 0-XA-55-12B, Rev 28
SSP-3.5, Regulatory reporting Requirements, Rev 20
NuReg-1022, Event Reporting Guidelines 10 CFR 50.72 and 10 CFR 50.73, Rev. 2

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271SPP-3.5 B.2.e.
For a given condition, determine the regulatory reporting requirements using appropriate reference material.
e. State the criteria requiring eight hour notification to the NRC.
OPT200.ABVENT B.5.f
Describe the operation of the AB Vent system as it relates to the following: f. How a instrument failure will affect system operation.

Question Source:
Bank # _____
Modified Bank # ___X_____
New _____

Question History: Modified SQN question SPP-3.5 008

Question Cognitive Level:
Memory or fundamental knowledge __X____
Comprehension or Analysis _____

10 CFR Part 55 Content: (41.5 / 43.5 / 45.3 / 45.13)

10CFR55.43.b (5)

Comments: Modified SQN question SPP-3.5 008

QUESTIONS REPORT
for BANK SQN Questions

SPP-3.5 008

During trouble shooting of 0-RM-90-102, MIG accidently initiated an ABI by inducing a voltage transient. Which one of the following describes the license reporting requirements.

A. A four hour notification and LER

B. A one hour notification and LER

C. No reporting required

D. A LER

This situation describes an invalid actuation of ABI. Since invalid actuation of ABI is one of the exceptions to 50.72.b.2.ii, it is not reportable.
K/A: 2.1.10, 2.1.14

paragraphs as well as under 10 CFR 50.72(b)(3)(v) and 10 CFR 50.73(a)(2)(v) (event or condition that could have prevented the fulfillment of the safety function of ....).

With regard to preplanned actuations, operation of a system as part of a planned test or operational evolution need not be reported. Preplanned actuations are those which are expected to actually occur due to preplanned activities covered by procedures. Such actuations are those for which a procedural step or other appropriate documentation indicates the specific actuation is actually expected to occur. Control room personnel are aware of the specific signal generation before its occurrence or indication in the control room. However, if during the test or evolution, the system actuates in a way that is not part of the planned evolution, that actuation should be reported. For example, if the normal reactor shutdown procedure requires that the control rods be inserted by a manual reactor scram, the reactor scram need not be reported. However, if unanticipated conditions develop during the shutdown that cause an automatic reactor scram, such a reactor scram should be reported. The fact that the safety analysis assumes that a system will actuate automatically during an event does not eliminate the need to report that actuation. Actuations that need not be reported are those initiated for reasons other than to mitigate the consequences of an event (e.g., at the discretion of the licensee as part of a planned evolution).

Note that if an operator were to manually scram the reactor in anticipation of receiving an automatic reactor scram, this would be reportable just as the automatic scram would be reportable.

Valid ~~ESF~~ actuations are those actuations that result from "valid signals" or from intentional manual initiation, unless it is part of a preplanned test. Valid signals are those signals that are initiated in response to actual plant conditions or parameters satisfying the requirements for initiation of the safety function of the system. ~~Note this definition of "valid" requires that the initiation signal must be an ESF signal. This distinction eliminates actuations~~ They do not include those which are the result of other signals ~~from the class of valid actuations~~. Invalid actuations are, by definition, those that do not meet the criteria for being valid. Thus, invalid actuations include actuations that are not the result of valid signals and are not intentional manual actuations.

Except for critical scrams, invalid actuations are not reportable by telephone under § 50.72. In addition, invalid actuations are not reportable under § 50.73 in any of the following circumstances:

(A) The invalid actuation occurred when the system is already properly removed from service. This means all requirements of plant procedures for removing equipment from service have been met. It includes required clearance documentation, equipment and control board tagging, and properly positioned valves and power supply breakers.

(B) The invalid actuation occurred after the safety function has already been completed. An example would be RPS actuation after the control rods have already been inserted into the core.

If an invalid ~~ESF~~ actuation reveals a defect in the ~~ESF~~ system so the system failed or would fail to perform its intended function, the event continues to be reportable under other requirements of 10 CFR 50.72 and 50.73. When invalid ~~ESF~~ actuations excluded by the conditions described

5.0 DEFINITIONS (continued)

Incident Investigation - Process conducted by the NRC for the purpose of accident prevention. The process includes gathering and analyzing information, determining findings and conclusions, including the cause(s) of a significant operational event; and the disseminating of the investigation results for NRC, industry, and public review.

Independent Spent Fuel Storage Installation (ISFSI) - A complex designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. An ISFSI which is located on the site of another facility licensed under §Part 72 or a facility licensed under §Part 50 (e.g., an operating nuclear power plant) and which shares common utilities and services with that facility or is physically connected with that other facility may still be considered independent.

Initiation of Shutdown - Physical act of reducing power or temperature to change modes.

Invalid Actuation (Signal) - Signals that do not meet the criteria for being valid. Invalid actuations include instances where instrument drift, spurious signals, human error or other invalid signals that result in manual or automatic actuation of the systems listed in §50.73(a)(2)(iv)(B).

Major Loss of Communication - Constitutes the loss of communication capabilities.

Major Deficiency - A condition or circumstance which under normal operating conditions, an anticipated transient, or postulated design basis accident could contribute to exceeding a safety limit or cause an accident. "Major deficiency" also means a condition or circumstance which in the event of an accident due to other causes could, considering an independent single failure, result in a loss of safety function necessary to mitigate the consequences of the accident.

Natural Phenomenon - Act of nature (e.g., fire, flood, tornado).

News Release - Known items which may be distributed to the media (UPI, television, radio, newspaper, etc.) and those items identified to be going on TVA news tape distributed by the TVA Public Affairs Staff.

Noncompliance (Failure To Comply) - A noncompliance for the purposes of this procedure means any failure to comply with the Atomic Energy Act of 1954, as amended, or with any applicable rule or regulation of the NRC relating to substantial safety hazards.
A noncompliance may be in operations, engineering, or construction of the facility or basic component thereof.

Organization Manager - This is the most senior manager available who is in the same organization as the individual who discovered the abnormal event. The senior manager is not normally interpreted to be the plant manager or site vice president.

Preplanned Sequence - Part of an approved procedure, including workplans, work request, work orders, surveillance instructions, general operating instructions and system operating instructions.

Prevented The Fulfillment - Failure or possible failure of a safety system to **properly complete** a safety function.

5.0 DEFINITIONS (continued)

Principal Safety Barrier - Fuel cladding, RCS pressure boundary, or the containment.

Redundant Equipment - Equipment, systems, structures capable of performing the same intended function within the same Technical Specification allowable values. (In most cases, this means opposite train equipment.)

Safe Shutdown - Mode 3, as defined by the Technical Specifications.

Safety Function - A component or structure designed to actuate upon receiving the proper signal (ESF or RPS).

Significant Operational Event - Any radiological, safeguards, or other safety-related operational event at an NRC licensed facility that poses an actual or potential hazard to the public health and safety, property, or the environment. These events or those that typically result in a §50.72 immediate notification. (See Appendix A of this procedure) A significant operational event also may be referred to as "an incident". Examples of these events include:

- Operations that exceeded, or were not included in the design basis of the facility,
- A major deficiency in design, construction, or operation having potential generic safety implications,
- A significant loss of integrity of the fuel, the primary coolant boundary, or the primary containment boundary,
- A loss of safety function or multiple failures in systems used to mitigate an actual event,
- Significant unexpected system interactions,
- Repetitive failures or events involving safety related equipment or deficiencies in operation,
- Questions or concerns pertaining to licensee operational performance.

Substantial Safety Hazard - Loss of safety function to the extent that there is a major reduction in the degree of protection provided to public health and safety for any facility or activity licensed.

Threat - Physical hazard (e.g., fire, severe radioactive release).

Unanalyzed Condition - Plant Condition outside the bounds of the initial conditions as described in the FSAR accident analysis.

Valid Actuation (Signal) - Valid actuations are those that result from "valid signals" or from intentional manual initiation. Valid signals are those that are initiated in response to actual plant conditions or parameters satisfying the requirements for initiation of the safety function of the system.

Appendix A
(Page 3 of 11)

3.1 Immediate Notification - NRC (continued)

3. §50.72(b).(1)) - Any deviation from the plant's Technical Specifications authorized pursuant to §50.54(x).

C. The following criteria require 4-hour notification:

1. §50.72(b)(2)(i) - The initiation of any nuclear plant shutdown required by the plant's Technical Specifications.

2. §50.72(b)(2)(iv)(A) - Any event that results or should have resulted in Emergency Core Cooling System (ECCS) discharge into the reactor coolant system as a result of a valid signal except when the actuation results from and is part of a pre-planned sequence during testing or reactor operation.

3. §50.72(b)(2)(iv)(B) - Any event or condition that results in actuation of the reactor protection system (RPS) when the reactor is critical except when the actuation results from and is part of a pre-planned sequence during testing or reactor operation.

4. §50.72(b)(2)(xi) - Any event or situation, related to the health and safety of the public or onsite personnel, or protection of the environment, for which a news release is planned or notification to other government agencies has been or will be made. Such an event may include an onsite fatality or inadvertent release of radioactive contaminated materials.

D. The following criteria require 8-hour notification:

NOTE
The non-emergency events specified below are only reportable if they occurred within three years of the date of discovery.

1. §50.72(b)(3)(ii)(A) - Any event or condition that results in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded.

2. §50.72(b)(3)(ii)(B) - Any event or condition that results in the nuclear power plant being in an unanalyzed condition that significantly degrades plant safety.

3. §50.72(b)(3)(iv)(A) - Any event or condition that results in valid actuation of any of the systems listed in paragraph (b)(3)(iv)(B) [see list below], except when the actuation results from and is part of a pre-planned sequence during testing or reactor operation.

   a. Reactor protection system (RPS) including: Reactor scram and reactor trip.

Appendix A
(Page 5 of 11)

3.1 Immediate Notification - NRC (continued)

NOTE
According to §50.72 (b)(3)(vi) events covered by §50.72(b)(3)(v) may include one or more procedural errors, equipment failures, and/or discovery of design, analysis, fabrication, construction, and/or procedural inadequacies. However, individual component failures need not be reported pursuant this paragraph if redundant equipment in the same system was operable and available to perform the required safety function.

5. §50.72(b)(3)(xii) - Any event requiring the transport of a radioactively contaminated person to an offsite medical facility for treatment.

6. §50.72(b)(3)(xiii) - Any event that results in a major loss of emergency assessment capability, offsite response capability, or offsite communications capability (e.g., significant portion of control room indication, emergency notification system, or offsite notification system).

E. Follow-up Notification (§50.72(c))

With respect to the telephone notifications made under paragraphs (a) and (b) [§50.72 (a) and §50.72 (b), respectively] of this section [§50.72], in addition to making the required initial notification, during the course of the event:

a. Immediately report (i) any further degradation in the level of safety of the plant or other worsening plant conditions including those that require the declaration of the Emergency Classes, if such a declaration has not been previously made; or

(1) Any change from one Emergency Class to another, or

(2) A termination of the Emergency Class.

b. Immediately report (i) the results of ensuing evaluations or assessments of plant conditions,

(1) The effectiveness of response or protective measures taken, and

(2) Information related to plant behavior that is not understood.

c. Maintain an open, continuous communication channel with the NRC Operations Center upon request by the NRC.

Source	Setpoint	0-RA-90-102A FUEL POOL RAD MONITOR HIGH RAD
SER 760 (Unit 1 annunciator system) 0-RE-90-102 Retransmitted to U-2 SER 2243 (Unit 2 annunciator system)	50 mr/hr > 1 second	

Probable Causes

1. High radiation in spent fuel pit area elevation 734.

Corrective Actions

[1] **IF** dry cask storage processing in progress, **THEN**
NOTIFY Cask Supervisor.

[2] **CHECK** 0-RM-90-102 and 0-RM-90-103 on 0-M-12 to verify alarm.

NOTE 0-RM-90-102 will be blocked and is expected to alarm during portions of Dry Cask Storage loading/unloading activities. Under this condition, remaining steps are N/A.

[3] **VERIFY** the following:

a. Auxiliary Building General Supply and Exhaust and Fuel Handling exhaust isolate (A-Train) (1-M-9).

b. Auxiliary Building Gas Treatment System starts (1-M-9).

[4] **IF** high radiation alarm valid, **THEN**

[a] **ANNOUNCE** "High Radiation at spent Fuel Pool Area" over PA system.

[b] **NOTIFY** SM.

[c] **NOTIFY** RADCON.

[5] **IF** B-Train ABI has not actuated from a valid High Radiation condition, **THEN**
INITIATE manually B-Train Auxiliary Building Ventilation Isolation via **[1-HS-30-101B]** or **[2-HS-30-101B]** (M-6).

[6] **IF** fuel handling in the Spent Fuel Pit is in progress, **THEN**
REFER TO AOP-M.04, *Refueling Malfunctions*.

[7] **REFER TO** AOP-M.06, *Loss of Spent Fuel Cooling.*

[8] **IF** Auxiliary Building Ventilation Isolation resulted from an invalid ABI signal, **THEN** ,
REFER to 0-SO-30-10 *Auxiliary Building Ventilation Systems* to recover from ABI.

(Continued on next page)

0-RA-90-102A
FUEL POOL RAD
MONITOR HIGH RAD

Corrective Actions (Continued)

[9] **EVALUATE** EPIP-1, Emergency Plan Classification Matrix.

[10] **EVALUATE** Technical Specifications 3.3.3.1 and 3.9.12.

[11] **INITIATE** Corrective Actions.

[12] **WHEN** conditions return to normal, **THEN**
RETURN Auxiliary Building Ventilation System to normal in accordance with 0-SO-30-10, *Auxiliary Building Ventilation Systems*.

References

45B655-12B-0, 47W610-90-1

Source	Setpoint	0-RA-90-102B FUEL POOL RAD MONITOR INSTR MALFUNC
SER 761 (Unit 1 annunciator system) 0-RM-90-102 Retransmitted to U-2 SER 2244 (Unit 2 annunciator system)	N/A	

Probable Causes

1. Instrument downside ratemeter trip.
2. Instrument loss of power.
3. Instrument placed in **TRIP ADJ** position.

Corrective Actions

[1] **CHECK** 0-RM-90-102 on 0-M-12 to attempt to determine problem.

[2] **NOTIFY** RADCON.

[3] **DISPATCH** personnel to check 0-RM-90-102 locally to determine problem.

[4] **EVALUATE** Technical Specification 3.3.3.1 and 3.9.12.

[5] **INITIATE** WO for maintenance, if required.

References

45B655-12B-0,
47W610-90-1

I. PROGRAM: OPERATOR TRAINING

II. COURSE: SYSTEMS TRAINING

III. TITLE: AUXILIARY BUILDING VENTILATION SYSTEM

IV. LENGTH OF LESSON: Initial License Training: 3 hour lecture; 1 hour simulator demonstration; 1hour self-study/workshop

V. TRAINING OBJECTIVES:

A. Terminal Objective:

Upon completion of this lesson and others presented, the student should be able to apply the knowledge to support satisfactory performance of the tasks associated with the Auxiliary Building Ventilation systems (AB Vent) in the plant and on the simulator.

B. Enabling Objectives:

0. Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with the Auxiliary Building Ventilation system that are rated $\geq$ 2.5 during Initial License training for the appropriate license position as identified in Appendix A.
1. State the purpose/functions of the Auxiliary Building Ventilation system as described in the SQN FSAR.
2. State the design basis of the Auxiliary Building Ventilation system in accordance with the SQN FSAR.
3. Explain the purpose/function of each major component in the flow path of the Auxiliary Building Ventilation system as illustrated on the simplified system drawing.
4. Describe the following items for each major component in the Auxiliary Building Ventilation system as described in this lesson:
   a. Location
   b. Power supply (include control power as applicable)
   c. Support equipment and systems
   d. Normal operating parameters
   e. Component operation
   f. Controls
   g. Interlocks (including setpoints)
   h. Instrumentation and Indications
   i. Protective features (including setpoints)
   j. Failure modes
   k. Unit differences
   l. Types of accidents for which the Auxiliary Building Ventilation system components are designed
   m. Location of controls and indications associated with the Auxiliary Building Ventilation system in the control room and auxiliary control room

V. TRAINING OBJECTIVES (Cont'd):

B. Enabling Objectives (Cont'd):

5. Describe the operation of the AB Vent system as it relates to the following:
   a. Precautions and limitations
   b. Major steps performed while placing the AB Vent system in service
   c. Alarms and alarm response
   d. How a component failure will affect system operation
   e. How a support system failure will affect AB Vent system operation
   f. How a instrument failure will affect system operation
6. Describe the administrative controls and limits for the AB Vent system.
7. State Tech Specs/TRM LCOs that govern the AB Vent system
   a. State the ≤1 hour action limit TS LCOs
   b. Given the conditions/status of the AB Vent system components and the appropriate sections of the Tech Spec, determine if operability requirements are met and what actions are required
8. Discuss related Industry Events:

   Event Title: Hot Particle Discovered on Auxiliary Building Roof.
   INPO Event # 327-940131-1

VI. TRAINING AIDS:

A. Computer.
B. Computer Display Projector & Controls.
C. Local Area Network (LAN) Access.
D. Simulator (if available)

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** REPORTING REQUIREMENTS

IV. **LENGTH OF LESSON/COURSE:** 4 hour(s)

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the actions necessary to comply with regulatory and plant reporting requirements.

B. Enabling Objectives

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with Regulatory and Plant Reporting Requirements that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Perform a plant response assessment using the 0-TI-QXX-000-001.0," Event Critique, Post Trip Report, and Equipment Root Cause,". a. State the responsibilities of each control room crew member. [C.1] b. Explain the process or Conduct a plant response assessment.
2.	For a given condition, determine the regulatory reporting requirements using appropriate reference material. a. List the tools available to the operator for determining regulatory reporting requirements. b. Define the key terms used to determine regulatory reporting requirements. c. State the criteria requiring one hour notification of the NRC. d. State the criteria requiring four hour notification of the NRC. e. State the criteria requiring eight hour notification of the NRC. f. State the criteria requiring 24 hour notification of the NRC. g. State the criteria requiring 2 day notification of the NRC. h. State the criteria requiring a written report or LER to the NRC. i. State the criteria allowing a telephone notification to be made in lieu of a written LER to the NRC.
3.	For a given condition, determine plant management reporting requirements using SPP-3.5.
4.	Complete a PER reportability determination per SPP-3.1.

94. G 2.1.25 094
Given the following:

- Unit 1 at 100% power with Boric Acid Tank (BAT) A aligned.
- RWST Boric Acid concentration is 2575 ppm.

Which ONE of the following identifies BAT A Volume and Boric Acid Concentration that will meet Operability requirements and when the maximum expected boration capability requirement occurs in accordance with the Technical Requirement Bases?

REFERENCE PROVIDED

A. 9600 gallons at 6500 ppm;
Near End of Life peak Xenon conditions.

B. 9600 gallons at 6500 ppm;
Near Beginning of Life peak Xenon conditions.

C✔ 9200 gallons at 6775 ppm;
Near End of Life peak Xenon conditions.

D. 9200 gallons at 6775 ppm;
Near Beginning of Life peak Xenon conditions.

DISTRACTOR ANALYSIS:

A. *Incorrect, BAT A volume of 9600 gallons at 6500 ppm with an RWST boron concentration of 2575 ppm is in the unacceptable region of TRM Figure 3.1.2.6 for BAT Tank Limits. Near the of life peak xenon is when the maximum expected boration capability requirement occurs as identified in Technical Requirement bases. Plausible because the BAT volume, BAT boron concentration, and the RWST boron concentration are near the limit and require interpolation when using the graph. Also, the higher level in the tank is not the correct answer and the limiting conditions occurring at near EOL is correct.*

B. *Incorrect, BAT A volume of 9600 gallons at 6500 ppm with an RWST boron concentration of 2575 ppm is in the unacceptable region of TRM Figure 3.1.2.6 for BAT Tank Limits, and the Beginning of life peak xenon is not when the maximum expected boration capability requirement occurs. Technical Requirement bases identifies the requirement to be at near EOL with peak Xenon conditions. Plausible because the BAT volume, BAT boron concentration, and the RWST boron concentration are near the limit and require interpolation when using the graph. Also, the higher level in the tank is not the correct answer and for other circumstances the limiting conditions occur at the beginning of life.*

C. *CORRECT, BAT A volume of 9200 gallons at 6775 ppm with an RWST boron concentration of 2575 ppm is in the acceptable region of TRM Figure 3.1.2.6 for BAT Tank Limits and the bases for the Technical Requirement states that the maximum expected boration capability requirement occurs at near EOL with peak Xenon conditions.*

D. *Incorrect, BAT A volume of 9200 gallons at 6775 ppm with an RWST boron concentration of 2575 ppm is in the acceptable region of TRM Figure 3.1.2.6 for BAT Tank Limits, but the Beginning of life peak xenon is not when the maximum expected boration capability requirement occurs. Technical Requirement bases identifies the requirement to be at near EOL with peak Xenon conditions. Plausible because the combination of BAT volume and boron concentration place the tank in an acceptable region of the graph and other limiting conditions to occur at the beginning of life.*

Question No. 94

Tier 3

K/A G 2.1.25
Ability to interpret reference materials, such as graphs, curves, tables, etc.

Importance Rating: 3.9 / 4.2

Technical Reference: Technical Requirements Bases 3.1.2.6

Proposed references to be provided to applicants during examination: **TRM Figure 3.1.2.6, Boric Acid Tank Limits Based on RWST Boron Concentration**

Learning Objective: OPT200.TRM B.4
Explain the TRM bases for each LCO (K/A 2.2.6)

Question Source:
Bank # _____
Modified Bank # _____
New __X____

Question History: New question for Sequoyah 2009 exam

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis __X____

10 CFR Part 55 Content: (41.10 / 43.5 / 45.12)

10CFR55.43.b (2) Facility operating limitations in the technical specifications and their bases.

Comments: New question for Sequoyah 2009 exam

REACTIVITY CONTROL SYSTEMS

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

TR 3.1.2.6 As a minimum, the following borated water source(s) shall be OPERABLE as required by TR 3.1.2.2:

a. A boric acid storage system with:

1. A contained volume of borated water in accordance with Figure 3.1.2.6,

2. A boron concentration in accordance with Figure 3.1.2.6, and

3. A minimum solution temperature of 63°F.

b. The refueling water storage tank with:

1. A contained borated water volume of between 370,000 and 375,000 gallons,

2. Between 2500 and 2700 ppm of boron,

3. A minimum solution temperature of 60°F, and

4. A maximum solution temperature of 105°F.

APPLICABILITY: MODES 1, 2, and 3.

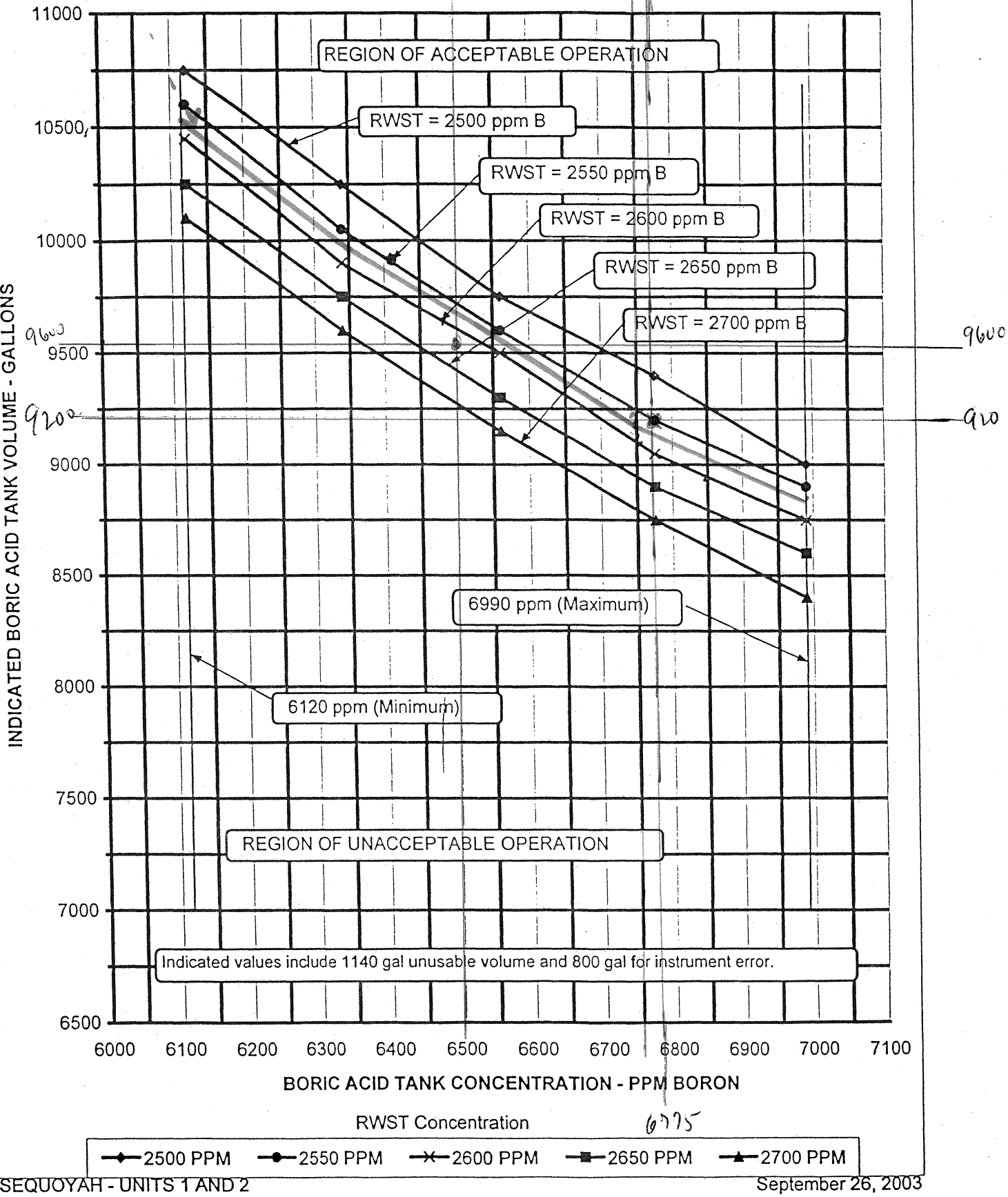
ACTION:

a. With the boric acid storage system inoperable and being used as one of the above required borated water sources, restore the storage system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 1% delta k/k at 200°F; restore the boric acid storage system to OPERABLE status within the next 7 days or be in HOT SHUTDOWN within the next 30 hours.

b. With the refueling water storage tank inoperable, restore the tank to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

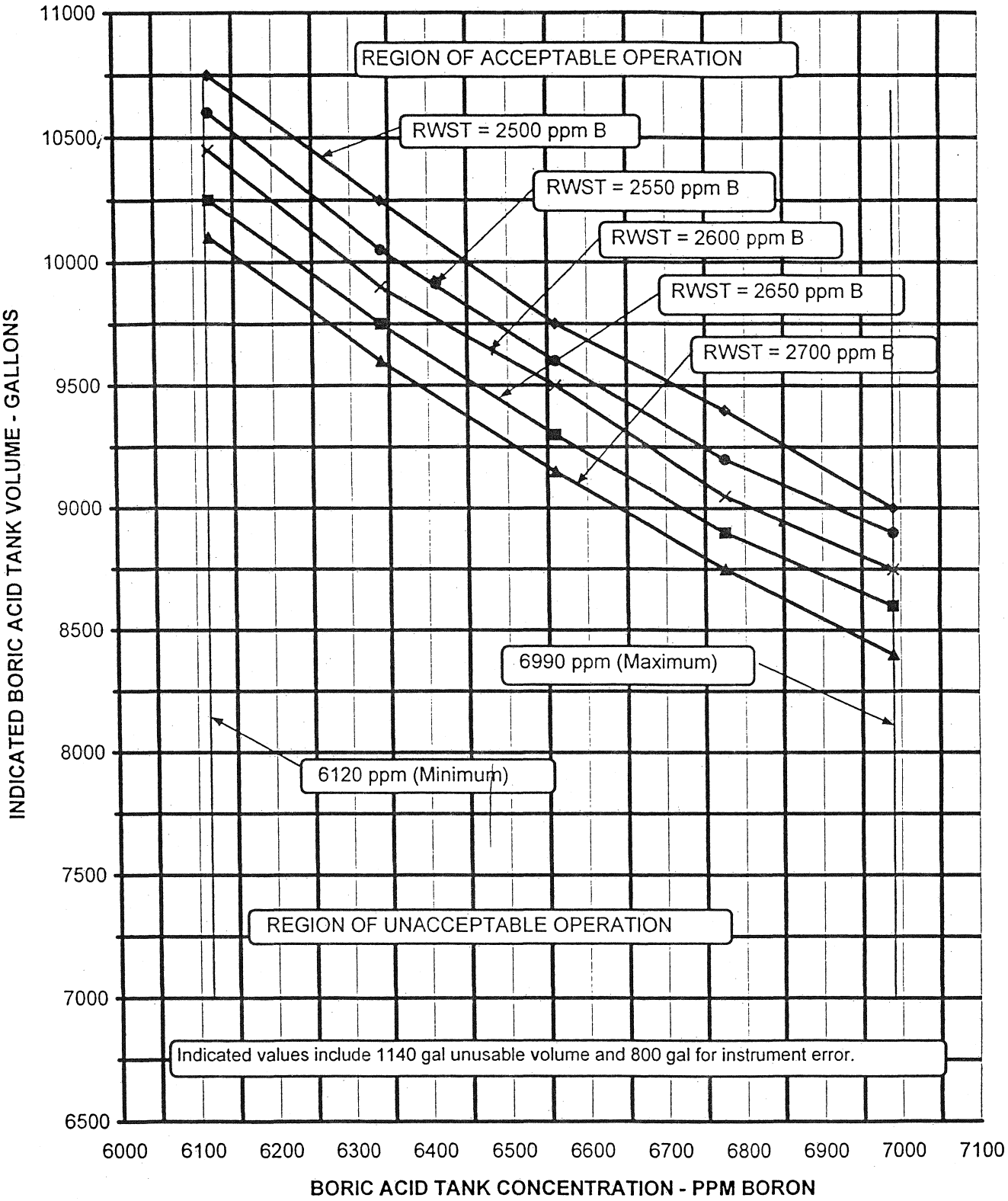
TRM FIGURE 3.1.2.6 (Units 1 & 2)

BORIC ACID TANK LIMITS BASED ON RWST BORON CONCENTRATION



TRM FIGURE 3.1.2.6 (Units 1 & 2)

BORIC ACID TANK LIMITS BASED ON RWST BORON CONCENTRATION



TRB 3/4.1.2 BORATION SYSTEMS

The boron injection system ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include 1) borated water sources, 2) charging pumps, 3) separate flow paths, 4) boric acid transfer pumps, and 5) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 350°F, a minimum of two boron injection flow paths are required to ensure single functional capability in the event an assumed failure renders one of the flow paths inoperable. The boration capability of either flow path is sufficient to provide a SHUTDOWN MARGIN from expected operating conditions of 1.6% delta k/k after xenon decay and cooldown to 200°F. The maximum expected boration capability requirement occurs at near EOL from full power peak xenon conditions and requires borated water from a boric acid tank in accordance with Figure 3.1.2.6, and additional makeup from either: (1) the common boric acid tank and/or batching, or (2) a minimum of 26,000 gallons of 2500 ppm borated water from the refueling water storage tank. With the refueling water storage tank as the only borated water source, a minimum of 57,000 gallons of 2500 ppm borated water is required.

The boric acid tanks, pumps, valves, and piping contain a boric acid solution concentration of between 3.5% and 4.0% by weight. To ensure that the boric acid remains in solution, the air temperature is monitored in strategic locations. By ensuring the air temperature remains at 63°F or above, a 5°F margin is provided to ensure the boron will not precipitate out. To provide operational flexibility, if the area temperature should fall below the required value, the solution temperature (as determined by the pipe or tank wall temperature) will be monitored at an increased frequency to compensate for the lack of solution temperature alarm in the main control room.

With the RCS temperature below 350°F, one injection system is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and operations involving positive reactivity additions that could result in loss of required SDM (Modes 4 or 5) or boron concentration (Mode 6) in the event the single injection system becomes inoperable. Suspending positive reactivity additions that could result in failure to meet minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than or equal to that required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

The boron capability required below 350°F, is sufficient to provide a SHUTDOWN MARGIN of 1.6% delta k/k after xenon decay and cooldown from 350°F to 200°, and a SHUTDOWN MARGIN of 1% delta k/k after xenon decay and cooldown from 200°F to 140°F. This condition requires either 6400 gallons of 6120 ppm borated water from the boric acid storage tanks or 13,400 gallons of 2500 ppm borated water from the refueling water storage tank.

The contained water volume limits include allowance for water not available because of discharge line location and other physical characteristics. The 6400 gallon limit in the boric acid tank for Modes 4, 5, and 6 is based on 4,431 gallons required for shutdown margin, 1,140 gallons for the unusable volume in the heel of the tank, 800 gallons for instrument error, and an additional 29 gallons due to rounding up. The 55,000 gallon limit in the refueling water storage tank for modes 4, 5, and 6 is based upon 22,182

gallons that is undetectable due to lower tap location, 19,197 gallons for instrument error, 13,400 gallons required for shutdown margin, and an additional 221 gallons due to rounding up.

The limits on contained water volume and boron concentration of the RWST also ensure a pH value of between 7.5 and 9.5 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components.

The OPERABILITY of one boron injection system during REFUELING ensures that this system is available for reactivity control while in MODE 6.

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** TECHNICAL REQUIREMENTS MANUAL

IV. **LENGTH OF LESSON/COURSE:** 2 hour(s)

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of this lesson and others presented, the student shall demonstrate an understanding of the purpose and background of the Technical Requirements Manual by successfully completing a written examination with a score of ≥ 80%.

B. Enabling Objectives: Slide 2

In order to accomplish these objectives, the student shall be able to successfully:

1. Determine plant mode of operation from memory. (K/A 2.1.22)

2. Apply TRM action statements of greater than one hour given a copy of the TRM
(K/A 2.1.12, 2.2.22)

3. Explain the process for making changes to the TRM (K/A 2.2.6)

4. Explain the TRM bases for each LCO. (K/A 2.2.25)

5. Apply less than one hour LCO actions using a copy of the TRM. (K/A 2.1.11)

95. G 2.2.21 095

Given the following:

- During the Operations review of a Work Order (WO), the SRO determines the return to operability (RTO) Post Maintenance Test (PMT) needs revision.
- The WO did not require an Independent Qualified Review (IQR), a 10CFR50.59 review, or 10CFR72.48 review.

In addition to documenting the reason for the revision, which ONE of the following identifies both...

(1) the requirement to revise the RTO test without routing the WO back through the review process

and

(2) when this type PMT revision would require Shift Manager approval?

A. (1) Revision signed by 2 SROs.
(2) when a generation risk critical component is involved.

B. (1) Revision signed by 2 SROs.
(2) when a configuration change to a component on the unit is required to perform the PMT.

C. (1) Revision signed by the Work Week Manager and an SRO.
(2) when a generation risk critical component is involved.

D. (1) Revision signed by the Work Week Manager and an SRO.
(2) when a configuration change to a component on the unit is required to perform the PMT.

DISTRACTOR ANALYSIS:

A. *CORRECT, SPP-6.3 allows revisions to RTO tests to be made by 2 SROs without routing back through the review cycle for the conditions identified in the stem of the question and does require Shift Manager approval if a generation critical component is involved.*

B. *Incorrect, SPP-6.3 allows revisions to RTO tests to be made by 2 SROs without routing back through the review cycle for the conditions identified in the stem of the question but does not require Shift Manager approval because a configuration change on the unit would be involved. Plausible because 2 SRO being required to make the revision is correct and verification of configuration changes are identified in the SPP as needing independent verification.*

C. *Incorrect, SPP-6.3 allows revisions to RTO tests to be made by 2 SROs, not an SRO and the Work Week Manager but Shift Manager approval if a generation critical component is involved is correct. Plausible because the Work Week Manager has other functions and requiring Shift Manager approval if a generation critical component is involved is correct.*

D. *Incorrect, SPP-6.3 allows revisions to RTO tests to be made by 2 SROs, not an SRO and the Work Week Manager and Shift Manager approval because a configuration change on the unit would be involved is also not correct. Plausible because the Work Week Manager has other functions and verification of configuration changes are identified in the SPP as needing independent verification.*

Question No. 95

Tier 3

K/A G 2.2.21
Knowledge of pre- and post-maintenance operability requirements.

Importance Rating: 2.9 / 4.1

Technical Reference: SPP-6.3, Pre-/ Post-Maintenance Testing, Rev 2

Proposed references to be provided to applicants during examination: None

Learning Objective: No training objective identified

Question Source:
Bank # _____
Modified Bank # _____
New __X____

Question History: New question for Sequoyah 2009 exam

Question Cognitive Level:
Memory or fundamental knowledge __X____
Comprehension or Analysis _____

10 CFR Part 55 Content: (41.10 / 43.2)

10CFR55.43.b (2,3)

Comments: New question for Sequoyah 2009 exam

3. A formal instruction prepared for the WO PMT receives an IQR, 10 CFR 50.59 and/or 10 CFR 72.48 review in accordance with SPP-2.2, "Administration of Site Technical Procedures."

System Engineer

F. Review WO PMTs (Maintenance Testing and RTO Testing) when requested for TS, ASME Section XI, 10 CFR 50 Appendix J, or other complex activities to ensure that they are correct and concur with the PMT.

Operations Shift Manager/SRO Designee

G. Perform initial reviews of WO in accordance with the criteria specified in SPP-7.1, "Work Control Process."

H. Review/revise RTO tests as necessary to ensure TS operability and surveillance requirements are met without imposing any adverse affects on the system or equipment. Contact System Engineering if assistance is needed. Changes to RTO tests are made in accordance with 3.4.N below or by revision to the work order.

I. Approve the RTO tests.

J. Ensure that the PMT satisfies all TS requirements.

K. Include status control requirements in the WO package. Specify the correct systems and component alignment required for the PMT performance and the configuration required to restore systems and components to ensure correct operating or standby mode following the completion of the PMT.

L. Ensure that the PMTs are performed at the appropriate system operating conditions or plant modes.

M. Review WO scope changes and revise RTO tests as necessary in accordance with 3.4.N below or by revision to the work order.

N. Revise RTO tests when warranted. Revisions to RTO tests may be made by two SROs without routing back through the review cycle provided that 1) the reason is documented, 2) both SROs sign the revision and 3) IQR, 10 CFR 50.59 and/or 10 CFR 72.48 review was not required previously. This type revision requires Shift Manager approval if the PMT involves a generation risk critical component as classified in MEL.

O. Waive PMT when warranted. A PMT requirement may be waived provided that the Shift Manager authorizes the waiver, the reason is documented (e.g., plant conditions prevent functional testing of a logic circuit), and affected configuration changes are verified by independent verification.

96. G 2.2.6 096

Given the following:

- Unit 1 is in MODE 5 during a refueling outage.
- It is determined that 1-SO-63-1, "Cold Leg Injection Accumulators" needs an Urgent "Minor/Editorial Change" revision to support system alignment changes due to system modification.

Which ONE of the following statements identifies the need for an Indepenent Qualified Reviewer (IQR) and if the Unit SRO can be the approval authority for the procedure revision?

A. An IQR is required.
The Unit SRO may sign as the approval authority.

B. An IQR is required.
The Unit SRO may NOT sign as the approval authority.

C. An IQR is NOT required.
The Unit SRO may sign as the approval authority.

D. An IQR is NOT required.
The Unit SRO may NOT sign as the approval authority.

DISTRACTOR ANALYSIS:

A. CORRECT, SPP-2.2 requires an IQR review for minor editorial changes for Quality Related procedures and 1-SO-63-1 is a Quality Related procedure the SPP also provides for the SRO on the Unit being the approval authority.

B. Incorrect, IQR review for minor editorial changes for Quality Related procedures is required and SPP-2.2 allows for the SRO on the Unit being the approval authority. Plausible because the IQR review is required for minor/editorial changes to quality related procedures and the SRO on the unit is not the approval authority for normal procedure revisions.

C. Incorrect, SPP-2.2 requires IQR review for minor editorial changes for Quality Related procedures and allows for the SRO on the Unit being the approval authority. Plausible because the IQR review is not required for minor/editorial changes to non-quality related procedures and the SPP allows for the SRO on the unit being the approval authority.

D. Incorrect, IQR review for minor editorial changes for Quality Related procedures is required and allows for the SRO on the Unit being the approval authority. Plausible because the IQR review is not required for minor/editorial changes to non-quality related procedures and the SRO of the unit is not the approval authority for normal procedure revisions.

Question No. 96

Tier 3

K/A G 2.2.6
Knowledge of the process for making changes to procedures.

Importance Rating: 3.0 / 3.6

Technical Reference: SPP-2.2, Administration of Site Technical Procedures, Rev 15

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271.SPP-2.2 B.5
Describe the procedure revision process.

Question Source:
Bank # _____
Modified Bank # __X_____
New _____

Question History: Question modified from Summer 2006 exam

Question Cognitive Level:
Memory or fundamental knowledge __X_____
Comprehension or Analysis _____

10 CFR Part 55 Content: (41.10 / 43.3 / 45.13)

10CFR55.43.b (3,5)

Comments: Question modified from Summer 2006 exam

3.4.4 Comments, Approval & Implementation

A. Reviewers should provide comments in BSL, or Form SPP-2.2-2, "Site Technical Procedure Review, Comment, and Concurrence Form", or by other appropriate means.

B. Preparers shall resolve comments and escalate unresolved comments to appropriate management.

C. The responsible organization obtains approval from the appropriate approval authority. The approval also ensures, as applicable, the reviewer is independent of the preparer and qualified to perform the review. Approval by telecon with the manager/supervisor who is the designated approval authority is acceptable for hard copy changes.

D. If required, PORC shall review and concur with the procedure. The PORC Chairman recommends to the Plant Manager his approval. Upon concurrence, the Plant Manager shall approve the procedure.

NOTES

1) PORC review is required for all procedures identified as a CIPTE and all revisions to those procedures.

2) Minor/editorial revisions do not require PORC review.

E. Following approval, the responsible manager establishes the effective date taking into consideration any work in progress or parallel changes, training, etc., identified and transmits the procedure package to MS for distribution and EDM archival. The effective date is normally three working days after receipt by MS.

NOTE

The 10 CFR 50.59 and 10 CFR 72.48 documents will be archived in EDM as standalone documents.

F. Revisions which will cause Operations to change the normal configuration of a component (i.e., changes to normal valve alignment checklists, switch position checklists, etc.), should be communicated to the affected Shift Manager or Unit Supervisor prior to the effective date.

3.5 Minor/Editorial Changes

A. Minor changes, such as inconsequential editorial corrections that do not affect the outcome, results, functions, processes, responsibilities, and requirements of the performance of procedure or instructions, require review by an IQR (quality-related procedures only) and approval by the appropriate approval authority. Minor changes do not require 10 CFR 50.59 review, 10 CFR 72.48 review, or PORC review. Minor changes shall not change the intent of the procedure or alter the technical sequence of procedural steps.

3.5 Minor/Editorial Changes (continued)

B. Procedure changes that meet the following criteria are considered minor changes:

1. correction of punctuation, style changes
2. redundant or insignificant word or title changes
3. correction of typographical errors including capitalization
4. annotation of critical steps,
5. correction of reference errors
6. omitted symbols that do not alter results
7. incorrect units of measure due to editorial error
8. misplaced decimals that are neither setpoint values nor tolerances
9. page number discrepancies
10. missing sign-offs, signatures, or date lines
11. corrections to attachment identifiers
12. corrections to titles of plant organizations, position titles, department/section/unit names when there is no change in authority, responsibility, or reporting relationships.
13. corrections to addresses, telephone numbers, or computer application names
14. corrections to or additions of equipment nomenclature or locations in procedures to be consistent with approved drawings, documents, labels, or procedure content.
15. addition of or changes to equipment unique identifier information (UNID) in procedures consistent with design output documents and which do not alter what component is operated
16. corrections to or clarification of a note or precaution which does not alter the method of accomplishing a task
17. changes which are purely administrative and non-technical in nature which do not change the intent or outcome of an activity (e.g. adding a step requiring a log entry, a plant announcement, informational notifications, or initiation of a PER)

C. A BSL System Administrator or Sponsor may make the following changes:

1. Organizational changes.
2. Reference changes, e.g., MMI is superseded by MCI-0-000-TRB001.

3.5 Minor/Editorial Changes (continued)

3. Misspelled words.

4. Language, grammar, syntax corrections.

D. The revision description will describe the reason for change.

E. The approval authority will obtain the IQR for quality-related procedures and approve the change.

F. The procedure package is transmitted to MS for distribution and EDM archival.

3.6 Urgent Procedure Changes

Urgent changes to procedures are revisions which are deemed necessary by plant management to maintain plant safety, operability or critical schedules and inadequate time exists to make a normal revision using BSL. Urgent changes may be handwritten and require the following:

A. Tracking Numbers from BSL.

B. Affected organization/Cross Discipline Review (see Sections 3.4.2D, 3.4.3C and 3.4.3D for review determination/requirements) when other organizations are affected by the change and obtain necessary signatures on the PCF.

C. Technical review by an IQR.

D. A 10 CFR 50.59 screening review, if required, in accordance with SPP-9.4, "10 CFR 50.59 Evaluations of Changes, Tests, and Experiments" or 10 CFR 72.48 Screening Review if required, in accordance with SPP-9.9, "10 CFR 72.48 Evaluations of Changes, Tests, and Experiments for Independent Spent Fuel Storage Installation."

E. Approval by the PORC, if required, and the approval authority. A licensed SRO on the unit affected may sign as the approval authority for minor/editorial changes.

F. The preparer shall obtain applicable reviews and approval documented on PCF. The preparer shall submit a hardcopy to the affected unit control room, if filed in the control room. The preparer shall forward the original to MS. The procedure may then be used to perform work.

G. The preparer shall ensure the change is processed and provided to MS for distribution. The preparer shall submit a copy to the sponsor by the next working day.

H. The responsible organization should ensure the handwritten change is incorporated and processed into BSL within 14 days for changes initiated during normal plant operation or within 30 days following an outage.

3.7 One-Time-Only Procedures and Revisions

One-Time-Only (OTO) procedures, and one-time revisions to existing procedures, can be developed and approved for use where existing procedures do not adequately address the activity due to unusual plant conditions. Such procedures/revisions are intended to be used only once and will automatically expire following completion of the use of the procedure.

A. OTO procedures/revisions shall be reviewed and approved as specified in Sections 3.4, 3.5, through 3.6 of this procedure. The preparer shall indicate that the revision is a OTO revision on the PCF. The tracking number on the PCF should be N/A'd.

B. The performer shall ensure that the revision is inserted/incorporated into the controlled copy of the procedure being used for performance of the activity. OTO procedures/revisions will not be distributed to other controlled manuals.

C. The completed procedure, PCF, and all other supporting documents are transmitted to MS to be retained as a record.

D. OTO procedures/revisions do not require cancellation. Following completion of performance, the active revision existing before the OTO revision was made will be the active version of the procedure.

3.8 Administrative Hold

A. Responsible organizations are required to place procedures on "administrative hold" when a revision is not feasible. The cover sheet of the procedure should indicate administrative hold. The responsible procedure sponsor shall forward the PCF (or audit trail) and the cover sheet to MS for placement on Administrative Hold.

B. MS shall not issue working copies of procedures on administrative hold.

C. Employees shall not use procedures on administrative hold to perform work. Only the Plant Manager/Duty Plant Manager can authorize issuance of a working copy of a document that is on administrative hold.

D. All reasonable measures shall be exhausted to release (if applicable) the procedure from administrative hold through the procedure revision process. The Plant Manager should carefully evaluate the situation before releasing the procedure for work.

E. When the reason for the hold has been resolved, the sponsor shall initiate a procedure revision (Section 3.4) to request release from administrative hold. Include the reason for administrative hold removal in the revision log.

F. The following procedures, due to their usage should have deficiencies corrected immediately, and should not be placed on administrative hold:

1. Abnormal Operating Instructions.

2. Emergency Operating Instructions. (E, ECA, FRG, ES).

3. Emergency Preparedness Implementing Procedures.

#96

QUESTIONS REPORT
for summer 10-4-06

G2.2.6 001

The RO is attempting to vent the PRT in accordance with *SOP-101, Reactor Coolant System*, when he notes that a valve not identified in the SOP needs to be open to complete venting.

The CRS determines that a restricted change is required.

Which ONE (1) of the following is the MINIMUM review/approval necessary for this procedure change?

a. Manager, Operations.

b. Duty Shift Supervisor.

c. ✓ Qualified Reviewer AND the Duty Shift Supervisor.

d. Procedure Group Supervisor AND the Plant Manager.

Requires examinee to determine that a restricted change is classified as a temporary change and then applies this to requirements in SAP-139.

SAP-139 requires a Qualified Reviewer and the Duty Shift Supervisor as minimum review/approval for approval of a Operations restricted procedure change. Other Discipline Supervisors may approve changes within their discipline.
Knowledge of the process for making changes in procedures as described in the safety analysis report.

Question Number: SRO 21

Tier 3 Group 2
Importance Rating: 3.3

Technical Reference: SAP-139
Proposed references to be provided to applicants during examination: None
Learning Objective: 4378
Question Source: Bank
Question History: VCS Bank
Question Cognitive Level: Lower
10 CFR Part 55 Content: 41

Comments: NRC Comment: Question appears to match K/A, and is SRO knowledge. SAT
BANK

10CFR55.43(b) is met because the applicant must understand the approval process for changes made to facility procedures.

I. **PROGRAM:** OPERATOR TRAINING

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** SPP-2.2, ADMINISTRATION OF SITE TECHNICAL PROCEDURES

IV. **LENGTH OF LESSON/COURSE:** 1 Hour

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, an understanding of SPP-2.2 "Administration of Site Technical Procedures" and OPDP-1 Attachment F "Plant Operating Procedures."

B. Enabling Objectives:

0.	Demonstrate an understanding of NUREG 1122 Knowledge's and Abilities associated with Rules of Procedure Use that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A
1.	Discuss the purpose of SPP-2.2.
2.	Discuss management philosophy for procedure use and adherence.
3.	List the four levels of use for technical procedures including examples of each level.
4	Give examples when a procedure step may be marked not applicable (N/A).
5	Describe the procedure revision process.
6	Briefly define a minor/editorial change.
7	Describe the conditions under which personnel may take reasonable action within the scope of their training that departs from procedure.
8	Explain how to obtain and verify controlled procedure copy.

G 2.3.13 197

iven the following:

- Unit 2 was shutdown for refueling on 01/20/09 at 2400.
- Today is 01/25/09 at 0200 and the Unit is in Mode 5.
- Lower cavity fill has not been started
- Transfer Tube Wafer Valve, 2-78-610 is required to be open for repair on the transfer tube and transfer system.

In accordance with 0-GO-9, "Refueling Operations", which ONE of the following identifies two conditions where either one of the two could be used to minimize the potential spread of airborne contamination?

	Containment Equipment Hatch...	Containment Purge System...
A.	open	in service and aligned to upper containment
B.	open	stopped.
C.	held closed by a minimum of 4 bolts.	in service and aligned to upper containment.
D.	held closed by a minimum of 4 bolts.	stopped.

DISTRACTOR ANALYSIS:

A. Incorrect, containment equipment hatch can be opened but the containment prurge being in service would not be a method to reduce the pressure.

B. CORRECT, In accordance with 0-GO-9 Precaution S, two of the four methods to prevent the potential spread of airborne radiation due to prevent excessive air flow through the transfer tube due to a differential pressure between the containment and the aux building is for the Equipment Hatch to be open and for the containment purge being stopped.

C. Incorrect, containment hatch being closed is not one of the method to identified to prevent the potential spread of airborne radiation.

D. Incorrect, containment hatch being closed is not one of the method to identified to prevent the potential spread of airborne radiation.

QUESTIONS REPORT
for additional Questions

Question No. 97

Tier 3

K/A G 2.3.13
Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

Importance Rating: 3.4 / 3.8

Technical Reference: 0-GO-9, Refueling Operations, Rev 34

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271C259 B.2
Describe the basis of each precaution, limitation and prerequisite in this procedure

Question Source:
Bank # _____
Modified Bank # _____
New ___X____

Question History: New question for Sequoyah 2009 exam

Question Cognitive Level:
Memory or fundamental knowledge __X____
Comprehension or Analysis _____

10 CFR Part 55 Content: (41.12 / 43.4 / 45.9 / 45.10)

10CFR55.43.b (7)

Comments: New question for Sequoyah 2009 exam

3.1 PRECAUTIONS (Continued)

S. Due to relative air pressure differences between the Containment and Auxiliary Buildings which causes excessive air flow through the transfer tube, if the Transfer Tube Wafer Valve 1,2-78-610 is open, at least one of four conditions should exist to minimize the potential spread of airborne contamination: Reference TS 3.9.4.

1. The Containment equipment hatch stays open. This is not permitted during movement of recently irradiated fuel within containment (less than 100 hours since shutdown).

2. A Containment airlock is breached open (both doors) (not permitted during fuel movement within the containment unless one train of ABGTS is operable and one door of each breach airlock is capable of closure).

3. The lower reactor cavity has water filled to a level above the transfer tube elevation.

4. Containment ventilation purge supply/exhaust are stopped and measured differential pressure is approximately 0.25 psi**d** or less between Computer Points P1001A to P1002A.

T. The use of the 1 ton Jib Crane in Unit One Containment is limited to Modes 6 and defueled conditions. The 1 ton Jib Crane will not be used during fuel handling operations or when there is the potential for interference with other cranes operation in the vicinity.

3.2 LIMITATIONS

A. Do not allow reactor vessel head to come into contact with the refueling water.

B. The fuel shall not be moved in the core unless the water visibility is adequate to allow the operator to see the top nozzle of the seated fuel assembly for core unload, and lower core plate pin holes for core reload.

C. Pressurizer manway must be open with airflow unobstructed whenever reactor head is in place and S/G U-tubes drained or pressurizer level off scale low. This ensures that adequate RCS vent exists to allow gravity fill from the RWST on a SBO event without natural circulation capability. This requirement does not apply when closing RCS in preparation for RCS vacuum refill (0-GO-13 section 5.3.4)

3/4.9.4 CONTAINMENT BUILDING PENETRATIONS

LIMITING CONDITION FOR OPERATION

3.9.4 The containment building penetrations shall be in the following status:

a. The equipment door closed and held in place by a minimum of four bolts,

b. A minimum of one door in each airlock is closed, and both doors of both containment personnel airlocks may be open if:

1. One personnel airlock door in each airlock is capable of closure, and

2. One train of the Auxiliary Building Gas Treatment System is OPERABLE in accordance with Technical Specification 3.9.12, and

c. Each penetration* providing direct access from the containment atmosphere to the outside atmosphere shall be either:

1. Closed by an isolation valve, blind flange, manual valve, or equivalent, or

2. Be capable of being closed by an OPERABLE automatic Containment Ventilation isolation valve.

APPLICABILTY:

3.9.4.a. Containment Building Equipment Door - During movement of recently irradiated fuel within the containment.

3.9.4.b. and c. Containment Building Airlock Doors and Penetrations - During movement of irradiated fuel within the containment.

ACTION:

1. With the requirements of the above specification not satisfied for the containment building equipment door, immediately suspend all operations involving movement of recently irradiated fuel in the containment building. The provisions of Specification 3.0.3 are not applicable.

2. With the requirements of the above specification not satisfied for containment airlock doors or penetrations, immediately suspend all operations involving movement of irradiated fuel in the containment building. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.4 Each of the above required containment building penetrations shall be determined to be either in its required condition or capable of being closed by an OPERABLE automatic Containment Ventilation isolation valve once per 7 days during movement of irradiated fuel in the containment building by:

a. Verifying the penetrations are in their required condition, or

b. Testing the Containment Ventilation isolation valves per the applicable portions of Specification 4.6.3.2.

* Penetration flow path(s) providing direct access from the containment atmosphere that transverse and terminate in the Auxiliary Building Secondary Containment Enclosure may be unisolated under administrative controls.

97. G 2.3.13 097

Given the following:

- The Unit 1 Elevation 690' pipe chase is locked in accordance with its normal radiological posting.
- Conditions require Operations to make an emergency entry into the pipe chase.

Which ONE of the following identifies how the room is normally posted and the "key control" for unlocking the pipe chase?

A. Very High Radiation Area;
Both Rad Ops and the Shift Manager have control of keys to the lock.

B. Very High Radiation Area;
ONLY Rad Ops has a key, the Shift Manager would contact Rad Ops to open the lock.

C. Locked High Radiation Area;
Both Rad Ops and the Shift Manager have control of keys to the lock.

D. LockedHigh Radiation Area;
ONLY Rad Ops has a key, the Shift Manager would contact Rad Ops to open the lock.

DISTRACTOR ANALYSIS:

A. Incorrect, The 690 pipe chase on both units is not a Very High Radiation Area (VHRA) but a key being located in the MCR under the administrative control of the Shift Manager is correct. Plausible because VHRA do exist and the Shift Manager does have access to a key located in the MCR.

B. Incorrect, The 690 pipe chase on both units is not a Very High Radiation Area (VHRA) and Rad Ops does not have not only key. Plausible because if the area had been a VHRA then only Rad Ops would have a key.

C. CORRECT, The 690 pipe chase on both units is a Locked High Radiation Area (LHRA). RCI-29 identifies the area as such and designates 2 key locations. One in the Rad Ops Lab and the other in the MCR under the administrative control of the Shift Manager.

D. Incorrect, The 690 pipe chase on both units is a Locked High Radiation Area (LHRA). Rad Ops is not the only location of a key. Another key is located in the MCR under the administrative control of the Shift Manager. Plausible because if the area is a locked high radiation area and for all other LHRA only Rad Ops has a key.

Question No. 97

Tier 3

K/A G 2.3.13
Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

Importance Rating: 3.4 / 3.8

Technical Reference: RCI-29, Control of Radiation Protection Keys, Rev 7

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271C259 B.1.g
Identify the requirements for entering and working in the following areas: g. Locked High Radiation Area

Question Source:
Bank # _____
Modified Bank # _____
New ___X____

Question History: New question for Sequoyah 2009 exam

Question Cognitive Level:
Memory or fundamental knowledge __X____
Comprehension or Analysis _____

10 CFR Part 55 Content: (41.12 / 43.4 / 45.9 / 45.10)

10CFR55.43.b (4)

Comments: New question for Sequoyah 2009 exam

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

RADIOLOGICAL CONTROL INSTRUCTION

RCI-29

CONTROL OF RADIATION PROTECTION KEYS

Revision 7

QUALITY RELATED

PREPARED BY: Terry F. Johnston

RESPONSIBLE ORGANIZATION: Radiation Protection

APPROVED BY: James S. McCamy

EFFECTIVE DATE: 09/12/2007

VALIDATION DATE: N/A

LEVEL OF USE: **INFORMATION ONLY**

REVISION DESCRIPTION: This revision is generated to provide that Operations shall maintain LHRA keys for the Unit 1 and Unit 2 El. 690' Pipe Chases in a Main Control Room key box under the administrative control of the Shift Manager.

6.0 REQUIREMENTS

Note Use of the term 'keys' in the text of this Instruction is understood to refer to LHRA and VHRA keys interchangeably, unless specifically noted otherwise.

6.1 General

A. Rad Ops will maintain positive control of LHRA and VHRA keys.

B. Rad Ops shall initiate a Work Order (WO), as necessary, for the installation or removal of a LHRA tumbler lock.

C. Rad Ops shall install or remove LHRA or VHRA security locks.

6.2 Key Controls [C.2] [C.3] [C.4]

A. Keys controlled by this Instruction shall be maintained in locked key boxes in the El. 690' Rad Ops Lab in the following configuration:

1. There is a designated **LHRA** key box that contains keys for tumbler locks and security locks that are in current use for active LHRAs only. This key box is kept locked at all times. It is opened each shift for the performance of a key inventory and is opened when issuing and returning LHRA keys.

2. There is a designated **VHRA** key box that contains keys for security locks that are in current use for active VHRAs only. This key box is kept locked at all times. Additionally, this key box has a wire tamper-proof security seal installed. It is only opened to issue or return VHRA keys.

B. The Operations section shall maintain one LHRA key each for the Unit 1 and Unit 2 El. 690' Pipe Chases.

1. These LHRA keys shall be maintained in the MCR in a locked break-glass-to-access key box, under the administrative control of the Shift Manager.

2. These LHRA keys are for **emergency use only** and Operations shall immediately notify the Rad Ops Lab if these keys are used.

3. Rad Ops shall maintain the key to the Ops LHRA key box in the Rad Ops Lab LHRA key box.

4. If during the course of normal duties the Operations LHRA key box is found to be open/unlocked, or the keys are not present in the box, Rad Ops shall be notified immediately.

C. The on-duty **Rad Ops Shift Supervisor**, or designee, is responsible for maintaining control of the keys to open the respective LHRA and VHRA key boxes, and access to the key boxes themselves and the keys stored in the key boxes, for their respective shift.

D. At the start of each shift, the **Rad Ops Shift Supervisor**, or designee, will verify that the keys to the LHRA and VHRA key boxes are present, that the LHRA key box is inventoried and that all LHRA keys are accounted for, to include the key to the Ops LHRA key box, and that the VHRA key box is locked and the seal is intact. Performance of this verification and inventory of the LHRA/VHRA key boxes shall be noted in the **Radiation Operations Log**.

PER #84532

E. If any key cannot be accounted for during shift inventory, or the seal on the VHRA key box is not intact, the **Rad Ops Manager** shall be notified, and immediate actions taken to locate and secure the missing key.

1.0 PURPOSE

The purpose of this Instruction is to provide guidelines for controlling Radiation Protection keys.

2.0 SCOPE

This Instruction establishes the requirements for maintaining positive control of the Radiation Protection keys utilized to access Locked High Radiation Areas and Very High Radiation Areas.

3.0 REFERENCES

10CFR19, Notices, Instructions, and Reports to Workers: Inspection and Investigations

10CFR20, Standards for Protection Against Radiation

Reg Guide 8.38, Control of Access to High and Very High Radiation Areas in Nuclear Power Plants

SPP-5.1, Radiological Controls

RCDP-1, Conduct of Radiological Controls

SQN Technical Specifications, Unit One and Unit Two

4.0 DEFINITIONS/ABBREVIATIONS

Absorbed Dose - The energy imparted by ionizing radiation per unit mass of irradiated material.

Accessible Area - Any area that can reasonably be occupied by a major portion of the whole body of an individual (as defined in **10CFR20**).

ANSI-Qualified Personnel - Rad Protection personnel assigned to SQN, permanent or temporary, who meet ANSI qualifications.

LHRA and VHRA Keys - Keys used to lock/unlock LHRA tumbler locks and security locks and/or VHRA security locks.

LHRA and VHRA Security Lock - A padlock in use to secure a LHRA (where a tumbler lock cannot be used) and a VHRA.

LHRA Tumbler Set - Lock tumblers installed exclusively in doors leading directly into a LHRA.

Locked High Radiation Area (LHRA) - Any area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of 1.0 rem (1,000 mrem) in one hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

Positive Control - Control of the keys utilized by Rad Ops to access a LHRA or VHRA, in accordance with the requirements of this Instruction.

Very High Radiation Area (VHRA) - Any area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving an absorbed dose in excess of 500 rads in one hour at one meter from a radiation source or from any surface that the radiation penetrates.

5.0 RESPONSIBILITIES

Responsibilities are defined in **Section 6.0**.

TVA 40385 [6-2003] Page 2 of 2

PROGRAM: OPERATOR TRAINING - LICENSED

II. COURSE: LICENSE TRAINING

III. LESSON TITLE: RADIOLOGICAL POSTINGS AND SIGNS

IV. LENGTH OF LESSON/COURSE: 1-2 hour(s)

V. TRAINING OBJECTIVES:

A. Terminal Objective:

Upon completion of this lesson and others presented, the student shall demonstrate an understanding of Radiological Postings and Signs by successfully completing a written examination as defined by program procedures.

B. Enabling Objectives:

1. Define and identify the requirements for entering/working in the following areas:
   a. Unrestricted Area
   b. Restricted Area
   c. Radiologically Controlled Area
   d. Radioactive Material/Radioactive Material Storage Areas
   e. Radiation Area
   f. High Radiation Area
   g. Locked High Radiation Area
   h. Very High Radiation Area
   i. Contamination Area
   j. High Contamination Area
   k. Airborne Radioactivity Area.

2. Identify the criteria for utilizing Hot Spot Labels/Tags and Radioactive Material Tags.

The following list contains knowledge and ability statements (K/As) from The Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors (PWR) NUREG-1122, Revision 2 that are applicable to the Initial Licensed Candidate training program. As such, questioning in these areas will be included on any testing in preparation of, or included in obtaining either RO or SRO NRC license.

K/A #	K/A Statement	10CFR55 Sect. Link(s)	IMPORTANCE RO/SRO
G 2.3.1	Knowledge of 10CFR20 and related facility radiation control requirements.	41.12 / 43.4. 45.9 / 45.10	2.6/3.0
G 2.3.2	Knowledge of facility ALARA program.	41.12 / 43.4 / 45.9 / 45.10	2.5/2.9
G 2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	43.4 / 45.10	2.5/3.1
G 2.3.5	Knowledge of use and function of personnel monitoring equipment.	41.11 / 45.9	2.3/2.5
G 2.3.7	Knowledge of the process for preparing a radiation work permit.	41.10 / 45.12	2.0/3.3
G 2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	43.4 / 45.10	2.9/3.3

LESSON BODY **INSTRUCTOR NOTES**

3) A radiation monitoring device that continuously transmits dose rate and cumulative dose information to a remote reciever monitored by radiation protection; or,

4) A self-reading dosimeter and be under the surveillance while in the area of an individual qualified and equiped with a radiation monitoning device that continuously displays radiation dose rates, or under the surveillance while in the area by means of closed circuit television and the means to communicate.

F. Locked High Radiation Areas (LHRA)

Obj. 1.g

1. Definition: An accessible area to individuals in which radiation levels could result in an individual receiving a dose equivalent in excess of 1,000 mrem in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

2. Explanation:

   a. The Shift Manager (SM) shall be notified when a LHRA is established or removed.

   b. LHRA keys shall be maintained under the administrative control of the SM, Rad Ops Manager, or their designees.

   c. Each LHRA shall be posted with a conspicuous sign or signs bearing the standard radiation symbol and the words "Caution – Locked High Radiation Area," or "Danger – Locked High Radiation Area."

   d. Entry shall be established by the use of a RWP. In addition, each individual or group entering such an area shall possess:

      1) A radiation monitoring devise which has an appropriate alarm setting capability, continuously integrates the radiation dose rate in the area and alarms when the device's dose alarm setpoint is reached; or,

      2) A radiation monitoring device that continuously transmits dose rate and collective dose information to a remote recorder monitored by Radiation Protection personnel with the means to communicate with and control every individual in the area; or,

      3) A self-reading dosimeter and be under closed circuit television surveillance by a qualified Radiation Protection Technician and equipped with a monitoring device that continuously displays radiation dose rates in the area; or,

      4) A self-reading dosimeter and be under closed circuit television surveillance by a qualified Radiation Protection Technician with the means to communicate with and control every individual in the area.

98. G 2.3.14 098

Given the following conditions:

- Both Units operating at 100% power.
- 0600 Due to extremely heavy rainfall, RSO/KEOC issues a Stage I flood warning.

Which one of the following identifies the time the Stage 1 flood mode actions are required to be completed, and if Stage II actions are required, how the Tritiated Drain Collector Tank would be prepared to prevent a possible release of radioactivity?

	Time	Tritiated Drain Collector Tank
A.	1600	Pressurized to greater than 23 psig.
B.	1600	Filled with water.
C.	2300	Pressurized to greater than 23 psig..
D.	2300	Filled with water.

DISTRACTOR ANALYSIS:

After entering AOP-N.03, "Flooding" Stage I preparations must be implemented and completed within the following 10 hours and if Stage II actions are required they must be completed within the following 17 hours.

A. Incorrect, The time requirement is correct. However, Stage II actions do require the Tritiated Drain Collector Tank to be filled with water to prevent the tank from floating away and becoming a radiation hazard. Plausible because the time requirement is correct and pressurizing the tank to greater than 23 psig is correct for other tanks during Stage II preparations.

B. CORRECT, The time requirement is correct and the requirement is to fill Tritiated Drain Collector Tank to be filled with water to prevent the tank from floating away and becoming a radiation hazard.

C. Incorrect, The time requirement is not correct and pressurizing the tank to greater than 23 psig is not correct. Plausible because the time identified is 17 hours which is the time required to complete Phase II actions after Phase II is initiate and pressurizing the tank to greater than 23 psig is correct for other tanks during Stage II preparations.

D. Incorrect, The time requirement is not correct but filling the tank with water is correct. Plausible because the time identified is 17 hours which is the time required to complete Phase II actions after Phase II is initiate and filling the tank with water is correct.

Question No. 98

Tier 3

K/A G 2.3.14
Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.

Importance Rating: 3.4 / 3.8

Technical Reference: AOP-N.03, Flooding, Rev 28
TRM 4.7.6, Flood Protection

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271AOP-N.03 B.4,5, & 8b
4. Upon entry into AOP-N.03, diagnose the applicable condition and transition to the appropriate section for response.
5. Describe the bases for all limits, notes cautions and steps of AOPN.03.
8.b Given a set of initial plant conditions use to correctly (b) Identify required actions.

Question Source:
Bank # _____
Modified Bank # ___X_____
New _____

Question History: Sequoyah Question AOP-N.03-B.4 002 modified

Question Cognitive Level:
Memory or fundamental knowledge _____
Comprehension or Analysis __X____

10 CFR Part 55 Content: (41.12 / 43.4 / 45.10)

10CFR55.43.b (2,4) Requires the candidate to know the facility Technical Requirements, implementation of AOP sections and be knowledgeable of provisions to prevent radiation hazards that may arise during normal, abnormal and emergency conditions.

Comments: Sequoyah Question AOP-N.03-B.4 002 modified

TR 3/4.7.6 FLOOD PROTECTION

LIMITING CONDITION FOR OPERATION

TR 3.7.6 The flood protection plan shall be ready for implementation to maintain the plant in a safe condition.

APPLICABILITY: When one or more of the following conditions exist:

a. early warning of major flood-producing rainfall conditions in the east Tennessee watershed,

b. an early warning that a critical combination of flood and/or higher than normal Summer pool levels plus possible dam failures or other dam safety emergencies may or have developed,

c. or warnings that flood elevation is predicted to exceed plant grade (Stages I and II).

ACTION:

a. With a Stage I flood warning issued initiate and complete within 10 hours the Stage I flood protection procedure which shall include being in at least HOT STANDBY within 6 hours, with a SHUTDOWN MARGIN of at least 5% delta k/k and T_{avg} less than or equal to 350°F within the following 4 hours. If within 10 hours following the issuance of a Stage I flood warning communications between the TVA Water Management River Scheduling (RS) and the Sequoyah Nuclear Plant cannot be verified, initiate and complete the Stage II flood protection procedure within the following 17 hours. With a Stage II flood warning issued initiate the Stage II flood protection plan in time to ensure completion before the predicted flooding of the site. Initiation shall be no later than 17 hours prior to the predicted arrival time of the initial critical flood level (703 ft msl winter and summer). Completion of any actions are not required if warnings are retracted by RS.

b. After an early warning is issued, verify communications between TVA RS and the Sequoyah Nuclear Plant within 5 hours or initiate and complete the Stage I flood protection plan within the following 10 hours. If communications have not been established upon completion of the Stage I flood protection plan initiate and complete the Stage II flood protection plan within the following 17 hours. Completion of any actions are not required if communications are verified.

TR 3/4.7.6 FLOOD PROTECTION

SURVEILLANCE REQUIREMENTS

TR 4.7.6.1 This requirement deleted.

TR 4.7.6.2 Communications between Sequoyah Nuclear Plant and TVA RS shall be maintained on 3 hour intervals. If not maintained, within 5 hours from previous contact initiate Stage I Flood Plan and continue with Stages I and II until contact is re-established and RS confirms that the flood plans are not required.

APPENDIX C

CVCS AND WDS TANK FILLING INSTRUCTIONS

NOTE 1 This appendix provides instructions for filling the partially filled and possibly radioactive tanks located below Maximum Probable Flood level of 723.1' elev. Performance of this procedure minimizes the possibility of the tanks collapsing or breaking loose and possible release of radioactivity.

NOTE 2 Steps 1 through 22 may be performed out of sequence.

1. **PLACE** Reactor Building Floor and Equipment Drain Sumps IN SERVICE to Tritiated Drain Collector Tank **USING** 0-SO-77-10.

2. **FILL** pressurizer relief tank **USING** 1,2-SO-68-5.

3. **NOTIFY** Maintenance to connect 2 inch passive failure discharge connection on Auxiliary Building Floor and Equipment Drain Sump Pumps discharge **USING** 0-FP-MXX-000-008.0.

4. **OPEN** the following valves to fill Floor Drain Collector Tank:
   - 0-77-915
   - 0-77-681

NOTE The time required for filling the Tritiated Drain Collector Tank is approximately 4 hours.

5. **OPEN** valve 0-77-914 and
   FILL Tritiated Drain Collector Tank.

6. **ALIGN** Laundry and Hot Shower Tank Pump to Waste Condensate Tanks A, B, and C **USING** 0-SO-77-5.

7. **ALIGN** Laundry and Hot Shower Tanks A and B and Chemical Drain Tank.

AOP-N.03-B.4 002

Which ONE of the following is the correct time allowed in AOP-N.03, Flooding, to complete any Stage I procedure section?

A. 10 hours.

B. 17 hours.

C. 27 hours.

D. 40 hours.

Justification:

A. Correct - Correct as stated in NOTE prior to step 1 of AOP-N.03

B. Incorrect - as it defines the 14 hours required to complete Stage 2 plus 3 hours margin.

C. Incorrect- as it defines the total time to complete Stage 1 + 2 plus 3 hours margin.

D. Incorrect- not defined by AOP-N.03.

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** AOP-N.03, FLOODING

IV. **LENGTH OF LESSON/COURSE:** 2 hours

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of AOP-N.03, FLOODING.

B. Enabling Objectives

	Objectives
0.	Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with a plant Flood that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate position as identified in Appendix A
1.	State the purpose/goal of this AOP-N.03.
2.	Describe AOP-N.03 entry conditions.
	a. Describe the setpoints, interlocks, and automatic actions associated with AOP-N.03 entry conditions.
	b. Describe the ARP requirements associated with AOP-N.03 entry conditions.
	c. Interpret, prioritize, and verify associated alarms are consistent with AOP-N.03 entry conditions.
	d. Describe the plant parameters that may indicate a plant Flood.
3.	Describe the initial operator response to stabilize the plant upon entry into AOP-N.03.
4.	Upon entry into AOP-N.03, diagnose the applicable condition and transition to the appropriate procedural section for response.
5.	Summarize the mitigating strategy for the failure that initiated entry into AOP-N.03.
6.	Describe the bases for all limits, notes, cautions, and steps of AOP-N.03.

7.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.
8.	Given a set of initial plant conditions use AOP-N.03 to correctly:
	a. Recognize entry conditions.
	b. Identify required actions.
	c. Respond to Contingencies.
	d. Observe and Interpret Cautions and Notes.
9.	Describe the Tech Spec and TRM actions applicable during the performance of AOP-N.03.
10.	Apply GFE and system response concepts to the abnormal condition – prior to, during and after the abnormal condition.

OBJECTIVES TO BE COVERED IN THESE SEQUOYAH OPERATOR TRAINING PROGRAMS

OBJECTIVE NO.	NONLICENSED OPERATORS	LICENSE TRAINING		
		RO	SRO	REQUAL/SPECIAL
0.		X	X	
1.		X	X	
2.		X	X	
3.		X	X	
4.		X	X	
5.		X	X	
6.		X	X	
7.		X	X	
8.		X	X	
9.		X	X	
10.		X	X	

Selected objectives to be covered in: _____

PowerPoint presentation to be used: _____

Sequoyah Operator Training Manager _____ /_____
Date

Sequoyah Operations Manager _____ /_____
Date

99. G 2.4.27 099

Given the following:

- Both units in service at 100% power.
- The plant is operating with minimum operations staffing.
- A fire develops at the ERCW pumping station.
- AOP-N.01, "Plant Fires", is implemented.
- The Shift Manager declares an ALERT emergency and initiates Assembly and Accountability.
- Fire Ops actions to extinquish the fire continue.

Which ONE of the following identifies...

(1) the direction the AUOs are to be given
and
(2) if the Shift Manager later decides to implement AOP-N.08, "Appendix R Fire Safe Shutdown", must both units enter the AOP or can the decision to enter the AOP be made separately for each unit?

A. (1) Direct all AUOs to report to the Main Control Room.
(2) Decision to enter AOP-N.08 can be made separately on each unit.

B. (1) Direct all AUOs to report to the Main Control Room.
(2) Decision to enter AOP-N.08 must be made on both units at the same time.

C. (1) Direct 2 AUOs to report to the OSC and the rest to report to the Main Control Room.
(2) Decision to enter AOP-N.08 can be made separately on each unit.

D. (1) Direct 2 AUOs to report to the OSC and the rest to report to the Main Control Room.
(2) Decision to enter AOP-N.08 must be made on both units at the same time.

DISTRACTOR ANALYSIS:

A. CORRECT, with the fire a the ERCW pumping station still burning and the staffing at minimum (8 AUOs), all AUOs will report to the main control room because in accordance with AOP-N.01, the requirement to assemble AUOs to assign and brief the actions of AOP-N.08 take priority over staffing the OSC and Level II Fire Brigade. Separate entry into AOP-N.08 is allowed in accordance with AOP-N.01 because the criteria requiring both units to enter the AOP at the same time are not met. The fire is not in one of the four limiting areas that require simultaneous entry by both units..

B. Incorrect, with the fire a the ERCW pumping station still burning and the staffing at minimum (8 AUOs), all AUOs will report to the main control room because in accordance with AOP-N.01, the requirement to assemble AUOs to assign and brief the actions of AOP-N.08 take priority over staffing the OSC and Level II Fire Brigade. However the AOP-N.08 entry does not met the criteria requiring both units to enter at the same time. Plausible because the directions to the AUOs is correct and a fire in a different location could cause the units to enter the AOP at the same time.

C. Incorrect, with the fire a the ERCW pumping station still burning and the staffing at minimum (8 AUOs), 2 AUOs would not be sent to the OSC, all would report to the main control room in accordance with AOP-N.01 because the requirement to assemble AUOs to assign and brief the actions of AOP-N.08 takes priority over staffing the OSC and Level II Fire Brigade. The AOP-N.08 can be made separately because entry does not met the criteria requiring both units to enter at the same time. Plausible because the directions to send 2 AUOs to the OSC is the normal protocol during an emergency event and the units entry into the AOP being allowed at separate times in correct.

D. Incorrect, with the fire a the ERCW pumping station still burning and the staffing at minimum (8 AUOs), 2 AUOs would not be sent to the OSC, all would report to the main control room in accordance with AOP-N.01 because the requirement to assemble AUOs to assign and brief the actions of AOP-N.08 takes priority over staffing the OSC and Level II Fire Brigade. Also, the AOP-N.08 entry does not met the criteria requiring both units to enter at the same time. Plausible because the directions to send 2 AUOs to the OSC is the normal protocol during an emergency event and a fire in a different location could cause the units to enter the AOP at the same time.

Question No. 99

Tier 3

K/A G 2.4.27
Knowledge of "fire in the plant" procedures.

Importance Rating: 3.4 / 3.9

Technical Reference: AOP-N.01, Plant Fires, Rev 26
AOP-N.08, Appendix R fire Safe Shutdown, Rev 5
OPDP-1, Conduct of Operations, Rev 0010
Lesson Plan OPL271REP, Rev 1

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271AOP-N.01 B.5
Describe the bases for all limits, notes, cautions, and steps of AOP-N.01.

Question Source:
Bank # _____
Modified Bank # _____
New __X____

Question History: New question for Sequoyah 2009 exam

Question Cognitive Level:
Memory or fundamental knowledge __X____
Comprehension or Analysis _____

10 CFR Part 55 Content: (41.10 / 43.5 / 45.13)

10CFR55.43.b (5)

Comments: New question for Sequoyah 2009 exam

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.0 GENERIC ACTIONS

NOTE AUOs assigned to Level II fire brigade, OSC, and monitoring fire pumps should be recalled for safe shutdown actions.

4. **NOTIFY** all available AUOs to perform the following:

   a. **REPORT** to MCR area immediately.

   b. **OBTAIN** radio and SCBA from MCR.

5. **PLACE** all RCP handswitches in STOP/PULL TO LOCK. [M-5]

6. **ENSURE** MSIV and MSIV bypass valve handswitches in CLOSE position. [M-4]

7. **MONITOR** fire location based upon reports from Fire Brigade Leader or Incident Commander.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE 1: To ensure manual actions in AOP-N.08 can be completed within the required time, AUOs must be ready to be dispatched when AOP-N.08 is entered. The requirement to assemble AUOs in this step takes priority over staffing the OSC and Level II Fire Brigade.

NOTE 2: Step 17 (two pages) should be handed off to CRO, if applicable.

17. **IF** fire is still burning
AND fire is in any of the following locations:

- Aux Building
- Additional Equipment Bldg
- Reactor Bldg (Containment or Annulus)
- ERCW Pumping Station

THEN
PERFORM the following:

a. **NOTIFY** at least eight (8) AUOs to report to Control Room.

b. **IF** fire is in Aux Building,
THEN
ENSURE the following CCS pumps RUNNING: [0-M-27B]

- CCS pump 1A-A
- CCS pump 1B-B
- CCS pump 2A-A
- CCS pump 2B-B

(step continued on next page)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE 1 The decision to implement AOP-N.08 or AOP-C.04 is an SRO judgment based upon the severity of fire and its potential effect on plant equipment.

NOTE 2 BOTH UNITS must enter AOP-N.08 at same time if ALL of the following conditions are met:

- fire is in one of four limiting Aux Bldg areas (el. 690 General Area, el. 714 General Area, 6.9KV Shutdown Board Rm A, or 6.9KV Shutdown Bd Rm B)
- both units in Mode 1-3
- criteria for AOP-N.08 entry in Step 19 is met on either unit.

NOTE 3 In fire areas other than the four limiting Aux Bldg areas, the decision to enter AOP-N.08 is made separately on each unit.

NOTE 4 AOP-N.08 is NOT applicable for a total loss of all ERCW capability. AOP-M.01 provides required actions.

19. **MONITOR** magnitude of fire and potential to impact control of unit:

    a. **CONSULT** Incident Commander or Fire Brigade Leader.

    b. **MONITOR** MCR indications and controls for equipment failures or spurious operation.

(step continued on next page)

X. LESSON BODY: **INSTRUCTOR NOTES**

2. Minimum TSC staffing

   - SED
   - RP Manager
   - Operations Manager or Operations Communicator
   - Technical Assessment Manager, Technical Assessment Team Leader, or Reactor Engineer
   - Mechanical Engineer
   - Electrical Engineer

3. Transfer of SED role from the SM to the TSC
   - Use EPIP-6, Appendix B

Refer to EPIP-6, Appendix B for discussion.

G. EPIP-7, Activation and Operation of the Operations Support Center (OSC)

1. This procedure provides the guidance for activating and operating the OSC. The OSC is required to be activated at the ALERT classification and above. The SED directs mitigating actions and determines OSC priorities. The OSC Manager oversees OSC activities.

SM - Ensure you keep OSC aware of AUO usage for tracking purposes.

2. Minimum OSC staffing

   - OSC Manager
   - Mechanical Maintenance Group (1)
   - Electrical Maintenance Group (1)
   - Instrument Maintenance Group (1)

3. AUO teams responding to procedure driven activities (EOPs, EAs, AOPs, etc.) are under the direction of the SM but tracked by the OSC.

4. RP and Operations should normally have personnel on each response team.

H. EPIP-8, Personnel Accountability and Evacuation

Assembly should not be initiated if assembly would present a danger to employees.

1. This procedure provides the method for accounting for all personnel and visitors in the protected area within 30 min.

X. LESSON BODY: **INSTRUCTOR NOTES**

2. Operations Personnel

   a. The protocol requires two AUOs to go to the OSC and the remaining AUOs go to the Main Control Room. The SM may send the AUOs to a waiting area within the protected ventilation area of the Control Building (such as the SM Office) if noise or congestion become a problem in the MCR.

   b. When the OSC Ops Advisor arrives in the OSC, he and the SM will collectively manage the resources to have the fastest response to problems yet still provide a check of radiological conditions prior to dispatching an AUO. Dispatching AUOs into plant areas needs input by RP as to appropriate protective equipment. This is best done by the OSC Ops Advisor once he/she arrives. The OSC Ops Advisor is expected to relieve the SM of some of the administrative burden of tracking field personnel so he/she can focus on the higher priority of operational safety.

   Obj 5.b

   c. The Shutdown Board Rooms and Control Building are spaces with protected ventilation similar to the MCR. Until advised by RP that these areas are becoming unsafe, they should be considered part of the MCR for the purpose of dispatching AUOs. This means that AUOs may be dispatched into these areas for tasks without being considered a "team" (much like sending an AUO behind the panels in the MCR to perform a task). As always, communications must be maintained at all times with AUOs while out on assignments and the TSC should be informed of AUO activities.

   d. This protocol allows dispatching AUOs by telephone briefing and/or radio briefing as well as transfer of oversight of individual AUOs between the OSC SRO and SM as needed. This provides the best utilization of personnel while still protecting the AUOs from radiological hazards.

   e. AUOs assigned to the OSC will report directly to the OSC when required.

   f. The SM is responsible to account for MCR personnel.

Attachment 1
(Page 2 of 2)

Shift Staffing

	WBN Mode 1-4	WBN Mode 5 & 6	SQN	BFN
Shift Manager (SRO)	1	1	1	1
Unit Supervisor (SRO)	1	1	3	3
Unit Operator (RO)	2	1	4	6
Non-licensed (AUO)	5	3	8	8
STA	1		1	1

SQN The SM, a US or the WCC may be the STA and one US will be the Incident Commander. The STA need not be licensed.
Two active-licensed SROs are required for Unit Supervisor positions and a third active licensed SRO is required as Shift Manager.

BFN One of the US can be the STA. The Incident Commander position may be filled by an additional qualified person.

Notification of Absences

- Operations personnel (except Fire Operations) unable to report for shift duty shall, at the earliest possible time and no later than 2 hours before the scheduled time, inform the SM/US of the situation. The SM/US shall make necessary arrangements for obtaining a replacement.

- Fire Operations personnel unable to report for shift duty shall, at the earliest possible time and no later than 2 hours before the scheduled time, inform the Fire Operations Foreman of the situation. The Fire Operations Foreman shall make necessary arrangements for obtaining a replacement.

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** AOP-N.01, PLANT FIRES

IV. **LENGTH OF LESSON/COURSE:** 1 hour

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of AOP-N.01, PLANT FIRES.

B. Enabling Objectives

	Objectives
0.	Demonstrate an understanding of NUREG 1122 knowledge's and abilities associated with Plant Fires that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate position as identified in Appendix A.
1.	State the purpose/goal of this AOP-N.01.
2.	Describe the AOP-N.01 entry conditions.
	a. Describe the setpoints, interlocks, and automatic actions associated with AOP-N.01entry conditions.
	b. Describe the ARP requirements associated with AOP-N.01 entry conditions.
	c. Interpret, prioritize, and verify associated alarms are consistent with AOP-N.01 entry conditions.
	d. Describe the plant parameters that may indicate a Plant Fire.
3.	Describe the initial operator response to stabilize the plant upon entry into AOP-N.01.
4.	Summarize the mitigating strategy for the failure that initiated entry into AOP-N.01.
5.	Describe the bases for all limits, notes, cautions, and steps of AOP-N.01.
6.	Describe the conditions and reason for transitions within this procedure and transitions to other procedures.

7.	Given a set of initial plant conditions use AOP-N.01 to correctly:
	a. Recognize entry conditions.
	b. Identify required actions.
	c. Respond to Contingencies.
	d. Observe and Interpret Cautions and Notes.
8.	Describe the Tech Spec and TRM actions applicable during the performance of AOP-N.01.
9.	Apply GFE and system response concepts to the abnormal condition – prior to, during and after the abnormal condition.

OBJECTIVES TO BE COVERED IN THESE SEQUOYAH OPERATOR TRAINING PROGRAMS

OBJECTIVE NO.	NONLICENSED OPERATORS	LICENSE TRAINING		
		RO	SRO	REQUAL/SPECIAL
0.		X	X	
1.		X	X	
2.		X	X	
3.		X	X	
4.		X	X	
5.		X	X	
6.		X	X	
7.		X	X	
8.		X	X	
9.		X	X	
10.		X	X	

NOTE: The following approval is required for License Requalification and special training only:

Selected objectives to be covered in: _____

PowerPoint presentation to be used: _____

Sequoyah Operator Training Manager _____ /_____
Date

Sequoyah Operations Manager _____ /_____
Date

QUESTIONS REPORT
for BANK SQN Questions

REP-B.1.D 001

Given the following:

- Unit 1 has experienced a LOCA and loss of 1A-A 6.9 kV SD Bd.
- You are the OATC.
- The SM just announced an ALERT and sounded assembly.

How will the AUOs respond to the siren going off?

A. The two AUOs assigned to the OSC will report to the OSC, the remaining AUOs will report to the SM.

B. The two AUOs assigned to the SM will report to the MCR, the remaining AUOs will report to the OSC.

C. ALL AUOs will immediately report to the SM until the OSC Operations Advisor SRO is ready to assume control of the AUOs.

D. ALL AUOs will immediately report to the OSC Operations Advisor SRO until the SM is ready to assume control of the AUOs.

Justification:

A. Correct. Refer to EPIP-7, Appendix D for stage 1, "Declaration of the Emergency."

B. Incorrect. Two AUOs are assigned to support the MSS in the OSC until staffed; all other AUOs are under SM control.

C. Incorrect. Two AUOs are assigned to support the MSS in the OSC until staffed; all other AUOs are under SM control. After OSC Operations Advisor arrives, the SM may assign additional AUOs not in the field to the OSC Operations Advisor.

D. Incorrect. Only two AUOs are assigned to support the MSS in the OSC until staffed; all other AUOs are under SM control.

100. G 2.4.28 100

Given the following:

- Both units trip from power operation due a loss of off site power and sabotage is suspected.
- Nuclear Security reports the following:
  - Information has been received that a specific credible insider threat exists associated with the loss of offsite power.
    and
  - Concerns exist for the health and safety of any oncoming emergency responders.
- The Shift Manager determines the need to staff the emergency centers, makes REP declaration and activates Assembly and Accountability.
- The Two-person line of sight rule has been implemented.
- The Operating crew needs to send personnel to the DG building due to an alarm occurring on DG 1A-A.

Which ONE of the following describes the selection the Shift Manager will make when activating the Emergency Paging System (EPS) and the required measures to be taken when sending personnel to the DG building.

A. STAGING AREA will be selected on the EPS;
Both individuals sent must be qualified for the task to be performed.

B. STAGING AREA will be selected on the EPS;
Only one of the individuals sent must be qualified for the task to be performed.

C. EMERGENCY will be selected on the EPS;
Both individuals sent must be qualified for the task to be performed.

D. EMERGENCY will be selected on the EPS;
Only one of the individuals sent must be qualified for the task to be performed.

DISTRACTOR ANALYSIS:

A. *Incorrect, In accordance with the Emergency Plan, if concerns exist for the health and safety of oncoming responders, the "Staging Area" choice is to be selected when initiating the staffing of the Emergency Centers but when the two-man rule is implemented, the individuals do not have to have the same qualifications. Plausible because choosing the "Staging Area" when initiating the staffing of the Emergency Centers is correct and typically when personnel are sent to perform a task both would be qualified.*

B. *CORRECT, In accordance with the Emergency Plan, if concerns exist for the health and safety of oncoming responders, the "Staging Area" choice is to be selected when initiating the staffing of the Emergency Centers and the individual do not have to posses the same qualification when the two-man rule is implemented.*

C. *Incorrect, the "Staging Area" choice is to be selected when initiating the staffing of the Emergency Centers (not the the "Emergency"), when concerns exist for the health and safety of oncoming responders, and the individual do not have to posses the same qualification when the two-man rule is implemented. Plausible because the the "Emergency" choice would be correct with different conditions when inititiating the staffing of the Emergency Centers and typically when personnel are sent to perform a task both would be qualified.*

D. *Incorrect, the "Staging Area" choice is to be selected when initiating the staffing of the Emergency Centers (not the the "Emergency"), when concerns exist for the health and safety of oncoming responders, and the individual do not have to posses the same qualification when the two-man rule is implemented. Plausible because the the "Emergency" choice would be correct with different conditions when inititiating the staffing of the Emergency Centers and the requirement for only one of the individuals to be qualified is correct.*

Question No. 100

Tier 3

K/A G 2.4.28
Knowledge of procedures relating to a security event (non-safeguards information).

Importance Rating: 3.2 / 4.1

Technical Reference: SPP-1.3, Access Authorization and Nuclear Security, Rev 0011
EPIP-8, Personnel Accountability and Evacuation, Rev 17
EPIP-3, Alert, Rev 30

Proposed references to be provided to applicants during examination: None

Learning Objective: OPL271REP B. 5.b.
State the duties of the Site Emergency Director (SED) .
b. State the conditions under which the SED may order relocation from one assembly point to another.

Question Source:
Bank # _____
Modified Bank # _____
New _X_____

Question History: New question for SQN 1/2009 exam

Question Cognitive Level:
Memory or fundamental knowledge __X____
Comprehension or Analysis _____

10 CFR Part 55 Content: (41.10 / 43.5 / 45.13)

10CFR55.43.b (5)

Comments: New question for SQN 1/2009 exam

3.9.9 Maintenance (continued)

B. Repair/replace failed security devices and components in the minimum time necessary.

3.9.10 Unauthorized Materials

Firearms, explosives, incendiary devices, alcoholic beverages and illegal drugs are prohibited on nuclear plant sites.

3.9.11 Credible Insider Threat

When Nuclear Security determines that a specific credible insider threat exists, Nuclear Security shall request Shift Manager/Site Emergency Director to implement a two-person (line of sight) rule for personnel in vital areas, unless unusual circumstances exists where emergency actions by a single individual are required to ensure nuclear safety. (See also Appendix A, paragraph 4.4 and EPIP-8, Personnel Accountability and Evacuation).

3.9.12 Hostage/Duress Situation

Any employee who is coerced, influenced or pressured in any way to initiate or be party to an act that presents an unsafe situation at any of the TVA NPG Sites will immediately contact Nuclear Security or Corporate Nuclear Security, as appropriate, and provide as much information as possible. Nuclear Security or Corporate Nuclear Security (CNS), as appropriate, will contact the appropriate agency to respond, (see also Appendix A).

3.9.13 Camera/Video Requirements

Individuals are prohibited from taking pictures, videos, etc of security equipment, security posts, or other security areas/items without prior authorization by the SSM or designee.

3.10 Safeguards Events (SGE)

3.10.1 Reporting SGEs

Individuals that discover an actual or suspected SGE are responsible for the immediate reporting of that event to Security.

A. If the actual or suspected SGE occurs offsite, contact the Manager, CNS or SSM immediately, in person, or by telephone (whichever is faster).

B. If the actual or suspected SGE occurs onsite, contact the SSM immediately, in person, or by telephone (whichever is faster).

NOTE

This immediate notification is necessary for the timely implementation of contingency plans and reporting requirements.

C. Provide as much detail regarding the incident as possible and, if requested, complete statement describing the event in as much detail as possible (for example: who, what, when, where, and why or how, if known). Upon completion submit the statement to Security.

Appendix A
(Page 2 of 2)

Guidelines for Initial Actions by Plant Personnel of Incidents Involving Suspected Tampering or Sabotage

4.2 Shift Manager (continued)

B. Shift Manager evaluates appropriate AOI or AOP entry for Security Event Response.

C. Shift Manager evaluates EPIP-1, Emergency Plan Classification Matrix.

4.3 Employee

If any act of coercion, influence or pressure is committed with intent to initiate an act of tampering or sabotage, then

Notify Nuclear Security.

4.4 Credible Insider Threat

This action is triggered when a credible insider threat specific to a facility exists. Once triggered, implementation of the 2-man rule will be as expeditious as resources permit recognizing that additional personnel may need to be called to the particular site. The two persons do not have to possess similar skills or knowledge, but must remain in visual contact with each other unless personnel or plant safety would be adversely impacted.

5.0 SUBSEQUENT ACTIONS

5.1 Employee

Retain any relevant information and provide to Nuclear Security to aid in investigation.

5.2 Security Supervisor

If an event as described in Sections 4.1, 4.2, 4.3 through Section 4.4 above is reported, then

A. Nuclear Security evaluate need to contact TVA Police Criminal Investigation Division for assistance, and

B. Nuclear Security evaluate in accordance with this instruction and NSDP-1, "Safeguard Event Reporting Guidelines."

NUCLEAR SECURITY - ASSEMBLY AND ACCOUNTABILITY ACTIONS

9. **REPORT** the results of accountability to the SM/SED within 30 minutes after the assembly and accountability sirens have sounded. Accountability is considered complete when all personnel have been accounted for or are known by name if not accounted for. ☐

10. Unaccounted Individuals ☐

IF... Individuals remain unaccounted 45 minutes following the activation of the assembly and accountability sirens,

THEN...REQUEST permission from the SM/SED to form search teams to locate the missing individual(s),

AND

NOTIFY RP and request they accompany all search teams.

11. **Implement** the Two Person (Line of Sight) Rule and make a Public Address Announcement _____ _____ Initials Time

WHEN... Assembly and Accountability have been completed,

AND

Nuclear Security has determined that the Two Person (Line of Sight) Rule is required.

THEN...REQUEST permission from the SM/SED to make the following Public Address Announcement: (Accountability area PA is accessible at x4800 from selected TSC and MCR phones)

> "Attention all personnel. A credible insider threat exists. Effective immediately, all personnel entering the Vital Areas must observe the 2-person rule. This rule requires that all persons in a vital area must remain in visual contact with another person unless personnel or plant safety would be adversely impacted. This does not require that the two persons possess similar skills or knowledge. I repeat. The 2-person rule is being implemented immediately."
>
> (REPEAT)

3.1 ALERT DECLARATION BY THE MAIN CONTROL ROOM (Continued)

[3] **ACTIVATE** Emergency Paging System (EPS) as follows:

[a] **IF** EPS has already been activated, **THEN GO TO Step 4.** ☐

[b] **IF** ongoing onsite Security events may present risk to the emergency responders, **THEN CONSULT** with Security to determine if site access is dangerous to the life and health of emergency responders. ☐

[c] **IF** ongoing events makes site access dangerous to the life and health of emergency responders **THEN SELECT** STAGING AREA button on the terminal **INSTEAD** of the EMERGENCY button. ☐

[d] **ACTIVATE** EPS using touch screen terminal. **IF** EPS fails to activate, **THEN** continue with **Step 4.** ☐

[4] **COMPLETE** Appendix B (TVA Initial Notification for Alert). ☐

NOTE: ODS should be notified within **5 minutes** after declaration of the event.

[5] **NOTIFY** ODS. _____ Initial _____ Time

ODS: Ringdown Line or
5-751-1700 or 5-751-2495 or 9-785-1700

[a] **IF** EPS failed to activate from SQN when attempted, **THEN DIRECT** ODS to activate SQN EPS. ☐

[b] **IF** ODS is also unable to activate EPS, **THEN** continue with step [5] [b]. ☐

[c] **READ** completed Appendix B to ODS. ☐

[d] **FAX** completed Appendix B to ODS. ☐

5-751-8620 (Fax)

[e] **MONITOR** for confirmation call from ODS that State/Local notifications complete: **RECORD** time State notified. _____ Notification Time

I. **PROGRAM:** OPERATOR TRAINING - LICENSED

II. **COURSE:** LICENSE TRAINING

III. **LESSON TITLE:** NP RADIOLOGICAL EMERGENCY PLAN AND SEQUOYAH EMERGENCY PLAN IMPLEMENTING PROCEDURES

IV. **LENGTH OF LESSON/COURSE:** 8 hours (Hot License Class), 2 - 4 hours (LOR)

V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of License Training, the participant shall be able to demonstrate or explain, using classroom evaluations and/or simulator scenarios, the requirements of the Radiological Emergency Plan (REP).

B. Enabling Objectives:

0.	Demonstrate an understanding of NUREG 1122 Knowledge and Abilities associated with Radiological Emergency Plan that are rated ≥ 2.5 during Initial License Training and ≥ 3.0 during License Operator Requalification Training for the appropriate license position as identified in Appendix A.
1.	Discuss the Radiological Emergency Plan a. Discuss the regulatory bases for the REP b. State the purpose of the REP. c. Define and state the purposes of a(n) NOUE, Alert, Site Area Emergency, and General Emergency d. State the purpose and major job functions of the Technical Support Center (TSC), the Operations Support Center (OSC), the Central Emergency Control Center (CECC) and give the location of each. e. Describe the role the state and federal agencies play during an event f. Describe the process of authorizing Emergency Radiological Exposures in accordance with EPIP-15. g. State the conditions under which onsite personnel would be administered potassium iodide (KI). h. Describe Chemistry and Radiation Protection tasks during emergency operations. i. Discuss the termination of a declared Radiological Emergency in accordance with EPIP-16.
2.	Determine the required notifications based upon the event, including time requirements.
3.	Classify emergency events using appropriate procedures.

4.	Determine protective action recommendations using appropriate procedures.
5.	State the duties and responsibilities of the Site Emergency Director (SED). a. State the duties and responsibilities the SED may not delegate b. State the conditions under which the SED may order relocation from one assembly point to another.
6.	Discuss medical emergency response per EPIP-10.